Final

Powerhouse 2 Ash Pits
Site Characterization Report

Former Plum Brook Ordnance Works
Sandusky, Ohio

Prepared for:

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Revision 1

September 2010

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Submittal of the Final Site Characterization Report for Powerhouse 2 Ash Pits
Former Plum Brook Ordnance Works, Sandusky, Ohio
Contract No. W912QR-08-D-0013: Shaw Project Number 133422

Dear Ms. McClanahan:

In accordance with the requirements of Delivery Order No. DX05 of Contract No. W912QR-08-D-0013, Shaw is pleased to submit this Final Site Characterization Report for Powerhouse 2 Ash Pits at the Former Plum Brook Ordnance Works (PBOW) located in Sandusky, Ohio.

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

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

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

Project Description: Site Characterization Report for Powerhouse 2 Ash Pits
Former Plum Brook Ordnance Works, Sandusky, Ohio

Contract No. W912QR-08-D-0013

Delivery Order No. DX05

Project No. 133422

Task/Phase Number: 12000000

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

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List of Acronyms

AP2	Powerhouse 2 Ash Pits
bgs	below ground surface
BHHRA	baseline human health risk assessment
BSC	background screening concentrations
D&M	Dames and Moore, Inc.
DNT	dinitrotoluene
DOD	U.S. Department of Defense
DQO	data quality objective
EPA	U.S. Environmental Protection Agency
FD	field duplicate
FS	field split
gpm	gallons per minute
GSA	General Services Administration
HSA	hollow-stem auger
HTRW	hazardous, toxic, and radiological waste
ID	inside diameter
IDW	investigation-derived waste
ILCR	incremental lifetime cancer risk
IT	IT Corporation
MDC	maximum detected concentrations
msl	mean sea level
NASA	National Aeronautics and Space Administration
OD	outside diameter
ORP	oxidation-reduction potential
PBOW	Plum Brook Ordnance Works
PBS	Plum Brook Station
PCB	polychlorinated biphenyl
PETN	pentolite
ppb	parts per billion
ppm	parts per million
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
QAPP	site-wide quality assurance project plan

List of Acronyms (Continued)

RBC	risk-based concentration
RBSC	risk-based screening concentrations
RI	remedial investigation
SCR	Site Characterization Report
Shaw	Shaw Environmental, Inc.
SI	site investigation
SLERA	screening-level ecological risk assessment
SOW	scope of work
SVOC	semivolatile organic compound
SWSAP	site-wide sampling and analysis plan
SWSHP	site-wide health and safety plan
TCL	target compound list
TNT	trinitrotoluene
TNTA	TNT Area A
TNTB	TNT Area B
TNTC	TNT Area C
TOC	total organic carbon
USGS	U.S. Geological Survey
VOC	volatile organic compound
USACE	U.S. Army Corps of Engineers

Executive Summary

The U.S. Army Corps of Engineers (USACE) is investigating the former Plum Brook Ordnance Works (PBOW), located in Sandusky, Erie County, Ohio, under the Defense Environmental Restoration Program's Formerly Used Defense Sites authorization and funding. During World War II the PBOW site was used for the manufacture of explosives. The former PBOW site is currently operated and maintained by the National Aeronautics and Space Administration (NASA) as Plum Brook Station, an active testing and research installation associated with NASA's John Glenn Research Center of Cleveland, Ohio. The USACE contracted Shaw Environmental, Inc. (Shaw) to conduct a remedial investigation (RI) of the former Powerhouse 2 Ash Pits Area (AP2) located on the west side of the PBOW facility. During the explosives manufacturing period the AP2 site served as an earthen banked impoundment for the coal ash slurry from nearby Powerhouse No. 2. Contamination that may have resulted from the ash pit operations would be expected to be primarily metals and possibly polycyclic aromatic hydrocarbons (PAH).

This Site Characterization Report (SCR) is Volume 1 of a three-volume RI report set for AP2 and details RI activities, including soil, groundwater, sediment, and surface water analytical results along with recommendations. Volume 2 is a Baseline Human Health Risk Assessment (BHHRA) Report and Volume 3 is a Screening-Level Ecological Risk Assessment (SLERA) Report, both to be submitted under separate cover.

In 1996, a site investigation (SI) was conducted of the surface and subsurface soil within the ash pits. Twelve surface (0 to 0.5 foot) and 12 subsurface (2 to 3 feet) soil samples were collected from 12 borings and analyzed for volatile organic compounds (VOC), semivolatile organic compounds (SVOC), pesticides, polychlorinated biphenyls (PCB), target analyte list (TAL) metals, and total cyanide. Samples were not analyzed for nitroaromatics. No VOCs, pesticides, PCBs, or cyanide were detected above risk-based concentrations (RBC) derived from the U.S. Environmental Protection Agency (EPA) Region 3 table. However, one SVOC (benzo[a]pyrene) and six metals (aluminum, arsenic, beryllium, iron, manganese, and thallium) were detected above their RBCs. The SI concluded that the "major chemicals of concern in soils of this area include metals and total cyanide. A few pesticides were also detected in this area, although the concentrations were significantly below the RBCs." The SI went on to recommend a risk

assessment "to determine the necessity of further soil (or other media) investigations leading to site remediation or site closure."

RI activities were conducted by Shaw at AP2 in 2009. Eight direct-push borings were made, seven of which became temporary piezometer installations. Surface water and collocated sediment samples were collected from five locations on Pipe Creek. Three overburden/shale groundwater monitoring wells and three bedrock groundwater monitoring wells were installed in locations that represent upgradient, downgradient, and within the source area groundwater conditions.

The analytical results for the various media were compared to risk-based screening concentrations (RBSC) derived from Oak Ridge National Laboratory-EPA 2009 regional screening levels for a residential land-use scenario. In addition, the analytical results for the metals in the soil samples were compared to 1998 soil background screening concentrations (BSC) and results for metals in the groundwater samples were compared to 2005 groundwater BSCs. Background levels for the surface water and sediments have not been determined.

Including quality assurance/quality control (QA/QC) samples, 30 soil samples were collected from the eight direct-push borings - 10 representative of surface soil (0-1 foot), 10 from soil 3-5 feet below ground surface (bgs), and 10 from soil 8-10 feet bgs. Each soil sample was analyzed for target compound list (TCL) SVOCs, nitroaromatics, PCBs, and TAL metals. No nitroaromatics were detected in any of the soil samples. There were two PCB detections both in surface soil samples; one, Aroclor 1016 at 0.525 parts per million (ppm), was above its RBSC of 0.39 ppm. In addition, the only SVOC detected above its RBSC was benzo(a)pyrene, a PAH , detected in a surface soil sample near the road at 0.0844 ppm, the RBSC being 0.015 ppm. A total of 22 metals were detected in both the surface (0-1 foot) and subsurface (3 to 5 feet and 8 to 10 feet bgs) soil samples. Six metals (aluminum, arsenic, chromium, cobalt, iron, and manganese) were above RBSC limits in both surface and subsurface samples. Beryllium exceeded its BSC in both surface and subsurface samples, and in two surface samples it also exceeded its RBSC. Magnesium exceeded its BSC in several subsurface samples. Mercury exceeded its BSC in two surface samples. Lead was below screening criteria in all but one sample, a surface sample, in which lead exceeded both its RBSC and its BSC. These results confirm metals as the primary soil contaminants at the AP2 site.

Including QA/QC, seven surface water samples were collected and analyzed for TCL SVOCs, nitroaromatics, TAL metals, and hardness. Surface water samples exhibited no nitroaromatics or PCB detections, and no SVOCs or metals were detected above RBSC values. These results indicate the AP2 site is not impacting the surface water of the area.

Including QA/QC, seven sediment samples were collected. Each sediment sample was analyzed for TCL SVOCs, nitroaromatics, PCBs, and TAL metals. One sediment sample was also analyzed for total organic carbon (TOC). In the sediment samples, no PCBs were detected and no nitroaromatics or SVOCs were detected above RBSC values. Two metals (arsenic and chromium) were detected above RBSCs in each of the sediment samples. Since all the sediment samples have the same contaminants it isn't certain whether the AP2 site has contributed to the sediment contamination or not.

Including QA/QC, 5 overburden/shale groundwater samples were collected by low-flow methods from three of the seven piezometers and analyzed for TCL VOCs, TCL SVOCs, nitroaromatics, TAL metals (filtered and unfiltered), TOC, total cyanide, and water quality parameters. One overburden/shale groundwater sample from the most upgradient piezometer exhibited no detections above screening criteria; however, the two duplicates of that sample did have detections exceeding screening criteria. No nitroaromatics, VOCs, or cyanide were detected in any of the overburden/shale groundwater samples from the peizometers. There was one detection of an SVOC in a piezometer sample; however, the detected SVOC was well below its RBSC. Sixteen metals were detected in the overburden/shale groundwater samples from the temporary piezometers, three (aluminum, cadmium, and iron) at levels above screening criteria. Aluminum exceeded its BSC in one unfiltered sample. Cadmium exceeded its RBSC in all but one of the samples and filtration had little effect (cadmium lacks a BSC value). In one unfiltered sample iron exceeded both its RBSC and its BSC. Iron was not detected in the filtered samples. The results from the piezometer groundwater samples suggest the AP2 site may have impacted the overburden/shale groundwater zone.

Monitoring well sampling occurred in May (wet season) and November (dry season) of 2009. The monitoring well samples were to be analyzed for the same parameters as the piezometer samples: TCL VOCs, TCL SVOCs, nitroaromatics, TAL metals (filtered and unfiltered), TOC, total cyanide, and water quality parameters.

In May, the overburden/shale wells yielded five complete groundwater samples (including QA/QC), while in November the downgradient well was dry and the other two wells yielded only enough groundwater for nitroaromatics analysis. There were no detections of nitroaromatics, VOCs, SVOCs, or cyanide in any of the groundwater samples from the overburden/shale monitoring wells. The same 16 metals detected in the piezometer groundwater samples were also detected in the samples from the overburden/shale monitoring wells. The groundwater sample from the upgradient overburden/shale monitoring well exhibited no metals detections above screening criteria. Samples (primary and two duplicates) from the well within the ash pit exhibited cobalt, manganese, and nickel at levels above screening criteria; filtration had little effect. Cobalt was above its RBSC in two of the duplicate samples from the well while nickel was detected in all three samples at levels just below and just above the RBSC and far above the BSC. Manganese exceeded its RBSC in all three of the samples. Manganese was also the only metal detected above screening criteria in the sample from the downgradient overburden/shale monitoring well, it exceeded its RBSC. These results when taken with the soils data suggest the overburden/shale groundwater may have been impacted by the AP2 site.

For the bedrock wells, the upgradient well did not have enough water to yield a sample during either sampling period, while the other two bedrock wells did yield four (including QA/QC) complete groundwater samples for each sampling period. No nitroaromatics were detected in any of the bedrock groundwater samples. Fourteen VOCs were detected, four (benzene, chloroform, ethylbenzene, and total xylenes) at levels above their RBSC. Three SVOCs were detected; however, only one (naphthalene) at levels exceeding the RBSC. Of three cyanide detections two exceeded the RBSC; however, cyanide was not detected in any of the duplicates of these samples. Eleven metals were detected in the bedrock groundwater samples, only calcium and selenium at levels above screening criteria. Calcium levels exceeded the BSC; however, since calcium is an essential nutrient there is no RBSC. Selenium exceeded its RBSC (a BSC has not been determined) in two samples, November samples from both wells. For the sample from the well within the ash pit, selenium was above the RBSC in both the filtered and unfiltered evaluations, the level in the unfiltered being near the RBSC and the level in the filtered being more than three times greater. However, in one of the two duplicates for that sample selenium was not detected and its concentration in the other, although near the RBSC, did not exceed the RBSC. For the sample from the well downgradient of the ash pit, selenium exceeded RBSC in only the filtered evaluation. Considering the contaminants found in the soils and overburden/shale groundwater samples, it does not appear that the AP2 site has had any impact on the bedrock groundwater.

Recommendations:

- During a preliminary AP2 site visit a brick-lined, 12-foot-deep, 2-foot-diameter, hand-dug well was found with 10 feet of water in it and strong hydrogen sulfide odors emanating from it. The well is believed to predate AP2. Due to potential health and safety issues, the hand-dug well should be backfilled, although backfill of a preexisting condition is not responsibility of the USACE.

- Given the limited water level data from the new wells, additional water level readings should be made to improve the understanding of groundwater flow directions for the overburden/shale and bedrock water zones in the AP2 area. This can be accomplished by including the AP2 wells in the site-wide groundwater level measurement activities.

- Given there were no detections of potential contaminants above screening criteria in the surface water samples, no further action, evaluation, or risk assessment is recommended for the surface water in the AP2 area.

- Given the detections of contaminants above screening criteria in the soil, sediment, overburden/shale groundwater, and bedrock groundwater samples from the AP2 area a baseline human health risk assessment (BHHRA) and a screening-level ecological risk assessment (SLERA) should be conducted for these media using the SI and the RI data.

Activities In Progress:

- BHHRA and SLERA (draft reports anticipated to be complete in 2010).

1.0 Introduction

The U.S. Army is conducting a study of the environmental impact of a suspected hazardous waste site at a property previously owned by the U.S. Department of Defense (DOD). The former Plum Brook Ordnance Works (PBOW), located in Sandusky, Erie County, Ohio, is currently being investigated under the Defense Environmental Restoration Program for Formerly Used Defense Sites. Figure 1-1 shows the geographical location of the former PBOW site. This former 9,000-acre facility was used for the manufacture of nitroaromatics during World War II. The National Aeronautics and Space Administration (NASA) operates and maintains the site as the Plum Brook Station (PBS) of the John Glenn Research Center.

The investigation is being managed and technically overseen by the Nashville, Tennessee, and Huntington, West Virginia, District Offices of the U.S. Army Corps of Engineers (USACE). Fieldwork and reporting for Powerhouse 2 Ash Pits (AP2) is performed under Delivery Order DX05 for the USACE Louisville Architecture/Engineering Environmental Services Indefinite Delivery/Indefinite Quantity, Contract Number W912DR-08-D-0013. Shaw Environmental Inc. (Shaw) was contracted by the USACE Nashville District to conduct a soil, groundwater, surface water, and sediment remedial investigation (RI) at the former AP2 disposal area.

This Site Characterization Report (SCR) of AP2 is Volume 1 of three planned volumes. Volume 1 consists of the text, tables, figures, and appendices and presents final evaluations, conclusions, and recommendations for the AP2 disposal area RI. Background screening data will be used as a comparison and evaluation tool for analytical results. The background data set and derivation of background screening concentrations (BSC) for groundwater are described in the 2004 Groundwater Data Summary and Evaluation Report (Shaw, 2005) and the background data set and derivation of soil BSCs are described in the 1998 Site Investigation of Acid Areas report (IT Corporation [IT], 1998). Volume 2 will be the baseline human health risk assessment (BHHRA) and Volume 3 will be a screening-level ecological risk assessment (SLERA). Each volume will be submitted under separate covers. The BHHRA and SLERA reports will be prepared by Shaw and will describe all points and findings of the BHHRA and SLERA with respect to the investigation area.

Groundwater sampling at AP2 was conducted to determine the overburden/shale and bedrock groundwater quality. To determine if water quality could be affected by seasonal changes,

groundwater sampling was timed to monitor potential seasonal precipitation fluxes. As concluded in the 2004 Groundwater Data Summary and Evaluation Report by evaluating precipitation data specifically in the Sandusky area, two general seasons were determined to exist in reference to groundwater recharge: a wet season (January through June) and a dry season (July through December) (Shaw, 2005).

In addition, quarterly groundwater elevation measurements were conducted by Stillwater Environmental Services, Inc. (personal communication, 2010) to support ongoing investigation and remediation activities at PBOW. This information, critical to the evaluation of groundwater flow and contaminant transport, is incorporated into this report.

The field activities completed by Shaw for investigation of AP2 were conducted pursuant to the following documents:

General Site Activities

- Site-Wide Accident Prevention Plan/Site-Wide Health and Safety Plan Appendix (SWSHP) (Shaw, 2008a)
- Site-Wide Sampling and Analysis Plan (SWSAP) (Shaw, 2008b)
- Site-Wide Quality Assurance Project Plan (QAPP) (Shaw, 2008c).

Site-Specific Activities

- Work Plan, Remedial Investigation, Powerhouse 2 Ash Pits, Site-Specific Sampling and Analysis Plan, and Site-Specific Safety and Health Plan, (Shaw, 2009a).

1.1 Scope of Work and Project Objectives

The scope of the RI included preparation of a quality control plan and site-specific addenda to the SWSHP and SWSAP, soil sampling, installation of temporary piezometers and permanent monitoring wells, monitoring well development, groundwater sampling, analytical work, and investigation-derived waste (IDW) management and disposal. Figure 1-2 identifies the AP2 location in relation to other areas of concern and site features.

The objectives of this investigation include the following:

- Evaluate and use existing data appropriate to AP2.

- Define site physical features and characteristics.
- Determine nature and extent of DOD-related contamination in soil, sediment, surface water, and groundwater at AP2.
- Determine chemical characteristics of contamination.
- Evaluate fate and transport of contamination.
- Determine if overburden groundwater underlying AP2 is in sufficient volume and quality to be defined as a potential drinking water source in the state of Ohio.
- Obtain site data of quality, quantity, and distribution appropriate for site characterization, risk assessment, and feasibility study.

1.2 Report Organization

Chapter 2.0 of this report describes PBOW and the AP2 site, its physical setting, geology, and hydrogeology features. Sampling strategy and field procedures are described in Chapter 3.0. The analytical program and background comparison data are presented in Chapters 4.0. Chapter 5.0 describes specific-site information and historical and current analytical data. Chapter 6.0 presents media conclusions. Recommendations are provided in Chapter 7.0. References that were used in preparing the report are listed in Chapter 8.0.

Soil boring, monitoring well drill logs, well construction diagrams, sample collection logs, and rock core photographs are provided in Appendices A, B, and C, respectively. Well development water photographs and logs are included in Appendix D. Appendix E contains land survey data. Appendix F presents copies of wastes manifests used for disposal of the IDW. Appendices G through J contain analytical data pertinent to the soil sampling and two groundwater (May and November 2009) sampling events. Appendix K presents the chains of custody for laboratory analysis. Appendix L provides incoming comments and responses.

1.3 Facility Location and Description

The former PBOW site is currently utilized and maintained by NASA and is operated as the PBS, a satellite office of the NASA John Glenn Research Center, located at Lewis Field in Cleveland, Ohio. Most of the aerospace testing facilities built at the site in the 1960s are on standby or inactive status. The site is located approximately 4 miles south of Sandusky, Ohio, and 59 miles west of Cleveland. Although primarily in Perkins and Oxford Townships, the

eastern edge of the site extends into Huron and Milan Townships. PBOW is bounded on the north by Bogart Road, on the south by Mason Road, on the west by Patten Tract Road, and on the east by U.S Highway 250. The areas surrounding PBOW are mostly agricultural and residential. Public access is restricted at PBOW except during the annual deer hunting season.

1.4 PBOW Site History and Previous Investigation

The PBOW site was built in early 1941 and manufactured 2,4,6- trinitrotoluene (TNT), dinitrotoluene (DNT), and pentolite (PETN). Production of explosives began in December 1941 and continued until 1945. During operation, three areas (TNT Area A [TNTA], TNT Area B [TNTB], and TNT Area C [TNTC]) manufactured TNT and DNT and one area manufactured PETN. TNTA consisted of manufacturing lines 1 through 4, TNTB consisted of lines 5 through 7, and TNTC consisted of lines 8 through 12. TNTA is located on the northeast side of PBOW, TNTB is located at the southern central part, and TNTC is located at the southwestern side of PBOW. The PETN manufacturing area is located in the north-central portion of PBOW and lies within the boundaries of Ransom Road on the west, Pentolite Road on the south, and Patrol Road on the north and east. The central portion of the former PETN manufacturing area is currently occupied by NASA's inactive nuclear reactor, which is presently in the process of being decommissioned.

It is estimated that more than one billion pounds of explosives were manufactured during the 4-year operating period. After the plant was shut down, decontamination of TNT, acid, PETN, and DNT processing lines began. Decontamination was considered complete during the last quarter of 1945. The property was initially transferred to the Ordnance Department after it was certified by the Army to be decontaminated in 1946. This transfer did not include the 2,800 acres comprising the Plum Brook area. The War Assets Administration accepted custody of the remaining acreage (approximately 3,230 acres) in 1946. The Department of the Army reacquired the 3,230 acres in 1954 and performed cleanup efforts during the 1950s through 1963.

Two property use agreements were entered into by the National Advisory Committee of Aeronautics, the predecessor of NASA, and the Army in 1956 and 1958. On March 15, 1963, accountability for and custody of the entire PBOW property (6,030 acres) was transferred to NASA by the Department of the Army. NASA performed further decontamination during 1964. The NASA decontamination process was accomplished in five steps (Dames and Moore, Inc. [D&M], 1997a):

1. Inspecting and removing contaminated surface soil above the drain tiles, flumes, etc.

2. Spot checking of subsurface soil in the vicinity of drain tiles, flumes, etc., to determine where the contaminated tiles and flumes were located. Where contamination was found, the flumes, tiles, etc., were removed in sections.

3. Removal of some items previously decontaminated to Level 3X (XXX-military decontamination level established primarily for worker safety that indicates potentially contaminated material or previously contaminated material that has been decontaminated to a zero residual contamination level) condition to a storage facility and additional decontamination of the remainder of the items to a 5X (XXXXX – level that indicates a decontaminated material with no detectable residual contamination) condition in order to be sold ("X" indicates the Army's specific decontamination level).

4. Destruction of all buildings by fire followed by removal of all debris and concrete foundations. All the materials, including the earth, in those areas was flashed and the area was then rough graded. [Soil investigations at the TNT areas prior to this RI suggest that at least portions of the concrete building foundations remain in place.

5. Decontamination of all sump basins and removal of the concrete.

The decontamination process also included burning of nitroaromatic-filled flumes that were excavated. As shown in the records review (D&M, 1997b) this was performed on July 10, 1963, near the intersection of Fox Road and Snake Road and is suspected to have also occurred at the Additional Burning Ground area.

On April 18, 1978, NASA declared approximately 2,152 acres of land as excess. This excess acreage included former buffer areas that were not formerly used by the Army and were not subject to decontamination efforts. The Perkins Township Board of Education acquired 46 acres of the excess for use as a bus transportation center. The General Services Administration retains the remaining acreage and currently has a use agreement with the Ohio National Guard for 604 acres of the land. NASA presently controls about 6,400 acres and is using the site to conduct space research as a satellite operation of the John Glenn Research Center based in Cleveland, Ohio. The details of these land transactions are listed in the site management plan (International Consultants Incorporated [ICI], 1995) and can be found at NASA PBS.

1.5 Powerhouse 2 Ash Pits

During PBOW operation, three power stations, Powerhouse 1, Powerhouse 2, and Powerhouse 3, were constructed and utilized to support the TNT manufacturing process. Each power station

consisted of a main powerhouse, a coal storage area, and an aboveground fuel storage tank. The fuel storage tank was surrounded by a berm to contain any potential spills or leaks. Each powerhouse building consisted of a boiler house, compressor room, electrical room, filter room, and locker room. The buildings also contained two to four large coal-burning boilers, a turboelectric generator, a feed water treatment system, and several steam-driven or electric air compressors. The generated steam was used for space heating, driving compressors, and generating electrical power. Coal ash generated from each of the boilers in the powerhouse was collected in pits. Water was added to the ash, producing a slurry that flowed through a sluice trench to an ash sump located at the end of each powerhouse. From the ash sump, the ash slurry traveled through a pipeline to a nearby surface water/ash impoundment (i.e., ash pit) (USACE, 2000). Based on topographical quadrangles (dated 1959 and 1969), aerial photographs, and a visual site survey conducted in 1999, the ash pit areas are noted to have essentially remained unchanged.

AP2 is located west of Campbell Street in an area that appears to be an old surface impoundment. Historical drawings indicated that the surface impoundment was rectangular in shape, measuring approximately 400 feet long by 200 feet wide, and was surrounded by an earthen embankment (USACE, 1995). As noted previously, ash from coal-fired boilers was reportedly pumped into the ash pit through a pipeline.

1996 Site Investigation. In September 1996, IT conducted an initial site investigation (SI) of AP2 (IT, 1997a). The sampling area was an ash pit that received discharge from nearby Powerhouse No. 2. As noted in the SI report, the layer of ash in the pit (black or dark brown) was generally 1 to 2 feet in thickness. However, the ash layer was found to be as great as 3.7 feet in thickness near the 6-inch steel drain pipe in the center of the pit. The steel drain pipe that discharged the slurry ash was also reported to be in good shape and was measured to be 144 feet in length from Campbell Street to the pipe’s end (8 feet per section by 18 sections). To determine if soil contamination was present at AP2, characteristic soil samples were collected from the native soil below the ash layer. IT collected 12 (0 to 0.5 foot) surface soil samples, and 11 (2 to 3 feet), and 1 (3 to 4 feet) native subsurface soil samples, with one surface and one subsurface soil sample from each of 12 boreholes. All of the soil samples below 2 feet were collected beneath the ash layer from native material. A native soil sample below the 3.7-foot ash layer was attempted but the soil boring encountered native soil at a depth of 2.8 feet bgs. During sample collection, bedrock was not encountered in any of the boring locations. The boring locations were selected using a systematic grid sampling strategy to minimize bias and to provide

complete site coverage. Figure 1-3 present the historical sample locations, and Tables 1-1 and 1-2 present historical organic and inorganic soil sample results.

Each soil sample was analyzed for volatile organic compounds (VOC), semivolatile organic compounds (SVOC), target analyte list metals, pesticides, polychlorinated biphenyls (PCB), and total cyanide. Three VOCs were detected in surface soil (0 to 0.5 foot) and four VOCs were detected in subsurface soil; none were detected above their risk-based concentrations (RBC) and two, acetone and methylene chloride, are laboratory contaminants. A total of 14 SVOCs were detected in surface soil. Of these, only benzo(a)pyrene was detected above the RBC. Neither of the two SVOCs in subsurface soil was detected above its RBC. PCBs were not detected in surface or subsurface soils. Three pesticides were detected in surface soil, but at concentrations below their respective RBCs. Pesticides were not detected in any subsurface soils. Total cyanide, detected in three surface soil locations only, was below the established RBC. A total of 18 metals were present in surface soils at AP2; 6 metals exceeded their RBCs. A total of 17 metals were present in subsurface soils; 6 metals exceeded their RBCs. No groundwater, surface water, or sediment samples were collected during the 1996 RI field activities. The SI went on to recommend a risk assessment “to determine the necessity of further soil (or other media) investigations leading to site remediation or site closure.” (IT, 1997a).

2008 Site Walk. During a site walk conducted in October 2008, the AP2 area was observed to be overgrown with trees and was nearly indistinguishable from the surrounding forest. Several moss-covered concrete slabs approximately 7 feet long and 3 feet wide were observed partially buried in the underbrush approximately 75 feet west of Campbell Street at the approximate location of historical soil sample PH2SO-01, collected during the 1996 AP2 investigation by IT (IT, 1997a). A small hand-dug water well constructed of exposed bricks and approximately 2 feet in diameter was located near the concrete slabs. The well was filled with water to within 2 feet of the ground surface. Total depth of the well was approximately 12 feet. A strong hydrogen sulfide odor was noted emanating from the hand-dug well. The origin of both the slabs and the well-like structure is thought to be related to a former farm that occupied the area before PBOW was constructed, but review of historical drawings and other documents does not provide confirmation.

2009 Powerhouse 2 Demolition. During the end of October-start of November 2009, the Powerhouse No. 2 concrete building, source of all ash and cinders in AP2, was razed by NASA.

2.0 Physical Setting

2.1 Geography, Topography, and Surface Drainage

PBOW is located within the Eastern Lake Region of the Central Lowland Province (Soil Conservation Service, 1971). Erie County is overlain by lacustrine sediment, glacial outwash, and glacial till. The surface is a plain with a slight slope to the north-northeast toward Lake Erie at approximately 25 feet per mile. Elevations at the PBOW range from 680 feet above mean sea level (msl) at the intersection of Taylor Road and Patrol Road on the southwestern side of the site to 625 feet above msl at the northern portion of the installation. In general, the topography of PBOW is characterized by a flat ground surface with occasional low hummocks caused primarily by glacial scouring and deposition. A low escarpment trends from the western to the northeastern portion of the site (Shaw, 2005).

PBOW lies in the eastern region of the Pickeral Creek-Pipe Creek Basin, which is part of the St. Lawrence River drainage basin (D&M, 1997a). Eleven streams exist within PBOW and flow north-northeast toward Lake Erie, which is located approximately 3.5 miles north of the site. The site is part of four drainage areas: (1) Sawmill Creek (southern PBOW); (2) Plum Brook (central PBOW); (3) Pipe Creek (western PBOW); and (4) Storrs-Hemminger Ditch (north central PBOW), all of which flow into Sandusky Bay (D&M, 1997b). Surface water at AP2 drains from former Powerhouse No. 2 in a west-to-northwest direction into Pipe Creek. Overall, surface water drainage of PBOW is controlled by site topography. The streams are incised into bedrock and are poorly developed where they have not yet eroded to the bedrock. Four drainages at the site, Lindsley Ditch, Ransom Brook, Kuebler Ditch, and Plum Brook are monitored by NASA PBS under a National Pollutant Discharge Elimination System outfall permit (OEPA, 2007). In addition to the streams, 17 isolated ponds and reservoirs and former red water ponds are located at PBOW (U.S. Geological Survey [USGS], 1992; D&M, 1997b).

2.2 Geology

2.2.1 Regional Geology

The bedrock in northern Ohio consists of Devonian and Silurian carbonates (limestone and dolomite) and clastics (shale, siltstone, and sandstone). These units unconformably overlie older sedimentary sequences of Ordovician and Cambrian Age rocks, which in turn unconformably overlie pre-Cambrian basement rocks (D&M, 1997a). The local bedrock is situated on the

eastern flank of the Findlay Arch. In the Devonian and Silurian of northern and western Erie County, weathering of the carbonates has produced cavernous porosity and karst topography.

2.2.2 Local Geology

At PBOW, three bedrock units are present—the Delaware Limestone, the Olentangy Shale, and the Ohio Shale. The Delaware Limestone is the lowermost formation screened by PBOW site wells. It is characterized as a hard, dense, finely crystalline limestone and dolomite. The unit is typically buff colored, hard, and massive, and usually is described as fossiliferous with pyrite crystals. In the vicinity of PBOW, quarries (Hanson Aggregates to the north, Hanson-Sandusky Crushed Stone to the southwest, and abandoned Castalia quarry to the west) mine limestone from the Delaware. Traces of natural petroleum-derived hydrocarbons and hydrogen sulfide (H_2S) are common in all three quarries. Overlying the Delaware Limestone is the Olentangy Shale. Two members of the Olentangy Shale have been characterized at the site, the Plum Brook Shale and the overlying Prout Limestone. The Plum Brook Shale is interpreted to consist of approximately 35 feet of bluish-gray, soft, fossiliferous shale containing thin layers of dark, hard, fossiliferous limestone. The Prout Limestone has been described as an approximate 15-to-50- foot thick unit which occasionally outcrops in a 1,000-to-2,000-foot-wide, northeast-striking band across the middle portion of PBOW. It is described as a dark-gray to blue, very hard, siliceous, fossiliferous limestone or dolomitic mudstone. The Olentangy Shale of PBOW dips to the southeast at a slope of approximately 21.1 feet per mile. The uppermost formation at the site is the Ohio Shale. Geographic Information System data (Shaw, 2005) show that the Ohio Shale dips to the southeast at a slope of approximately 26.4 feet per mile (Shaw, 2005). Only one member of the Ohio Shale is present in the PBOW area, the Huron Shale. This unit is described as black, thinly bedded, with abundant carbonaceous matter. Some large pyrite/carbonate concretions are also present in the Huron Shale, some as large as 6 feet in diameter (D&M, 1997a).

2.2.3 Regional Hydrogeology

Regional groundwater flow is to the north-northeast towards Lake Erie, although local flow may vary due to local topography. Water in the limestone typically occurs in joints and along bedding planes or in solutionally enlarged openings. Although some limestone in the middle of the county provide well yields of up to 500 gallons per minute (gpm), the overburden and the majority of the other formations can sustain groundwater pumping of only 10 gpm or less (D&M, 1997b). A hydrogeological study conducted by USGS on the glacial deposits in Sandusky in 1990 reported a horizontal hydraulic conductivity of 0.046 feet per day and a vertical hydraulic conductivity of 1.2 feet per day (USGS, 1992).

2.2.4 Local Hydrogeology

From domestic groundwater wells outside of PBOW boundaries, the bedrock groundwater is divided into three zones based on location and yield. Zone 1 occurs in the north and northwestern portion of PBOW. It is characterized as yielding from 100 to 500 gpm from karstic limestone approximately 100 feet below grade. Zone 2 is in the northern portion of PBOW and has yields of 15 gpm or less from limestone approximately 300 feet below grade. Zone 3 is located in the eastern and southern portion of the site in predominantly shale bedrock. In addition to being found in the shale, groundwater is located in thin sand and gravel horizons interbedded with silt and clay deposits. Most Zone 3 wells are poor yielding, many of them providing less than 3 gpm (D&M, 1997a).

Two main water-bearing zones at PBOW are present, one in the overburden/shale and one in the Delaware Limestone bedrock. Data from recent investigations (*2004 Groundwater Data Summary and Evaluation Report* [Shaw, 2005], *2002 Groundwater Data Summary and Evaluation*, [Shaw, 2003], TNT Areas A and C RI [IT, 2000a,b], *Summary Report, Site-Wide Groundwater Monitoring* [1997-1998] [IT, 1999], and the *Site-Wide Groundwater Investigation Report* [IT, 1997b]) have found that groundwater in the overburden is in discontinuous pockets during dry time periods exemplified by monitoring wells that are typically dry or site areas in which wells could not be installed due to a lack of water in the overburden soil at the time of drilling.

2.2.5 Influence of Precipitation on Water Levels

As mentioned in the 2004 Groundwater Data Summary and Evaluation Report (Shaw, 2005), previous investigations have indicated that there is a strong connection between precipitation and groundwater elevations, but no clear correlation exists between monthly precipitation rates and water level elevations in site wells. The lack of observed correlation is probably influenced by the amount of precipitation and the runoff rate. For example, summer thunderstorms that produce short periods of heavy precipitation may result in more surface runoff and less infiltration. Conversely, constant periods of precipitation at a lower rate over a period of days may result in more infiltration. Freezing rain or snow will also not result in an immediate recharge to groundwater. From review of local monthly precipitation data, evapotranspiration and rainfall runoff rates calculations, and a comparison table of sitewide monitoring well groundwater elevations verses aquifer recharge rates, a seasonal correlation was determined. During the months of January through June, a greater volume of groundwater in the overburden/shale

monitoring wells was present as compared to the months of July through December, when a lesser amount of water was present. Therefore, in general, the time period of January through June, when the greatest amount of water in a monitoring well is expected to be present, was given the term “wet” time period, while July through December was given the term “dry” time period.

3.0 Field Activities

3.1 Introduction

Field activities at the AP2 site were performed in accordance with the updated and revised SWSAP (Shaw, 2008b) and site-specific work plan, as noted in Chapter 1.0. Activities included direct-push drilling operations with soil sampling, installation of temporary piezometers within the AP2 site, installation of permanent monitoring wells upgradient, within and downgradient of the AP2 site, surface water and sediment sampling, two rounds of groundwater sampling (one conducted during the 2009 wet season and the second in the 2009 dry season), and disposal of IDW

Prior to any intrusive work, a NASA authorized dig permit was obtained for AP2. The dig permit process included review of utility maps for any underground utilities, including storm water, sewer, electrical, natural gas, telephone, cable, or fiber optic lines in the AP2 area. In addition, following Shaw's requirements, a Utility Mark-Out form was completed and any location to be bored was hand dug for the first 5 feet, verifying no utilities were present. To comply with NASA fire regulations, a NASA authorized burn permit was also obtained each time cutting and welding of steel isolation casing was required during bedrock monitoring well installation.

3.2 Direct-Push Soil Sampling/Piezometer Installation

Direct-push drilling was used to collect soil samples and install temporary piezometers at AP2. Eight soil borings were drilled and seven temporary piezometers installed (SB01/PZ01, SB0-2/PZ0-2, SB03/PZ03, SB04/PZ04, SB05/PZ05, SB06/PZ06, SB07, and SB08/PZ07). Figure 3-1 shows locations of direct-push borings. Direct-push drilling activities were conducted by Tri-State Drilling Company, of Chattanooga, Tennessee. A track-mounted, Geoprobe 6610 DT drill rig was used at all boring locations on January 15, 16, and 18, 2009. Locations of the soil boring/piezometers at AP2 were selected using data and knowledge from the 1997 SI report (IT, 1997a), topography, layout of historical disposal operations, and anticipated overburden/shale and 2004 RI bedrock groundwater flow directions.

Following PBOW closure and demolition of TNT manufacturing buildings, a fill material (sand) was graded over many PBOW areas covering remaining foundations and other former ground surface features. Direct push sampling at AP2 indicated the area had not been covered with any fill material. Three soil samples were collected from each soil boring from approximate depths of 0 to 1, 3 to 5, and 8 to 10 feet below ground surface (bgs) and analyzed for nitroaromatics,

SVOCs, and inorganics. Also, the 0 to 1 and 3 to 5 feet soil samples were analyzed for PCBs, and one surface soil sample (0 to 1 foot interval) was analyzed for total organic carbon (TOC).

Continuous lithologic logs were recorded for all soil borings during the drilling. Boreholes in which a piezometer was installed were advanced to refusal, and a 1-inch-diameter polyvinyl chloride (PVC) screen with 0.010-inch slots, typically 10 feet in length, and 1-inch diameter PVC riser, was placed into the 3.25-inch-diameter borehole. No filter pack material or bentonite was used during piezometer construction. To prevent rainwater from entering the borehole from the surface, the piezometer was surrounded with plastic sheeting to a depth of approximately 0.5 feet bgs, cardboard with a hole in the center was placed over the piezometer covering the borehole, and bentonite was placed over the cardboard and surrounding surface to a radius of approximately 1 foot. Hazardous, toxic, and radiological waste (HTRW) drilling logs for each borehole along with the associated temporary piezometer construction diagram, if appropriate, are included in Appendix A. Table 3-1 presents a summary of direct-push soil and groundwater samples collected.

3.3 Direct-Push Groundwater Sampling

As noted in Section 3.2, seven temporary piezometers were installed at AP2 (SB01/PZ01, SB02/PZ02, SB03/PZ03, SB04/PZ04, SB05/PZ05, SB06/PZ06, and SB08/PZ07). The purpose of the piezometers was to locate potentially contaminated groundwater, determine placement for permanent monitoring well installation, determine quantity and quality of overburden/shale groundwater, and to determine if the water is a potable supply. From January 31 through February 2, 2009, using the low-flow groundwater sampling method, only three groundwater samples from piezometers PZ03, PZ04, and PZ07 could be collected from the seven installed piezometers due to low yield. Groundwater from temporary piezometers was low-flow sampled using a peristaltic pump. Groundwater samples were analyzed for nitroaromatics, SVOCs, inorganics (filtered and unfiltered), hardness, and water quality parameters including alkalinity, chloride, cyanide, hardness, nitrate, sulfate, total dissolved solids, total suspended solids, turbidity, and ferrous iron. VOCs were not sampled from the piezometers. Appendix B contains sample collections logs from PZ03, PZ04, and PZ07.

3.4 Monitoring Well Installation

A total of six 2-inch monitoring wells, three overburden/shale (AP2-MW01, AP2-MW02, and AP2-MW03) and three bedrock (AP2-BEDGW-001, AP2-BEDGW-002, and AP2-BEDGW-003), were installed as part of the RI activities at AP2. Monitoring wells were installed in

upgradient, downgradient, and suspected source area locations based upon analytical data from soil and groundwater samples obtained during direct-push soil sampling, temporary piezometer groundwater sampling, February 18, 2009 overburden/shale groundwater flow directions, and 2004 bedrock groundwater flow directions. Figure 3-1 shows newly installed monitoring well locations along with soil boring and temporary piezometer locations at AP2.

Monitoring wells were installed in accordance with guidelines specified in the USACE Engineering Manual EM-1110-1-4000 (USACE, 1998) and following the procedures in the site-wide SWSAP (Shaw, 2008b). All monitoring wells were completed as described below.

Monitoring well installation was conducted March 30 through April 19, 2009 by A.E. Drilling Services of Greeneville, South Carolina. Prior to drilling, dig permits already in place with NASA for direct-push drilling were reviewed to ensure no underground utilities would be encountered during drilling at monitoring well borehole locations. In addition, the first 5 feet at each borehole location were manually dug with a 4-inch-outside diameter (OD) decontaminated, stainless-steel posthole digger to confirm no utilities were overlooked or were not identified by NASA utility location diagrams.

Following posthole digging to 5 feet, all overburden/shale boreholes were advanced by a CME-750 drill rig using 8-inch-OD (4.25-inch-inside diameter [ID]) hollow-stem augers (HSA) to the depth of auger refusal. At most boreholes, unless paired with an adjacent bedrock well in which lithologic soil sampling was conducted (AP-MW02/AP2-BEDGW-002), soil core samples were continuously collected from the ground surface to terminating depth using a 2-foot-long and 2-inch-OD stainless-steel split spoon. Soil core samples were visually examined by a Shaw field geologist and documented on HTRW drilling logs. Overburden/shale monitoring well construction logs are included in Appendix A. Well completion in each borehole was accomplished using 2-inch-diameter PVC Schedule 40 riser pipe and a 10-foot Schedule 40, PVC section of 0.010-inch factory slotted screen. No soil samples were submitted to an analytical laboratory, but each sample was screened by a Sirius air quality meter to measure any organic vapors. Well construction logs of the monitoring well associated with the appropriate borehole are also included in Appendix A.

For all bedrock wells, following posthole digging to 5 feet, a pilot borehole was drilled by a CME-750 drill rig using 4.25-inch-ID by 8-inch OD HSA to bedrock refusal. As with the overburden/shale borehole, soil core samples were continuously collected from the ground

surface to terminating depth using a 2-foot-long and 2-inch-OD stainless-steel split spoon. Soil core samples were visually examined by a Shaw field geologist, screened for organic vapors, and documented on HTRW drilling logs (Appendix A).

All bedrock wells were installed as double-cased wells. Therefore, following the pilot borehole drilling, each soil borehole was overdrilled with an 8.25-inch-ID by 12-inch-OD HSA until refusal. These augers were temporarily left in place to hold back overburden materials. Following the overdrilling, an 8-inch-OD roller cone bit was used to cut through the weathered bedrock, if present, and several feet into the competent bedrock. Roller cone drilling was performed using water for the purpose of both cooling the drill bit and washing rock cuttings from the borehole. The roller cone bit was advanced until at least 3 to 5 feet of competent drilling was completed, which was measured by the competency of cutting pressure, size and color of rock fragments, and sound of drill bit cutting “chatter.” Upon reaching the appropriate depth, black steel isolation casing (6-inch-ID by 6 5/8-inch-OD) was installed into the borehole and pressure grouted in place.

All pressure grouting was performed using an expendable grout shoe. The grout shoe was 6 5/8-inch PVC cap placed over the end of the isolation casing before insertion into the borehole. The center of the grout shoe consisted of a one-way valve, similar to the ball valve in a bailer. After the isolation casing and grout shoe were pushed to a depth approximately 2 to 3 inches above the drilled depth, a PVC tremie pipe was connected to the valve and grout was pumped through the shoe and into the borehole until freely flowing around the isolation casing at the surface. This method ensured a complete seal of the isolation casing.

After allowing the grout to cure for a minimum of 48 hours, bedrock was then cored with water using a CME-750 drill rig. Coring was conducted through the center of the black steel isolation casing using a custom manufactured PQ bit that collects a 3-inch-OD rock core but drills a 6-inch-OD borehole. All coring was performed using a 5-foot-long core barrel. Rock cores were visually examined and a lithology description prepared (Appendix A). Photographs of the rock cores were taken and are presented in Appendix C.

It was necessary to use tap water during coring of the bedrock for the purpose of flushing bedrock chips from the borehole, cooling the drill bit, and providing some type of lubrication between the bit and bedrock. This made the interpretation of knowing when or if groundwater was encountered difficult. After a 5- or 10-foot run was drilled and coring equipment was out of

the borehole, water was purged and any recovery rate measured. If groundwater was interpreted to have been encountered, well completion was accomplished using a 2-inch diameter Schedule 40 PVC riser pipe and 15-foot sections of 0.010-inch continuous wrap screen. Filter packs in screened wells were constructed with sand (tremied) beginning at a depth approximately 1 foot below the screen to approximately 2 feet above the screen. Three to 6 feet of pellet bentonite were then placed above the sand. The remaining annular space between the PVC riser and the borehole and the PVC riser and the black steel casing was filled (tremied) with bentonite-cement grout from the top of the bentonite to approximately 2 feet bgs.

Each well was completed to minimize frost heave. Beginning at a depth of around 2 feet bgs, bentonite was added within and around the protective casing above the bentonite-cement grout to ground surface. In addition, the concrete for the concrete pad was prevented from touching the protective casing by placing an expendable plastic spacer between the concrete and the casing. This was done in case the ground surface with the pad should heave due to frost and therefore allow the concrete pad to move without breaking. Surface completion at each well consisted of a 4-inch-square, lockable, metal, above-grade protective casing. A 4-foot-square, 4-inch-thick, concrete pad with sides sloping away was constructed around each well. Four protective steel posts were installed at each corner of the concrete pad. An identification plate with the well name, total depth, depth to screen, and survey information was secured to the protective casing.

Monitoring well construction details for the new monitoring wells are summarized in Table 3-2. Drilling logs and well construction diagrams are included in Appendix A.

3.5 Monitoring Well Development

All newly constructed monitoring wells were developed no sooner than 48 hours and no later than 7 days after completion of well construction. A Watera pump connected with 1-inch check valve and ½-inch-ID high-density polyethelyene tubing was used to perform well development. The Watera pump is an inertial pump that requires a 6- to 8-inch surging action for water removal. During development, the check valve and associated tubing were repositioned vertically throughout the screened interval to fully develop the entire well screen. Periodically, development was further enhanced by removal of the tubing from the pump and a more aggressive, manual, 1- to 2-foot length surging action was conducted. A well development log was completed for each well to document well development progress, field parameters, and other pertinent information. Photographs of development water and well development logs are included in Appendix D.

3.6 Piezometer Abandonment

On July 6, 2009, all seven of the temporary piezometers installed at AP2 for initial investigations purposes were abandoned. Prior to abandonment, the depth to groundwater was measured and recorded. Following measurement of the water level, the piezometer was manually removed from the ground and backfilled with granular bentonite consistent with Ohio regulatory requirements. Approximately 1.25 pounds of bentonite were used in each borehole. Abandonment forms for each piezometer were completed and filed with the Ohio Department of Natural Resources, Division of Water (www.dnr.state.oh.us).

3.7 Groundwater Sampling

Two low-flow groundwater sampling events were completed at AP2 during the PBOW wet and dry seasons. The first sampling event was conducted following well installation during the PBOW wet season of May 2009 and the second during the dry season of November 2009. Groundwater from the monitoring wells was low-flow sampled using a bladder pump. Groundwater samples were analyzed for nitroaromatics, inorganics (filtered and unfiltered), VOCs, SVOCs, and water quality parameters (alkalinity, chloride, cyanide, hardness, nitrate/nitrite, sulfate, total dissolved solids, total suspended solids, turbidity, ferrous iron, and oxidation-reduction potential [ORP]).

To assess the potential air quality that may be at the well during purging activities, upon arrival at all monitoring wells and following removal of the security lock, the lid to the well was removed and vapors within the casing were immediately measured using a Sirius air quality meter that measures organic vapors, lower explosion level, carbon dioxide, oxygen, and hydrogen sulfide content. Measurement was performed as an early indication of the breathing air vapors that may be encountered when purging activities began. Once well purging activities commenced, breathing air concentrations were continuously measured and compared with the health and safety requirements (Shaw, 2008a). Hydrogen sulfide is one of the hazardous chemicals commonly encountered when purging groundwater from the bedrock wells screened within the Delaware Limestone. Hydrogen sulfide readings did not pose a problem at AP2 during either groundwater sampling event.

Three procedures were used for purging and sampling monitoring wells. Low-flow (minimal drawdown) was the preferred purging and sampling method in wells where adequate recharge was present. If a well did not recharge adequately to use the low-flow sampling method (i.e.,

water level dropped 6 inches or more), removal of three volumes of groundwater from above the top of screen was performed by continued pumping. If water recharge while above the screen was so minimal (less than 50 milliliters per minute) that this purging and sampling method could not be conducted in an efficient, timely manner, the water column in the well was removed entirely. Recharged groundwater was sampled the following day.

Samples collected for inorganics analysis were filtered in the field through a 0.45-micrometer high-capacity filter attached to the discharge line of the bladder pump. If the well was not sampled using the bladder pump (i.e., with a disposable Teflon® bailer), a hand-operated, disposable 0.45-micrometer filter was used.

All groundwater that was removed from the wells during purging activities was containerized and properly disposed of following the IDW management procedures as identified in the Shaw SWSAP (Shaw, 2008b) and Work Plan (Shaw, 2009a). Details of disposal activities are presented in Section 3.11.

Table 3-3 shows a list of the primary groundwater samples collected. Final field measurements recorded immediately before the water quality meter flow-through cell was disconnected and prior to groundwater sample collection are shown in Table 3-4. A final water quality reading was not recorded if adequate water volume was not present or if sample water would have possibly contaminated the recording instrument beyond decontamination efforts. Monitoring well locations are shown on Figure 3-1. Appendix B contains groundwater sample collection logs.

3.8 Surface Water and Sediment Sampling

Surface water and sediments samples were collected from Pipe Creek located adjacent to and west of AP2 (Figure 3-1). Six surface water samples (including one field duplicate [FD] sample) and six sediment samples (including one FD sample) were collected in collocated locations in Pipe Creek. Surface water and sediment samples were analyzed for nitroaromatics, inorganics, SVOCs, and PCBs. Water quality readings (ORP, pH, conductivity, turbidity, dissolved oxygen, and temperature) were also recorded for the surface water samples and are shown in Table 3-4. In addition, one surface water sample (AP2-SW01) was analyzed for hardness and collocated sediment sample (AP2-SD01) was analyzed for TOC. Table 3-5 presents a summary of surface water and sediment samples collected at the investigation areas. Appendix B contains surface water and sediment sample collection logs.

3.9 Decontamination Procedures

Decontamination of drill rigs, downhole tools, and sampling equipment was performed in accordance with Section 5.0 of the SWSAP (Shaw, 2008b). Specifically, drill rigs, rods, drill bits, and augers were cleaned at the decontamination pad using high-pressure hot water from a steam cleaner before entering the drilling site, between sites, and after completion of the last borehole. Other sampling equipment was decontaminated by rinsing in sequence with phosphate-free soapy water, tap water, methanol, and deionized water. Equipment was then air dried, if possible, before use. The bladder pump used during groundwater sampling was decontaminated by disassembling the pump and decontaminating individual pieces. Disposable tubing and bailers were used in the groundwater sampling. New tubing and a new bailer (if necessary) were used for each well.

3.10 Land Survey

An Ohio-registered professional land surveyor surveyed the direct-push soil boring and piezometer, overburden/shale and bedrock monitoring well, and surface water and sediment sampling locations during two mobilizations. During the first survey event, conducted from January 27 through 30, 2009, soil borings and piezometers were surveyed. During the second event, conducted from May 18 through 21, 2009, monitoring wells, surface water and sediment sampling locations, and a stream staff gauge were surveyed. Horizontal coordinates were surveyed to the closest 0.1 foot and referenced to the Ohio State Plane Coordinate System. Vertical coordinates (land surface and top-of-casing elevation) were surveyed to the nearest 0.01 foot and referenced to the 1929 National Geodetic Vertical Datum. Land survey data reports are included in Appendix E.

3.11 Investigation-Derived Waste Management

IDW generated during investigation activities included soil, groundwater, rock cores, decontamination water, and personal protective equipment. All IDW was managed and handled in accordance with procedures described in the SWSAP (Shaw, 2008b).

Coring fluids, decontamination, development, and purge water generated during field activities were stored in labeled 55-gallon drums. Soil generated during direct-push and monitoring well drilling was collected in 55-gallon drums and labeled with identification of contained material, content volume, date of generation, and source of origin as applicable. Personal protective equipment (Tyvek® suits, latex gloves, etc.) and general refuse were double bagged and disposed in an on-site, Shaw contracted industrial dumpster for disposal.

Following direct-push and monitoring well drilling, groundwater sampling, and analytical determination that the media were nonhazardous, soil and groundwater IDW was transported to a registered disposal facility. Disposed-of media include all soil and water generated during monitoring well installation activities and purge and decontamination water generated during groundwater sampling. All fluids and solids were transported by Triad Transport, Inc. to the Environmental Quality Company in Detroit, Michigan, for disposal. All rock cores are currently being stored inside a weather protected, secure NASA bunker. Upon USACE approval of reporting requirements and evaluation of related groundwater contaminant data to determine the disposition, the rock cores will be disposed.

RI activities at AP2 were conducted in sequence and simultaneously with other PBOW investigations. Although identification on the storage drums included contents, date generated, volume, and location of origin, disposal of the drums was based upon weight and area stored. A record of specific drums taken by the disposal company with each trip was not kept. Therefore, drums containing AP2 media (soil, purge water, isolation casing, rock core drill water, and decontamination water) may have been transported by the Environmental Quality Company on more than one date. Because the specific disposal dates of AP2 waste drums are unknown, all of the waste manifests generated during the drilling and sampling events are included in Appendix F.

4.0 Analytical Program

The following sections present the analytical program used in this investigation. This review includes the laboratories used for all samples, the analytical methods used, data quality evaluation, and blank analysis. In addition, a description and derivation of risk-based screening criteria (RBSC) is presented in Section 4.2.1. The derivation and use of BSCs and the analytical results are presented in Section 4.2.2.

4.1 Analytical Program and Methodologies

4.1.1 Sample Analysis and Data Validation

Primary and FD project samples collected in January and February 2009 were analyzed by AML Scientific, LLC of Olathe, Kansas. AML Scientific, LLC ceased operations at the end of February 2009. Regular and FD project samples collected after February 2009 were analyzed by Accutest Laboratories of Orlando, Florida. Field splits were analyzed by Test America, Inc., Canton, Ohio. Analysis for nitroaromatic field split samples was performed by Test America of Knoxville, Tennessee, and Test America of Denver, Colorado. Shaw performed the data validation. The validation summaries are provided in Appendix G. The analytical results are summarized in Appendix H. Tables of detected hits that exclude “B” qualified (Section 5.1.3) data are included in Appendix I. A data quality evaluation is located in Appendix J.

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

4.1.2 Analytical Methods

Chemical analyses for the investigation were performed in accordance with guidelines detailed in EPA's *Test Methods for Evaluating Solid Waste (SW-846), Physical/Chemical Methods,* Third Edition, September 1986 (EPA, 1986) and subsequent revisions. The groundwater samples and associated quality assurance/quality control (QA/QC) samples were analyzed for VOCs, SVOCs, inorganics, nitroaromatics, and several water quality parameters. Methods used for analysis for all four events are summarized in Table 4-1.

4.1.3 Data Quality Evaluation

The reliability of the sampling and analytical procedures used during the investigation was demonstrated by implementing the project-specific quality assurance procedures specified in the SWSAP (Shaw, 2008b) and QAPP (Shaw, 2008c) and its site-specific attachments. Successful execution of these procedures provides strong supporting evidence that the data are representative of the areas under investigation.

The DQOs for this project were to produce scientifically valid data of known accuracy and precision that were complete with respect to identified critical samples, comparable with similar data types, and representative of the media sampled so as to be useful for the cited purposes. Evaluation of the data using the DQOs and the data validation process resulted in the determination that the data set is valid and of sufficient quality to meet the objectives of the investigation.

Thirteen VOC results and all nitroaromatic results for two samples were rejected during the data validation process. Nitroaromatic results for samples AP0114 and AP0125 were rejected due to surrogate recoveries of "0" and professional judgment during data validation process. These samples should have been reanalyzed by the laboratory. However, AML did not reanalyze these samples before ceasing operations in February 2009. Seven results for acetone, two results for 2-butanone, two results for 1,2-dibromo-3-chloropropane, and two results for chloromethane were rejected during data validation (i.e., "R" qualified) because of calibration problems. Acetone and 2-butanone are "poor performers" by SW-846 8260B and often exhibit relative response factors below acceptance criteria. None of the VOCs listed are constituents of concern at Ash Pit 2 and all were reported by the lab as non-detects. A complete evaluation of the analytical results is given in the data quality evaluation found in Appendix J.

4.1.4 Blank Evaluation

The purpose of blank analysis is to detect contamination resulting from laboratory and field activities. Blank evaluation involves qualification of data based on the results of associated field blanks, trip blanks, equipment rinsates, and laboratory method blanks. The criteria for blank evaluation are as follows:

- If a parameter is found in a blank but not detected in the sample, no action is taken.
- For organics, if the sample result is greater than the contract-required quantitation limit, but is less than 5 times (most analytes) or 10 times (common laboratory contaminants) that of the blank result, the sample result is qualified “B.”
- For organics, if the sample result is less than the contract-required quantitation limit and less than 5 times (most analytes) or 10 times (common laboratory contaminants) the blank result, the sample result is qualified "B." The "J" qualifier is not used.
- For inorganics, if the sample result is greater than the instrument detection limit but less than 5 times the blank result, the sample result is qualified "B."
- If the sample result is greater than 5 times (most analytes) or 10 times (common laboratory contaminants) the blank result, the sample result is not qualified.

In instances where more than one blank is associated with a given sample, qualification is based upon a comparison with the associated blank having the highest concentration of a contaminant. Blank results are not subtracted from sample concentrations. Note that data with “B” validation qualifiers are included in the Chapter 5.0 tables, but the associated concentrations are not included in the tables’ “maximum detected concentration” (MDC) column because “B” qualified data are not used in PBOW risk assessments.

4.2 Comparison to Screening Criteria

The analytical result tables presented in Chapter 5.0 include a comparison to RBSCs and BSCs as points of reference only. Concentrations of analytes that exceed the RBSCs are highlighted in the tables. RBSCs do not infer a regulatory limit or mandated cleanup level, nor is the identification of an exceedance intended to indicate an unacceptable human health risk or a need for remedial action. Formal evaluation of human health risks will be performed in the BHHRA. Concentrations in individual samples that exceed the respective BSCs are identified as bolded in the Chapter 5.0 result tables.

4.2.1 Risk-Based Screening Concentrations

The RBSCs are derived from Oak Ridge National Laboratory-EPA (2009) regional screening levels as described in the AP2 BHHRA work plan (Shaw, 2009b). The groundwater RBSCs are based on a generalized residential drinking water scenario, assumed to be the most restrictive use of groundwater, and correspond to a one-in-a-million (1E-6) incremental lifetime cancer risk (ILCR) or a noncancer hazard quotient of 0.1, whichever results in a lower concentration (Shaw, 2009b). The soil RBSCs are based on a long-term residential land-use scenario that assumes use by a young child for noncancer effects and use by the combined young child and adult life stages for carcinogenic effects. Together, these capture a worst plausible case for future land use. The soil RBSCs are likewise based on an ILCR of 1E-6 and an hazard quotient of 0.1. RBSCs for surface water and sediment are derived from the respective groundwater and soil RBSCs as described in the BHHRA work plan (Shaw, 2009b). As stated in Section 4.2, laboratory analytical results are compared to RBSCs only as a point of reference. Further details on the RBSCs and their derivation are provided in the BHHRA work plan.

4.2.2 Background Screening Concentrations

BSCs have been derived for inorganic analytes and benzene, toluene, ethylbenzene, and xylenes in groundwater as shown in the 2004 groundwater and data summary report (Shaw, 2005). Derivation and BSC values for PBOW soil are presented in the acid areas site investigation report (IT, 1998). Table 4-2 presents a complete list of background screening values generated for groundwater while Table 4-3 presents a complete list for metals in soil. The BSCs were derived from concentrations of these analytes found in PBOW background groundwater monitoring wells and soil data sets. The background soil samples were collected from near the property boundary, away from any potential source areas, and the background groundwater wells were installed in off-site areas upgradient of PBOW sources. Each BSC is either the MDC or the calculated 95th percent upper tolerance limit of the background data set, whichever value is lower, for each relevant analyte (IT, 1998; Shaw, 2005). The background monitoring well samples were collected using low-flow methodology and were not filtered.

5.0 Investigation Results

5.1 AP2 Local Physical Setting

5.1.1 AP2 Site-Specific Soils

At many PBOW sites, following closure and removal of the manufacturing structures, tanks, and equipment, a local fill sand was brought to the areas to cover the remaining concrete building foundations and demolition scars and to provide a natural landscape appearance. At AP2 black ash and cinders are visible on the ground surface suggesting no fill cover was placed there. In addition, no fill material was encountered in any of the soil borings drilled within the former ash pit (note: fill material was encountered at two borings [AP2-MW01 and AP2-BEDGW-003] drilled near the road, but this fill material was determined to be from road construction) (Appendix A). Figure 5-1 shows an AP2 site map with soil boring locations.

The ash layer was encountered at AP2 in the upper 3 feet of soil. Below this ash layer, native soil consisted of a glacial till, glacial outwash, or a glacial lacustrine (lake) deposit. In general, a soft, mottled, brownish colored silt was first encountered, followed by a loose, mottled, very fine grain, brownish colored sand. Below the sand, a stiff, low plasticity, silty clay was encountered that continued to the top of bedrock, commonly found around 11 feet bgs. Shale or limestone fragments in the clay increased in quantity with depth until final probe refusal.

5.1.2 AP2 Site-Specific Geology

Bedrock units in the AP2 area are of Devonian age and consist of the Olentangy Shale and the underlying Delaware Limestone. The contact between these two units is believed to run near or through AP2. Figure 5-2 presents a regional geological map. All the AP2 bedrock well borings encountered Delaware Limestone. The only possible Olentangy Shale occurrence may have been at overburden well AP2-MW01, but this is not definitive since only a small portion of bedrock is sampled to facilitate well installation. Delaware Limestone was found conclusively at depths ranging from 13 feet (619.4 feet above msl) in bedrock well AP2-BEDGW-002 to 19.5 feet (618.9 feet above msl) in bedrock well AP2-BEDGW-003. The limestone was typically found to be brown in color if very weathered and gray if less weathered, and hard, fossiliferous (brachiopods, corals, styolites), with massive bedding below approximately 20 feet. Pyrite crystals were found on several cores. In addition, during drilling for monitoring well AP2-BEDGW-002 at around 47 and 70 feet bgs petroleum hydrocarbon was found seeping from the rock core. This is believed to be a natural petroleum common in the Delaware Limestone of the

region. Table 5-1 lists information relative to PBOW monitoring well borings which encountered natural petroleum hydrocarbon vapors, rock core staining, or hydrogen sulfide vapors.

5.1.3 AP2 Site-Specific Hydrogeology

Overburden/shale groundwater at AP2 was encountered at depths ranging from 1.7 feet (SB03/PZ03) to 5 feet bgs (SB08/PZ07) in January 2009 (wet season) during soil boring drilling/piezometer installation. However, groundwater was only encountered in three of the eight soil borings. During monitoring well installation conducted in April 2009 (wet season), overburden/shale groundwater was encountered at depths of 2.1 feet (AP2-MW03) to 8 to 10 feet bgs (AP2-MW01). Table 5-2 shows water level elevations at piezometers and monitoring wells. As shown by the May 23, 2009 overburden/shale groundwater elevation contour map (Figure 5-3), which includes water level measurements from both the temporary piezometers and permanent monitoring wells, groundwater flow is in a west direction toward Pipe Creek. Figure 5-4 presents an overburden/shale groundwater potentiometric map of water level measurements taken November 12, 2009 (dry season) from the overburden/shale monitoring wells (the piezometers were abandoned in July 2009). The groundwater flow direction during November 2009 is also in a west-northwest direction. Overburden/shale groundwater flow from both contour maps indicates that it mimics the surface topography.

In addition, one stream level staff gauge was placed in Pipe Creek and survey elevations recorded at the top and base of the rod. Water level measurements of Pipe Creek surface water were conducted from the staff gauge. When elevations are plotted in correlation with groundwater level measurements from overburden/shale monitoring wells, Pipe Creek meets the definition of a water “gaining” stream during the wet season month of May (Figure 5-3) and the definition of a water “losing” stream during the dry season month of November (Figure 5-4). Figure 5-3 shows May groundwater elevations in the AP2 area adjacent to Pipe Creek are greater than the water level elevation of Pipe Creek indicating groundwater is flowing into the creek. Figure 5-4 shows November groundwater elevations near Pipe Creek are less than the water level elevation of Pipe Creek indicating the creek is losing water to the adjacent overburden/shale groundwater system.

Three bedrock wells (AP2-BEDGW-001, AP2-BEDGW-002, and AP2-BEDGW-003) are present at AP2. Bedrock groundwater was encountered during April 2009 drilling of these wells in fractures at depths of 46.9 to 50.1 feet (AP2-BEDGW-003), 72.6 feet (AP2-BEDGW-001), and 73.2 feet (AP2-BEDGW-002). The screened interval of each of these wells is within the

Delaware Limestone bedrock. Groundwater level measurements collected from these three bedrock wells showed groundwater flow in a southwest direction, opposite of the expected northeast direction toward Lake Erie. To confirm or deny this flow direction made by just three bedrock monitoring wells, a regional bedrock groundwater flow map (Figure 5-5) was constructed from October 2009 PBOW groundwater level data collected by Stillwater Company, Inc. (company contracted by USACE for conducting quarterly groundwater level measurements). Unfortunately, the AP2 monitoring wells were not part of the contracted groundwater level measurements so they are not included in the bedrock groundwater flow determination of Figure 5-5. Figure 5-5 shows the regional groundwater flow to be northeast toward Lake Erie. To clarify bedrock groundwater flow in the AP2 area, inclusion of the bedrock monitoring wells in the PBOW site-wide water level measurements is recommended.

5.1.4 AP2 Site-Specific Hydraulic Connection Between Zones

Vertical hydraulic gradients were calculated for paired wells AP2-MW02 and AP2-BEDGW-002, located at AP2 near the center of the ash pit (Table 5-3). These wells are the only paired wells at the AP2 site. Overburden well AP2-MW02 is screened within overburden material and bedrock well AP2-BEDGW-002 is screened within the Delaware Limestone. Groundwater elevations in the overburden well are higher than those in the bedrock well. This difference suggests that there may be relatively limited connectivity between the overburden and bedrock water-bearing zones at AP2. In addition, any vertical groundwater migration that occurs will be downward from the overburden into the bedrock. The vertical gradient at this well pair was compared with the vertical gradient at other PBOW well pairs (Table 5-3). In comparison with other well pairs at PBOW, this well pair has a relatively small vertical gradient for downward groundwater movement from the overburden/shale water zone to the bedrock aquifer.

5.2 Soil Analytical Results

On April 15, 16, and 18, 2009, eight borings were drilled within the former ash pit. One soil boring, SB07, was drilled to a depth of 10 feet and soil samples collected. Seven other soil borings (SB01/PZ01 through SB06/PZ06 and SB08/PZ07) were drilled to a depth of 10 feet, soil samples collected, and drilling continued until probe refusal for piezometer installation.

A total of 30 soil samples were collected from the eight borings at AP2. Ten surface soil samples (including one FD and one field split sample [FS]) from depths of 0 to 1 foot and 20 subsurface (including two FD and two FS samples) from depths of 3 to 5 and 8 to 10 feet were collected from soil boring SB07 and seven piezometer soil sample locations (SB01/PZ01 through

SB06/PZ06 and SB08/PZ07). Table 5-4 summarizes the soil concentrations above RBSCs and BSCs. Figure 5-6 shows soil sample locations along with corresponding analytical results above RBSCs and BSCs.

5.2.1 2009 Surface Soil Samples

No nitroaromatics were detected in the surface soil (0 to 1 foot) samples at AP2. Two PCBs, Aroclor 1016 and 1260, were detected in the soil. Aroclor 1016 was detected in SB02 at a concentration of 0.525 parts per million (ppm), above the RBSC of 0.39 ppm. Aroclor 1260 was detected in SB03 (0.0162 ppm), but the concentration was below the RBSC. A total of nine SVOCs were detected in the surface soil samples, but only benzo(a)pyrene in a sample from SB01 was above its RBSC value. It was found at a concentration of 0.0844 ppm, above the RBSC of 0.015 ppm.

Seven inorganics were detected above RBSC limits in surface soil samples from AP2, while four samples were above BSC values. Arsenic, chromium, cobalt, and iron were detected above RBSCs in each of the soil samples. Concentrations of arsenic above the RBSC of 0.39 ppm ranged from a low of 5.50 ppm in the field split sample from boring SB07 to a high concentration of 26.8 ppm found in boring SB04. Results for chromium ranged from 6.13 ppm in boring SB08 to a high of 12.8 ppm from boring SB05, above the RBSC of 0.29 ppm. Cobalt concentrations above the RBSC of 2.3 ppm ranged from 3.90 ppm in boring SB08 to a high of 14.6 ppm in boring SB02. Iron was also detected above the RBSC value of 5,500 ppm in all of the samples. Concentrations ranged from 14,300 ppm in SB01 to 109,000 ppm in boring SB04. Four borings exhibited four surface soil samples that were above aluminum RBSC limits (7,700 ppm). Concentrations ranged from 8,070 ppm in SB03 to 9,310 ppm in boring SB02. Concentrations of beryllium were above the RBSC limit of 16 ppm in only two samples, SB04 (16.3 ppm) and SB08 (16.9 ppm). Manganese was the last metal that was found above the RBSC value. It was detected above the value of 180 ppm in seven samples, with the highest result of 546 ppm in SB02. Three inorganics (beryllium, lead, and mercury) exceeded BSC values. Beryllium exceeded the BSC value of 1 ppm in all surface soil samples except the field split sample, with concentrations ranging from 4.74 ppm (SB01) to a maximum of 16.9 ppm in SB08. Lead was found above the BSC value of 48.6 ppm in only one sample, AP0100 from boring SB01, and mercury exhibited results from two samples AP0100 (SB01) and 0.118 ppm (SB05) above the BSC value of 0.09 ppm. TOC was 11,400 ppm in the one sample that was analyzed for TOC (the surface sample at SB02).

5.2.2 2009 Subsurface Soil Samples

No nitroaromatics or PCBs were detected in the subsurface (3 to 5 and 8 to 10 feet) soil samples at AP2. Phenanthrene was the only SVOC to be detected in subsurface soils, and it was below the RBSC in all seven 8 to 10 feet detections. No RBSC value is established for phenanthrene. Concentrations ranged from a low of 0.0403 ppm in boring SB06 to a high of 0.0855 ppm in boring SB01.

Six inorganics were detected above RBSCs in subsurface soil samples, and three were above BSCs. Inorganics that exceeded RBSC values included aluminum, arsenic, chromium, cobalt, iron, and manganese, and inorganics above background included most beryllium, calcium, and magnesium detections. Aluminum exceeded the RBSC of 7,700 ppm in 14 of the samples, with concentrations ranging from 7,720 ppm in the 8 to 10 feet sample from SB03 to 15,100 ppm in the 8 to 10 feet sample from SB08. Arsenic, chromium, cobalt, and iron exceeded the respective RBSC in every 3 to 5 and 8 to 10 feet sample. Arsenic concentrations ranged from a low of 3.55 ppm (8 to 10 feet; SB06) to a maximum of 15.7 ppm (3 to 5 feet; SB02), exceeding the RBSC of 0.39 ppm. Chromium concentrations ranged from a low of 8.82 ppm (3 to 5 feet; SB07) to a maximum of 22.4 ppm (8 to 10 feet; SB08), exceeding the RBSC of 0.29 ppm. Cobalt concentrations ranged from a low of 6.67 ppm (3 to 5 feet; SB05) to a maximum of 15.60 ppm (8 to 10 feet; SB08), exceeding the RBSC of 0.23 ppm, while iron concentrations ranged from a low of 13,300 ppm in the FS sample (3 to 5 feet; SB02) to a maximum of 55,100 ppm (8 to 10 feet; SB07), exceeding the RBSC of 5,500 ppm. Manganese was the last metal detected that exceeded RBSC values. The RBSC for manganese (180 ppm) was exceeded in 16 samples, with an MDC of 726 ppm from the 3 to 5 feet sample in boring SB02. Most of the beryllium concentrations exceeded the BSC value of 1 ppm, with results ranging from 5.46 ppm (3 to 5 feet; SB07) to 9.06 ppm (3 to 5 feet; SB02). Although not discussed because they are commonly occurring nutritionally essential elements, calcium had two detections and magnesium had seven detections that were above BSC values of 52,300 and 10,400 ppm, respectively.

5.3 Surface Water Analytical Results

On May 24 and 25, 2009, five surface water samples along with correlated QA/QC samples were collected from Pipe Creek. Surface water samples were analyzed for nitroaromatics, SVOCs, inorganics, PCBs, and water quality readings (ORP, pH, conductivity, turbidity, dissolved oxygen, and temperature) were recorded. In addition to the other parameters at one sample location, AP2-SW01, hardness was also analyzed. Surface water samples were not filtered. All samples were collected by submerging the appropriate sample bottle. Stream water flow was

gentle, in a northerly direction, and continuous. Sample bottles that contained preservative were submerged and nearly filled, but remaining bottle space was topped off with water from a non-preserved bottle. Sample collection began at the farthest downstream location and continued in the upstream direction. Table 3-4 presents final surface water quality field measurements. Table 5-5 presents detected constituents above RBSC values in surface water samples. Figure 5-7 presents surface water sample locations along with corresponding analytical results above RBSCs. Appendix B presents surface water sample collection logs.

No nitroaromatics or PCBs were detected in any surface water samples. The semivolatile bis(2-ethylhexyl)phthalate, a common laboratory contaminant, was detected in the FD of sample AP2-SW03 at a concentration of 2 parts per billion (ppb), far below the RBSC of 48 ppb. This was the only SVOC detected and it was not found in the regular sample or the field split sample also analyzed from this sample location. A total of nine inorganics, excluding essential human macronutrients (calcium, magnesium, potassium, and sodium) necessary for the human body livelihood, were detected in the five surface water samples. These essential human macronutrients are calcium, chloride, magnesium, phosphorous, potassium, and sodium, which are typically found in all sample media. Inorganic analytes detected included aluminum, barium, cobalt, iron, lead, manganese, nickel, vanadium, and zinc. None of the results were above the associated RBSC for that parameter, and in most cases, analytical results were one to two orders lower when compared to the appropriate RBSC value. Lead was the only analyte detected that was not a essential human macronutrients that does not have an established RBSC. Lead was detected in samples AP2-SW03 and AP2-SW04, with results in both samples at 2.9 ppb. Hardness was measured in surface water sample AP2-SW01 at a concentration of 286,000 ppb.

5.4 Sediment Analytical Results

Collocated with the surface water samples, five sediment samples and associated QA/QC samples were collected from Pipe Creek on May 24 and 25, 2009. Sediment samples were analyzed for nitroaromatics, SVOCs, inorganics, PCBs, and one sample, AP2-SD01, was also analyzed for TOC. Six inches (0.5 foot) of sediment were collected and placed in a new resealable plastic bag and homogenized. For each sample, if present, organics (leaves and roots) were removed prior to sample collection. Table 5-6 presents detected constituents in sediment samples above RBSC and BSC values. Figure 5-7 presents sediment sample locations along with corresponding analytical results above RBSCs and BSCs. Appendix B presents sediment sample collection logs.

One nitroaromatic, TNT, was detected in sediment sample AP2-SD03 at a concentration of 0.0647 ppm, below the RBSC of 36 ppm. Fluoranthene was the only SVOC parameter detected. It was found in sample AP2-SD03 at a concentration of 0.0525 ppm, far below the RBSC of 2,300 ppm. A total of 17 inorganics, excluding the 4 nutritionally essential inorganic elements, were detected in 5 sediment samples. Inorganic analytes detected included aluminum, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, silver, vanadium, and zinc. Most of the inorganics were found in each of the sediment samples collected. The only inorganics above RBSC values were arsenic and chromium. Arsenic was detected in each sample collected and was above the RBSC of 3.9 ppm. Concentrations ranged from a low of 3.9 ppm in sample AP2-SD05 to a high of 10.1 ppm in sample AP2-SD03. Chromium was found above the RBSC value of 2.9 ppm in each sample, with concentrations ranging from a low of 6.4 ppm in AP2-SD01 to 12.8 ppm in sample AP2-SD04. TOC was measured in sediment sample AP2-SD01 at a concentration of 0.57 ppm.

5.5 Overburden/Shale Groundwater Results

From January 31 through February 2, 2009, groundwater was collected from three of the seven piezometers installed at AP2- SB03/PZ03, SB04/PZ04, and SB08/PZ07. All samples were collected from temporary piezometers using the low-flow groundwater sampling methodology. Groundwater from other piezometers (SB01/PZ01, SB02/PZ02, SB05/PZ05, and SB06/PZ06) recharged at a flow rate less than 50 milliliters per minute, so no groundwater sample was collected. A total of five groundwater samples (including one FD and one FS sample) were collected from the three piezometers. Groundwater samples were analyzed for nitroaromatics, SVOCs, inorganics (filtered and unfiltered), hardness, and water quality parameters (alkalinity, chloride, cyanide, hardness, nitrate, sulfate, total dissolved solids, total suspended solids, turbidity, oxidation reduction potential, and ferrous iron). Table 3-4 provides final water quality readings of the groundwater immediately prior to sample collection. Table 5-7 summarizes the groundwater analytical concentrations above RBSCs and BSCs. Figure 5-8 shows groundwater sample locations along with corresponding analytical results above the RBSCs and BSCs.

Overburden/shale groundwater was also sampled in permanently installed shallow monitoring wells AP2-MW01, AP2, MW02, and AP2-MW03. Groundwater was sampled near the end of May 2009 during the wet season and also sampled in November 2009 (dry season). Groundwater was collected during the month of May using a bladder pump and the low-flow sampling methodology. Due to dry conditions during the month of November, only nitroaromatics could be collected from wells AP2-MW01 and AP2-MW02. Groundwater from these two wells was

purged with a bladder pump one day and samples for nitroaromatics collected the following day by using a new, disposable Teflon bailer. Overburden/shale monitoring well AP2-MW03 was found dry during the month of November, so no groundwater sample was collected. Groundwater was analyzed for nitroaromatics, inorganics (filtered and unfiltered), VOCs, SVOCs, and water quality parameters (alkalinity, chloride, cyanide, hardness, nitrate/nitrite, sulfate, total dissolved solids, total suspended solids, turbidity, ferrous iron, and ORP). Table 3-4 provides final water quality readings of the groundwater immediately prior to sample collection. Table 5-7 and Figure 5-8 show analytical results above the RBSCs and BSCs. (Note: Because monitoring wells AP2-MW01 and AP2-MW02 were analyzed only for nitroaromatics during the November 2009 sampling and no nitroaromatics were detected, and because the tables are presenting detections only, both wells are absent from the table).

5.5.1 Piezometer Analytical Data

All AP2 piezometer sampling took place in January and February of 2009 corresponding to wet season conditions. No nitroaromatics or SVOCs were detected above RBSCs or BSCs in the groundwater in AP2 piezometers. Two unfiltered inorganics were detected above RBSCs in the overburden/shale groundwater in the piezometers sampled. Cadmium was detected above the RBSC of 1.8 ppb in all samples and ranged from 3.91 ppb in groundwater from PZ07 to 4.28 ppb in piezometer PZ04. Iron was detected in groundwater above the RBSC of 2,600 ppb in one piezometer, PZ03, at a concentration of 5,060 ppb. This result also exceeded the BSC of 1,550 ppb. Aluminum exceeded the groundwater BSC of 309 ppb in PZ03 at a concentration of 2,400 ppb. Cadmium was the only metal that exhibited concentrations above the RBSC in the filtered samples. Cadmium concentrations were detected in each temporary piezometer and ranged from 3.90 ppb in PZ07 to 4.36 ppb in PZ03. No inorganic BSC values were exceeded in the filtered samples.

5.5.2 Overburden/Shale Monitoring Well Analytical Data

May 2009 (Wet Season). Similar to groundwater in temporary piezometers, no nitroaromatics or SVOCs were detected in the groundwater in AP2 overburden/shale monitoring wells. Three inorganics were detected above RBSCs in the unfiltered groundwater. Cobalt was detected above the RBSC of 1.1 ppb in the regular and FD sample from AP2-MW02 at concentrations of 7.9 and 8.3 ppb, respectively. Manganese was detected above the RBSC of 88 ppb in four samples, three from AP2-MW02 and one from AP2-MW03. The highest concentration in groundwater from AP2-MW02 was 229 ppb (regular and FD sample) to a low concentration of 173 ppb in

AP2-MW03. Nickel was detected in well AP2-MW02 at a concentration of 74.2 ppb in both the regular and FD sample, above the RBSC of 73 ppb. This result also exceeded the BSC for nickel of 8.6 ppb. In addition, although the concentration of nickel in the FS sample did not exceed the RBSC, the result of 68.9 ppb was above the BSC value. These same three elements also exceeded the RBSC and BSC values in the filtered samples. Cobalt was above the RBSC, with concentrations of 8.9 and 8.7 ppb in the regular and FD sample. Manganese was also above the RBSC in the three samples from AP2-MW02, with concentrations of 220 ppb (regular), 214 ppb (FD), and 218 ppb (FS). The manganese result above the RBSC of 88 ppb for well AP2-MW03 was 171 ppb. Nickel exceeded the RBSC in the regular sample, and the BSC value was also exceeded by all three AP2-MW02 concentrations.

November 2009 (Dry Season). As mentioned in Section 5.5, due to dry conditions during the month of November, wells AP2-MW01 and AP2-MW02 yielded only enough water for nitroaromatics analysis. Well AP2-MW03 was dry and could not be sampled. No nitroaromatics were detected in the groundwater from either AP2-MW01 or AP2-MW02. Because no nitroaromatics were present in either of these two wells, corresponding data for the month of November are absent in Table 5-8 (table shows detections only).

5.6 Bedrock Groundwater Results

In conjunction with the groundwater sampling of the overburden/shale monitoring wells, groundwater in the bedrock monitoring wells (AP2-BEDGW-001, AP2-BEDGW-002, and AP2-BEDGW-003) was also sampled. Monitoring well screens from all three of the bedrock monitoring wells are located within the Delaware Limestone bedrock unit. Like the overburden/shale wells, groundwater was sampled near the end of May 2009 during the wet season and also sampled in November 2009 during the PBOW dry season. During the months of May and November, insufficient groundwater was found in monitoring well AP2-BEDGW-001, so a groundwater sample could not be collected. Groundwater from the other bedrock wells (AP2-BEDGW-002 and AP2-BEDGW-003) was collected during both sampling events by low-flow sampling methodology using a bladder pump. During the month of May, in addition to the regular samples collected from both wells, an FD and an FS sample were collected from the groundwater of AP2-BEDGW-003. Then during the month of November, in addition to the regular samples, an FD and an FS sample were collected from well AP2-BEDGW-002. Groundwater was analyzed for nitroaromatics, inorganics (filtered and unfiltered), VOCs, SVOCs, and water quality parameters (alkalinity, chloride, cyanide, hardness, nitrate/nitrite, sulfate, total dissolved solids, total suspended solids, turbidity, ferrous iron, and ORP). Table 3-4

provides final water quality readings of the groundwater immediately prior to sample collection. Table 5-9 and Figure 5-9 show analytical results above the RBSCs and/or BSCs.

5.6.1 May 2009 (Wet Season)

No nitroaromatics were detected in the groundwater from bedrock monitoring wells during the PBOW wet season month of May. Volatile organics above RBSCs included three compounds; benzene, ethylbenzene, and total xylenes. Results from these analytes and toluene also exceeded BSC values. Benzene was above the RBSC of 0.41 ppb and BSC of 2.4 ppb in both wells sampled. Concentrations range from 8.5 ppb in AP2-BEDGW-002 to 100 ppb in the FS sample in well AP2-BEDGW-003. Ethylbenzene was found at a concentration of 9.6 ppb in well AP2-BEDGE-002, above the 1.5 ppb RBSC and 0.87 ppb BSC value, while the FS sample of AP2-BEDGW-003 was 21 ppb. Groundwater from well AP2-BEDGW-002 showed a total xylene concentration of 63.2 ppb, above the RBSC of 20 ppb and BSC value of 5.5 ppb, while well AP2-BEDGW-003 showed a concentration nearly twice that amount in the FS sample, with a result of 260 ppb. SVOC naphthalene was found above the RBSC of 0.14 ppb in both wells, with results of 2 ppb in AP2-BEDGW-002 and 2.9 ppb in the regular sample in well AP2-BEDGW-003. No inorganics that are not nutritionally essential elements were detected above RBSC or BSC values in either the filtered or unfiltered samples. Calcium was the only inorganic that was detected above screening limits, and it exceeded its BSC value in both wells. Cyanide was detected above the RBSC in groundwater from bedrock well AP2-BEDGW-003 in the FS sample. It was found at a concentration of 710 ppb above the RBSC of 73 ppb. Cyanide was not detected in either of the other two associated samples (regular and FD sample) from the well.

5.6.2 November 2009 (Dry Season)

Like the wet season month of May, no nitroaromatics were detected in the bedrock groundwater at AP2. Volatile organics above RBSCs included benzene, chloroform, chloromethane, ethylbenzene, methylene chloride, and total xylenes. Benzene was above the RBSC of 0.41 ppb and BSC of 2.4 ppb in both wells sampled. Concentrations ranged from 4.1 ppb in AP2-BEDGW-002 (FS sample) to 336 ppb in well AP2-BEDGW-003. Ethylbenzene ranged from 5 ppb in well AP2-BEDGW-002 in the FS sample to 57.1 ppb in AP2-BEDGW-003. Groundwater from well AP2-BEDGW-002 showed total xylene concentrations ranging from 29 ppb in the FS sample from AP2-BEDGE-002 to 630 ppb in well AP2-BEDGW-003. Chloroform exceeded the RBSC value of 0.19 ppb, with concentrations of 4 ppb in well AP2-BEDGW-002 and a maximum concentration of 14.6 ppb in well AP2-BEDGW-003. Toluene exceeded the BSC value in all samples, with concentrations ranging from 2.3 ppb in the FS sample from well AP2-

BEDGW-003 to a maximum of 147 ppb in well AP2-BEDGW-003. Naphthalene exceeded the RBSC in groundwater results from both wells, with a maximum concentration of 1.9 ppm in well AP2-BEDGW-002 and a result of 7.4 ppb in AP2-BEDGW-003. Selenium was detected in both the unfiltered (21.3 ppb) and filtered (74.9 ppb) groundwater samples from well AP2-BEDGW-002, above the RBSC of 18 ppb, and was also detected in the filtered sample from well AP2-BEDGW-003 at a concentration of 22.4 ppb. Once again, nutritionally essential element calcium was detected above BSC values in both the filtered and unfiltered samples in well AP2-BEDGW-002. Cyanide was detected above the RBSC in groundwater from bedrock well AP2-BEDGW-002 in the FS sample. It was found at a concentration of 510 ppb, above the RBSC of 73 ppb. Cyanide was not detected in either of the other two associated samples (regular and FD sample) from the well.

6.0 Conclusions

This chapter presents conclusions of RI activities conducted at AP2. Activities were conducted from January to November 2009 and included soil borehole drilling, temporary piezometer installation, soil sample collection, overburden/shale groundwater sampling from temporary piezometers, permanent overburden/shale and Delaware Limestone bedrock monitoring well installation, two rounds of groundwater sampling from monitoring wells (one in the PBOW derived wet season and one in the dry season), surface water and sediment sampling, and IDW management and disposal. Analytical results obtained from all samples were screened against RBSC and BSC values. RBSC values do not infer a regulatory limit or mandated cleanup level, nor does an exceedance necessarily represent an unacceptable human health risk. They are used in this report only as points of reference. BSC values were derived from PBOW background samples and were also used as points of reference.

6.1 Surface Water Sample Summary

A total of seven surface water samples (FD and FS samples included in total) were collected from five locations in Pipe Creek. Surface water samples were analyzed for nitroaromatics, SVOCs, inorganics, PCBs, and water quality readings (ORP, pH, conductivity, turbidity, dissolved oxygen, and temperature). In addition, at sample location AP2-SW01, hardness was also analyzed. The major findings are summarized as follows:

- No nitroaromatics or PCBs were detected in any of the surface water samples from Pipe Creek.
- No SVOCs or inorganics were detected above RBSC or BSC values.
- Hardness was detected at a concentration of 286,000 ppb in Pipe Creek surface water.

6.2 Sediment Sample Summary

A total of seven sediment samples (FD and FS samples included in total) were collocated with the surface water sample locations in Pipe Creek. Sediment samples were analyzed for nitroaromatics, SVOCs, inorganics, and PCBs, and one sample, AP2-SD01, was also analyzed for TOC. Six inches (0.5 foot) of sediment were collected and placed in a new resealable bag and homogenized. The major findings are summarized as follows:

- No nitroaromatics or SVOCs were detected above RBSC values in the sediment samples from Pipe Creek.

- No PCBs were detected in any of the sediment samples.
- Only arsenic and chromium were detected above the RBSCs in each sample.
- TOC was found to be 0.57 ppm.

6.3 Soil Sample Summary

A total 30 soil samples were collected at AP2; 10 surface soil samples from depths of 0 to 1 foot and 20 subsurface soil samples from depths of 3 to 5 and 8 to 10 feet. Soil samples from depths of 0 to 1 and 3 to 5 feet were analyzed for nitroaromatics, inorganics, PCBs, and SVOCs and one 0 to 1 foot sample was analyzed for TOC. Soil from the 8 to 10 feet depth was analyzed for nitroaromatics, inorganics, and SVOCs. The major findings are summarized as follows:

- No nitroaromatics were detected in surface or subsurface soil samples at AP2.
- The PCB Aroclor 1016 was detected above the RBSC in one surface soil sample.
- Benzo(a)pyrene was detected in the surface soil in boring AP2-SB01 at a concentration of 0.0844 ppm, above the RBSC of 0.015 ppm.
- Metals found in the surface soil (0 to 1 foot) above the RBSC and BSC included aluminum, arsenic, beryllium, chromium, cobalt, iron, lead, manganese, and mercury.
- Metals found in the subsurface soil (3 to 5 and 8 to 10 feet) above the RBSC and BSC included aluminum, arsenic, beryllium, chromium, cobalt, iron, and manganese. In addition, the nutritionally essential calcium and magnesium were detected above BSC levels (as nutritionally essential elements they lack RBSC values).

6.4 Piezometer Overburden/Shale Groundwater Sample Summary

A total of five groundwater samples were collected from three temporary piezometers (FD and FS samples included in total) in January and February 2009 and analyzed for nitroaromatics, SVOCs, inorganics (filtered and unfiltered), hardness, and water quality parameters (alkalinity, chloride, cyanide, hardness, nitrate, sulfate, total dissolved solids, total suspended solids, turbidity, ORP, and ferrous iron). The major findings are summarized as follows:

- No nitroaromatics were detected in piezometer overburden/shale groundwater samples at AP2.
- No SVOCs were detected above RBSC or BSC values in piezometer overburden/shale groundwater samples at AP2.

- Inorganics detected above the RBSC and BSC in the unfiltered samples included aluminum, cadmium, and iron.
- Inorganics detected above the RBSC in the filtered samples included only cadmium (BSC value not established).

6.5 Monitoring Well Overburden/Shale Groundwater Sample Summary

Five groundwater samples (FD and FS samples included in total) were collected during the wet season month of May 2009 and two groundwater samples were collected during the dry season month of November 2009. Groundwater was analyzed for nitroaromatics, inorganics (filtered and unfiltered), VOCs, SVOCs, and water quality parameters (alkalinity, chloride, cyanide, hardness, nitrate/nitrite, sulfate, total dissolved solids, total suspended solids, turbidity, ORP, and ferrous iron). The two groundwater samples collected from overburden/shale monitoring wells during the dry season (November 2009) were analyzed only for nitroaromatics. The major findings are summarized as follows:

- No nitroaromatics were detected in monitoring well overburden/shale groundwater samples at AP2 during either the wet (May) or dry (November) season at AP2.
- No VOCs or SVOCs were detected in monitoring well overburden/shale groundwater samples collected during the wet month of May.
- Inorganics detected above the RBSC and BSC in the unfiltered samples included cobalt, manganese, and nickel.
- Inorganics detected above the RBSC and BSC in the filtered samples included cobalt, manganese, and nickel.

6.6 Bedrock Groundwater Sample Summary

Five groundwater samples (FD and FS samples included in total) were collected during the wet season of May 2009 and five groundwater samples were collected during the dry season month of November 2009. Groundwater samples were collected from wells AP2-BEDGW-002 and AP2-BEDGW-003. No samples were able to be collected from bedrock well AP2-BEDGW-001 during either sampling event due to the well being dry. Groundwater was analyzed for nitroaromatics, inorganics (filtered and unfiltered), VOCs, SVOCs, and water quality parameters (alkalinity, chloride, cyanide, hardness, nitrate/nitrite, sulfate, total dissolved solids, total suspended solids, turbidity, ferrous iron, and ORP). The major findings are summarized as follows:

- No nitroaromatics were detected in bedrock groundwater samples at AP2.
- VOCs detected above RBSCs and/or BSCs during the months of May and November included petroleum related hydrocarbon compounds benzene, chloroform, chloromethane, ethylbenzene, methylene chloride, toluene, and total xylenes.
- Naphthalene was the only SVOC detected above the RBSC and that occurred during both the wet and dry seasons.
- Calcium was the only metal found at concentrations exceeding BSC values (as an essential nutrient calcium has no RBSC). Calcium exceeded its BSC in both filtered and unfiltered May and November samples.
- Selenium was the only metal found in the unfiltered samples above RBSC values, selenium lacks a BSC value. It exceeded its RBSC of 18 ppb in one of the November samples where it was detected at a concentration of 21.3 ppb,
- Selenium was the only metal found in the filtered samples above RBSC values. It exceeded its RBSC of 18 ppb in two November samples, one from AP2-BEDGW-002 (74.9 ppb) and one from AP2-BEDGW-003 (22.4 ppb).
- Total cyanide was detected in well AP2-BEDGW-002 (FS sample) during the dry season at a concentration of 510 ppb. Total cyanide was also detected above the RBSC in the FS sample from bedrock well AP2-BEDGW-003 during the wet season at a concentration of 710 ppb. Cyanide lacks a BSC value.
- Due to the presence of chloroform in the bedrock groundwater detected in both bedrock monitoring wells along with the detection of breakdown daughter products, chloromethane and methylene chloride, an anaerobic environment is indicated.

7.0 Recommendations

Based upon conclusions from soil, groundwater, sediment, and surface water, analytical results in this investigation, the following actions are recommended:

- During a preliminary AP2 site visit a brick-lined, 12-foot-deep, 2-foot-diameter, hand-dug well was found with 10 feet of water in it and strong hydrogen sulfide odors emanating from it. The well is believed to predate AP2. Due to potential health and safety issues, the hand-dug well should be backfilled, although backfill of a preexisting condition is not responsibility of the USACE.

- Given the limited water level data from the new wells, additional water level readings should be made to improve the understanding of groundwater flow directions for the overburden/shale and bedrock water zones in the AP2 area. This can be accomplished by including the AP2 wells in the site-wide groundwater level measurement activities.

- Given there were no detections of potential contaminants above screening criteria in the surface water samples, no further action, evaluation, or risk assessment is recommended for the surface water in the AP2 area.

- Given the detections of contaminants above screening criteria in the soil, sediment, overburden/shale groundwater, and bedrock groundwater samples from the AP2 area a baseline human health risk assessment (BHHRA) and a screening-level ecological risk assessment (SLERA) should be conducted for these media using the SI and the RI data.

Activities In Progress:

- BHHRA and SLERA (draft reports anticipated to be complete in 2010).

8.0 References

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TABLES

Table 1-1

Historical Summary of Organics in Surface and Subsurface Soil
Powerhouse 2 Ash Pits Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

	Sample Location:	PH2SO-01		PH2SO-02		PH2SO-03		PH2SO-04		PH2SO-05		PH2SO-06	
	Sample Number:	4010	4020	4030	4040	4050	4060	4070	4080	4090	4100	4110	4120
	Sample Depth (feet):	0 - 0.5	2 - 3	0 - 0.5	2 - 3	0 - 0.5	2 - 3	0 - 0.5	2 - 3	0 - 0.5	2 - 3	0 - 0.5	2 - 3
	Sample Date:	9/28/96	9/28/96	9/28/96	9/28/96	9/28/96	9/28/96	9/28/96	9/28/96	9/28/96	9/28/96	9/28/96	9/28/96
Parameter	RBC[a]	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds (µg/kg)													
Acetone	7.80E+05							120 J			120	42 J	
Bromomethane	1.10E+04												
Methylene chloride	8.50E+04									52 J			
Toluene	1.60E+06					18 J	11						
Xylene (total)	1.60E+07						6.5						
Semivolatile Organic Compounds (µg/kg)													
Anthracene	6.30E+06	58 J[b]											
Acenaphthylene	4.70E+05[c]	110 J											
Benzo(a)anthracene	880	130 J				76 J							
Benzo(a)pyrene	88	170 J				99 J							
Benzo(b)fluoranthene	880	160 J											
Benzo(g,h,i)perylene	2.30E+5[d]	130 J											
Benzo(k)fluoranthene	8.80E+03	230 J											
bis(2-Ethylhexyl)phthalate	4.60E+04												
Chrysene	8.80E+04	160 J				98 J							
di-n-butyl phthalate	7.80E+05												
Fluoranthene	3.10E+05	300 J		70 J		180 J							
indeno(1,2,3-cd)pyrene	880	120 J											
Phenanthrene	2.30E+6[e]	100 J				63 J							
Pyrene	2.30E+05	250 J		59 J		150 J							
Pesticides/PCBs (µg/kg)													
4,4' - DDE	1,900	7.4								3.4			
4,4' - DDT	1,900	6.3								3.6		2.6	
Methoxychlor	39,000			6.1		6.5							
Cyanide (µg/kg)													
Cyanide, total	1.60E+05[f]												

Table 1-1

Historical Summary of Organics in Surface and Subsurface Soil
Powerhouse 2 Ash Pits Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

	Sample Location:	PH2SO-07		PH2SO-08		PH2SO-09		PH2SO-10		PH2SO-11		PH2SO-12	
	Sample Number:	4130	4140	4150	4160	4170	4180	4190	4200	4210	4220	4230	4240
	Sample Depth (feet):	0 - 0.5	2 - 3	0 - 0.5	2 - 3	0 - 0.5	2 - 3	0 - 0.5	2 - 3	0 - 0.5	2 - 3	0 - 0.5	2 - 3
	Sample Date:	9/28/96	9/28/96	9/28/96	9/28/96	9/29/96	9/29/96	9/29/96	9/29/96	9/29/96	9/29/96	9/29/96	9/29/96
Parameter	RBC[a]	Result	Result	Result	Result	Result	Result	Result	Resulst	Result	Result	Result	Result
Volatile Organic Compounds (µg/kg)													
Acetone	7.80E+05												
Bromomethane	1.10E+04				1.1 J								
Methylene chloride	8.50E+04												
Toluene	1.60E+06												
Xylene (total)	1.60E+07												
Semivolatile Organic Compounds (µg/kg)													
Anthracene	6.30E+06												
Acenaphthylene	4.70E+05[c]												
Benzo(a)anthracene	880												
Benzo(a)pyrene	88												
Benzo(b)fluoranthene	880												
Benzo(g,h,i)perylene	2.30E+5[d]												
Benzo(k)fluoranthene	8.80E+03												
bis(2-Ethylhexyl)phthalate	4.60E+04							95 J			66 J		
Chrysene	8.80E+04												
di-n-butyl phthalate	7.80E+05									170 J			66 J
Fluoranthene	3.10E+05					79 J				83 J			
indeno(1,2,3-cd)pyrene	880												
Phenanthrene	2.30E+6[e]												
Pyrene	2.30E+05					52 J				67 J			
Pesticides/PCBs (µg/kg)													
4,4' - DDE	1,900	7.1		2.4		5.8		3.9		3.4			
4,4' - DDT	1,900	7.1		3.5		5.7		4.1		3.3			
Methoxychlor	39,000												
Cyanide (µg/kg)													
Cyanide, total	1.60E+05[f]	930				710		890					

[a]Risk-based concentration for residential soil taken from EPA, 1997, *Risk-Based Concentration Table*, 14 March, EPA Region III, Philadelphia, PA, on-line, unless otherwise noted; adjusted to reflect a cancer risk of 1E-6 and noncancer hazard index of 0.1 to provide additional protection for exposure to multiple chemicals or media.

[b]J qualifier. Analyte present. Reported value may not be accurate or precise.

[c]Based on the noncancer effects of acenaphthene, a structurally similar member of the same chemical class.

[d]Based on the noncancer effects of pyrene, a structurally similar member of the same chemical class.

[e]Based on the noncancer effects of anthracene, a structurally similar member of the same chemical class.

[f]Based on the value for free cyanide.

Note 1: 170

Note 2: Blank cells indicate that compound was analyzed for but was not detected.

µg/kg - Micrograms per kilogram.

Table 1-2

Historical Summary of Inorganics in Surface and Subsurface Soil
Powerhouse 2 Ash Pits Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

	Sample Location:	PH2SO-01		PH2SO-02		PH2SO-03		PH2SO-04		PH2SO-05		PH2SO-06		PH2SO-07	
	Sample Number:	4010	4020	4030	4040	4050	4060	4070	4080	4090	4100	4110	4120	4130	4140
	Sample Depth (feet):	0-0.5	1.5 - 2	0-0.5	2 - 3	0-0.5	2 - 3	0-0.5	2 - 3	0-0.5	2 - 3	0 - 0.5	2 - 3	0-0.5	2 - 3
	Sample Date:	9/28/96	9/28/96	9/28/96	9/28/96	9/28/96	9/28/96	9/28/96	9/28/96	9/28/96	9/28/96	9/28/96	9/28/96	9/28/96	9/28/96
Parameter	RBC[a]	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Metals (mg/kg)															
Aluminum	7,800	**12700**	5880	**8210**	3520	**8940**	6580	**13900**	**9490**	**8300**	**9920**	**9850**	**8570**	**10300**	**8940**
Arsenic	0.43	**11.6**	**4.8**	**17.8**	**3.6**	**15.1**	**6.2**	**7**	**7.1**	**20.7**	**5.5**	**19**	**4.4**	**18.1**	**4.6**
Barium	550	85.3	40.3	141	29.9	108	60	90.2	59.4	133	82.9	121	73	141	90
Beryllium	0.15	**1.2**		**1.1**		**1.2**		**0.83**	**0.6**	**1.4**	**0.76**	**1**	**0.76**	**1.6**	**0.68**
Cadmium	3.9			1.1						1.4					
Chromium	39[b]	16.2	8.9	7.5	6.1	12.5	10.2	17.7	14.2	9.9	13.4	1.9	11.6	14.8	11.5
Cobalt	470	15.1	10.7	19	8.5	16.5	13.4	16.4	15.2	13.8	19.6	15.4	12.3	15.8	12.1
Copper	310	33.1	12.5	28.2	8.3	25.4	14.1	18.6	17.3	25.7	18	38.6	18.4	25	24.7
Iron	2,300	**38700**	**14000**	**74000**	**10500**	**28900**	**18000**	**25200**	**22500**	**45400**	**22500**	**107000**	**23700**	**41200**	**20800**
Lead	400[c]	32.2	7.7	15.6	6.1	25.4	10.3	14.8	10.5	18.8	11.1	15.6	10.9	19.1	11.1
Manganese	160	**189**	**259**	**1020**	129	**494**	**236**	**430**	**464**	**350**	**693**	**165**	**126**	**241**	**324**
Mercury (inorganic)	2.3	0.1		0.059		0.098				0.069				0.072	
Nickel	160	41.9	18.3	30.8	13.9	26	20.4	30.4	31.9	23.5	34.3	28.3	28.3	27	29.3
Selenium	39	2.1		1.8		2		0.65		2.2		1.8	0.64	1.7	
Silver	39			2				1.6	1.6		1.2	1.7			
Thallium	0.51[d]	**1.9**		**2.9**			**1.3**			**1.9**		**4.4**			
Vanadium	55	19.6	14.3	8.8	7.5	19	13.2	24.9	21.1	14.3	17.7		13.5	19.9	14.8
Zinc	2,300	127	39.2	73	35.3	78	56	88.7	73.2	61.5	78.5	45.7	76.5	73.6	68.8

Table 1-2

Historical Summary of Inorganics in Surface and Subsurface Soil
Powerhouse 2 Ash Pits Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

	Sample Location:	PH2SO-08		PH2SO-09		PH2SO-10		PH2SO-11		PH2SO-12	
	Sample Number:	4150	4160	4170	4180	4190	4200	4210	4220	4230	4240
	Sample Depth (feet):	0-0.5	2 - 3	0-0.5	2 - 3	0-0.5	2 - 3	0-0.5	2 - 3	0 - 0.5	3- 4
	Sample Date:	9/28/96	9/28/96	9/29/96	9/29/96	9/29/96	9/29/96	9/29/96	9/29/96	9/29/96	9/29/96
Parameter	RBC[a]	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Metals (mg/kg)											
Aluminum	7,800	**11500**	6950	**13800**	7100	**10500**	5650	**10900**	**9880**	**11600**	5370
Arsenic	0.43	**6.3**	**5.1**	**9.3**	**5**	**16.2**	**4.4**	**13.6**	**5.8**	**21.2**	**4.3**
Barium	550	74.3	54.2	103	55.2	107	40.8	102	90.3	131	38.3
Beryllium	0.15	**0.73**		**0.96**		**1.2**		**1.3**	**0.7**	**1.2**	
Cadmium	3.9										
Chromium	39[b]	14.5	9.9	17	9.8	14.4	8.1	15.8	13.7	8.1	7.4
Cobalt	470	14.6	11.3	14.5	11.9	12	7.5	13	24.7	9.4	5.6
Copper	310	16.8	12.8	25.3	12.9	26.9	12	23.8	20.7	31.5	9.6
Iron	2,300	**21300**	**16200**	**27700**	**16700**	**38000**	**13900**	**29300**	**23100**	**70300**	**12800**
Lead	400[c]	17.6	7.3	21.8	8.2	25.5	10.5	22.6	15.1	11.7	7
Manganese	160	**450**	**565**	**663**	**305**	**423 J[e]**	149 J	**394 J**	**1560 J**	**258 J**	82.1 J
Mercury (inorganic)	2.3	0.045		0.061		0.11		0.14			0.039
Nickel	160	26.2	22.9	33.6	21.1	23.6	16.2	23.7	35.2	21.4	13.8
Selenium	39			1.3		2.4		1.9	0.81	2.6	
Silver	39										
Thallium	0.51[d]		**1.5**			**5**	**2**	**3.9**	**2.4**	**8.5**	**1.4**
Vanadium	55	22.3	15.6	23.7	14.2	18.9	10.4	21.5	18.4	9.3	10.7
Zinc	2,300	81.1	53.6	103	50.3	85.4	42.2	79	77.2	51.6	37.2

[a]Risk-based concentration for residential soil taken from EPA, 1997, *Risk-Based Concentration Table*, 14 March, EPA Region III, Philadelphia, PA, on-line, unless otherwise noted; adjusted to reflect a cancer risk of 1E-6 and noncancer hazard index of 0.1 to provide additional protection for exposure to multiple chemicals or media.

[b]Based on the value for chromium (VI).

[c]Highest level in soil to which children may be regularly exposed for which exposure reduction is not recommended (EPA, 1994, "Guidance on Residential Lead-Based Paint, Lead-Contaminated Dust, and Lead-Contaminated Soil," Memorandum from Lynn R. Golc Assistant Administrator, to EPA Regional Directors, dated July 14).

[d]RBC for thallium sulfate multiplied by 0.81 to adjust for differences in molecular weight.

[e]J qualifier. Analyte present. Reported value may not be accurate or precise.

Arsenic is identified as a carcinogenic.

Note 1: **12700** Concentration exceeds RBC.

Note 2: Blank cells indicate that compound was analyzed for but was not detected.

mg/kg - Milligrams per kilogram.

Table 3-1

Summary of Direct-Push Soil and Temporary Piezometer Groundwater Samples Collected
Powerhouse 2 Ash Pits Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Sample Type	Sample Location	Sample Number	Sample Date	Sample Purpose	SDG Number
GW	ASH PIT 2-PZ01	AP3015	02/02/2009	FD	0902003
GW	ASH PIT 2-PZ01	AP3016	02/02/2009	FS	A9B030206
GW	ASH PIT 2-PZ01	AP3022	02/02/2009	REG	0902003
GW	ASH PIT 2-PZ03	AP3018	01/31/2009	REG	0902003
GW	ASH PIT 2-PZ04	AP3019	02/01/2009	REG	0902003
SS	ASH PIT 2-SB01	AP0100	01/15/2009	REG	0901026
DS	ASH PIT 2-SB01	AP0101	01/15/2009	REG	0901026
DS	ASH PIT 2-SB01	AP0102	01/15/2009	REG	0901026
SS	ASH PIT 2-SB02	AP0103	01/16/2009	REG	0901026
DS	ASH PIT 2-SB02	AP0104	01/16/2009	REG	0901026
DS	ASH PIT 2-SB02	AP0105	01/16/2009	FD	0901026
DS	ASH PIT 2-SB02	AP0106	01/16/2009	FS	A9A170114
DS	ASH PIT 2-SB02	AP0107	01/16/2009	REG	0901026
SS	ASH PIT 2-SB03	AP0108	01/18/2009	REG	0901027
DS	ASH PIT 2-SB03	AP0109	01/18/2009	REG	0901027
DS	ASH PIT 2-SB03	AP0110	01/18/2009	REG	0901027
SS	ASH PIT 2-SB04	AP0111	01/18/2009	REG	0901027
DS	ASH PIT 2-SB04	AP0112	01/18/2009	REG	0901027
DS	ASH PIT 2-SB04	AP0113	01/19/2009	REG	0901027
SS	ASH PIT 2-SB05	AP0114	01/16/2009	REG	0901026
DS	ASH PIT 2-SB05	AP0115	01/16/2009	REG	0901026
DS	ASH PIT 2-SB05	AP0116	01/16/2009	REG	0901026
SS	ASH PIT 2-SB06	AP0117	01/15/2009	REG	0901026
DS	ASH PIT 2-SB06	AP0118	01/15/2009	REG	0901026
DS	ASH PIT 2-SB06	AP0119	01/15/2009	REG	0901026
SS	ASH PIT 2-SB07	AP0120	01/16/2009	REG	0901026
SS	ASH PIT 2-SB07	AP0121	01/16/2009	FD	0901026
SS	ASH PIT 2-SB07	AP0122	01/16/2009	FS	A9A170114
DS	ASH PIT 2-SB07	AP0123	01/16/2009	REG	0901026
DS	ASH PIT 2-SB07	AP0124	01/16/2009	REG	0901026
SS	ASH PIT 2-SB08	AP0125	01/16/2009	REG	0901026
DS	ASH PIT 2-SB08	AP0126	01/16/2009	REG	0901026
DS	ASH PIT 2-SB08	AP0127	01/16/2009	REG	0901026
DS	ASH PIT 2-SB08	AP0128	01/16/2009	FD	0901026
DS	ASH PIT 2-SB08	AP0129	01/16/2009	FS	A9A170114

SDG - Sample delivery group.
GW - Groundwater.
FD - Field duplicate.
FS - Field split.
REG - Regular.
SS - Surface soil.
DS - Deep soil (subsurface).

Table 3-2

Monitoring Well Construction Details
Powerhouse 2 Ash Pits Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Well ID	Coordinates (Ohio Plane) Northings (y)	Eastings (x)	Well Depth (feet bgs)	Date Installed	Installed By	Casing Type	Casing Diameter (inches)	Borehole Diameter (inches)	Screen Interval (feet bgs)	Geologic Unit Screened	Top of Filter Pack (feet bgs)	TOC Elevation (feet msl)	Ground Elevation (feet msl)	Well Bottom Elevation (feet msl)
Monitoring Wells Screened in Overburden														
AP2-MW01	622866.250	1911550.020	19.35	4/15/2009	Shaw	PVC (40)	2	8	9.0-19.0	Overburden	7.0	640.94	638.20	618.85
AP2-MW02	622892.790	1911351.160	15.35	4/15/2009	Shaw	PVC (40)	2	8	5.0-15.0	Overburden	4.0	635.53	632.50	617.15
AP2-MW03	622973.780	1911157.350	10.08	4/14/2009	Shaw	PVC (40)	2	8	4.9-9.9	Overburden	4.5	632.16	629.50	619.42
Monitoring Wells Screened in Delaware Limestone														
AP2-BEDGW-001	622795.83	1911202.97	85.85	4/18/2009	Shaw	Steel to 20.40', PVC (40) to 85.85'	2	12" to 14.5', 8" to 20.5', 6" to 87.0'	70.5-85.5	Delaware LM	66.0	633.46	630.40	544.55
AP2-BEDGW-002	622887.85	1911361.47	85.35	4/17/2009	Shaw	Steel to 21.1', PVC (40) to 85.35'	2	12" to 15.0', 8" to 21.1', 6" to 86.1'	70.0-85.0	Delaware LM	66.0	635.58	632.40	547.05
AP2-BEDGW-003	623117.29	1911619.32	60.35	4/15/2009	Shaw	Steel to 24.45', PVC (40) to 60.35'	2	12" to 19.5', 8" to 24.5', 6" to 61.0'	45.0-60.0	Delaware LM	41.0	640.83	638.40	578.05

Coordinates scaled to the Ohio State Plane coordinate system, North Zone, NAD 1983. Vertical datum is NAVD 1929.

bgs - Below ground surface.

msl - Mean sea level.

Table 3-3

Summary of Monitoring Well Groundwater Samples Collected
Powerhouse 2 Ash Pits Site Characterization Report
Former Plum Brook Ordnance Works,Sandusky, Ohio

Sample Type	Sample Location	Sample Number	Sample Date	Sample Purpose	Lot Number
GW	AP2-BEDGW-002	AP3063	05/24/2009	REG	F65480
GW	AP2-BEDGW-003	AP3064	05/23/2009	REG	F65480
GW	AP2-BEDGW-003	AP3065	05/23/2009	FD	F65480
GW	AP2-BEDGW-003	AP3066	05/23/2009	FS	A9E270266
GW	AP2-MW01	AP3057	05/23/2009	REG	F65480
GW	AP2-MW02	AP3058	05/25/2009	REG	F65480
GW	AP2-MW02	AP3059	05/25/2009	FD	F65480
GW	AP2-MW02	AP3060	05/26/2009	FS	A9E270266
GW	AP2-MW03	AP3061	05/24/2009	REG	F65480
GW	AP2-BEDGW-002	AP3079	11/17/2009	REG	F69607
GW	AP2-BEDGW-003	AP3080	11/16/2009	REG	F69607
GW	AP2-BEDGW-002	AP3081	11/17/2009	FD	F69607
GW	AP2-BEDGW-002	AP3082	11/17/2009	FS	A9K190539
GW	AP2-MW02	AP3076	11/13/2009	REG	F69502
GW	AP2-MW01	AP3070	11/04/2009	REG	F69338

GW - Groundwater.
REG - Regular.
FD - Field duplicate.
FS - Field split.

Table 3-4

Final Field Measurements of Temporary Piezometer and Monitoring Well Groundwater and Surface Water Powerhouse 2 Ash Pits Site Characterization Report Former Plum Brook Ordnance Works, Sandusky, Ohio

Identification	Date	Low-Flow Sampled	Dissolved Oxygen (ppm)	Ferrous Iron (mg/L)	Oxidation Reduction Potential (mV)	pH	Electrical Conductivity (mS/cm)	Temperature (C^0)	Turbidity (NTU)	Amount Purged (L)
Temporary Piezometer										
AP2-PZ03	31-Jan-09	Yes	2.02	0.0	14.4	6.77	1.251	1.52	60.1	7.15
AP2-PZ04	01-Feb-09	Yes	1.10	0.0	23.7	6.55	0.958	7.31	26.6	7.33
AP2-PZ07	02-Feb-09	Yes	0.50	0.0	20.4	6.53	0.778	6.19	28.2	14.81
Overburden/Shale Monitoring Well										
AP2-MW01	23-May-09	Yes	10.27	0.0	-141.3	6.35	0.895	13.59	2.5	2.86
AP2-MW02	25-May-09	Yes	1.92	0.0	623.8	5.72	0.856	11.69	1.7	5.9
AP2-MW03	24-May-09	Yes	5.60	0.0	-394.8	6.29	1.368	13.20	10.1	3.72
AP2-MW01	13-Nov-09	No	1.32	NM	-8.3	6.99	0.980	14.59	7.8	
AP2-MW02	13-Nov-09	No		NM						
Delaware Limestone Monitoring Well										
AP2-BEDGW-002	24-May-09	Yes	1.64		-144.8	6.20	2.968	17.0	16.2	4.6
AP2-BEDGW-003	23-May-09	Yes	0.22	0.0	-315.1	6.15	2.141	25.59	5.9	5.58
AP2-BEDGW-002	17-Nov-09	No	1.01	2.0	-6.9	6.78	2.635	9.67	3.6	
AP2-BEDGW-003	16-Nov-09	No	4.51	0.0	-1.8	6.72	2.202	8.87	0.0	
Surface Water										
AP2-SW01	24-May-09	NA	7.55	NM	163.5	7.28	0.924	17.45	12.9	NA
AP2-SW02	24-May-09	NA	7.81	NM	124.3	7.42	0.912	18.94	12.5	NA
AP2-SW03	24-May-09	NA	7.94	NM	113.8	7.60	0.908	19.16	17.7	NA
AP2-SW04	24-May-09	NA	7.40	NM	193.5	7.43	0.885	15.93	24.6	NA
AP2-SW05	25-May-09	NA	8.37	NM	157.8	7.66	0.900	16.26	11.7	NA

Notes:

Water quality measurements recorded by YSI water quality instrument immediately prior to the sample collection time.

^{0}C - Degree Celsius.
Eh - oxidation-reduction potential.
L - Liters.
mS/cm - Millisiemens per centimeter.
mV - Millivolts.
NA - Not Applicable.
NM - Not measured.
ppm - Parts per million.
mg/L - Milligrams per liter (ppm).
NTU - Nephelometric turbidity unit.
Ferrous iron measured in field using Hach test kit.

Table 3-5

Summary of Surface Water and Sediment Samples Collected
Power House 2 Ash Pits Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Sample Type	Sample Location	Sample Number	Sample Date	Sample Purpose	Lot Number
SD	ASH PIT 2-SD01	AP1000	05/24/2009	REG	F65476
SD	ASH PIT 2-SD02	AP1001	05/24/2009	REG	F65476
SD	ASH PIT 2-SD03	AP1002	05/24/2009	REG	F65476
SD	ASH PIT 2-SD04	AP1003	05/25/2009	REG	F65476
SD	ASH PIT 2-SD04	AP1004	05/25/2009	FD	F65476
SD	ASH PIT 2-SD04	AP1005	05/25/2009	FS	A9E270266
SD	ASH PIT 2-SD05	AP1006	05/25/2009	REG	F65476
SW	AP2-SW01	AP2000	05/24/2009	REG	F65479
SW	AP2-SW02	AP2001	05/24/2009	REG	F65479
SW	AP2-SW03	AP2002	05/24/2009	REG	F65479
SW	AP2-SW03	AP2003	05/24/2009	FD	F65479
SW	AP2-SW03	AP2004	05/24/2009	FS	A9E270266
SW	AP2-SW04	AP2005	05/25/2009	REG	F65479
SW	AP2-SW05	AP2006	05/25/2009	REG	F65479

SD - Sediment.
SW - Surface water.
REG - Regular.
FD - Field duplicate.
FS - Field split.

Table 4-1

Summary of Analytical Parameters and Methods for Soil Temporary Piezometer, Groundwater, Surface Water, and Sediment Samples
Power House 2 Ash Pits Site Characterizaion Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Sample Matrix	Analytical Parameters[a]	Analytical Method[b]
Groundwater	TCL Volatile Organic Compounds	SW-846 5030B/8260B
	TCL Semivolatile Organic Compounds	SW-846 3510C/8270C
	Nitroaromatic Compounds	SW-846 3535/8330A
	TAL Metals (T/D)	SW-846 3005A/6010B/6020A/7470A
	Turbidity	EPA 180.1
	Alkalinity	EPA 310.1
	Hardness	EPA 130.2
	Total Organic Carbon	SW-846 9060
	Total Dissolved Solids	EPA 160.1
	Total Suspended Solids	EPA 160.2
	Chloride	EPA 325.3
	Cyanide, total	SW-846 9010A/9012
	Nitrate	EPA 350.2
	Sulfate	EPA 375.3
Surface Water	TCL Semivolatile Organic Compounds	SW-846 3510C/8270C
	Nitroaromatic Compounds	SW-846 3535/8330A
	TAL Metals	SW-846 3005A/6010B/6020A/7470A
	Hardness	EPA 130.2
Soil	TCL Semivolatile Organic Compounds	SW-846 3541/8270C
	Nitroaromatic Compounds	SW-846 8330A
	PCBs	SW-846 8082
	TAL Metals	SW-846 3050B/6010B/6020A/7471A
Sediment	TCL Semivolatile Organic Compounds	SW-846 3541/8270C
	Nitroaromatic Compounds	SW-846 8330A
	PCBs	SW-846 8082
	Total Organic Carbon	Walkley-Black
	TAL Metals	SW-846 3050B/6010B/6020A/7471A

[a]Target analyte list (TAL) and target compound list (TCL) are used to designate parameter lists with no requirements for Contract Laboratory Program (CLP) method quality control or data reporting packages
[b]Analyses found in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* USEPA Publication, Third Edition and *Methods for Chemical Analysis of Water and Wastes*, EPA-600/4-79-020, March 1983 and subsequent revisions.
T/D - Total/dissolved.
TAL - Target analyte list.
TCL - Target compound list.
PCB - Polychlorinated biphenyl.

Table 4-2

Background Screening Concentrations for Inorganics and BTEX Compounds in Groundwater Powerhouse 2 Ash Pits Site Characterization Report Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent hits	Range of Values, µg/L: Detected Concentrations Minimum	Detected Concentrations Maximum	Reporting Limits Minimum	Reporting Limits Maximum	Mean µg/L	Standard Deviation	UTL [a] µg/L	BSC [b] µg/L
Metals - Unfiltered										
Aluminum	11 / 13	85	3.15E+01	3.09E+02	2.00E+02	2.00E+02	1.05E+02	6.98E+01	4.17E+02	309
Arsenic	4 / 26	15	3.30E+00	7.40E+00	1.00E+01	1.00E+01	4.99E+00	6.56E-01	7.92E+00	7.4
Barium	28 / 28	100	2.58E+01	1.18E+04	2.00E+02	2.00E+03	1.73E+03	3.77E+03	1.86E+04	11800
Calcium	28 / 28	100	1.74E+04	3.16E+05	5.00E+03	5.00E+03	1.38E+05	8.31E+04	5.09E+05	316000
Cobalt	6 / 27	22	1.00E+00	1.21E+01	5.00E+01	5.00E+01	2.05E+01	8.75E+00	5.96E+01	12.1
Copper	2 / 28	7	3.30E+00	1.98E+01	2.50E+01	2.50E+01	1.24E+01	2.26E+00	2.25E+01	19.8
Iron	24 / 27	89	3.82E+01	1.55E+03	1.00E+02	1.00E+02	4.15E+02	4.87E+02	2.59E+03	1550
Magnesium	28 / 28	100	7.28E+03	2.17E+05	5.00E+03	5.00E+03	7.17E+04	5.85E+04	3.33E+05	217000
Manganese	28 / 28	100	3.60E+00	6.88E+02	1.50E+01	1.50E+01	8.12E+01	1.24E+02	6.36E+02	636
Nickel	4 / 27	15	4.80E+00	8.60E+00	4.00E+01	4.00E+01	1.81E+01	4.67E+00	3.90E+01	8.6
Potassium	28 / 28	100	2.53E+03	1.16E+05	5.00E+03	5.00E+04	2.70E+04	3.06E+04	1.64E+05	116000
Sodium	28 / 28	100	1.33E+04	1.39E+06	5.00E+03	5.00E+04	3.55E+05	4.36E+05	2.30E+06	1390000
Zinc	14 / 19	74	8.30E-01	5.07E+02	2.00E+01	2.00E+01	5.55E+01	1.23E+02	6.06E+02	507
Volatile Organic Compounds										
Benzene	9 / 28	32	1.45E-01	2.40E+00	1.00E+00	5.00E+00	6.73E-01	5.43E-01	3.10E+00	2.4
Ethylbenzene	6 / 28	21	1.30E-01	8.70E-01	1.00E+00	5.00E+00	5.82E-01	4.00E-01	2.37E+00	0.87
Toluene	8 / 28	29	1.20E-01	1.70E+00	1.00E+00	5.00E+00	4.99E-01	2.83E-01	1.76E+00	1.7
Xylenes, total	8 / 28	29	3.60E-01	5.50E+00	1.00E+00	5.00E+00	1.22E+00	1.53E+00	8.07E+00	5.5

[a] The UTL (upper tolerance limit) is calculated using the Chebychev equation (mean + 4.47 * standard deviation).

[b] The BSC (background screening criterion) is the calculated UTL or the maximum detected concentration, whichever is less.

µg/L - Micrograms per liter.

mg/L - Milligrams per liter.

BTEX - Benzene, toluene, ethylbenzene, and xylenes.

Source: Shaw Environmental, Inc., 2005, 2004 Data Summary and Evaluation Report, Final, Plum Brook Ordnance Works, Sandusky, Ohio, April.

Table 4-3

Background Concentrations of Metals in Soil[a]
Powerhouse 2 Ash Pits Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemical Name (mg/kg)	Frequency of Detection	Range of Detected Concentrations	Range of Reporting Limits	Statistical Distribution	Arithmetic Mean	95% UTL [b]	Background Screening Criterion [c]
Aluminum	12 / 12	3520 - 15500	NA	L	8.43E+03	2.69E+04	1.55E+04
Antimony	9 / 25	5.9 - 9.3	5.4 - 74	NP	4.68E+00	NA	9.30E+00
Arsenic	23 / 26	2.1 - 36.5	1.2 - 3.7	L	1.08E+01	7.10E+01	3.65E+01
Barium	9 / 12	35.6 - 826	23.2 - 24.7	L	1.16E+02	1.30E+03	8.26E+02
Beryllium	6 / 25	0.57 - 1	0.57 - 1.2	L	5.65E-01	1.17E+00	1.00E+00
Cadmium	0 / 25	NA	0.57 1.2	L	4.49E-01	NA	NA
Calcium	12 / 12	735 - 52300	NA	L	1.13E+04	2.18E+05	5.23E+04
Chromium	25 / 26	4.4 - 29	12.3 - 12.3	NP	1.34E+01	NA	2.90E+01
Cobalt	9 / 12	9.6 - 116	5.8 - 6.2	L	2.26E+01	2.48E+02	1.16E+02
Copper	23 / 26	2.3 - 56.2	2.2 - 2.9	L	1.70E+01	1.47E+02	5.62E+01
Iron	12 / 12	5880 - 234000	NA	L	4.01E+04	3.58E+05	2.34E+05
Lead	26 / 26	1.9 - 48.6	NA	L	1.28E+01	5.13E+01	4.86E+01
Magnesium	12 / 12	629 - 10400	NA	L	3.26E+03	3.08E+04	1.04E+04
Manganese	26 / 26	21 - 13300	NA	L	7.29E+02	3.51E+03	3.51E+03
Mercury	2 / 26	0.085 - 0.085	0.037 - 0.3	L	9.06E-02	5.60E-01	8.50E-02
Nickel	26 / 26	5.4 - 55.1	NA	L	2.28E+01	7.79E+01	5.51E+01
Potassium	11 / 12	579 - 3390	617 - 617	L	1.24E+03	6.08E+03	3.39E+03
Selenium	5 / 25	0.61 - 2	0.57 - 4.9	NP	1.55E+00	NA	2.00E+00
Silver	2 / 26	1.1 - 11.1	1.1 - 1.3	NP	1.00E+00	NA	1.11E+01
Sodium	0 / 12	NA	566 - 663	L	3.03E+02	NA	NA
Thallium	2 / 25	1.2 - 1.3	1.1 - 6.1	NP	1.91E+00	NA	1.30E+00
Vanadium	11 / 12	9 - 40.9	61.7 - 61.7	L	2.48E+01	8.31E+01	4.09E+01
Zinc	26 / 26	6.6 - 655	NA	L	7.30E+01	3.22E+02	3.22E+02

mg/kg - Milligrams per kilogram.
NA - Not applicable; not available.
[a] Data used to determine soil background are based on sampling from IT, 1998, ***Site Investigation of Acid Areas, Plum Brook Ordnance Works, Sandusky, Ohio.***
[b] 95% UTL = 95% upper tolerance limit calculated as described in Section 2.1.4 and rounded to 3 significant figures.
[c] The maximum detected concentration is used as the background screening criterion for nonparametric data sets; for normal or lognormal data sets, the 95% UTL or the maximum detected concentration, whichever is less, is used.
Note: Detection limits from sample 6990 were deleted when calculating results for antimony, beryllium, cadmium, selenium and thallium. The detection limits were elevated by dilution factors which greatly exceed any detected concentration and would bias results unrealistically high.

Table 5-1

Observances of Hydrocarbons in Bedrock During Borehole Coring
Powerhouse 2 Ash Pits Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Borehole Identification	Date Drilled	Location	Depth to Bedrock (ft)	Depth to Bedrock (refusal - ft)	Depth to Delaware Limestone[a] (ft)	Depth Drilled (ft)	Hydrocarbon/H_2S Odor Detected[b] (ft)	Hydrocarbon Stained Core[c] (ft)	Comments
TPCB-1 (Boring)	6/9/1941	Behind Water Clarification Bldg 416	3	Unknown	85	336.8	Gas 58-60;Oil intermittently	Unknown	
BED-MW22 (Well)	8/24/01-9/10/01	Downgradient Boundary, North of Reactor Area	19.5	19.5	19.5	43	20-24.5	40-43	
BED-MW23 (Well)	8/25/01-9/6/01	South of Reactor Area and Pentolite Road	26.3	26.3	26.3	74	30-74	33-74	Hydrocarbon observed seepng from rock core.
BED-MW24 (Well)	8/26/01-9/13/01	West of West Red Water Ponds, Downgradient	17.3	17.3	17.3	41.5	26.5-40.0	31.5-41.5	Hydrocarbon observed seepng from rock core. Gas discharge (gurgling) heard during water recharge.
BED-MW27 (Well) (Abandoned)	8/23/01-9/8/01	Downgradient Boundary, East-Northeast of Reactor Area	18.8	18.8	20	105	95-105	41-105	Hydrocarbon observed seepng from rock core. Well abandoned due to excessive (nuisance) hydrogen sulfide odors.
TNTA-BEDGW-001 (Well)	9/24/01-9/13/01	TNT Area A, Near Maintenance and Short Cut Rd, At Former Bldg 146	8.5	25	51	86	None	68-85	A thickness of approx. 3.5 feet free-phase hydrocarbon was encountered prior to sampling (10/9/01).
BED-MW30 (Well)	3/15/04-3/19/04	Near Bouy Road and Patten Tract .Intersection, Outside (west) PBOW Boundaries	24	24	24	58.3	31-58.3	34.5-35.7; 38.8-39.1; 39.5-49.5;	
BED-MW31 (Boring)	3/16/04-3/20/04	At former RR bed, West of Schenk Rd, Outside (downgradient) of PBOW Boundaries	13	14.5	13.8	90.2	17.5-90.2	20-30; 31.1; 40.1-21; 87.1-90.2	

Table 5-1

Observances of Hydrocarbons in Bedrock During Borehole Coring
Powerhouse 2 Ash Pits Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Borehole Identification	Date Drilled	Location	Depth to Bedrock (ft)	Depth to Bedrock (refusal - ft)	Depth to Delaware Limestone[a] (ft)	Depth Drilled (ft)	Hydrocarbon/H_2S Odor Detected[b] (ft)	Hydrocarbon Stained Core[c] (ft)	Comments
BED-MW32 (Boring)	3/29/04-4/1/04	East of Columbus Rd, Between east and west bound lanes of Route 2; Outside (downgradient) of PBOW Boundaries	17.5	17.5	17.5	90.1	17.5-55.1	29-29.5; 30-40;	
BED-MW33 (Well)	3/30/04-4/2/04	Columbus Park, Northeast of facility; Outside (downgradeint) of PBOW Boundaries	15	15	15	89.5	20-39.5	38-39.5; 85.3-89	
BED-MW34 (Boring)	3/17/04-3/22/04	NASA's Old Sewage Water Treatment Plant Area; Outside (downgradient) of main PBOW facility	19	20	35.5	90.1	20-90.1	41.5-90.1	Core section very heavily stained. Heard gas "burping" in borehole 66.1-71.1'. Free-phase hydrocarbon on water (0.3 to 0.8'), prior to abandonment.
1SLA-BEDGW-001	2/26/09 - 3/6/09	TNTA Sewer line area, north of Maintenance Rd. and Short Cut Rd.	17.9	24.2	40.2	58.2	None	52.8 - 58.2	11-9-09 - Well gauging detected 0.08' product on water.
1SLA-BEDGW-002	2/26/09 - 3/4/09	TNTA Sewer line area, north of Maintenance Rd. and Short Cut Rd.	11.2	39	43.8	75.2	50 - 65	None	After setting well, strong hydrocarbon/H2S odors detected in vicinity of well until water level becoame static.

Table 5-1

Observances of Hydrocarbons in Bedrock During Borehole Coring
Powerhouse 2 Ash Pits Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Borehole Identification	Date Drilled	Location	Depth to Bedrock (ft)	Depth to Bedrock (refusal - ft)	Depth to Delaware Limestone[a] (ft)	Depth Drilled (ft)	Hydrocarbon/H_2S Odor Detected[b] (ft)	Hydrocarbon Stained Core[c] (ft)	Comments
AP1-BEDGW-001	3/13/09 - 3/18/09	AP1 area south of Maintenance Rd., in grass north of white block building.	25.5	44.8	44.6	81.3	57.5 - 81.3	57.5 - 66.0	11-6-09 - Well gauging detected 0.9' product on water.
AP1-BEDGW-002	3/15/09 - 3/29/09	AP1 area immediately south of Maintenance Rd. in grass.	21.4	40	39.5	61.3	None	None	Well emits H2S when cap is removed.
AP2-BEDGW-002	4/2/09 - 4/17/09	AP2 west of Campbell Rd.	15.8	21.1	15.8	86.1	None	47.1 seeping from coral, 69.5 seeping from rock	
LBA-BEDGW-002	3/25/09 - 3/30/09	LBA area southeast corner of building.	27	37	37.9	71.1	None	49.6 - 56.4	11-4-09 - Well gauging indicated 0.9' product on water.

Table 5-1

Observances of Hydrocarbons in Bedrock During Borehole Coring
Powerhouse 2 Ash Pits Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Borehole Identification	Date Drilled	Location	Depth to Bedrock (ft)	Depth to Bedrock (refusal - ft)	Depth to Delaware Limestone[a] (ft)	Depth Drilled (ft)	Hydrocarbon/H_2S Odor Detected[b] (ft)	Hydrocarbon Stained Core[c] (ft)	Comments
RCA-BEDGW-001	3/18/09 - 3/29/09	RCA area north of Maintenance Rd. in grass.	23.2	41.6	41.2	81.5	None	53.8 - 70.2	
RCA-BEDGW-002	3/17/09 - 3/29/09	RCA area north of Maintenance Rd. in thicket.	26	37.3	37.3	66	None	57.0 - 58.2	11-3-09 - Sheen noted on water during well gauging, not detectable with interface probe.
RCA- BEDGW-003	3/19/09 - 3/29/09	RCA area north of Maintenance Rd. north of creek.	24.8	35.5	35.5	105.8	None	63.7 - 80.2	
WTP1-BEDGW-003	3/3/09 - 3/14/09	WTP1 north of the intersection of Maintenance Rd and Taylor Rd.	21.2	37.95	38.5	61.5	None	49.9 - 55.8	

Table 5-1

Observances of Hydrocarbons in Bedrock During Borehole Coring
Powerhouse 2 Ash Pits Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Borehole Identification	Date Drilled	Location	Depth to Bedrock (ft)	Depth to Bedrock (refusal - ft)	Depth to Delaware Limestone[a] (ft)	Depth Drilled (ft)	Hydrocarbon/H_2S Odor Detected[b] (ft)	Hydrocarbon Stained Core[c] (ft)	Comments
WTP3-BEDGW-001	3/27/09 - 4/1/09	WTP3 on east side of gravel drive.	24	33	30	53.1	None	40.4 - 53.1	Well emits H2S when cap is removed.
WTP3-BEDGW-002	3/28/09 - 4/14/09	WTP3 in berm north of building	25	33	30	53.4	None	43.4 - 47.8	Well emits H2S when cap is removed.
WTP3-BEDGW-003	3/29/09 - 4/14/09	WTP3 west of creek.	25.8	33.3	30	52.9	None	40.2 - 52.9	

Notes

[a] Limestone unit interpretations from Regional Geologic Map, 2004 Groundwater Data Summary and Evaluation Report (Shaw, 2005).
[b] A hydrocarbon odor was detected by the olfactory senses. Photoionization detector readings in the breathing air remained below action levels.
[c] Hydrocarbon staining on the rock core is also seen in photographs (Appendix C).
A hydrocarbon thickness of 0.05 feet was measured in well BED-MW16 on 10/3/01.
A hydrocarbon thickness of 0.63 feet was measured in well AA1-BEDGW-001 on 10/4/01.
ft - Feet.
NASA - National Aeronautics and Space Administration.
PBOW - Plum Brook Ordnance Works.
TNT - Trinitrotoluene.
Identifies borehole/monitoring well of the Powerhouse 2 Ash Pits Area.

Table 5-2

Summary of Groundwater Level Measurements
Powerhouse 2 Ash Pits Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Well Identification	Coordinates (Ohio Plane)[a] Northing (y)	Easting (x)	Top of Casing Elevation[a] (ft msl)	Ground Elevation[a] (ft msl)	Groundwater Elevation Measurements (feet above mean sea level [msl]) 23-May-09 DTW	23-May-09 Elevation	12-Nov-09 DTW	12-Nov-09 Elevation
Tempoary Piezometer								
AP2-PZ01	623,073.14	1,911,485.20	634.97	631.70	6.56	628.41	[c]Abandoned	--
AP2-PZ02	623,041.37	1,911,260.38	630.32	627.50	4.12	626.20	[c]Abandoned	--
AP2-PZ03	622,845.22	1,911,148.24	630.69	627.70	2.90	627.79	[c]Abandoned	--
AP2-PZ04	622,789.21	1,911,348.96	633.70	630.00	5.49	628.21	[c]Abandoned	--
AP2-PZ05	622,901.66	1,911,339.77	633.97	631.80	5.65	628.32	[c]Abandoned	--
AP2-PZ06	622,942.86	1,911,404.17	633.42	629.70	5.28	628.14	[c]Abandoned	--
AP2-PZ07	622,955.41	1,911,280.43	632.92	629.8	NM	NA	[c]Abandoned	--
AP2-SG04	623,270.04	1,911,226.61	625.46	621.1[b]	4.07	621.39	3.85	621.61
Overburden/Shale Monitoring Well								
AP2-MW01	622,866.25	1,911,550.02	640.94	638.20	10.83	630.11	17.00	623.94
AP2-MW02	622,892.79	1,911,351.16	635.53	632.50	7.09	628.44	14.08	621.45
AP2-MW03	622,973.78	1,911,157.35	632.16	629.50	4.64	627.52	Dry	--
Delaware Limestone Monitoring Well								
AP2-BEDGW-001	622,795.83	1,911,202.97	633.46	630.40	87.17	546.29	85.52	547.94
AP2-BEDGW-002	622,887.85	1,911,361.47	635.58	632.40	23.02	612.56	28.06	607.52
AP2-BEDGW-003	623,117.29	1,911,619.32	640.83	638.40	27.55	613.28	32.68	608.15

Notes:

[a]Northings and Eastings are scaled to the Ohio State Plane Coordinate System (North Zone), NAD 1983. Vertical datum to NGVD 1929.

[b]Elevation is of Pipe Creek bottom.

[c]Piezometers were abandoned July 2009.

NM - Not measured.

NA - Not applicable.

DTW - Depth to water.

ft msl - Feet above mean sea level.

Table 5-3

Well Pair Vertical Hydraulic Gradients
Powerhouse 2 Ash Pits Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

(Page 1 of 2)

	Well Name	Unit Monitored (ft bgs)	Well TD (ft bgs)	Depth of Monitored Zone (ft bgs)	Elevation of Ground Surface (ft)	Elevation of Center of Monitored Zone (ft)	Groundwater Elevation 5/6/2009	Groundwater Elevation 5/26/2009	Groundwater Elevation 11/9/2009	Average Vertical Gradient (ft/ft)
Pair 1	1SLA-MW02	OB/OS	28.75	13.4-28.4	630.8	609.90	620.7	625.88	629.38	
	1SLA-BEDGW-002	DL	74.6	64.2-74.2	630.9	561.70	Not measured	587.22	587.61	
	Distance between Center of Monitored Zones					48.20				
	Vertical Gradient						NA	0.802	0.867	0.834
Pair 2	AP1-MW02	OB/OLS	19.55	9.2-19.2	634.7	620.50	633.81	632.8	630.8	
	AP1-BEDGW-002	DL	59.35	44.0-59.0	634.5	583.00	599.63	594.1	596.5	
	Distance between Center of Monitored Zones					37.50				
	Vertical Gradient						0.911	1.032	0.915	0.953
Pair 3	AP2-MW02	OB	15.35	5.0-15.0	632.5	622.50	NA	628.44	621.45	
	AP2-BEDGW-002	DL	85.35	70.0-85.0	632.4	554.90	NA	612.56	607.45	
	Distance between Center of Monitored Zones					67.60				
	Vertical Gradient						NA	0.235	0.207	0.221
Pair 4	LBA-MW01	OB/OS	16.35	6.0-16.0	637.2	626.20	633.74	632.66	629.58	
	LBA-BEDGW-001	DL	100.35	85.0-100.0	637.3	544.80	538.44	538.15	541.56	
	Distance between Center of Monitored Zones					81.40				
	Vertical Gradient						1.171	1.161	1.081	1.138
Pair 5	LBA-MW-2	OB/OS	16.35	6.0-16.0	635.9	624.90	631.63	631.19	630.85	
	LBA-BEDGW-002	DL	70.35	55.0-70.0	636.30	573.80	573.03	567.58	574.38	
	Distance between Center of Monitored Zones					51.10				
	Vertical Gradient						1.147	1.245	1.105	1.166
Pair 6	RCA-MW01	OB/OS	9.35	4.0-9.0	638.4	631.90	634.1	633.21	629.99	
	RCA-BEDGW-001	DL	80.35	65.0-80.0	638.50	566.00	562.8	560.78	565.2	
	Distance between Center of Monitored Zones					65.90				
	Vertical Gradient						1.082	1.099	0.983	1.055
Pair 7	RCA-MW02	OB/OS	28.05	17.70-27.70	635.3	612.60	633.51	630.03	624.25	
	RCA-BEDGW-002	DL	65.35	50.0-65.0	635.50	578.00	583	599.31	597.89	
	Distance between Center of Monitored Zones					34.60				
	Vertical Gradient						1.460	0.888	0.762	1.037

Table 5-3

Well Pair Vertical Hydraulic Gradients
Powerhouse 2 Ash Pits Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

	Well Name	Unit Monitored (ft bgs)	Well TD (ft bgs)	Depth of Monitored Zone (ft bgs)	Elevation of Ground Surface (ft)	Elevation of Center of Monitored Zone (ft)	Groundwater Elevation 5/6/2009	Groundwater Elevation 5/26/2009	Groundwater Elevation 11/9/2009	Average Vertical Gradient (ft/ft)
Pair 8	WTP1-MW02	OB/OS	16.3	6.0-16.0	638.6	627.60	636.42	634.09	631.07	
	WTP1-BEDGW-002	DL	53.35	43.0-53.0	637.80	589.80	601.8	603.75	616.51	
	Distance between Center of Monitored Zones					37.80				
	Vertical Gradient						0.916	0.803	0.385	0.701
Pair 9	WTP1-MW03	OB/OS	16.3	6.0-16.0	637	626.00	635.63	633.52	630.7	
	WTP1-BEDGW-003	DL	55.35	45.0-55.0	637.10	587.10	600.74	599.29	600.85	
	Distance between Center of Monitored Zones					38.90				
	Vertical Gradient						0.897	0.880	0.767	0.848
Pair 10	WTP3-MW01	OB/OS	18.35	8.0-18.0	637	624.00	633.89	Not measured	626.07	
	WTP3-BEDGW-001	DL	52.35	37.0-52.0	637.10	592.60	603.05	Not measured	603.98	
	Distance between Center of Monitored Zones					31.40				
	Vertical Gradient						0.982	NA	0.704	0.843
Pair 11	WTP3-MW02	OB/OS	18.35	8.0-18.0	637.7	624.70	632.68	Not measured	628.97	
	WTP3-BEDGW-002	DL	52.35	37.0-52.0	637.60	593.10	603.64	Not measured	603.95	
	Distance between Center of Monitored Zones					31.60				
	Vertical Gradient						0.919	NA	0.792	0.855

A negative vertical gradient indicates an upward gradient.
A positive vertical gradient indicates a downward gradient.
bgs - Below ground surface.
ft - Feet.
OB - Overburden.
OS - Ohio Shale.
DL - Delaware limestone.
OLS - Olentangy shale.
Identifies monitoring wells of the Powerhouse 2 Ash Pits Area.

Table 5-4

Detected Constituents in Surface and Subsurface Soil Samples Above RBSCs and/or BSCs
Powerhouse 2 Ash Pits Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

				Location Code:	AP2-SB01						AP2-SB02									
				Sample Number:	AP0100		AP0101		AP0102		AP0103		AP0104		AP0105		AP0106		AP0107	
				Sample Date:	15-Jan-09		15-Jan-09		15-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09	
				Sample Type:	Surface		Subsurface		Subsurface		Surface		Subsurface		Subsurface		Subsurface		Subsurface	
				Sample Depth:	0 - 1 Ft		3 - 5 Ft		8 - 10 Ft		0 - 1 Ft		3 - 5 Ft		3 - 5 Ft		3 - 5 Ft		8 - 10 Ft	
				Sample Purpose:	REG		REG		REG		REG		REG		FD		FS		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
PCBs																				
Aroclor 1016	mg/kg	0.39	NE	0.525	-	-	-	-	-	-	0.525	J	-	-	-	-	-	-	-	-
Aroclor 1260	mg/kg	0.22	NE	0.0162	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEMIVOLATILES																				
Benzo(a)anthracene	mg/kg	0.15	NE	0.0827	0.0827	J	-	-	-	-	0.0464	J	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.015	NE	0.0844	0.0844	J	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.15	NE	0.13	0.13	J	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzoic acid	mg/kg	24000	NE	1.43	-	-	-	-	-	-	1.43		-	-	-	-	-	-	-	-
Chrysene	mg/kg	15	NE	0.0979	0.0979	J	-	-	-	-	0.0639	J	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	0.132	0.132	J	-	-	-	-	0.131	J	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	3.6	NE	0.0559	0.0446	J	-	-	-	-	0.0559	J	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.0964	0.0733	J	-	-	0.0855	J	0.0964	J	-	-	-	-	-	-	0.0544	J
Pyrene	mg/kg	170	NE	0.111	0.111	J	-	-	-	-	0.0894	J	-	-	-	-	-	-	-	-
METALS																				
Aluminum	mg/kg	7700	15500	15100	6,460	J	6,420	J	8,750	J	9,310	J	12,700	J	8,930	J	6,930		10,700	J
Antimony	mg/kg	3.1	9.3	0.958	0.81		0.269	J	0.355	J	0.958		0.362	J	0.287	J	-	-	0.626	
Arsenic	mg/kg	0.39	36.5	26.8	11.6		4.93		11.3		15.3		15.7	J	8.31	J	4		12.1	
Barium	mg/kg	1500	826	109	55.7	J	45.6		26.8		84.4	J	85.3	J	59.4	J	54.4		41.2	J
Beryllium	mg/kg	16	1	16.9	**4.74**		**5.97**		**6.72**		**15.3**	J	**9.06**	J	**6.76**	J	-	-	**7.06**	J
Cadmium	mg/kg	7	NE	0.716	0.436	J	-	-	-	-	0.381	J	-	-	-	-	-	-	-	-
Calcium	mg/kg	NE	52300	153000	47,200	J	4,310		47,400		7,110		23,300		16,100		7,170	J	46,600	
Chromium	mg/kg	0.29	29	22.4	8.64		11.5		13		11.1		19.8		13.7		10.6		16	
Cobalt	mg/kg	2.3	116	15.6	7.74		8.32		11.9		14.6	J	13.4	J	10.9	J	8.3		11.7	J
Copper	mg/kg	310	56.2	38.4	23.6	J	18.3	J	32	J	33.7	J	28.9	J	20.9	J	13.4		27.8	J
Iron	mg/kg	5500	234000	109000	14,300	J	16,500	J	23,100	J	61,300	J	30,500	J	19,400	J	13,300		23,200	J
Lead	mg/kg	40	48.6	50.7	**50.7**		8.39		13		22.5		13.8		11.9		7.5		18.9	
Magnesium	mg/kg	NE	10400	12200	8,960	J	2,350	J	**11,400**	J	1,560	J	8,640	J	4,940	J	3,340		**10,800**	J
Manganese	mg/kg	180	3506	726	354	J	172		386		546		726	J	351	J	320		431	
Mercury	mg/kg	2.3	0.09	0.118	**0.0959**		0.0245		0.0128	J	0.0539		0.0162	J	0.0164	J	-	-	-	-
Nickel	mg/kg	150	55.1	39.7	18.3	J	20.2		32.6		35.5		35.6		26.9		18.7		30.8	
PotaSurfaceium	mg/kg	NE	3390	2870	893	J	589		1,160		587		1,170		803		1,070	J	1,450	
Selenium	mg/kg	39	2	1.44	0.727	J	-	-	-	-	1.36		-	-	-	-	-	-	-	-
Sodium	mg/kg	NE	NE	152	55.1	B	68.7	B	107		60.4	B	93.9		64.9	B	-	-	152	
Thallium	mg/kg	NE	1.3	0.939	0.425	J	-	-	0.423	J	0.416	J	0.3	J	-	-	-	-	0.343	J
Vanadium	mg/kg	39	40.9	26.9	15.9		16.5		17.3		21.4		26.2		18.1		13		20.2	
Zinc	mg/kg	2300	322	102	64		67.4		59.1		88.6		74.6		66.2		43.5		62.9	
GENERAL CHEMISTRY																				
Total organic carbon	mg/kg	NE	NE	11400	-	-	-	-	-	-	11,400		-	-	-	-	-	-	-	-

Table 5-4

Detected Constituents in Surface and Subsurface Soil Samples Above RBSCs and/or BSCs
Powerhouse 2 Ash Pits Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

			Location Code:		AP2-SB03						AP2-SB04						AP2-SB05					
			Sample Number:		AP0108		AP0109		AP0110		AP0111		AP0112		AP0113		AP0114		AP0115		AP0116	
			Sample Date:		18-Jan-09		18-Jan-09		18-Jan-09		18-Jan-09		18-Jan-09		19-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09	
			Sample Type:		Surface		Subsurface		Subsurface		Surface		Subsurface		Subsurface		Surface		Subsurface		Subsurface	
			Sample Depth:		0 - 1 Ft		3 - 5 Ft		8 - 10 Ft		0 - 1 Ft		3 - 5 Ft		8 - 10 Ft		0 - 1 Ft		3 - 5 Ft		8 - 10 Ft	
			Sample Purpose:		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
PCBs																						
Aroclor 1016	mg/kg	0.39	NE	0.525	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1260	mg/kg	0.22	NE	0.0162	0.0162	J	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEMIVOLATILES																						
Benzo(a)anthracene	mg/kg	0.15	NE	0.0827	0.0307		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.015	NE	0.0844	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.15	NE	0.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzoic acid	mg/kg	24000	NE	1.43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	15	NE	0.0979	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	0.132	0.0599	J	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	3.6	NE	0.0559	-	-	-	-	-	-	-	-	-	-	-	-	0.0444	J	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.0964	-	-	-	-	0.0667	J	-	-	-	-	0.0453	J	-	-	-	-	0.0491	J
Pyrene	mg/kg	170	NE	0.111	0.044	J	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
METALS																						
Aluminum	mg/kg	7700	15500	15100	8,070		15,000		7,720		7,130		7,830		8,670		8,800	J	8,060	J	9,300	J
Antimony	mg/kg	3.1	9.3	0.958	0.637		0.257	J	0.329	J	0.485		0.312	J	0.392	J	0.922		0.259	J	0.486	
Arsenic	mg/kg	0.39	36.5	26.8	7.71	J	5.27	J	12.6	J	26.8	J	4.51	J	12.1	J	24.4		6.27		11.1	
Barium	mg/kg	1500	826	109	69.4	J	98.9	J	18.6	J	98.4	J	61.5	J	35.6	J	109	J	68.2	J	49	J
Beryllium	mg/kg	16	1	16.9	**6.46**	J	**7.43**	J	**6.35**	J	16.3	J	**6.68**	J	**7.02**	J	**15.5**	J	**7.61**	J	**7.53**	J
Cadmium	mg/kg	7	NE	0.716	0.558		-	-	-	-	-	-	-	-	-	-	0.716		-	-	0.276	J
Calcium	mg/kg	NE	52300	153000	3,430	J	36,500	J	**54,300**	J	2,160	J	3,010	J	50,700	J	4,140		351		42,300	
Chromium	mg/kg	0.29	29	22.4	12	J	22.1	J	11.8	J	10.5	J	11.9	J	12.7	J	12.8		11.7		14.4	
Cobalt	mg/kg	2.3	116	15.6	8.68	J	10.8	J	10.7	J	5.96	J	7.88	J	11	J	8.29	J	6.67	J	14	J
Copper	mg/kg	310	56.2	38.4	22.5		29.8		29.6		26		20.9		38.4		31.3	J	15.6	J	33.6	J
Iron	mg/kg	5500	234000	109000	19,100		24,900		22,100		109,000		19,200		24,400		61,600	J	22,100	J	24,500	J
Lead	mg/kg	40	48.6	50.7	27.7	J	16.7	J	15.8	J	10.1	J	18.9	J	16	J	27.4		12.2		13.4	
Magnesium	mg/kg	NE	10400	12200	2,150	J	10,100	J	**10,400**	J	442	J	2,530	J	**10,800**	J	1,320	J	1,980	J	8,760	J
Manganese	mg/kg	180	3506	726	211		436		414		116		87.4		522		319		100		551	
Mercury	mg/kg	2.3	0.09	0.118	0.0642		0.013	J	0.0132	J	0.0265		0.0352		0.0147	J	**0.118**		0.0242	J	-	-
Nickel	mg/kg	150	55.1	39.7	21.7	J	31.5	J	27.4	J	17.1	J	24.8	J	28.8	J	20.5		18		36.8	
PotaSurfaceium	mg/kg	NE	3390	2870	745		1,570		1,110		827		705		1,150		837		513		990	
Selenium	mg/kg	39	2	1.44	0.928	J	-	-	-	-	0.678	J	0.859	J	-	-	1.44		-	-	0.779	J
Sodium	mg/kg	NE	NE	152	36.3	B	119		120		55.7	B	43.6	B	119		79.2		18.4	B	91.4	
Thallium	mg/kg	NE	1.3	0.939	0.47	J	0.35	J	0.336	J	0.468	J	-	-	0.315	J	0.939		-	-	0.347	J
Vanadium	mg/kg	39	40.9	26.9	18.7		25.3		15.4		26.9		17.8		17.5		23		17		18.2	
Zinc	mg/kg	2300	322	102	80	J	68.5	J	61.5	J	57	J	64.4	J	60.4	J	102		68.9		85.3	
GENERAL CHEMISTRY																						
Total organic carbon	mg/kg	NE	NE	11400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 5-4

Detected Constituents in Surface and Subsurface Soil Samples Above RBSCs and/or BSCs
Powerhouse 2 Ash Pits Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

			Location Code:		AP2-SB06						AP2-SB07									
			Sample Number:		AP0117		AP0118		AP0119		AP0120		AP0121		AP0122		AP0123		AP0124	
			Sample Date:		15-Jan-09		15-Jan-09		15-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09	
			Sample Type:		Surface		Subsurface		Subsurface		Surface		Surface		Surface		Subsurface		Subsurface	
			Sample Depth:		0 - 1 Ft		3 - 5 Ft		8 - 10 Ft		0 - 1 Ft		0 - 1 Ft		0 - 1 Ft		3 - 5 Ft		8 - 10 Ft	
			Sample Purpose:		REG		REG		REG		REG		FD		FS		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
PCBs																				
Aroclor 1016	mg/kg	0.39	NE	0.525	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1260	mg/kg	0.22	NE	0.0162	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEMIVOLATILES																				
Benzo(a)anthracene	mg/kg	0.15	NE	0.0827	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.015	NE	0.0844	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.15	NE	0.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzoic acid	mg/kg	24000	NE	1.43	0.622		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	15	NE	0.0979	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	0.132	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	3.6	NE	0.0559	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.0964	-	-	-	-	0.0403	J	-	-	-	-	-	-	-	-	0.0798	J
Pyrene	mg/kg	170	NE	0.111	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
METALS																				
Aluminum	mg/kg	7700	15500	15100	7,150	J	6,750	J	13,200	J	7,100	J	8,180	J	7,200		5,250	J	7,150	J
Antimony	mg/kg	3.1	9.3	0.958	0.708		0.412	J	0.44	J	0.336	J	0.291	J	-	-	0.269	J	0.479	
Arsenic	mg/kg	0.39	36.5	26.8	11.4		6.33		3.55		6.09		6.04		5.5		6.18		10.9	
Barium	mg/kg	1500	826	109	98.7		58.3		53.4	J	44.5		56.7		48.6		43.7		20.8	J
Beryllium	mg/kg	16	1	16.9	**12.1**		**6.9**		**7.73**	J	**6.01**		**6.41**		-	-	**5.46**		**6.31**	J
Cadmium	mg/kg	7	NE	0.716	0.423	J	0.293	J	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/kg	NE	52300	153000	2,830		2,090		44,000		2,100		2,270		1,820	J	1,840		**153,000**	
Chromium	mg/kg	0.29	29	22.4	7.84		10.1		19.4		10.6		11.8		10.4		8.82		11	
Cobalt	mg/kg	2.3	116	15.6	4.64		8.93		14.6	J	8.14		8.99		7.7		7.46		11	J
Copper	mg/kg	310	56.2	38.4	22.2	J	12.6	J	32.1	J	18	J	16.5	J	14.6		13.8	J	31.5	J
Iron	mg/kg	5500	234000	109000	51,800	J	19,900	J	24,000	J	17,600	J	19,100	J	16,600		15,500	J	55,100	J
Lead	mg/kg	40	48.6	50.7	12.5		11.2		14.3		12.5		12.8		9.3		9.74		15.9	
Magnesium	mg/kg	NE	10400	12200	819	J	2,110	J	**12,000**	J	2,100	J	2,350	J	1,880		1,730	J	9,490	J
Manganese	mg/kg	180	3506	726	243		234		392		198		226		169		152		372	
Mercury	mg/kg	2.3	0.09	0.118	0.0688		0.0156	J	0.0132	J	0.0203	J	0.0193	J	-	-	0.0112	J	-	-
Nickel	mg/kg	150	55.1	39.7	13.7		21.8		36.7		19.1		20.2		17.9		18.5		32.5	
PotaSurfaceium	mg/kg	NE	3390	2870	616		426		1,730		450		470		703	J	323		1,060	
Selenium	mg/kg	39	2	1.44	0.737	J	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/kg	NE	NE	152	76.3	B	37.1	B	135		28.4	B	28	B	-	-	43.3	B	116	
Thallium	mg/kg	NE	1.3	0.939	0.312	J	-	-	0.293	J	-	-	-	-	-	-	-	-	0.316	J
Vanadium	mg/kg	39	40.9	26.9	17.3		15.5		23.2		15.4		17.4		14.1		13.6		13.6	
Zinc	mg/kg	2300	322	102	53.2		63.7		73		63.2		27.8		51.4		55.4		52.7	
GENERAL CHEMISTRY																				
Total organic carbon	mg/kg	NE	NE	11400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 5-4

Detected Constituents in Surface and Subsurface Soil Samples Above RBSCs and/or BSCs
Powerhouse 2 Ash Pits Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

				Location Code:	AP2-SB08									
				Sample Number:	AP0125		AP0126		AP0127		AP0128		AP0129	
				Sample Date:	16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09	
				Sample Type:	Surface		Subsurface		Subsurface		Subsurface		Subsurface	
				Sample Depth:	0 - 1 Ft		3 - 5 Ft		8 - 10 Ft		8 - 10 Ft		8 - 10 Ft	
				Sample Purpose:	REG		REG		REG		FD		FS	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
PCBs														
Aroclor 1016	mg/kg	0.39	NE	0.525	-	-	-	-	-	-	-	-	-	-
Aroclor 1260	mg/kg	0.22	NE	0.0162	-	-	-	-	-	-	-	-	-	-
SEMIVOLATILES														
Benzo(a)anthracene	mg/kg	0.15	NE	0.0827	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.015	NE	0.0844	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.15	NE	0.13	-	-	-	-	-	-	-	-	-	-
Benzoic acid	mg/kg	24000	NE	1.43	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	15	NE	0.0979	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	0.132	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	3.6	NE	0.0559	-	-	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.0964	-	-	-	-	-	-	-	-	-	-
Pyrene	mg/kg	170	NE	0.111	-	-	-	-	-	-	-	-	-	-
METALS														
Aluminum	mg/kg	7700	15500	15100	4,070	J	5,350	J	15,100	J	14,900	J	12,100	
Antimony	mg/kg	3.1	9.3	0.958	-	-	0.227	J	-	-	0.248	J	-	-
Arsenic	mg/kg	0.39	36.5	26.8	12.8		12.6		6.16		6.61		7	
Barium	mg/kg	1500	826	109	73.2	J	56	J	81	J	83.7	J	85	
Beryllium	mg/kg	16	1	16.9	**16.9**	J	**8.48**	J	**8.51**	J	**8.11**	J	-	-
Cadmium	mg/kg	7	NE	0.716	-	-	-	-	-	-	-	-	-	-
Calcium	mg/kg	NE	52300	153000	1,650		1,860		44,800		45,500		45,000	J
Chromium	mg/kg	0.29	29	22.4	6.13		8.82		22.4		21.9		18.5	
Cobalt	mg/kg	2.3	116	15.6	3.9	J	8.7	J	15.6	J	14.6	J	12.4	
Copper	mg/kg	310	56.2	38.4	21.3	J	11	J	31.1	J	30.1	J	23.9	
Iron	mg/kg	5500	234000	109000	72,600	J	28,000	J	26,600	J	28,500	J	23,900	
Lead	mg/kg	40	48.6	50.7	4.64		9.05		11.6		14.1		10.7	
Magnesium	mg/kg	NE	10400	12200	312	J	1,730	J	**12,200**	J	**11,500**	J	10,100	
Manganese	mg/kg	180	3506	726	98.2		196		473		432		363	
Mercury	mg/kg	2.3	0.09	0.118	0.034		0.0151	J	-	-	-	-	-	-
Nickel	mg/kg	150	55.1	39.7	10.5		22		39.7		38		32.8	
PotaSurfaceium	mg/kg	NE	3390	2870	477		371		1,980		1,990		2,870	J
Selenium	mg/kg	39	2	1.44	0.914	J	-	-	-	-	-	-	-	-
Sodium	mg/kg	NE	NE	152	36.4	B	27.4	B	145		134		-	-
Thallium	mg/kg	NE	1.3	0.939	0.308	J	-	-	-	-	-	-	-	-
Vanadium	mg/kg	39	40.9	26.9	18.8		15.1		25.4		24.7		20.5	
Zinc	mg/kg	2300	322	102	41.4		58.9		76.6		73.4		61.3	
GENERAL CHEMISTRY														
Total organic carbon	mg/kg	NE	NE	11400	-	-	-	-	-	-	-	-	-	-

Table 5-4

Detected Constituents in Surface and Subsurface Soil Samples Above RBSCs and/or BSCs
Powerhouse 2 Ash Pits Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

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

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

Table 5-5

Detected Constituents in Surface Water Samples Above RBSCs
Powerhouse 2 Ash Pits Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION CODE	AP2-SW01		AP2-SW02		AP2-SW03						AP2-SW04		AP2-SW05	
			SAMPLE NO	AP2000		AP2001		AP2002		AP2003		AP2004		AP2005		AP2006	
			SAMPLE DATE	24-May-09		24-May-09		24-May-09		24-May-09		24-May-09		25-May-09		25-May-09	
			DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
			SAMPLE PURPOSE	REG		REG		REG		FD		FS		REG		REG	
Parameter	Units	RBSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES																	
Bis(2-ethylhexyl)phthalate	µg/L	48	2	-	-	-	-	-	-	2	J	-	-	-	-	-	-
METALS																	
Aluminum	µg/L	37000	1030	720		531		357		377		368		1,030	J	359	
Barium	µg/L	7300	50.9	48.4	J	46.8	J	44.7	J	45.3	J	-	-	50.9	J	43.9	J
Calcium	µg/L	NE	80900	79,100		78,800		76,400		77,400		80,900		80,700		75,900	
Cobalt	µg/L	11	1.2	-	-	-	-	-	-	-	-	-	-	1.2	J	-	-
Iron	µg/L	26000	1060	1,060		700		451		455		546		1,020		376	
Lead	µg/L	NE	2.9	-	-	-	-	2.9	J	-	-	-	-	2.9	J	-	-
Magnesium	µg/L	NE	22300	21,400		21,200		20,500		20,800		22,300	J	20,700		19,800	
Manganese	µg/L	880	102	102		63		52.6		52.9		53.4		83.1		53.3	
Nickel	µg/L	730	6.2	-	-	-	-	-	-	-	-	-	-	6.2	J	-	-
Potassium	µg/L	NE	4400	3,290	J	3,340	J	3,150	J	3,190	J	-	-	4,400	J	2,900	J
Sodium	µg/L	NE	40000	32,800		32,700		32,100		32,800		40,000		34,800		30,300	
Vanadium	µg/L	180	3.1	2.6	J	1.8	J	1.7	J	1.6	J	-	-	3.1	J	2	J
Zinc	µg/L	11000	12.4	12.1	J	12.4	J	-	-	8.1	J	-	-	10.6	J	9.9	J
GENERAL CHEMISTRY																	
HARDNESS (as CaCO3)	µg/L	NE	286000	286,000		-	-	-	-	-	-	-	-	-	-	-	-

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

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

Table 5-6

Detected Constituents in Sediment Samples Above RBSCs
Powerhouse 2 Ash Pits Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

			Location Code:	AP2-SD01		AP2-SD02		AP2-SD03		AP2-SD04						AP2-SD05	
			Sample No.:	AP1000		AP1001		AP1002		AP1003		AP1004		AP1005		AP1006	
			Sample Date:	24-May-09		24-May-09		24-May-09		25-May-09		25-May-09		25-May-09		25-May-09	
			Sample Depth:	0 - 0.5 Ft		0 - 0.5 Ft		0 - 0.5 Ft		0 - 0.5 Ft		0 - 0.5 Ft		0 - 0.5 Ft		0 - 0.5 Ft	
			Sample Purpose:	REG		REG		REG		REG		FD		FS		REG	
Parameter	Units	RBSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
EXPLOSIVES																	
Trinitrotoluene, 2,4,6-	mg/kg	36	0.0647	-	-	-	-	0.0647	J	-	-	-	-	-	-	-	-
SEMIVOLATILES																	
Fluoranthene	mg/kg	2300	0.0547	-	-	-	-	0.0525	J	-	-	-	-	-	-	0.0547	J
METALS																	
Aluminum	mg/kg	77000	8000	3,640		6,310		7,220		8,000		6,840		6,780		4,690	
Arsenic	mg/kg	3.9	10.1	4.1		5.1		10.1	J	9.3		7.8		8.8		3.9	
Barium	mg/kg	15000	67.1	22.8		43.5		67.1	J	59.8		50		53		43.1	
Beryllium	mg/kg	160	0.59	0.36		0.49		0.52		0.59		0.53		-	-	0.42	
Cadmium	mg/kg	70	0.6	0.24	J	0.37		-	-	0.6		0.53		-	-	0.26	J
Calcium	mg/kg	NE	37600	7,660		26,000		12,900	J	28,700		25,200		37,600		9,790	
Chromium	mg/kg	2.9	12.8	6.4		10.5		8.6	J	12.8		10.5		11.6		7.7	
Cobalt	mg/kg	23	14.1	7.4		7.4		6.2	J	14.1		9.8		9.9		8	
Copper	mg/kg	3100	23.7	9.6		14.2		17.2		23.7		20.4		22.8		12.2	
Iron	mg/kg	55000	39100	10,400		14,000		39,100	J	19,400		17,700		20,700		10,400	
Lead	mg/kg	400	15.2	7.9		7.9		10.6	J	15.2	J	9.1	J	11		9.7	
Magnesium	mg/kg	NE	8170	1,950		7,440		7,470	J	6,110		6,040		8,170		2,450	
Manganese	mg/kg	1800	668	127		379		151	J	668		547		413		187	
Mercury	mg/kg	23	0.025	-	-	0.018	J	0.016	J	0.015	J	0.019	J	-	-	0.025	J
Nickel	mg/kg	1500	27.6	15.7		16.1		16	J	27.6		22.6		27.1		17.8	
Potassium	mg/kg	NE	1850	498	J	1,300		1,060	J	1,850		1,470		1,420		628	J
Selenium	mg/kg	390	1	1	J	0.39	J	0.92	J	0.83	J	0.48	J	-	-	0.96	J
Silver	mg/kg	390	0.083	-	-	-	-	0.083	J	-	-	-	-	-	-	-	-
Sodium	mg/kg	NE	170	85.2	J	157	J	54.8	J	170	J	157	J	-	-	123	J
Vanadium	mg/kg	390	15.2	9.4		15.2		13.6	J	14.9		12.5		13.3		11.1	
Zinc	mg/kg	23000	62.5	34.7		38.9		27	J	59.7		54.9		62.5		45.1	
GENERAL CHEMISTRY																	
Total organic carbon	mg/kg	NE	0.57	0.57		-	-	-	-	-	-	-	-	-	-	-	-

NE - Not established (RBSCs).

Shaded cell indicates value is greater than RBSC.

RBSC - Values reflect an incremental lifetime cancer risk (ICLR) of 1E-6 or a noncancer hazard quotient (HQ) of 0.1.

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

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

"-" - Not Detected.

mg/kg - Parts per million.

Validation Qualifiers (VQ)

J - The analyte was postively identifed; the reported value is estimated.

Table 5-7

Detected Constituents in Temporary Piezometers Above RBSCs and/or BSCs
Powerhouse 2 Ash Pits SCR
Former Plum Brook Ordnance Works, Sandusky, Ohio

				Location Code:	AP2-PZ03		AP2-PZ04		AP2-PZ07					
				Sample Number:	AP3018		AP3019		AP3022		AP3015		AP3016	
				Sample Date:	31-Jan-09		1-Feb-09		2-Feb-09		2-Feb-09		2-Feb-09	
				Sample Depth:	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
				Sample Purpose:	REG		REG		REG		FD		FS	
				Low-Flow Sampled:	Yes		Yes		Yes		Yes		Yes	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
Semivolatiles														
Dimethylphenol, 2,4-	µg/L	73	NE	3.38	-	-	-	-	-	-	3.38	J	-	-
Metals-Unfiltered														
Aluminum	µg/L	3,700	309	2,400	**2,400**		74.3	J	147	J	93.3	J	-	-
Barium	µg/L	730	11,800	51	51.1		24		31.9		31.3		-	-
Cadmium	µg/L	1.8	NE	4.3	4.16	J	4.28	J	3.91	J	4.27	J	-	-
Calcium	µg/L	NE	316,000	179,000	179,000		135,000		110,000		110,000		101,000	
Cobalt	µg/L	1.1	12.1	0.0	-	-	-	-	-	-	-	-	-	-
Copper	µg/L	150	19.8	12.3	12.3		5.63	J	-	-	5.71	J	-	-
Iron	µg/L	2,600	1,550	5,060	5,060		203		593	J	325	J	191	
Lead	µg/L	15	NE	3.02	3.02	J	-	-	-	-	-	-	-	-
Magnesium	µg/L	NE	217,000	42,700	42,700		39,600		31,900		32,200		29,200	
Manganese	µg/L	88	636	52	51.8		22.1		24.5		21.6		20.7	
Nickel	µg/L	73	8.6	6.3	6.28	J	5.36	J	-	-	4	J	-	-
Potassium	µg/L	NE	116,000	1,260	1,260		405	J	548	J	521	J	-	-
Selenium	µg/L	18	NE	7.6	7.55	J	-	-	-	-	-	-	-	-
Sodium	µg/L	NE	1,390,000	12,200	12,200		9,150		6,990		6,860		6,380	
Vanadium	µg/L	18	NE	5.4	5.39		-	-	-	-	-	-	-	-
Zinc	µg/L	1,100	507	0.0	-	-	-	-	-	-	-	-	-	-
Metals-Filtered														
Aluminum	µg/L	3,700	309	0.0	-	-	-	-	-	-	-	-	-	-
Barium	µg/L	730	11,800	34.9	34.9		22.8		28.2		29.3		-	-
Cadmium	µg/L	1.8	NE	4.4	4.36	J	4.13	J	3.9	J	3.98	J	-	-
Calcium	µg/L	NE	316,000	172,000	172,000		135,000		103,000		108,000		103,000	
Cobalt	µg/L	1.1	12.1	0.0	-	-	-	-	-	-	-	-	-	-
Copper	µg/L	150	19.8	6.9	6.9	J	-	-	-	-	-	-	-	-
Lead	µg/L	15	NE	0.00	-	-	-	-	-	-	-	-	-	-
Magnesium	µg/L	NE	217,000	42,800	42,800		40,800		31,400		31,100		29,900	
Manganese	µg/L	88	636	31	-	-	16.2		19		17.1		30.7	
Nickel	µg/L	73	8.6	0.0	-	-	-	-	-	-	-	-	-	-
Potassium	µg/L	NE	116,000	0,510	510	J	346	J	May 2009	J	445	J	-	-
Selenium	µg/L	18	NE	6.8	6.82	J	-	-	-	-	-	-	-	-
Sodium	µg/L	NE	1,390,000	12,500	12,500		9,280		7,000		6,840		6,180	
Vanadium	µg/L	18	NE	0.0	-	-	-	-	-	-	-	-	-	-
Zinc	µg/L	1,100	507	0.0	-	-	-	-	-	-	-	-	-	-
Water Quality Parameters														
Alkalinity	µg/L	NE	NE	260,000	231,000		132,000		169,000		222,000		260,000	
Chloride	µg/L	NE	NE	11,600	11,600	J	5,140	J	3,040	J	2,810	J	2,100	
Cyanide, total	µg/L	73	NE	44									44	
Hardness	µg/L	NE	NE	622,000	622,000		501,000		407,000		408,000		620,000	
HARDNESS (as CaCO3)	µg/L	NE	NE	0										
Nitrate-Nitrite	µg/L	NE	NE	566	566	J	49	J	28	J	-	-		
Sulfate	µg/L	NE	NE	341,000	341,000		236,000		80,600		79,600		177,000	
Total dissolved solids	µg/L	NE	NE	804,000	804,000		619,000		450,000		442,000		450,000	
Total suspended solids	µg/L	NE	NE	59,000	59,000		3,000	J	4,000		-	-	-	-
Turbidity	NTU	NE	NE	51.50	51.5	J	4.56	J	4.52		4.93		1.3	

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

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

Table 5-8

Detected Constituents in Overburden/Shale Monitoring Wells Above RBSCs and/or BSCs
Powerhouse 2 Ash Pits Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

				Location Code:	AP2-MW01		AP2-MW02						AP2-MW03	
				Sample Number:	AP3057		AP3058		AP3059		AP3060		AP3061	
				Sample Date:	23-May-09		25-May-09		25-May-09		26-May-09		24-May-09	
				Sample Depth:	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
				Sample Purpose:	REG		REG		FD		FS		REG	
				Low-Flow Sampled:	Yes		Yes		Yes		Yes		Yes	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
Semivolatiles														
Dimethylphenol, 2,4-	µg/L	73	NE	0	-	-	-	-	-	-	-	-	-	-
Metals-Unfiltered														
Aluminum	µg/L	3,700	309	0,133	133	J	79.1	J	77.6	J	-	-	47.1	J
Barium	µg/L	730	11,800	98	98	J	25.3	J	24.5	J	-	-	25.2	J
Cadmium	µg/L	1.8	NE	1.1	-	-	1.1	J	1	J	-	-	-	-
Calcium	µg/L	NE	316,000	112,000	112,000		102,000		102,000		94,900		54,400	
Cobalt	µg/L	1.1	12.1	8.3	-	-	7.9	J	8.3	J	-	-	-	-
Copper	µg/L	150	19.8	0.0	-	-	-	-	-	-	-	-	-	-
Iron	µg/L	2,600	1,550	81	80.8	J	-	-	-	-	-	-	37	J
Lead	µg/L	15	NE	2.40	2.4	J	-	-	-	-	-	-	-	-
Magnesium	µg/L	NE	217,000	38,700	38,700		11,600		11,600		10,800		12,700	
Manganese	µg/L	88	636	229	82.2		229		229		212		173	
Nickel	µg/L	73	8.6	74.2	-	-	**74.2**		**74.2**		**68.9**		-	-
Potassium	µg/L	NE	116,000	8,940	4,150	J	7,690	J	7,410	J	8,940		1,500	J
Selenium	µg/L	18	NE	5.7	-	-	-	-	-	-	-	-	5.7	B
Sodium	µg/L	NE	1,390,000	10,200	7,440	J	2,560	J	2,460	J	-	-	10,200	J
Vanadium	µg/L	18	NE	3.7	3.7	J	-	-	-	-	-	-	1.4	J
Zinc	µg/L	1,100	507	42.6	-	-	42.6		33.9		29.9		-	-
Metals-Filtered														
Aluminum	µg/L	3,700	309	45.4	-	-	45.4	J	44	J	-	-	-	-
Barium	µg/L	730	11,800	88.1	88.1	J	23.9	J	23.6	J	-	-	22.3	J
Cadmium	µg/L	1.8	NE	0.0	-	-	-	-	-	-	-	-	-	-
Calcium	µg/L	NE	316,000	103,000	102,000		96,400		93,100		103,000		47,200	
Cobalt	µg/L	1.1	12.1	8.9	-	-	8.9	J	8.7	J	-	-	-	-
Copper	µg/L	150	19.8	0.0	-	-	-	-	-	-	-	-	-	-
Lead	µg/L	15	NE	2.10	2.1	B	-	-	-	-	-	-	-	-
Magnesium	µg/L	NE	217,000	34,100	34,100		11,000		10,600		11,900	J	11,500	
Manganese	µg/L	88	636	220	72.3		220		214		218		171	
Nickel	µg/L	73	8.6	74.5	-	-	**74.5**		**72.1**		**72.6**		-	-
Potassium	µg/L	NE	116,000	9,500	5,030	J	9,090	J	8,950	J	9,500		1,950	J
Selenium	µg/L	18	NE	3.5	3.5	J	-	-	-	-	-	-	-	-
Sodium	µg/L	NE	1,390,000	11,000	8,520	J	3,030	J	2,930	J	-	-	11,000	
Vanadium	µg/L	18	NE	3.5	3.5		-	-	-	-	-	-	-	-
Zinc	µg/L	1,100	507	33.6	-	-	33.6		32.4		31		-	-

Table 5-8

Detected Constituents in Overburden/Shale Monitoring Wells Above RBSCs and/or BSCs
Powerhouse 2 Ash Pits Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

				Location Code:	AP2-MW01		AP2-MW02						AP2-MW03	
				Sample Number:	AP3057		AP3058		AP3059		AP3060		AP3061	
				Sample Date:	23-May-09		25-May-09		25-May-09		26-May-09		24-May-09	
				Sample Depth:	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
				Sample Purpose:	REG		REG		FD		FS		REG	
				Low-Flow Sampled:	Yes		Yes		Yes		Yes		Yes	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
Water Quality Parameters														
Alkalinity	µg/L	NE	NE	362,000	362,000		70,300		73,400		72,000		116,000	
Chloride	µg/L	NE	NE	12,600	4,600		4,100		3,600		12,600		6,500	
Cyanide, total	µg/L	73	NE	0	-	-	-	-	-	-	-	-	-	-
Hardness	µg/L	NE	NE	330,000							330,000			
HARDNESS (as CaCO3)	µg/L	NE	NE	439,000	439,000		300,000		302,000				188,000	
Nitrate-Nitrite	µg/L	NE	NE	10,900	65	J	10,900		10,900		8,700		610	
Sulfate	µg/L	NE	NE	173,000	81,500		165,000		159,000		173,000		94,900	
Total dissolved solids	µg/L	NE	NE	508,000	294,000	J	507,000	J	508,000	J	460,000		295,000	J
Total suspended solids	µg/L	NE	NE	4,000	-	-	-	-	4,000	J	-	-	-	-
Turbidity	NTU	NE	NE	1.00	-	-	-	-	-	-	-	-	1	J

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

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

Table 5-9

Detected Constituents in Bedrock Monitoring Wells Above RBSCs and/or BSCs
Powerhouse 2 Ash Pits Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

(1 of 2)

					Location Code:	AP2-BEDGW-002								AP2-BEDGW-003							
					Sample Number:	AP3063		AP3079		AP3081		AP3082		AP3064		AP3065		AP3066		AP3080	
					Sample Date:	24-May-09		17-Nov-09		17-Nov-09		17-Nov-09		23-May-09		23-May-09		23-May-09		16-Nov-09	
					Sample Depth:	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
					Sample Purpose:	REG		REG		FD		FS		REG		FD		FS		REG	
					Low-Flow Sampled:	Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Parameter	Filtered	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
Volatiles																					
Acetone	N	ug/L	2,200	NE	50.6	-	-	50.6	J	34.4	J	-	-	-	-	-	-	-	-	86.1	J
Benzene	N	ug/L	0.41	2.4	100	**8.5**		**9.4**	J	**6.2**	J	**4.1**		**94.1**		**91.3**		**100**		**336**	
Butanone, 2-	N	ug/L	710	NE	7.4	7.4		2.4	J	-	-	-	-	4.3	J	4.9	J	-	-	-	-
Carbon disulfide	N	ug/L	100	NE	5.2	-	-	-	-	1.2	B	1.3		-	-	-	-	5.2		3.7	J
Chloroform	N	ug/L	0.19	NE	5.6	-	-	5.6	B	4	B	-	-	-	-	-	-	-	-	14.6	B
Chloromethane	N	ug/L	19	NE	7.7	-	-	7.7	J	3.5	J	-	-	-	-	-	-	-	-	44.9	J
Cyclohexane	N	ug/L	1,300	NE	74							54						74			
Dichloropropene, trans-1,3-	N	ug/L	NE	NE	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.7	J
Ethylbenzene	N	ug/L	1.5	0.87	21	**9.6**		**9.7**	J	**6.6**	J	**5**		**17.7**		**17.2**		**21**		**57.1**	
Isopropylbenzene	N	ug/L	68	NE	5.8							2.5						5.8			
Methylcyclohexane	N	ug/L	NE	NE	39							39						29			
Methylene chloride	N	ug/L	4.8	NE	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.4	B
Toluene	N	ug/L	230	1.7	54	**5.3**		**4.8**	J	**3.3**	J	**2.3**		**41.3**		**39.6**		**54**		**147**	
Xylenes, total	N	ug/L	20	5.5	260	**63.2**		**55.7**	J	**36.8**	J	**29**		**193**		**185**		**260**		**630**	
Semivolatiles																					
Dimethylphenol, 2,4-	N	ug/L	73	NE	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.7	J
Methylnaphthalene, 2-	N	ug/L	15	NE	2.8	2.8	J	2.8	J	2.5	J	-	-	1.9	J	1.3	J	-	-	6.3	
Naphthalene	N	ug/L	0.14	NE	2.9	2	J	1.9	J	1.6	J	-	-	2.9	J	1.9	J	-	-	7.4	
Metals-Unfiltered																					
Aluminum	N	ug/L	3,700	309	46.7	42.8	J	46.7	J	45.5	J	-	-	-	-	17.4	J	-	-	33.9	J
Barium	N	ug/L	730	11,800	184	22.7	J	21.1	J	21.3	J	-	-	175	J	184	J	-	-	161	J
Cadmium	N	ug/L	1.8	NE	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	N	ug/L	NE	316,000	404000	**377,000**		**392,000**	J	**385,000**	J	**404,000**		266,000	J	275,000		**317,000**		280,000	J
Cobalt	N	ug/L	1.1	12.1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	N	ug/L	150	19.8	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	N	ug/L	2,600	1,550	283	283	J	-	-	-	-	194		-	-	33	J	-	-	-	-
Lead	N	ug/L	15	NE	2.4	-	-	-	-	2.4	B	-	-	-	-	-	-	-	-	-	-
Magnesium	N	ug/L	NE	217,000	124000	121,000		124,000		123,000		119,000		103,000	J	110,000		120,000		112,000	
Manganese	N	ug/L	88	636	53.7	53.7		11.1	J	10.7	J	-	-	5.9	J	5.4	J	-	-	7.1	J
Nickel	N	ug/L	73	8.6	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	N	ug/L	NE	116,000	13300	7,740	J	10,900		11,000		7,380		13,300		11,500	J	11,300		15,600	
Selenium	N	ug/L	18	NE	21.3	-	-	21.3	J	17.7	J	-	-	6.7	B	14.3	B	-	-	12.4	J
Sodium	N	ug/L	NE	1,390,000	63000	26,400		32,100	J	32,100	J	28,500		56,600	J	58,500		63,000		61,100	J
Vanadium	N	ug/L	18	NE	1.6	1.6	J	1.1	J	-	-	-	-	1	J	1.3	J	-	-	-	-
Zinc	N	ug/L	1,100	507	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 5-9

Detected Constituents in Bedrock Monitoring Wells Above RBSCs and/or BSCs
Powerhouse 2 Ash Pits Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

(2 of 2)

					Location Code:	AP2-BEDGW-002								AP2-BEDGW-003							
					Sample Number:	AP3063		AP3079		AP3081		AP3082		AP3064		AP3065		AP3066		AP3080	
					Sample Date:	24-May-09		17-Nov-09		17-Nov-09		17-Nov-09		23-May-09		23-May-09		23-May-09		16-Nov-09	
					Sample Depth:	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
					Sample Purpose:	REG		REG		FD		FS		REG		FD		FS		REG	
					Low-Flow Sampled:	Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Parameter	Filtered	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
Metals-Filtered																					
Aluminum	Y	ug/L	3,700	309	39.3	16.2	J	37.4	B	39.3	B	-	-	-	-	12.4	J	-	-	40.8	B
Barium	Y	ug/L	730	11,800	186	22.6	J	19.8	J	18.8	J	-	-	171	J	186	J	-	-	164	J
Cadmium	Y	ug/L	1.8	NE	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	Y	ug/L	NE	316,000	411000	**389,000**		**347,000**	J	**335,000**	J	**411,000**		257,000		281,000		**323,000**		256,000	J
Cobalt	Y	ug/L	1.1	12.1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	Y	ug/L	150	19.8	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	Y	ug/L	2,600	1,550	46.5	-	-	36.1	J	46.5	J	-	-	-	-	-	-	-	-	65.5	J
Lead	Y	ug/L	15	NE	2.1	2.1	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	Y	ug/L	NE	217,000	123000	119,000		118,000	J	113,000	J	121,000		98,700	J	108,000		123,000		109,000	J
Manganese	Y	ug/L	88	636	52.4	52.4		9.6	J	9.3	J	-	-	5.6	J	6.1	J	-	-	7.2	J
Nickel	Y	ug/L	73	8.6	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	Y	ug/L	NE	116,000	13800	9,790	J	11,500	J	11,000	J	7,540		13,000		13,800		11,800		16,300	J
Selenium	Y	ug/L	18	NE	74.9	-	-	74.9	J	14.3	J	-	-	8.1	J	8.8	J	-	-	22.4	J
Sodium	Y	ug/L	NE	1,390,000	65900	28,900		33,100		31,400		29,100		55,700		58,700		65,900		63,100	
Vanadium	Y	ug/L	18	NE	2.3	1.1	J	2	J	2.3	J	-	-	1.2	J	1.1	J	-	-	2.6	J
Zinc	Y	ug/L	1,100	507	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Water Quality Parameters																					
Alkalinity	N	ug/L	NE	NE	649000	417,000		472,000	J	492,000	J	490,000		649,000	J	632,000		590,000		662,000	J
Chloride	N	ug/L	NE	NE	111000	40,600		74,200	J	46,900	J	48,800		111,000		105,000		93,600		118,000	
Cyanide, total	N	ug/L	73	NE	710	7.2	J	-	-	-	-	510		-	-	-	-	710		-	-
Hardness	N	ug/L	NE	NE	1600000							1,600,000						1,200,000			
HARDNESS (as CaCO3)	N	ug/L	NE	NE	1490000	1,440,000		1,490,000		1,460,000				1,090,000		1,140,000				1,160,000	
Nitrate-Nitrite	N	ug/L	NE	NE	2000	-	-	2,000	J	54	B			760	J	-	-	-	-	47	B
Sulfate	N	ug/L	NE	NE	1080000	946,000		776,000	J	1,070,000	J	1,080,000		519,000		476,000		626,000		496,000	
Total dissolved solids	N	ug/L	NE	NE	2240000	2,240,000	J	2,200,000	J	2,050,000	J	2,000,000		1,900,000	J	1,740,000	J	1,500,000		1,570,000	J
Total suspended solids	N	ug/L	NE	NE	18000	18,000		4,000	UJ	-	-	-	-	-	-	17,000		-	-	-	-
Turbidity	N	NTU	NE	NE	110	38.2	J	1.7	J	21.4	J	110		14	J	-	-	94		51.2	

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

Ferrous iron measured in field using Hach test kit.
Oxidation reduction potential - Final YSI water quality meter field measurement prior to groundwater sample collection.
NM - Not measured.

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

FIGURES

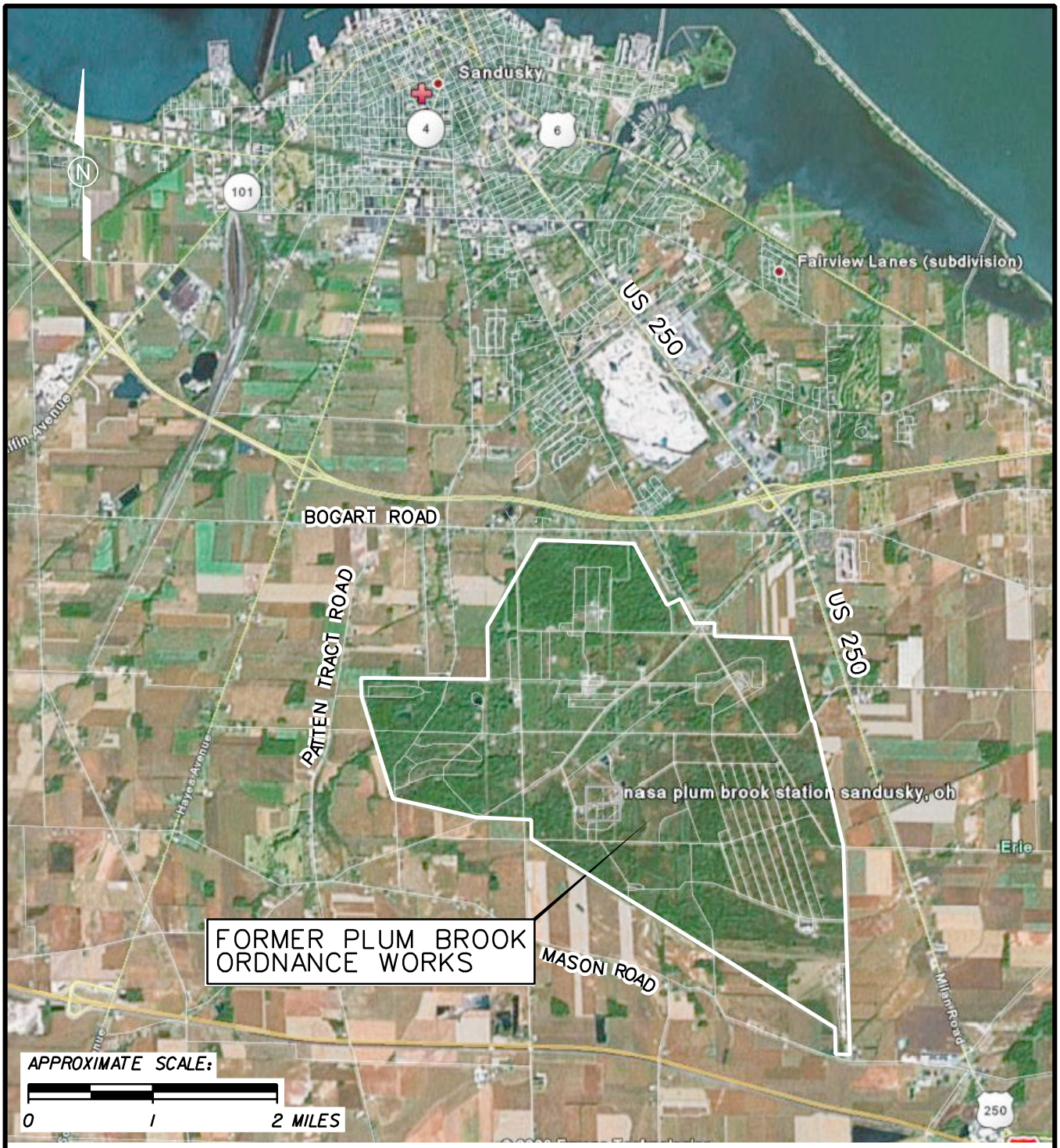

FIGURE 1-1
PBOW VICINITY MAP

POWERHOUSE 2 ASH PITS SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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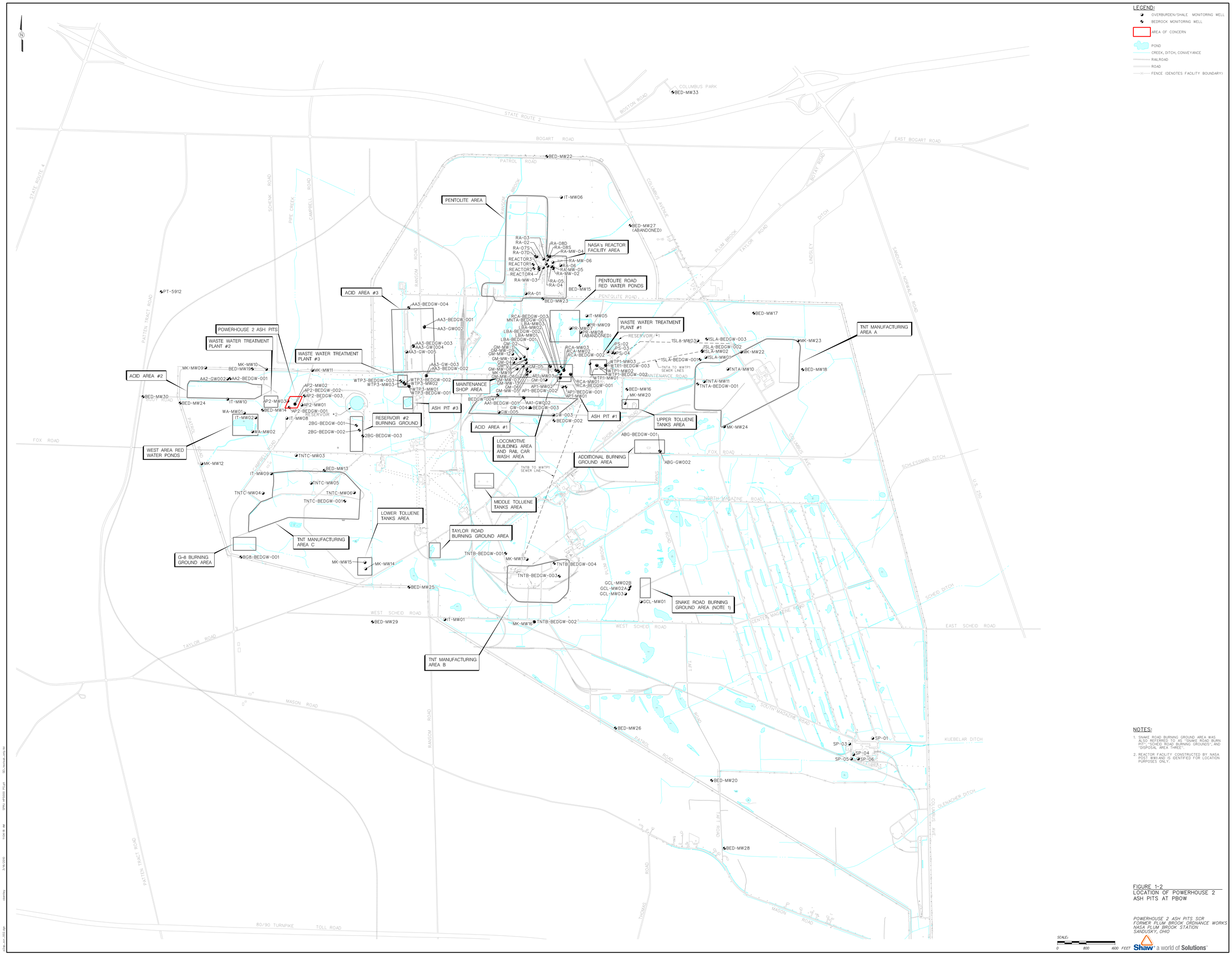
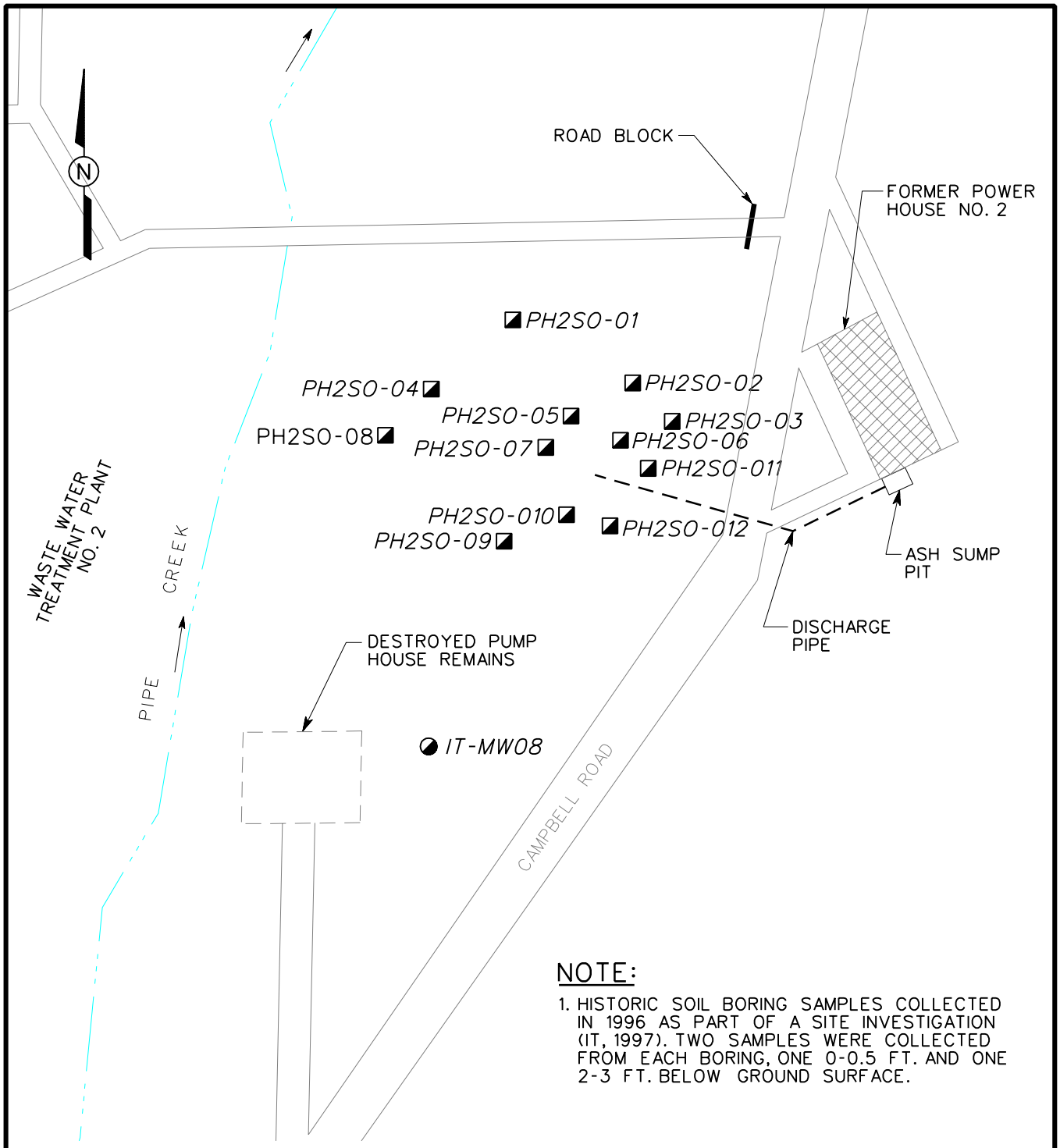


NOTES:

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

FIGURE 1-2
LOCATION OF POWERHOUSE 2 ASH PITS AT PBOW

POWERHOUSE 2 ASH PITS SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO



NOTE:

1. HISTORIC SOIL BORING SAMPLES COLLECTED IN 1996 AS PART OF A SITE INVESTIGATION (IT, 1997). TWO SAMPLES WERE COLLECTED FROM EACH BORING, ONE 0-0.5 FT. AND ONE 2-3 FT. BELOW GROUND SURFACE.

LEGEND:

- BUILDINGS
- DITCH
- HISTORIC SOIL BORING LOCATION (NOTE 1)
- EXISTING MONITORING WELL (OVERBURDEN/SHALE)

SCALE

0 200 400 FEET

FIGURE 1-3
HISTORIC SOIL BORING LOCATIONS
POWERHOUSE 2 ASH PITS

POWERHOUSE 2 ASH PITS SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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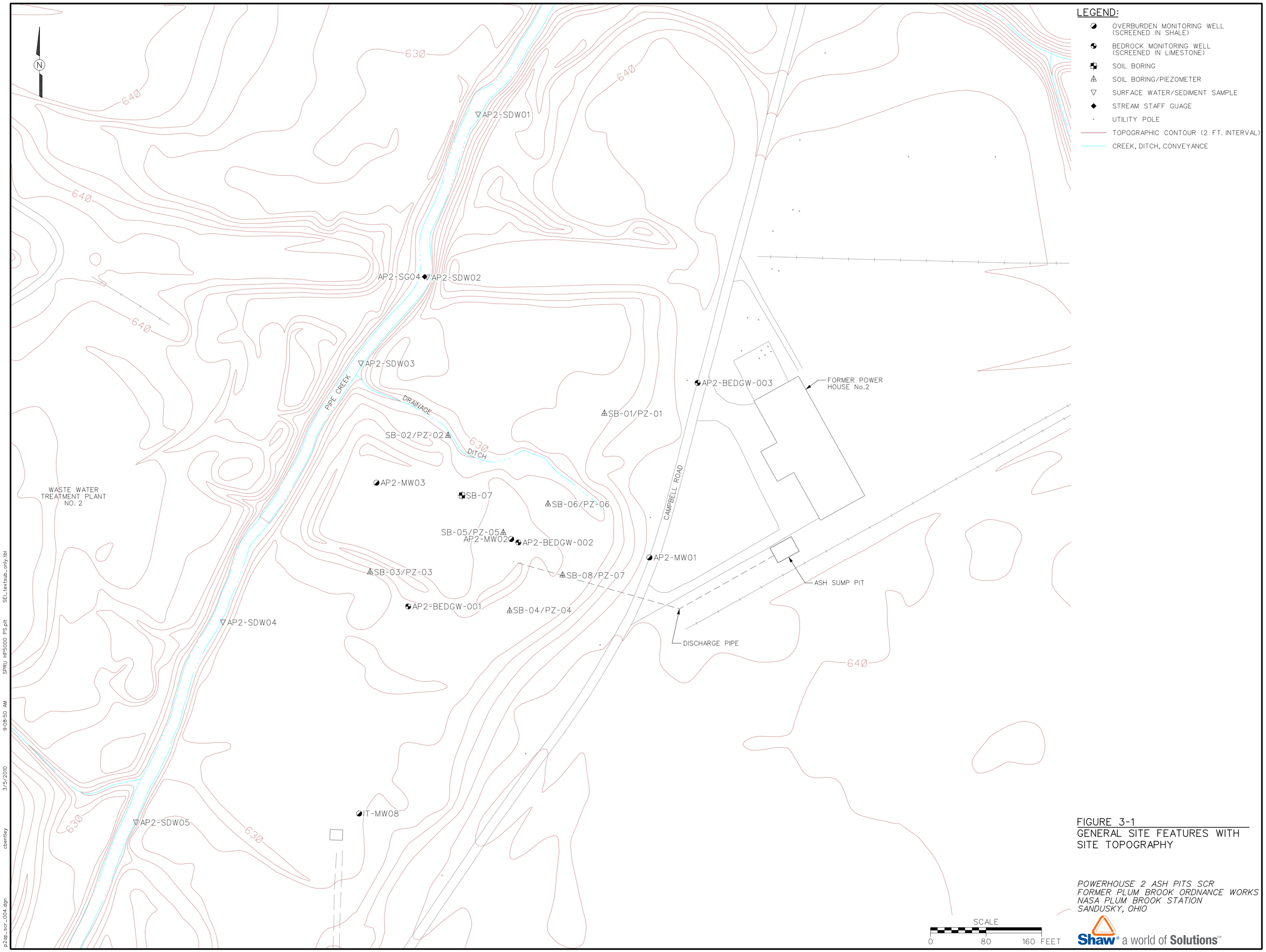


FIGURE 3-1
GENERAL SITE FEATURES WITH SITE TOPOGRAPHY

POWERHOUSE 2 ASH PITS SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

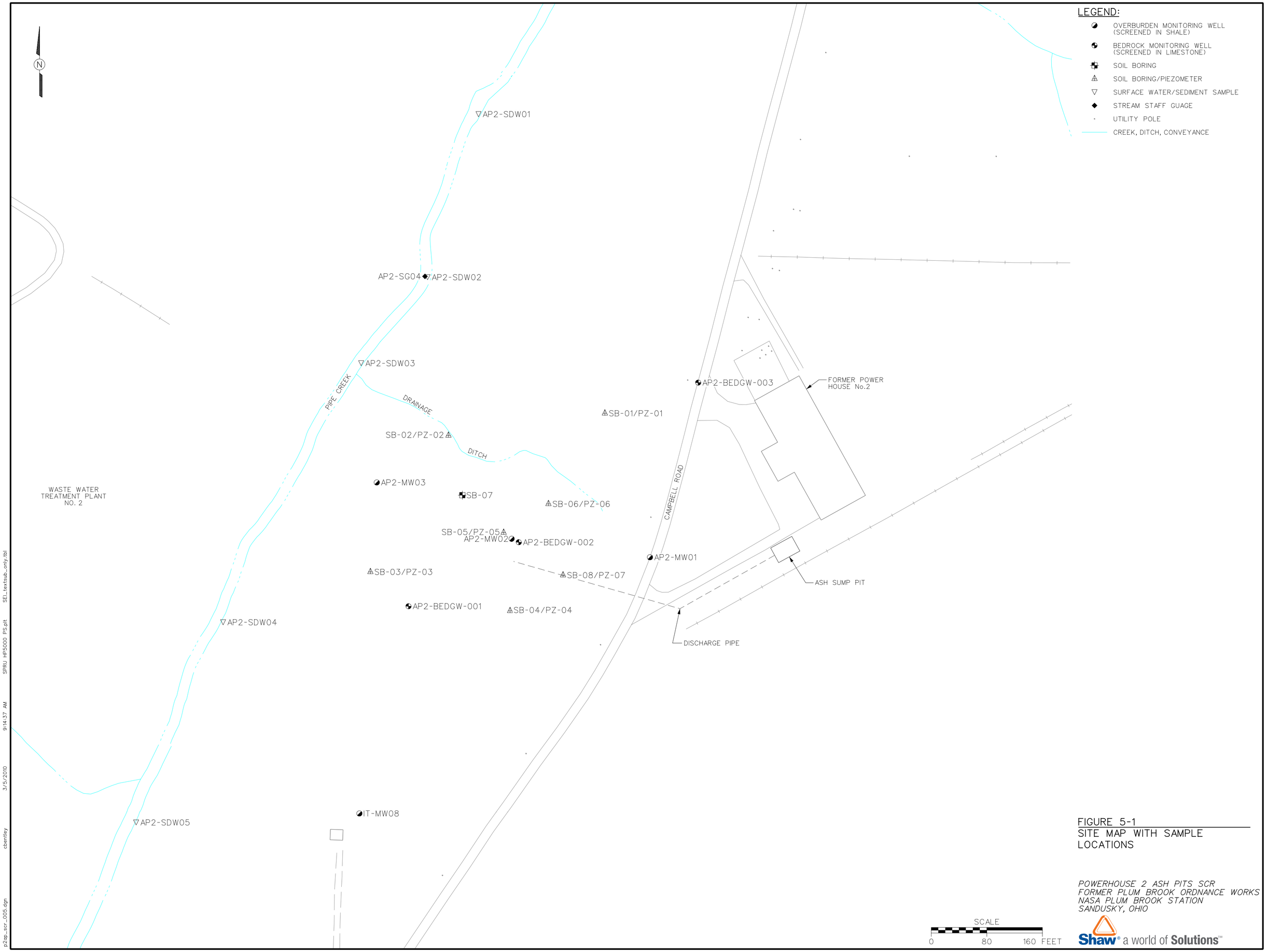
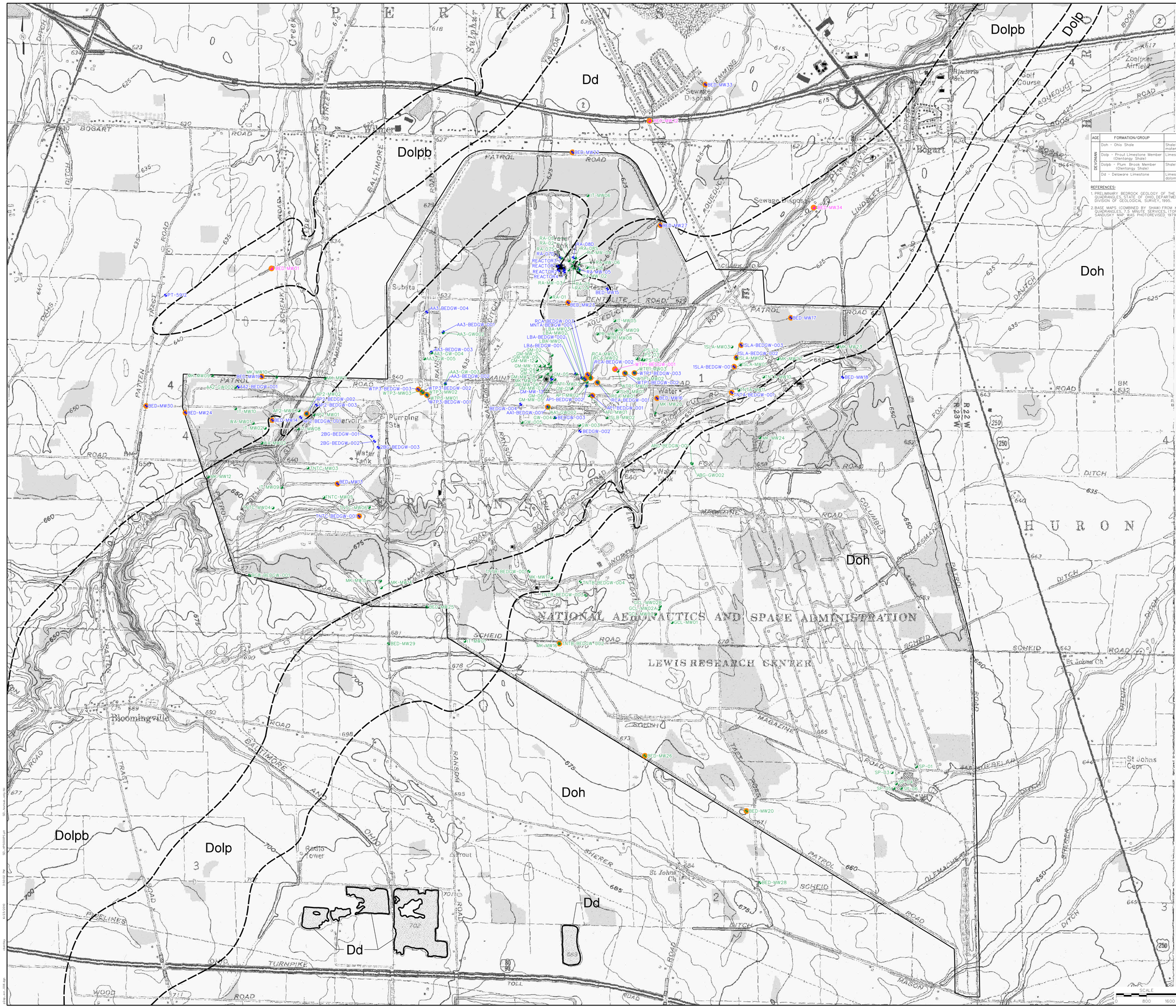


FIGURE 5-1
SITE MAP WITH SAMPLE LOCATIONS

POWERHOUSE 2 ASH PITS SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO



LEGEND:

- OVERBURDEN MONITORING WELL (SCREENED IN SHALE)
- BEDROCK MONITORING WELL (SCREENED IN SHALE)
- BEDROCK MONITORING WELL (SCREENED IN LIMESTONE)
- ABANDONED OVERBURDEN MONITORING WELL (SCREENED IN SHALE)
- ABANDONED BEDROCK MONITORING WELL (SCREENED IN LIMESTONE)
- ABANDONED BEDROCK WELL BORING
- H_2S AND/OR NATURAL GAS AND/OR PETROLEUM HYDROCARBON WERE NOTED DURING BEDROCK DRILLING
- GEOLOGIC CONTACT: SOLID WHERE EXPOSED, DASHED WHERE CONCEALED BY SEDIMENTS

AGE	FORMATION/GROUP	ROCK DESCRIPTION
DEVONIAN	Doh - Ohio Shale	Shale: black, thin-bedded with bituminous and carboneous material, pyrite, natural gas pockets.
	Dolp - Prout Limestone Member (Olentangy Shale)	Limestone: light gray, calcareous.
	Dolpb - Plum Brook Member (Olentangy Shale)	Shale: dark gray, thin-bedded.
	Dd - Delaware Limestone	Limestone: buff, earthy, interbedded with brown crystalline dolomite, fossiliferous, hydrogen sulfide, petroleum hydrocarbon.

REFERENCES:

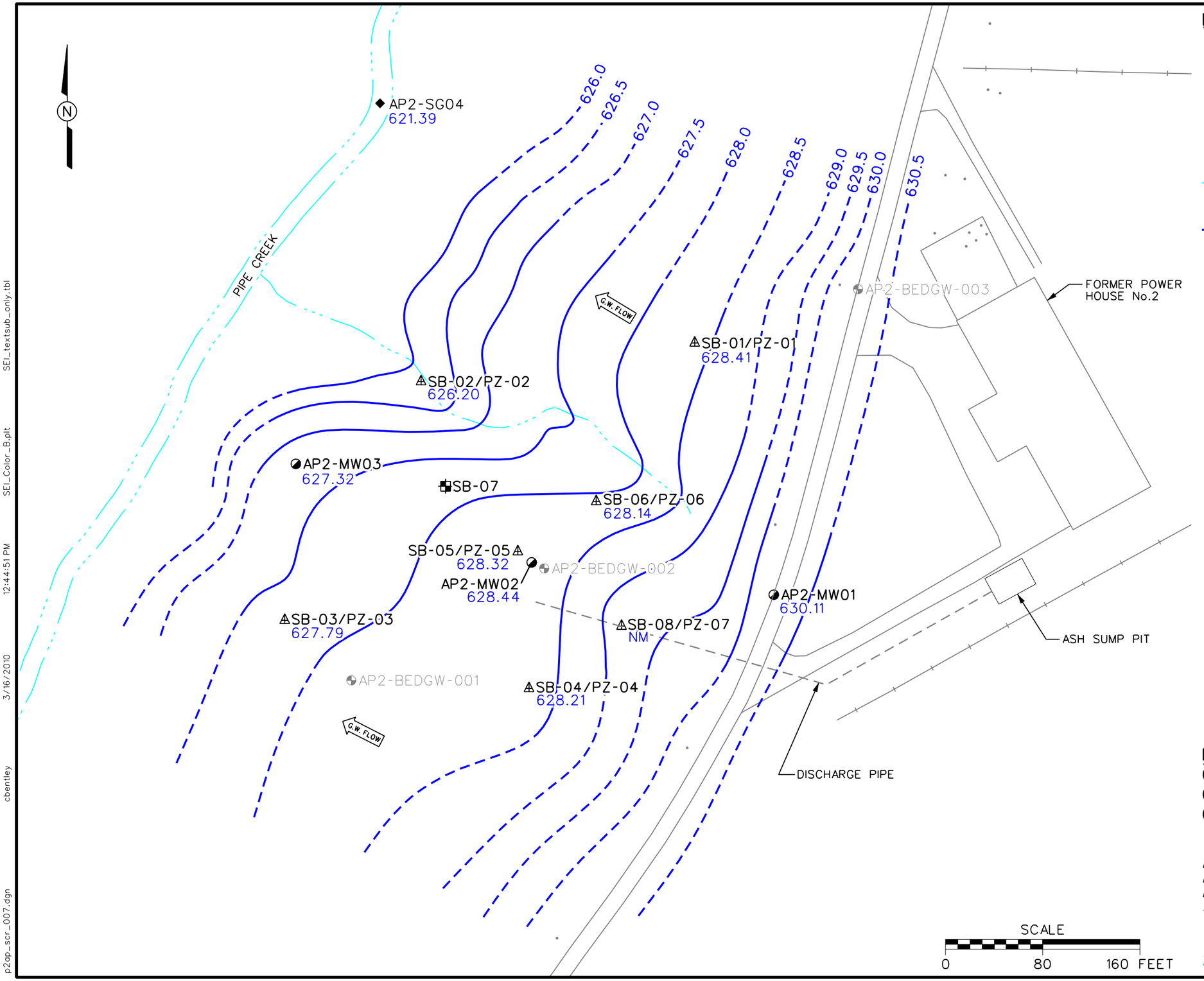
1. PRELIMINARY BEDROCK GEOLOGY OF THE KIMBALL AND SANDUSKY, OHIO, QUADRANGLES, STATE OF OHIO, DEPARTMENT OF NATURAL RESOURCES, DIVISION OF GEOLOGICAL SURVEY, 1995.
2. BASE MAPS (COMBINED BY SHAW) FROM KIMBALL AND SANDUSKY QUADRANGLES, 7.5 MINUTE SERVICES, (TOPOGRAPHIC), 1969. SANDUSKY MAP WAS PHOTOREVISED, 1979.

NOTES:

1. CONTACT LINES WERE ADJUSTED BASED ON 2009 MONITORING WELLS/SOIL BORING DATA.

FIGURE 5-2
REGIONAL GEOLOGIC MAP WITH WELL LOCATIONS

POWERHOUSE 2 ASH PITS SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO



LEGEND:

- OVERBURDEN/SHALE MONITORING WELL
- DELAWARE LIMESTONE MONITORING WELL
- SOIL BORING
- SOIL BORING/PIEZOMETER
- STREAM STAFF GUAGE
- UTILITY POLE
- CREEK, DITCH, CONVEYANCE
- 628.41 GROUNDWATER ELEVATION (FT. MSL)
- -628.0- GROUNDWATER CONTOUR (FT. MSL) (DASHED WHERE INFERRED)
- G.W. FLOW GROUNDWATER FLOW DIRECTION
- NM NOT MEASURED

FIGURE 5-3
OVERBURDEN/SHALE
GROUNDWATER ELEVATION
CONTOUR MAP (MAY 23, 2009)

POWERHOUSE 2 ASH PITS SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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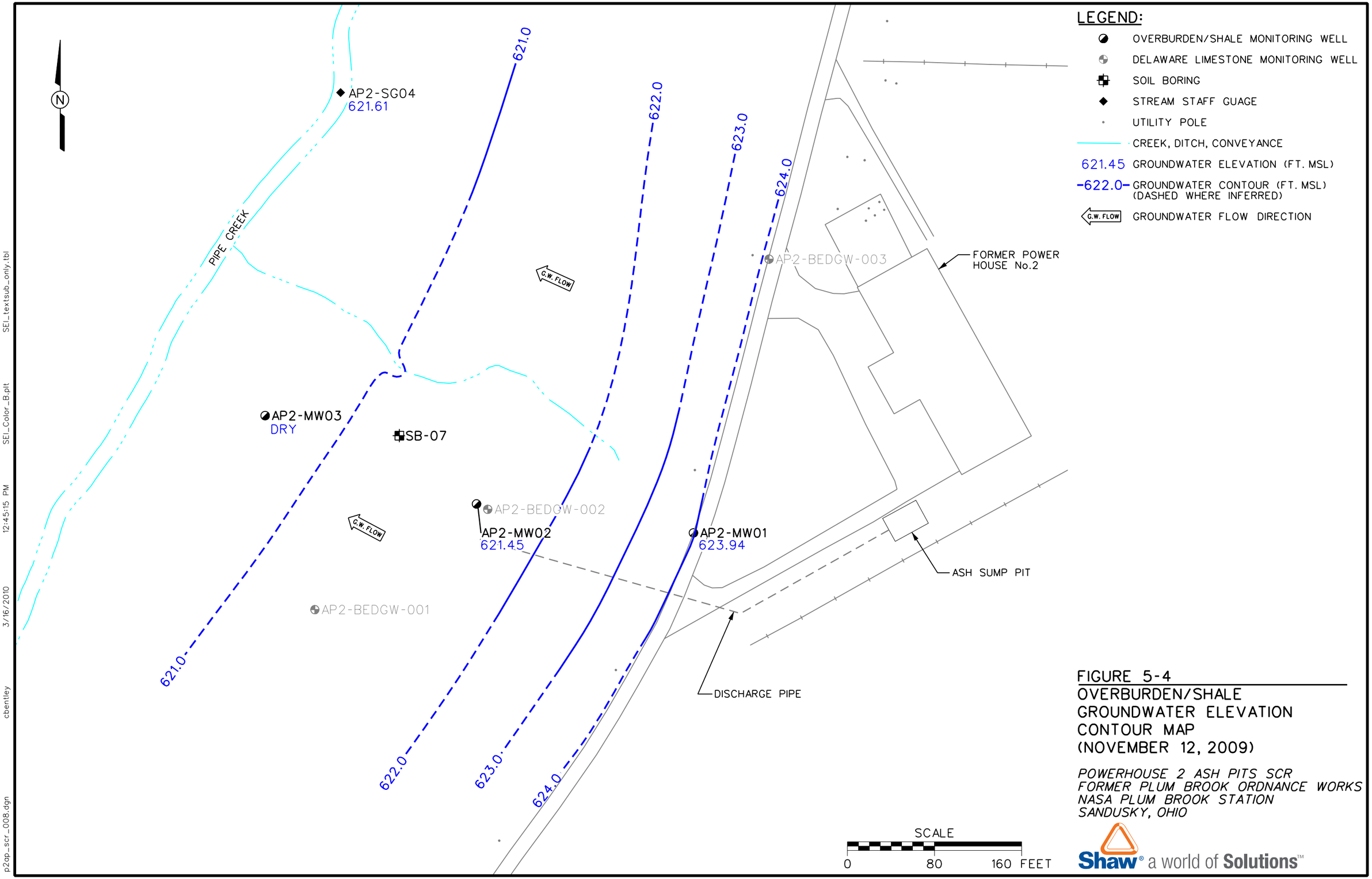

FIGURE 5-4
OVERBURDEN/SHALE GROUNDWATER ELEVATION CONTOUR MAP (NOVEMBER 12, 2009)

POWERHOUSE 2 ASH PITS SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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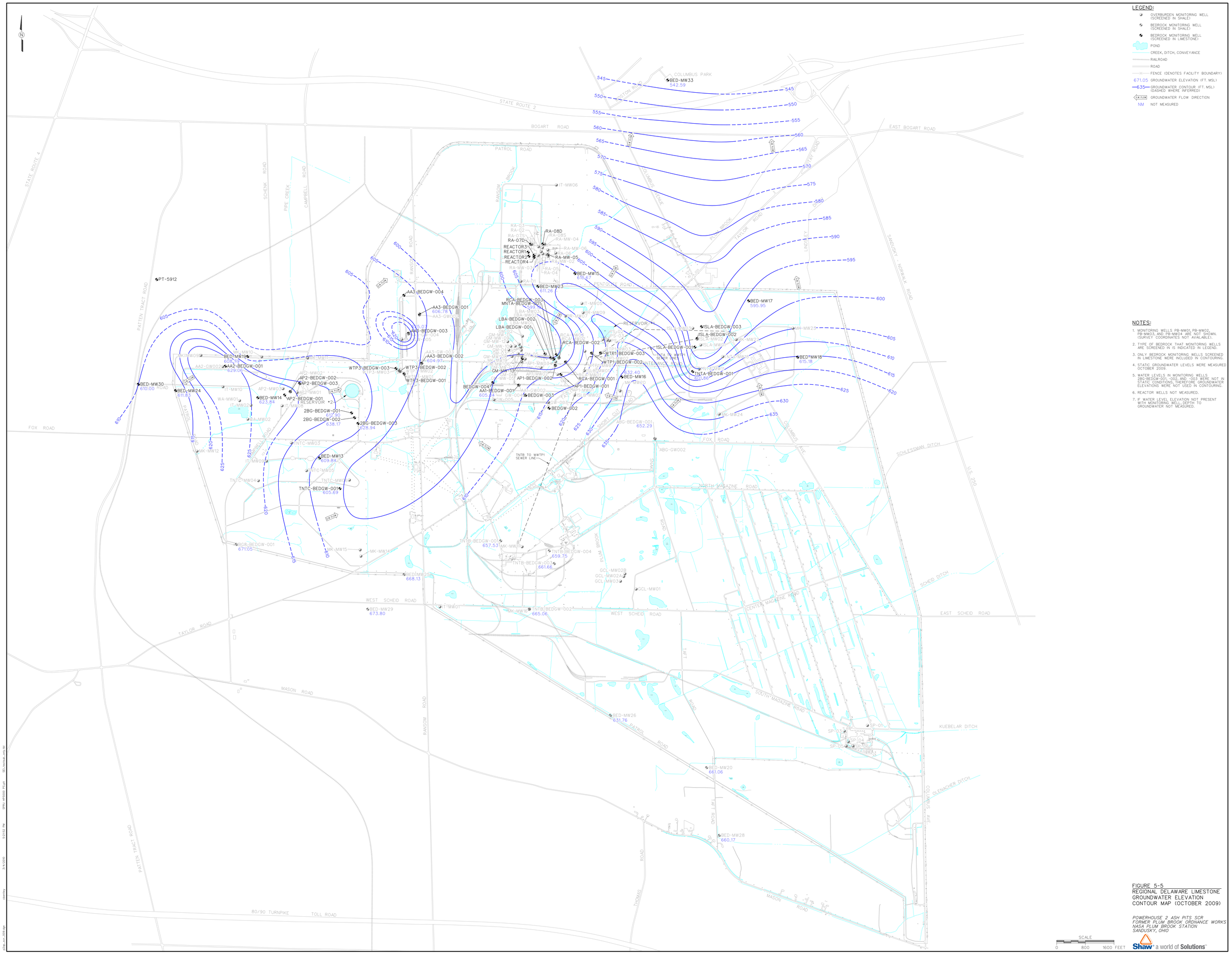

FIGURE 5-5
REGIONAL DELAWARE LIMESTONE GROUNDWATER ELEVATION CONTOUR MAP (OCTOBER 2009)

POWERHOUSE 2 ASH PITS SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

SCALE
0 800 1600 FEET

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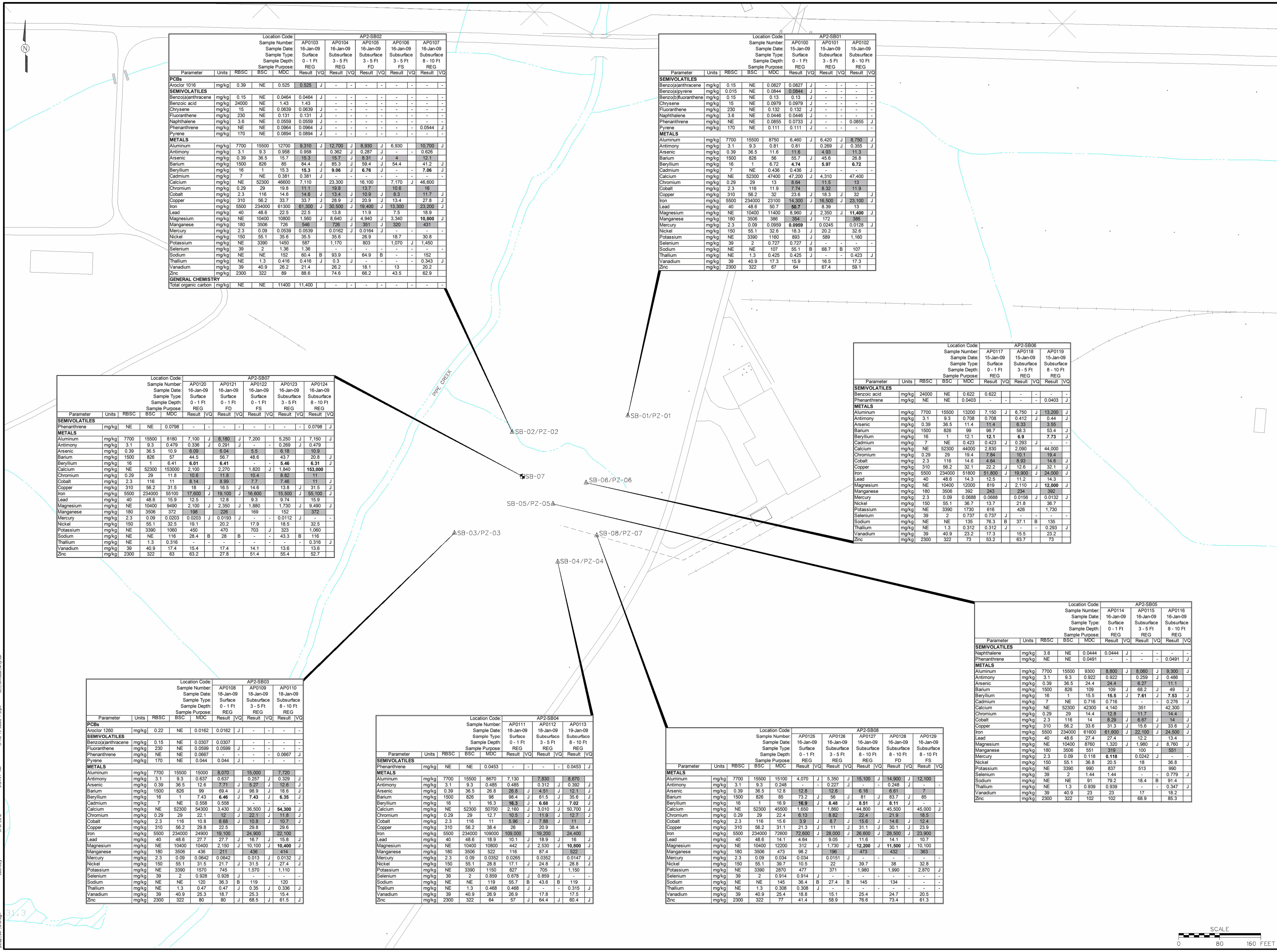

				Location Code:	AP2-SB02									
				Sample Number:	AP0103		AP0104		AP0105		AP0106		AP0107	
				Sample Date:	16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09	
				Sample Type:	Surface		Subsurface		Subsurface		Subsurface		Subsurface	
				Sample Depth:	0 - 1 Ft		3 - 5 Ft		3 - 5 Ft		3 - 5 Ft		8 - 10 Ft	
				Sample Purpose:	REG		REG		FD		FS		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
PCBs														
Aroclor 1016	mg/kg	0.39	NE	0.525	0.525	J	-	-	-	-	-	-	-	-
SEMIVOLATILES														
Benzo(a)anthracene	mg/kg	0.15	NE	0.0464	0.0464	J	-	-	-	-	-	-	-	-
Benzoic acid	mg/kg	24000	NE	1.43	1.43		-	-	-	-	-	-	-	-
Chrysene	mg/kg	15	NE	0.0639	0.0639	J	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	0.131	0.131	J	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	3.6	NE	0.0559	0.0559	J	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.0964	0.0964	J	-	-	-	-	-	-	0.0544	J
Pyrene	mg/kg	170	NE	0.0894	0.0894	J	-	-	-	-	-	-	-	-
METALS														
Aluminum	mg/kg	7700	15500	12700	9,310	J	12,700	J	8,930	J	6,930		10,700	J
Antimony	mg/kg	3.1	9.3	0.958	0.958		0.362	J	0.287	J	-	-	0.626	
Arsenic	mg/kg	0.39	36.5	15.7	15.3		15.7	J	8.31	J	4		12.1	
Barium	mg/kg	1500	826	85	84.4	J	85.3	J	59.4	J	54.4		41.2	J
Beryllium	mg/kg	16	1	15.3	**15.3**	J	**9.06**	J	**6.76**	J	-	-	**7.06**	J
Cadmium	mg/kg	7	NE	0.381	0.381	J	-	-	-	-	-	-	-	-
Calcium	mg/kg	NE	52300	46600	7,110		23,300		16,100		7,170	J	46,600	
Chromium	mg/kg	0.29	29	19.8	11.1		19.8		13.7		10.6		16	
Cobalt	mg/kg	2.3	116	14.6	14.6	J	13.4	J	10.9	J	8.3		11.7	J
Copper	mg/kg	310	56.2	33.7	33.7	J	28.9	J	20.9	J	13.4		27.8	J
Iron	mg/kg	5500	234000	61300	61,300	J	30,500	J	19,400	J	13,300		23,200	J
Lead	mg/kg	40	48.6	22.5	22.5		13.8		11.9		7.5		18.9	
Magnesium	mg/kg	NE	10400	10800	1,560	J	8,640	J	4,940	J	3,340		**10,800**	J
Manganese	mg/kg	180	3506	726	546		726	J	351	J	320		431	
Mercury	mg/kg	2.3	0.09	0.0539	0.0539		0.0162	J	0.0164	J	-	-	-	-
Nickel	mg/kg	150	55.1	35.6	35.5		35.6		26.9		18.7		30.8	
Potassium	mg/kg	NE	3390	1450	587		1,170		803		1,070	J	1,450	
Selenium	mg/kg	39	2	1.36	1.36		-	-	-	-	-	-	-	-
Sodium	mg/kg	NE	NE	152	60.4	B	93.9		64.9	B	-	-	152	
Thallium	mg/kg	NE	1.3	0.416	0.416	J	0.3	J	-	-	-	-	0.343	J
Vanadium	mg/kg	39	40.9	26.2	21.4		26.2		18.1		13		20.2	
Zinc	mg/kg	2300	322	89	88.6		74.6		66.2		43.5		62.9	
GENERAL CHEMISTRY														
Total organic carbon	mg/kg	NE	NE	11400	11,400		-	-	-	-	-	-	-	-

				Location Code:	AP2-SB01					
				Sample Number:	AP0100		AP0101		AP0102	
				Sample Date:	15-Jan-09		15-Jan-09		15-Jan-09	
				Sample Type:	Surface		Subsurface		Subsurface	
				Sample Depth:	0 - 1 Ft		3 - 5 Ft		8 - 10 Ft	
				Sample Purpose:	REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES										
Benzo(a)anthracene	mg/kg	0.15	NE	0.0827	0.0827	J	-	-	-	-
Benzo(a)pyrene	mg/kg	0.015	NE	0.0844	0.0844	J	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.15	NE	0.13	0.13	J	-	-	-	-
Chrysene	mg/kg	15	NE	0.0979	0.0979	J	-	-	-	-
Fluoranthene	mg/kg	230	NE	0.132	0.132	J	-	-	-	-
Naphthalene	mg/kg	3.6	NE	0.0446	0.0446	J	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.0855	0.0733	J	-	-	0.0855	J
Pyrene	mg/kg	170	NE	0.111	0.111	J	-	-	-	-
METALS										
Aluminum	mg/kg	7700	15500	8750	6,460	J	6,420	J	8,750	J
Antimony	mg/kg	3.1	9.3	0.81	0.81		0.269	J	0.355	J
Arsenic	mg/kg	0.39	36.5	11.6	11.6		4.93		11.3	
Barium	mg/kg	1500	826	56	55.7	J	45.6		26.8	
Beryllium	mg/kg	16	1	6.72	**4.74**		**5.97**		**6.72**	
Cadmium	mg/kg	7	NE	0.436	0.436	J	-	-	-	-
Calcium	mg/kg	NE	52300	47400	47,200	J	4,310		47,400	
Chromium	mg/kg	0.29	29	13	8.64		11.5		13	
Cobalt	mg/kg	2.3	116	11.9	7.74		8.32		11.9	
Copper	mg/kg	310	56.2	32	23.6	J	18.3	J	32	J
Iron	mg/kg	5500	234000	23100	14,300	J	16,500	J	23,100	J
Lead	mg/kg	40	48.6	50.7	**50.7**		8.39		13	
Magnesium	mg/kg	NE	10400	11400	8,960	J	2,350	J	**11,400**	J
Manganese	mg/kg	180	3506	386	354	J	172		386	
Mercury	mg/kg	2.3	0.09	0.0959	**0.0959**		0.0245		0.0128	J
Nickel	mg/kg	150	55.1	32.6	18.3	J	20.2		32.6	
Potassium	mg/kg	NE	3390	1160	893	J	589		1,160	
Selenium	mg/kg	39	2	0.727	0.727	J	-	-	-	-
Sodium	mg/kg	NE	NE	107	55.1	B	68.7	B	107	
Thallium	mg/kg	NE	1.3	0.425	0.425	J	-	-	0.423	J
Vanadium	mg/kg	39	40.9	17.3	15.9		16.5		17.3	
Zinc	mg/kg	2300	322	67	64		67.4		59.1	

				Location Code:	AP2-SB06					
				Sample Number:	AP0117		AP0118		AP0119	
				Sample Date:	15-Jan-09		15-Jan-09		15-Jan-09	
				Sample Type:	Surface		Subsurface		Subsurface	
				Sample Depth:	0 - 1 Ft		3 - 5 Ft		8 - 10 Ft	
				Sample Purpose:	REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES										
Benzoic acid	mg/kg	24000	NE	0.622	0.622		-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.0403	-	-	-	-	0.0403	J
METALS										
Aluminum	mg/kg	7700	15500	13200	7,150	J	6,750	J	13,200	J
Antimony	mg/kg	3.1	9.3	0.708	0.708		0.412	J	0.44	J
Arsenic	mg/kg	0.39	36.5	11.4	11.4		6.33		3.55	
Barium	mg/kg	1500	826	99	98.7		58.3		53.4	J
Beryllium	mg/kg	16	1	12.1	**12.1**		**6.9**		**7.73**	J
Cadmium	mg/kg	7	NE	0.423	0.423	J	0.293	J	-	-
Calcium	mg/kg	NE	52300	44000	2,830		2,090		44,000	
Chromium	mg/kg	0.29	29	19.4	7.84		10.1		19.4	
Cobalt	mg/kg	2.3	116	14.6	4.64		8.93		14.6	J
Copper	mg/kg	310	56.2	32.1	22.2	J	12.6	J	32.1	J
Iron	mg/kg	5500	234000	51800	51,800	J	19,900	J	24,000	J
Lead	mg/kg	40	48.6	14.3	12.5		11.2		14.3	
Magnesium	mg/kg	NE	10400	12000	819	J	2,110	J	**12,000**	J
Manganese	mg/kg	180	3506	392	243		234		392	
Mercury	mg/kg	2.3	0.09	0.0688	0.0688		0.0156	J	0.0132	J
Nickel	mg/kg	150	55.1	36.7	13.7		21.8		36.7	
Potassium	mg/kg	NE	3390	1730	616		426		1,730	
Selenium	mg/kg	39	2	0.737	0.737	J	-	-	-	-
Sodium	mg/kg	NE	NE	135	76.3	B	37.1	B	135	
Thallium	mg/kg	NE	1.3	0.312	0.312	J	-	-	0.293	J
Vanadium	mg/kg	39	40.9	23.2	17.3		15.5		23.2	
Zinc	mg/kg	2300	322	73	53.2		63.7		73	

				Location Code:	AP2-SB07									
				Sample Number:	AP0120		AP0121		AP0122		AP0123		AP0124	
				Sample Date:	16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09	
				Sample Type:	Surface		Surface		Surface		Subsurface		Subsurface	
				Sample Depth:	0 - 1 Ft		0 - 1 Ft		0 - 1 Ft		3 - 5 Ft		8 - 10 Ft	
				Sample Purpose:	REG		FD		FS		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES														
Phenanthrene	mg/kg	NE	NE	0.0798	-	-	-	-	-	-	-	-	0.0798	J
METALS														
Aluminum	mg/kg	7700	15500	8180	7,100	J	8,180	J	7,200		5,250	J	7,150	J
Antimony	mg/kg	3.1	9.3	0.479	0.336	J	0.291	J	-	-	0.269	J	0.479	
Arsenic	mg/kg	0.39	36.5	10.9	6.09		6.04		5.5		6.18		10.9	
Barium	mg/kg	1500	826	57	44.5		56.7		48.6		43.7		20.8	J
Beryllium	mg/kg	16	1	6.41	**6.01**		**6.41**		-	-	**5.46**		**6.31**	J
Calcium	mg/kg	NE	52300	153000	2,100		2,270		1,820	J	1,840		**153,000**	
Chromium	mg/kg	0.29	29	11.8	10.6		11.8		10.4		8.82		11	
Cobalt	mg/kg	2.3	116	11	8.14		8.99		7.7		7.46		11	J
Copper	mg/kg	310	56.2	31.5	18	J	16.5	J	14.6		13.8	J	31.5	J
Iron	mg/kg	5500	234000	55100	17,600	J	19,100	J	16,600		15,500	J	55,100	J
Lead	mg/kg	40	48.6	15.9	12.5		12.8		9.3		9.74		15.9	
Magnesium	mg/kg	NE	10400	9490	2,100	J	2,350	J	1,880		1,730	J	9,490	J
Manganese	mg/kg	180	3506	372	198		226		169		152		372	
Mercury	mg/kg	2.3	0.09	0.0203	0.0203	J	0.0193	J	-	-	0.0112	J	-	-
Nickel	mg/kg	150	55.1	32.5	19.1		20.2		17.9		18.5		32.5	
Potassium	mg/kg	NE	3390	1060	450		470		703	J	323		1,060	
Sodium	mg/kg	NE	NE	116	28.4	B	28	B	-	-	43.3	B	116	
Thallium	mg/kg	NE	1.3	0.316	-	-	-	-	-	-	-	-	0.316	J
Vanadium	mg/kg	39	40.9	17.4	15.4		17.4		14.1		13.6		13.6	
Zinc	mg/kg	2300	322	63	63.2		27.8		51.4		55.4		52.7	

				Location Code:	AP2-SB05					
				Sample Number:	AP0114		AP0115		AP0116	
				Sample Date:	16-Jan-09		16-Jan-09		16-Jan-09	
				Sample Type:	Surface		Subsurface		Subsurface	
				Sample Depth:	0 - 1 Ft		3 - 5 Ft		8 - 10 Ft	
				Sample Purpose:	REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES										
Naphthalene	mg/kg	3.6	NE	0.0444	0.0444	J	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.0491	-	-	-	-	0.0491	J
METALS										
Aluminum	mg/kg	7700	15500	9300	8,800	J	8,060	J	9,300	J
Antimony	mg/kg	3.1	9.3	0.922	0.922		0.259	J	0.486	
Arsenic	mg/kg	0.39	36.5	24.4	24.4		6.27		11.1	
Barium	mg/kg	1500	826	109	109	J	68.2	J	49	J
Beryllium	mg/kg	16	1	15.5	**15.5**	J	**7.61**	J	**7.53**	J
Cadmium	mg/kg	7	NE	0.716	0.716		-	-	0.276	J
Calcium	mg/kg	NE	52300	42300	4,140		351		42,300	
Chromium	mg/kg	0.29	29	14.4	12.8		11.7		14.4	
Cobalt	mg/kg	2.3	116	14	8.29	J	6.67	J	14	J
Copper	mg/kg	310	56.2	33.6	31.3	J	15.6	J	33.6	J
Iron	mg/kg	5500	234000	61600	61,600	J	22,100	J	24,500	J
Lead	mg/kg	40	48.6	27.4	27.4		12.2		13.4	
Magnesium	mg/kg	NE	10400	8760	1,320	J	1,980	J	8,760	J
Manganese	mg/kg	180	3506	551	319		100		551	
Mercury	mg/kg	2.3	0.09	0.118	**0.118**		0.0242	J	-	-
Nickel	mg/kg	150	55.1	36.8	20.5		18		36.8	
Potassium	mg/kg	NE	3390	990	837		513		990	
Selenium	mg/kg	39	2	1.44	1.44		-	-	0.779	J
Sodium	mg/kg	NE	NE	91	79.2		18.4	B	91.4	
Thallium	mg/kg	NE	1.3	0.939	0.939		-	-	0.347	J
Vanadium	mg/kg	39	40.9	23	23		17		18.2	
Zinc	mg/kg	2300	322	102	102		68.9		85.3	

				Location Code:	AP2-SB03					
				Sample Number:	AP0108		AP0109		AP0110	
				Sample Date:	18-Jan-09		18-Jan-09		18-Jan-09	
				Sample Type:	Surface		Subsurface		Subsurface	
				Sample Depth:	0 - 1 Ft		3 - 5 Ft		8 - 10 Ft	
				Sample Purpose:	REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ
PCBs										
Aroclor 1260	mg/kg	0.22	NE	0.0162	0.0162	J	-	-	-	-
SEMIVOLATILES										
Benzo(a)anthracene	mg/kg	0.15	NE	0.0307	0.0307		-	-	-	-
Fluoranthene	mg/kg	230	NE	0.0599	0.0599	J	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.0667	-	-	-	-	0.0667	J
Pyrene	mg/kg	170	NE	0.044	0.044	J	-	-	-	-
METALS										
Aluminum	mg/kg	7700	15500	15000	8,070		15,000		7,720	
Antimony	mg/kg	3.1	9.3	0.637	0.637		0.257	J	0.329	J
Arsenic	mg/kg	0.39	36.5	12.6	7.71	J	5.27	J	12.6	J
Barium	mg/kg	1500	826	99	69.4	J	98.9	J	18.6	J
Beryllium	mg/kg	16	1	7.43	**6.46**	J	**7.43**	J	**6.35**	J
Cadmium	mg/kg	7	NE	0.558	0.558		-	-	-	-
Calcium	mg/kg	NE	52300	54300	3,430	J	36,500	J	**54,300**	J
Chromium	mg/kg	0.29	29	22.1	12	J	22.1	J	11.8	J
Cobalt	mg/kg	2.3	116	10.8	8.68	J	10.8	J	10.7	J
Copper	mg/kg	310	56.2	29.8	22.5		29.8		29.6	
Iron	mg/kg	5500	234000	24900	19,100		24,900		22,100	
Lead	mg/kg	40	48.6	27.7	27.7	J	16.7	J	15.8	J
Magnesium	mg/kg	NE	10400	10400	2,150	J	10,100	J	**10,400**	J
Manganese	mg/kg	180	3506	436	211		436		414	
Mercury	mg/kg	2.3	0.09	0.0642	0.0642		0.013	J	0.0132	J
Nickel	mg/kg	150	55.1	31.5	21.7	J	31.5	J	27.4	J
Potassium	mg/kg	NE	3390	1570	745		1,570		1,110	
Selenium	mg/kg	39	2	0.928	0.928	J	-	-	-	-
Sodium	mg/kg	NE	NE	120	36.3	B	119		120	
Thallium	mg/kg	NE	1.3	0.47	0.47	J	0.35	J	0.336	J
Vanadium	mg/kg	39	40.9	25.3	18.7		25.3		15.4	
Zinc	mg/kg	2300	322	80	80	J	68.5	J	61.5	J

				Location Code:	AP2-SB04					
				Sample Number:	AP0111		AP0112		AP0113	
				Sample Date:	18-Jan-09		18-Jan-09		19-Jan-09	
				Sample Type:	Surface		Subsurface		Subsurface	
				Sample Depth:	0 - 1 Ft		3 - 5 Ft		8 - 10 Ft	
				Sample Purpose:	REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES										
Phenanthrene	mg/kg	NE	NE	0.0453	-	-	-	-	0.0453	J
METALS										
Aluminum	mg/kg	7700	15500	8670	7,130		7,830		8,670	
Antimony	mg/kg	3.1	9.3	0.485	0.485		0.312	J	0.392	J
Arsenic	mg/kg	0.39	36.5	26.8	26.8	J	4.51	J	12.1	J
Barium	mg/kg	1500	826	98	98.4	J	61.5	J	35.6	J
Beryllium	mg/kg	16	1	16.3	**16.3**	J	**6.68**	J	**7.02**	J
Calcium	mg/kg	NE	52300	50700	2,160	J	3,010	J	50,700	J
Chromium	mg/kg	0.29	29	12.7	10.5	J	11.9	J	12.7	J
Cobalt	mg/kg	2.3	116	11	5.96	J	7.88	J	11	J
Copper	mg/kg	310	56.2	38.4	26		20.9		38.4	
Iron	mg/kg	5500	234000	109000	109,000		19,200		24,400	
Lead	mg/kg	40	48.6	18.9	10.1	J	18.9	J	16	J
Magnesium	mg/kg	NE	10400	10800	442	J	2,530	J	**10,800**	J
Manganese	mg/kg	180	3506	522	116		87.4		522	
Mercury	mg/kg	2.3	0.09	0.0352	0.0265		0.0352		0.0147	J
Nickel	mg/kg	150	55.1	28.8	17.1	J	24.8	J	28.8	J
Potassium	mg/kg	NE	3390	1150	827		705		1,150	
Selenium	mg/kg	39	2	0.859	0.678	J	0.859	J	-	-
Sodium	mg/kg	NE	NE	119	55.7	B	43.6	B	119	
Thallium	mg/kg	NE	1.3	0.468	0.468	J	-	-	0.315	J
Vanadium	mg/kg	39	40.9	26.9	26.9		17.8		17.5	
Zinc	mg/kg	2300	322	64	57	J	64.4	J	60.4	J

				Location Code:	AP2-SB08									
				Sample Number:	AP0125		AP0126		AP0127		AP0128		AP0129	
				Sample Date:	16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09	
				Sample Type:	Surface		Subsurface		Subsurface		Subsurface		Subsurface	
				Sample Depth:	0 - 1 Ft		3 - 5 Ft		8 - 10 Ft		8 - 10 Ft		8 - 10 Ft	
				Sample Purpose:	REG		REG		REG		FD		FS	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
METALS														
Aluminum	mg/kg	7700	15500	15100	4,070	J	5,350	J	15,100	J	14,900	J	12,100	
Antimony	mg/kg	3.1	9.3	0.248	-	-	0.227	J	-	-	0.248	J	-	-
Arsenic	mg/kg	0.39	36.5	12.8	12.8		12.6		6.16		6.61		7	
Barium	mg/kg	1500	826	85	73.2	J	56	J	81	J	83.7	J	85	
Beryllium	mg/kg	16	1	16.9	**16.9**	J	**8.48**	J	**8.51**	J	**8.11**	J	-	-
Calcium	mg/kg	NE	52300	45500	1,650		1,860		44,800		45,500		45,000	J
Chromium	mg/kg	0.29	29	22.4	6.13		8.82		22.4		21.9		18.5	
Cobalt	mg/kg	2.3	116	15.6	3.9	J	8.7	J	15.6	J	14.6	J	12.4	
Copper	mg/kg	310	56.2	31.1	21.3	J	11	J	31.1	J	30.1	J	23.9	
Iron	mg/kg	5500	234000	72600	72,600	J	28,000	J	26,600	J	28,500	J	23,900	
Lead	mg/kg	40	48.6	14.1	4.64		9.05		11.6		14.1		10.7	
Magnesium	mg/kg	NE	10400	12200	312	J	1,730	J	**12,200**	J	**11,500**	J	10,100	
Manganese	mg/kg	180	3506	473	98.2		196		473		432		363	
Mercury	mg/kg	2.3	0.09	0.034	0.034		0.0151	J	-	-	-	-	-	-
Nickel	mg/kg	150	55.1	39.7	10.5		22		39.7		38		32.8	
Potassium	mg/kg	NE	3390	2870	477		371		1,980		1,990		2,870	J
Selenium	mg/kg	39	2	0.914	0.914	J	-	-	-	-	-	-	-	-
Sodium	mg/kg	NE	NE	145	36.4	B	27.4	B	145		134		-	-
Thallium	mg/kg	NE	1.3	0.308	0.308	J	-	-	-	-	-	-	-	-
Vanadium	mg/kg	39	40.9	25.4	18.8		15.1		25.4		24.7		20.5	
Zinc	mg/kg	2300	322	77	41.4		58.9		76.6		73.4		61.3	

LEGEND:

- SOIL BORING
- SOIL BORING/PIEZOMETER
- mg/kg MILLIGRAMS PER KILOGRAM
- NE NOT ESTABLISHED (RBSCs), NOT EVALUATED (BSCs)
- NM NOT MEASURED
- \- NOT DETECTED

NOTES:

1. SHADED CELL INDICATES VALUE IS GREATER THAN THE RBSC.
2. BOLD TEXT INDICATES VALUE IS GREATER THAN THE BSC.
3. RBSC VALUES REFLECT AN INCREMENTAL LIFETIME CANCER RISK (ILCR) OF 1E-6 OR A NONCANCER HAZARD QUOTIENT (HQ) OF 0.1. FOR CHEMICALS THAT EXHIBIT BOTH CANCER AND NONCANCER EFFECTS, WHICHEVER TYPE OF EFFECT IN A LOWER CONCENTRATION (USING AN ILCR OF 1E-6 AND AN HQ OF 0.1), THAT CONCENTRATION IS SELECTED AS THE RBSC.
4. BSC IS BACKGROUND SCREENING CONCENTRATION.
5. MDC IS MAXIMUM DETECTED CONCENTRATION FOR THE INVESTIGATION AREA ("B" QUALIFIED DATA NOT INCLUDED).
6. FERROUS IRON MEASURED IN FIELD USING HACH TEST KIT.
7. OXIDATION REDUCTION POTENTIAL - FINAL YSI WATER QUALITY METER FIELD MEASUREMENT PRIOR TO GROUNDWATER SAMPLE COLLECTION.
8. VALIDATION QUALIFIERS (VQ):
   B - THE ANALYTE WAS NOT DETECTED SIGNIFICANTLY ABOVE THE LEVELS FOUND IN THE ASSOCIATED METHOD BLANK OR FIELD BLANKS.
   J - THE ANALYTE WAS POSITIVELY IDENTIFIED; THE REPORTED VALUE IS ESTIMATED.

FIGURE 5-6

DETECTED CONSTITUENTS AT POWERHOUSE 2 ASH PITS IN SURFACE AND SUBSURFACE SOIL SAMPLES ABOVE RBSCs AND/OR BSCs (JANUARY AND FEBRUARY 2009)

POWERHOUSE 2 ASH PITS SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

Shaw a world of Solutions™

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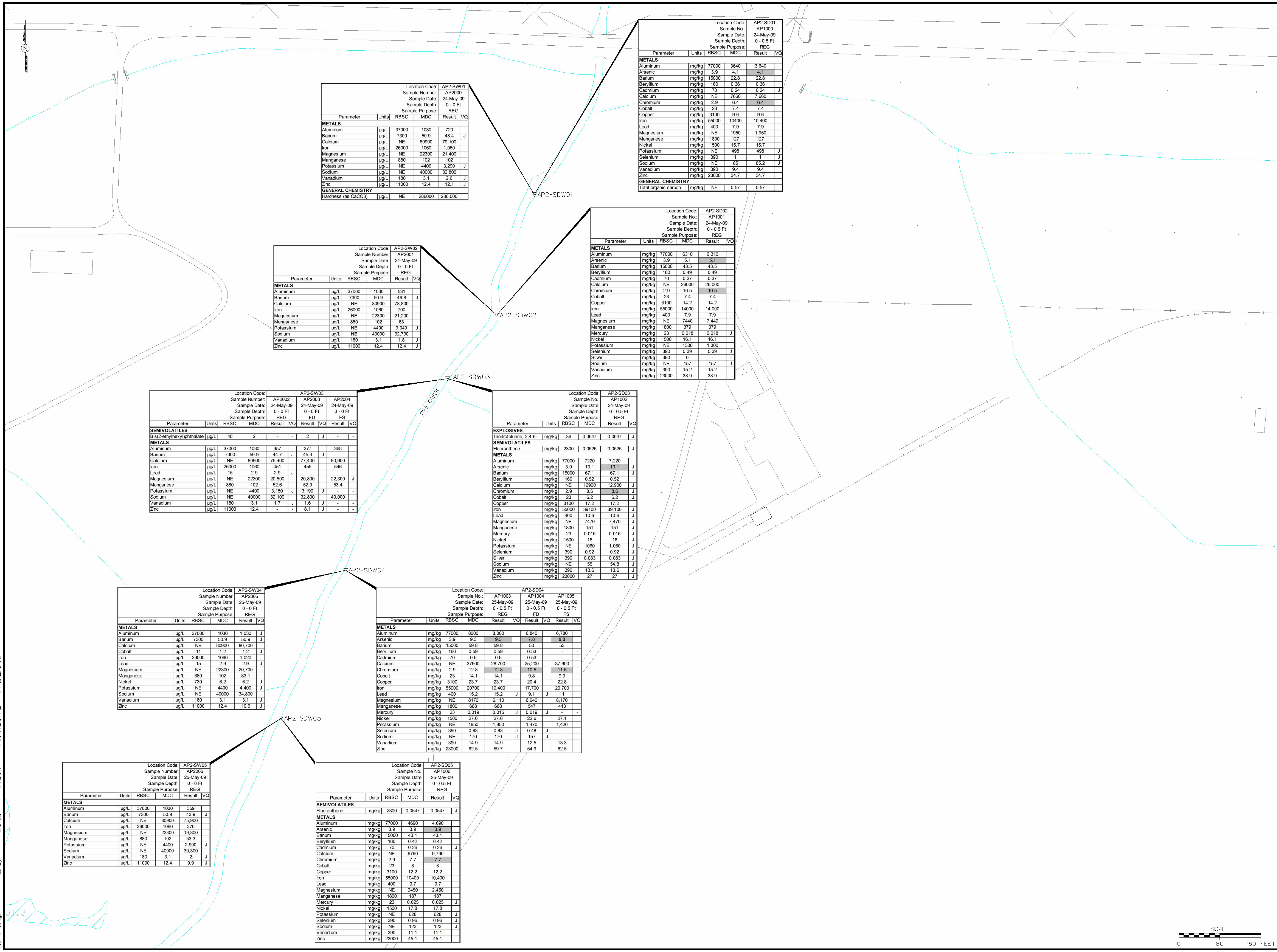

Location Code:				AP2-SW01	
Sample Number:				AP2000	
Sample Date:				24-May-09	
Sample Depth:				0 - 0 Ft	
Sample Purpose:				REG	
Parameter	Units	RBSC	MDC	Result	VQ
METALS					
Aluminum	µg/L	37000	1030	720	
Barium	µg/L	7300	50.9	48.4	J
Calcium	µg/L	NE	80900	79,100	
Iron	µg/L	26000	1060	1,060	
Magnesium	µg/L	NE	22300	21,400	
Manganese	µg/L	880	102	102	
Potassium	µg/L	NE	4400	3,290	J
Sodium	µg/L	NE	40000	32,800	
Vanadium	µg/L	180	3.1	2.6	J
Zinc	µg/L	11000	12.4	12.1	J
GENERAL CHEMISTRY					
Hardness (as CaCO3)	µg/L	NE	286000	286,000	

Location Code:				AP2-SD01	
Sample No.:				AP1000	
Sample Date:				24-May-09	
Sample Depth:				0 - 0.5 Ft	
Sample Purpose:				REG	
Parameter	Units	RBSC	MDC	Result	VQ
METALS					
Aluminum	mg/kg	77000	3640	3,640	
Arsenic	mg/kg	3.9	4.1	4.1	
Barium	mg/kg	15000	22.8	22.8	
Beryllium	mg/kg	160	0.36	0.36	
Cadmium	mg/kg	70	0.24	0.24	J
Calcium	mg/kg	NE	7660	7,660	
Chromium	mg/kg	2.9	6.4	6.4	
Cobalt	mg/kg	23	7.4	7.4	
Copper	mg/kg	3100	9.6	9.6	
Iron	mg/kg	55000	10400	10,400	
Lead	mg/kg	400	7.9	7.9	
Magnesium	mg/kg	NE	1950	1,950	
Manganese	mg/kg	1800	127	127	
Nickel	mg/kg	1500	15.7	15.7	
Potassium	mg/kg	NE	498	498	J
Selenium	mg/kg	390	1	1	J
Sodium	mg/kg	NE	85	85.2	J
Vanadium	mg/kg	390	9.4	9.4	
Zinc	mg/kg	23000	34.7	34.7	
GENERAL CHEMISTRY					
Total organic carbon	mg/kg	NE	0.57	0.57	

Location Code:				AP2-SW02	
Sample Number:				AP2001	
Sample Date:				24-May-09	
Sample Depth:				0 - 0 Ft	
Sample Purpose:				REG	
Parameter	Units	RBSC	MDC	Result	VQ
METALS					
Aluminum	µg/L	37000	1030	531	
Barium	µg/L	7300	50.9	46.8	J
Calcium	µg/L	NE	80900	78,800	
Iron	µg/L	26000	1060	700	
Magnesium	µg/L	NE	22300	21,200	
Manganese	µg/L	880	102	63	
Potassium	µg/L	NE	4400	3,340	J
Sodium	µg/L	NE	40000	32,700	
Vanadium	µg/L	180	3.1	1.8	J
Zinc	µg/L	11000	12.4	12.4	J

Location Code:				AP2-SD02	
Sample No.:				AP1001	
Sample Date:				24-May-09	
Sample Depth:				0 - 0.5 Ft	
Sample Purpose:				REG	
Parameter	Units	RBSC	MDC	Result	VQ
METALS					
Aluminum	mg/kg	77000	6310	6,310	
Arsenic	mg/kg	3.9	5.1	5.1	
Barium	mg/kg	15000	43.5	43.5	
Beryllium	mg/kg	160	0.49	0.49	
Cadmium	mg/kg	70	0.37	0.37	
Calcium	mg/kg	NE	26000	26,000	
Chromium	mg/kg	2.9	10.5	10.5	
Cobalt	mg/kg	23	7.4	7.4	
Copper	mg/kg	3100	14.2	14.2	
Iron	mg/kg	55000	14000	14,000	
Lead	mg/kg	400	7.9	7.9	
Magnesium	mg/kg	NE	7440	7,440	
Manganese	mg/kg	1800	379	379	
Mercury	mg/kg	23	0.018	0.018	J
Nickel	mg/kg	1500	16.1	16.1	
Potassium	mg/kg	NE	1300	1,300	
Selenium	mg/kg	390	0.39	0.39	J
Silver	mg/kg	390	0	-	-
Sodium	mg/kg	NE	157	157	J
Vanadium	mg/kg	390	15.2	15.2	
Zinc	mg/kg	23000	38.9	38.9	

Location Code:				AP2-SW03					
Sample Number:				AP2002		AP2003		AP2004	
Sample Date:				24-May-09		24-May-09		24-May-09	
Sample Depth:				0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
Sample Purpose:				REG		FD		FS	
Parameter	Units	RBSC	MDC	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES									
Bis(2-ethylhexyl)phthalate	µg/L	48	2	-	-	2	J	-	-
METALS									
Aluminum	µg/L	37000	1030	357		377		368	
Barium	µg/L	7300	50.9	44.7	J	45.3	J	-	-
Calcium	µg/L	NE	80900	76,400		77,400		80,900	
Iron	µg/L	26000	1060	451		455		546	
Lead	µg/L	15	2.9	2.9	J	-	-	-	-
Magnesium	µg/L	NE	22300	20,500		20,800		22,300	J
Manganese	µg/L	880	102	52.6		52.9		53.4	
Potassium	µg/L	NE	4400	3,150	J	3,190	J	-	-
Sodium	µg/L	NE	40000	32,100		32,800		40,000	
Vanadium	µg/L	180	3.1	1.7	J	1.6	J	-	-
Zinc	µg/L	11000	12.4	-	-	8.1	J	-	-

Location Code:				AP2-SD03	
Sample No.:				AP1002	
Sample Date:				24-May-09	
Sample Depth:				0 - 0.5 Ft	
Sample Purpose:				REG	
Parameter	Units	RBSC	MDC	Result	VQ
EXPLOSIVES					
Trinitrotoluene, 2,4,6-	mg/kg	36	0.0647	0.0647	J
SEMIVOLATILES					
Fluoranthene	mg/kg	2300	0.0525	0.0525	J
METALS					
Aluminum	mg/kg	77000	7220	7,220	
Arsenic	mg/kg	3.9	10.1	10.1	J
Barium	mg/kg	15000	67.1	67.1	J
Beryllium	mg/kg	160	0.52	0.52	
Calcium	mg/kg	NE	12900	12,900	J
Chromium	mg/kg	2.9	8.6	8.6	J
Cobalt	mg/kg	23	6.2	6.2	J
Copper	mg/kg	3100	17.2	17.2	
Iron	mg/kg	55000	39100	39,100	J
Lead	mg/kg	400	10.6	10.6	J
Magnesium	mg/kg	NE	7470	7,470	J
Manganese	mg/kg	1800	151	151	J
Mercury	mg/kg	23	0.016	0.016	J
Nickel	mg/kg	1500	16	16	J
Potassium	mg/kg	NE	1060	1,060	J
Selenium	mg/kg	390	0.92	0.92	J
Silver	mg/kg	390	0.083	0.083	J
Sodium	mg/kg	NE	55	54.8	J
Vanadium	mg/kg	390	13.6	13.6	J
Zinc	mg/kg	23000	27	27	J

Location Code:				AP2-SW04	
Sample Number:				AP2005	
Sample Date:				25-May-09	
Sample Depth:				0 - 0 Ft	
Sample Purpose:				REG	
Parameter	Units	RBSC	MDC	Result	VQ
METALS					
Aluminum	µg/L	37000	1030	1,030	J
Barium	µg/L	7300	50.9	50.9	J
Calcium	µg/L	NE	80900	80,700	
Cobalt	µg/L	11	1.2	1.2	J
Iron	µg/L	26000	1060	1,020	
Lead	µg/L	15	2.9	2.9	J
Magnesium	µg/L	NE	22300	20,700	
Manganese	µg/L	880	102	83.1	
Nickel	µg/L	730	6.2	6.2	J
Potassium	µg/L	NE	4400	4,400	J
Sodium	µg/L	NE	40000	34,800	
Vanadium	µg/L	180	3.1	3.1	J
Zinc	µg/L	11000	12.4	10.6	J

Location Code:				AP2-SD04					
Sample No.:				AP1003		AP1004		AP1005	
Sample Date:				25-May-09		25-May-09		25-May-09	
Sample Depth:				0 - 0.5 Ft		0 - 0.5 Ft		0 - 0.5 Ft	
Sample Purpose:				REG		FD		FS	
Parameter	Units	RBSC	MDC	Result	VQ	Result	VQ	Result	VQ
METALS									
Aluminum	mg/kg	77000	8000	8,000		6,840		6,780	
Arsenic	mg/kg	3.9	9.3	9.3		7.8		8.8	
Barium	mg/kg	15000	59.8	59.8		50		53	
Beryllium	mg/kg	160	0.59	0.59		0.53		-	-
Cadmium	mg/kg	70	0.6	0.6		0.53		-	-
Calcium	mg/kg	NE	37600	28,700		25,200		37,600	
Chromium	mg/kg	2.9	12.8	12.8		10.5		11.6	
Cobalt	mg/kg	23	14.1	14.1		9.8		9.9	
Copper	mg/kg	3100	23.7	23.7		20.4		22.8	
Iron	mg/kg	55000	20700	19,400		17,700		20,700	
Lead	mg/kg	400	15.2	15.2	J	9.1	J	11	
Magnesium	mg/kg	NE	8170	6,110		6,040		8,170	
Manganese	mg/kg	1800	668	668		547		413	
Mercury	mg/kg	23	0.019	0.015	J	0.019	J	-	-
Nickel	mg/kg	1500	27.6	27.6		22.6		27.1	
Potassium	mg/kg	NE	1850	1,850		1,470		1,420	
Selenium	mg/kg	390	0.83	0.83	J	0.48	J	-	-
Sodium	mg/kg	NE	170	170	J	157	J	-	-
Vanadium	mg/kg	390	14.9	14.9		12.5		13.3	
Zinc	mg/kg	23000	62.5	59.7		54.9		62.5	

Location Code:				AP2-SW05	
Sample Number:				AP2006	
Sample Date:				25-May-09	
Sample Depth:				0 - 0 Ft	
Sample Purpose:				REG	
Parameter	Units	RBSC	MDC	Result	VQ
METALS					
Aluminum	µg/L	37000	1030	359	
Barium	µg/L	7300	50.9	43.9	J
Calcium	µg/L	NE	80900	75,900	
Iron	µg/L	26000	1060	376	
Magnesium	µg/L	NE	22300	19,800	
Manganese	µg/L	880	102	53.3	
Potassium	µg/L	NE	4400	2,900	J
Sodium	µg/L	NE	40000	30,300	
Vanadium	µg/L	180	3.1	2	J
Zinc	µg/L	11000	12.4	9.9	J

Location Code:				AP2-SD05	
Sample No.:				AP1006	
Sample Date:				25-May-09	
Sample Depth:				0 - 0.5 Ft	
Sample Purpose:				REG	
Parameter	Units	RBSC	MDC	Result	VQ
SEMIVOLATILES					
Fluoranthene	mg/kg	2300	0.0547	0.0547	J
METALS					
Aluminum	mg/kg	77000	4690	4,690	
Arsenic	mg/kg	3.9	3.9	3.9	
Barium	mg/kg	15000	43.1	43.1	
Beryllium	mg/kg	160	0.42	0.42	
Cadmium	mg/kg	70	0.26	0.26	J
Calcium	mg/kg	NE	9790	9,790	
Chromium	mg/kg	2.9	7.7	7.7	
Cobalt	mg/kg	23	8	8	
Copper	mg/kg	3100	12.2	12.2	
Iron	mg/kg	55000	10400	10,400	
Lead	mg/kg	400	9.7	9.7	
Magnesium	mg/kg	NE	2450	2,450	
Manganese	mg/kg	1800	187	187	
Mercury	mg/kg	23	0.025	0.025	J
Nickel	mg/kg	1500	17.8	17.8	
Potassium	mg/kg	NE	628	628	J
Selenium	mg/kg	390	0.96	0.96	J
Sodium	mg/kg	NE	123	123	J
Vanadium	mg/kg	390	11.1	11.1	
Zinc	mg/kg	23000	45.1	45.1	

LEGEND:

- ▽ SURFACE WATER/SEDIMENT SAMPLE
- mg/kg MILLIGRAMS PER KILOGRAM
- ug/L MICROGRAMS PER LITER
- NE NOT ESTABLISHED (RBSCs), NOT EVALUATED (BSCs)
- NM NOT MEASURED
- \- NOT DETECTED

NOTES:

1. SHADED CELL INDICATES VALUE IS GREATER THAN THE RBSC.
2. RBSC VALUES REFLECT AN INCREMENTAL LIFETIME CANCER RISK (ILCR) OF 1E-6 OR A NONCANCER HAZARD QUOTIENT (HQ) OF 0.1. FOR CHEMICALS THAT EXHIBIT BOTH CANCER AND NONCANCER EFFECTS, WHICHEVER TYPE OF EFFECT IN A LOWER CONCENTRATION (USING AN ILCR OF 1E-6 AND AN HQ OF 0.1), THAT CONCENTRATION IS SELECTED AS THE RBSC.
3. MDC IS MAXIMUM DETECTED CONCENTRATION FOR THE INVESTIGATION AREA ("B" QUALIFIED DATA NOT INCLUDED).
4. VALIDATION QUALIFIERS (VQ):
   B - THE ANALYTE WAS NOT DETECTED SIGNIFICANTLY ABOVE THE LEVELS FOUND IN THE ASSOCIATED METHOD BLANK OR FIELD BLANKS.
   J - THE ANALYTE WAS POSITIVELY IDENTIFIED; THE REPORTED VALUE IS ESTIMATED.

FIGURE 5-7
DETECTED CONSTITUENTS AT POWERHOUSE 2 ASH PITS IN SURFACE WATER AND SEDIMENT SAMPLES ABOVE RBSCs (MAY 2009)

POWERHOUSE 2 ASH PITS SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

SCALE 0 80 160 FEET

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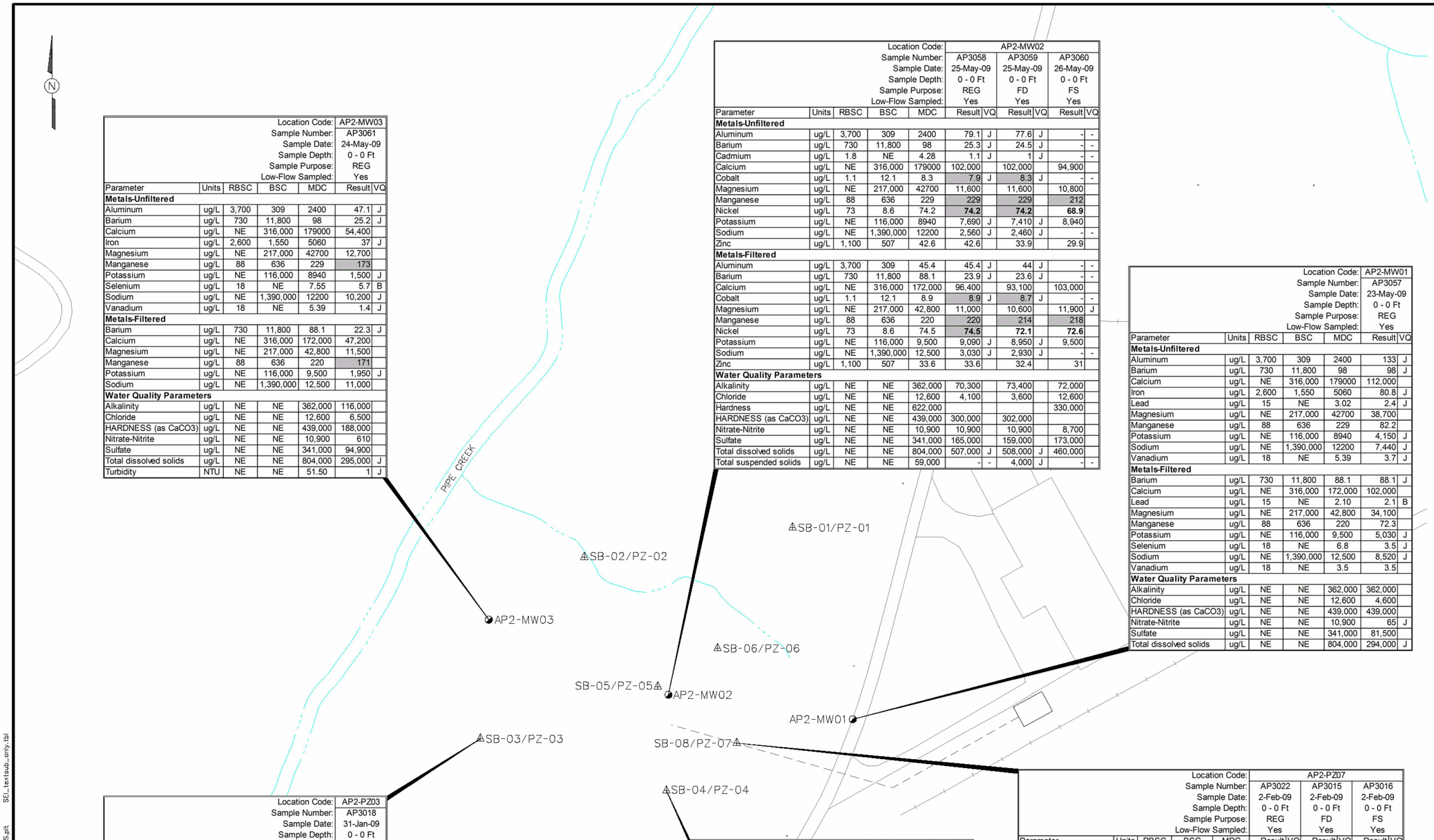


LEGEND:

◕	OVERBURDEN MONITORING WELL
⚠	SOIL BORING/PIEZOMETER
ug/L	MICROGRAMS PER LITER
NE	NOT ESTABLISHED (RBSCs), NOT EVALUATED (BSCs)
NM	NOT MEASURED
-	NOT DETECTED

NOTES:

1. SHADED CELL INDICATES VALUE IS GREATER THAN THE RBSC.
2. BOLD TEXT INDICATES VALUE IS GREATER THAN THE BSC.
3. RBSC VALUES REFLECT AN INCREMENTAL LIFETIME CANCER RISK (ILCR) OF 1E-6 OR A NONCANCER HAZARD QUOTIENT (HQ) OF 0.1. FOR CHEMICALS THAT EXHIBIT BOTH CANCER AND NONCANCER EFFECTS, WHICHEVER TYPE OF EFFECT IN A LOWER CONCENTRATION (USING AN ILCR OF 1E-6 AND AN HQ OF 0.1), THAT CONCENTRATION IS SELECTED AS THE RBSC.
4. BSC IS BACKGROUND SCREENING CONCENTRATION.
5. MDC IS MAXIMUM DETECTED CONCENTRATION FOR THE INVESTIGATION AREA ("B" QUALIFIED DATA NOT INCLUDED).
6. VALIDATION QUALIFIERS (VQ):
   B - THE ANALYTE WAS NOT DETECTED SIGNIFICANTLY ABOVE THE LEVELS FOUND IN THE ASSOCIATED METHOD BLANK OR FIELD BLANKS.
   J - THE ANALYTE WAS POSITIVELY IDENTIFIED; THE REPORTED VALUE IS ESTIMATED.
7. ONLY NITROAROMATICS WERE ANALYZED IN GROUNDWATER DURING THE MONTH OF NOVEMBER. NO NITROAROMATICS WERE DETECTED THEREFORE NO DATA IS SHOWN.

				Location Code:	AP2-MW03	
				Sample Number:	AP3061	
				Sample Date:	24-May-09	
				Sample Depth:	0 - 0 Ft	
				Sample Purpose:	REG	
				Low-Flow Sampled:	Yes	
Parameter	Units	RBSC	BSC	MDC	Result	VQ
Metals-Unfiltered						
Aluminum	ug/L	3,700	309	2400	47.1	J
Barium	ug/L	730	11,800	98	25.2	J
Calcium	ug/L	NE	316,000	179000	54,400	
Iron	ug/L	2,600	1,550	5060	37	J
Magnesium	ug/L	NE	217,000	42700	12,700	
Manganese	ug/L	88	636	229	173	
Potassium	ug/L	NE	116,000	8940	1,500	J
Selenium	ug/L	18	NE	7.55	5.7	B
Sodium	ug/L	NE	1,390,000	12200	10,200	J
Vanadium	ug/L	18	NE	5.39	1.4	J
Metals-Filtered						
Barium	ug/L	730	11,800	88.1	22.3	J
Calcium	ug/L	NE	316,000	172,000	47,200	
Magnesium	ug/L	NE	217,000	42,800	11,500	
Manganese	ug/L	88	636	220	171	
Potassium	ug/L	NE	116,000	9,500	1,950	J
Sodium	ug/L	NE	1,390,000	12,500	11,000	
Water Quality Parameters						
Alkalinity	ug/L	NE	NE	362,000	116,000	
Chloride	ug/L	NE	NE	12,600	6,500	
HARDNESS (as CaCO3)	ug/L	NE	NE	439,000	188,000	
Nitrate-Nitrite	ug/L	NE	NE	10,900	610	
Sulfate	ug/L	NE	NE	341,000	94,900	
Total dissolved solids	ug/L	NE	NE	804,000	295,000	J
Turbidity	NTU	NE	NE	51.50	1	J

				Location Code:	AP2-MW02					
				Sample Number:	AP3058		AP3059		AP3060	
				Sample Date:	25-May-09		25-May-09		26-May-09	
				Sample Depth:	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
				Sample Purpose:	REG		FD		FS	
				Low-Flow Sampled:	Yes		Yes		Yes	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ
Metals-Unfiltered										
Aluminum	ug/L	3,700	309	2400	79.1	J	77.6	J	-	-
Barium	ug/L	730	11,800	98	25.3	J	24.5	J	-	-
Cadmium	ug/L	1.8	NE	4.28	1.1	J	1	J	-	-
Calcium	ug/L	NE	316,000	179000	102,000		102,000		94,900	
Cobalt	ug/L	1.1	12.1	8.3	7.9	J	8.3	J	-	-
Magnesium	ug/L	NE	217,000	42700	11,600		11,600		10,800	
Manganese	ug/L	88	636	229	229		229		212	
Nickel	ug/L	73	8.6	74.2	**74.2**		**74.2**		**68.9**	
Potassium	ug/L	NE	116,000	8940	7,690	J	7,410	J	8,940	
Sodium	ug/L	NE	1,390,000	12200	2,560	J	2,460	J	-	-
Zinc	ug/L	1,100	507	42.6	42.6		33.9		29.9	
Metals-Filtered										
Aluminum	ug/L	3,700	309	45.4	45.4	J	44	J	-	-
Barium	ug/L	730	11,800	88.1	23.9	J	23.6	J	-	-
Calcium	ug/L	NE	316,000	172,000	96,400		93,100		103,000	
Cobalt	ug/L	1.1	12.1	8.9	8.9	J	8.7	J	-	-
Magnesium	ug/L	NE	217,000	42,800	11,000		10,600		11,900	J
Manganese	ug/L	88	636	220	220		214		218	
Nickel	ug/L	73	8.6	74.5	**74.5**		**72.1**		**72.6**	
Potassium	ug/L	NE	116,000	9,500	9,090	J	8,950	J	9,500	
Sodium	ug/L	NE	1,390,000	12,500	3,030	J	2,930	J	-	-
Zinc	ug/L	1,100	507	33.6	33.6		32.4		31	
Water Quality Parameters										
Alkalinity	ug/L	NE	NE	362,000	70,300		73,400		72,000	
Chloride	ug/L	NE	NE	12,600	4,100		3,600		12,600	
Hardness	ug/L	NE	NE	622,000					330,000	
HARDNESS (as CaCO3)	ug/L	NE	NE	439,000	300,000		302,000			
Nitrate-Nitrite	ug/L	NE	NE	10,900	10,900		10,900		8,700	
Sulfate	ug/L	NE	NE	341,000	165,000		159,000		173,000	
Total dissolved solids	ug/L	NE	NE	804,000	507,000	J	508,000	J	460,000	
Total suspended solids	ug/L	NE	NE	59,000	-	-	4,000	J	-	-

				Location Code:	AP2-MW01	
				Sample Number:	AP3057	
				Sample Date:	23-May-09	
				Sample Depth:	0 - 0 Ft	
				Sample Purpose:	REG	
				Low-Flow Sampled:	Yes	
Parameter	Units	RBSC	BSC	MDC	Result	VQ
Metals-Unfiltered						
Aluminum	ug/L	3,700	309	2400	133	J
Barium	ug/L	730	11,800	98	98	J
Calcium	ug/L	NE	316,000	179000	112,000	
Iron	ug/L	2,600	1,550	5060	80.8	J
Lead	ug/L	15	NE	3.02	2.4	J
Magnesium	ug/L	NE	217,000	42700	38,700	
Manganese	ug/L	88	636	229	82.2	
Potassium	ug/L	NE	116,000	8940	4,150	J
Sodium	ug/L	NE	1,390,000	12200	7,440	J
Vanadium	ug/L	18	NE	5.39	3.7	J
Metals-Filtered						
Barium	ug/L	730	11,800	88.1	88.1	J
Calcium	ug/L	NE	316,000	172,000	102,000	
Lead	ug/L	15	NE	2.10	2.1	B
Magnesium	ug/L	NE	217,000	42,800	34,100	
Manganese	ug/L	88	636	220	72.3	
Potassium	ug/L	NE	116,000	9,500	5,030	J
Selenium	ug/L	18	NE	6.8	3.5	J
Sodium	ug/L	NE	1,390,000	12,500	8,520	J
Vanadium	ug/L	18	NE	3.5	3.5	
Water Quality Parameters						
Alkalinity	ug/L	NE	NE	362,000	362,000	
Chloride	ug/L	NE	NE	12,600	4,600	
HARDNESS (as CaCO3)	ug/L	NE	NE	439,000	439,000	
Nitrate-Nitrite	ug/L	NE	NE	10,900	65	J
Sulfate	ug/L	NE	NE	341,000	81,500	
Total dissolved solids	ug/L	NE	NE	804,000	294,000	J

				Location Code:	AP2-PZ03	
				Sample Number:	AP3018	
				Sample Date:	31-Jan-09	
				Sample Depth:	0 - 0 Ft	
				Sample Purpose:	REG	
				Low-Flow Sampled:	Yes	
Parameter	Units	RBSC	BSC	MDC	Result	VQ
Metals-Unfiltered						
Aluminum	ug/L	3,700	309	2400	**2,400**	
Barium	ug/L	730	11,800	98	51.1	
Cadmium	ug/L	1.8	NE	4.28	4.16	J
Calcium	ug/L	NE	316,000	179000	179,000	
Copper	ug/L	150	19.8	12.3	12.3	
Iron	ug/L	2,600	1,550	5060	**5,060**	
Lead	ug/L	15	NE	3.02	3.02	J
Magnesium	ug/L	NE	217,000	42700	42,700	
Manganese	ug/L	88	636	229	51.8	
Nickel	ug/L	73	8.6	74.2	6.28	J
Potassium	ug/L	NE	116,000	8940	1,260	
Selenium	ug/L	18	NE	7.55	7.55	J
Sodium	ug/L	NE	1,390,000	12200	12,200	
Vanadium	ug/L	18	NE	5.39	5.39	
Metals-Filtered						
Barium	ug/L	730	11,800	88.1	34.9	
Cadmium	ug/L	1.8	NE	4.4	4.36	J
Calcium	ug/L	NE	316,000	172,000	172,000	
Copper	ug/L	150	19.8	6.9	6.9	J
Magnesium	ug/L	NE	217,000	42,800	42,800	
Potassium	ug/L	NE	116,000	9,500	510	J
Selenium	ug/L	18	NE	6.8	6.82	J
Sodium	ug/L	NE	1,390,000	12,500	12,500	
Water Quality Parameters						
Alkalinity	ug/L	NE	NE	362,000	231,000	
Chloride	ug/L	NE	NE	12,600	11,600	J
Hardness	ug/L	NE	NE	622,000	622,000	
Nitrate-Nitrite	ug/L	NE	NE	10,900	566	J
Sulfate	ug/L	NE	NE	341,000	341,000	
Total dissolved solids	ug/L	NE	NE	804,000	804,000	
Total suspended solids	ug/L	NE	NE	59,000	59,000	
Turbidity	NTU	NE	NE	51.50	51.5	J

				Location Code:	AP2-PZ04	
				Sample Number:	AP3019	
				Sample Date:	1-Feb-09	
				Sample Depth:	0 - 0 Ft	
				Sample Purpose:	REG	
				Low-Flow Sampled:	Yes	
Parameter	Units	RBSC	BSC	MDC	Result	VQ
Metals-Unfiltered						
Aluminum	ug/L	3,700	309	2400	74.3	J
Barium	ug/L	730	11,800	98	24	
Cadmium	ug/L	1.8	NE	4.28	4.28	J
Calcium	ug/L	NE	316,000	179000	135,000	
Copper	ug/L	150	19.8	12.3	5.63	J
Iron	ug/L	2,600	1,550	5060	203	
Magnesium	ug/L	NE	217,000	42700	39,600	
Manganese	ug/L	88	636	229	22.1	
Nickel	ug/L	73	8.6	74.2	5.36	J
Potassium	ug/L	NE	116,000	8940	405	J
Sodium	ug/L	NE	1,390,000	12200	9,150	
Metals-Filtered						
Barium	ug/L	730	11,800	88.1	22.8	
Cadmium	ug/L	1.8	NE	4.4	4.13	J
Calcium	ug/L	NE	316,000	172,000	135,000	
Magnesium	ug/L	NE	217,000	42,800	40,800	
Manganese	ug/L	88	636	220	16.2	
Potassium	ug/L	NE	116,000	9,500	346	J
Sodium	ug/L	NE	1,390,000	12,500	9,280	
Water Quality Parameters						
Alkalinity	ug/L	NE	NE	362,000	132,000	
Chloride	ug/L	NE	NE	12,600	5,140	J
Hardness	ug/L	NE	NE	622,000	501,000	
Nitrate-Nitrite	ug/L	NE	NE	10,900	49	J
Sulfate	ug/L	NE	NE	341,000	236,000	
Total dissolved solids	ug/L	NE	NE	804,000	619,000	
Total suspended solids	ug/L	NE	NE	59,000	3,000	J
Turbidity	NTU	NE	NE	51.50	4.56	J

				Location Code:	AP2-PZ07					
				Sample Number:	AP3022		AP3015		AP3016	
				Sample Date:	2-Feb-09		2-Feb-09		2-Feb-09	
				Sample Depth:	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
				Sample Purpose:	REG		FD		FS	
				Low-Flow Sampled:	Yes		Yes		Yes	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ
Semivolatiles										
Dimethylphenol, 2,4-	ug/L	73	NE	3.38	-	-	3.38	J	-	-
Metals-Unfiltered										
Aluminum	ug/L	3,700	309	2400	147	J	93.3	J	-	-
Barium	ug/L	730	11,800	98	31.9		31.3		-	-
Cadmium	ug/L	1.8	NE	4.28	3.91	J	4.27	J	-	-
Calcium	ug/L	NE	316,000	179000	110,000		110,000		101,000	
Copper	ug/L	150	19.8	12.3	-	-	5.71	J	-	-
Iron	ug/L	2,600	1,550	5060	593	J	325	J	191	
Magnesium	ug/L	NE	217,000	42700	31,900		32,200		29,200	
Manganese	ug/L	88	636	229	24.5		21.6		20.7	
Nickel	ug/L	73	8.6	74.2	-	-	4	J	-	-
Potassium	ug/L	NE	116,000	8940	548	J	521	J	-	-
Sodium	ug/L	NE	1,390,000	12200	6,990		6,860		6,380	
Metals-Filtered										
Barium	ug/L	730	11,800	88.1	28.2		29.3		-	-
Cadmium	ug/L	1.8	NE	4.4	3.9	J	3.98	J	-	-
Calcium	ug/L	NE	316,000	172,000	103,000		108,000		103,000	
Magnesium	ug/L	NE	217,000	42,800	31,400		31,100		29,900	
Manganese	ug/L	88	636	220	19		17.1		30.7	
Potassium	ug/L	NE	116,000	9,500	460	J	445	J	-	-
Sodium	ug/L	NE	1,390,000	12,500	7,000		6,840		6,180	
Water Quality Parameters										
Alkalinity	ug/L	NE	NE	362,000	169,000		222,000		260,000	
Chloride	ug/L	NE	NE	12,600	3,040	J	2,810	J	2,100	
Cyanide, total	ug/L	73	NE	44					44	
Hardness	ug/L	NE	NE	622,000	407,000		408,000		620,000	
Nitrate-Nitrite	ug/L	NE	NE	10,900	28	J	-	-		
Sulfate	ug/L	NE	NE	341,000	80,600		79,600		177,000	
Total dissolved solids	ug/L	NE	NE	804,000	450,000		442,000		450,000	
Total suspended solids	ug/L	NE	NE	59,000	4,000		-	-	-	-
Turbidity	NTU	NE	NE	51.50	4.52		4.93		1.3	

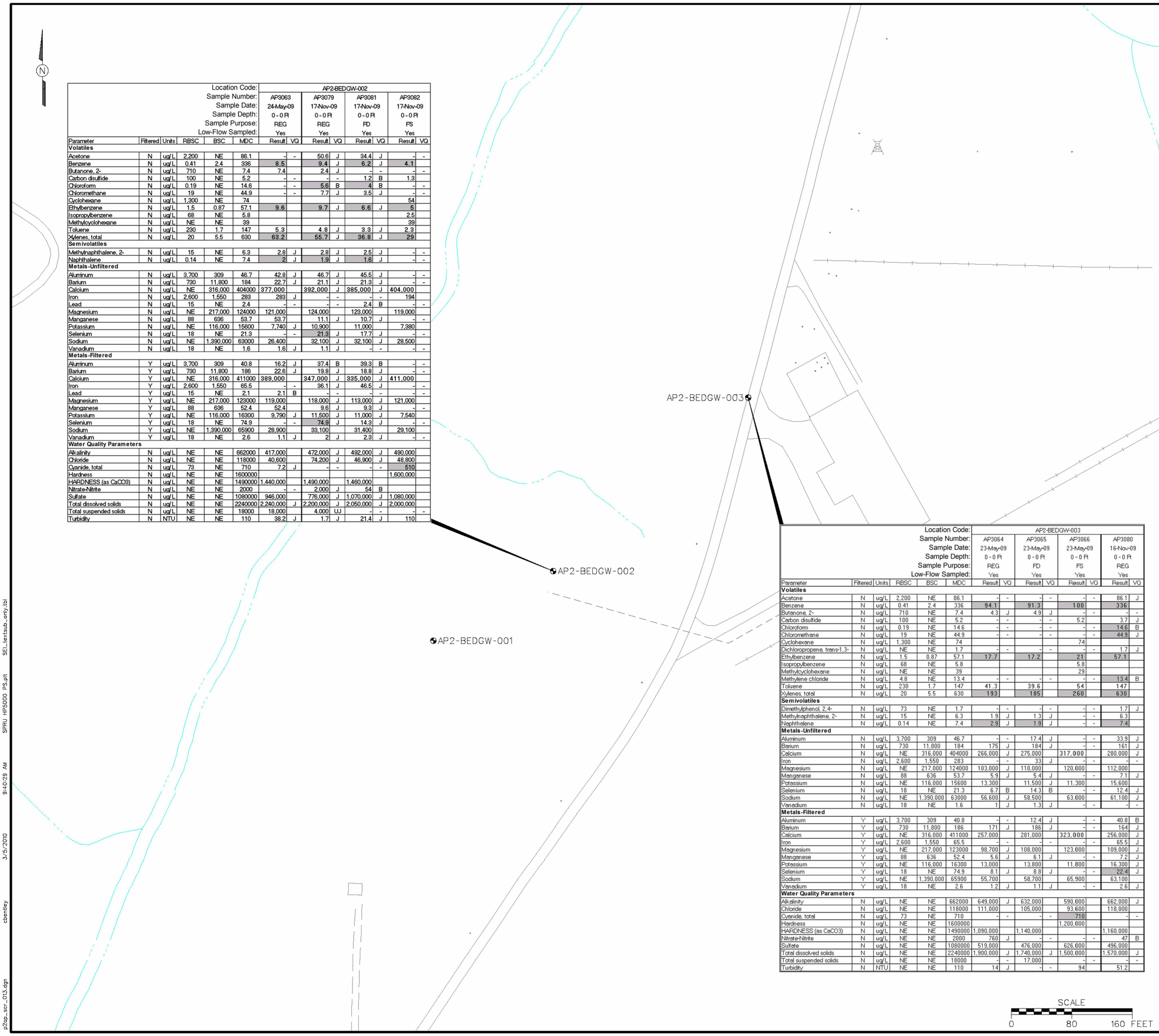
SCALE
0 80 160 FEET

FIGURE 5-8
DETECTED CONSTITUENTS AT POWERHOUSE 2 ASH PITS IN OVERBURDEN/SHALE GROUNDWATER SAMPLES ABOVE RBSCs AND/OR BSCs (JAN., FEB., MAY, AND NOV. 2009)

POWERHOUSE 2 ASH PITS SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

Shaw® a world of Solutions™

p2op_scr_012.dgn ebentley 3/4/2010 5:48:18 PM SPRU HP5000 PS.pit SEL_textsub_only.tbl



Location Code:	AP2-BEDGW-002			
Sample Number:	AP3063	AP3079	AP3081	AP3082
Sample Date:	24-May-09	17-Nov-09	17-Nov-09	17-Nov-09
Sample Depth:	0 - 0 Ft	0 - 0 Ft	0 - 0 Ft	0 - 0 Ft
Sample Purpose:	REG	REG	FD	FS
Low-Flow Sampled:	Yes	Yes	Yes	Yes

Parameter	Filtered	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ
Volatiles													
Acetone	N	ug/L	2,200	NE	86.1	-	-	50.6	J	34.4	J	-	-
Benzene	N	ug/L	0.41	2.4	336	8.5		9.4	J	6.2	J	4.1	
Butanone, 2-	N	ug/L	710	NE	7.4	7.4		2.4	J	-	-	-	-
Carbon disulfide	N	ug/L	100	NE	5.2	-	-	-	-	1.2	B	1.3	
Chloroform	N	ug/L	0.19	NE	14.6	-	-	5.6	B	4	B	-	-
Chloromethane	N	ug/L	19	NE	44.9	-	-	7.7	J	3.5	J	-	-
Cyclohexane	N	ug/L	1,300	NE	74							54	
Ethylbenzene	N	ug/L	1.5	0.87	57.1	9.6		9.7	J	6.6	J	5	
Isopropylbenzene	N	ug/L	68	NE	5.8							2.5	
Methylcyclohexane	N	ug/L	NE	NE	39							39	
Toluene	N	ug/L	230	1.7	147	5.3		4.8	J	3.3	J	2.3	
Xylenes, total	N	ug/L	20	5.5	630	63.2		55.7	J	36.8	J	29	
Semivolatiles													
Methylnaphthalene, 2-	N	ug/L	15	NE	6.3	2.8	J	2.8	J	2.5	J	-	-
Naphthalene	N	ug/L	0.14	NE	7.4	2	J	1.9	J	1.6	J	-	-
Metals-Unfiltered													
Aluminum	N	ug/L	3,700	309	46.7	42.8	J	46.7	J	45.5	J	-	-
Barium	N	ug/L	730	11,800	184	22.7	J	21.1	J	21.3	J	-	-
Calcium	N	ug/L	NE	316,000	404000	377,000		392,000	J	385,000	J	404,000	
Iron	N	ug/L	2,600	1,550	283	283	J	-	-	-	-	194	
Lead	N	ug/L	15	NE	2.4	-	-	-	-	2.4	B	-	-
Magnesium	N	ug/L	NE	217,000	124000	121,000		124,000		123,000		119,000	
Manganese	N	ug/L	88	636	53.7	53.7		11.1	J	10.7	J	-	-
Potassium	N	ug/L	NE	116,000	15600	7,740	J	10,900		11,000		7,380	
Selenium	N	ug/L	18	NE	21.3	-	-	21.3	J	17.7	J	-	-
Sodium	N	ug/L	NE	1,390,000	63000	26,400		32,100	J	32,100	J	28,500	
Vanadium	N	ug/L	18	NE	1.6	1.6	J	1.1	J	-	-	-	-
Metals-Filtered													
Aluminum	Y	ug/L	3,700	309	40.8	16.2	J	37.4	B	39.3	B	-	-
Barium	Y	ug/L	730	11,800	186	22.6	J	19.8	J	18.8	J	-	-
Calcium	Y	ug/L	NE	316,000	411000	389,000		347,000	J	335,000	J	411,000	
Iron	Y	ug/L	2,600	1,550	65.5	-	-	36.1	J	46.5	J	-	-
Lead	Y	ug/L	15	NE	2.1	2.1	B	-	-	-	-	-	-
Magnesium	Y	ug/L	NE	217,000	123000	119,000		118,000	J	113,000	J	121,000	
Manganese	Y	ug/L	88	636	52.4	52.4		9.6	J	9.3	J	-	-
Potassium	Y	ug/L	NE	116,000	16300	9,790	J	11,500	J	11,000	J	7,540	
Selenium	Y	ug/L	18	NE	74.9	-	-	74.9	J	14.3	J	-	-
Sodium	Y	ug/L	NE	1,390,000	65900	28,900		33,100		31,400		29,100	
Vanadium	Y	ug/L	18	NE	2.6	1.1	J	2	J	2.3	J	-	-
Water Quality Parameters													
Alkalinity	N	ug/L	NE	NE	662000	417,000		472,000	J	492,000	J	490,000	
Chloride	N	ug/L	NE	NE	118000	40,600		74,200	J	46,900	J	48,800	
Cyanide, total	N	ug/L	73	NE	710	7.2	J	-	-	-	-	510	
Hardness	N	ug/L	NE	NE	1600000							1,600,000	
HARDNESS (as CaCO3)	N	ug/L	NE	NE	1490000	1,440,000		1,490,000		1,460,000			
Nitrate-Nitrite	N	ug/L	NE	NE	2000	-	-	2,000	J	54	B		
Sulfate	N	ug/L	NE	NE	1080000	946,000		776,000	J	1,070,000	J	1,080,000	
Total dissolved solids	N	ug/L	NE	NE	2240000	2,240,000	J	2,200,000	J	2,050,000	J	2,000,000	
Total suspended solids	N	ug/L	NE	NE	18000	18,000		4,000	UJ	-	-	-	-
Turbidity	N	NTU	NE	NE	110	38.2	J	1.7	J	21.4	J	110	

Location Code:	AP2-BEDGW-003			
Sample Number:	AP3064	AP3065	AP3066	AP3080
Sample Date:	23-May-09	23-May-09	23-May-09	16-Nov-09
Sample Depth:	0 - 0 Ft	0 - 0 Ft	0 - 0 Ft	0 - 0 Ft
Sample Purpose:	REG	FD	FS	REG
Low-Flow Sampled:	Yes	Yes	Yes	Yes

Parameter	Filtered	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ
Volatiles													
Acetone	N	ug/L	2,200	NE	86.1	-	-	-	-	-	-	86.1	J
Benzene	N	ug/L	0.41	2.4	336	94.1		91.3		100		336	
Butanone, 2-	N	ug/L	710	NE	7.4	4.3	J	4.9	J	-	-	-	-
Carbon disulfide	N	ug/L	100	NE	5.2	-	-	-	-	5.2		3.7	J
Chloroform	N	ug/L	0.19	NE	14.6	-	-	-	-	-	-	14.6	B
Chloromethane	N	ug/L	19	NE	44.9	-	-	-	-	-	-	44.9	J
Cyclohexane	N	ug/L	1,300	NE	74					74			
Dichloropropene, trans-1,3-	N	ug/L	NE	NE	1.7	-	-	-	-	-	-	1.7	J
Ethylbenzene	N	ug/L	1.5	0.87	57.1	17.7		17.2		21		57.1	
Isopropylbenzene	N	ug/L	68	NE	5.8					5.8			
Methylcyclohexane	N	ug/L	NE	NE	39					29			
Methylene chloride	N	ug/L	4.8	NE	13.4	-	-	-	-	-	-	13.4	B
Toluene	N	ug/L	230	1.7	147	41.3		39.6		54		147	
Xylenes, total	N	ug/L	20	5.5	630	193		185		260		630	
Semivolatiles													
Dimethylphenol, 2,4-	N	ug/L	73	NE	1.7	-	-	-	-	-	-	1.7	J
Methylnaphthalene, 2-	N	ug/L	15	NE	6.3	1.9	J	1.3	J	-	-	6.3	
Naphthalene	N	ug/L	0.14	NE	7.4	2.9	J	1.9	J	-	-	7.4	
Metals-Unfiltered													
Aluminum	N	ug/L	3,700	309	46.7	-	-	17.4	J	-	-	33.9	J
Barium	N	ug/L	730	11,800	184	175	J	184	J	-	-	161	J
Calcium	N	ug/L	NE	316,000	404000	266,000	J	275,000		317,000		280,000	J
Iron	N	ug/L	2,600	1,550	283	-	-	33	J	-	-	-	-
Magnesium	N	ug/L	NE	217,000	124000	103,000	J	110,000		120,000		112,000	
Manganese	N	ug/L	88	636	53.7	5.9	J	5.4	J	-	-	7.1	J
Potassium	N	ug/L	NE	116,000	15600	13,300		11,500	J	11,300		15,600	
Selenium	N	ug/L	18	NE	21.3	6.7	B	14.3	B	-	-	12.4	J
Sodium	N	ug/L	NE	1,390,000	63000	56,600	J	58,500		63,000		61,100	J
Vanadium	N	ug/L	18	NE	1.6	1	J	1.3	J	-	-	-	-
Metals-Filtered													
Aluminum	Y	ug/L	3,700	309	40.8	-	-	12.4	J	-	-	40.8	B
Barium	Y	ug/L	730	11,800	186	171	J	186	J	-	-	164	J
Calcium	Y	ug/L	NE	316,000	411000	257,000		281,000		323,000		256,000	J
Iron	Y	ug/L	2,600	1,550	65.5	-	-	-	-	-	-	65.5	J
Magnesium	Y	ug/L	NE	217,000	123000	98,700	J	108,000		123,000		109,000	J
Manganese	Y	ug/L	88	636	52.4	5.6	J	6.1	J	-	-	7.2	J
Potassium	Y	ug/L	NE	116,000	16300	13,000		13,800		11,800		16,300	J
Selenium	Y	ug/L	18	NE	74.9	8.1	J	8.8	J	-	-	22.4	J
Sodium	Y	ug/L	NE	1,390,000	65900	55,700		58,700		65,900		63,100	
Vanadium	Y	ug/L	18	NE	2.6	1.2	J	1.1	J	-	-	2.6	J
Water Quality Parameters													
Alkalinity	N	ug/L	NE	NE	662000	649,000	J	632,000		590,000		662,000	J
Chloride	N	ug/L	NE	NE	118000	111,000		105,000		93,600		118,000	
Cyanide, total	N	ug/L	73	NE	710	-	-	-	-	710		-	-
Hardness	N	ug/L	NE	NE	1600000					1,200,000			
HARDNESS (as CaCO3)	N	ug/L	NE	NE	1490000	1,090,000		1,140,000				1,160,000	
Nitrate-Nitrite	N	ug/L	NE	NE	2000	760	J	-	-	-	-	47	B
Sulfate	N	ug/L	NE	NE	1080000	519,000		476,000		626,000		496,000	
Total dissolved solids	N	ug/L	NE	NE	2240000	1,900,000	J	1,740,000	J	1,500,000		1,570,000	J
Total suspended solids	N	ug/L	NE	NE	18000	-	-	17,000		-	-	-	-
Turbidity	N	NTU	NE	NE	110	14	J	-	-	94		51.2	

LEGEND:

- BEDROCK MONITORING WELL
- ug/L — MICROGRAMS PER LITER
- NE — NOT ESTABLISHED (RBSCs), NOT EVALUATED (BSCs)
- NM — NOT MEASURED
- \- — NOT DETECTED

NOTES:

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

SCALE
0 80 160 FEET

FIGURE 5-9
DETECTED CONSTITUENTS AT POWERHOUSE 2 ASH PITS IN BEDROCK GROUNDWATER SAMPLES ABOVE RBSCs AND/OR BSCs (MAY AND NOVEMBER 2009)

POWERHOUSE 2 ASH PITS SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

Shaw® a world of Solutions™

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APPENDIX A

DIRECT-PUSH SOIL BORING/PIEZOMETER AND MONITORING WELL HTRW DRILL LOGS AND WELL CONSTRUCTION DIAGRAMS

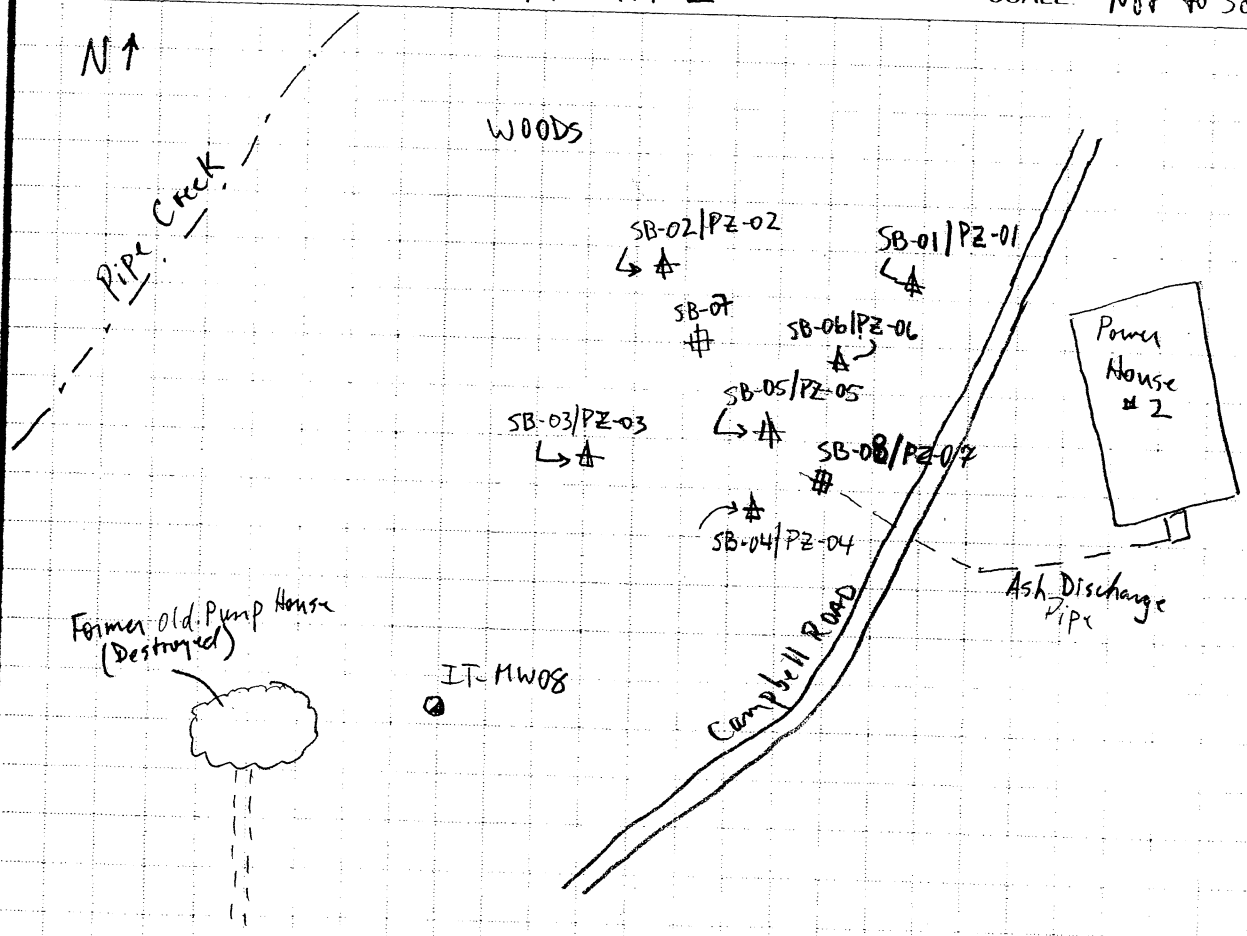
HTRW DRILLING LOG

1. COMPANY NAME	Shaw E+I
DISTRICT	Nashville, TN
HOLE NUMBER	SB-01/PZ-01
2. DRILL SUBCONTRACTOR	Tri-State Drilling
SHEET / SHEETS	1 OF 3
3. PROJECT	PBOW
4. LOCATION	NASA Plum Brook Station, Sandusky, OH
5. NAME OF DRILLER	Jimmy Griffith
6. MANUFACTURER'S DESIGNATION OF DRILL	Geoprobe 6610DT
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Surface and Subsurface initially cleared with geophysics, Drove 2-inch macrocore with 5-ft long acetate liners.
8. HOLE LOCATION	See Sketch
9. SURFACE ELEVATION	Northing: 623073.14 Easting: 1911485.20 Elevation: 631.7
10. DATE STARTED	1/15/09
11. DATE COMPLETED	1/15/09
12. OVERBURDEN THICKNESS	12 Ft
15. DEPTH GROUNDWATER ENCOUNTERED	Not encountered
13. DEPTH DRILLED INTO ROCK	-0-
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
14. TOTAL DEPTH OF HOLE	12 Ft
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	NA

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	NA	✓	Nitros	PCB's	SVOCs	NA %
22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR		
	NA	NA	1" Piezo	David Kesch		

LOCATION SKETCH/COMMENTS Ash Pit 2 SCALE: Not to Scale



PROJECT PBOW HOLE NO. SB-01/PZ-01

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: SB-01/PZ-01

Project: PBOW

Geologist: D. Kessler

Sheet 2 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
		Black (10YR 2/1), black shale fragments, low plasticity, clayey SILT, pebble size gravel 5%, moist, organics (roots), grading to	ml	0.0	NA	AP0100 0830	3.7/ 5.0	Began drilling 1/15/09 S-1 0830 ~~0820~~ (0-5') gravel in silt 0-0.5'
1								
2		10YR 4/4 dark yellowish brown, mottled dark brown, SILT						
3				0.0		3 AP0101 0835		Core frozen like rock. Let thaw in bag for homogenization. Done
4		4.5				3.7		Breathing Air: VOCs = 0.0 ppm O_2 = 20.8 ~~ppm~~ % H_2S = 0 ppm CO = 0 ppm LEL = 0%
5		color change at 4.5 ft to (2.5Y 4/3) light yellowish brown, 5% mottling (dark yellowish brown) very fine grain, SAND, dry	~~fsm~~ SP ~~sd~~				5/5	S-2 0835 (5-10')
6								
7		6.5 (10YR 3/3) dark brown, low plasticity, homogeneous, silty CLAY, 10% very coarse grain ~~gravel~~ rock bits, angular to rounded, various colors (brown, white, gray) moist	CL					
8						8 AP0102		
9		8.5 (10YR 3/1) very dark gray, low plasticity, SILT, trace clay, very coarse grain rock 10%, moist	ml	0.0				
10						0840		

Project: PBOW

Hole Number: SB-01/PZ-01

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Shaw
Shaw E & I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: SB-01/PZ-01

Project: PBOW

Geologist: D. Kessler

Sheet 3 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
	10	(10YR 3/1) very dark gray, low plasticity, SILT, trace clay, very coarse grain Rock, 10%, moist	ML		NA	NA	2/2	S-3 0840 (10-12")
	11							
	12	~~Auger~~ Refusal @ 12 ft Total Depth: 12 ft SHALE, gray						
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							

Project: PBOW

Hole Number: PZ-01/SB-01

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Temporary Piezometer

Project:	PBOW	Piezometer Number:	PZ-01
Location:	Sandusky, Ohio	Site Location:	Ash Pit 2
Client:	USACE, Nashville, TN	Installation Date	1/15/09
Subcontractor:	Tri-State Drilling	Northing:	623073.14
Driller:	Jimmy Griffith	Easting:	1911485.20
Shaw Field Representative:	David Kessler	Shaw Project Number:	133422

Top of Casing Elevation (ft): 634.97

Top of Casing Stickup (ft): 3.1

Land Surface Elevation (ft): 631.7

Approximate Diameter of Borehole (in): 3 1/2"

Well Casing Diameter (in): 1"

Depth to Water (ft):

During Drilling: Not encountered

Date: 1/15/09

Post Development: NA TOC

Date: NA

Top of Filter Pack (ft): NA

Top of Screen Interval (ft): 1.90

Bottom of Screen Interval (ft): 11.90

Bottom of Piezometer (ft): 12.15

Bottom of Borehole (ft): 12

Filter Pack Material: None

Manufacturer:

Product Name:

Size:

Installation: Prepacked Screen Filter Sock

Well Casing:

Manufacturer: DSI

Type: PVC

Diameter (in): 1"

Well Screen Casing:

Manufacturer: DSI

Type: PVC

Slot Size (in): 0.010 %Open

Slot Type: Continuous wrap Factory slot

Sump/End Cap: 0.25 ~~0.14~~ Pkr Lt

Backfill Material: None

Abandonment:

Date: 7/6/09

Procedure: Natural fill Grouted Bentonite

Casing Removed

Completed as Well NA

Shaw

Shaw E & I, Inc.

Depths and heights are referenced to ground surface unless specified TOC.

All elevations are referenced to MSL (NAVD 88).

If completed as well - see well construction diagram.

HTRW DRILLING LOG

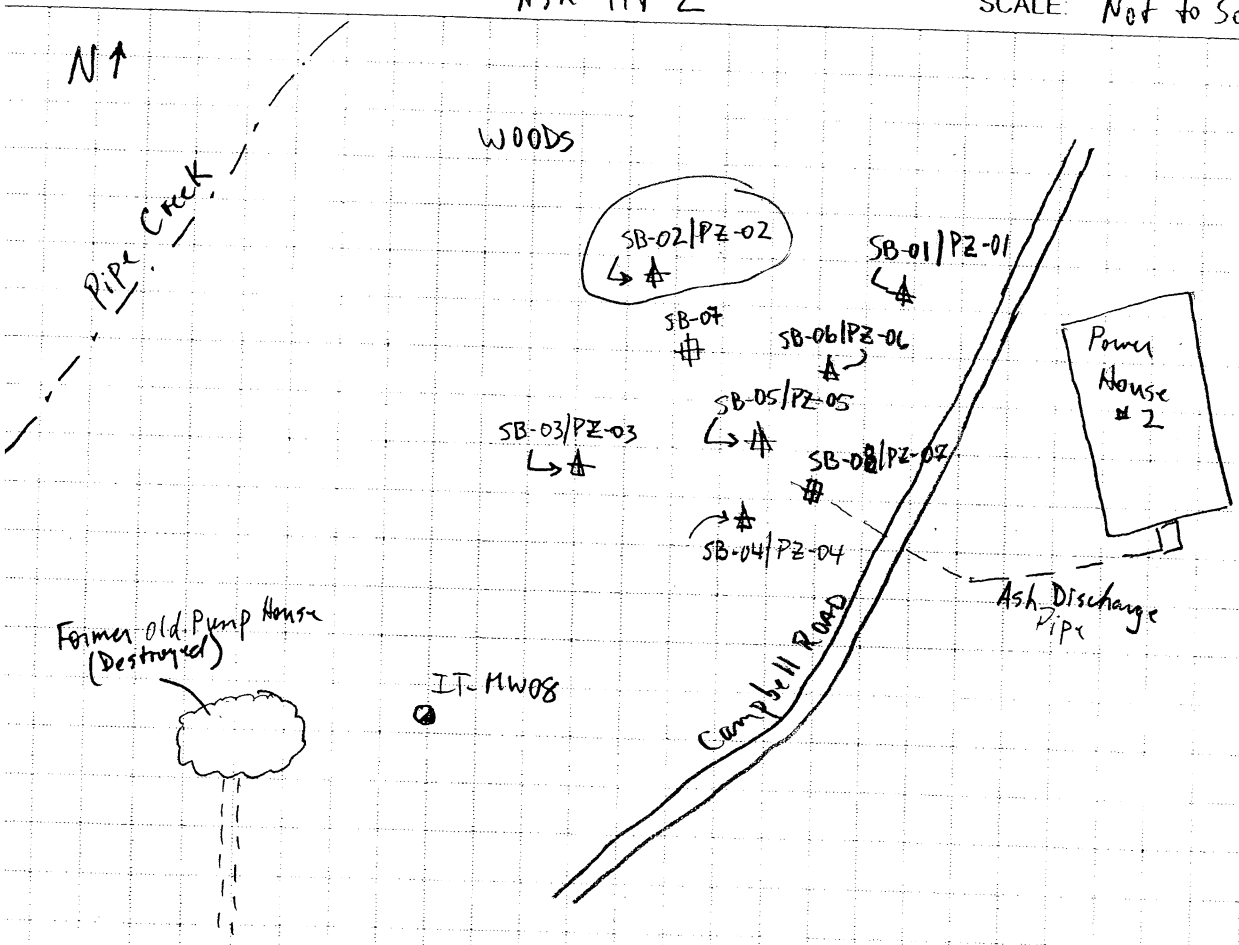
1. COMPANY NAME	Shaw E+I
DISTRICT	Nashville, TN
HOLE NUMBER	SB02/PZ2
2. DRILL SUBCONTRACTOR	Tri-State Drilling
SHEET / OF SHEETS	1 OF 3
3. PROJECT	PBOW
4. LOCATION	NASA Plum Brook Station, Sandusky, OH
5. NAME OF DRILLER	Jimmy Griffith
6. MANUFACTURER'S DESIGNATION OF DRILL	Geoprobe 6610 DT
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Surface and Subsurface initially cleared with geophysics. Drove 2-inch macrocore with 5-ft long acetate liners.
8. HOLE LOCATION	See Sketch
9. SURFACE ELEVATION	627.5 Northing: 623041.37 Easting: 1911260.38
10. DATE STARTED	1/16/09
11. DATE COMPLETED	1/16/09
12. OVERBURDEN THICKNESS	10.6 Ft
15. DEPTH GROUNDWATER ENCOUNTERED	Not encountered
13. DEPTH DRILLED INTO ROCK	-0-
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
14. TOTAL DEPTH OF HOLE	10.6'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	NA

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	NA	Yes	Nitros	SVOCs	PCBs	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	NA	NA	1" Piezo	David Fraser

LOCATION SKETCH/COMMENTS Ash Pit 2 SCALE: Not to Scale



PROJECT PBOW

HOLE NO. SB02/PZ02

Shaw
Shaw E & I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: SB02/PZ02

Project: PBOW

Geologist: Eric Vernon

Sheet 2 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
		Black ASH, very coarse grain, dry, trace organics (roots, leaves) 0.0'		0.3	NA	AP0103 1030	3.7'/5	Begon drilling 1/16/09
	1	Soft (2.5Y 3/2) Very dark grayish brown low plasticity, SILT, moist.	ML			1		S-1 (0-5') 1030
	2	Loose (2.5Y 4/3) Olive brown, very fine grained SAND, moist grading to (2.5Y 5/4) light olive brown	SP					
	3	Stiff to very stiff (10YR 4/3) brown CLAY, moist		0.4		3' AP0104 AP0105 AP0106 1033 3'		
	4		CL					
	5							S-2 (5'-10') 1200
	6							
	7							
	8					8'		
	9							
	10					10'		

Project: PBOW

Hole Number: SB-02/PZ-02

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Shaw
Shaw E & I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: SB-02/PZ-02

Project: PBOW

Geologist: E. Weaver

Sheet 3 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
	10	(2.5y 3/1) very dark gray, silty CLAY, rock fragments (15%) medium to fine grain moist	CL		NA		0.6/0.6	S-3 (10-10.6) 1205
	11	10.6 Refusal @ 10.6 Ft Total Depth = 10.6 Ft						
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							

Project: PBOW

Hole Number: SB2/PZ2

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Temporary Piezometer

Project:	PBOW	Piezometer Number:	PZ-02
Location:	Sandusky, Ohio	Site Location:	Ash Pit 2
Client:	USACE, Nashville, TN	Installation Date	1/16/09
Subcontractor:	Tri-State Drilling	Northing:	623041.37
Driller:	Jimmy Griffith	Easting:	1911260.38
Shaw Field Representative:	DAVID Kessler	Shaw Project Number:	133422

Top of Casing Elevation (ft): 630.32

Top of Casing Stickup (ft): 2

Land Surface Elevation (ft): 627.5

Approximate Diameter of Borehole (in): 3 1/2"

Well Casing Diameter (in): 1"

Depth to Water (ft):

During Drilling: Not encountered

Date: 1/16/09

Post Development: NA TOC

Date: NA

Top of Filter Pack (ft): NA

Top of Screen Interval (ft): 3.5

7' screen slip cap

Bottom of Screen Interval (ft): 10.5

Bottom of Piezometer (ft): 10.6

Bottom of Borehole (ft): 10.6 Ft

Filter Pack Material: None

Manufacturer:

Product Name:

Size:

Installation: Prepacked Screen Filter Sock

Well Casing:

Manufacturer: DSI

Type: PVC

Diameter (in): 1"

Well Screen Casing:

Manufacturer: DSI

Type: PVC

Slot Size (in): 0.010 %Open

Slot Type: Continuous wrap Factory slot

Sump/End Cap: 0.0 ~~0.44 Ft~~ ~~DKK~~

Backfill Material: None

Abandonment:

Date: 7/6/09

Procedure: Natural fill Grouted Bentonite Casing Removed

Completed as Well NA

Shaw
Shaw E & I, Inc.

Depths and heights are referenced to ground surface unless specified TOC.

All elevations are referenced to MSL (NAVD 88).

If completed as well - see well construction diagram.

HTRW DRILLING LOG

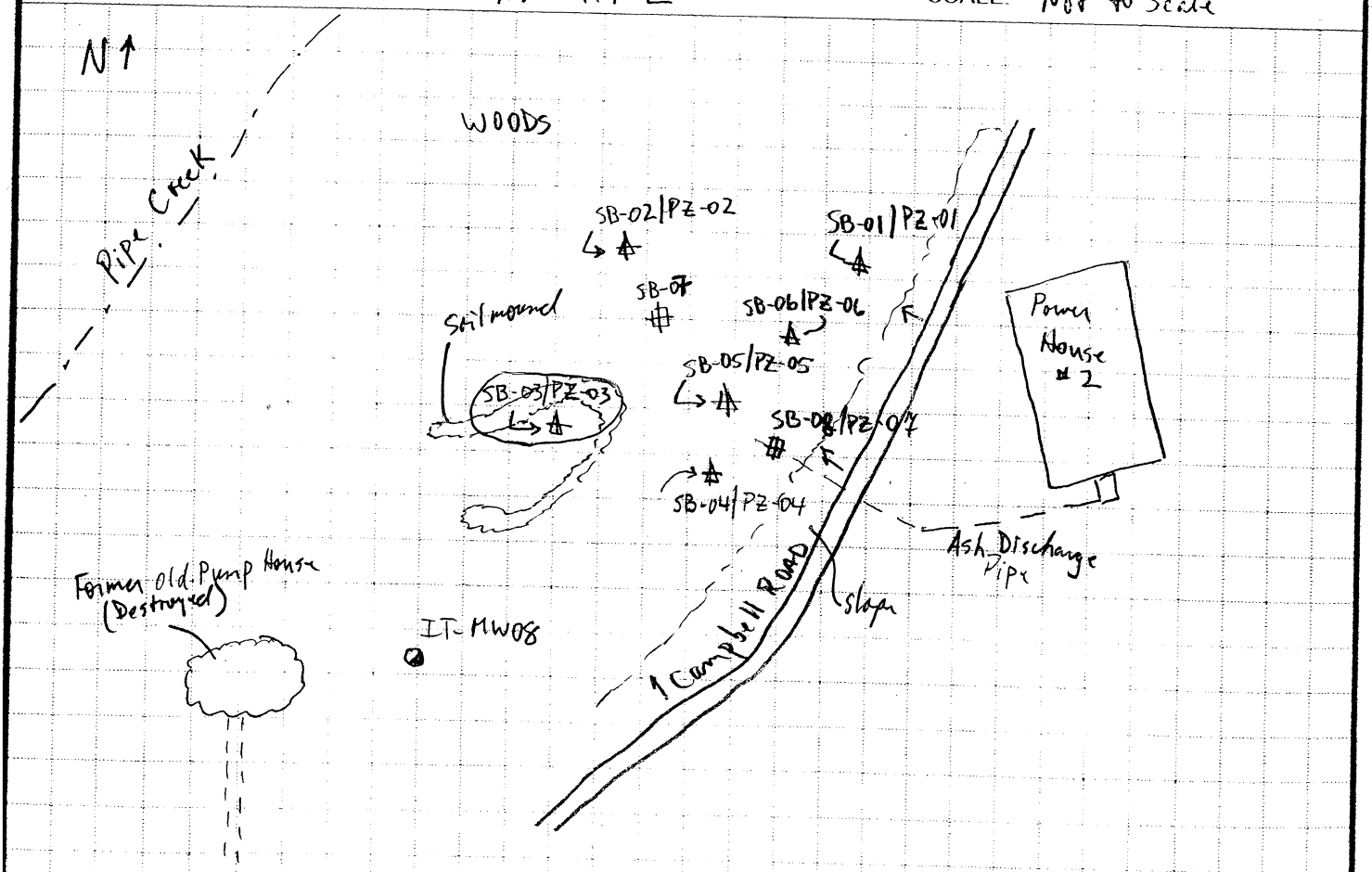
1. COMPANY NAME	Shaw E+I
DISTRICT	Nashville, TN
HOLE NUMBER	SB-03/PZ-03
2. DRILL SUBCONTRACTOR	Tri-State Drilling
SHEET / SHEETS	1 OF 3
3. PROJECT	PBOW
4. LOCATION	NASA Plum Brook Station, Sandusky, OH
5. NAME OF DRILLER	Jimmy Griffith
6. MANUFACTURER'S DESIGNATION OF DRILL	Geoprobe 6610DT
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Surface and Subsurface initially cleared with geophysics. Drove 2-inch macrocore with 5-ft long acetate liners.
8. HOLE LOCATION	See Sketch
9. SURFACE ELEVATION	607.7 Northing: 622845.22 Easting: 1911148.24
10. DATE STARTED	1/18/09
11. DATE COMPLETED	1/18/09
12. OVERBURDEN THICKNESS	11.1 Ft
15. DEPTH GROUNDWATER ENCOUNTERED	1.7 Ft
13. DEPTH DRILLED INTO ROCK	-0-
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
14. TOTAL DEPTH OF HOLE	11.1 Ft
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	NA

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	NA	yes	Nitros	SVOCs	PCBs	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	NA	NA	1" Pipe	David Kessler

LOCATION SKETCH/COMMENTS Ash Pit 2 SCALE: Not to Scale



PROJECT	PBOW	HOLE NO.	SB-03/PZ-03

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: SB-03/PZ-03

Project: PBOW

Geologist: D. Kessler

Sheet 2 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
		Soft, (10YR 2/2) very dark br, homogeneous. clayey SILT, organics roots, moist grading to (10YR 3/6) dry 1.1	ml		NA	0 AP0108 0925	3.5/5	Began drilling 1/18/09 S-1 0925 (0-5')
	1							
	2	Loose. (10YR 3/3) dark brown, SAND, little silt (15%), very fine grain, well sorted, very wet silt content increases w/depth clay content begins and increases w/depth 2.8	SP					▽ Encountered gw 1.7 ft
	3	Stiff to very stiff. (10YR 4/1) dark gray, mottled (yellowish brown) (30%-2.8-4'), mottling decreases with depth. high plasticity, CLAY mottled (color SILT-3%), moist to wet.				3 AP0109 0925		Breathing Air: VOCs = 0.0ppm LEL = 0% O_2 = 21.1% CO = 0.0 ppm H_2S = 0.0 ppm
	4							
	5		ch					
	6						5/5	S-2 0930 (5-10')
	7							
	8					8 AP0110		
	9	Shale fragments 9.5 ft, friable						
	10					0930	10	

Project: PBOW

Hole Number: SB-03/PZ-03

Shaw
Shaw E & I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: SB-03/PZ-03

Project: PBOW

Geologist: D. Kessler

Sheet 3 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
	10	very stiff, (10yR 4/1) dark gray, homogeneous, CLAY, high plasticity, shale fragments, limestone fragments, (1m pebble 11.1 Ft), wet	Ch	0.0	NA	NA	1.1/ 1.1	S-3 0935 (10-11.1')
	11	Refusal @ 11.1 Ft Total Depth = 11.1 Ft						
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							

Project: PBOW

Hole Number: SB-03/PZ-03

Temporary Piezometer

Project:	PBOW	Piezometer Number:	PZ-03
Location:	Sandusky, Ohio	Site Location:	Ash Pit 2
Client:	USACE, Nashville, TN	Installation Date	1/18/09
Subcontractor:	Tri-State Drilling	Northing:	622 845.22
Driller:	Jimmy Griffith	Easting:	1911 148.24
Shaw Field Representative:	David Kessler	Shaw Project Number:	133422

Top of Casing Elevation (ft): 630.69

Top of Casing Stickup (ft): ~~[illegible]~~ 2.9

Land Surface Elevation (ft): 627.7

Approximate Diameter of Borehole (in): 3 1/2"

Well Casing Diameter (in): 1"

Depth to Water (ft):

During Drilling: 1.7 Ft

Date: 1/18/09

Post Development: NA TOC

Date: NA

Top of Filter Pack (ft) NA

Top of Screen Interval (ft) 1.00 ~~[illegible]~~

Bottom of Screen Interval (ft): 11.00

Bottom of Piezometer (ft): 11.25

Bottom of Borehole (ft): 11.1 Ft

Filter Pack Material: None

Manufacturer:

Product Name:

Size:

Installation: Prepacked Screen Filter Sock

Well Casing:

Manufacturer: DSI

Type: PVC

Diameter (in): 1"

Well Screen Casing:

Manufacturer: DSI

Type: PVC

Slot Size (in): 0.010 %Open

Slot Type: Continuous wrap Factory slot

Sump/End Cap: 0.14 Ft

Backfill Material: None

Abandonment:

Date: 7/6/09

Procedure: Natural fill Grouted Bentonite Casing Removed

Completed as Well NA

Shaw
Shaw E & I, Inc.

Depths and heights are referenced to ground surface unless specified TOC.

All elevations are referenced to MSL (NAVD 88).

If completed as well - see well construction diagram.

10+5
screen riser (end 1.1') 2.9 stick-up

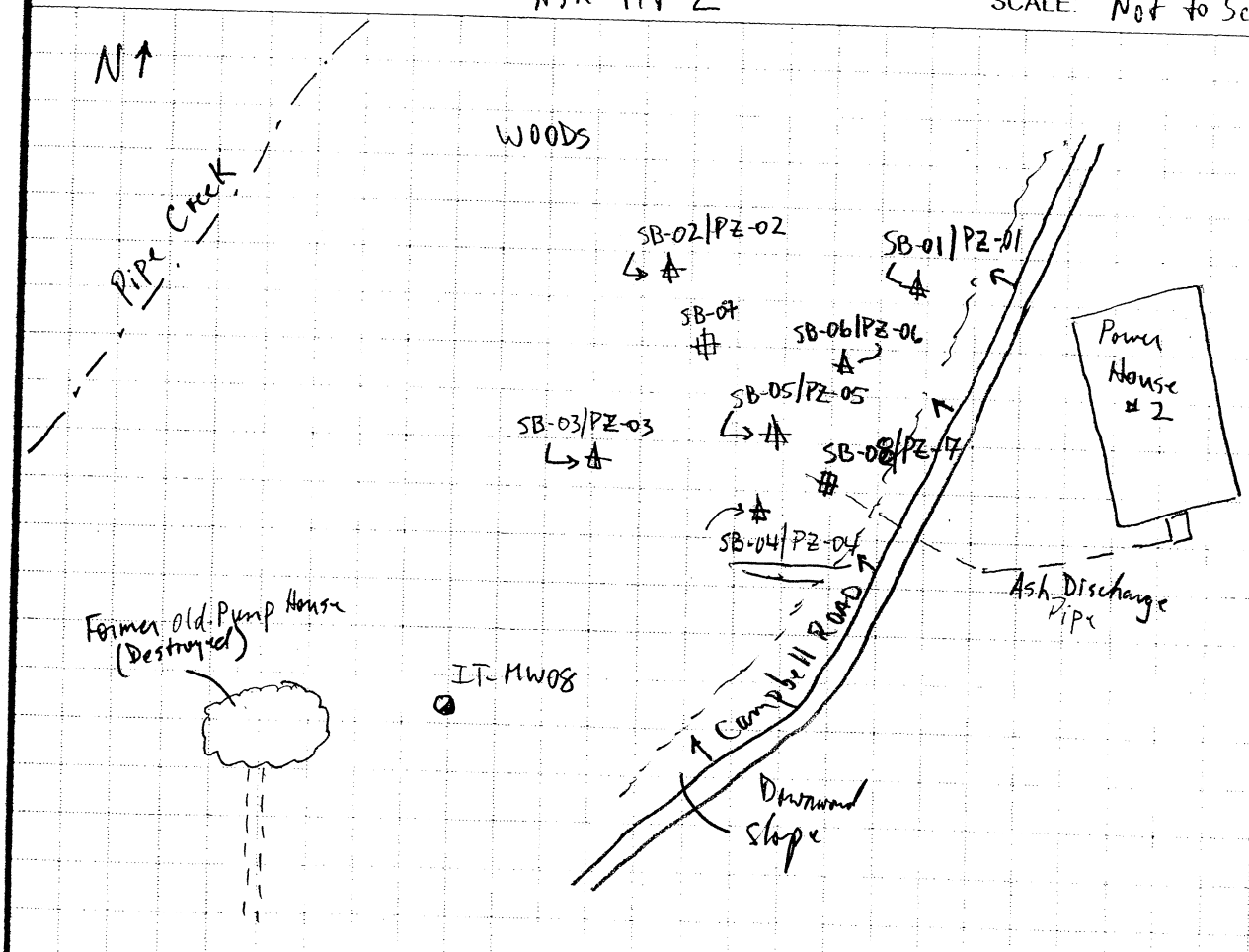
HTRW DRILLING LOG

1. COMPANY NAME	Shaw E+I
DISTRICT	Nashville, TN
HOLE NUMBER	SB-04/PZ-04
2. DRILL SUBCONTRACTOR	Tri-State Drilling
SHEET / SHEETS	1 OF 3
3. PROJECT	PBOW
4. LOCATION	NASA Plum Brook Station, Sandusky, OH
5. NAME OF DRILLER	Jimmy Griffith
6. MANUFACTURER'S DESIGNATION OF DRILL	Geoprobe 6610 DT
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Surface and Subsurface initially cleared with geophysics. Drove 2-inch macrocore with 5-ft long acetate liners.
8. HOLE LOCATION	See Sketch
9. SURFACE ELEVATION	630.0
	Northing: 622789.21 Easting: 1941348.96
10. DATE STARTED	1/18/09
11. DATE COMPLETED	1/18/09
12. OVERBURDEN THICKNESS	11.7 Ft
15. DEPTH GROUNDWATER ENCOUNTERED	~4 Ft
13. DEPTH DRILLED INTO ROCK	-0-
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
14. TOTAL DEPTH OF HOLE	11.7 Ft
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	NA

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	NA	yes	Nitros	PCBs	SVOCs	NA %
22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR		
	NA	NA	1" Piezo	David Kessler		

LOCATION SKETCH/COMMENTS Ash Pit 2 SCALE: Not to Scale



PROJECT	PBOW	HOLE NO.	SB-04/PZ-04

Shaw
Shaw E & I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: SB-04/PZ-04

Project: PBOW

Geologist: D. Kessler

Sheet 2 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
	1	Black, ASH/CINDERS, very loose, mottled (yellowish br), cinders common at base; ~10 mm layers of ASH black/brown, moist organics (roots), 10% white specks		0.0	NA	AP0111 0845	2.7/5.0	Began drilling 1/18/09 0845 S-1 (0-5')
	2	2						Attempted 4 sleeves (2 @ 0-5' pushes + 2 discrete 3-5' pushes), best collected 3-3.5
	3	Soft, (10YR 3/3) dark brown, mottled (very dark brown) (30%), low plasticity, clayey SILT, 3.3	ml			AP0112 0848	3 / 3	
	4	Very loose, (10YR 3/3) dark br, mottled (br yellow), silty SAND, very fine grain, silt (35%), wet	SP	0.0		3.5	0848 3.5	▽ Encountered gw ~4 ft
	5							
	6						5/5	S-2 0850 (5-10')
	7	7.2						
	8	Stiff, (10YR 4/2) dark grayish brown, high ~~plasticity~~ plasticity, CLAY, silt 10%, moist color changes to (10YR 4/1) dark gray at 9 ft; very stiff, silt content higher (30%) low plasticity	ch			AP0113		
	9			0.0				
	10					0850		

Project: PBOW

Hole Number: SB-04/PZ-04

Shaw
Shaw E & I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: SB-04/PZ-04

Project: PBOW

Geologist: D. Kessler

Sheet 3 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
	10	Very stiff, (10 yr 4/1) dark gray, low plasticity, silty CLAY, silt content high (40%), wet	CH	0.0	NA	NA	1.7/ 1.7	S-3 0855
	11							
	12	Refusal @ 11.7 Ft Total Depth = 11.7 Ft						
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							

Project: PBOW

Hole Number: SB-04/PZ-04

Temporary Piezometer

Project:	PBOW	Piezometer Number:	PZ-04
Location:	Sandusky, Ohio	Site Location:	Ash Pit 2
Client:	USACE, Nashville, TN	Installation Date	1/18/09
Subcontractor:	Tri-State Drilling	Northing:	622789.21
Driller:	Jimmy Griffith	Easting:	1911348.96
Shaw Field Representative:	David Kessler	Shaw Project Number:	133422

Top of Casing Elevation (ft): 633.70

Top of Casing Stickup (ft): 3.35'

Land Surface Elevation (ft): 630.0

Approximate Diameter of Borehole (in): 3 1/2"

Well Casing Diameter (in): 1"

Depth to Water (ft):

During Drilling: ~4 Ft

Date: 1/18/09

Post Development: NA TOC

Date: NA

Top of Filter Pack (ft): NA

Top of Screen Interval (ft): 1.65

Bottom of Screen Interval (ft): 11.65

Bottom of Piezometer (ft): 11.90'

Bottom of Borehole (ft): 11.70'

Filter Pack Material: None

Manufacturer:

Product Name:

Size:

Installation: Prepacked Screen Filter Sock

Well Casing:

Manufacturer: DSI

Type: PVC

Diameter (in): 1"

Well Screen Casing:

Manufacturer: DSI

Type: PVC

Slot Size (in): 0.010 %Open

Slot Type: Continuous wrap Factory slot

Sump/End Cap: 0.14 Ft

Backfill Material: None

Abandonment:

Date: 7/6/09

Procedure: Natural fill Grouted Bentonite

Casing Removed

Completed as Well NA

Shaw

Shaw E & I, Inc.

Depths and heights are referenced to ground surface unless specified TOC.

All elevations are referenced to MSL (NAVD 88).

If completed as well - see well construction diagram.

10' ±5' screen Pitm 3.35' stc

HTRW DRILLING LOG

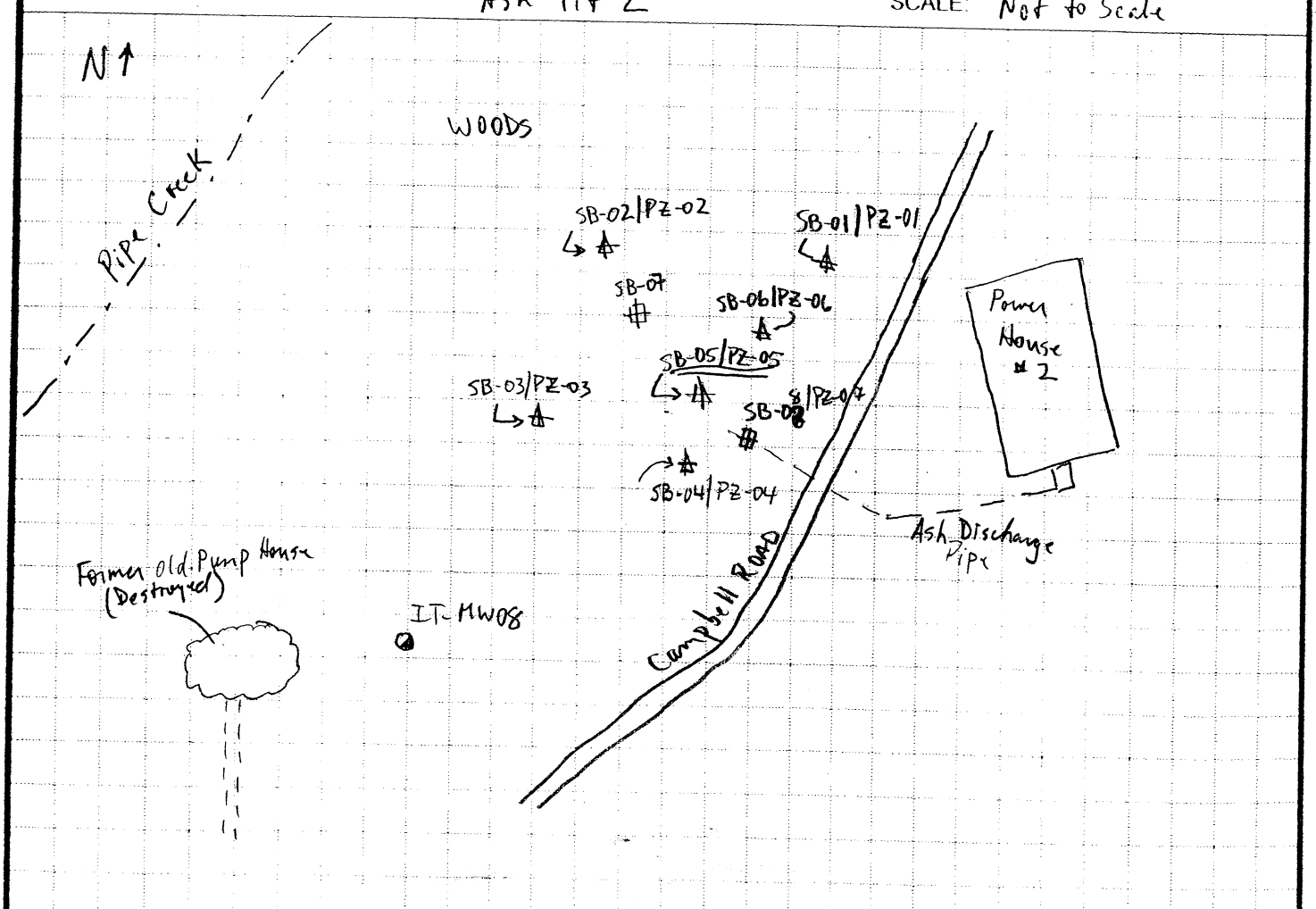
1. COMPANY NAME	Shaw E+I
DISTRICT	Nashville, TN
HOLE NUMBER	SB-05/PZ-05
2. DRILL SUBCONTRACTOR	Tri-State Drilling
SHEET / OF SHEETS	1 / 2
3. PROJECT	PBOW
4. LOCATION	NASA Plum Brook Station, Sandusky, OH
5. NAME OF DRILLER	Jimmy Griffith
6. MANUFACTURER'S DESIGNATION OF DRILL	Geoprobe 6610DT
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Surface and Subsurface initially cleared with geophysics. Drove 2-inch macrocore with 5-ft long acetate liners.
8. HOLE LOCATION	See Sketch
9. SURFACE ELEVATION	631.8 — Northing: 622901.66, Easting: 1911339.77
10. DATE STARTED	1/16/09
11. DATE COMPLETED	1/16/09
12. OVERBURDEN THICKNESS	9.3 Ft
15. DEPTH GROUNDWATER ENCOUNTERED	Not encountered
13. DEPTH DRILLED INTO ROCK	-0-
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
14. TOTAL DEPTH OF HOLE	9.3 Ft
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	NA

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	NA	yes	Nitros	SVOC	PCBs	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	NA	NA	1" Piezo	David Kessler

LOCATION SKETCH/COMMENTS Ash Pit 2 SCALE: Not to Scale



PROJECT	PBOW	HOLE NO.	SB-05/PZ-05

Shaw
Shaw E & I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: SB-05/PZ-05

Project: PBOW

Geologist: D. Kessler

Sheet 2 of 2 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
		ASH, Black, mottled (brown), loose, organics (roots, bugs), dry cinders 5% 1.4			NA	0 AP0114 1225 1	3.3/5	Begon drilling 1/16/09 1225 S-1 (0-5')
	1	(10YR 3/3) Dark brown, no plasticity, SILT, moist 1.8	ml					
	2	Loose (2.5Y 6/4) light yellowish brown, very fine grain, SAND, trace of clay, moist clay content 5-10% 7.1	SP	0.0		AP0115 1227 3.3		Pushed 2@0-5F sleeves, both poor recovery Breathing Air: VOCs = 0.0 ppm H_2S = 0.0 ppm O_2 = 20.8% CO = 0.0 ppm LEL = 0%
	3							
	4							
	5							
	6						5/5	S-2 (5-DKK 9.3) 1235
	7	Stiff, (10YR 4/3) brown mottled (gray, light brown, clayey SILT, no-to low plasticity, rock fragments 10% (shale/limestone), dry	ml	0.2		7.3 AP0116 1235 9.3		
	8							
	9	Refusal @ 9.3 Ft Total Depth - 9.3 Ft						
	10							

Project: PBOW

Hole Number: SB-05/PZ-05

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Temporary Piezometer

Project:	PBOW	Piezometer Number:	PZ-05
Location:	Sandusky, Ohio	Site Location:	Ash Pit 2
Client:	USACE, Nashville, TN	Installation Date	1/16/09
Subcontractor:	Tri-State Drilling	Northing:	622 901.66
Driller:	Jimmy Griffith	Easting:	1911339.77
Shaw Field Representative:	DAVID KESSLER	Shaw Project Number:	133422

Top of Casing Elevation (ft): 633.97

Top of Casing Stickup (ft): 1.9

Land Surface Elevation (ft): 631.8

Approximate Diameter of Borehole (in): 3 1/2"

Well Casing Diameter (in): 1"

Depth to Water (ft):

During Drilling: Not encountered

Date: 1/16/09

Post Development: NA TOC

Date: NA

Top of Filter Pack (ft) NA

Top of Screen Interval (ft): 3.1

6 ft screen
0.1 slip cap

Bottom of Screen Interval (ft): 9.1

Bottom of Piezometer (ft): 9.2

Bottom of Borehole (ft): 9.3

Filter Pack Material: None

Manufacturer:

Product Name:

Size:

Installation: Prepacked Screen Filter Sock

Well Casing:

Manufacturer: DSI

Type: PVC

Diameter (in): 1"

Well Screen Casing:

Manufacturer: DSI

Type: PVC

Slot Size (in): 0.010 %Open

Slot Type: Continuous wrap Factory slot

Sump/End Cap: ~~0.14 ft Dke~~ 0.10 ft

Backfill Material: None

Abandonment:

Date: 7/6/09

Procedure: Natural fill Grouted Bentonite Casing Removed

Completed as Well NA

Shaw
Shaw E & I, Inc.

Depths and heights are referenced to ground surface unless specified TOC.

All elevations are referenced to MSL (NAVD 88).

If completed as well - see well construction diagram.

HTRW DRILLING LOG

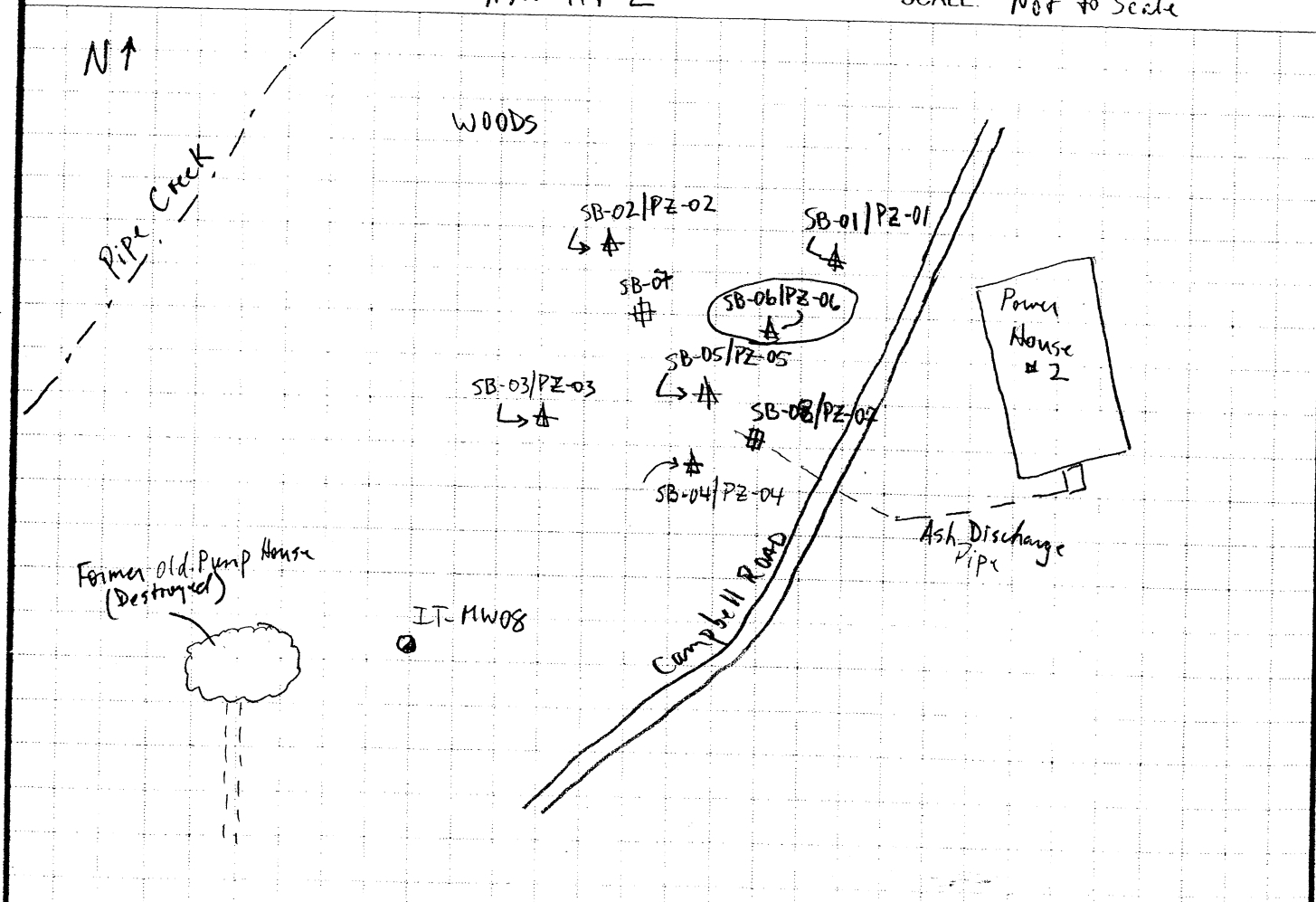
1. COMPANY NAME	Shaw E+I
DISTRICT	Nashville, TN
HOLE NUMBER	SB-06/PZ-06
2. DRILL SUBCONTRACTOR	Tri-State Drilling
SHEET / SHEETS	1 OF 3
3. PROJECT	PBOW
4. LOCATION	NASA Plum Brook Station, Sandusky, OH
5. NAME OF DRILLER	Jimmy Griffith
6. MANUFACTURER'S DESIGNATION OF DRILL	Geoprobe 6610DT
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Surface and Subsurface initially cleared with geophysics. Drove 2-inch macrocore with 5-ft long acetate liners.
8. HOLE LOCATION	See Sketch
9. SURFACE ELEVATION	629.7 Northing: 622942.86 Easting: 1911404.17
10. DATE STARTED	1/15/09
11. DATE COMPLETED	1/15/09
12. OVERBURDEN THICKNESS	11.8
15. DEPTH GROUNDWATER ENCOUNTERED	Not encountered
13. DEPTH DRILLED INTO ROCK	-0-
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
14. TOTAL DEPTH OF HOLE	11.8
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	NA

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	NA	yes	Nitros	PCBs	SVOCs	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	NA	NA	1" Piezo	David Kessler

LOCATION SKETCH/COMMENTS Ash Pit 2 SCALE: Not to Scale



PROJECT PBOW HOLE NO. SB-06/PZ-06

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: SB-06/PZ-06

Project: PBOW

Geologist: D. Kussler

Sheet 2 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
		Black, ASH, very coarse grain, dry, trace organics (roots) 0.9		0.0	NA	AP0117 0	3.8/	Began drilling 1/15/09
	1	soft, (2.5Y 4/3) olive brown, mottled (brown), low plasticity, SILT, moist	ml			0920 1	5	S-1 0920
	2							
	3	3				3		
		Loose, (2.5Y 6/3) light yellowish brown mottled (dark brown - 5%) very fine grain, SAND, moist	SP	0.0		AP0118 0923 3.8		
	4							
	5							
	6	6.1					5/5	S-2 0925 (5-10')
		Stiff to very stiff, (10YR 4/3) brown, low plasticity, silty CLAY, 30% silt, moist	cl					
	7							
	8	color grading to gray (2.5Y 3/1) very dark gray, silt content increases				8 AP0019		
	9			0.0				
	10					0925 10		

Project: PBOW

Hole Number: SB-06/PZ-06

Shaw
Shaw E & I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: SB-06/PZ-06

Project: PBOW

Geologist: D. Kessler

Sheet 3 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
	10	(2.5 Y/3/1) very dark gray, silty CLAY, rock fragments (30%) very coarse gray to pebble size, moist	cl		NA	NA	1.8	S-3 0930 (10-11.8')
	11						1.8	
	12	Refusal @ 11.8 ft Total Depth = 11.8 ft						
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							

Project: PBOW

Hole Number: SB-06/PZ-06

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Temporary Piezometer

Project:	PBOW	Piezometer Number:	PZ-06
Location:	Sandusky, Ohio	Site Location:	Ash Pit 2
Client:	USACE, Nashville, TN	Installation Date	1/15/09
Subcontractor:	Tri-State Drilling	Northing:	622942.86
Driller:	Jimmy Griffith	Easting:	1911404.17
Shaw Field Representative:	DAVID KESSLER	Shaw Project Number:	133422

Top of Casing Elevation (ft): 633.42

Top of Casing Stickup (ft): 3.6

Land Surface Elevation (ft): 629.7

Approximate Diameter of Borehole (in): 3 1/2"

Well Casing Diameter (in): 1"

Depth to Water (ft):

During Drilling: Not encountered

Date: 1/15/09

Post Development: NA TOC

Date: NA

Top of Filter Pack (ft): NA

Top of Screen Interval (ft): 1.40

Bottom of Screen Interval (ft): 11.40

Bottom of Piezometer (ft): 11.65

Bottom of Borehole (ft): 11.8

Filter Pack Material: None

Manufacturer:

Product Name:

Size:

Installation: Prepacked Screen Filter Sock

Well Casing:

Manufacturer: DSI

Type: PVC

Diameter (in): 1"

Well Screen Casing:

Manufacturer: DSI

Type: PVC

Slot Size (in): 0.010 %Open

Slot Type: Continuous wrap (Factory slot)

Sump/End Cap: ~~0.14~~ 0.25 ~~DKE~~ EA

Backfill Material: None

Abandonment:

Date: 7/6/09

Procedure: Natural fill Grouted (Bentonite) (Casing Removed)

Completed as Well NA

Shaw
Shaw E & I, Inc.

Depths and heights are referenced to ground surface unless specified TOC.

All elevations are referenced to MSL (NAVD 88).

If completed as well - see well construction diagram.

HTRW DRILLING LOG

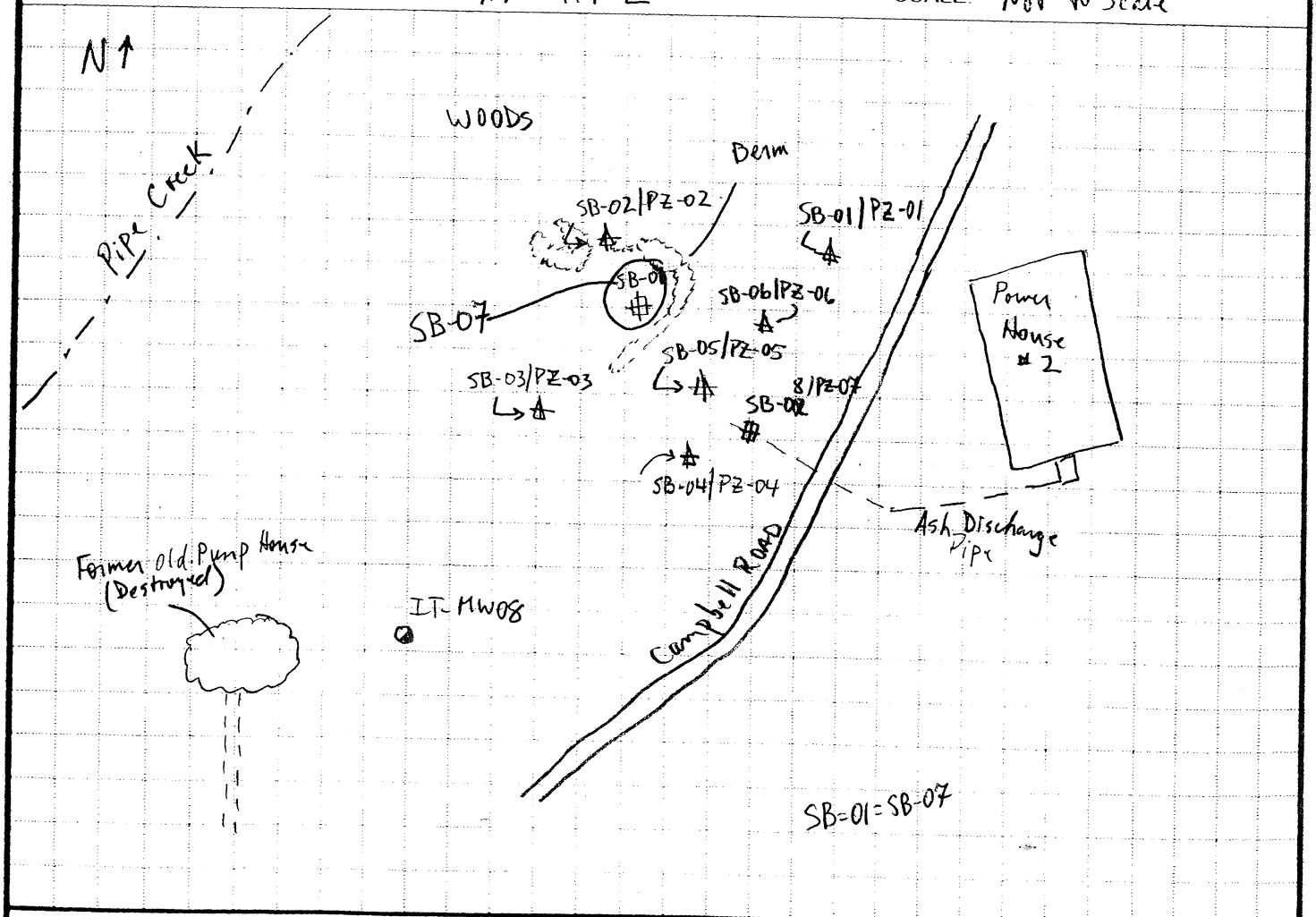
DISTRICT	Nashville, TN
HOLE NUMBER	SB-07
SHEET / SHEETS	1 OF 2
1. COMPANY NAME	Shaw E+I
2. DRILL SUBCONTRACTOR	Tri-State Drilling
3. PROJECT	PBOW
4. LOCATION	NASA Plum Brook Station, Sandusky, OH
5. NAME OF DRILLER	Jimmy Griffith
6. MANUFACTURER'S DESIGNATION OF DRILL	Geoprobe 6610 DT
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Surface and Subsurface initially cleared with geophysics. Drove 2-inch macrocore with 5-ft long acetate liners.
8. HOLE LOCATION	See Sketch
9. SURFACE ELEVATION	629.46 — Northing: 622955.41, Easting: 1911280.43
10. DATE STARTED	1/16/09
11. DATE COMPLETED	1/16/09
12. OVERBURDEN THICKNESS	unknown
13. DEPTH DRILLED INTO ROCK	-0-
14. TOTAL DEPTH OF HOLE	10 ft
15. DEPTH GROUNDWATER ENCOUNTERED	Not encountered
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	NA

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	NA	yes	Nitros	PCB's	SVOC	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	yes	NA	NA	David Kesah

LOCATION SKETCH/COMMENTS Ash Pit 2 SCALE: Not to Scale



PROJECT PBOW HOLE NO. SB-07

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: SB-07

Project: PBOW

Geologist: D. Kessler

Sheet 2 of 2 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
		Soft, (2.5Y 2.5/1) black, low plasticity, SILT, moist 0.4'	ML		NA	AP0120 AP0121 AP0122 1000	4.1'/5'	Begon drilling 1/16/09
	1	Loose (2.5Y 5/4) light olive brown, very fine grained SAND, moist		0.0		1		S-1 (0-5')
	2							
			SP					
	3					3		
						AP0123		
	4			0.1		1003 4.1		
	5							
		5.7					5'/5'	S-2 (5-10')
	6	Stiff to very stiff (10YR 3/2) very dark grayish brown, low plasticity SILT ~~[illegible]~~ ~~[illegible]~~ rock fragments (30%) very coarse to fine, moist,						
	7		ml					
	8					8		
						AP0124		
		Color grading to (10YR 3/1) very dark gray		0.2				
	9					1005		
	10	Total Depth = 10 ft				10'		

Project: PBOW

Hole Number: SB-07

HTRW DRILLING LOG

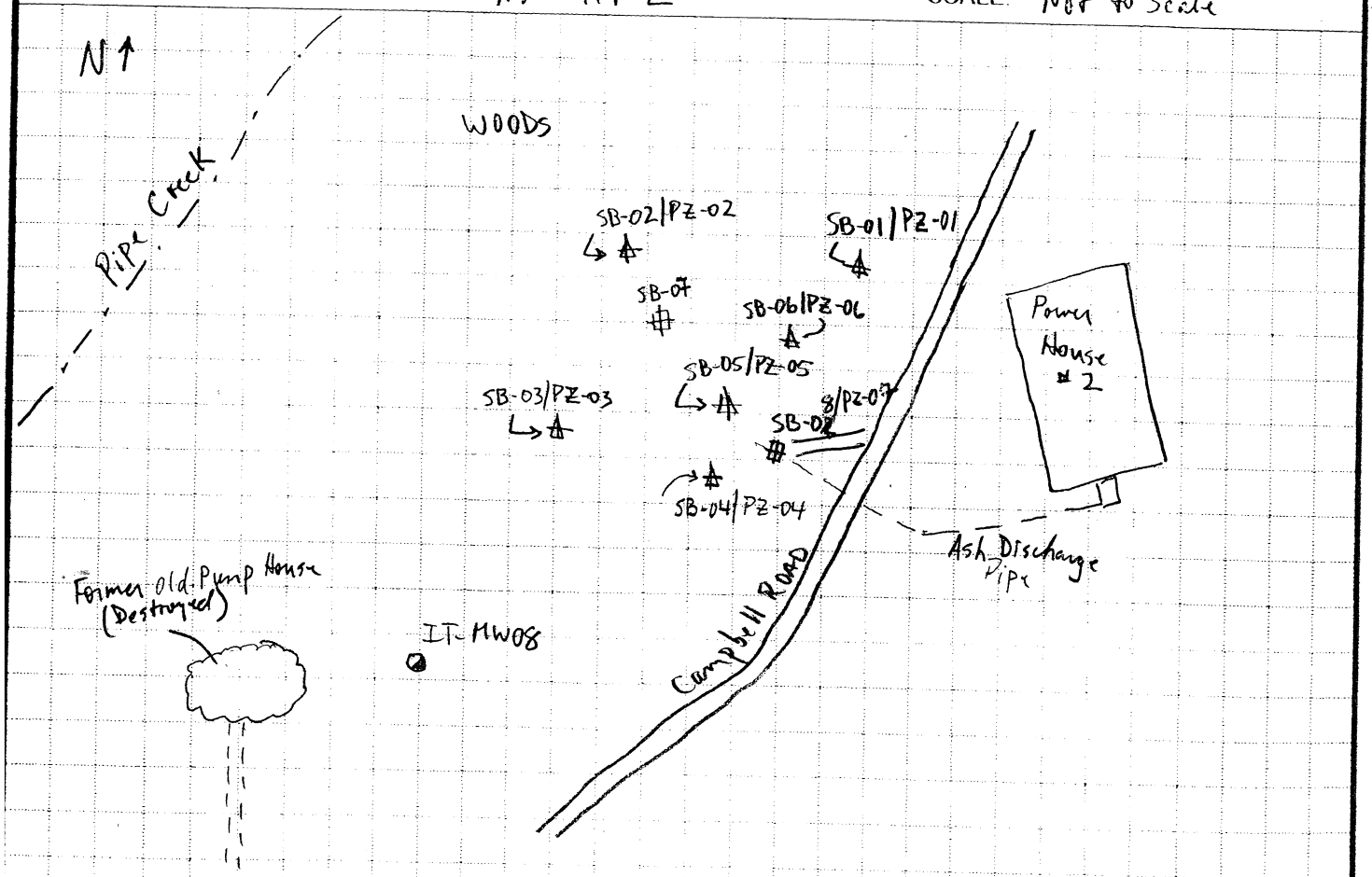
1. COMPANY NAME	Shaw E+I
DISTRICT	Nashville, TN
HOLE NUMBER	SB-08/PZ-07
2. DRILL SUBCONTRACTOR	Tri-State Drilling
SHEET / SHEETS	1 OF 3
3. PROJECT	PBOW
4. LOCATION	NASA Plum Brook Station, Sandusky, OH
5. NAME OF DRILLER	Jimmy Griffith
6. MANUFACTURER'S DESIGNATION OF DRILL	Geoprobe 6610DT
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Surface and Subsurface initially cleared with geophysics. Drove 2-inch macrocore with 5-ft long acetate liners.
8. HOLE LOCATION	See Sketch
9. SURFACE ELEVATION	629.8 Northing: 622840.49 Easting: 1911425.01
10. DATE STARTED	1/16/09
11. DATE COMPLETED	1/16/09
12. OVERBURDEN THICKNESS	12.4 Ft
15. DEPTH GROUNDWATER ENCOUNTERED	5 Ft
13. DEPTH DRILLED INTO ROCK	-0-
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
14. TOTAL DEPTH OF HOLE	12.4 Ft
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	NA

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	NA	Yes	Nitros	SVOCs	PCBs	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	NA	NA	1" Piezo	David Kosch

LOCATION SKETCH/COMMENTS Ash Pit 2 SCALE: Not to Scale



PROJECT PBOW HOLE NO. SB-08/PZ-07

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: SB-08/PZ-07

Project: PBOW

Geologist: D. Kessler

Sheet 2 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
		ASH, cinders, black, mottled rust colored brown, 10mm layers (black/brown ash) organics, roots in top 0.2ft, dry 10% white specks			NA	AP0125 1305	3.5/5	Began drilling 1/16/09 S-1 1305 (0-5')
	1							
				0.3				
	2	Cinder layer 1.9-2.3, very coarse to pebble size 2.3						
		soft, (10YR 4/6) dark yellowish brown, mottled (strong brown - 30%), clayey SILT, low plasticity, moist	ml			3 AP0126 1307 3.5		
	3							
	4	clay content increases w/depth						
	5							▽ encountered gw 5ft
	6						3.8/5	S-2 1320 (5-10')
		7						
	7	soft, (10YR 4/1) dark gray, homogeneous, high plasticity, CLAY, little silt (20%), wet rock fragments (5%) (shale, lm)	ch					pushed 2 sleeves
	8			0.0		AP0127 8 AP0128 - FD AP0129 - FS 1320 8.8		
	9	silt content increases consistency increases						
	10							

Project: PBOW

Hole Number: SB-08/PZ-07

Shaw
Shaw E & I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: SB-08/PZ-07

Project: PBOW

Geologist: D. Kessler

Sheet 3 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
	10	Stiff, (10YR 4/1) dark gray, homogeneous, high plasticity, silty CLay, rock fragment (15%), wet	Ch	0.0	NA	NA	2.4/ 2.4	S-3 1330 (10-12.4')
	11							
	12							
		Refusal @ 12.4 ft Total Depth = 12.4 ft						
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							

Project: PBOW

Hole Number: SB08/PZ-07

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Temporary Piezometer

Project:	PBOW	Piezometer Number:	PZ-07
Location:	Sandusky, Ohio	Site Location:	Ash Pit 2
Client:	USACE, Nashville, TN	Installation Date	1/16/09
Subcontractor:	Tri-State Drilling	Northing:	622840.49
Driller:	Jimmy Griffith	Easting:	1911425.01
Shaw Field Representative:	David Kessler	Shaw Project Number:	133422

Top of Casing Elevation (ft): 632.92

Top of Casing Stickup (ft): 2.4

Land Surface Elevation (ft): 629.8

Approximate Diameter of Borehole (in): 3 1/2"

Well Casing Diameter (in): 1"

Depth to Water (ft):

During Drilling: 5 ft

Date: 1/16/09

Post Development: NA TOC

Date: NA

Top of Filter Pack (ft): NA

Top of Screen Interval (ft): 2.60

Bottom of Screen Interval (ft): 12.60

Bottom of Piezometer (ft): 12.74

Bottom of Borehole (ft): 12.4

Filter Pack Material: None

Manufacturer:

Product Name:

Size:

Installation: Prepacked Screen Filter Sock

Well Casing:

Manufacturer: DSI

Type: PVC

Diameter (in): 1"

Well Screen Casing:

Manufacturer: DSI

Type: PVC

Slot Size (in): 0.010 %Open

Slot Type: Continuous wrap Factory slot

Sump/End Cap: 0.14 ft

Backfill Material: None

Abandonment:

Date: 7/6/09

Procedure: Natural fill Grouted Bentonite

Casing Removed

Completed as Well NA

Shaw
Shaw E & I, Inc.

Depths and heights are referenced to ground surface unless specified TOC.

All elevations are referenced to MSL (NAVD 88).

If completed as well - see well construction diagram.

HTRW DRILLING LOG

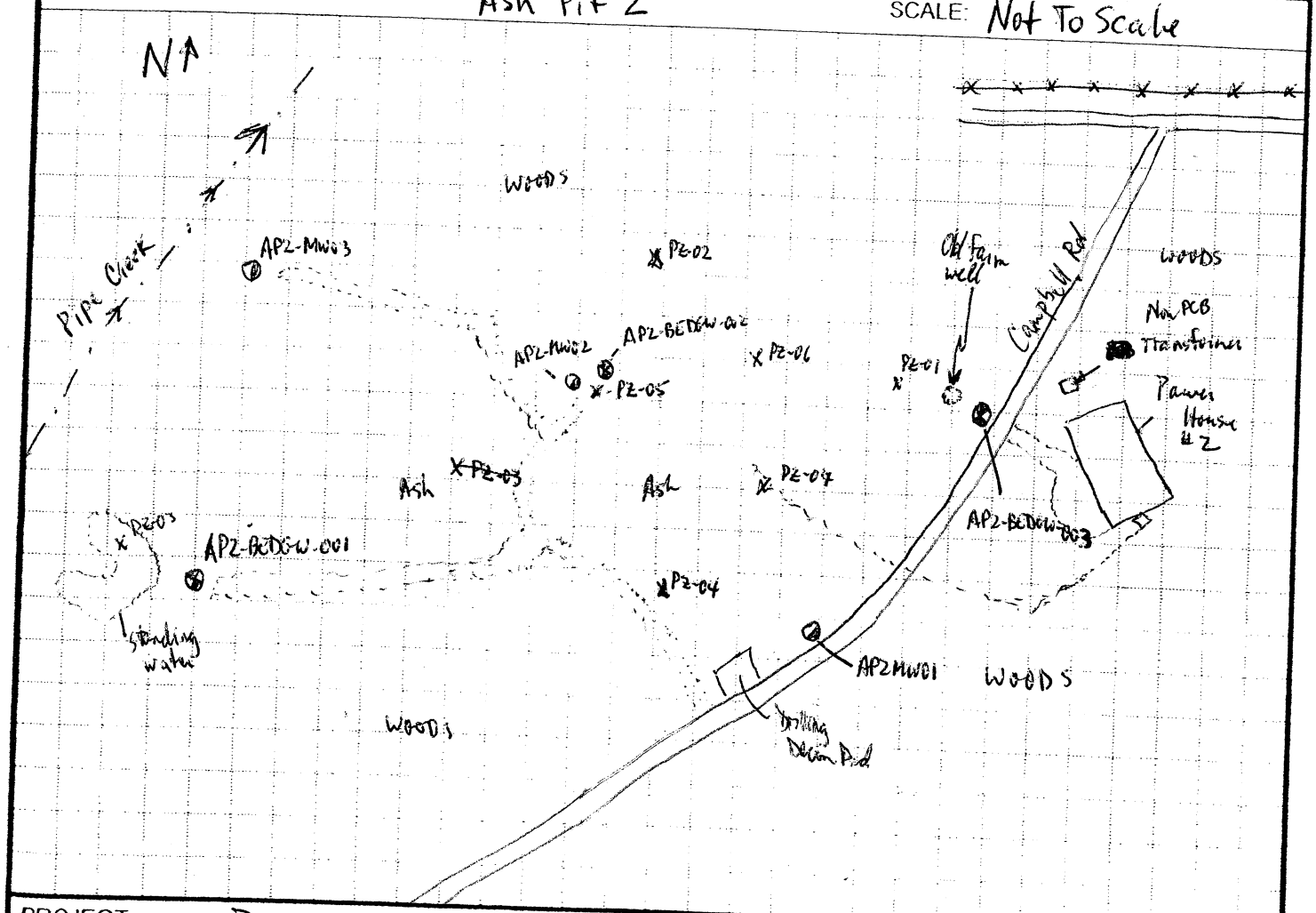
1. COMPANY NAME	Shaw E+I
DISTRICT	Nashville, TN
HOLE NUMBER	APZ-MW01
2. DRILL SUBCONTRACTOR	AE Drilling
SHEET / SHEETS	1 OF 3
3. PROJECT	PBOW
4. LOCATION	NASA Plum Brook Station, Sandusky, OH
5. NAME OF DRILLER	Tom Burnett
6. MANUFACTURER'S DESIGNATION OF DRILL	All Terrain CME-750
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Post-hole dug first 5-feet. Drilled w/ 4¼" ID / 8" OD HSA. and 2" split spoon sampler to 20.0'
8. HOLE LOCATION	See Sketch
9. SURFACE ELEVATION	638.2 ft — Northing: 622866.25, Easting: 1911550.02
10. DATE STARTED	4-15-09
11. DATE COMPLETED	4-15-09
12. OVERBURDEN THICKNESS	~~Unknown~~ 20 ft
15. DEPTH GROUNDWATER ENCOUNTERED	No free water observed
13. DEPTH DRILLED INTO ROCK	0
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
14. TOTAL DEPTH OF HOLE	20.0 ft
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	0

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	NA	NA	NA	NA	NA	%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	NA	NA	NA	E. W. Weaver

LOCATION SKETCH/COMMENTS Ash Pit 2 SCALE: Not To Scale



PROJECT	PBOW	HOLE NO.	APZ-MW01

Shaw
Shaw E & I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: AP2-MW01

Project: PBOW

Geologist: Eckwarm

Sheet 2 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
	1	Brown (10YR 4/3) Silty CLAY (FILL) moist-soft, noted grass and roots.	CL					Posthole dig to 5' bgs
	2	Dark yellowish brown (10YR 4/6) Silty CLAY, medium stiff, moist, trace fine sand						
	3							
	4							
	5				3/3	1400	1.0/1.0	Soil Tube-driven by 140 lbs mechanical hammer.
	6	-grading to with numerous fine grained sand lenses.			2/3 - 4/3	1403	1.2/2.0	
	7							
	8							
	9	Very dark grayish brown (10YR 3/2) SILT, moist, medium stiff with ~~numbers~~ numerous yellowish brown (10 YR 5/6) thin ~~frequently~~ fine sand grain lenses.	ML		3/3 - 3/3	1410	1.2/2.0	
	10							

Project: PBOW

Hole Number: AP2-MW01

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Shaw
Shaw E & I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: AP2-MW01

Project: PBOW

Geologist: E. Weaver

Sheet 3 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
		Very dark grayish brown (10YR 3/2) SILT moist medium stiff. with numerous yellowish brown (10YR 5/6) thin fine grain sand lenses.	ml		3/4		1.2/2.0	
	11				3/4			
	12	Very dark brown (10YR 2/2) CLAY, with silt, moist, medium stiff.	cl		4/3		1.6/2.0	
	13				3/4			
	14				2/4		0.0/2.0	
	15				3/2			
	16				3/3		1.6/2.0	
	17				4/4			
	18				2/3		1.2/2.0	
	19				4/2			
		- grading to with shale fragments						
	20	Refusal @ 20'						

Project: PBOW

Hole Number: AP2-MW09

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Monitoring Well Construction Form

Project:	PBAW	Well Number:	AP2-MW02
Location:	NASA Plum Brook Station, Sandusky, Ohio	Site Location:	Ash Pit #2
Client:	USACE - Nashville, TN	Installation Date	4-15-09
Subcontractor:	A.E. Drilling	Northing:	622866.25
Driller:	Tom Burnett	Easting:	1911550.02
Shaw Field Representative:	Eric Weaver	NAD: 83	NGVD: 1929

Shaw Project # 133422

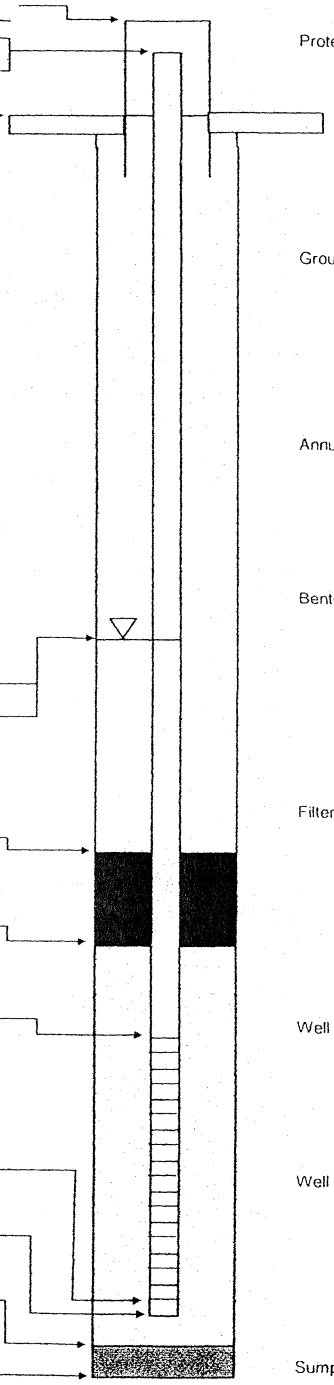
Protective Cover Elevation (ft): 641.39
Top of Casing Elv. (ft): 640.94
Top of Casing Stickup (ft): 2.64
Land Surface Elv. (ft): 638.2

Approximate Diameter of Borehole (in): 8"

Well Casing Diameter (in): 2"

Depth to Water (ft):
During Drilling: ~8'-10'
Date: 4-15-09
Post Development: — TOC
Date: —

Top of Bentonite Seal (ft): 5.0'
Top of Filter Pack (ft): 7.0'
Top of Screen Interval (ft): 9.0'
Bottom of Screen Interval (ft): 19.0'
Bottom of Well (ft): 19.35'
Bottom of Filter Pack (ft): 20.0'
Bottom of Borehole (ft): 20.0'



Protective Casing:
- Type: Steel
- Dimensions (in): 4" x 4"
- Length (ft): 5'
- Guard Post: 4- concrete filled

Ground Seal (Surface Pad)
- Dimensions: 4' x 4' x 4"
- Type: Concrete

Annular Space Seal:
- Type: Bentonite-Cement Grout
- Installation: Gravity Tremie Pumped

Bentonite Seal:
- Manufacturer: Haliburton
- Type: Pellets Slurry chips
- Installation: 6-in lifts One Section
- Gravity Tremie Pumped
- Hydration time (hrs): >1 hr.

Filter Pack Material:
- Manufacturer: Southern Products
- Product Name: Filter Media
- Size: Gravel Pack #1
- Volume Added (ft^3): 3 ft^3 (6-bags)
- Installation: Gravity Tremie

Well Casing:
- Manufacturer: Campbell Monoflex
- Type: PVC
- Diameter (in): 2"

Well Screen Casing:
- Manufacturer: Campbell Monoflex
- Type: PVC
- Slot Size (in): .010 %Open
- Slot Type: Continuous wrap Factory slot

Sump/End Cap: 0.35

Backfill Material: None

Shaw
Shaw E & I, Inc.

All elevations are referenced to the Ohio State Plane (North Zone) NAD 83 and vertical datum NGVD 1929.
Depths and heights are referenced to ground surface unless specified TOC.

HTRW DRILLING LOG

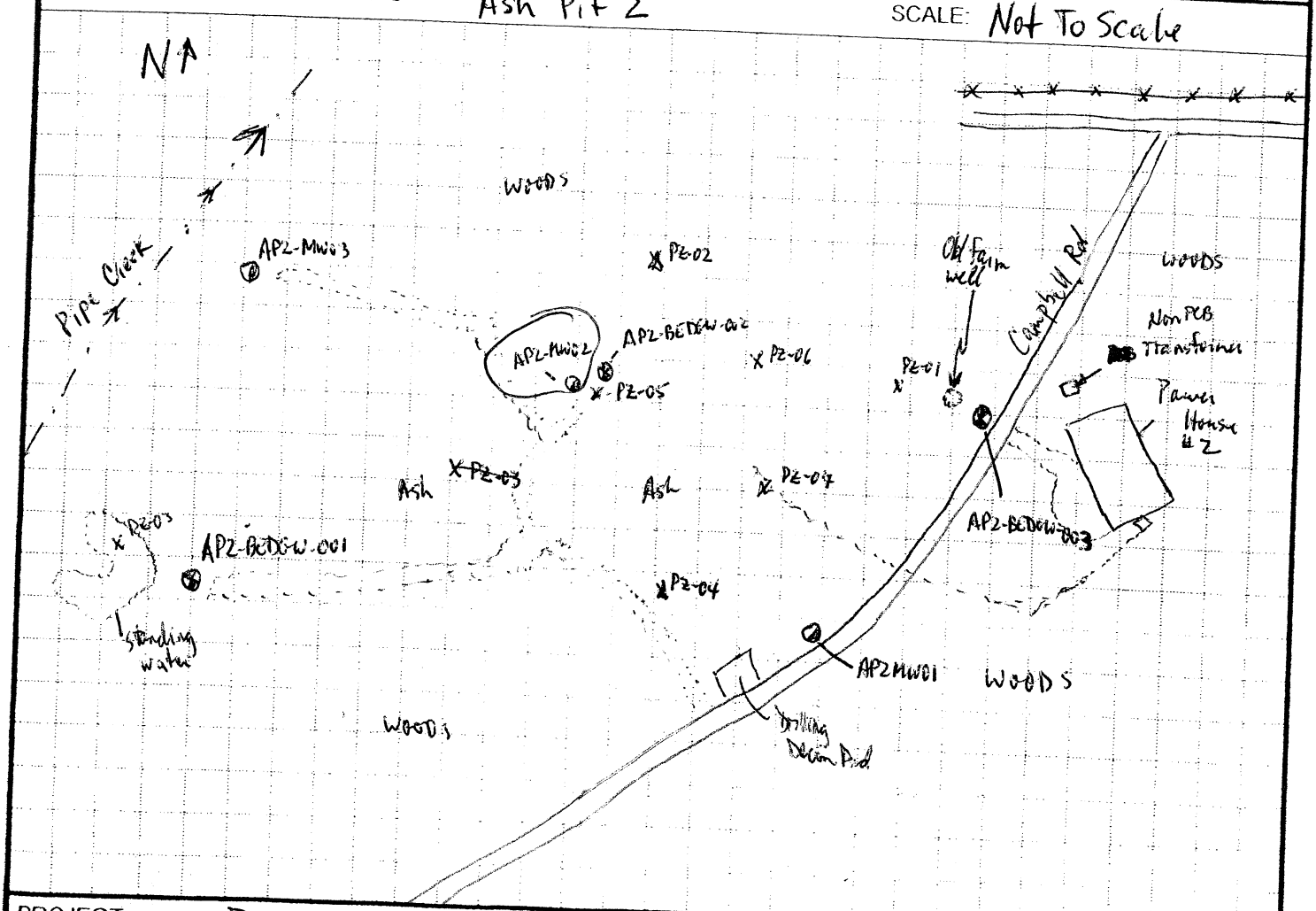
1. COMPANY NAME	Shaw E+I
DISTRICT	Nashville, TN
HOLE NUMBER	AP2-MW02
2. DRILL SUBCONTRACTOR	AE Drilling
SHEET / SHEETS	1 OF 3
3. PROJECT	PBOW
4. LOCATION	NASA Plum Brook Station, Sandusky, OH
5. NAME OF DRILLER	Tom Burnette
6. MANUFACTURER'S DESIGNATION OF DRILL	All Terrain CME-75U
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Post-hole dug first 5-feet. Drilled w/ 4¼" ID / 8" OD HSA. to 16' bgs.
8. HOLE LOCATION	See Sketch
9. SURFACE ELEVATION	632.5 (ft) Northing: 622892.79 Easting: 1911351.16
10. DATE STARTED	4-15-09
11. DATE COMPLETED	4-15-09
12. OVERBURDEN THICKNESS	~~16.5' Unknown~~ PBK 16 Ft
13. DEPTH DRILLED INTO ROCK	-0-
14. TOTAL DEPTH OF HOLE	16.0' Ft
15. DEPTH GROUNDWATER ENCOUNTERED	~8 ft
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	—

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	-0-

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	NA	NA	NA	NA	NA	%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
			NA	L. W. Weaver

LOCATION SKETCH/COMMENTS Ash Pit 2 SCALE: Not To Scale



PROJECT PBOW HOLE NO. AP2-MW02

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: APZ-MW02

Project: PBOW

Geologist: B. Weaver

Sheet 2 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
		See boring log for APZ-BEDGW-002 for soil descriptions.			NA	NA	NA	Posthole dig to 5' bgs
	1			0.0				
	2							
	3							
	4							
	5							Auger with 8.25" O.D. HSA to 16.0' bgs
	6							
	7							
	8	- Cuttings wet						
	9							
	10							

Project: PBOW

Hole Number: APZ-MW02

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Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: AP2-MW02

Project: PBOW

Geologist: E. Weaver

Sheet 3 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
		See boring log for AP2-BEDGW-002 for soil descriptions.		NA	NA	NA	NA	
	11							
	12							
	13							
	14							
	15							
	16	16.0						
	17	Auger Refusal = 16 ft Monitor Well set at 15' bgs. sand up to 4' bgs. (10' screen) (5.5 bags) bentonite up to 2.5' (0.75 bags)						
	18							
	19							
	20							

Project: PBOW

Hole Number: AP2-MW02

Monitoring Well Construction Form

Project: PBOW
Location: NASA Plum Brook Station, Sandusky, Ohio
Client: USACE - Nashville, TN
Subcontractor: A.E. Drilling
Driller: Tom Burnett
Shaw Field Representative: Eric Weaver

Well Number: AP2-MW02
Site Location: Ash Pit #2
Installation Date: 4-15-09
Northing: 622892.79
Easting: 1911351.16
NAD: 83 | NGVD: 1929

Shaw Project #- 133422

Protective Cover Elevation (ft): 635.92
Top of Casing Elv. (ft): 635.53
Top of Casing Stickup (ft): 2.78

Land Surface Elv. (ft): 632.5

Approximate Diameter of Borehole (in): 8"

Well Casing Diameter (in): 2"

Depth to Water (ft).
During Drilling: ~8'
Date: 4-15-09
Post Development: — TOC
Date: —

Top of Bentonite Seal (ft): 2.5'

Top of Filter Pack (ft): 4.0'

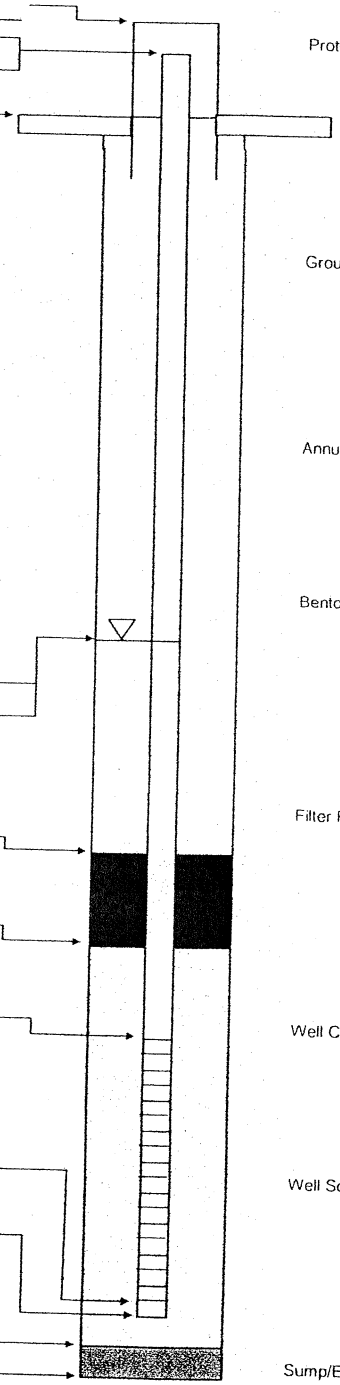
Top of Screen Interval (ft): 5.0'

Bottom of Screen Interval (ft): 15.0'

Bottom of Well (ft): 15.35

Bottom of Filter Pack (ft): 15.50'

Bottom of Borehole (ft): 16.0'



Protective Casing:
Type: Steel
Dimensions (in): 4"x4"
Length (ft): 5'
Guard Post: 4- concrete filled

Ground Seal (Surface Pad)
Dimensions: 4'x4'x4"
Type: Concrete

Annular Space Seal:
Type: Bentonite-Cement Grout
Installation: (Gravity) Tremie Pumped

Bentonite Seal:
Manufacturer: Haliburton
Type: Pellets Slurry (chips)
Installation: 6-in lifts (One Section)
Gravity Tremie Pumped
Hydration time (hrs): >1 hr.

Filter Pack Material:
Manufacturer: Southern Products
Product Name: Filter Media
Size: Gravel Pack #1
Volume Added (ft^3): 2.75 ft^3 (5.5 bags)
Installation: Gravity (Tremie)

Well Casing:
Manufacturer: Campbell Monoflex
Type: PVC
Diameter (in): 2"

Well Screen Casing:
Manufacturer: Campbell Monoflex
Type: PVC
Slot Size (in): .010 | %Open
Slot Type: Continuous wrap (Factory slot)

Sump/End Cap: 0.35

Backfill Material: None

Shaw
Shaw E & I, Inc.

All elevations are referenced to the Ohio State Plane (North Zone) NAD 83 and vertical datum NGVD 1929.
Depths and heights are referenced to ground surface unless specified TOC.

HTRW DRILLING LOG

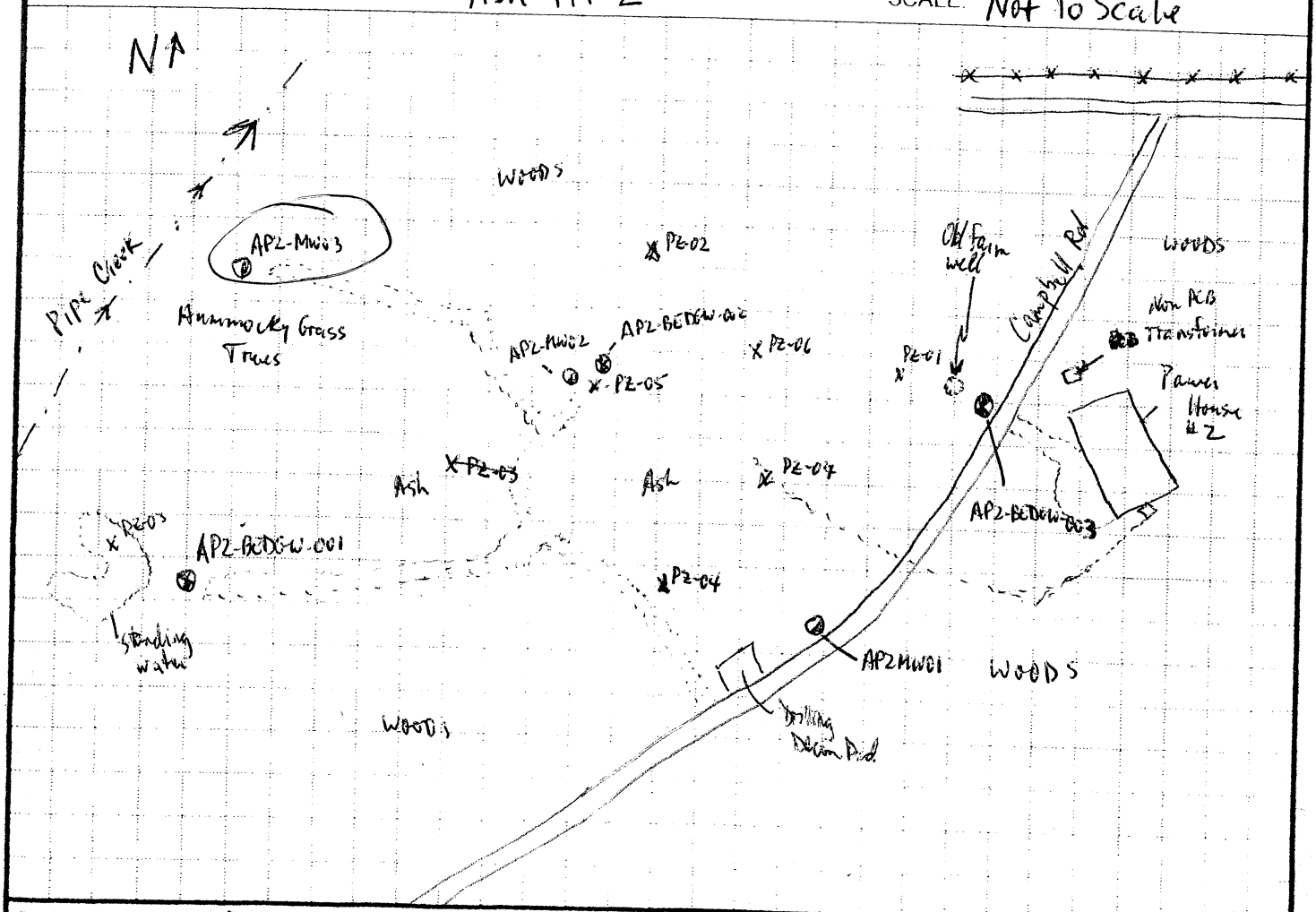
DISTRICT	Nashville, TN
HOLE NUMBER	APZ-MW03
SHEET	1 OF 3 SHEETS
1. COMPANY NAME	Shaw E+I
2. DRILL SUBCONTRACTOR	AE Drilling
3. PROJECT	PBOW
4. LOCATION	NASA Plum Brook Station, Sandusky, OH
5. NAME OF DRILLER	Marcelos Gonzales
6. MANUFACTURER'S DESIGNATION OF DRILL	All Terrain CME-750
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Post-hole dug first 5-feet. Drilled w/ 4¼" ID / 8" OD HSA. Continuously collected soil samples w/ 1.4" ID x 2' length stainless steel split-spoon sampler. Installed 2" PVC monitoring well with 5-ft screen at a depth of 10.08 ft below ground surface.
8. HOLE LOCATION	See Sketch
9. SURFACE ELEVATION	629.5 ft — Northing: 622973.78, Easting: 1911157.35
10. DATE STARTED	4/14/09
11. DATE COMPLETED	4/14/09
12. OVERBURDEN THICKNESS	9.8 Ft
13. DEPTH DRILLED INTO ROCK	1.5 Ft
14. TOTAL DEPTH OF HOLE	11.3 Ft
15. DEPTH GROUNDWATER ENCOUNTERED	2.1 Ft overburden
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	—

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	NA	NA	NA	NA	NA	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	NA	2" PVC	NA	David Kessler

LOCATION SKETCH/COMMENTS Ash Pit 2 SCALE: Not To Scale



PROJECT	HOLE NO.
PBOW	APZ-MW03

Shaw
Shaw E & I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: AP2-MW03

Project: PBOW | Geologist: D. Kessler | Sheet 2 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	~~Analytical Sample No.~~ Blows	Recovery (ft)	Remarks
		very soft (2.5Y 5/1) black, homogeneous, SILT, trace sand, organics, moist 1	ml		NA			Post-Hole Dug first 5 Feet
	1	Soft, (10YR 5/8) yellowish brown, mottled (gray, light br), low plasticity, clayey SILT, trace sand, moist wet at 2.1 Ft	ml	NM				NM- Not Measured RAIN ▽ Encountered gw @ 2.1 Ft
	2							
	3							
	4							
	5	very loose 5			5			
		Loose, (10YR 6/3) pale br, mottled yellowish br, SAND, silt 20%, fine grading to coarse grain, subangular, wet 6.2	SM	NM		1/2/ 2/4	2/ 2	Began Drilling 4/14/09 1015 S-1
	6							
	7	Soft, (10YR 5/2) grayish br, mottled (dark brown, gray), clayey SILT, trace sand, low plasticity, wet clay content 10-40%, 8.4	ml	NM	7	1015 3/5/ 8/11	2/ 2	S-2
	8							
	9	Soft, (10YR 4/1) dark gray, homogeneous, high plasticity, silty CLAY, silt content (30%), shale / limestone fragments, moist 9.8	Ch	NM	9	1030 3/3/	1.8/	S-3
	10							

Project: PBOW | Hole Number: AP2-MW03

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: AP2-MW03

Project: PBOW | Geologist: D. Kessler | Sheet 3 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	~~Geotech. Sample or Core Box No.~~	~~Analytical Sample No.~~ Blows	Recovery (ft)	Remarks
	10	LIMESTONE, very weathered, brown, thinly laminated, broken, shaley texture, weathered brachiopod shell, dry	NA	NM	NA	/10/11	/2	S-3 (cont'd)
	11			NM	11	50 over 4"	0.3/0.3	S-4
		Spoon Refusal @ 11.3 Ft Total Depth = 11.3 Ft						HSA Refusal at 10 Ft
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							

Project: PBOW | Hole Number: AP2-MW03

Monitoring Well Construction Form

Project:	PBAW	Well Number:	AP2-MWD3
Location:	NASA Plum Brook Station, Sandusky, OH	Site Location:	Ash Pit 2
Client:	USACE - Nashville, TN	Installation Date	4/14/09
Subcontractor:	AE Drilling	Northing:	622973.78
Driller:	Marcelos Gonzales	Easting:	1911157.35
Shaw Field Representative:	David Kissler	NAD: 83	NGVD: 1929

Protective Cover Elevation (ft): 632.45

Top of Casing Elv. (ft): 632.16

Top of Casing Stickup (ft): 2.5

Land Surface Elv. (ft): 629.5

Approximate Diameter of Borehole (in): 8

Well Casing Diameter (in): 2

Depth to Water (ft):

During Drilling: 2.1

Date: 4/14/09

Post Development: — TOC

Date: —

Top of Bentonite Seal (ft): 2.5

Top of Filter Pack (ft): 4.5

Top of Screen Interval (ft): 4.90

Bottom of Screen Interval (ft): 9.90

Bottom of Well (ft): 10.08

Bottom of Filter Pack (ft): 11.3

Bottom of Borehole (ft): 11.3

Spun

Protective Casing:

Type: Steel

Dimensions (in): 4" x 4"

Length (ft): 5 Ft

Guard Post: 4 @ Concrete filled

Ground Seal (Surface Pad)

Dimensions: 4' x 4' x 4"

Type: Concrete

Annular Space Seal:

Type: Bentonite-Cement Grout

Installation: (Gravity) Tremie Pumped

Bentonite Seal:

Manufacturer: ~~Campbell Bro~~

Type: (Pellets) Slurry (Chips)

Installation: 6-in lifts (One Section)

(Gravity) Tremie Pumped

Hydration time (hrs):

Filter Pack Material:

Manufacturer: Global

Product Name:

Size: #6

Volume Added (ft^3): 3 bags

Installation: (Gravity) Tremie

Well Casing:

Manufacturer: Campbell, Monoflex

Type: PVC

Diameter (in): 2

Well Screen Casing:

Manufacturer: Campbell - Monoflex

Type: PVC

Slot Size (in): 0.010 %Open

Slot Type: Continuous wrap (Factory slot)

Sump/End Cap: 0.18

Backfill Material: None

Shaw

Shaw E & I, Inc.

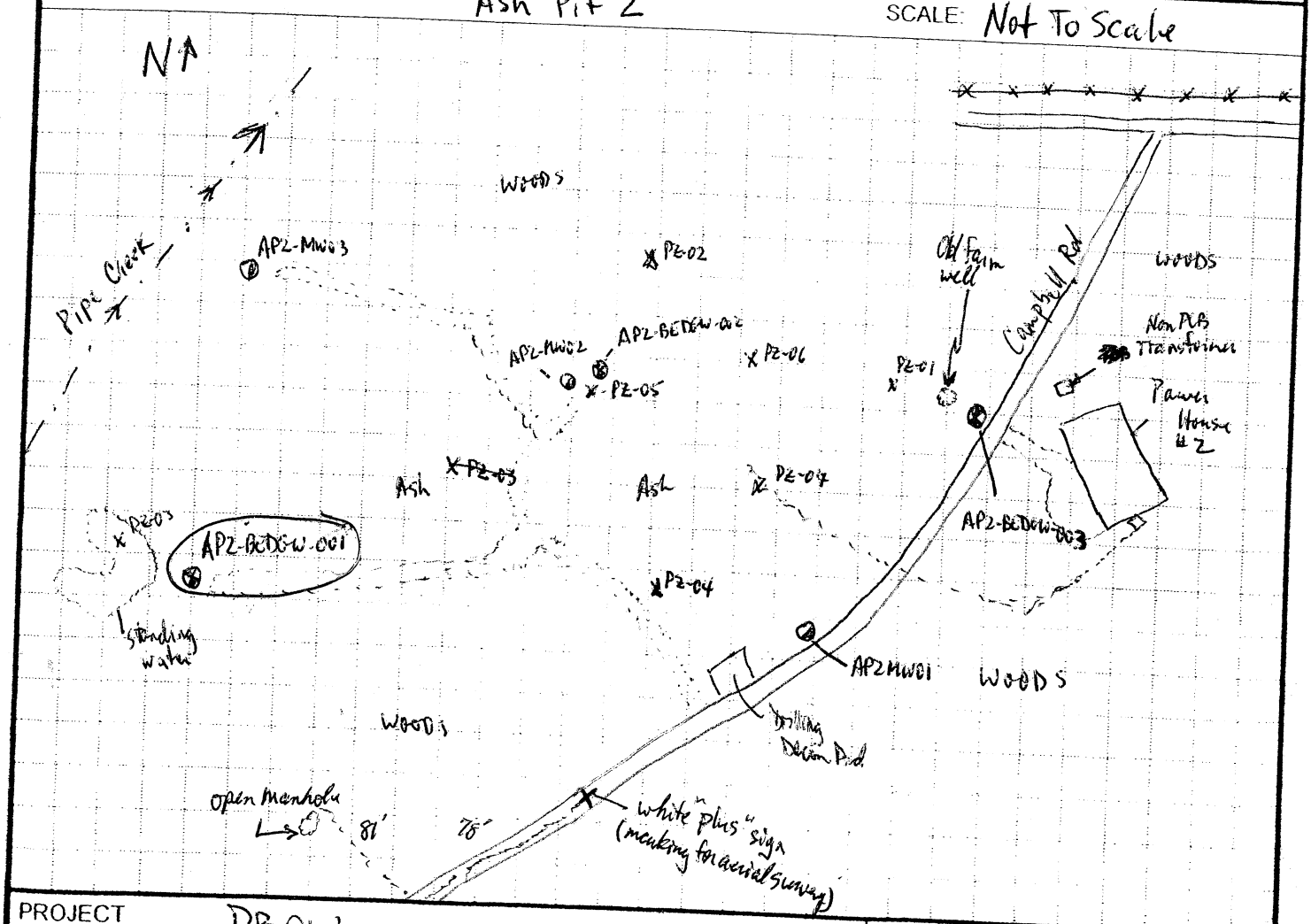
All elevations are referenced to the Ohio State Plane (North Zone) NAD 83 and vertical datum NGVD 1929.

Depths and heights are referenced to ground surface unless specified TOC.

HTRW DRILLING LOG

1. COMPANY NAME	Shaw E+I
DISTRICT	Nashville, TN
HOLE NUMBER	APZ-BEDOW-001
2. DRILL SUBCONTRACTOR	AE Drilling
SHEET / SHEETS	1 of 10
3. PROJECT	PBOW
4. LOCATION	NASA Plum Brook Station, Sandusky, OH
5. NAME OF DRILLER	Kevin Warren / Tom Burnett
6. MANUFACTURER'S DESIGNATION OF DRILL	All Terrain CME-75U
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Post-hole dug first 5-feet. Drilled w/ 4¼" ID / 8" OD HSA to 15'. Continuously sampled soil w/ 1.4" ID x 2' length split-spoons. Overdrilled borehole w/ 12" OD HSA to 14.5 ft. Cut bedrock w/ 8" OD rotary bit to 20.5'. Set steel casing at 20.4 ft. Cored rock with 6" OD PQ bit to 87.0'
8. HOLE LOCATION	See Sketch
9. SURFACE ELEVATION	630.4 ft — Northing: 622 795.83, Easting: 1911 202.97
10. DATE STARTED	4/1/09
11. DATE COMPLETED	4-19-09
12. OVERBURDEN THICKNESS	13 Ft
13. DEPTH DRILLED INTO ROCK	74.0'
14. TOTAL DEPTH OF HOLE	87.0
15. DEPTH GROUNDWATER ENCOUNTERED	overburden 2.2 Ft / Bedrock 72.6'
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	—
18. GEOTECHNICAL SAMPLES	DISTURBED: NA; UNDISTURBED: NA
19. TOTAL NUMBER OF CORE BOXES	8
20. SAMPLES FOR CHEMICAL ANALYSIS	VOC: NA; METALS: NA; OTHER (SPECIFY): NA; OTHER (SPECIFY): NA; OTHER (SPECIFY): NA
21. TOTAL CORE RECOVERY	%
22. DISPOSITION OF HOLE	BACKFILLED; MONITORING WELL; OTHER (SPECIFY): NA
23. SIGNATURE OF INSPECTOR	David Kessler / Eric W. Weaver

LOCATION SKETCH/COMMENTS Ash Pit 2 SCALE: Not To Scale



PROJECT	PBOW
HOLE NO.	APZ-BEDOW-001

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: AP2-BEDGW-001

Project: PBOW

Geologist: D. Kessler

Sheet 2 of 10 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	~~Analytical~~ Sample No. Blows	Recovery (ft)	Remarks
	1	very soft, (2.5Y 5/1) black, homogeneous, no plasticity, SILT, trace very fine grain sand, organics, moist 1.5	ml		NA	NA	NA	Post-hole dug first 5-ft
	2	soft, (2.5Y 5/3) light olive br, mottled (yellowish br, gray), low plasticity, clayey SILT, wet	ml	0.0				▽ Encountered gw at 2.2 ft
	3							Blows in spoons by 140lb mechanical hammer.
	4							
	5	soft, (10YR 5/2) grayish brown, mottled (yellowish br), clayey SILT, low plasticity, wet 6		0.0	5	1/2 / 2/1	1.5 / 2	Begin drilling 4/1/09 S-1 Breathing Air/Background. VOC = 0.0 ppm LEL = 0% O_2 = 21.4% H_2S = 0 ppm CO = 0 ppm
	6	Loose, (10YR 5/8) yellowish br, medium to coarsegrain, SAND, little silt, (15%), wet 7	sp		7	0850		S-2
	7	soft, (2.5Y 4/2) dark grayish br, homogeneous, low plasticity, SILT, trace clay <10%, wet silty clay lense 7.8-7.9' 9	ml	0.0	9	1/1 / 1/2 / 0905	1.3 / 2	
	9	Medium stiff, (10YR 4/1) dark gray, homogeneous, silty CLAY, moist shale fragments	ch	0.0		1/2	1.6	S-3
	10							

Project: PBOW

Hole Number: AP2-BEDGW-001

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Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: AP2-BEDGW-001

Project: PBOW | Geologist: D. Kessler | Sheet 3 of 10 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	~~Analytical Sample No.~~ Blows	Recovery (ft)	Remarks
	10	Medium stiff to stiff, (10YR 4/1) dark gray, homogeneous, high plasticity, silty CLAY, shale fragments subangular, very coarse grain to pebble size, gray, moist	Ch	0.0	NA	1/3/3	1/2	S-3 (cont)
	11				11	0910		S-4
	12			0.0		4/7/ 9/13	1.1/ 2	
	13	13			13	0913		S-5
	14	LIMESTONE, gray moderately weathered, 2" tense 13-13.2' hard, then lm is broken, thinnly bedded	NA	0.0			1/ 2	12"OD HSA advanced to 14.5 ft 4 1/4" ID HSA refusal at 15 ft
	15	very broken 15-15.5'		0.0	15	7/50 over 0"	0.5/ 0.5	S-6
		Spoon refusal @ 15.5 ft			15.5			
	16	LIMESTONE, hard, competent, gray fresh weathering	NA					Faint petroleum odor from drill water (air quality indicator 0.0 ppm)
	17		~~0.0~~	0.0				chips show signs of iron staining, edges are sharp, fresh
	18							
	19							
	20							

Project: PBOW | Hole Number: AP2-BEDGW-001

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HTRW DRILLING LOG (continuation sheet)

Hole Number: AP2-BED6W-001

Project: PBOW

Geologist: D. Kessler / E. Wave

Sheet 4 of 9 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	~~Geotech. Sample or Core Box No.~~	~~Analytical Sample No.~~	Recovery (ft)	Remarks
	20	Start rock coring 4-17-03			NA	NA	NA	8" Rotary Bit Cut to 20.5 ft 6" ID Casing at 20.40 ft 20.5
	21	LIMESTONE, dark gray. massive bedding, fossiliferous (brachs, corals), highly fractured, hard, slightly weathered.			Box #1	21.1	20.5	C-1 (20.5-25.8) Run - 5.3 Rec - 5.3 Start - 1345 End - 1352
	22					22.0		
	23					22.8 23.1		
	24					23.6		
	25	- grading to light gray				25.1		25.8
	26	- stylolite, grading to moderately fractured				25.8 26.2		C-2 (25.8-30.8) Run - 5.0 Rec - 5.0 Start - 1358 End - 1402
	27	- Stylolite - Pyrite nugget						
	28					28.0		
	29	- Stylolite - Pyrite Nugget						
	30				29.9 Box #2	29.9		

Project: PBOW

Hole Number: AP2-BED6W-001

Shaw
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HTRW DRILLING LOG (continuation sheet)

Hole Number: APZ-BEDGW-001

Project: PBOW

Geologist: E. Weaver

Sheet 4 of 10 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	~~Geotech Sample or~~ Core Box No.	~~Analytical Sample No.~~ Fracs	Recovery (ft)	Remarks
		LIMESTONE, light gray, massive bedding, fossiliferous (brachs, corals), moderately fractured, hard, slightly weathered.			Box #2 Cont			
		- Pyrite nuggets						
	31	- stylolite				30.8		30.8'
		- stylolite						C-3 (30.8-35.8)
	32	- stylolite						Run - 5.0 Rec - 5.0 Start - 1412 End - 1417
	33							
						33.3		Breathing Space Air O_2 - 21.4
	34					34.1		H_2S - 0 CO - 0 LEL - 0 VOC - 0
		- stylolite						
	35							Trigger bottom @ 35.8'
						35.8		35.8
	36					35.9		C-4 (35.8-40.8)
		- stylolite				36.7		Run - 5.0 Rec - 5.0
	37	-						Start - 1636 End - 1641
	38	- stylolite			37.9 Box #3	37.9		
		- stylolite						
	39							
		- Pyrite nugget						
	40							

Project: PBOW

Hole Number: APZ-BEDGW-001

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HTRW DRILLING LOG (continuation sheet)

Hole Number: AP2-BEDGW-001

Project: PBOW

Geologist: E. Weaver

Sheet 5 of 10 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No. Fracs	Recovery (ft)	Remarks
		LIMESTONE, light gray, massive bedding, fossiliferous (brachs, coral) moderately fractured, hard, slightly weathered	NA	NA	Box #3 Cont.			
		Coral Reef to 41.5'				40.5		
						40.8		40.8
	41	- stylolite						C-5 (40.8-45.8)
		- stylolite						
						41.4-MB		Run - 5.0
								Rec - 5.2
	42							Start - 1648
								End - 1659
	43	- stylolite				43.0		Breathing Space Air
								O_2 - 21.3
								H_2S - 0
	44							CO - 0
								LEL - 0
								VOC - 0
		- stylolite						
	45							
		- stylolite				45.7		45.8
	46				46.0' Box #4	46.0-MB		C-6 (45.8-50.8)
		- stylolite				46.4		Run - 5.0
								Rec - 5.0
	47							Start - 1705
								End - 1710
	48	- stylolite				48.0		
	49							
	50							

Project: PBOW

Hole Number: AP2-BEDGW-001

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HTRW DRILLING LOG (continuation sheet)

Hole Number: AP2-BEDGW-001

Project: PBOW

Geologist: E. Weaver

Sheet 7 of 10 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	~~Geotech. Sample or~~ Core Box No.	~~Analytical Sample No.~~ Fracs	Recovery (ft)	Remarks
		LIMESTONE, light gray, massive bedding, fossiliferous, (bracks, corals), unfractured, hard, slightly weathered.	NA	NA	Box #4 cont.	-50.4-MB		50.8
	51					-51.0-MB		C-7 (50.8-55.8) Run - 5.0 Rec - 4.9 Start - 1740 End - 1745
	52							
	53							
	54							
	55					-55.4-MB		
	56				55.9 Box #5	-55.9-MB		55.8 C-8 (55.8-60.8) Run - 5.0 Rec - 4.8 Start - 1756 End - 1802
	57							
	58							
	59							
	60							

Project: PBOW

Hole Number: AP2-BEDGW-001

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HTRW DRILLING LOG (continuation sheet)

Hole Number: AP2-BEDGW-001

Project: PBOW | Geologist: E. Weaver | Sheet 9 of 10 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	~~Analytical Sample No.~~ Fracs	Recovery (ft)	Remarks
		LIMESTONE, light gray, massive bedding, fossiliferous (brachs, corals) unfractured, hard, slightly weathered			Box #5 Cont.			Tagged bottom @ 60.7
						60.7 - MB		Start 4-18-09 60.8
	61							C-9 (60.8 - 65.8)
								Run - 5.0
						61.7 - MB		Rec. 5.0
	62							Start - 1506
								End - 1511
	63							O_2 - 20.8
								H_2S - 0
								CO - 0
								LEL - 0
	64							VOC - 0
	65							
					65.7	65.7 - MB		65.8
	66	- grading to slightly fractured			Box #6	66.0	~~66.0~~	C-10 (65.8 - 70.8)
								Run - 5.0
	67							Rec. 5.2
								Start - 1525
								End - 1530
	68							
						68.3	~~68.5~~	
	69							
	70							

Project: PBOW | Hole Number: AP2-BEDGW-001

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HTRW DRILLING LOG (continuation sheet)

Hole Number: AP2-BEDGW-001

Project: PBOW

Geologist: E. Weaver

Sheet 9 of 10 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	~~Geotech. Sample~~ or Core Box No.	~~Analytical Sample No.~~ Fracs	Recovery (ft)	Remarks
		LIMESTONE, light gray, massive bedding, fossiliferous (brachs, corals) highly fractured, hard, slightly weathered			Box #6 Cont.	70.4		Tagged bottom @ 70.8
						70.8 - MB		70.8
	71					70.9 - MB		C-11 (70.8 - 75.8)
								Run - 5.0
								Rec - 4.9
	72							Start - 1544
								End - 1549
		- potential water bearing fracture				72.6		O_2 - 21.3
	73							H_2S - 0
								CO - 0
		- Potential water bearing fracture				73.5		LEL - 0
								VOC - 0
	74							
		- Potential water bearing fracture to 74.6.				74.4		
						74.6		~~Tagged bottom 75.0~~
	75							
					75.4	75.4 - MB		
		- Potential water bearing fracture			Box #7	75.8		75.8
	76							C-12 (75.8 - 80.8)
		- Potential water bearing fracture				76.6		Run - 5.0
								Rec - 5.1
	77							Start - 1559
						77.2		End - 1604
						77.7		
	78							
						78.2		
	79					79.0		
						79.8		
	80					79.9		

Project: PBOW

Hole Number: AP2-BEDGW-001

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HTRW DRILLING LOG (continuation sheet)

Hole Number: AP2-BEDGW-001

Project: PBOW

Geologist: E. Wiemann

Sheet 10 of 10 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	~~Geotech. Sample~~ or Core Box No.	~~Analytical Sample No.~~ Fracs	Recovery (ft)	Remarks
		LIMESTONE) light gray, massive bedding, fossiliferous (bracks, corals), highly fractured, hard, slightly weathered.			Box #7 Cont'd			80.8
	81					80.9		C-13 (80.8-85.8)
						81.3		Run - 5.0 Rec - 4.8 Start - 1636
	82							End - 1642
						82.2		
						82.6		
	83							
						83.5		
	84				Box #8	84.2		
	85					85.0		
						85.7		85.8
	86	- Stylolite						C-14 (85.8-87.0) Run - 1.2 Rec - 1.2 Start - 1655 End - 1659
		87.0'			87.0	87.0		87.0'
	87	Boring Completed Monitor Well Installed @ 85.5' with 15' screen.						
	88							
	89							
	90							

Project: PBOW

Hole Number: AP2-BEDGW-001

Monitoring Well Construction Form (Bedrock)

Project:	PDOW	Well Number:	AP2-BEDGW-002
Location:	NASA Plum Brook Station, Sandusky, Ohio	Site Location:	Ash Pit #2
Client:	USACE- Nashville, TN	Installation Date	4-18-09
Subcontractor:	A. E. Drilling	Northing:	622795.83
Driller:	Kevin Warren / Tom Burnett	Easting:	1911202.97
Shaw Field Representative:	David Kessler / Eric Weaver	Shaw Project Number:	133422

Protective Cover Elevation (ft): 633.8

Top of Casing Elevation (ft): 633.46

Top of Casing Stickup (ft): 3.0'

Land Surface Elevation (ft): 630.4

Approximate Diameter of Section 1 Borehole (in): 12" to 14.5' / 8" to 20.5'

Diameter of Surface Casing (in): 6 5/8" OD / 6" ID

Depth to Bedrock (ft): 13 ft.

Bottom of Surface Casing (ft): 20.40'

Used 5.5 @ 94 lbs bags portland Type I/II cement mixed with bentonite gel to seal casing.

Depth to Water (ft):

During Drilling: ~72.6'

Date: 4-18-09

Post Development: — TOC

Date: —

Approximate Diameter of Section 2 Borehole (in): 6"

Well Casing Diameter (in): 2"

Top of Bentonite Seal (ft): 62.0'

Top of Filter Pack (ft): 66.0'

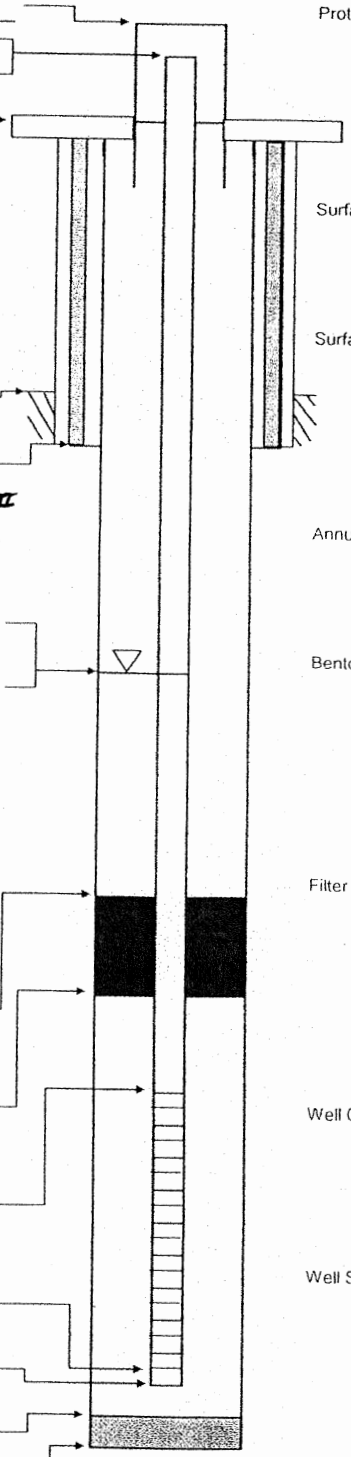
Top of Screen Interval (ft): 70.50'

Bottom of Screen Interval (ft): 85.50'

Bottom of Well (ft): 85.85'

Bottom of Filter Pack (ft): 87.0'

Bottom of Borehole (ft): 87.0'



Protective Casing:

Type: Steel

Dimensions (in): 4" x 4"

Length (ft): 5'

Guard Post: 4 - concrete filled

Surface Pad:

Dimensions: 4' x 4' x 4"

Type: Concrete

Surface Casing:

Type: Black Steel

Diameter (in): 6 5/8" OD / 6" ID

Installation: Tremie Haliburton Cementing Plug ~~Other Plug~~ Johnson Grout shoe

Annular Space Seal:

Type: Bentonite-Cement Grout

Installation: Gravity (Tremie) Pumped

Bentonite Seal:

Manufacturer: Haliburton

Type: (Pellets) Slurry

Installation: 6-in lifts (One Section) Gravity (Tremie) Pumped

Hydration time (hrs): 14 hrs.

Filter Pack Material:

Manufacturer: Southern Products

Product Name: Filter Media

Size: Gravel Pack #1

Volume Added (ft^3): 3.5 ft^3 (7-bags)

Installation: Gravity (Tremie)

Well Casing:

Manufacturer: Campbell Monoflex

Type: PVC

Diameter (in): 2"

Well Screen Casing:

Manufacturer: Johnson

Type: PVC

Slot Size (in): .010 %Open

Slot Type: (Continuous wrap) Factory slot

Sump/End Cap: 0.35'

Backfill Material: None

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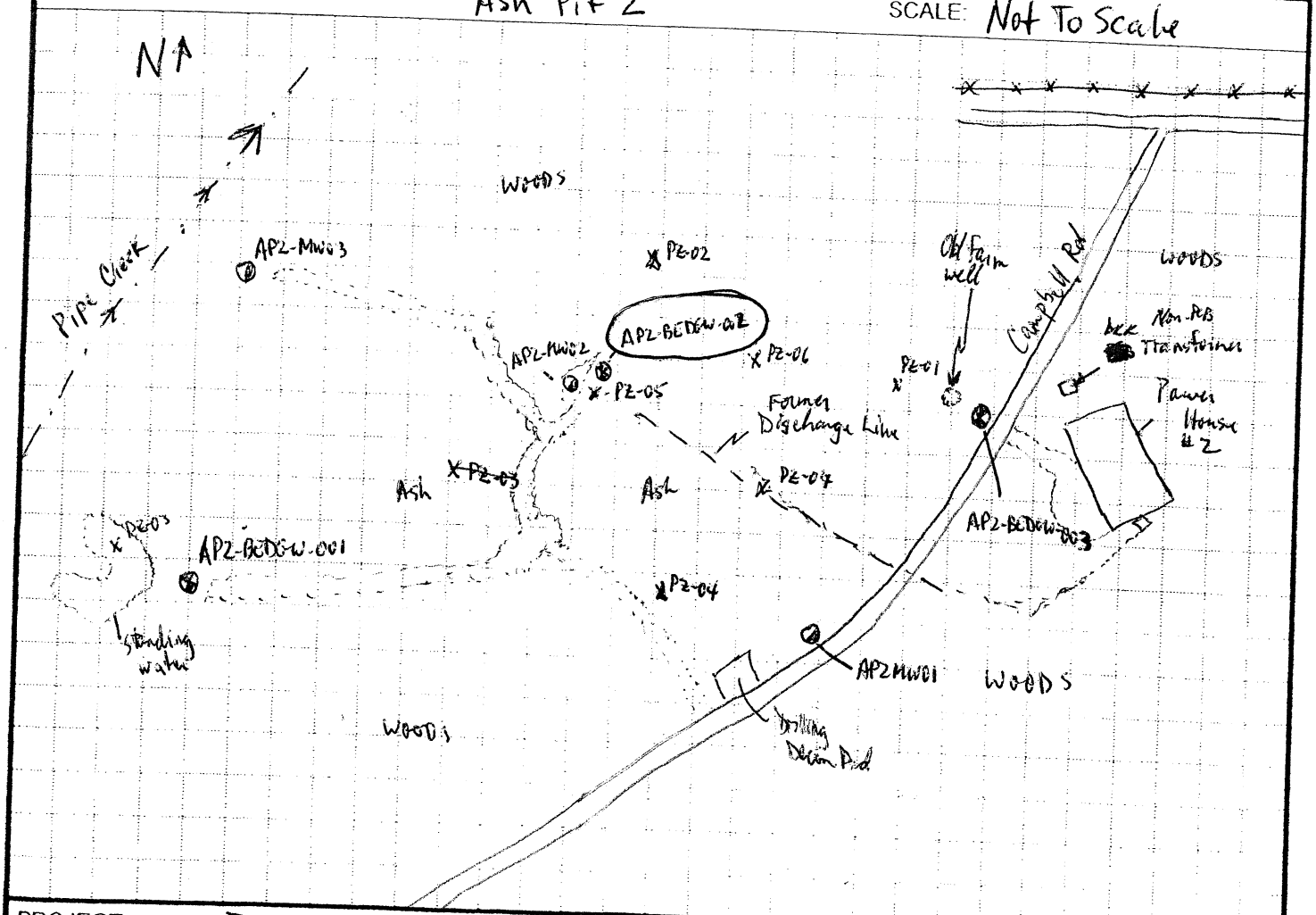
Depths and heights are referenced to ground surface unless specified TOC.
All elevations are referenced to MSL (NAVD 88).

HTRW DRILLING LOG

1. COMPANY NAME	Shaw E+I
DISTRICT	Nashville, TN
HOLE NUMBER	AP2-BEDGW-002
2. DRILL SUBCONTRACTOR	AE Drilling
SHEET / SHEETS	1 OF 10
3. PROJECT	PBOW
4. LOCATION	NASA Plum Brook Station, Sandusky, OH
5. NAME OF DRILLER	Kevin Warren / Tom Burnett
6. MANUFACTURER'S DESIGNATION OF DRILL	All Terrain CME-750
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Post-hole dug first 5-feet. Drilled w/ 4¼" ID/8" OD HSA to 16'. Continuously sampled soil w/ 1.4" ID x 2' length split spoons. Overdrilled borehole w/ 8¼" ID/12" OD HSA to 15 ft. Drilled bedrock w/ 8" OD rotary bit to 21.1 ft. Set 6⅝" OD/6" ID Steel Casing at 21.1 Ft. Cored rock w/ 6" OD PQ 21.7 to 86.1'.
8. HOLE LOCATION	See Sketch
9. SURFACE ELEVATION	632.4 ft; Northing: 622887.85; Easting: 1911361.47
10. DATE STARTED	4/2/09
11. DATE COMPLETED	4-17-09
12. OVERBURDEN THICKNESS	15.8 Ft
13. DEPTH DRILLED INTO ROCK	70.3'
14. TOTAL DEPTH OF HOLE	86.1'
15. DEPTH GROUNDWATER ENCOUNTERED	6.5 Ft overburden / Bedrock 73.2'
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	
18. GEOTECHNICAL SAMPLES	DISTURBED: NA; UNDISTURBED: NA
19. TOTAL NUMBER OF CORE BOXES	4
20. SAMPLES FOR CHEMICAL ANALYSIS	VOC: NA; METALS: NA; OTHER (SPECIFY): NA; OTHER (SPECIFY): NA; OTHER (SPECIFY): NA
21. TOTAL CORE RECOVERY	%
22. DISPOSITION OF HOLE	BACKFILLED; MONITORING WELL; OTHER (SPECIFY): NA
23. SIGNATURE OF INSPECTOR	David Kresak / B.W. Weaver

LOCATION SKETCH/COMMENTS Ash Pit 2 SCALE: Not To Scale



PROJECT PBOW HOLE NO. AP2-BEDGW-002

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HTRW DRILLING LOG (continuation sheet)

Hole Number: AP2-BEDGW-002

Project: PBOW | Geologist: D. Kessler | Sheet 2 of 10 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	~~Analytical Sample No.~~ Blows	Recovery (ft)	Remarks
		CINDERS/ASH, black, some black silt, organics, moist		NM	NA	NA	NA	Post hole dug first 5-ft.
	1							
	2							
	3	3						Breathing Air/Background VOC = 0.0 (3.7 ppm) LEL = 0% O_2 = 20.8% H_2S = 0 ppm CO = 0 ppm
	4							Blows on spoons by 140lb mechanical hammer
	5	Soft, (10YR 5/3) light olive br, mottled (dark yellowish br), low to medium plasticity, sandy, clayey, SILT, 30% sand, 30% clay, 40% silt, sand very fine grain, moist	ml	0.0	5	2/1/ 2/1	1.5/ 2	Began drilling 4/2/04 0840 S-1
	6							
	7	wet at 7 Ft			7	0840 2/2/ 1/1	1.2/ 2	▽ Believe to encounter gw at 6.5 Ft S-2
	8	8.2		0.0				
	9	Medium stiff, (2.5y 4/4) olive br, mottled (gray), low plasticity silty CLAY, moist	cl		9	0845 1/2/	1.4/	S-3
	10							

Project: PBOW | Hole Number: AP2-BEDGW-002

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HTRW DRILLING LOG (continuation sheet)

Hole Number: AP2-BEDGW-002

Project: PBOW | Geologist: D. Kessler | Sheet 3 of 10 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	~~Analytical Sample No.~~ Blows	Recovery (ft)	Remarks
	10	10.4	Cl	0.0	NA	3/4	1/2	S-3 (cont)
		Stiff, (2.5y 4/1) dark gray, homogeneous, high plasticity, silty CLAY, shale fragments, 15%, very coarse grain to pebble size, subangular to subrounded, saturated			11	0848		
	11					3/4/	2/2	S-4
	12		ch	0.0		6/6		
					13	0855		
	13					3/4/	1.7/	S-5
	14	limestone pebble 14.6', 30 mm		0.0		10/10	2	
					15	0900		
	15	15.8		0.0		9/5/ 50 cm 0"	1/1	S-6 2¼" ID/12" OD HSA advanced to 15 ft
	16	LIMESTONE, gray, moderately weathered, very broken, dry 15.8-16'			16	0905		spoon 1¼" HSA refusal at 16'
						NA	NA	
	17	competency of bedrock hard, fresh at 16'						
	18	chips light gray, sharp edges.						
	19							
	20							

Project: PBOW | Hole Number: AP2-BEDGW-002

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HTRW DRILLING LOG (continuation sheet)

Hole Number: AP2-BEDGW-002

Project: PBOW

Geologist: D. Kessler / E. Lekeaver

Sheet 4 of 10 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	~~Geotech Sample or~~ Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
	20	LIMESTONE, gray, hard competent cutting.	NA	0.0	NA	NA	NA	~~8 1/4" OD HSA~~ 8" OD Rotary bit cut to 21.1 ft 6" ID steel casing set at 21.1 ft
	21	Start 4-16-09			21.1	Fracs		21.1
	22	LIMESTONE, dark gray, massive bedding, fossiliferous (brachs, corals), highly fractured, hard, slightly weathered.	NA	NA	Box #1			C-1 (21.1-~~25.9~~ 26.1) Run 5.0 Rec 4.8 Start 0835 End 0842
	23					22.8		Breathing Space Air
	24	- intense fracturing with some clay to 23.9'				23.6 23.9 24.3 24.4		O_2 - 21.4 H_2S - 0 CO - 0 LEL - 0 VOC - 6.0 (?)
	25					25.1		Tagged bottom of hole @ 25.8 Tom said there were some cuttings in bottom.
	26	- grading to light gray and moderately fractured.				25.9		26.1 - 31.1 26.1 C-2 (~~25.9~~ - ~~30.9~~) Run 5.0 Rec 4.9 Start 0851 End 0858
	27							
	28	- stylolite				27.6 28.5		
	29							
	30					29.7		

Project: PBOW

Hole Number: AP2-BEDGW-002

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HTRW DRILLING LOG (continuation sheet)

Hole Number: AP2-BEDGW-002

Project: PBOW | Geologist: E. Weaver | Sheet 5 of 10 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	~~Geotech Sample~~ or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
		LIMESTONE, light gray, massive bedding, fossiliferous (brachs, corals), moderately fractured, hard, slightly weathered.	NA	NA	Box #1 cont.			Tagged bottom of hole @ 30.8' bgs. Tom said there was still a nub of rock and some material (cuttings) in bottom of hole.
					30.8 Box #2	30.8		31.1
	31							C-3 (31.1-36.1)
		- stylolite				31.8		Run - 5.0
	32	- stylolite						Rec - 5.3
								Start - 0910
								End - 0916
		- stylolite						
	33							Purged hole. No immediate recharge. Tagged bottom after flushing hole. Tagged @ 36.1'.
	34					34.1		
	35					35.0		
		- stylolite						
	36							36.1
						36.1		C-4 (36.1-41.1)
		- stylolite						Run - 5.0
	37					36.8		Rec - 4.8
								Start - 1021
								End - 1026
		- stylolite			37.6 Box #3	37.6		
	38	- stylolite						
		- stylolite						Breathing Space Air
								O_2 - 21.3
		- stylolite						H_2S - 0
	39							CO - 0
								LEL - 0
		- stylolite						VOC - 4.1
	40							

Project: PBOW | Hole Number: AP2-BEDGW-002

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HTRW DRILLING LOG (continuation sheet)

Hole Number: AP2-BEDGW-002

Project: PBOW

Geologist: E. Weaver

Sheet 6 of 10 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	~~Geotech. Sample or~~ Core Box No.	~~Analytical Sample No.~~ Fracs	Recovery (ft)	Remarks
		LIMESTONE, light gray, massive bedding, fossiliferous (breccia, corals), moderately fractured, hard, slightly weathered,	NA	NA	Box #3 cont.			
	41					40.8 40.9	MB	41.1
		- stylolite				41.4		C-5 (41.1 - 46.1)
		- stylolite - coral reef to 42.8'						Run - 5.0
	42					42.1		Rec - 5.2 Start - 1036 End - 1043
		- stylolite						
	43							Breathing Space Air O_2 - 21.4 H_2S - 0
		- stylolite				43.8		CO - 0
	44							LEL - 0 VOC - 4.5
	45							
		- stylolite				45.5		
	46				46.1	46.1	MB	46.1
		- stylolite			Box #4			C-6 (46.1 - 51.1)
		- Piece of coral						Run - 5.0
	47	- Piece of coral (hydrocarbon seeping from coral)				47.2		Rec - 4.9 Start - 1050 End - 1056
	48	- stylolite						
		- stylolite - stylolite				48.8		
	49							
	50							

Project: PBOW

Hole Number: AP2-BEDGW-002

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HTRW DRILLING LOG (continuation sheet)

Hole Number: AP2-BEDGW-002

Project: PBOW

Geologist: E. Weaver

Sheet 7 of 10 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	~~Geotech Sample or~~ Core Box No.	~~Analytical Sample No.~~ Fracs	Recovery (ft)	Remarks
		LIMESTONE, light gray, massive bedding, fossiliferous (bracks, corals), unfractured, hard, slightly weathered	NA	NA	Box #4 cont.			
						-50.6		Tagged bottom @ 51.0
	51					-51.0 -MB		51.1
								C-7 (51.1-56.1)
								Run - 5.0
	52							Rec - 5.1
								Start - 1350
								End - 1354
	53							Breathing Space Air
								O_2 ~21.4
								H_2S - 0
	54							CO - 0
								LEL - 0
								VOC - 0
	55							
					55.5 Box #5	55.5-MB		
	56					-56.1-MB		56.1
		- lighter colored layer in rock to 56.7'						C-8 (56.1-61.1)
	57							Run 5.0
								Rec 5.1
								Start - 1402
								End - 1407
	58							
	59							
	60							

Project: PBOW

Hole Number: AP2-BEDGW-002

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HTRW DRILLING LOG (continuation sheet)

Hole Number: AP2-BEDGW-002

Project: PBOW

Geologist: E. Weaver

Sheet 8 of 10 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	~~Geotech. Sample or~~ Core Box No.	~~Analytical Sample No.~~ Fracs	Recovery (ft)	Remarks
		LIMESTONE, light gray, massive bedding, fossiliferous (brachs, corals), unfractured, hard, slightly weathered.			Box #5 Cont.	60.4-MB		
	61					61.1-MB		61.1
								C-9 (61.1-66.1) Run - 5.0 Rec - 5.1 Start - 1416 End - 1421
	62	- lighter colored layers in rock to 62.5'						
	63							
	64							Breathing Space Air O_2 - 21.4 H_2S - 0 CO - 0 LEL - 0 VOC - 0
	65				65.3 Box #6	65.3 MB		
	66							66.1
						66.2-MB		C-10 (66.1-71.1) Run - 5.0 Rec - 5.0 Start - 1429 End - 1435
	67							
	68							
	69	- Angular fracture filled with seeping hydrocarbon				68.9		
	70							

Project: PBOW

Hole Number: AP2-BEDGW-002

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HTRW DRILLING LOG (continuation sheet)

Hole Number: AP2-BEDGW-002

Project: PBOW | Geologist: E. Weaver | Sheet 9 of 10 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	~~Geotech Sample or~~ Core Box No.	~~Analytical Sample No.~~ Fracs	Recovery (ft)	Remarks
		LIMESTONE, light gray, massive bedding, fossiliferous (bracks, corals) unfractured, hard, slightly weathered.			Box #6 Cont.	70.3	MB	
	71	- Pyrite nuggets.				71.2	MB	71.1
								C-11 (71.1-76.1) Run - 5.0' Rec - 5.0 Start - 1518 End - 1526
	72							
		- Pyrite nugget						
	73	- potential water bearing fractures grading to moderately fractured				73.2 73.3		Breathing Space Air O_2 - 21.5 H_2S - 0 CO - 0 LEL - 0 VOC - 0
	74				74.5 Box #7	74.5	MB	
	75	- stylolite				75.3		
		- Stylolite						
	76					76.2		76.1
								C-12 (76.1-81.1) Run - 5.0 Rec - 5.0 Start - 1608 End - 1616
		- stylolite				76.7		
	77							
		- Stylolite						
	78							
						78.8		
	79							
	80							

Project: PBOW | Hole Number: AP2-BEDGW-002

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HTRW DRILLING LOG (continuation sheet)

Hole Number: AP2-BEDGW-002

Project: PBOW

Geologist: E. Weaver

Sheet 10 of 10 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	~~Geotech Sample or~~ Core Box No.	~~Analytical Sample No.~~ Fracs	Recovery (ft)	Remarks
	81	LIMESTONE, light gray, massive bedding, fossiliferous (bryozoans, corals) moderately fractured, hard, slightly weathered.	NA	NA	Box #7 Cont.			81.1
						81.3		C-13 (81.1 - 86.1) Run - 5.0 Rec - 4.8 Start - 1628 End - 1634
	82							
	83							Breathing Space Air
		- Stylolite			83.4 Box #8	83.4		O_2 - 21.5 H_2S - 0 CO - 0 LEL - 0 VOC - 0
	84							
	85							Pump hole, Recharging Quickly
	86	86.1'			86.1	86.1		86.1
		Boring Completed @ 86.1' Monitor Well Installed with 15' screen						
	87							
	88							
	89							
	90							

Project: PBOW

Hole Number: AP2-BEDGW-002

Monitoring Well Construction Form (Bedrock)

Project:	PBOW	Well Number:	APZ-BEDGW-002
Location:	NASA Plum Brook Station, Sandusky, Ohio	Site Location:	Ash Pit #2
Client:	USACE - Nashville, TN	Installation Date	4-17-09
Subcontractor:	A.E. Drilling	Northing:	622887.85
Driller:	Kevin Warren / Tom Burnett	Easting:	1911361.47
Shaw Field Representative:	David Kessler / Eric Weaver	Shaw Project Number:	133422

Protective Cover Elevation (ft): 636.07

Top of Casing Elevation (ft): 635.58

Top of Casing Stickup (ft): ~~0.49~~ 3.18

Land Surface Elevation (ft): 632.4

Approximate Diameter of Section 1 Borehole (in): 12" to 15' / 8" to 21.1'

Diameter of Surface Casing (in): 6 5/8" OD / 6" ID

Depth to Bedrock (ft): 15.8'

Bottom of Surface Casing (ft): 21.1'

Depth to Water (ft):

During Drilling: ~73.2'

Date: 4-16-09

Post Development: — TOC

Date: —

Approximate Diameter of Section 2 Borehole (in): 6"

Well Casing Diameter (in): 2"

Top of Bentonite Seal (ft): 62.0'

Top of Filter Pack (ft): 66.0'

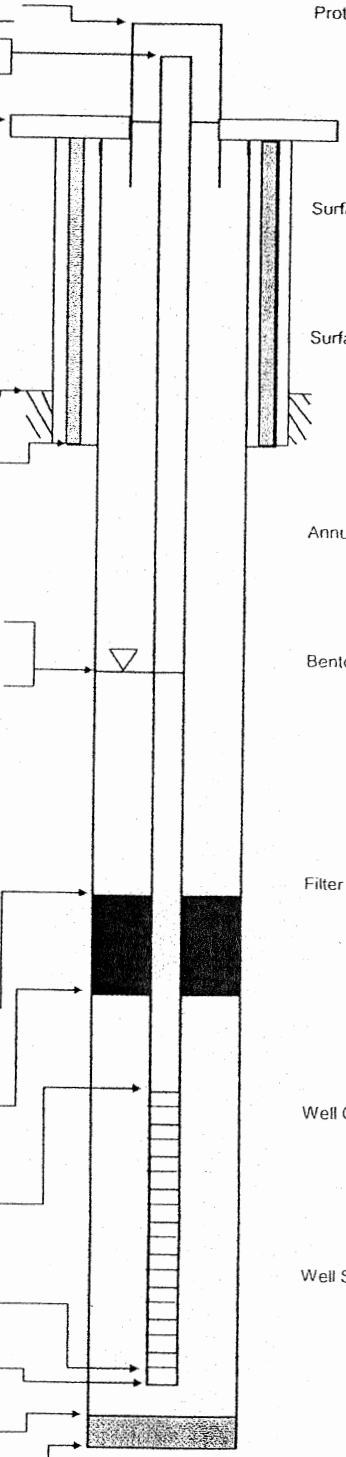
Top of Screen Interval (ft): 70.0'

Bottom of Screen Interval (ft): 85.0'

Bottom of Well (ft): 85.35'

Bottom of Filter Pack (ft): 86.1'

Bottom of Borehole (ft): 86.1'



Protective Casing:

Type: Steel

Dimensions (in): 4"x4"

Length (ft): 5'

Guard Post: 4 - concrete filled

Surface Pad:

Dimensions: 4'x4'x4"

Type: Concrete

Surface Casing:

Type: Black Steel

Diameter (in): 6 5/8" OD / 6" ID

Installation: Tremie Haliburton

Cementing Plug ~~Other Plug~~ Johnson Grout shoe

Annular Space Seal:

Type: Bentonite-Cement Grout

Installation: Gravity (Tremie) Pumped

Bentonite Seal:

Manufacturer: Haliburton

Type: (Pellets) Slurry

Installation: 6-in lifts (One Section)

Gravity (Tremie) Pumped

Hydration time (hrs): >1 hr

Filter Pack Material:

Manufacturer: Southern Products

Product Name: Filter Media

Size: Gravel Pack #1

Volume Added (ft^3): 3 ft^3 (6-bags)

Installation: Gravity (Tremie)

Well Casing:

Manufacturer: Campbell Monoflex

Type: PVC

Diameter (in): 2"

Well Screen Casing:

Manufacturer: Johnson

Type: PVC

Slot Size (in): .010 %Open

Slot Type: (Continuous wrap) Factory slot

Sump/End Cap: 0.35'

Backfill Material: None

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Depths and heights are referenced to ground surface unless specified TOC.

All elevations are referenced to MSL (NAVD 88).

HTRW DRILLING LOG

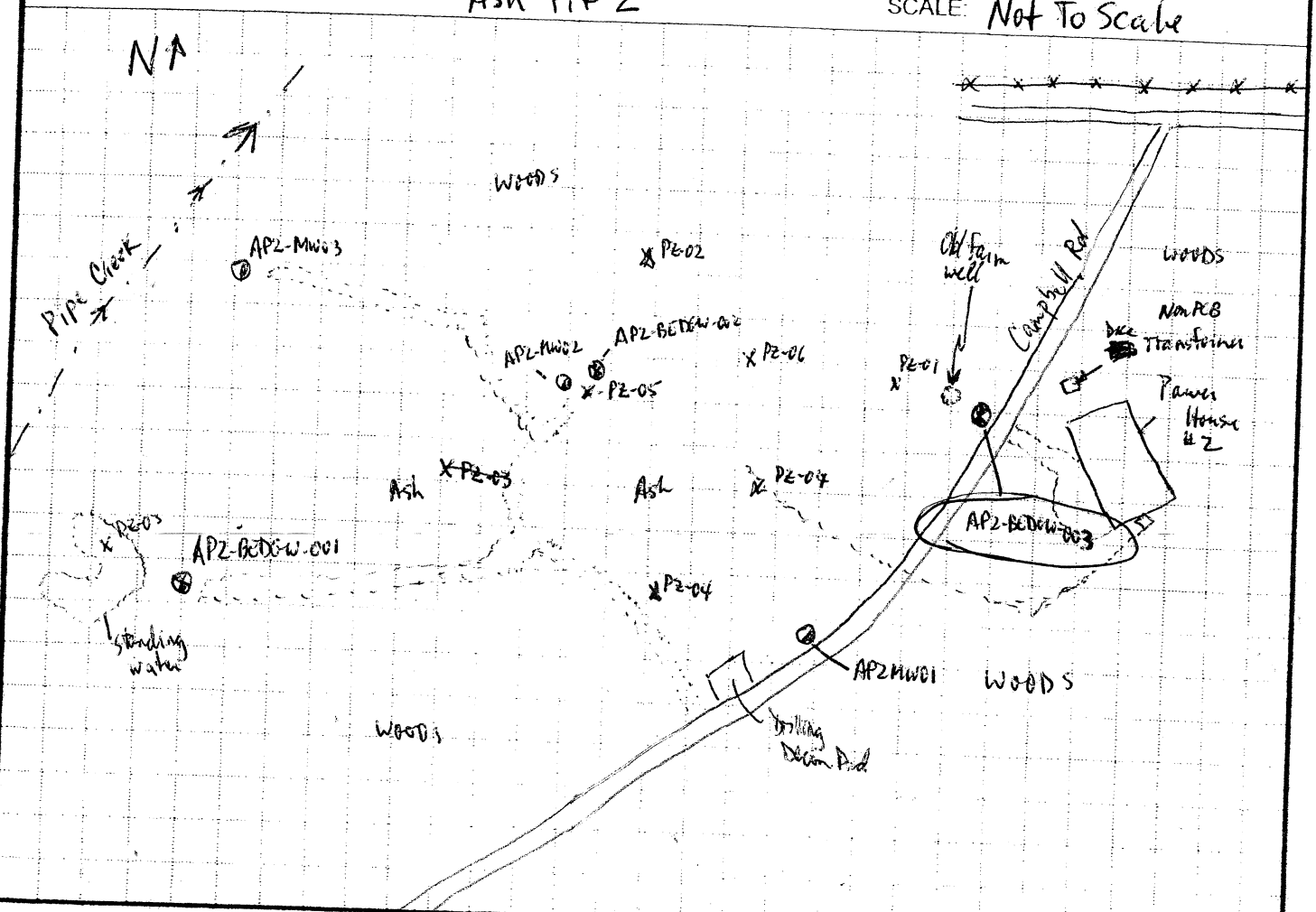
1. COMPANY NAME	Shaw E+I
DISTRICT	Nashville, TN
HOLE NUMBER	AP2-BED-W-003
2. DRILL SUBCONTRACTOR	AE Drilling
SHEET / SHEETS	1 OF 8
3. PROJECT	PBOW
4. LOCATION	NASA Plum Brook Station, Sandusky, OH
5. NAME OF DRILLER	Kevin Warren / Tom Burnette
6. MANUFACTURER'S DESIGNATION OF DRILL	All Terrain CME-75U
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Post-hole dug first 5-feet. Drilled w/ 4¼" ID/8" OD HSA. to 19.5 ft. Overdrilled borehole w/ 8¼" ID/12" OD HSA. Continuously soil sampled (thru 4¼" HSA) w/ 1.4" ID x 2 ft length split-spoons. Drilled bedrock w/ 8" OD rotary bit (wet) to 24.5 ft. Steel casing 6⅝" OD set at 24.45'. Cored rock w/ 6" OD PQ 6.7 to 61.0'
8. HOLE LOCATION	See Sketch
9. SURFACE ELEVATION	638.4 ft — Northing: 623117.29, Easting: 1911619.32
10. DATE STARTED	3/30/09
11. DATE COMPLETED	4-15-09
12. OVERBURDEN THICKNESS	19.5 ft
15. DEPTH GROUNDWATER ENCOUNTERED	overburden 6.2 ft / bedrock 46.9 - 50.1
13. DEPTH DRILLED INTO ROCK	41.5
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
14. TOTAL DEPTH OF HOLE	61.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	—

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	3

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	NA	NA	NA	NA	NA	%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	NA	NA	NA	David Keseler / Kevin W. Weaver

LOCATION SKETCH/COMMENTS Ash Pit 2 SCALE: Not To Scale



PROJECT PBOW

HOLE NO. AP2-BED-W-003

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HTRW DRILLING LOG (continuation sheet)

Hole Number: APZ-BEDG-W-003

Project: PBOW

Geologist: D. Kessler

Sheet 2 of 8 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	~~Analytical Sample No.~~ Blows	Recovery (ft)	Remarks
		Weeds						
	1	Fill: (Soft, (10YR 3/3) dark brown, silty SAND (silt 30%), 10% gravel, sand very fine grain to very coarse grain, poorly sorted, organics (roots), dry) 1.8	SM		NA	NA	NA	Post-hole dug first 5-feet. Old Road Bed base 0-1.8 ft
	2	Soft, (10YR 5/8) yellowish br, mottled (br, gray), low plasticity, Clayey SILT,	ml	0.0				Breathing Air/Background: VOC = 0.0 (11.0 ppm) LEL = 0% O_2 = 21.2% H_2S = 0 ppm CO = 0 ppm
	3							
	4							
	5	Soft, color grading to (10YR 4/4) dark yellowish brown, mottling (brown/gray - 10% mottles), fine platy structure	ml		5	2/2 1/2	1.9/2	Began drilling 3/30/09 S-1 ▽ 6.2 water encountered (very moist to wet)
	6			0.0				
	7	Medium stiff, clay content increases w/ depth, pink (oxidized) silt in horizontal fracture			7	1625		S-2
	8	8.5		0.0		3/3 2/3	2/2	
	9	Medium stiff, (10YR 5/2) grayish br, mottled (dark br, yellowish br), silty Clay, high plasticity, silt content 30-40%, very moist, wet	ch		9	1630		S-3
	10			0.0		3/4/	1.8/	

Project: PBOW

Hole Number: APZ-BEDG-W-003

Shaw
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HTRW DRILLING LOG (continuation sheet)

Hole Number: AP2-BEDGW-003

Project: PBOW

Geologist: D. Kessler

Sheet 3 of 8 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	~~Analytical Sample No.~~ Blows	Recovery (ft)	Remarks
	10	Medium stiff. (10YR 5/2) grayish brown, mottled (dark br, yellowish br) high plasticity, silty CLAY, silt content varies (30-40%), silt content decreases w/ depth	ch	0.0	NA	4/4	1/2	S-3 (cont)
	11				11	1635		
				0.0		2/3 / 5/5	2/2	S-4 11.5' saturated
	12							
	13				13	1640		
				0.0		2/2 / 3/2	2/2	S-5
	14							
	15				15	1645		
		At 16.5 ft, silt content 5%, nothing 5%	ch	0.0		2/1 / 2/1	1.4/ 2	S-6
	16							
	17				17	1655		
		Shale fragments appear 18.3 ft, rounded		0.0		1/2 / 3/3	1.7/ 2	S-7
	18							
	19				19	1700		
						1/50 cm 0"	0.6/ 0.6	S-8 Bedrock @ 19.5 ft
		19.5 ~~Lime~~ Shaley LIMESTONE, gray, very weathered, dry			19.6			spoon Refusal 19.6 ft
	20							

Project: PBOW

Hole Number: AP-BEDGW-003

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HTRW DRILLING LOG (continuation sheet)

Hole Number: AP2-BEDGW-003

Project: PBOW

Geologist: D. Kessler/Weaver

Sheet 7/4 of 8 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
	20	LIMESTONE, dark gray, small chips w/ sharp edges, competent	NA		NA	NA	NA	Began drilling w/ 8" OD rotary bit at 19.5' 3/31/09 1010. wet drilling
	21							
	22			0.0				Breathing Air / Background VOC = 0.0 ppm LEL = 0% O_2 = 21.2% H_2S = 0 ppm CO = 0 ppm
	23							
	24	Start Coring.				Fracs		8" OD Rotary bit drilled to 24.5 ft. Black steel casing 6 5/8" OD set at 24.45' 24.5
	25	LIMESTONE, dark gray, massive bedding, fossiliferous (brachs, corals), highly fractured, hard, slightly weathered.	NA	NA	Box #1		NA	Began Drilling (Coring) 4/14/09
	26					25.9 26.0		C-1 (24.5-25.9) Run - 1.4 Rec - 1.4
						26.6 26.7		Start 1523 End 1526
	27					27.0		C-2 (25.9-30.9)
						27.4 27.5		Run 5.0 Rec 5.0
	28							Start 1534 End 1540
						28.3-MB		Breathing Space Air
	29	grading to light gray						O_2 - 21.3 H_2S 0
						29.3		CO 0
						29.7		LEL 0 VOC [illegible]
	30							

Project: PBOW

Hole Number: AP2-BEDGW-003

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HTRW DRILLING LOG (continuation sheet)

Hole Number: AP2-BEDGW-003

Project: PBOW

Geologist: B. Weaver

Sheet 4 of 8 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	~~Geotech. Sample or~~ Core Box No.	~~Analytical Sample No.~~ Frac	Recovery (ft)	Remarks
	30	LIMESTONE, lt, lt gray, massive bedding, fossiliferous (brachs, corals), moderately fractured, hard, slightly weathered.			AA Box #1 Cont.	30.5		
	31					30.9		C-3 (30.9-35.9) Run 5.0 Rec 5.0 Start 1550 End 1555
	32	- Stylolite - Stylolite				32.2		
	33	- Stylolite						
	34				34.0 Box #2	34.0		
	35	- Stylolite - Stylolite				35.0		
	36	- Stylolite				35.9		C-4 (35.9-40.9) Run 5.0 Rec 5.0 Start - 1602 End - 1607
	37					37.3		
	38					38.2		Breathing Space Air O_2 - 21.2 H_2S - 0 CO - 0 LEL - 0 VOC - 0
	39	- Stylolite - Stylolite						
	40					39.9		

Project: PBOW

Hole Number: AP2-BEDGW-003

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HTRW DRILLING LOG (continuation sheet)

Hole Number: AP2-BEDGW-003

Project: PBOW

Geologist: E. Weaver

Sheet 6 of 8 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
		LIMESTONE, light gray, massive bedding, fossiliferous (brachs, corals), highly fractured, hard, slightly weathered.			Box #2 Cont.			
	41					40.8 40.9 41.1		C5 (40.9-45.9)
	42	- stylolite						Run 5.0 Rec 5.1 Start - 1655
					42.A Box #3	42.A		End - 1701
	43							
	44					44.0		
		- Coral Reef to 45.7' - Stylolite						
	45					44.9		
	46					45.7 46.0		C6 (45.9-50.9)
	47	- possible water bearing fracture				46.9		Run 5.0 Rec 5.1 Start 1708
	48							End
		- Stylolite						
	49							
		- Stylolite				49.A		
	50							

Project: PBOW

Hole Number: AP2-BEDGW-003

Shaw
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HTRW DRILLING LOG (continuation sheet)

Hole Number: APZ-BEDGW-003

Project: PBOW

Geologist: E. Weaver

Sheet 7 of 8 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
		LIMESTONE, light gray, massive bedding, fossiliferous (bryozoans, corals), moderately fractured, hard, slightly weathered.			Box #3 cont.	50.1		Saturated with bearing fracture
	51				51.1 Box #4	51.1		C7 (50.9-55.9) Run - 5.0 Rec - 5.0 Start 1721 End 1726
	52					52.0		
	53							
						53.6		
	54							
	55							
						55.6		Start 4-15-09
	56				56.1 Box #5	56.1		C8 (55.9-60.9)
	57							Run - 5.0 Rec - 5.0 Start 0921 End - 0925
	58							
	59							Breathing Space Air O_2 - 21.1 H_2S - 0 CO - 0 LEL - 0 VOC - 0
	60							

Project: PBOW

Hole Number: APZ-BEDGW-003

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HTRW DRILLING LOG (continuation sheet)

Hole Number: AP2-BEDGW-003

Project: PBOW

Geologist: E. Weaver

Sheet 8 of 8 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	~~Analytical Sample No.~~ Fracs	Recovery (ft)	Remarks
		LIMESTONE, light gray, massive bedding, fossiliferous (branchs, worms) moderately fractured hard, slightly weathered	NA	NA	Box #5 Cont.			
	61		NA		61.0	61.0		61.0
		Boring Completed @ 61.0 ft Monitoring Well Installed Total Depth = 61.0 ft						
	62							
	63							
	64							
	65							
	66							
	67							
	68							
	69							
	70							

Project: PBOW

Hole Number: AP2-BEDGW-003

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Monitoring Well Construction Form (Bedrock)

Project: PDOW
Location: NASA Plum Brook Station, Sandusky, Ohio
Client: USACE - Nashville, TN
Subcontractor: A.E. Drilling
Driller: Kevin Warren / Tom Burnett
Shaw Field Representative: David Kessler / Eric Weaver

Well Number: AP2-BE06W-003
Site Location: Ash Pit #2
Installation Date: 4-15-09
Northing: 623117.29
Easting: 1911619.32
Shaw Project Number: 133422

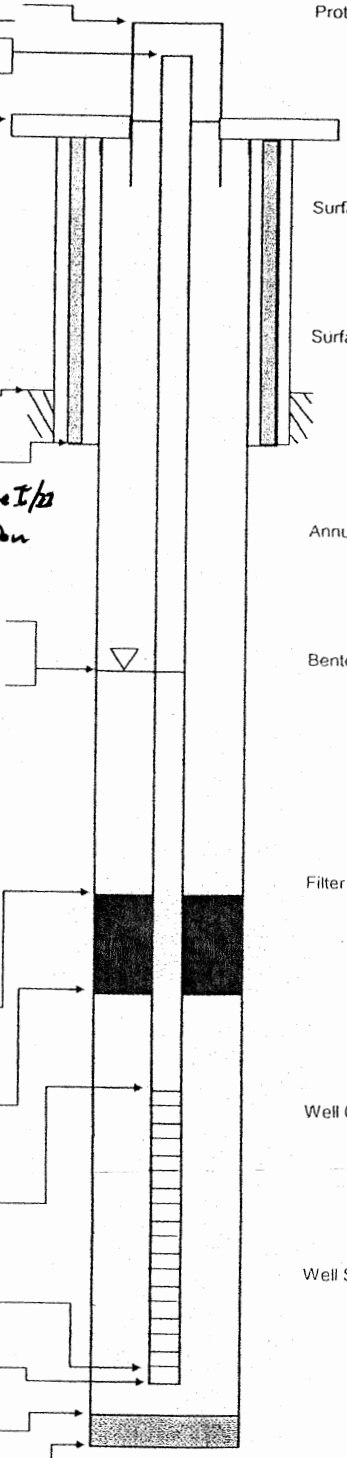
Protective Cover Elevation (ft): 641.17
Top of Casing Elevation (ft): 640.83
Top of Casing Stickup (ft): 2.43
Land Surface Elevation (ft): 638.4

Approximate Diameter of Section 1 Borehole (in): 12" to 19.5'; 8" to 24.5'
Diameter of Surface Casing (in): 6 5/8" OD / 6" ID
Depth to Bedrock (ft): 19.5'
Bottom of Surface Casing (ft): 24.45'

Used 7@ 94 lbs bags Portland Cement Type I/II mixed with bentonite gel to seal isolation casing.

Depth to Water (ft):
During Drilling: 46.9' or 50.1'
Date: 4-15-09
Post Development: — TOC
Date: —

Approximate Diameter of Section 2 Borehole (in): 6"
Well Casing Diameter (in): 2"
Top of Bentonite Seal (ft): 38.0'
Top of Filter Pack (ft): 41.0'
Top of Screen Interval (ft): 45.0'
Bottom of Screen Interval (ft): 60.0'
Bottom of Well (ft): 60.35'
Bottom of Filter Pack (ft): 61.0'
Bottom of Borehole (ft): 61.0'



Protective Casing:
Type: Steel
Dimensions (in): 4" x 4"
Length (ft): 5'
Guard Post: 4 - concrete filled

Surface Pad:
Dimensions: 4' x 4' x 4"
Type: Concrete

Surface Casing:
Type: Black Steel
Diameter (in): 6 5/8" OD / 6" ID
Installation: Tremie Haliburton
Cementing Plug ~~Other Plug~~ Johnson Grout shoe

Annular Space Seal:
Type: Bentonite-Cement Grout
Installation: Gravity (Tremie) Pumped

Bentonite Seal:
Manufacturer: Haliburton
Type: (Pellets) Slurry
Installation: 6-in lifts (One Section)
Gravity (Tremie) Pumped
Hydration time (hrs): >1 hr.

Filter Pack Material:
Manufacturer: Southern Products
Product Name: Filter Media
Size: Gravel Pack #1
Volume Added (ft^3): 3 ft^3 (6-bags)
Installation: Gravity (Tremie)

Well Casing:
Manufacturer: Campbell Monoflex
Type: PVC
Diameter (in): 2"

Well Screen Casing:
Manufacturer: Johnson
Type: PVC
Slot Size (in): .010 %Open
Slot Type: (Continuous wrap) Factory slot

Sump/End Cap: 0.35'
Backfill Material: None

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Depths and heights are referenced to ground surface unless specified TOC.
All elevations are referenced to MSL (NAVD 88).

APPENDIX B

DIRECT-PUSH SOIL BORING, DIRECT-PUSH GROUNDWATER, SURFACE WATER, SEDIMENT, AND GROUNDWATER SAMPLE COLLECTION LOGS

Shaw E & I, Inc.

Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011609AML

Location Code: **ASH PIT 2-SB01**/PZ01

Sample Number: **AP0100**

Sample Name: **PBOW-09-SS-ASH PIT 2-SB01-AP0100-(0-1)**

Sampling Method: **DP**

Sample Type: **SS** *Sample Purpose:* **REG**

Sampling Equip: Geoprobe, 5' Acetate Liner, disposable ziplock baggie

QC Partners:

(TB) ——— **(ER)** ——— **(FB)** ———

Task: **ASH PIT2**

Collection Date: 1-15-09

Collection Time: 0830

Start Depth: 0' ~~btoc~~ mk

End Depth: 1' ~~btoc~~ mk

Sample Matrix: **SOIL**

Sample Team: Kessler/Weaver

ERPIMS Values:

Sacode:

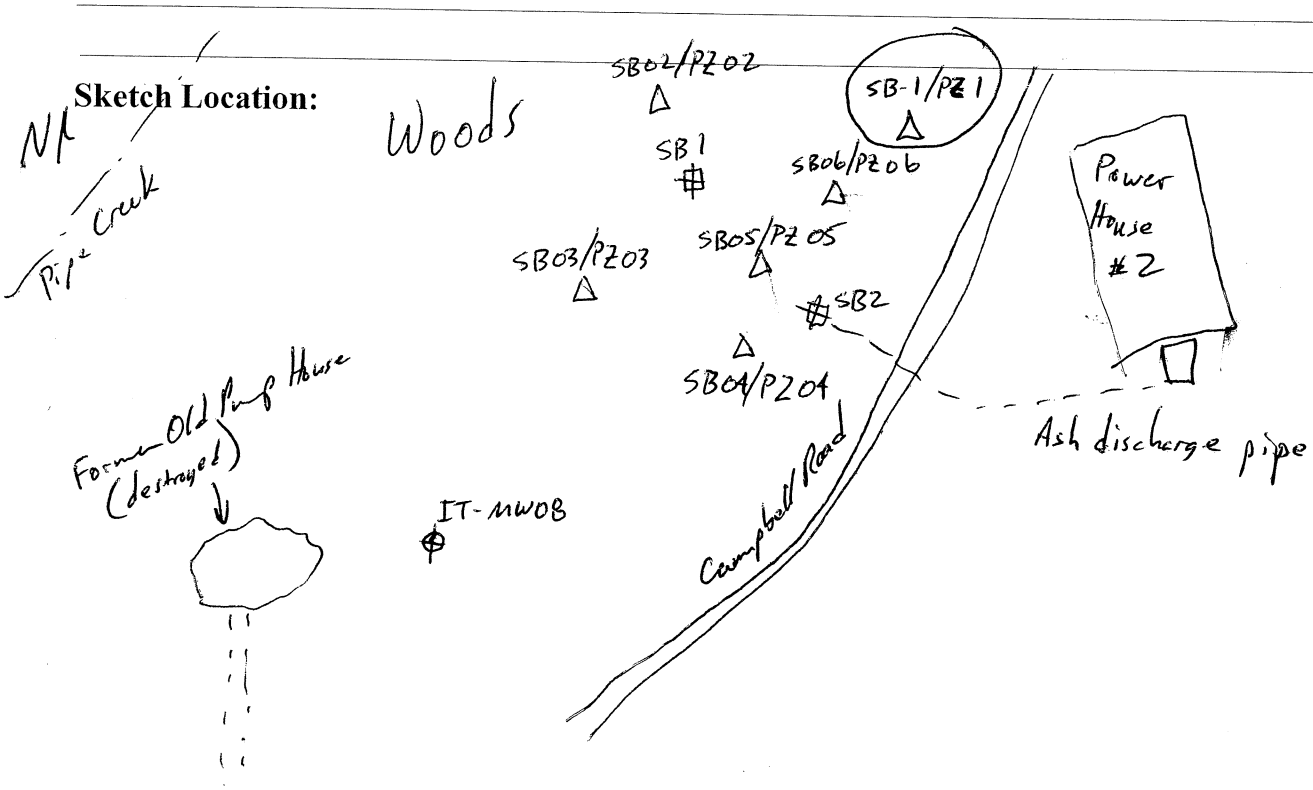
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

Comments: PID - 0.0

Sketch Location:



Logged BY / Date: E. W. Weaver 1-15-09

Reviewed BY / Date: Edward A. Weaver 11-8-09

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Shaw E & I, Inc.

Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011609AML

Location Code: **ASH PIT 2-SB01/PZ01**
Sample Number: **AP0100MS**
Sample Name: **PBOW-09-SS-ASH PIT 2-SB01-AP0100MS-((**
Sampling Method: **DP**
Sample Type: **SS** *Sample Purpose:* **MS**
Sampling Equip: Geoprobe, 5' Acetate liner, disposable ziplock baggie

Task: **ASH PIT2**
Collection Date: 1-15-09
Collection Time: 0830
Start Depth: 0' ~~btoc~~ mn
End Depth: 1' ~~btoc~~ mn
Sample Matrix: **SOIL**
Sample Team: Kessler/Weaver

QC Partners:
(TB) ——— (ER) ——— (FB) ———

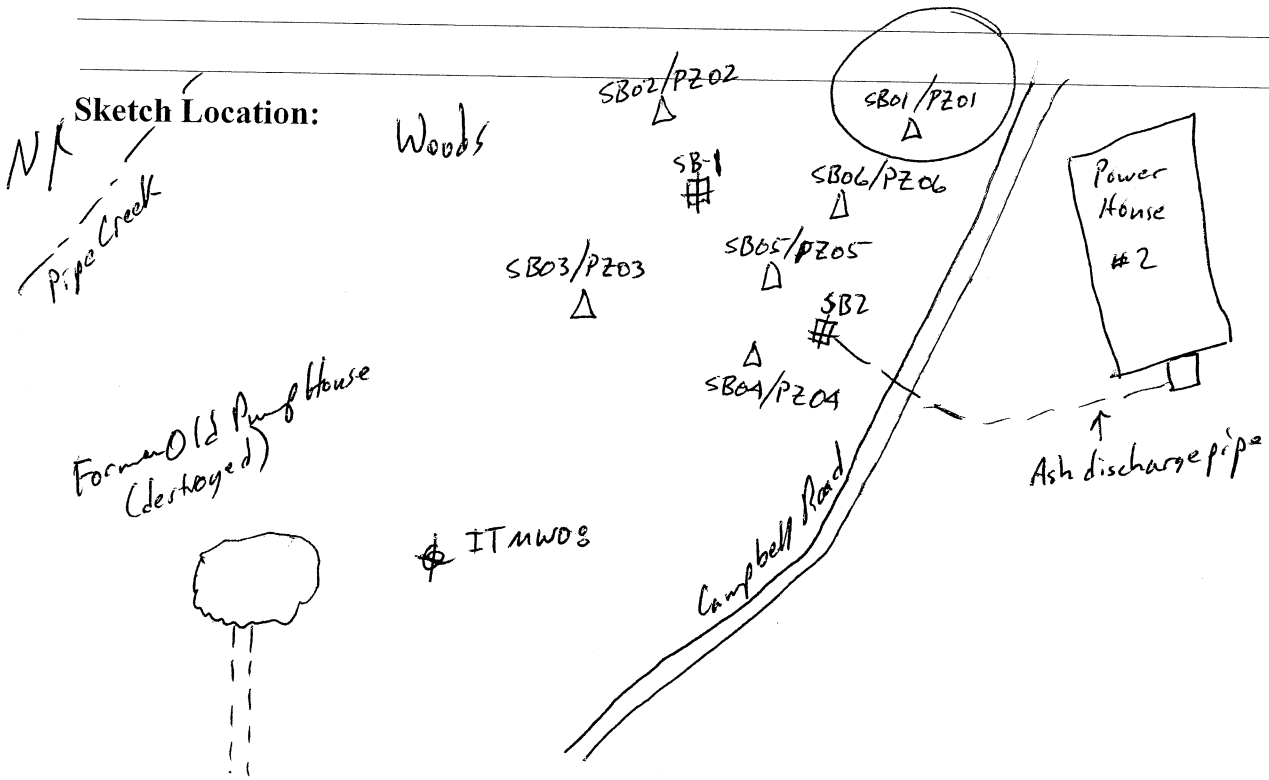
ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

Comments: PID- 0.0

Sketch Location:



Logged BY / Date: Eric W. Weaver 1-15-09

Reviewed BY / Date: Edward L. Kessler 11-8-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011609AML

Location Code: **ASH PIT 2-SB01**/PZ01
Sample Number: **AP0100MSD**
Sample Name: **PBOW-09-SS-ASH PIT 2-SB01-AP0100MSD-**
Sampling Method: **DP**
Sample Type: **SS** *Sample Purpose:* **MSD**
Sampling Equip: Geoprobe, 5' Acetate liner, disposable ziplock baggie

Task: **ASH PIT2**
Collection Date: 1-15-09
Collection Time: 0830
Start Depth: 0' ~~btoc~~ MR
End Depth: 1' ~~btoc~~ MR
Sample Matrix: **SOIL**
Sample Team: Kessler/Weaver

QC Partners:
(TB) ——— (ER) ——— (FB) ———

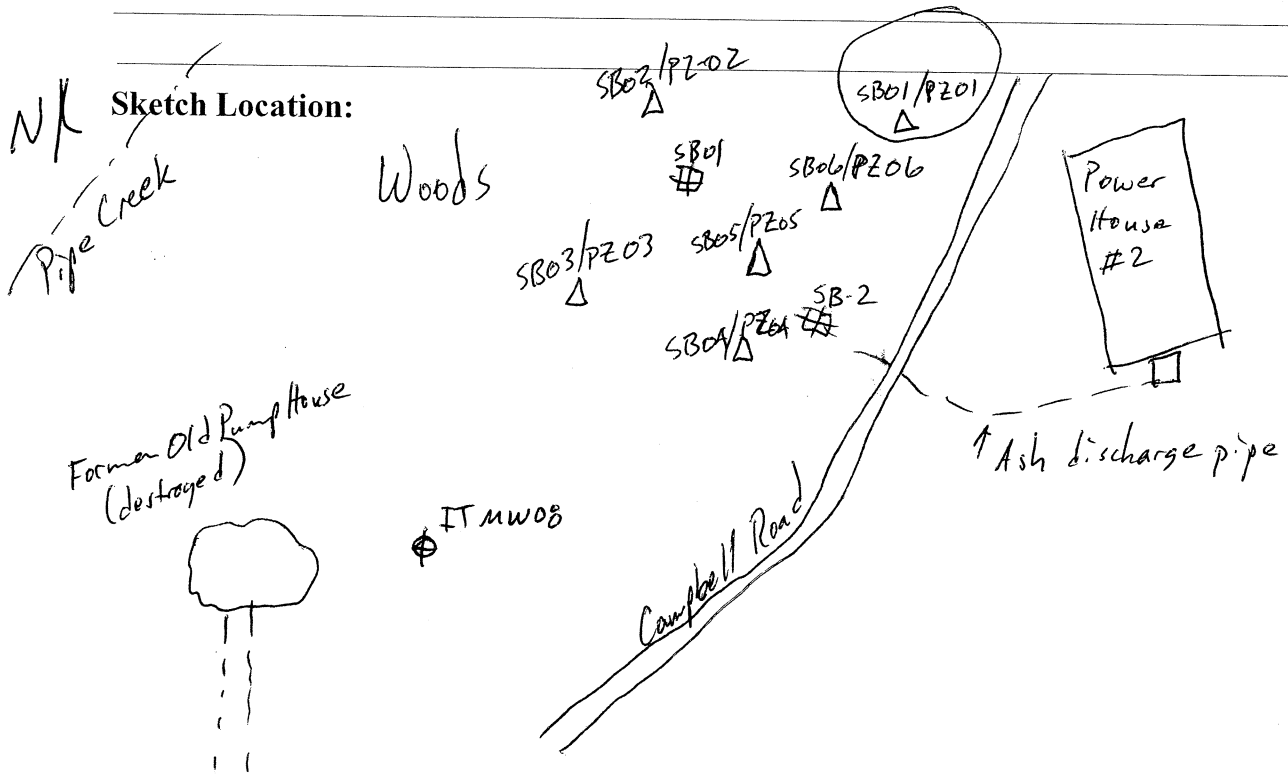
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: PID - 0.0

Sketch Location:



Logged BY / Date: Eric W. Weaver 1-15-09 *Reviewed BY / Date:* Edward E. Weaver 11-8-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011609AML

Location Code: **ASH PIT 2-SB01**

Sample Number: **AP0101**

Sample Name: **PBOW-09-DS-ASH PIT 2-SB01-AP0101-(3-5)**

Sampling Method: **DP**

Sample Type: **DS** *Sample Purpose:* **REG**

Sampling Equip: Geoprobe, 5' Acetate Liner, disposable ziplock baggie

Task: **ASH PIT2**

Collection Date: 1-15-09

Collection Time: 0835

Start Depth: 3' ~~bgs~~ MK

End Depth: ~~3~~ 3.7' ~~bgs~~ MK EW

Sample Matrix: **SOIL**

Sample Team: Kessler / Weaver

QC Partners:

(TB) ——— (ER) ——— (FB) ———

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

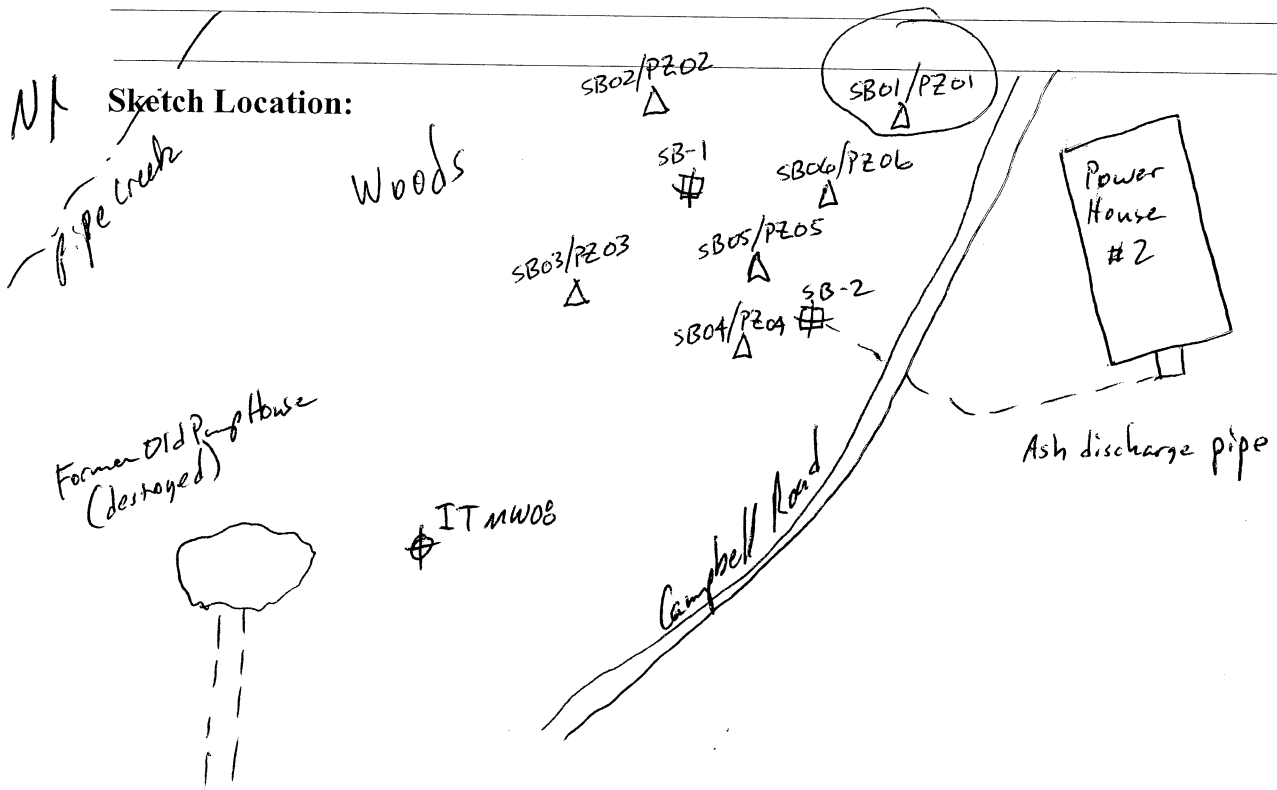
ERPIMS Values:

Sacode:

Lot Control#:

Comments: PID - 0.0

NA **Sketch Location:**



Logged BY / Date: E. W. Weaver 1-15-09 *Reviewed BY / Date:* Edward E. Weaver 11-8-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011609AML

Location Code: **ASH PIT 2-SB01**
Sample Number: **AP0102**
Sample Name: **PBOW-09-DS-ASH PIT 2-SB01-AP0102-(8-1(**
Sampling Method: **DP**
Sample Type: **DS** *Sample Purpose:* **REG**
Sampling Equip: Geoprobe, 5' Acetate liner, disposable ziplock baggie

Task: **ASH PIT2**
Collection Date: 1-15-09
Collection Time: 0840
Start Depth: 8' ~~btoc~~ MR
End Depth: 10' ~~btoc~~ MR
Sample Matrix: **SOIL**
Sample Team: Keeler/Weaver

QC Partners:
(TB) ——— (ER) ——— (FB) ———

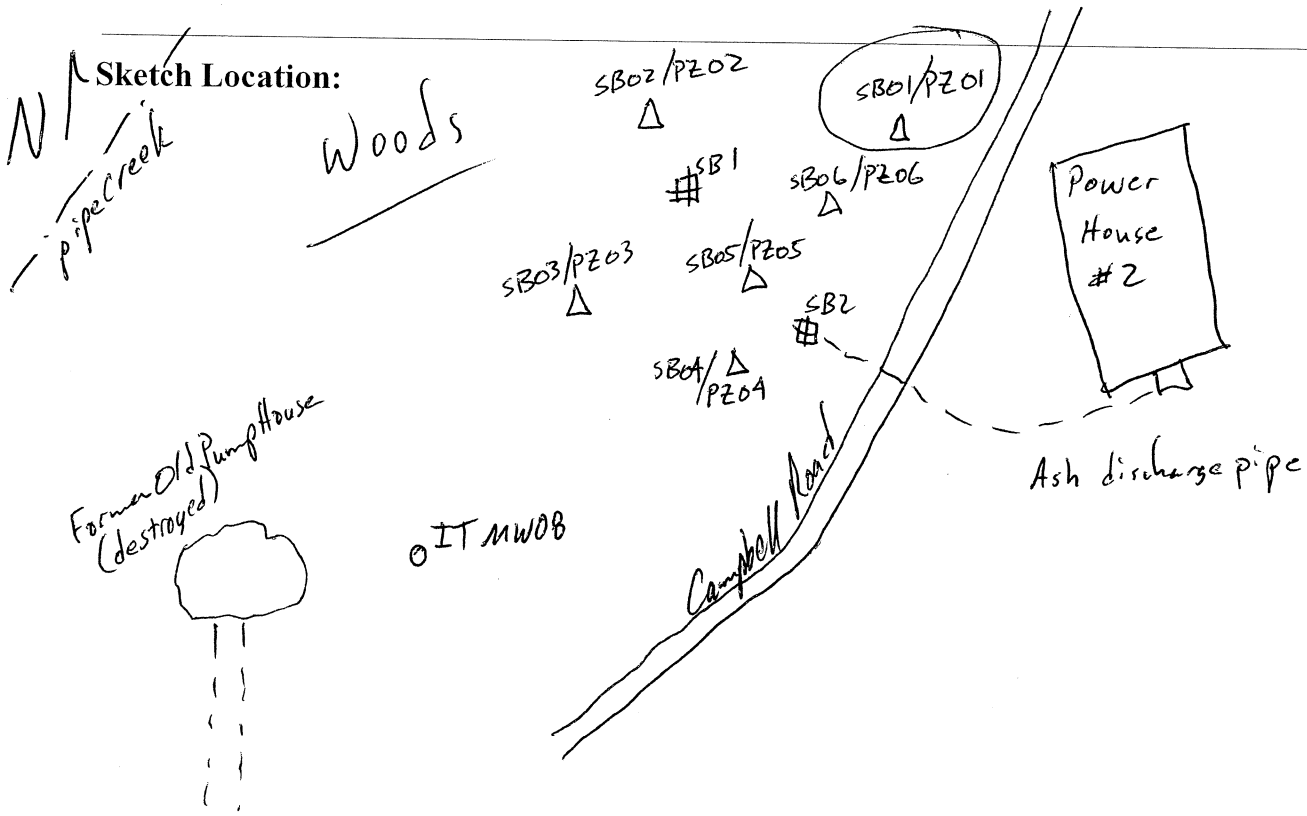
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: PID - 0.0

Sketch Location:



Logged BY / Date: E. W. Weaver 1-15-09 *Reviewed BY / Date:* Edward G. Weaver 11-8-0

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011609AML

Location Code: **ASH PIT 2-SB06**

Sample Number: **AP0117**

Sample Name: **PBOW-09-SS-ASH PIT 2-SB06-AP0117-(0-1)**

Sampling Method: **DP**

Sample Type: **SS** *Sample Purpose:* **REG**

Sampling Equip: Geoprobe, 5' Acetate Liner, disposable ziplock baggie

QC Partners:

(TB) ——— **(ER)** ——— **(FB)** ———

Task: **ASH PIT2**

Collection Date: 1-15-09

Collection Time: 0920

Start Depth: 0' ~~bgs~~ mk

End Depth: 1' ~~bgs~~ mk

Sample Matrix: **SOIL**

Sample Team: Kessler/Weaver

ERPIMS Values:

Sacode:

Lot Control#:

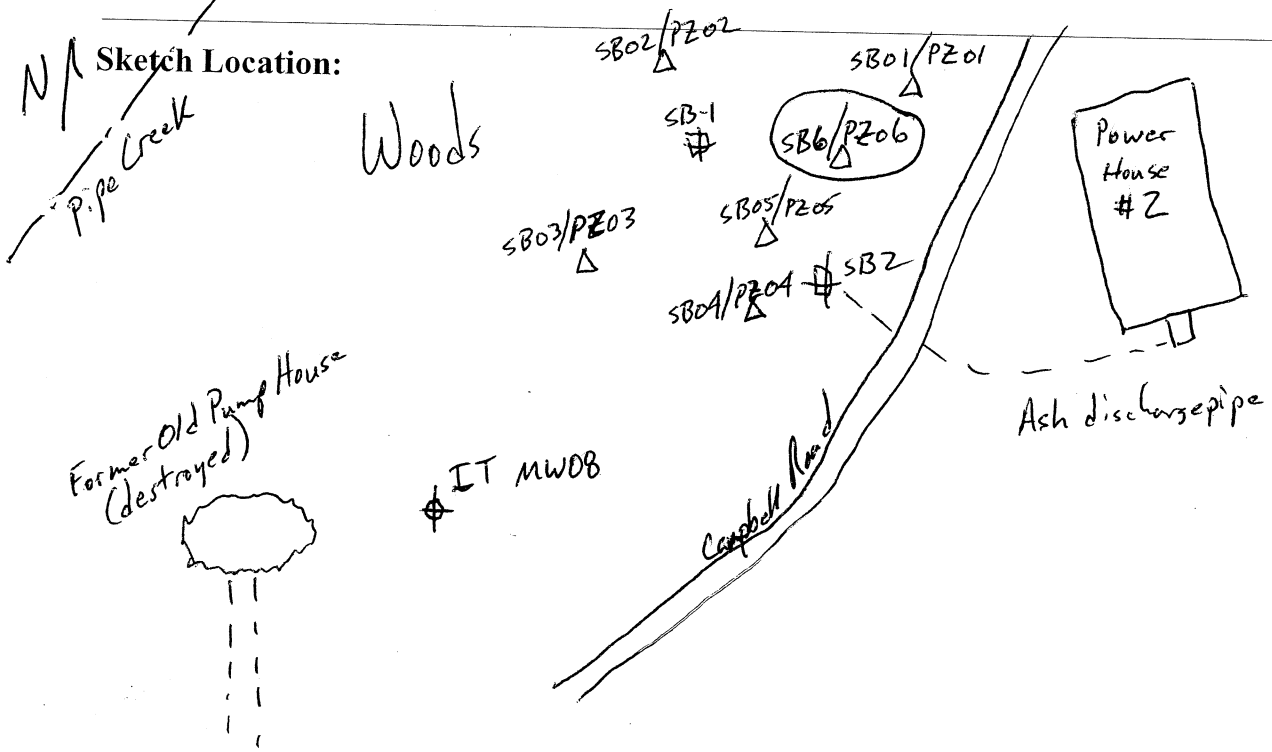
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

Comments: PID 0.0

NA

Sketch Location:



Logged BY / Date: E. W. Weaver 1-15-09 *Reviewed BY / Date:* Edward L. Weaver 11-8-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011609AML

Location Code: **ASH PIT 2-SB06**
Sample Number: **AP0118**
Sample Name: **PBOW-09-DS-ASH PIT 2-SB06-AP0118-(3-5)**
Sampling Method: **DP**
Sample Type: **DS** *Sample Purpose:* **REG**
Sampling Equip: Geoprobe, 5' Acetate liner, disposable ziplock baggie

Task: **ASH PIT2**
Collection Date: 1-15-09
Collection Time: 0923
Start Depth: 3' ~~bgs~~ na
End Depth: 3.8' ~~bgs~~ na
Sample Matrix: **SOIL**
Sample Team: Keesler/Weaver

QC Partners:
(TB) —— (ER) —— (FB) ——

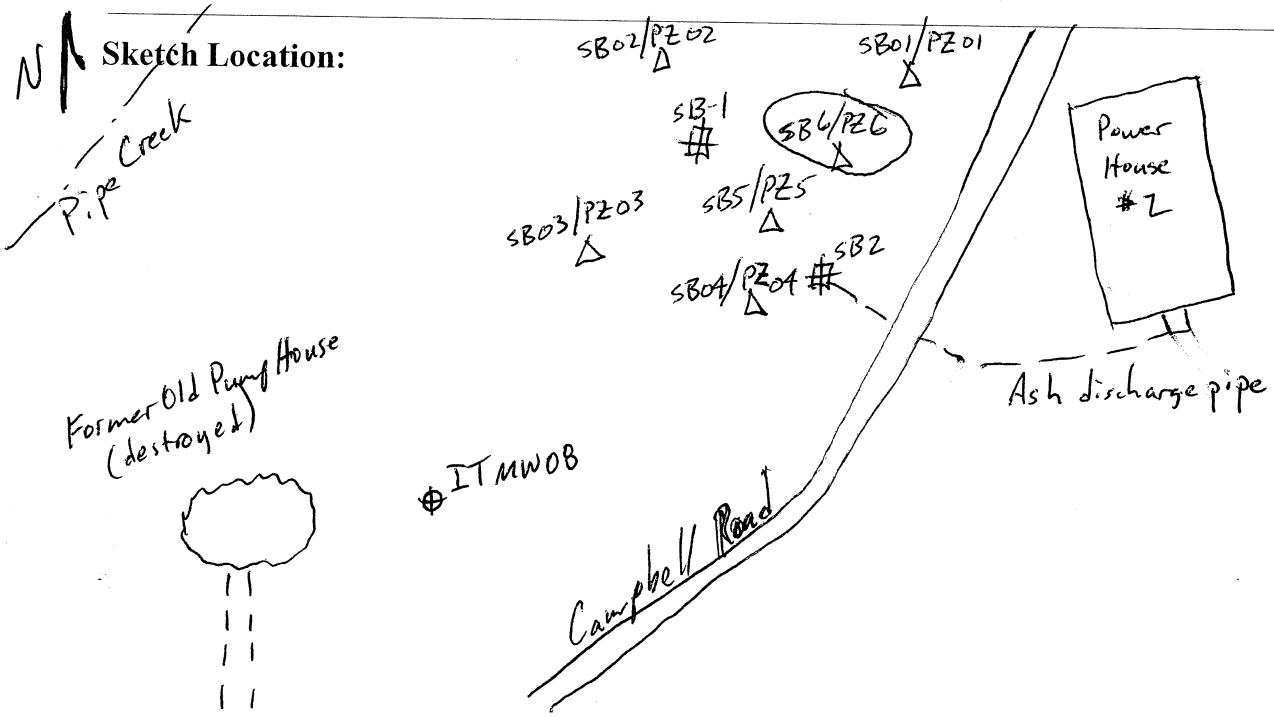
ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

Comments: PID - 0.0

Sketch Location:



Logged BY / Date: E. W. Weaver 1-15-09 *Reviewed BY / Date:* Edward W. Weaver 1-15-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011609AML

Location Code: **ASH PIT 2-SB06**

Sample Number: **AP0119**

Sample Name: **PBOW-09-DS-ASH PIT 2-SB06-AP0119-(8-1(**

Sampling Method: **DP**

Sample Type: **DS** *Sample Purpose:* **REG**

Sampling Equip: Geoprobe, 5' Acetate liner, disposable ziplock baggie

Task: **ASH PIT2**

Collection Date: 1-15-09

Collection Time: 0930

Start Depth: 8' ~~bgs~~ MR

End Depth: 10' ~~bgs~~ MR

Sample Matrix: **SOIL**

Sample Team: Kessler/Weaver

QC Partners:

(TB) ——— (ER) ——— (FB) ———

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

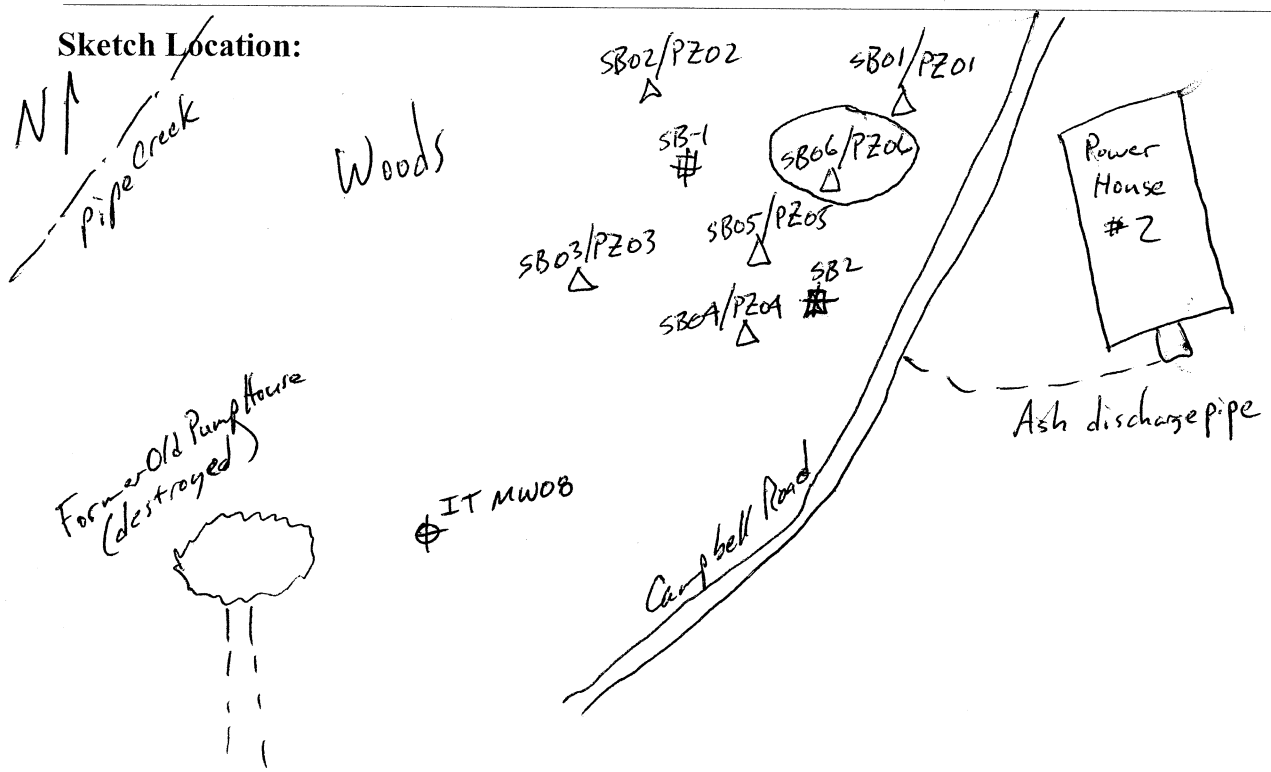
ERPIMS Values:

Sacode:

Lot Control#:

Comments: PID - 0.0

Sketch Location:



Logged BY / Date: Eric W. Weaver 1-15-09 *Reviewed BY / Date:* Edward E. Weaver 1-8-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011609AML

Location Code: **ASH PIT 2-SB07**

Sample Number: **AP0120**

Sample Name: **PBOW-09-SS-ASH PIT 2-SB07-AP0120-(0-1)**

Sampling Method: **DP**

Sample Type: **SS** *Sample Purpose:* **REG**

Sampling Equip: Geoprobe, 5' Acetate liner, disposable ziplock baggie

Task: **ASH PIT2**

Collection Date: 1-16-09

Collection Time: 1000

Start Depth: 0' ~~bgs~~ nk

End Depth: 1' ~~bgs~~ nk

Sample Matrix: **SOIL**

Sample Team: Kessler/Weaver

QC Partners:

(TB) ——— **(ER)** ——— **(FB)** ———

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

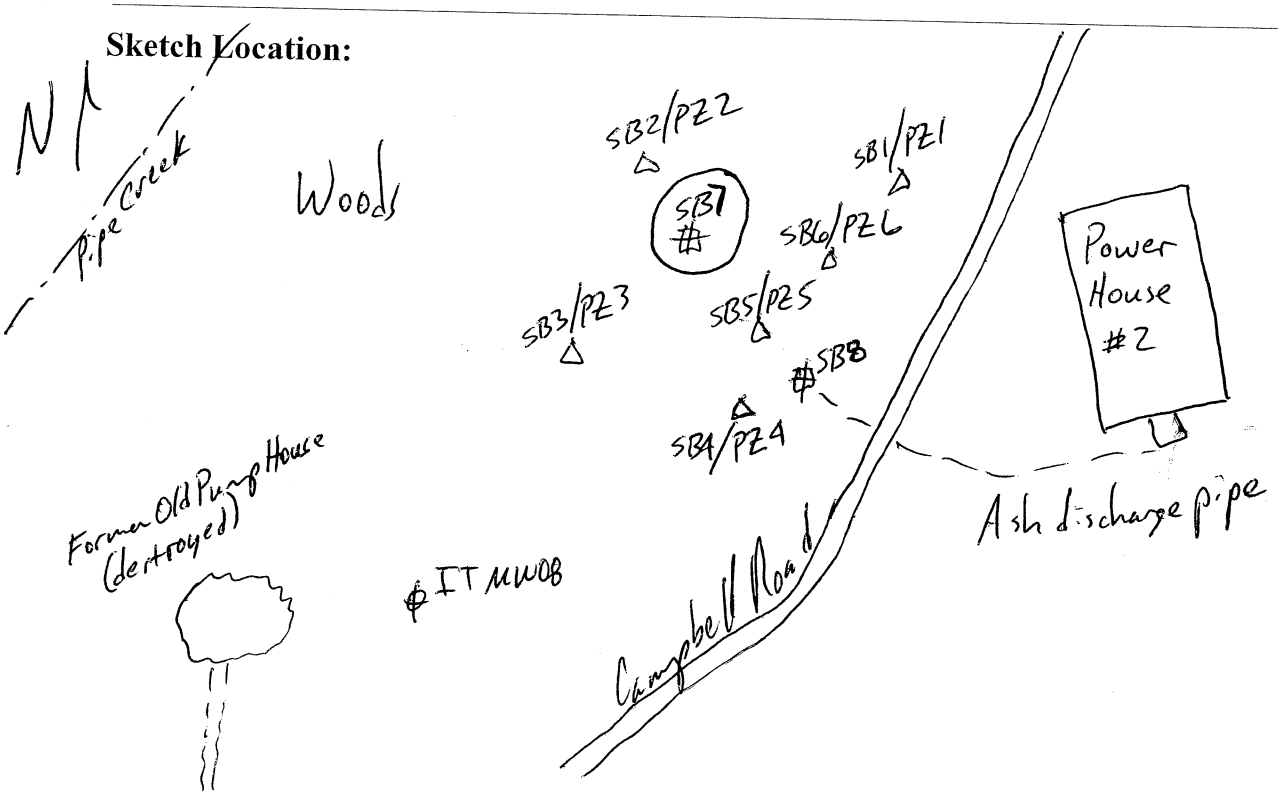
ERPIMS Values:

Sacode:

Lot Control#:

Comments: PID - 0.0

Sketch Location:



Logged BY / Date: E. Weaver 1-16-09 *Reviewed BY / Date:* Edward K. Weaver 4-8-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011609AML

Location Code: **ASH PIT 2-SB07**

Sample Number: **AP0121**

Sample Name: **PBOW-09-SS-ASH PIT 2-SB07-AP0121-(0-1)**

Sampling Method: **DP**

Sample Type: **SS** *Sample Purpose:* **FD**

Sampling Equip: Geoprobe, 5' Acetate liner, disposable zip lock baggie

QC Partners:

(TB) — **(ER)** — **(FB)** —

Task: **ASH PIT2**

Collection Date: 1-16-09

Collection Time: 1000

Start Depth: 0' ~~btoc~~ MR

End Depth: 1' ~~btoc~~ MR

Sample Matrix: **SOIL**

Sample Team: Kercher/Weaver

ERPIMS Values:

Sacode:

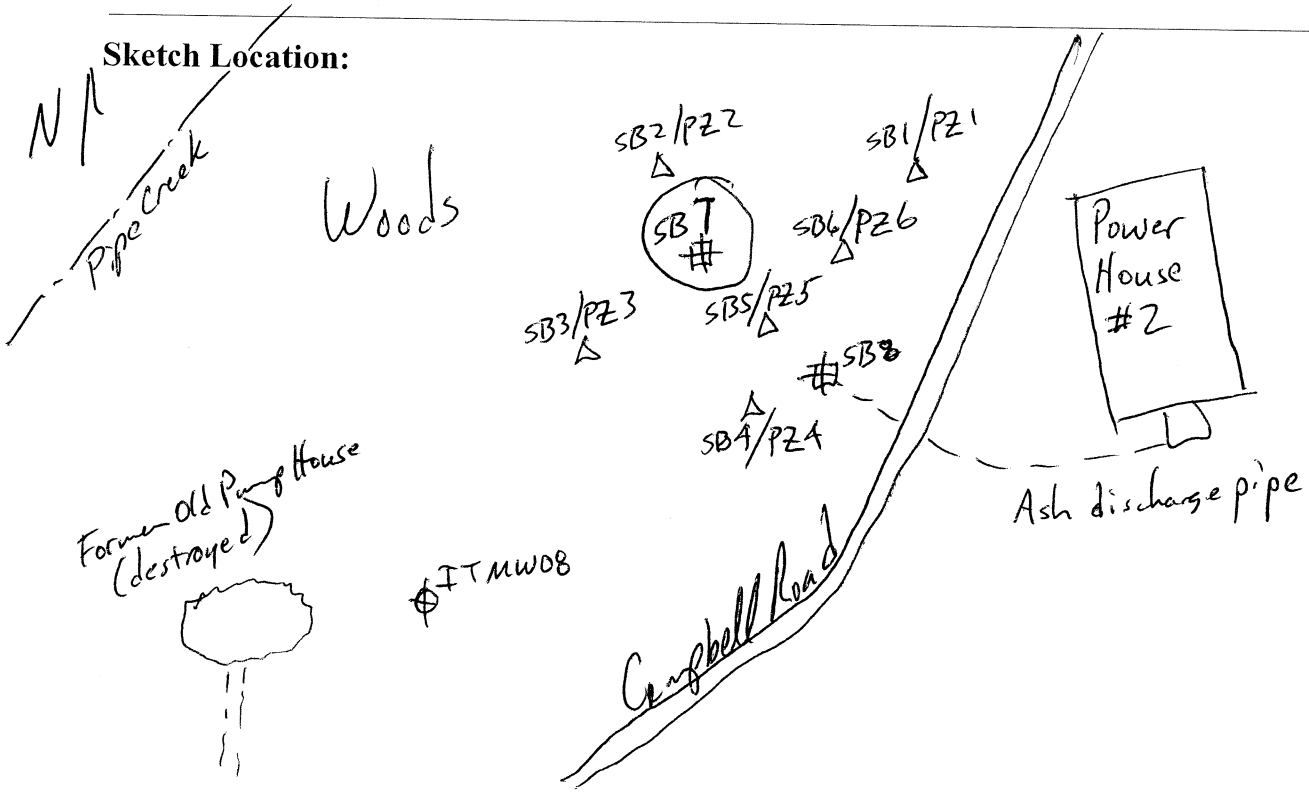
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

Comments: PID - 0.0

Sketch Location:



Logged BY / Date: E.W. Weaver 1-16-09 *Reviewed BY / Date:* Edward Weaver 11-8-0

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011609TA

Location Code: **ASH PIT 2-SB07**

Sample Number: **AP0122**

Sample Name: **PBOW-09-SS-ASH PIT 2-SB07-AP0122-(0-1)**

Sampling Method: **DP**

Sample Type: **SS** *Sample Purpose:* **FS**

Sampling Equip: Geoprobe, 5' Acetate liner, disposable plastic bag, sieve

QC Partners:

(TB) — **(ER)** — **(FB)** —

Task: **ASH PIT2**

Collection Date: 1-16-09

Collection Time: 1000

Start Depth: 0' ~~bgs~~ mrk

End Depth: 1' ~~bgs~~ mrk

Sample Matrix: **SOIL**

Sample Team: Kessler/Weaver

ERPIMS Values:

Sacode:

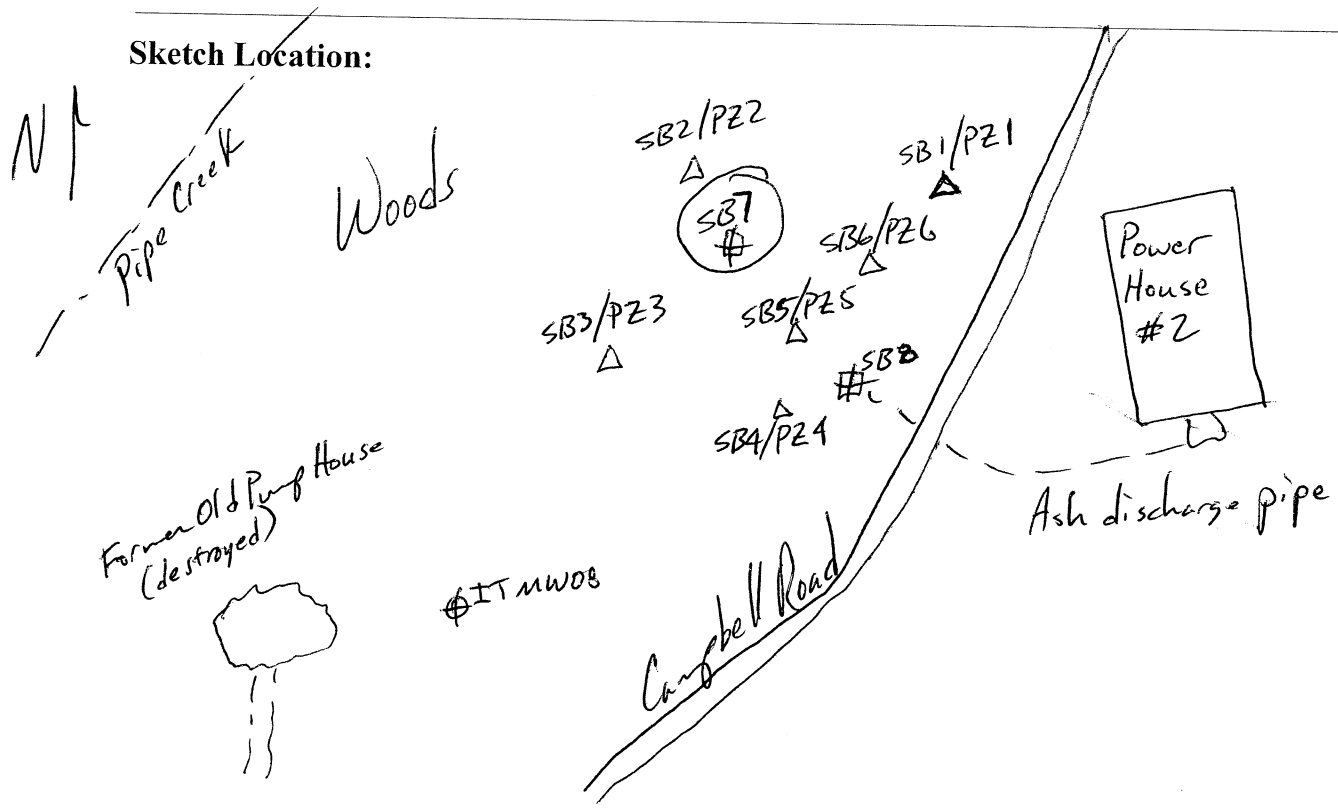
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	4	oz	CWM
METALS	N	A	2	4	oz	CWM
PCBS	N	A	2	4	oz	CWM
SEMIVOLATILES	N	A	2	4	oz	CWM

Comments: PID - 0.0

Sketch Location:



Logged BY / Date: E. W. Weaver 1-16-09

Reviewed BY / Date: Edward E. Weaver 1-8-0

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011609AML

Location Code: **ASH PIT 2-SB07**

Sample Number: **AP0123**

Sample Name: **PBOW-09-DS-ASH PIT 2-SB07-AP0123-(3-5)**

Sampling Method: **DP**

Sample Type: **DS** *Sample Purpose:* **REG**

Sampling Equip: Geoprobe, 5' Acetate liner, disposable cylock basis'e

Task: **ASH PIT2**

Collection Date: 1-16-09

Collection Time: 1003

Start Depth: 3'

End Depth: 4.1'

Sample Matrix: **SOIL**

Sample Team: Kessler/Weaver

QC Partners:

(TB) — **(ER)** — **(FB)** —

ERPIMS Values:

Sacode:

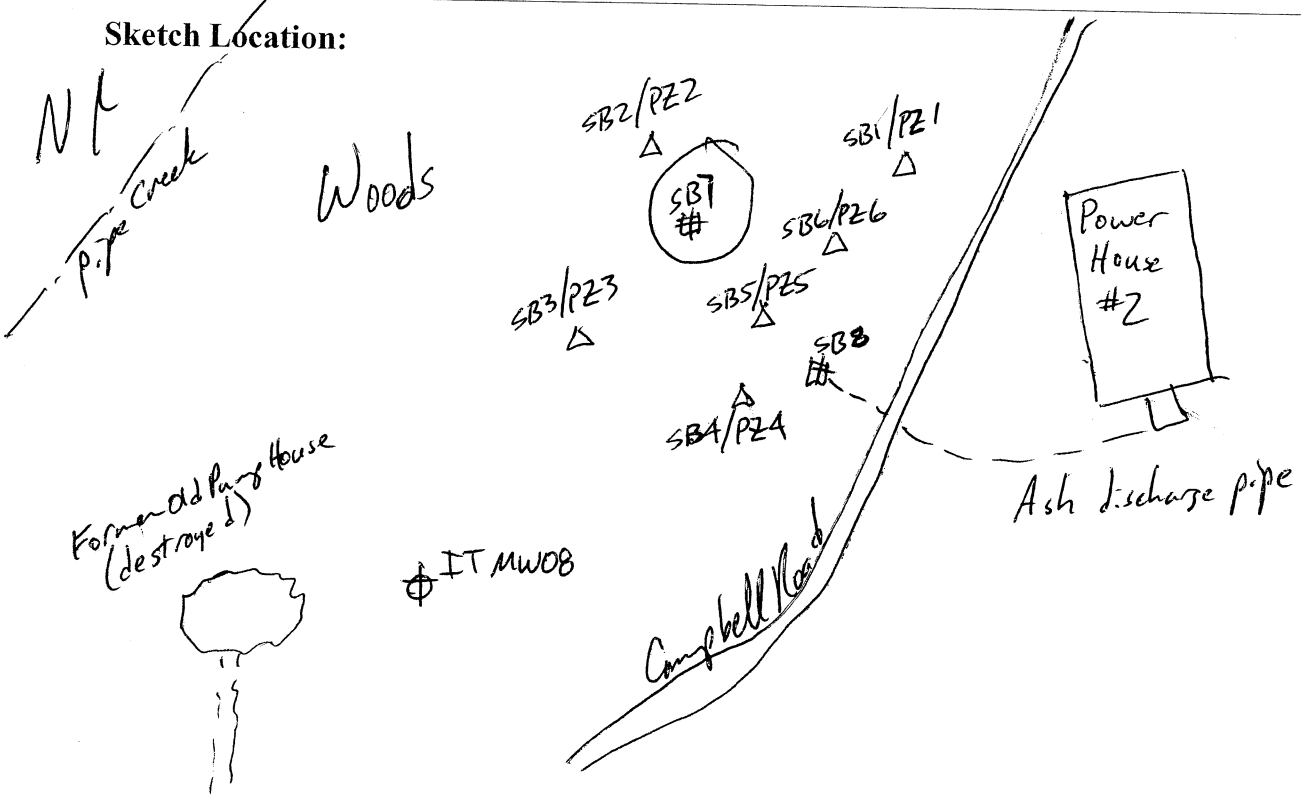
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

Comments: PID - 0.0

Sketch Location:



Logged BY / Date: E. Weaver 1-16-09 *Reviewed BY / Date:* Edward E. Weaver 11-8-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011609AML

Location Code: **ASH PIT 2-SB07**

Sample Number: **AP0124**

Sample Name: **PBOW-09-DS-ASH PIT 2-SB07-AP0124-(8-1(**

Sampling Method: **DP**

Sample Type: **DS** *Sample Purpose:* **REG**

Sampling Equip: Geoprobe, 5' Acetate liner, disposable ziplock baggie

QC Partners:

(TB) — **(ER)** — **(FB)** —

Task: **ASH PIT2**

Collection Date: 1-16-09

Collection Time: 1005

Start Depth: 8'

End Depth: 10'

Sample Matrix: **SOIL**

Sample Team: Kessler/Weaver

ERPIMS Values:

Sacode:

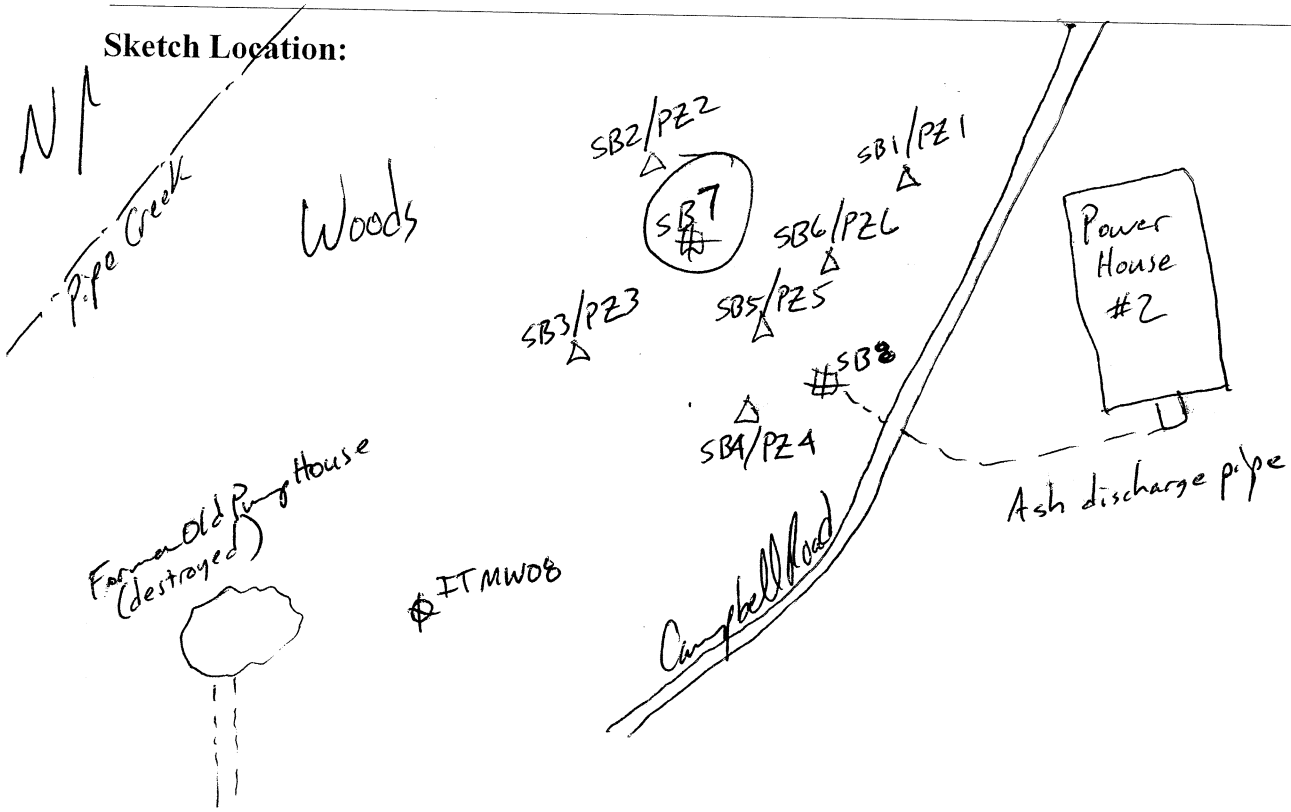
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

Comments: PID - 0.0

Sketch Location:



Logged BY / Date: E.W. Weaver 1-16-09 *Reviewed BY / Date:* Edward E. Howard 11-8-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011609 AML

Location Code: **ASH PIT 2-SB02**

Sample Number: **AP0103**

Sample Name: **PBOW-09-SS-ASH PIT 2-SB02-AP0103-(0-1)**

Sampling Method: **DP**

Sample Type: **SS** *Sample Purpose:* **REG**

Sampling Equip: Geoprobe, 5' Acetate Liner, disposable ziplock baggie

QC Partners:

(TB) — **(ER)** — **(FB)** —

Task: **ASH PIT2**

Collection Date: 1-16-09

Collection Time: 1030

Start Depth: 0

End Depth: 1'

Sample Matrix: **SOIL**

Sample Team: Kessler/Weaver

ERPIMS Values:

Sacode:

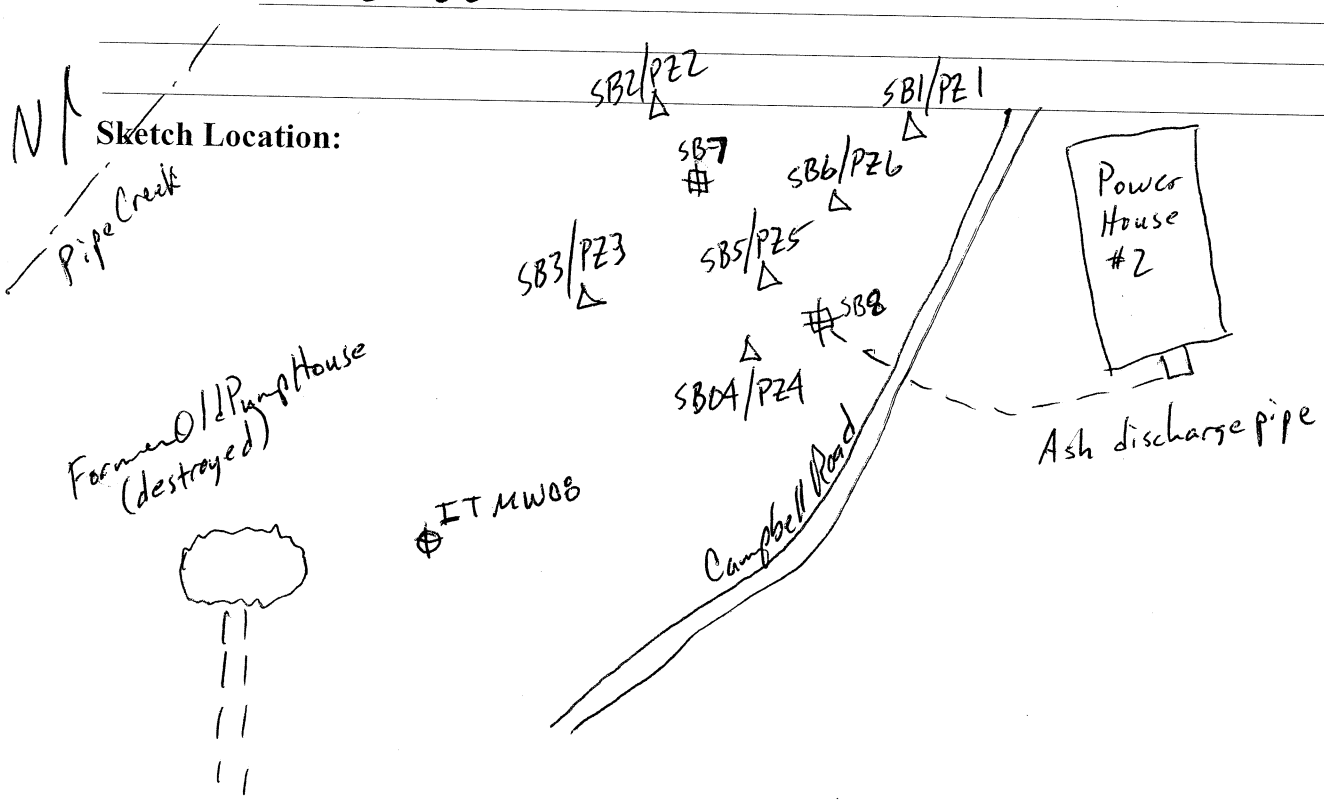
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM
TOC-B	N	B	1	4	oz	CWM

Comments: PID - 0.0

Sketch Location:



Logged BY / Date: E. Weaver 1-16-09 *Reviewed BY / Date:* Edward E. Weaver 11-8-0

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011609 AML

Location Code: **ASH PIT 2-SB02**
Sample Number: **AP0104**
Sample Name: **PBOW-09-DS-ASH PIT 2-SB02-AP0104-(3-5)**
Sampling Method: **DP**
Sample Type: **DS** *Sample Purpose:* **REG**
Sampling Equip: Geoprobe, 5' Acetate Liner, disposable ziplock baggie

Task: **ASH PIT2**
Collection Date: 1-16-09
Collection Time: 1033
Start Depth: 3'
End Depth: 5'
Sample Matrix: **SOIL**
Sample Team: Kessler / Weaver

QC Partners:
(TB) —— (ER) —— (FB) ——

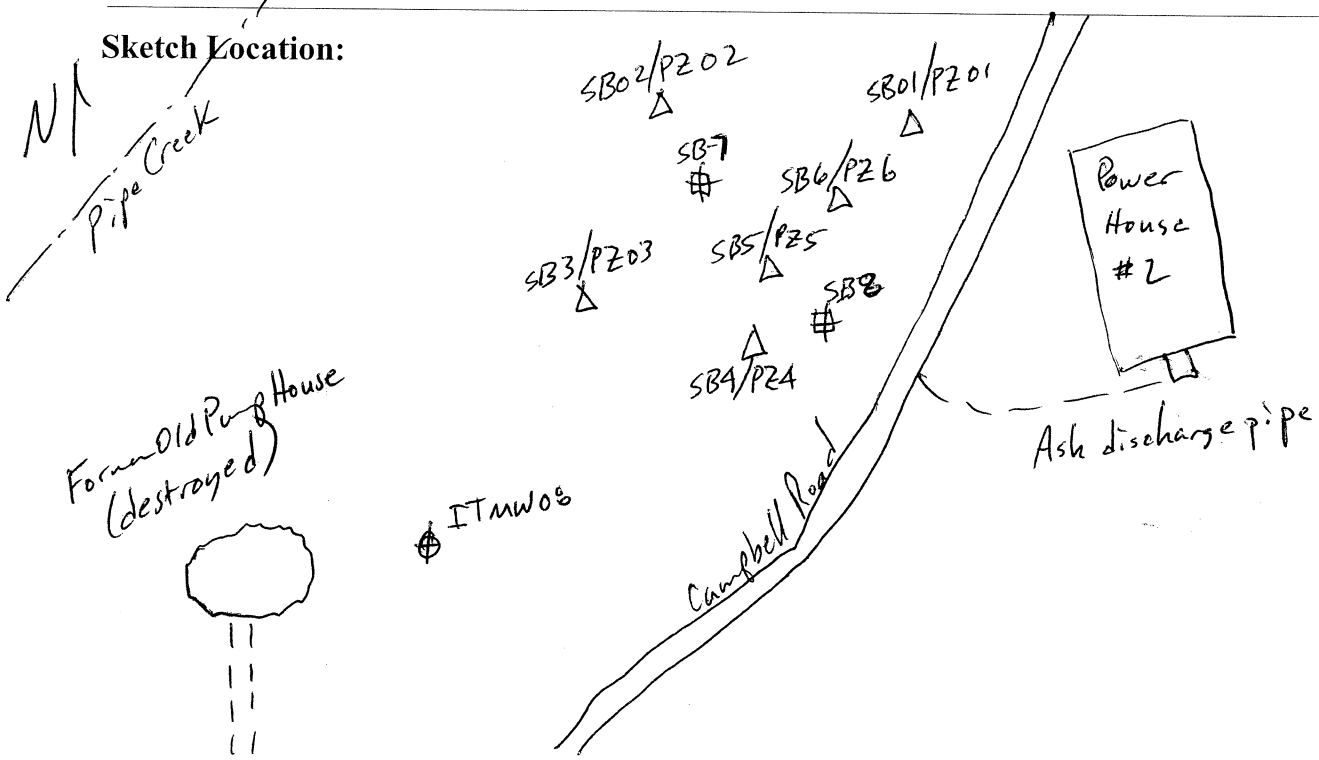
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: PID -0.0

Sketch Location:



Logged BY / Date: E. W. Weaver 1-16-09 *Reviewed BY / Date:* Edward W. Weaver 11-8-0

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Shaw E & I, Inc.

Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS
Manager: Steve Downey

RFA / COC Number: PB011609 AML

Location Code: **ASH PIT 2-SB02**
Sample Number: **AP0105**
Sample Name: **PBOW-09-DS-ASH PIT 2-SB02-AP0105-(3-5)**
Sampling Method: **DP**
Sample Type: **DS** *Sample Purpose:* **FD**
Sampling Equip: Geoprobe, 5' Acetate Liner, disposable ziplock baggie

Task: **ASH PIT2**
Collection Date: 1-16-09
Collection Time: 1033
Start Depth: 3'
End Depth: 5'
Sample Matrix: **SOIL**
Sample Team: Kessler/Weaver

QC Partners:
(TB) — (ER) — (FB) —

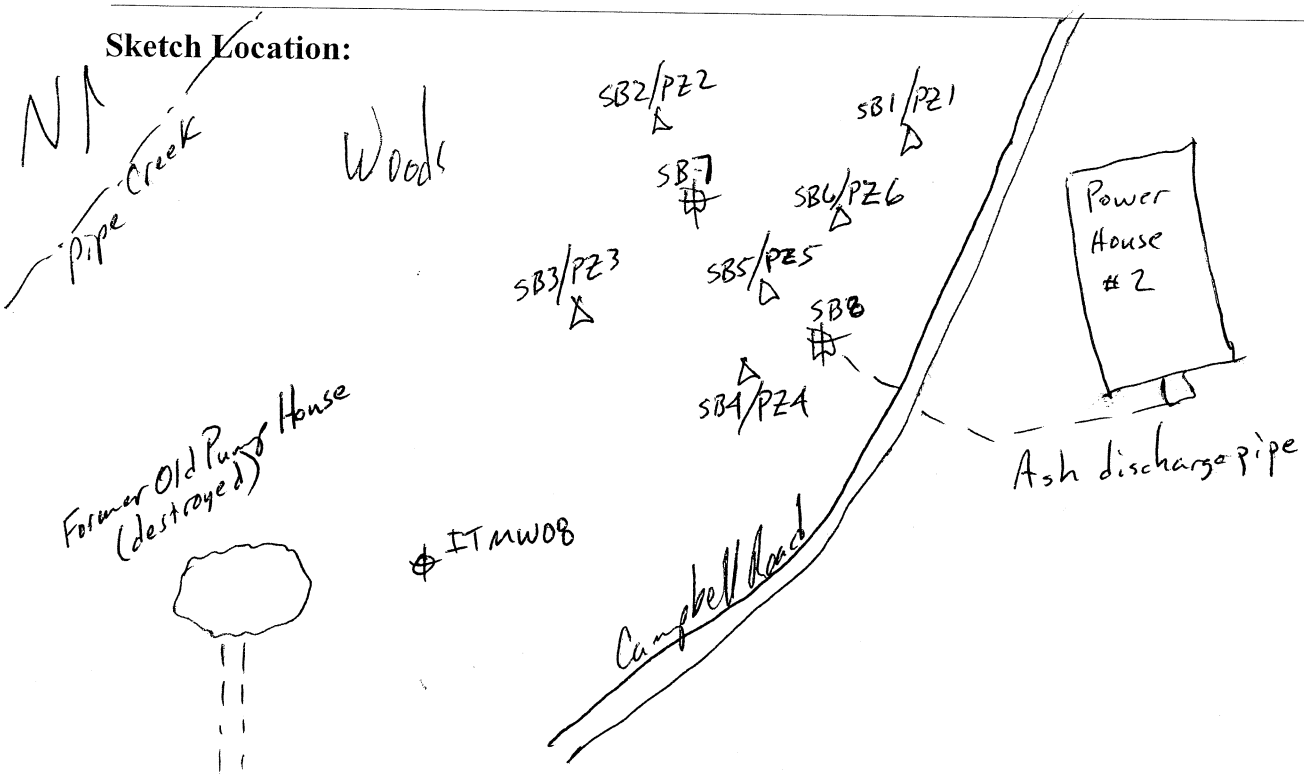
ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

Comments: PID -0.0

Sketch Location:



Logged BY / Date: E. Weaver 1-16-09 *Reviewed BY / Date:* Edward R Weaver 11-8-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011609TA

Location Code: **ASH PIT 2-SB02**

Sample Number: **AP0106**

Sample Name: **PBOW-09-DS-ASH PIT 2-SB02-AP0106-(3-5)**

Sampling Method: **DP**

Sample Type: **DS** *Sample Purpose:* **FS**

Sampling Equip: Geoprobe, 5' Acetate Liner, disposable ziplock baggie

Task: **ASH PIT2**

Collection Date: 1-16-09

Collection Time: 1033

Start Depth: 3'

End Depth: 5'

Sample Matrix: **SOIL**

Sample Team: Kessler/Weaver

QC Partners:

(TB) —— (ER) —— (FB) ——

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	4	oz	CWM
METALS	N	A	2	4	oz	CWM
PCBS	N	A	2	4	oz	CWM
SEMIVOLATILES	N	A	2	4	oz	CWM

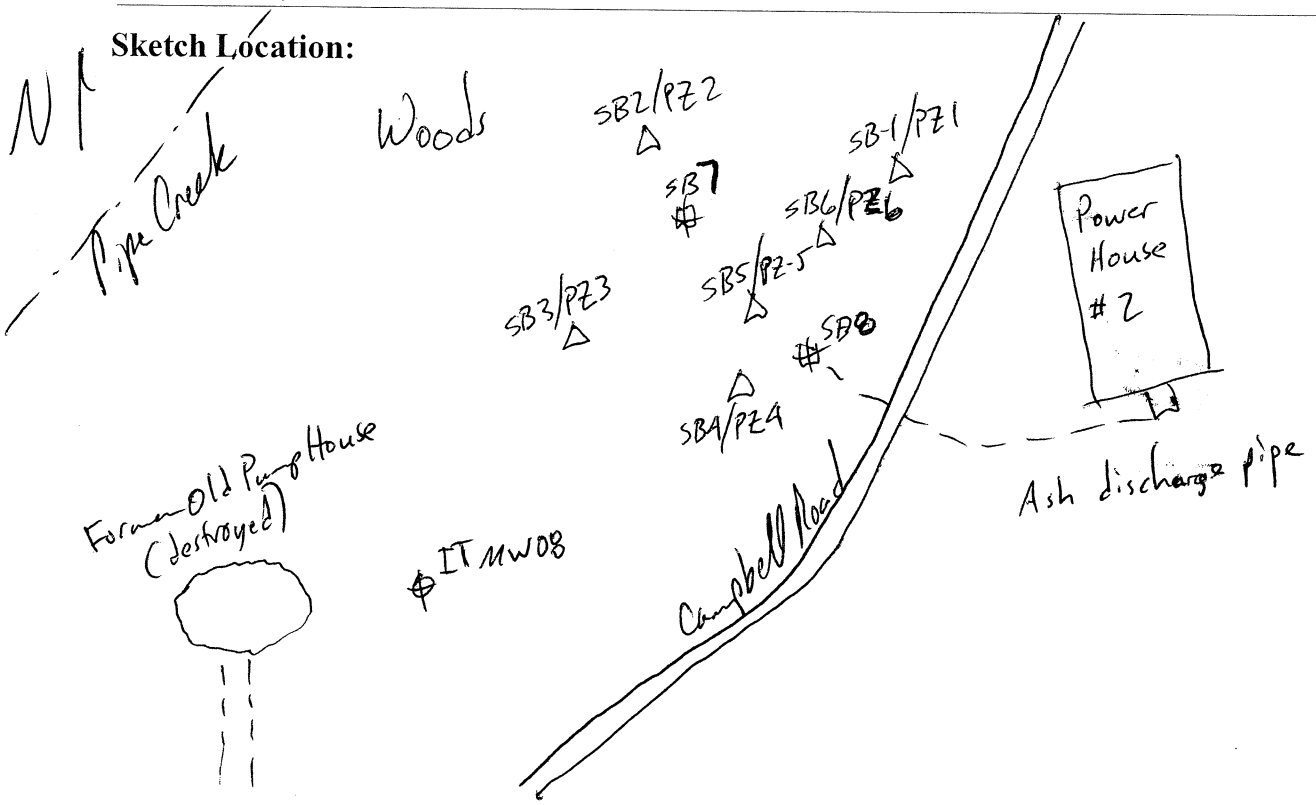
ERPIMS Values:

Sacode:

Lot Control#:

Comments: PID - 0.0

Sketch Location:



Logged BY / Date: E. Weaver 1-16-09

Reviewed BY / Date: Edward J. Weaver 11-8-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011609AML

Location Code: **ASH PIT 2-SB02**
Sample Number: **AP0107**
Sample Name: **PBOW-09-DS-ASH PIT 2-SB02-AP0107-(8-1(**
Sampling Method: **DP**
Sample Type: **DS** *Sample Purpose:* **REG**
Sampling Equip: Geoprobe, 5' Acetate Liner, disposable ziplock baggie

Task: **ASH PIT2**
Collection Date: 1-16-09
Collection Time: 1200
Start Depth: 8'
End Depth: 10'
Sample Matrix: **SOIL**
Sample Team: Kessler/Weaver

QC Partners:
(TB) — (ER) — (FB) —

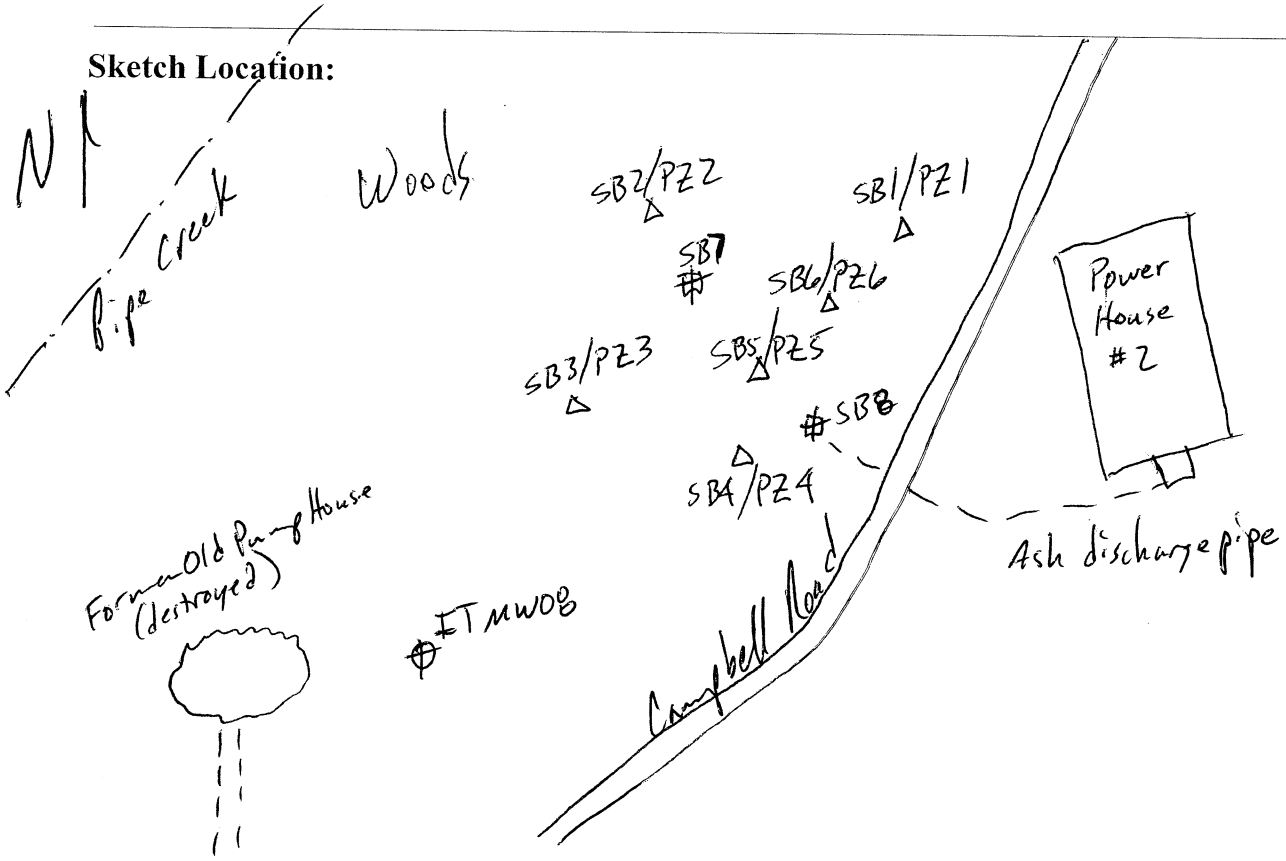
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: PID - 0.0

Sketch Location:



Logged BY / Date: E. Weaver 1-16-09 *Reviewed BY / Date:* Edward K. Weaver 1-8-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011609 AML

Location Code: **ASH PIT 2-SB05**

Sample Number: **AP0114**

Sample Name: **PBOW-09-SS-ASH PIT 2-SB05-AP0114-(0-1)**

Sampling Method: **DP**

Sample Type: **SS** *Sample Purpose:* **REG**

Sampling Equip: Geoprobe, 5' Acetate liner, disposable ziplock baggies

QC Partners:

(TB) — **(ER)** — **(FB)** —

Task: **ASH PIT2**

Collection Date: 1-16-09

Collection Time: 1225

Start Depth: 0

End Depth: 1'

Sample Matrix: **SOIL**

Sample Team: Kessler/Weaver

ERPIMS Values:

Sacode:

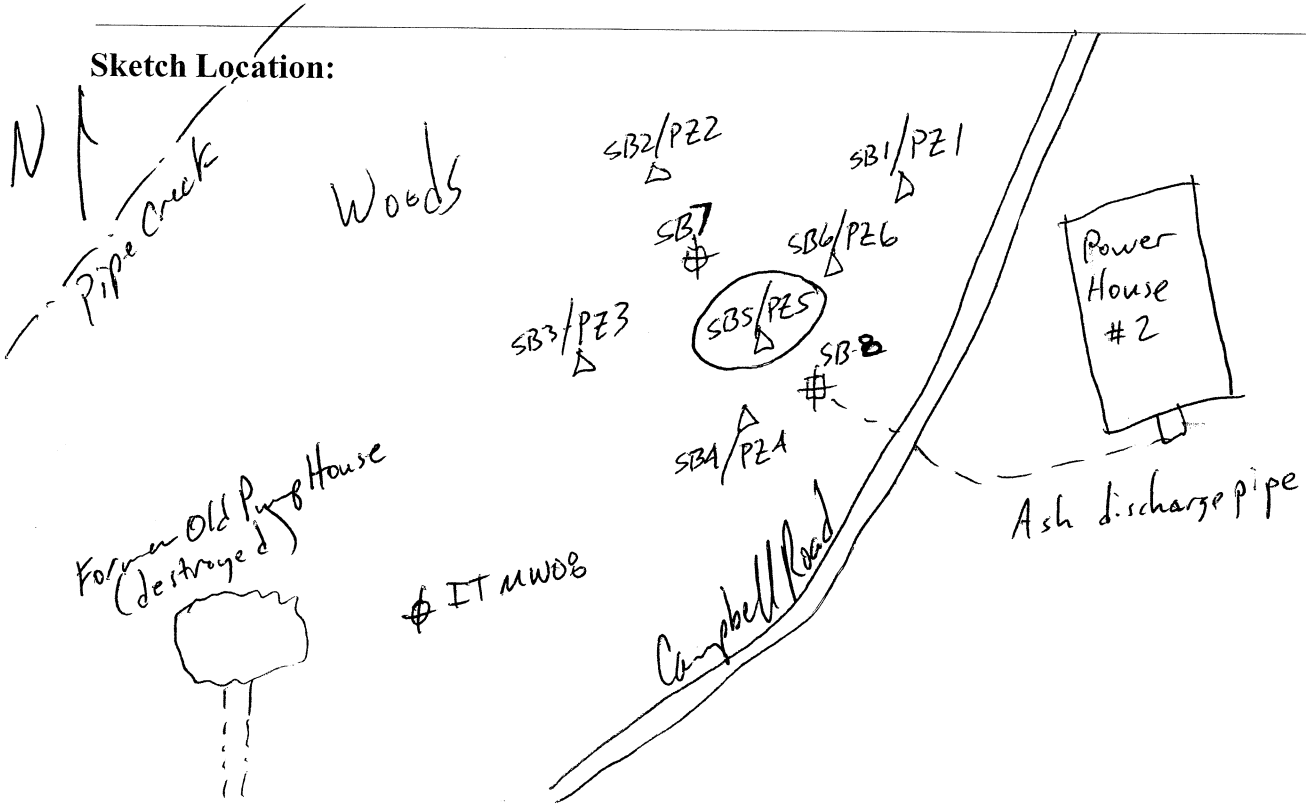
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

Comments: PID 0.0

Sketch Location:



Logged BY / Date: [signature] 1-16-09

Reviewed BY / Date: Edward E. Weaver 11-8-0

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011609AUL

Location Code: **ASH PIT 2-SB05**

Sample Number: **AP0115**

Sample Name: **PBOW-09-DS-ASH PIT 2-SB05-AP0115-(3-5)**

Sampling Method: **DP**

Sample Type: **DS** *Sample Purpose:* **REG**

Sampling Equip: Geoprobe, 5' Acetate liner, disposable ziplock baggie

Task: **ASH PIT2**

Collection Date: 1-16-09

Collection Time: 1227

Start Depth: 3'

End Depth: 3.3'

Sample Matrix: **SOIL**

Sample Team: Kessler/Weaver

QC Partners:

(TB) — **(ER)** — **(FB)** —

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

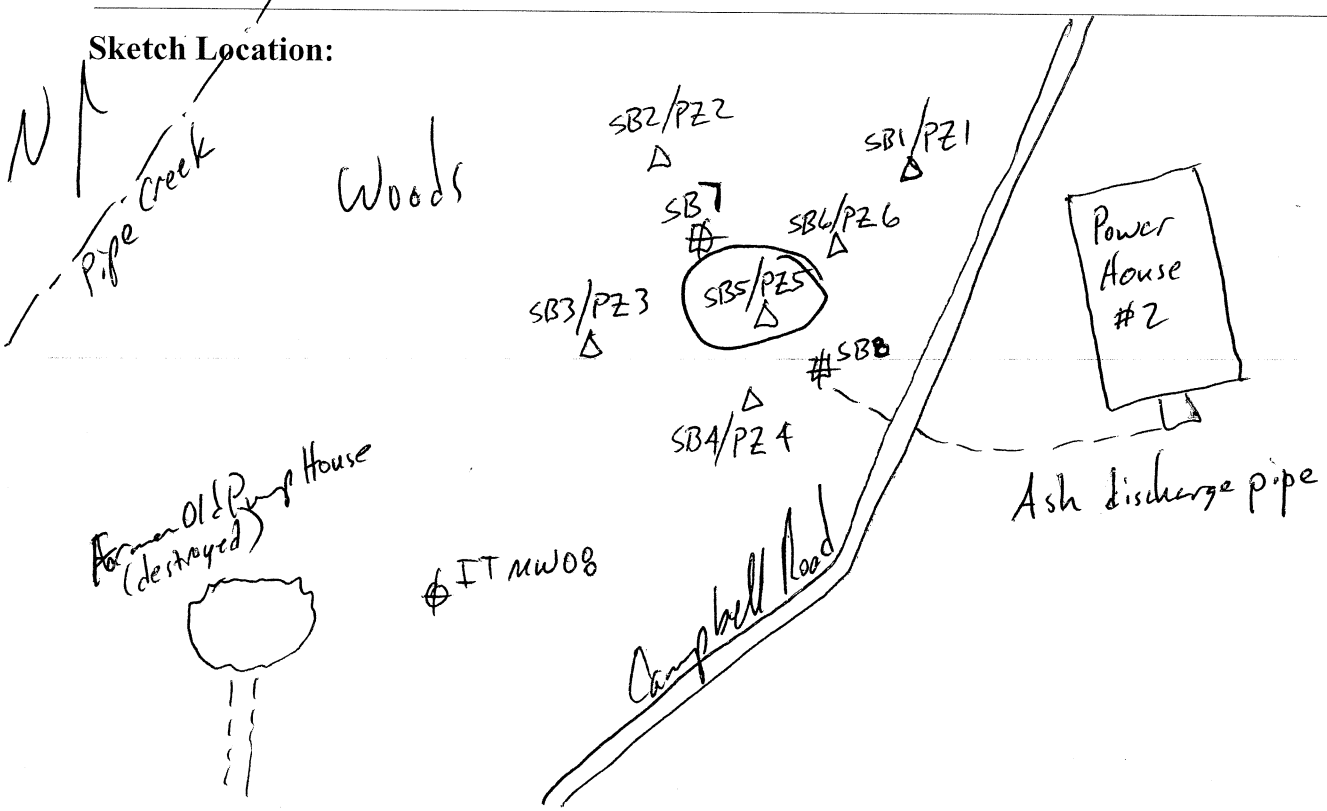
ERPIMS Values:

Sacode:

Lot Control#:

Comments: PID - 0.0

Sketch Location:



Logged BY / Date: [signature] 1-16-09

Reviewed BY / Date: [signature] 1-16-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011609AML

Location Code: **ASH PIT 2-SB05**
Sample Number: **AP0116**
Sample Name: **PBOW-09-DS-ASH PIT 2-SB05-AP0116-(8-1(**
Sampling Method: **DP**
Sample Type: **DS** *Sample Purpose:* **REG**
Sampling Equip: Geoprobe, 5' Acetate liner, disposable ziplock baggie

Task: **ASH PIT2**
Collection Date: 1-16-09
Collection Time: 1235
Start Depth: 7.3'
End Depth: 9.3'
Sample Matrix: **SOIL**
Sample Team: Kessler/Weaver

QC Partners:
(TB) — (ER) — (FB) —

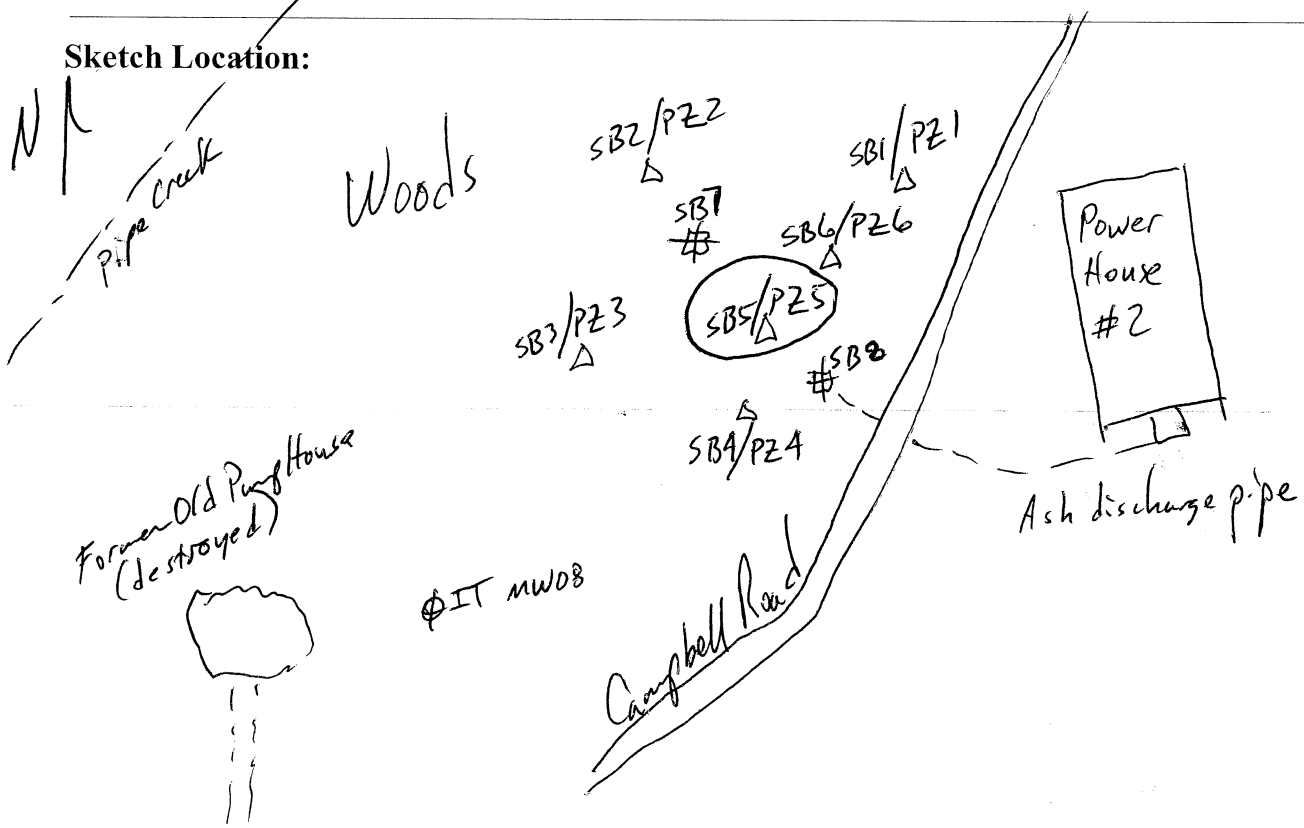
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: PID - 0.2

Sketch Location:



Logged BY / Date: E. W. Weaver 1-16-09 *Reviewed BY / Date:* Edward G. Weaver 11-8-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011609 AML

Location Code: **ASH PIT 2-SB08**

Sample Number: **AP0125**

Sample Name: **PBOW-09-SS-ASH PIT 2-SB08-AP0125-(0-1)**

Sampling Method: **DP**

Sample Type: **SS** *Sample Purpose:* **REG**

Sampling Equip: Geoprobe, 5' Acetate liner, disposable ziplock baggie

QC Partners:

(TB) — **(ER)** — **(FB)** —

Task: **ASH PIT2**

Collection Date: 1-16-09

Collection Time: 1305

Start Depth: 0

End Depth: 1'

Sample Matrix: **SOIL**

Sample Team: Kessler/Weaver

ERPIMS Values:

Sacode:

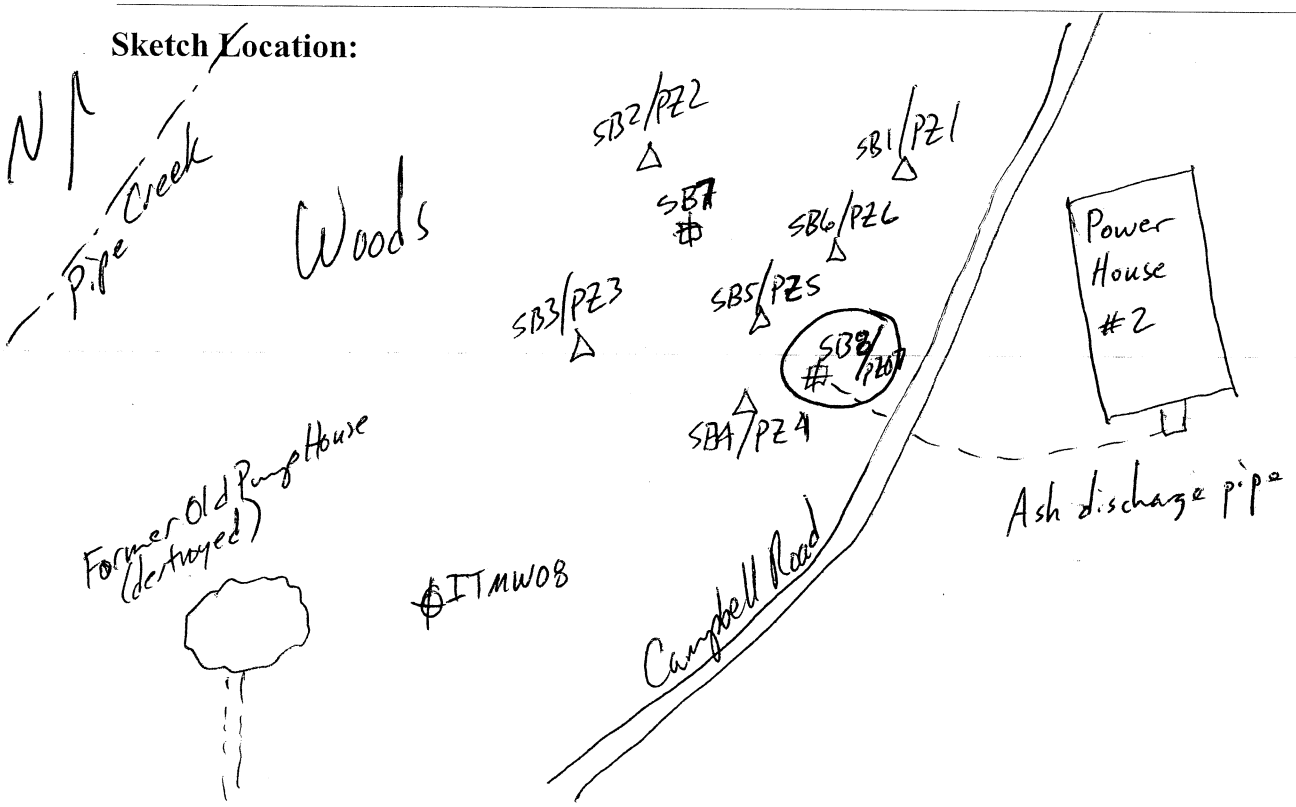
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

Comments: PID 0.3

Sketch Location:



Logged BY / Date: Eric W. Weaver 1-16-09

Reviewed BY / Date: Edward K. Weaver 11-8-10

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011609AML

Location Code: **ASH PIT 2-SB08**
Sample Number: **AP0126**
Sample Name: **PBOW-09-DS-ASH PIT 2-SB08-AP0126-(3-5)**
Sampling Method: **DP**
Sample Type: **DS** *Sample Purpose:* **REG**
Sampling Equip: Geoprobe, 5' Acetate liner, disposable ziplock baggie

Task: **ASH PIT2**
Collection Date: 1-16-09
Collection Time: 1307
Start Depth: 3'
End Depth: 3.5'
Sample Matrix: **SOIL**
Sample Team: Kessler/Weaver

QC Partners:
(TB) — (ER) — (FB) —

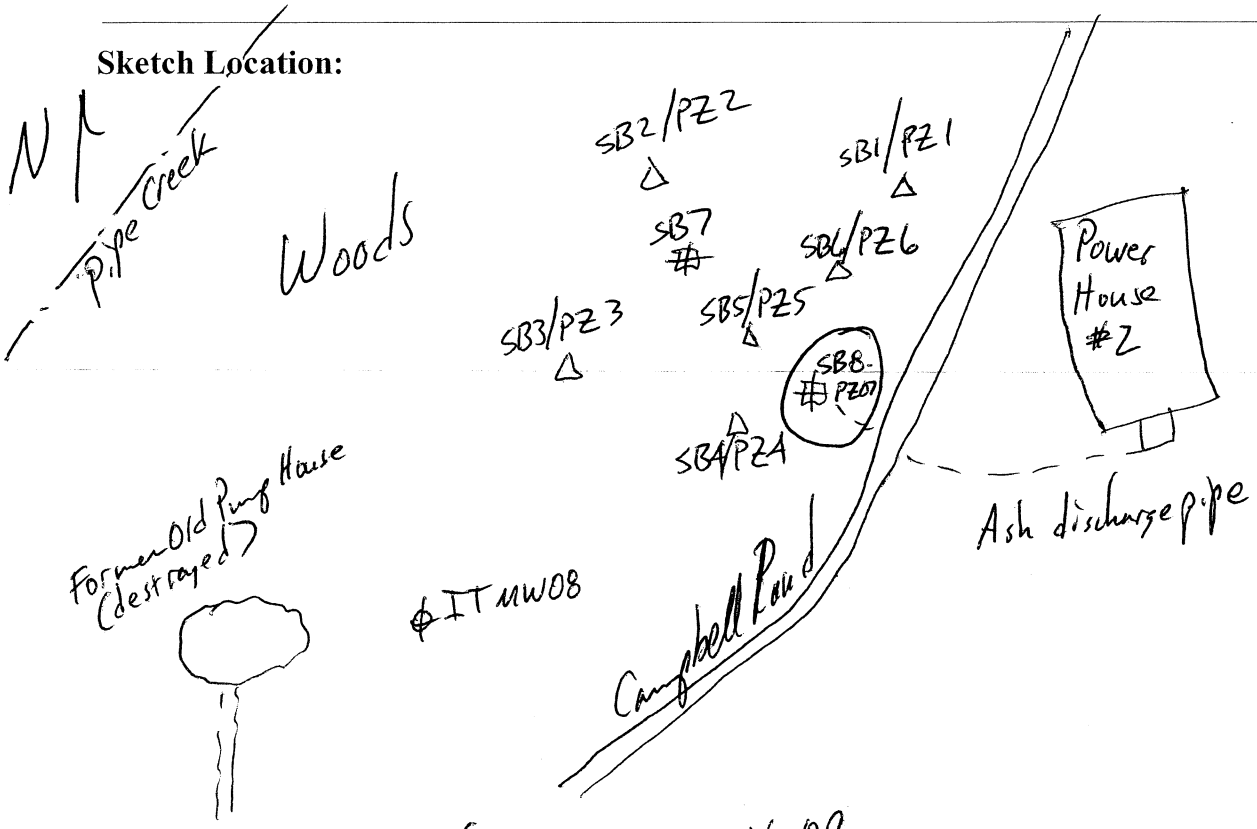
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: PID 0.0

Sketch Location:



Logged BY / Date: 1-16-09 *Reviewed BY / Date:* 1-8-

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011609 AML

Location Code: **ASH PIT 2-SB08**
Sample Number: **AP0127**
Sample Name: **PBOW-09-DS-ASH PIT 2-SB08-AP0127-(8-1(**
Sampling Method: **DP**
Sample Type: **DS** *Sample Purpose:* **REG**
Sampling Equip: Geoprobe, 5' Acetate liner disposable/plastic basin

Task: **ASH PIT2**
Collection Date: 1-16-09
Collection Time: 1320
Start Depth: 8'
End Depth: 8.8'
Sample Matrix: **SOIL**
Sample Team: Kessler/Weaver

QC Partners:
(TB) —— (ER) —— (FB) ——

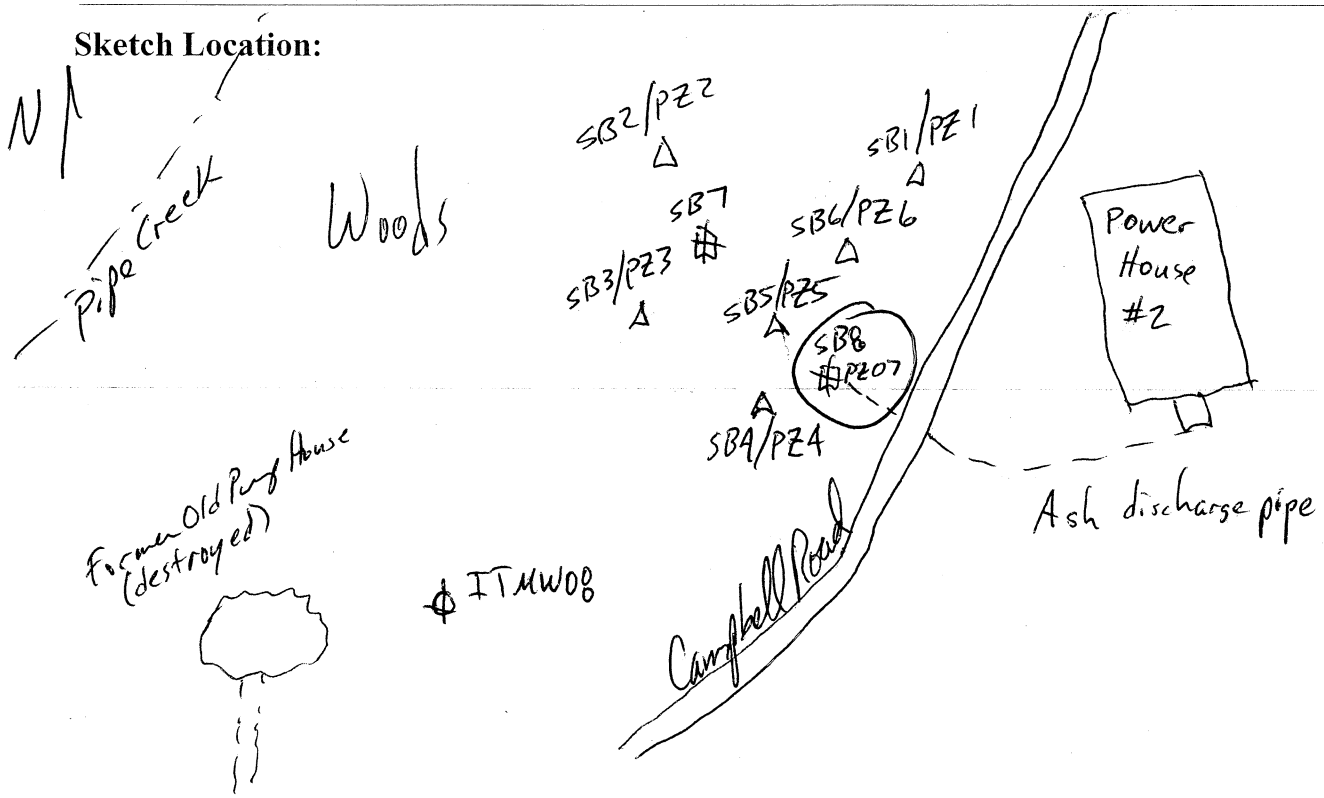
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: PID 0.0

Sketch Location:



Logged BY / Date: E. W. Weaver 1-16-09

Reviewed BY / Date: Edward E. Weaver 11-8-0

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011609AML

Location Code: **ASH PIT 2-SB08**
Sample Number: **AP0128**
Sample Name: **PBOW-09-DS-ASH PIT 2-SB08-AP0128-(8-1(**
Sampling Method: **DP**
Sample Type: **DS** *Sample Purpose:* **FD**
Sampling Equip: Geoprobe, 5' Acetate liner, disposable ziplock baggie

Task: **ASH PIT2**
Collection Date: 1-16-09
Collection Time: 1320
Start Depth: 8'
End Depth: 8.0'
Sample Matrix: **SOIL**
Sample Team: Keeler/Weaver

QC Partners:
(TB) — (ER) — (FB) —

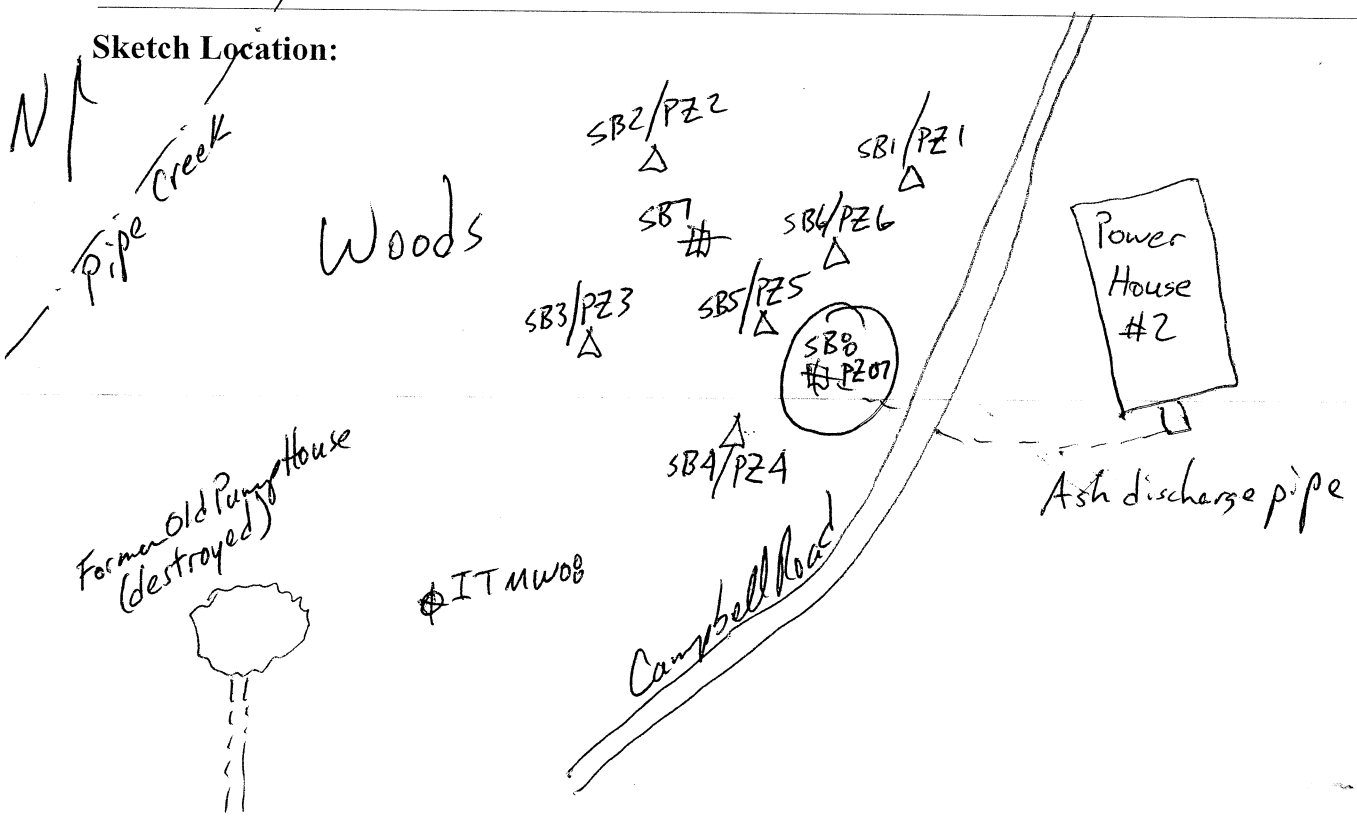
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: PID - 0.0

Sketch Location:



Logged BY / Date: E. W. Weaver 1-16-09

Reviewed BY / Date: Edward A. Weaver 11-8-0(

Shaw E & I, Inc.

Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011609TA

Location Code: **ASH PIT 2-SB08**

Sample Number: **AP0129**

Sample Name: **PBOW-09-DS-ASH PIT 2-SB08-AP0129-(8-1(**

Sampling Method: **DP**

Sample Type: **DS** *Sample Purpose:* **FS**

Sampling Equip: Geoprobe, 5' Acetate liner, disposable ziplock baggie

QC Partners:

(TB) — **(ER)** — **(FB)** —

Task: **ASH PIT2**

Collection Date: 1-16-09

Collection Time: 1320

Start Depth: 8'

End Depth: 8.8'

Sample Matrix: **SOIL**

Sample Team: Kessler/Weaver

ERPIMS Values:

Sacode:

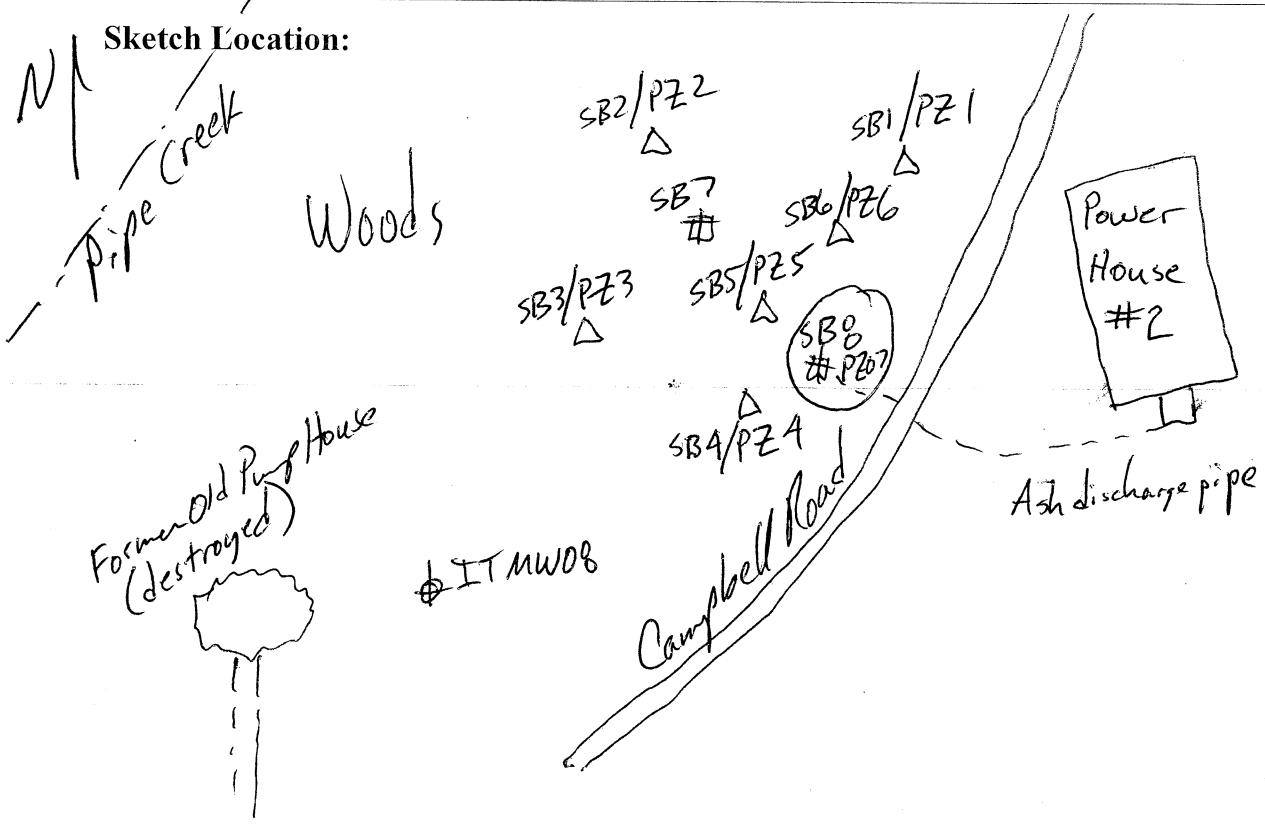
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	4	oz	CWM
METALS	N	A	2	4	oz	CWM
SEMIVOLATILES	N	A	2	4	oz	CWM

Comments: PID - 0.0

Sketch Location:



Logged BY / Date: E. W. Weaver 1-16-09

Reviewed BY / Date: Edward S. Weaver 11-8-0

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011909AML

Location Code: **ASH PIT 2-SB03**
Sample Number: **AP0108**
Sample Name: **PBOW-09-SS-ASH PIT 2-SB03-AP0108-(0-1)**
Sampling Method: **DP**
Sample Type: **SS** *Sample Purpose:* **REG**
Sampling Equip: Geoprobe, 5' Acetate liner, disposable ziplock baggie

Task: **ASH PIT2**
Collection Date: 1-18-09
Collection Time: 0925
Start Depth: 0
End Depth: 1'
Sample Matrix: **SOIL**

QC Partners:
(TB) — (ER) — (FB) —

Sample Team: Kessler/Weaver

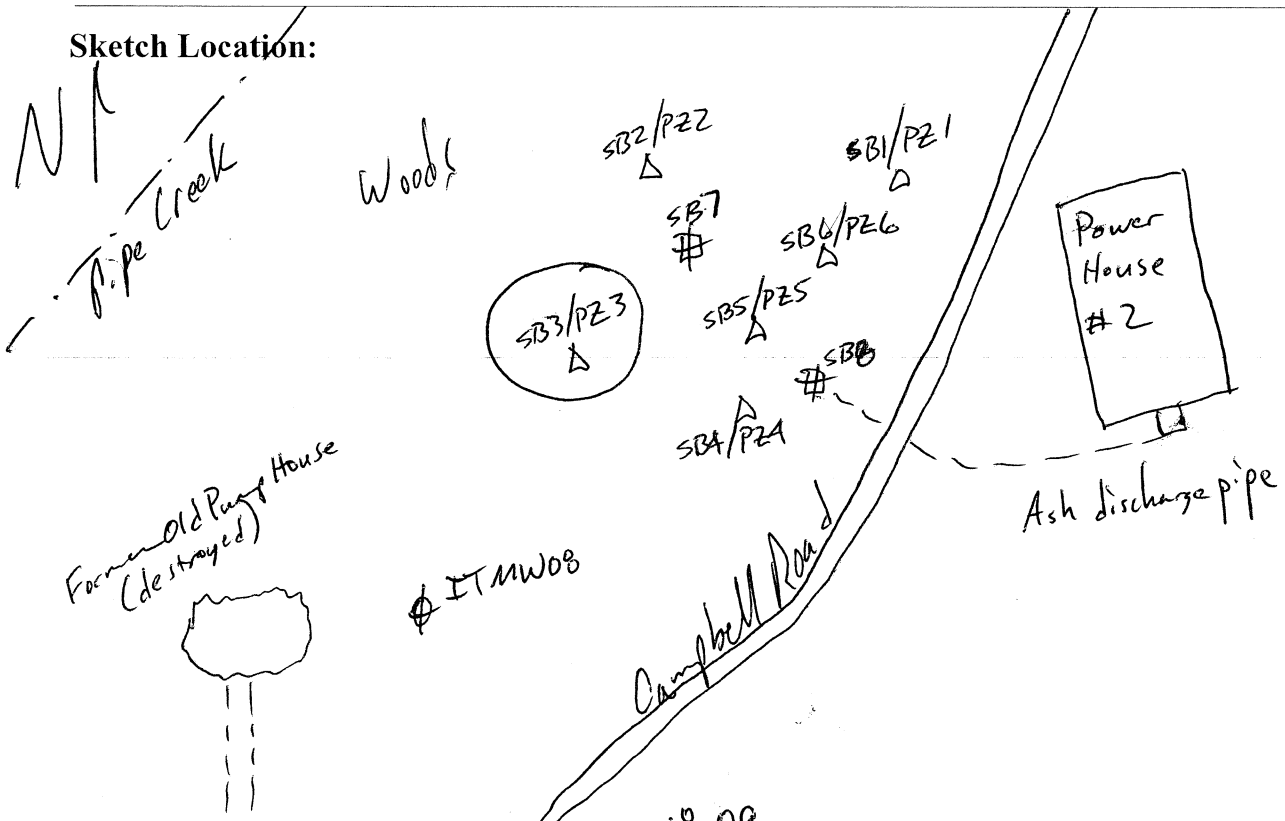
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: PID - 0.0

Sketch Location:



Logged BY / Date: [signature] 1-18-09

Reviewed BY / Date: Edward S. Weaver 11-8-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011909AML

Location Code: **ASH PIT 2-SB03**
Sample Number: **AP0109**
Sample Name: **PBOW-09-DS-ASH PIT 2-SB03-AP0109-(3-5)**
Sampling Method: **DP**
Sample Type: **DS** *Sample Purpose:* **REG**
Sampling Equip: Geoprobe, 5' Acetate liner, disposable ziplock baggie

Task: **ASH PIT2**
Collection Date: 1-18-09
Collection Time: ~~930~~ EST 0928
Start Depth: 3'
End Depth: 3.5'
Sample Matrix: **SOIL**
Sample Team: Kessler / Weaver

QC Partners:
(TB) — (ER) — (FB) —

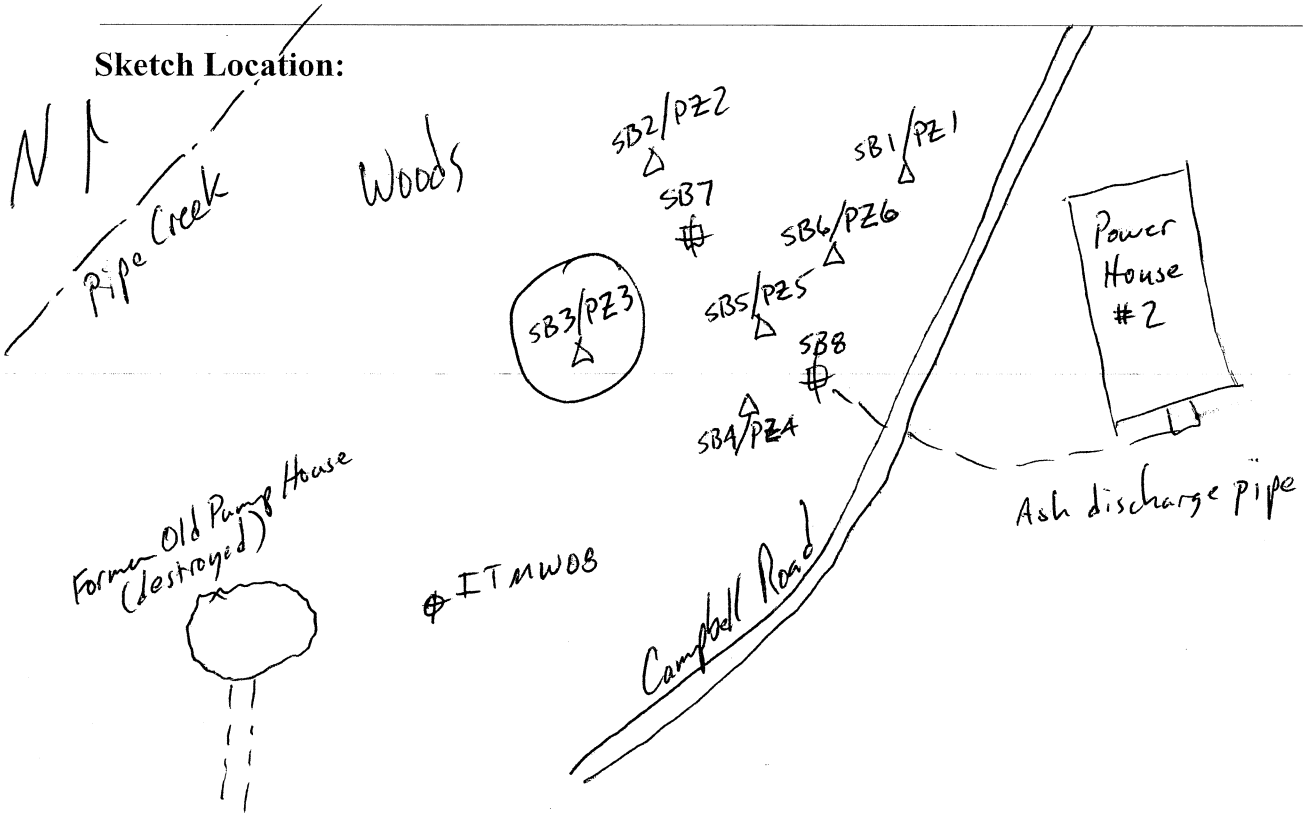
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: PID - 0.0

Sketch Location:



Logged BY / Date: E. W. Weaver 1-18-09 *Reviewed BY / Date:* Edward E. Weaver 11-8-0

Shaw™
Shaw E & I, Inc.

Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011909AML

Location Code: **ASH PIT 2-SB03**
Sample Number: **AP0110**
Sample Name: **PBOW-09-DS-ASH PIT 2-SB03-AP0110-(8-1(**
Sampling Method: **DP**
Sample Type: **DS** *Sample Purpose:* **REG**
Sampling Equip: Geoprobe, 5' Acetate Liner, disposable ziplock baggie

Task: **ASH PIT2**
Collection Date: 1-18-09
Collection Time: 0930
Start Depth: 8'
End Depth: 10'
Sample Matrix: **SOIL**
Sample Team: Kessler/Weaver

QC Partners:
(TB) —— (ER) —— (FB) ——

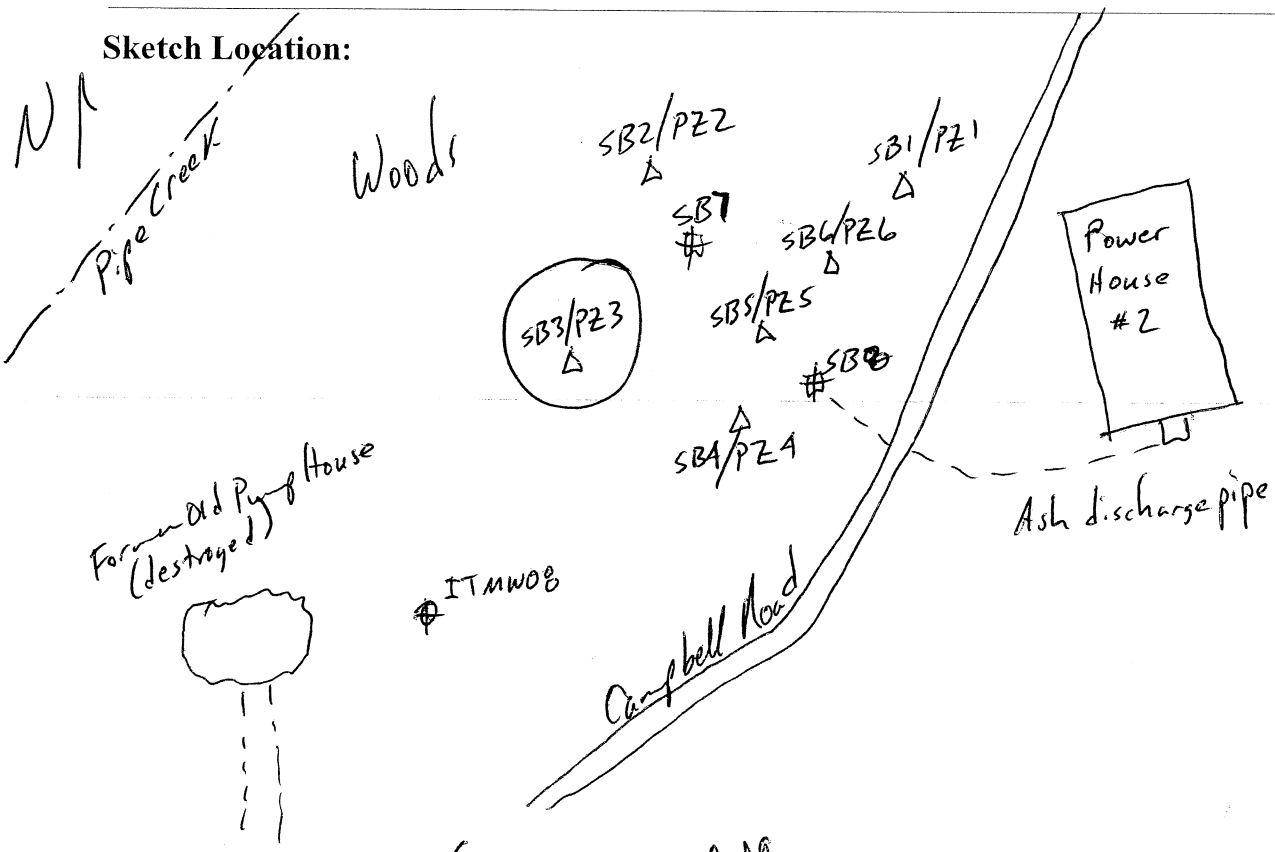
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: PID - 0.0

Sketch Location:



Logged BY / Date: E. W. Weaver 1-18-09

Reviewed BY / Date: Edward K. Weaver 11-8-0

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011909AML

Location Code: **ASH PIT 2-SB04**

Task: **ASH PIT2**

Sample Number: **AP0111**

Collection Date: 1-18-09

Sample Name: **PBOW-09-SS-ASH PIT 2-SB04-AP0111-(0-1)**

Collection Time: 0845

Sampling Method: **DP**

Start Depth: 0

Sample Type: **SS** *Sample Purpose:* **REG**

End Depth: 1'

Sampling Equip: Geoprobe, 5' Acetate liner, disposable ziplock baggie

Sample Matrix: **SOIL**

QC Partners:

(TB) — **(ER)** — **(FB)** —

Sample Team: Kessler / Weaver

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

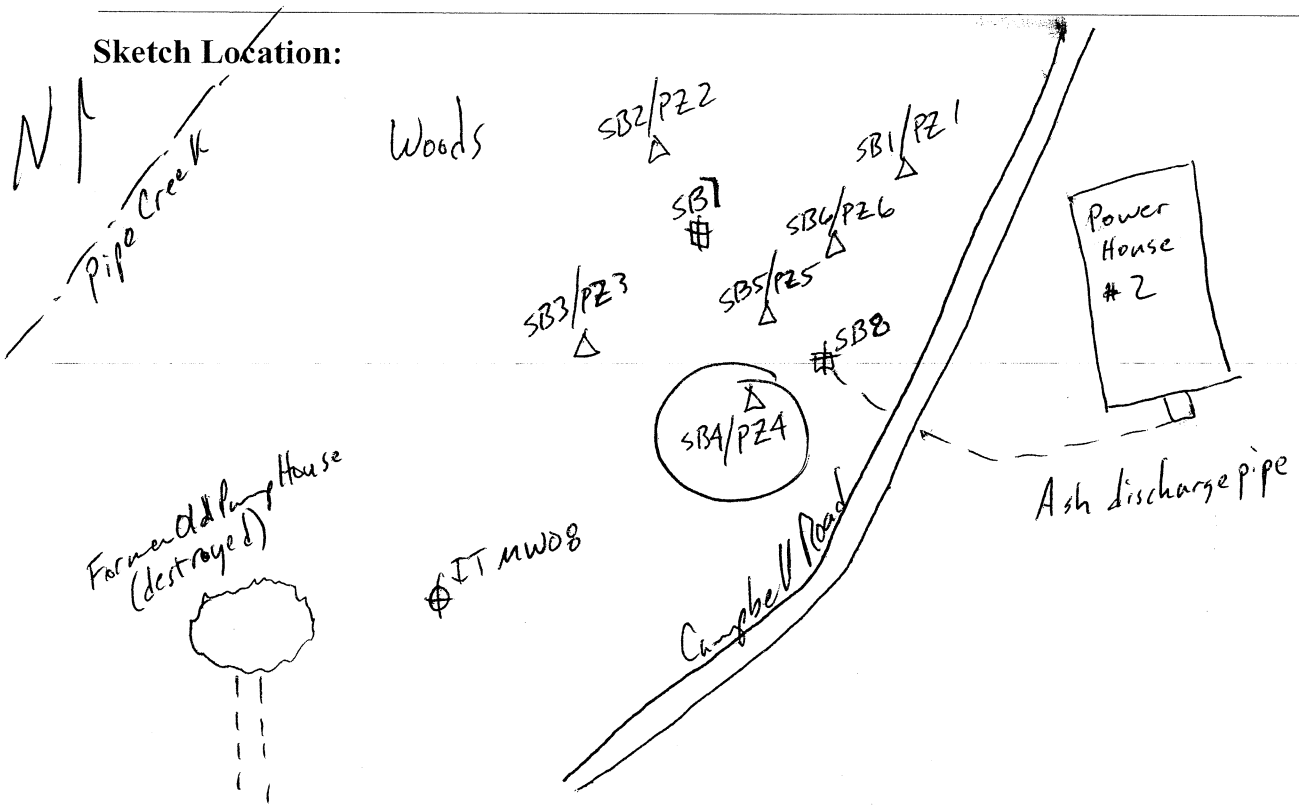
ERPIMS Values:

Sacode:

Lot Control#:

Comments: PID - 0.0

Sketch Location:



Logged BY / Date: [signature] 1-18-09

Reviewed BY / Date: [signature] 11-8-09

Shaw E & I, Inc.

Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB011909 AML

Location Code: **ASH PIT 2-SB04**

Sample Number: **AP0112**

Sample Name: **PBOW-09-DS-ASH PIT 2-SB04-AP0112-(3-5)**

Sampling Method: **DP**

Sample Type: **DS** *Sample Purpose:* **REG**

Sampling Equip: Geoprobe, 5' Acetate liner, disposable ziplock baggie

QC Partners:

(TB) — **(ER)** — **(FB)** —

Task: **ASH PIT2**

Collection Date: 1-18-09

Collection Time: 0848

Start Depth: 3'

End Depth: 3.5'

Sample Matrix: **SOIL**

Sample Team: Kessler/Weaver

ERPIMS Values:

Sacode:

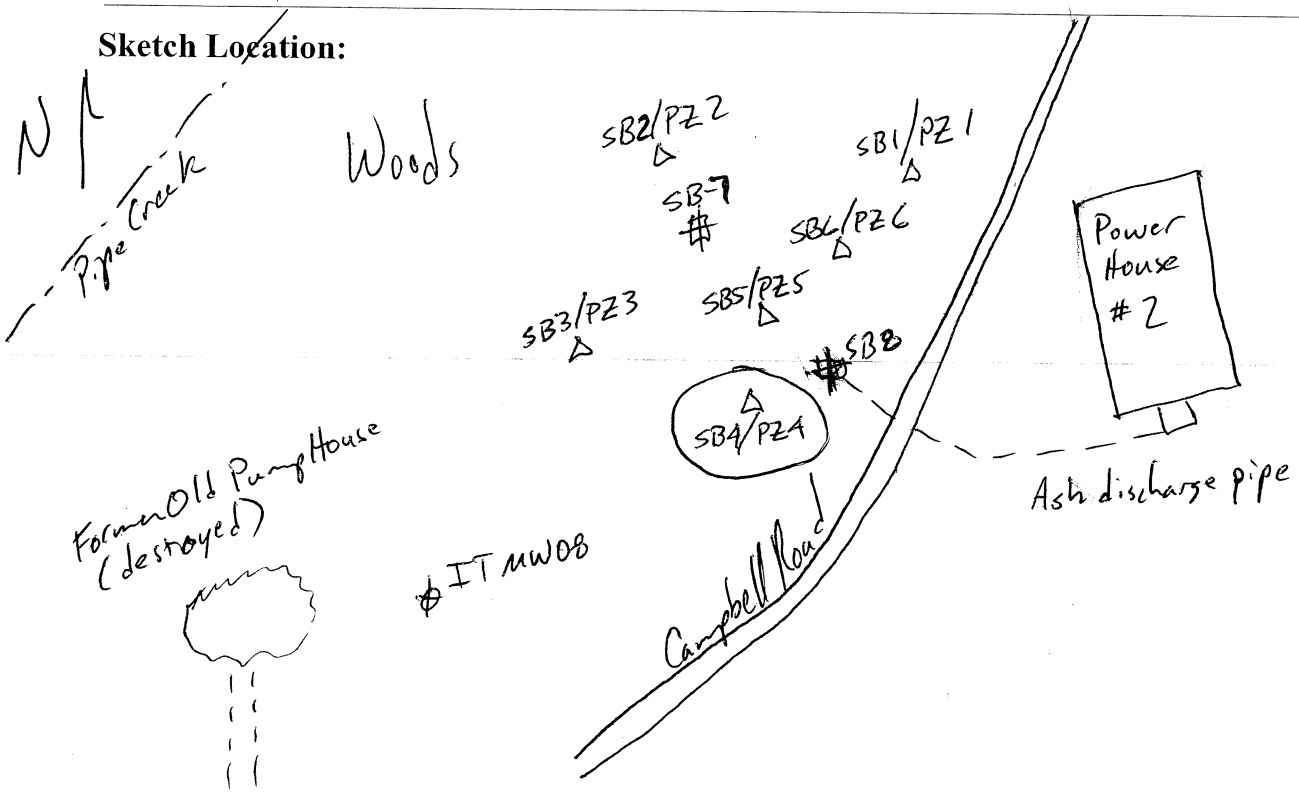
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

Comments: PID - 0.0

Sketch Location:



Logged BY / Date: E. W. Weaver 1-18-09

Reviewed BY / Date: Edward W. Weaver 11-8-0

Shaw E & I, Inc.

Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB01 1909 AML

Location Code: **ASH PIT 2-SB04**

Sample Number: **AP0113**

Sample Name: **PBOW-09-DS-ASH PIT 2-SB04-AP0113-(8-1(**

Sampling Method: **DP**

Sample Type: **DS** *Sample Purpose:* **REG**

Sampling Equip: Geoprobe, 5' Acetate liner, disposable ziplock baggie

QC Partners:

(TB) — (ER) — (FB) —

Task: **ASH PIT2**

Collection Date: 1-18-09

Collection Time: 0850

Start Depth: 8'

End Depth: 10'

Sample Matrix: **SOIL**

Sample Team: Kessler / Weaver

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

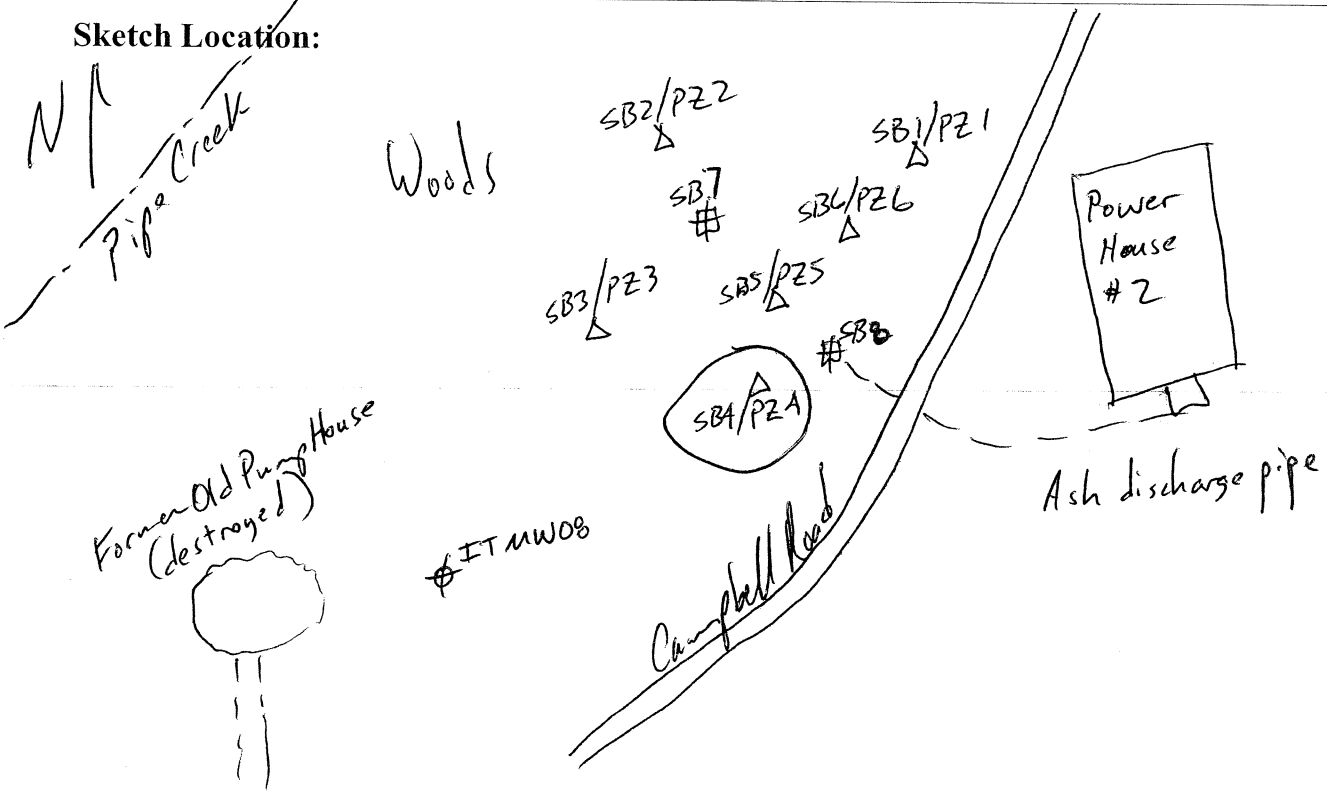
ERPIMS Values:

Sacode:

Lot Control#:

Comments: PID 0.0

Sketch Location:



Logged BY / Date: Eric W. Weaver 1-18-09

Reviewed BY / Date: Edward E. Weaver 1-18-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB020209AM2

Location Code: **ASH PIT 2-PZ03**
Sample Number: **AP3018**
Sample Name: **PBOW-09-GW-ASH PIT 2-PZ03-AP3018**
Sampling Method: **SP**
Sample Type: **GW** *Sample Purpose:* **REG**
Sampling Equip: Peristaltic pump. Teflon lined tubing

Task: **ASH PIT2**
Collection Date: 1-31-09
Collection Time: 1730
Start Depth: 5.34' btoc
End Depth: 5.38' btoc
Sample Matrix: **WATER**
Sample Team: DK/EW/MW

QC Partners:
(TB) — (ER) — (FB) —

ERPIMS Values:
Sacode:
Lot Control#:

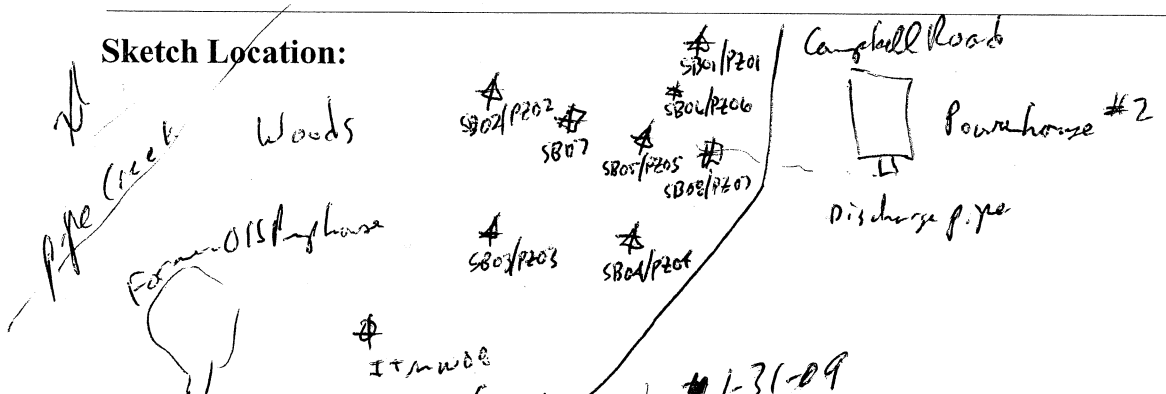
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
ALKALINITY	N	A	1	1	L	HDPE
CHLORIDE	N	A	1	1	L	HDPE
SULFATE	N	A	1	1	L	HDPE
TDS	N	A	1	1	L	HDPE
TSS	N	A	1	1	L	HDPE
TURB 180.1	N	A	1	1	L	HDPE
HARDNESS	N	B	1	500	mL	HDPE
METALS3-W	N	B	1	500	mL	HDPE
METALS3-W-F	Y	C	1	500	mL	HDPE
CYANIDE	N	D	1	500	mL	HDPE
NITRATE	N	E	1	125	mL	HDPE
EXPLOSIVES	N	F	2	1	L	Amb. Glass
SEMIVOLATILES3	N	G	2	1	L	Amb. Glass

Groundwater Information:
Measured Well Depth: 14.15' btoc **Depth To Water:** 5.28' btoc

Comments: NA

Sketch Location:



Logged BY / Date: E. W. Weaver 1-31-09 *Reviewed BY / Date:* Edward E. Nowe 11-8-0

Groundwater Purge Form

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GROUNDWATER PURGE FORM

Sheet 1 of 2

Operable Unit/Site ID: Ash Pit 2
Project Name/#: PBOW
Weather: cloudy ~ 15°F
Purge Equipment: Peristaltic pump, Teflon lined tubing
Sampling Equipment: same

Sampling location ID: Ash Pit 2 - PZ03
Sample ID: AP3018
Collection Time/Date: 1-31-09
Purge Purpose (circle): Sample or Redevelop

Pump Installation

Pump installation crew: DK/EW/MW
PID/FID reading (well head/background): 0
Casing diameter (inches): 1"
Total well Depth (ft. BTOC): 14.15
Initial (pre-installation) DTW/time: 5.27
Final (after pump priming) DTW/time: 5.28
Free product (circle): LNAPL / DNAPL
Depth to free product (ft BTOC): —
Volume of water removed during priming (mL): —
Discharge tube length (ft.): 21

Installation date/beginning time: 1-31-09
Installation date/completion time: 1-31-09
Screen Interval (ft. BTOC): 3.9 to 13.9
Sample Depth/Pump intake depth (ft BTOC): 13.5
Post-installation DTW/time: 5.28
Max. sustainable pump rate (mL/min): —
Appearance of product: —
Discharge tube diameter (3/8" or 1/4"): 1/4" ID
Inlet reducer used (Y/N): N

Pneumatic Controller Tuning: Initial air pressure = H (ft.) X 0.43 = — psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting									
Discharge Setting									
Flow rate (mL/min)									

Purging

Purging/sampling crew: DK/EW/MW
Purge date/beginning time: 1-31-09
Initial (pre-purging) DTW (ft. BTOC): 5.27
Calculated tubing + pump volume: 0.21
Unit casing volume: 0.041

PID/FID reading (well head/background): 0
Purge date/completion time: 1-31-09
Final (post-purging) DTW (ft. BTOC): 5.36
Total volume purged: 7.150
Required purge volume: 0.63

Pneumatic Controller Tuning: Initial air pressure = H (ft.) X 0.43 = — psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting									
Discharge Setting									
Flow rate (mL/min)									

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Conductivity (mMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1635	5.27	—	0	—	—	—	—	—	—
1645	5.31	130	1.300	3.45	2.045	6.52	24.2	2.57	775.2
1650	5.31	130	1.950	3.15	1.854	6.53	23.4	2.37	554.6
1655	5.32	130	2.600	2.58	1.630	6.58	20.9	2.38	365.2
1700	5.33	130	3.250	2.29	1.502	6.64	19.2	2.31	232.0
1705	5.33	130	3.900	2.05	1.409	6.67	17.2	2.24	199.3
1710	5.33	130	4.550	1.77	1.338	6.70	16.4	2.19	157.4
1715	5.34	130	5.200	1.72	1.323	6.70	15.3	2.15	118.1

Groundwater Purge Form

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GROUNDWATER PURGE FORM

Sheet 2 of 2

Water Quality Parameter Measurements (continued)

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Conductivity (mMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1720	5.34	130	5.850	1.67	1.289	6.73	14.4	2.11	85.4
1725	5.34	130	6.500	1.51	1.272	6.75	14.6	2.07	54.3
1730	5.34	130	7.150	1.52	1.251	6.73	14.4	2.02	60.1

1/31/09

Sampling

Sampling beginning time: 1730

Sampling completion time: 1825

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Conductivity (mMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1730	5.34	130	7.150	1.52	1.251	6.73	14.4	2.02	60.1

Field Screening Parameters (ferrous iron, sulfide, etc.)

	Result	Units
Ferrous Iron	0.0	

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB020209AML

Location Code: **ASH PIT 2-PZ04**
Sample Number: **AP3019**
Sample Name: **PBOW-09-GW-ASH PIT 2-PZ04-AP3019**
Sampling Method: **SP**
Sample Type: **GW** *Sample Purpose:* **REG**
Sampling Equip: Peristaltic pump, Teflon lined tubing

Task: **ASH PIT2**
Collection Date: 2-1-09
Collection Time: 1110
Start Depth: 8.33' btoc
End Depth: 8.38' btoc
Sample Matrix: **WATER**
Sample Team: EW/MW

QC Partners:
(TB) ——— (ER) ——— (FB) ———

ERPIMS Values:
Sacode:
Lot Control#:

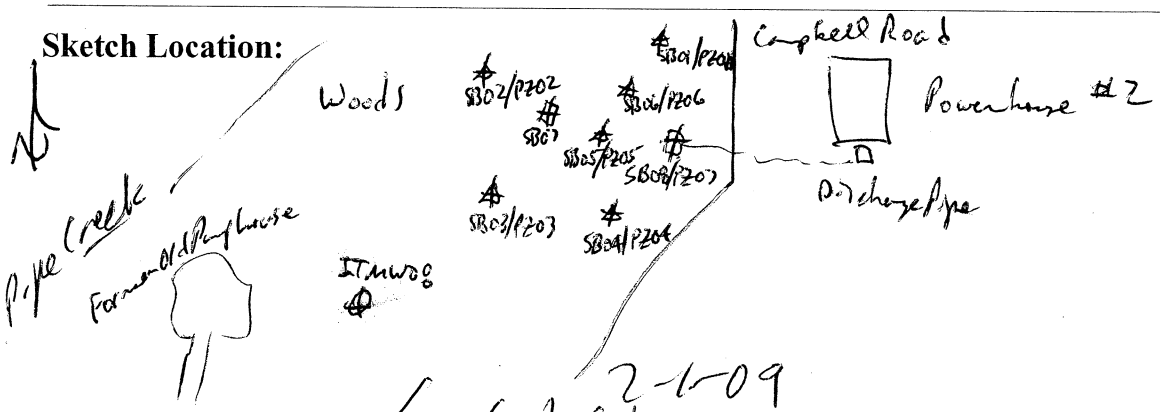
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
ALKALINITY	N	A	1	1	L	HDPE
CHLORIDE	N	A	1	1	L	HDPE
SULFATE	N	A	1	1	L	HDPE
TDS	N	A	1	1	L	HDPE
TSS	N	A	1	1	L	HDPE
TURB 180.1	N	A	1	1	L	HDPE
HARDNESS	N	B	1	500	mL	HDPE
METALS3-W	N	B	1	500	mL	HDPE
METALS3-W-F	Y	C	1	500	mL	HDPE
CYANIDE	N	D	1	500	mL	HDPE
NITRATE	N	E	1	125	mL	HDPE
EXPLOSIVES	N	F	2	1	L	Amb. Glass
SEMIVOLATILES3	N	G	2	1	L	Amb. Glass

Groundwater Information:
Measured Well Depth: 15.25' btoc **Depth To Water:** 7.72' btoc

Comments: Collected MS + MSD at this location

Sketch Location:



Logged BY / Date: E. W. Wilson 2-1-09 *Reviewed BY / Date:* Edward [illegible] 11-8-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB020209AML

Location Code: **ASH PIT 2-PZ0~~6~~4** OW

Sample Number: **AP30~~217MS~~19MS**

Sample Name: **PBOW-09-GW-ASH PIT 2-PZ06-AP3021MS**

Sampling Method: **SP**

Sample Type: **GW** *Sample Purpose:* **MS**

Sampling Equip: Peristaltic pump, Teflon lined tubing

Task: **ASH PIT2**

Collection Date: 2-1-09

Collection Time: 1110

Start Depth: 8.33' btoc

End Depth: 8.38' btoc

Sample Matrix: **WATER**

Sample Team: EW/MW

QC Partners:

(TB) — (ER) — (FB) —

ERPIMS Values:

Sacode:

Lot Control#:

Containers

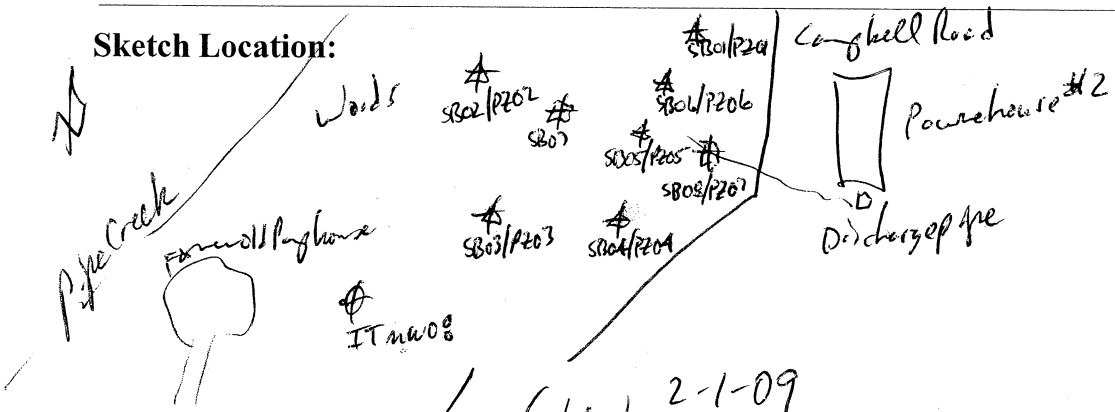
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
ALKALINITY	N	A	1	1	L	HDPE
CHLORIDE	N	A	1	1	L	HDPE
SULFATE	N	A	1	1	L	HDPE
TDS	N	A	1	1	L	HDPE
TSS	N	A	1	1	L	HDPE
TURB 180.1	N	A	1	1	L	HDPE
HARDNESS	N	B	1	500	mL	HDPE
METALS3-W	N	B	1	500	mL	HDPE
METALS3-W-F	N	C	1	500	mL	HDPE
CYANIDE	N	D	1	500	mL	HDPE
NITRATE-W	N	D	1	125	mL	HDPE
EXPLOSIVES	N	F	2	1	L	Amb. Glass
SEMIVOLATILES	N	G	2	1	L	Amb. Glass

Groundwater Information:

Measured Well Depth: 15.25' btoc **Depth To Water:** 7.72' btoc

Comments: Also collected MSD + Regular sample at this location

Sketch Location:



Logged BY / Date: E. W. Weaver 2-1-09

Reviewed BY / Date: Edward M. Weaver 11-8-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB020209AML

Location Code: ASH PIT 2-PZ0~~6~~4

Sample Number: AP30~~2~~19MSD

Sample Name: PBOW-09-GW-ASH PIT 2-PZ06-AP3021MSI

Sampling Method: SP

Sample Type: GW *Sample Purpose:* MSD

Sampling Equip: Peristaltic pump, Teflon lined tubing

QC Partners:

(TB) — (ER) — (FB) —

Task: ASH PIT2

Collection Date: 2-1-09

Collection Time: 1110

Start Depth: 8.33' btoc

End Depth: 8.38' btoc

Sample Matrix: WATER

Sample Team: EW/MW

ERPIMS Values:

Sacode:

Lot Control#:

Containers

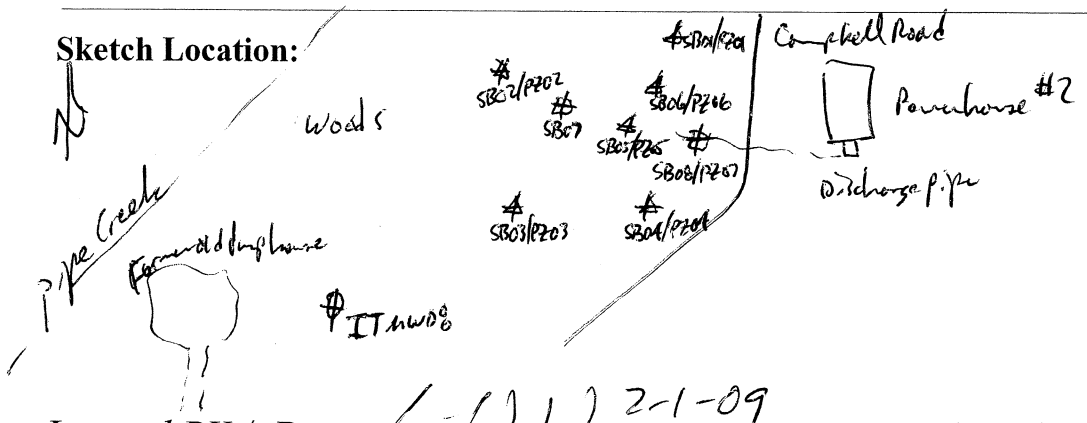
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
ALKALINITY	N	A	1	1	L	HDPE
CHLORIDE	N	A	1	1	L	HDPE
SULFATE	N	A	1	1	L	HDPE
TDS	N	A	1	1	L	HDPE
TSS	N	A	1	1	L	HDPE
TURB 180.1	N	A	1	1	L	HDPE
HARDNESS	N	B	1	500	mL	HDPE
METALS-W	N	B	1	500	mL	HDPE
NITRATE-W	N	B	1	125	mL	HDPE
METALS3-W-F	N	C	1	500	mL	HDPE
CYANIDE	N	D	1	500	mL	HDPE
EXPLOSIVES	N	F	2	1	L	Amb. Glass
SEMIVOLATILES	N	H	2	1	L	Amb. Glass

Groundwater Information:

Measured Well Depth: 15.25' btoc **Depth To Water:** 7.72' btoc

Comments: Also collected regular sample + MS at this location

Sketch Location:



Logged BY / Date: E. W. Weaver 2-1-09 *Reviewed BY / Date:* Edward [illegible] 11-8-09

GROUNDWATER PURGE FORM

Sheet 1 of 2

Sampling location ID: Ash Pit #2
Project Name/#: PBOW
Weather: clear Sunny ≈35°F
Purge Equipment: Peristaltic Pump, Teflon lined tubing
Sampling location ID: Ash Pit 2 – PZ04
Sample ID: AP3019
Collection Time/Date: 2-1-09
Purge Purpose (circle): Sample or Redevelop

Pump Installation

Pump installation crew: EW/MW
PID/FID reading (well head/background): 0
Casing diameter (inches): 1"
Total well Depth (ft. BTOC): 15.25
Initial (pre-installation) DTW/time: 7.75 / 0954
Final (after pump priming) DTW/time: 7.72 / 0959
Free product (circle): LNAPL / DNAPL
Depth to free product (ft BTOC): —
Volume of water removed during priming (mL): —
Discharge tube length (ft.): 23'
Installation date/beginning time: 02-01-09
Installation date/completion time: 02-01-09
Screen Interval (ft. BTOC): 1.65 to 16.65
Sample Depth/Pump intake depth (ft BTOC): 14'
Post-installation DTW/time: 7.72 / 0959
Max. sustainable pump rate (mL/min): —
Appearance of product: —
Discharge tube diameter (3/8" or 1/4"): 1/4" ID
Inlet reducer used (Y/N): N

Pneumatic Controller Tuning: Initial air pressure = H (ft.) X 0.43 = — psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting									
Discharge Setting									
Flow rate (mL/min)									

Purging

Purging/sampling crew: EW/MW
Purge date/beginning time: 02-01
Initial (pre-purging) DTW (ft. BTOC): 7.72
Calculated tubing + pump volume: 0.23
Unit casing volume: 0.041
PID/FID reading (well head/background): 0
Purge date/completion time: 02-01-09
Final (post-purging) DTW (ft. BTOC): 8.41
Total volume purged: 7.730 Liters
Required purge volume: 0.69

Pneumatic Controller Tuning: Initial air pressure = H (ft.) X 0.43 = — psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting									
Discharge Setting									
Flow rate (mL/min)									

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Conductivity (mMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1007	7.72	—	0	—	—	—	—	—	—
1020	8.17	110	1430	7.58	1.134	6.42	29.9	2.39	293.1
1025	8.19	110	1980	7.53	1.197	6.47	27.8	1.42	415.8
1030	8.21	130	2.530	7.38	1.075	6.49	26.6	1.24	327.7
1035	8.23	130	3.180	7.29	1.072	6.51	25.8	1.17	348.9
1040	8.25	130	3.830	7.36	1.057	6.54	24.3	1.12	373.9
1045	8.28	130	4.480	7.26	1.001	6.55	24.1	1.11	256.0
1050	8.29	140	5180	7.31	0.981	6.54	24.0	1.10	137.2

Groundwater Purge Form

2/2

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Water Quality Parameter Measurements (continued)

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Conductivity (mMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
~~1100~~	~~8.31~~								
1100	8.31	140	5.880	7.19	0.962	6.55	23.9	1.09	51.5
1105	8.32	145	6.605	7.21	0.961	6.55	23.9	1.10	52.9
1110	8.33	145	7.330	7.31	0.958	6.55	23.7	1.10	26.6

Sampling time: 1110 Sampling completion time: 1335

Water Quality Parameter Measurements

	(ft. BTOC)	(mL/min)	Volume Purged (L)	(degree C)	(mMhos/cm)		(mv)	(mg/L)	(NTU)
1110	8.33	145	7.330	7.31	0.958	6.55	23.7	1.10	26.6

Field Screening Parameters (ferrous iron, sulfide, etc.)

Parameter	Result	Units
Ferrous Iron	0	

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB020209AM2

Location Code: **ASH PIT 2-PZ0~~1~~7**

Sample Number: **AP~~3014~~** 3022 EW

Sample Name: **PBOW-09-GW-ASH PIT 2-PZ01-AP3014**

Sampling Method: **SP**

Sample Type: **GW** *Sample Purpose:* **REG**

Sampling Equip: Peristaltic Pump, Teflon/medtubing

Task: **ASH PIT2**

Collection Date: 2-2-09

Collection Time: 1030

Start Depth: 7.18' btoc

End Depth: 7.15' btoc

Sample Matrix: **WATER**

Sample Team: EW/MW

QC Partners:

(TB) — (ER) — (FB) —

ERPIMS Values:

Sacode:

Lot Control#:

Containers

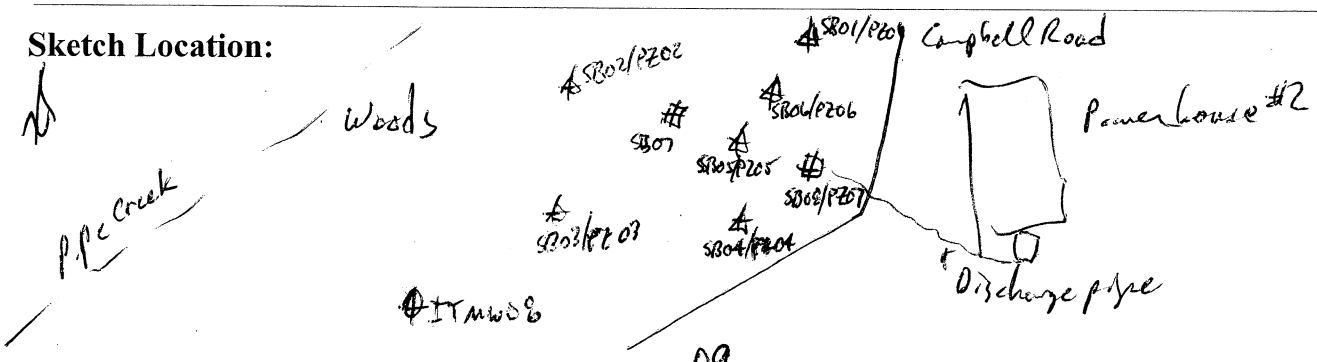
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
ALKALINITY	N	A	1	1	L	HDPE
CHLORIDE	N	A	1	1	L	HDPE
SULFATE	N	A	1	1	L	HDPE
TDS	N	A	1	1	L	HDPE
TSS	N	A	1	1	L	HDPE
TURB 180.1	N	A	1	1	L	HDPE
HARDNESS	N	B	1	500	mL	HDPE
METALS3-W	N	B	1	500	mL	HDPE
METALS3-W-F	Y	C	1	500	mL	HDPE
CYANIDE	N	D	1	500	mL	HDPE
NITRATE	N	E	1	125	mL	HDPE
EXPLOSIVES	N	F	2	1	L	Amb. Glass
SEMIVOLATILES3	N	G	2	1	L	Amb. Glass

Groundwater Information:

Measured Well Depth: 15.14' btoc **Depth To Water:** 7.18' btoc

Comments: Collected FD + FS at this location ~~(AP3015)~~ (AP3016)

Sketch Location:



Logged BY / Date: L. W. Weaver 2-2-09

Reviewed BY / Date: Edward [illegible] 11-8-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB0280209TA

Location Code: **ASH PIT 2-PZ07**
Sample Number: **AP3016**
Sample Name: **PBOW-09-GW-ASH PIT 2-PZ01-AP3016**
Sampling Method: **SP**
Sample Type: **GW** *Sample Purpose:* **FS**
Sampling Equip: Peristaltic pump, Teflon lined tubing

Task: **ASH PIT2**
Collection Date: 2-2-09
Collection Time: 1030
Start Depth: 7.18 ' btoc
End Depth: 7.15' btoc
Sample Matrix: **WATER**
Sample Team: EW/MW

QC Partners:
(TB) — **(ER)** — **(FB)** —

ERPIMS Values:
Sacode:
Lot Control#:

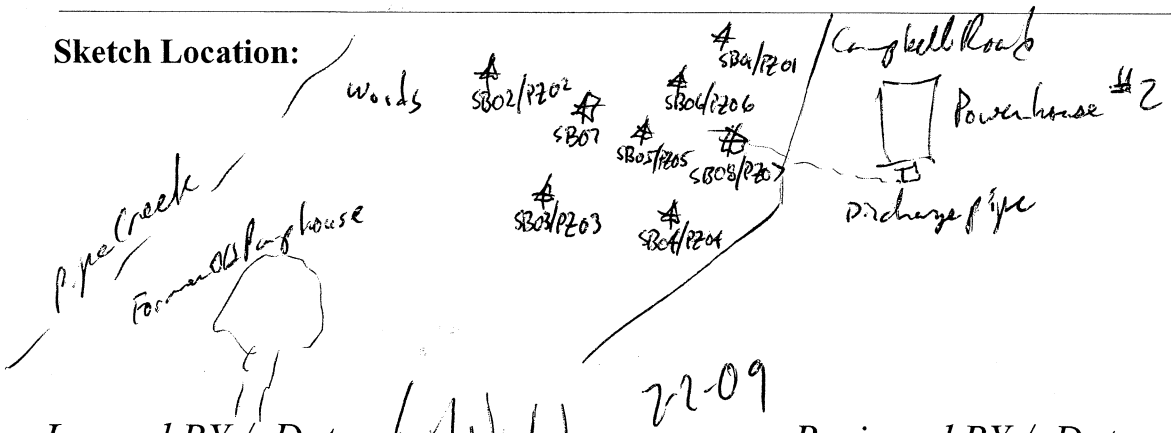
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
ALKALINITY	N	A	1	1	L	HDPE
CHLORIDE	N	A	1	1	L	HDPE
NITRATE-W	N	A	1	1	L	HDPE
SULFATE	N	A	1	1	L	HDPE
TDS	N	A	1	1	L	HDPE
TSS	N	A	1	1	L	HDPE
TURB 180.1	N	A	1	1	L	HDPE
METALS3-W	N	C	1	1	L	HDPE
METALS3-W-F	Y	D	1	1	L	HDPE
CYANIDE	N	E	1	250	mL	HDPE
HARDNESS	N	F	1	250	mL	HDPE
EXPLOSIVES	N	G	2	1	L	Amb. Glass
SEMIVOLATILES	N	H	2	1	L	Amb. Glass

Groundwater Information:
Measured Well Depth: 15.14' btoc **Depth To Water:** 7.18' btoc

Comments: Collected at Ash Pit #2-PZ07. Also collected regular sample (AP3022) + FD. (AP3016)

Sketch Location:



Logged BY / Date: E. W. Weaver 2-2-09 *Reviewed BY / Date:* Edward M. Weaver 11-8-0

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB020209AML

Location Code: **ASH PIT 2-PZ0~~1~~7**

Sample Number: **AP3015**

Sample Name: **PBOW-09-GW-ASH PIT 2-PZ01-AP3015**

Sampling Method: **SP**

Sample Type: **GW** *Sample Purpose:* **FD**

Sampling Equip: Peristaltic pump, Teflon lined tubing

Task: **ASH PIT2**

Collection Date: 2-2-09

Collection Time: 1030

Start Depth: 7.18' btoc

End Depth: 7.15' btoc

Sample Matrix: **WATER**

Sample Team: EW/MW

QC Partners:

(TB) — (ER) — (FB) —

ERPIMS Values:

Sacode:

Lot Control#:

Containers

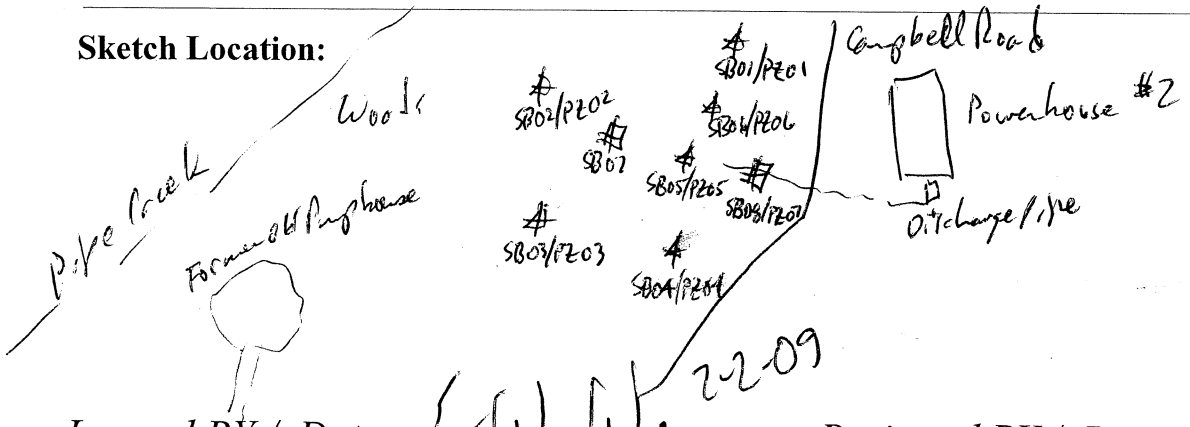
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
ALKALINITY	N	A	1	1	L	HDPE
CHLORIDE	N	A	1	1	L	HDPE
SULFATE	N	A	1	1	L	HDPE
TDS	N	A	1	1	L	HDPE
TSS	N	A	1	1	L	HDPE
TURB 180.1	N	A	1	1	L	HDPE
HARDNESS	N	B	1	500	mL	HDPE
METALS3-W	N	B	1	500	mL	HDPE
METALS3-W-F	Y	C	1	500	mL	HDPE
CYANIDE	N	D	1	500	mL	HDPE
NITRATE-W	N	E	1	125	mL	HDPE
EXPLOSIVES	N	F	2	1	L	Amb. Glass
SEMIVOLATILES	N	G	2	1	L	Amb. Glass

Groundwater Information:

Measured Well Depth: 15.14' btoc **Depth To Water:** 7.18' btoc

Comments: Collected at Ash Pit #2 PZ07. Also collected regular sample (AP3022) & FS (AP3016).

Sketch Location:



Logged BY / Date: [signature] 2-2-09

Reviewed BY / Date: [signature] 11-8-09

Groundwater Purge Form

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GROUNDWATER PURGE FORM

Sheet 1 of 2

Operable Unit/Site ID: Ash Pit #2
Project Name/#: PBOW
Weather: cloudy but clearing, ~25°F.
Purge Equipment: Peristaltic Pump, Teflon lined tubing
Sampling Equipment: same

Sampling location ID: Ash Pit #2 - PZ07
Sample ID: AP3022
Collection Time/Date: 2-2-09
Purge Purpose (circle): Sample or Redevelop

Pump Installation

Pump installation crew: EW/MW
PID/FID reading (well head/background): 0
Casing diameter (inches): 1"
Total well Depth (ft. BTOC): 15.14
Initial (pre-installation) DTW/time: 6.48 / 900
Final (after pump priming) DTW/time: 6.49 / 905
Free product (circle): LNAPL / DNAPL
Depth to free product (ft BTOC): —
Volume of water removed during priming (mL): —
Discharge tube length (ft.): 22

Installation date/beginning time: 2-2-09 / 903
Installation date/completion time: 2-2-09 / 904
Screen Interval (ft. BTOC): 2-60 to 12.60
Sample Depth/Pump intake depth (ft BTOC): 13.5'
Post-installation DTW/time: 2-2-09 7.15 / 1215
Max. sustainable pump rate (mL/min): —
Appearance of product: —
Discharge tube diameter (3/8" or 1/4"): 1/4" ID
Inlet reducer used (Y/N): N

Pneumatic Controller Tuning: Initial air pressure = H (ft.) X 0.43 = — psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting									
Discharge Setting									
Flow rate (mL/min)									

Purging

Purging/sampling crew: EW/MW
Purge date/beginning time: 2-2-09 /
Initial (pre-purging) DTW (ft. BTOC): 6.49
Calculated tubing + pump volume: 0.22 L
Unit casing volume: 0.041

PID/FID reading (well head/background): 0
Purge date/completion time: 2-2-09 /
Final (post-purging) DTW (ft. BTOC): 7.15 / 1215
Total volume purged: 3.5 gallons
Required purge volume: 0.66 L

Pneumatic Controller Tuning: Initial air pressure = H (ft.) X 0.43 = — psi

	Initial	2	3	4	5	6			
Pressure (psi)									
Refill Setting									
Discharge Setting									

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Conductivity (mMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
0907	6.49	210	0	—	—	—	—	—	—
0915	7.21	210	1.680	4.88	1.192	6.48	21.5	2.19	327.2
0920	7.16	175	2.555	4.84	1.001	6.48	22.0	1.04	172.3
0925	7.13	160	3.355	5.06	0.911	6.49	21.6	0.83	82.1
0930	7.13	160	4.155	5.06	0.892	6.50	21.0	0.65	50.9
0935	7.13	160	4.955	4.99	0.869	6.51	21.5	0.57	33.2
0940	7.14	170	5.805	5.16	0.851	6.52	20.8	0.62	20.9
0945	7.27	170	6.655	5.32	0.872	6.53	19.9	0.59	281.0

water suddenly turned very brown (turbid) for no apparent reason

volumes [illegible] bottom of flow through cell and altered turbidity [illegible]

Groundwater Purge Form

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GROUNDWATER PURGE FORM

Sheet 2 of 2

Water Quality Parameter Measurements (continued)

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Conductivity (mMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
0950	7.18	170	7.505	5.53	0.894	6.55	19.1	0.53	750.2
0955	7.12	180	8.405	5.54	0.840	6.55	18.9	0.47	859.5
1000	7.11	180	9.305	5.48	0.815	6.54	19.1	0.40	499.3
1005	7.15	180	10.205	5.81	0.793	6.54	19.4	0.44	87.3
1010	7.19	180	11.105	5.91	0.787	6.54	19.6	0.52	138.1
1015	7.22	180	12.005	5.88	0.782	6.53	19.9	0.53	72.6
1020	7.22	180	12.905	6.04	0.785	6.54	19.8	0.41	69.6
1025	7.25	190	13.855	5.80	0.781	6.53	20.2	0.50	61.8
1030	7.18	190	14.805	6.19	0.778	6.53	20.4	0.50	28.2

Start sampling ~~0950~~ 1030 1215

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume	Temp. (degree C)	Conductivity (mMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1030	7.18	190	14.805	6.19	0.778	6.53	20.4	0.50	28.2

Field Screening Parameters (ferrous iron, sulfide, etc.)

	Result	Units
Ferrous Iron	0	

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB052609-ACCT

Location Code: **AP2-SW01**
Sample Number: **AP2000**
Sample Name: **PBOW-09-SW-AP2-SW01-AP2000-REG**
Sampling Method: **GRAB**
Sample Type: **SW** *Sample Purpose:* **REG**
Sampling Equip: Submerged sample bottles

Task: **AP2-SW**
Collection Date: 5/24/09
Collection Time: 1025
Start Depth: 0.0 ft
End Depth: 0.3 ft
Sample Matrix: **WATER**
Sample Team: DK/BT

QC Partners:
(TB) — (ER) — (FB) —

ERPIMS Values:
Sacode:
Lot Control#:

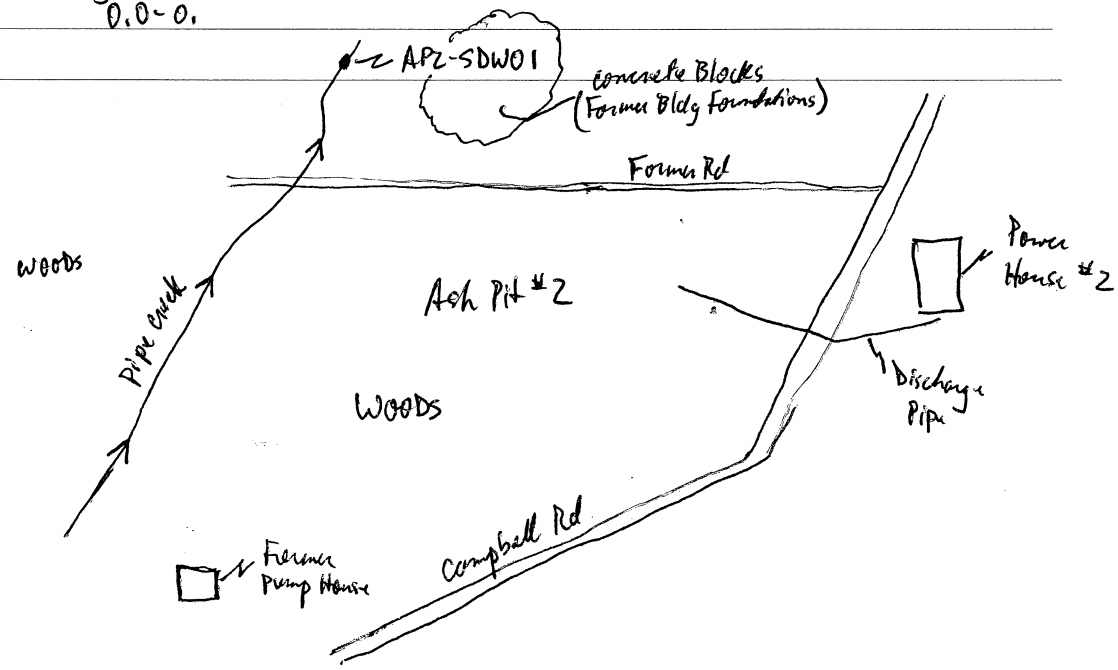
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
SEMIVOLATILES3	N	A	2	1	L	Amb. Glass
HARDNESS	N	B	1	500	mL	HDPE
METALS3-W	N	B	1	500	mL	HDPE
PCB3	N	C	2	1	L	Amb. Glass
EXPLOSIVES	N	D	2	1	L	Amb. Glass

Surface Water Parameters:	Eh (mV)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DissOxygen (ppm)	Temperature (C)
	163.5	7.28	0.924	12.9	7.55	17.45

Comments: Water Flowing in Pipe Creek
0.0-0.

Sketch Location:



Logged BY / Date: David Kesh 5/24/09 *Reviewed BY / Date:* Edward [illegible] 11-8-09

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB 052609-ACCT

Location Code: **AP2-SW02**
Sample Number: **AP2001**
Sample Name: **PBOW-09-SW-AP2-SW02-AP2001-REG**
Sampling Method: **GRAB**
Sample Type: **SW** *Sample Purpose:* **REG**
Sampling Equip: Submerged sample bottle

Task: **AP2-SW**
Collection Date: 5-24-09
Collection Time: 1350
Start Depth: 0.0'
End Depth: 0.3'
Sample Matrix: **WATER**
Sample Team: DK/BT

QC Partners:
(TB) — **(ER)** — **(FB)** —

Containers

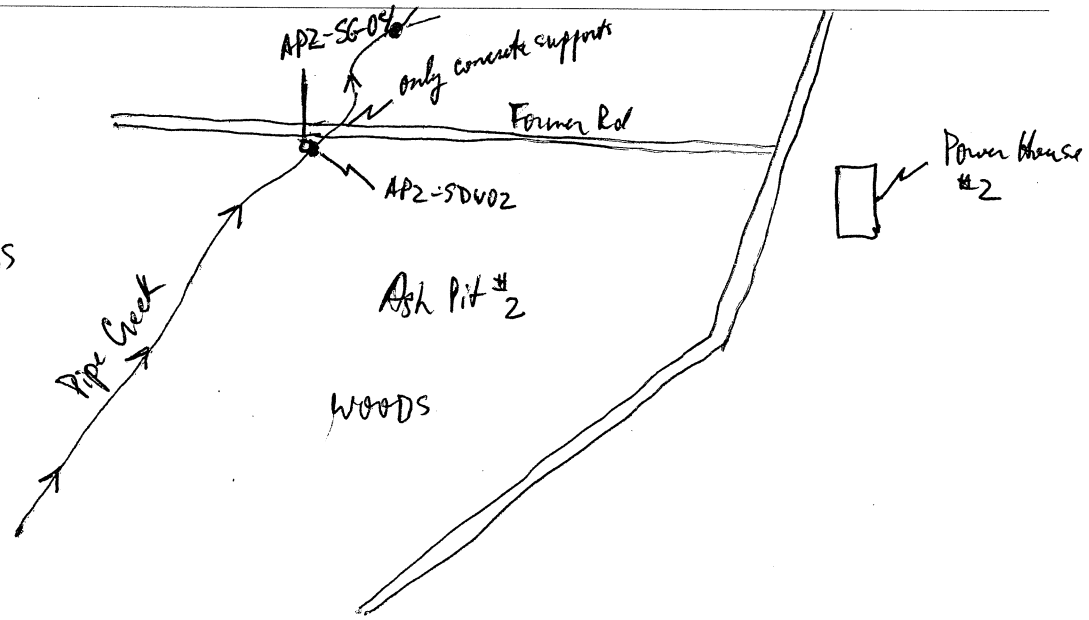
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
SEMIVOLATILES3	N	A	2	1	L	Amb. Glass
METALS3-W	N	B	1	500	mL	HDPE
PCB3	N	C	2	1	L	Amb. Glass
EXPLOSIVES	N	D	2	1	L	Amb. Glass

ERPIMS Values:
Sacode:
Lot Control#:

Surface Water Parameters:	Eh (mV)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DissOxygen (ppm)	Temperature (C)
	124.3	7.42	0.912	12.5	7.81	18.94

Comments: NA

Sketch Location:



Logged BY / Date: David Kresh 5/24/09 *Reviewed BY / Date:* Edward E. Wasson 11-8-0

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB 052609-ACCT

Location Code: **AP2-SW03**
Sample Number: **AP2002**
Sample Name: **PBOW-09-SW-AP2-SW03-AP2002-REG**
Sampling Method: **GRAB**
Sample Type: **SW** *Sample Purpose:* **REG**
Sampling Equip: Submerged sample bottles

Task: **AP2-SW**
Collection Date: 5/24/09
Collection Time: 1505
Start Depth: 0.0'
End Depth: 0.3'
Sample Matrix: **WATER**
Sample Team: DKBT

QC Partners:
(TB) — (ER) — (FB) —

ERPIMS Values:
Sacode:
Lot Control#:

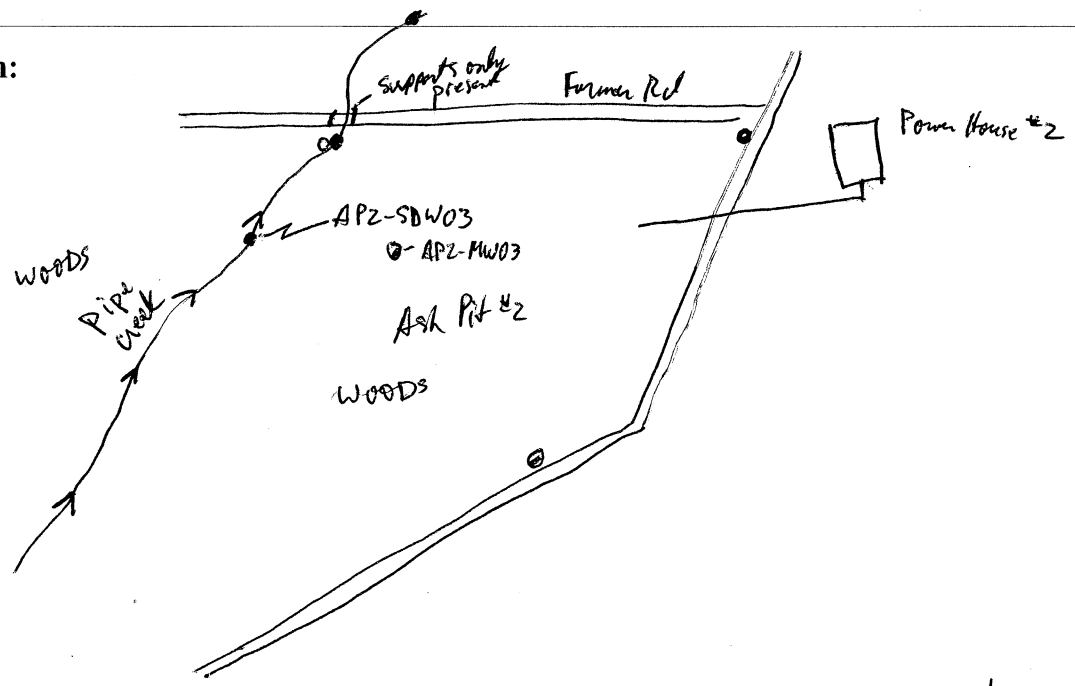
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
SEMIVOLATILES3	N	A	2	1	L	Amb. Glass
METALS3-W	N	B	1	500	mL	HDPE
PCB3	N	C	2	1	L	Amb. Glass
EXPLOSIVES	N	D	2	1	L	Amb. Glass

Surface Water Parameters:	Eh (mV)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DissOxygen (ppm)	Temperature (C)
	113.8	7.60	0.908	17.7	7.94	19.16

Comments: Preserved metals bottles filled w/ by nitro bottle.

Sketch Location:



Logged BY / Date: David Keach 5/24/09 *Reviewed BY / Date:* Edward L. Mawn 11-8-09

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB052609-ACCT

Location Code: **AP2-SW03**
Sample Number: **AP2003**
Sample Name: **PBOW-09-SW-AP2-SW03-AP2003-REG**
Sampling Method: **GRAB**
Sample Type: **SW** *Sample Purpose:* **FD**
Sampling Equip: Submerged Sample Bottles
C Partners:
(TB) — **(ER)** — **(FB)** —

Task: **AP2-SW**
Collection Date: 5/24/09
Collection Time: 1505
Start Depth: 0.0'
End Depth: 0.3'
Sample Matrix: **WATER**
Sample Team: DIE/BT

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
SEMIVOLATILES3	N	A	2	1	L	Amb. Glass
METALS3-W	N	B	1	500	mL	HDPE
PCB3	N	C	2	1	L	Amb. Glass
EXPLOSIVES	N	D	2	1	L	Amb. Glass

ERPIMS Values:
Sacode:
Lot Control#:

Surface Water Parameters:	Eh (mV)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DissOxygen (ppm)	Temperature (C)
	113.8	7.60	0.908	17.7	7.94	19.16

Comments: NA

Sketch Location:

See SW SCL AP2002 for sketch

Logged BY / Date: David Kresh 5/24/09 *Reviewed BY / Date:* Edward Kwan 11-8-09

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB052609-TA

Location Code: **AP2-SW03**
Sample Number: **AP2004**
Sample Name: **PBOW-09-SW-AP2-SW03-AP2004-REG**
Sampling Method: **GRAB**
Sample Type: **SW** *Sample Purpose:* **FS**
Sampling Equip: Submerged Sample Bottle

Task: **AP2-SW**
Collection Date: 5-24-09
Collection Time: 1505
Start Depth: 0.0'
End Depth: 0.3'
Sample Matrix: **WATER**
Sample Team: DK/BT

QC Partners:
(TB) — (ER) — (FB) —

ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
SEMIVOLATILES3	N	A	2	1	L	Amb. Glass
METALS3-W	N	B	1	500	mL	HDPE
PCB3	N	C	2	1	L	Amb. Glass
EXPLOSIVES	N	D	2	1	L	Amb. Glass

Surface Water Parameters:	Eh (mV)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DissOxygen (ppm)	Temperature (C)
	113.8	7.60	0.908	17.7	7.94	19.16

Comments: NA

Sketch Location:

See SW SCL AP2002 for sketch

Logged BY / Date: David Kressler 5/24/09 *Reviewed BY / Date:* Edward [illegible] 11-8-09

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB052609-ACCT

Location Code: **AP2-SW04**
Sample Number: **AP2005**
Sample Name: **PBOW-09-SW-AP2-SW04-AP2005-REG**
Sampling Method: **GRAB**
Sample Type: **SW** *Sample Purpose:* **REG**
Sampling Equip: Submerged Sample bottle

Task: **AP2-SW**
Collection Date: 5-25-09
Collection Time: 0825
Start Depth: 0.0'
End Depth: 0.3'
Sample Matrix: **WATER**
Sample Team: DK/BT

QC Partners:
(TB) — (ER) — (FB) —

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
SEMIVOLATILES3	N	A	2	1	L	Amb. Glass
METALS3-W	N	B	1	500	mL	HDPE
PCB3	N	C	2	1	L	Amb. Glass
EXPLOSIVES	N	D	2	1	L	Amb. Glass

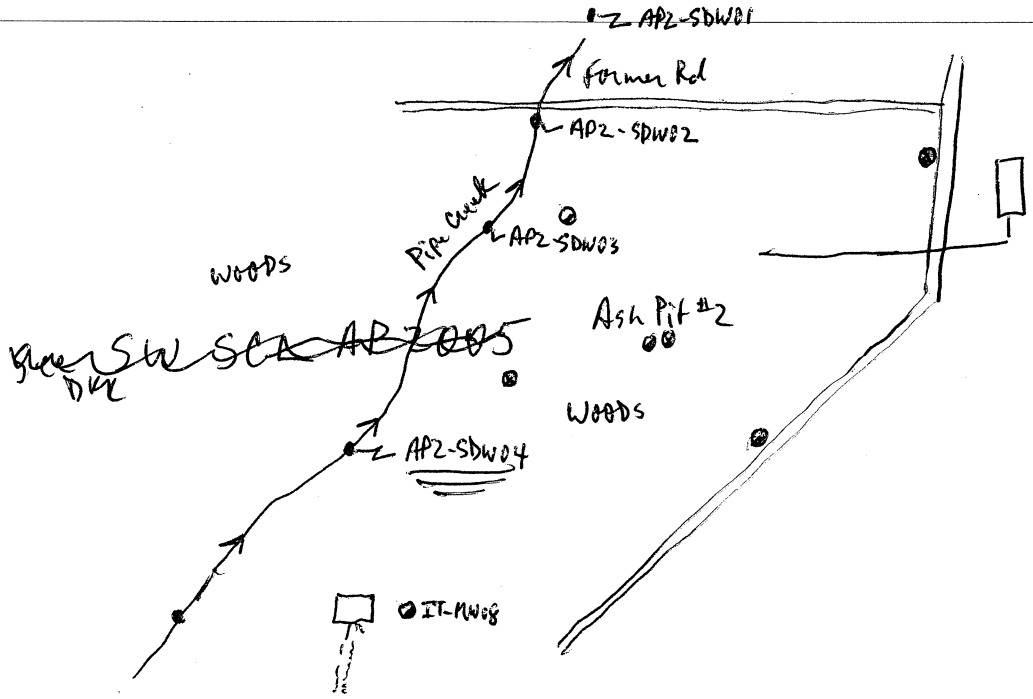
ERPIMS Values:
Sacode:
Lot Control#:

Surface Water Parameters:	Eh (mV)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DissOxygen (ppm)	Temperature (C)
	193.5	7.43	0.885	24.6	7.40	15.93

Comments: Pre-preserved metals bottle filled w/SVOCs bottle.

Sketch Location:

N ↑



Logged BY / Date: David Kessler 5/25/09 *Reviewed BY / Date:* Edward Weave 11-8-09

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB0526 09-ACCT

Location Code: **AP2-SW04**
Sample Number: **AP2005MS**
Sample Name: **PBOW-09-SW-AP2-SW04-AP2005MS-MS**
Sampling Method: **GRAB**
Sample Type: **SW** *Sample Purpose:* **MS**
Sampling Equip: Submerged sample bottle

Task: **AP2-SW**
Collection Date: 5-25-09
Collection Time: 0925
Start Depth: 0.0'
End Depth: 0.3'
Sample Matrix: **WATER**
Sample Team: DK/BT

QC Partners:
(TB) — (ER) — (FB) —

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
SEMIVOLATILES3	N	A	2	1	L	Amb. Glass
METALS3-W	N	B	1	500	mL	HDPE
PCB3	N	C	2	1	L	Amb. Glass
EXPLOSIVES	N	D	2	1	L	Amb. Glass

ERPIMS Values:
Sacode:
Lot Control#:

Surface Water Parameters:	Eh (mV)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DissOxygen (ppm)	Temperature (C)
	193.5	7.43	0.885	24.6	7.40	15.93

Comments: NA

Sketch Location:

See SW SCL AP2005 for sketch

Logged BY / Date: David Kussler 5/25/09 *Reviewed BY / Date:* Edward W Lowe 11-8-09

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB0526 09-ACCT

Location Code: **AP2-SW04**
Sample Number: **AP2005MSD**
Sample Name: **PBOW-09-SW-AP2-SW04-AP2005MS-MSD**
Sampling Method: **GRAB**
Sample Type: **SW** *Sample Purpose:* **MSD**
Sampling Equip: Submerged sample bottles

Task: **AP2-SW**
Collection Date: 5/25/09
Collection Time: 0925
Start Depth: 0.0'
End Depth: 0.3'
Sample Matrix: **WATER**
Sample Team: BK/BT

QC Partners:
(TB) — (ER) — (FB) —

ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
SEMIVOLATILES3	N	A	2	1	L	Amb. Glass
METALS3-W	N	B	1	500	mL	HDPE
PCB3	N	C	2	1	L	Amb. Glass
EXPLOSIVES	N	D	2	1	L	Amb. Glass

Surface Water Parameters:	Eh (mV)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DissOxygen (ppm)	Temperature (C)
	193.5	7.43	0.885	24.6	7.40	15.93

Comments: NA

Sketch Location:

See SW SCL AP2005 for sketch

Logged BY / Date: David Kresch 5/25/09 *Reviewed BY / Date:* Edward [illegible] 11-8-09

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB052609-ACCT

Location Code: **AP2-SW05**
Sample Number: **AP2006**
Sample Name: **PBOW-09-SW-AP2-SW05-AP2006-REG**
Sampling Method: **GRAB**
Sample Type: **SW** *Sample Purpose:* **REG**
Sampling Equip: Submerged Sample bottles

QC Partners:
(TB) — (ER) — (FB) —

Task: **AP2-SW**
Collection Date: 5/25/09
Collection Time: 1155
Start Depth: 0.0'
End Depth: 0.3'
Sample Matrix: **WATER**
Sample Team: DK/BT

ERPIMS Values:
Sacode:
Lot Control#:

Containers

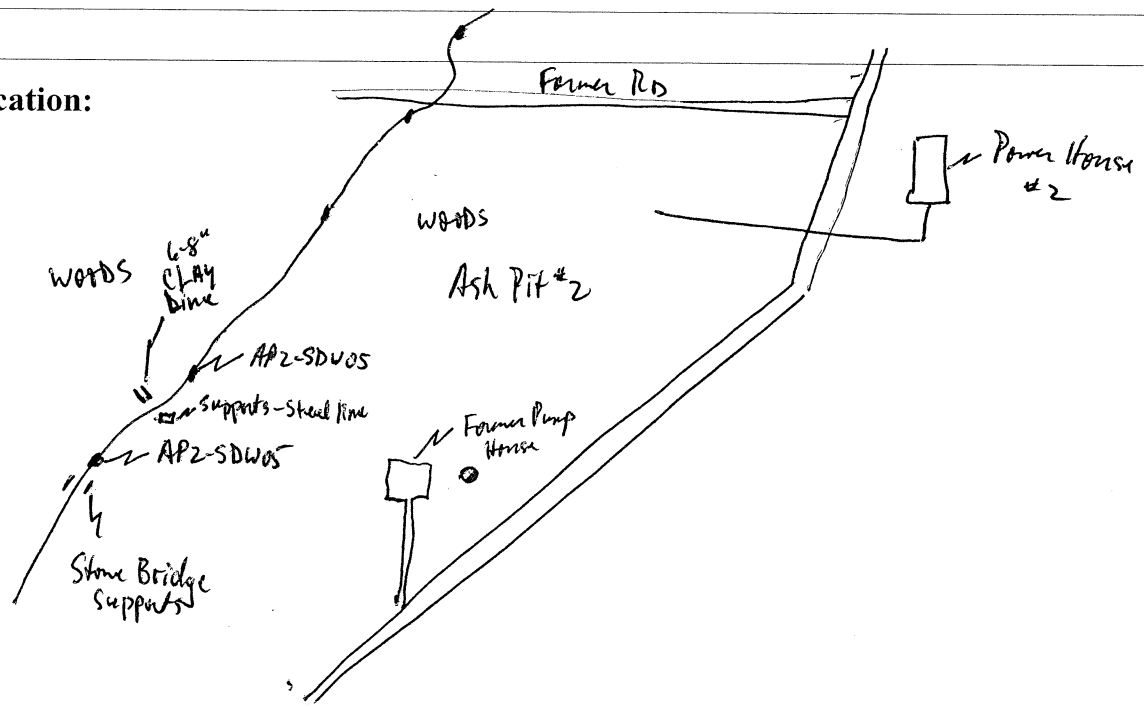
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
SEMIVOLATILES3	N	A	2	1	L	Amb. Glass
METALS3-W	N	B	1	500	mL	HDPE
PCB3	N	C	2	1	L	Amb. Glass
EXPLOSIVES	N	D	2	1	L	Amb. Glass

Surface Water Parameters:	Eh (mV)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DissOxygen (ppm)	Temperature (C)
	157.8	7.66	0.900	11.7	8.37	16.26

Comments: NA

Sketch Location:

NA



Logged BY / Date: David Kesh 5/25/09 *Reviewed BY / Date:* Edward C Weaver 11-8-09

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB 052609-ACCT

Location Code: **ASH PIT 2-SD01**
Sample Number: **AP1000**
Sample Name: **PBOW-09-SD-AP2-SD01-AP1000-(0-0.5)-REG**
Sampling Method: **GRAB**
Sample Type: **SD** *Sample Purpose:* **REG**
Sampling Equip: nitrile gloves grab, zip-lock bag composite

Task: **AP2-SED**
Collection Date: 5/24/09
Collection Time: 1050
Start Depth: 0.2'
End Depth: 0.7'
Sample Matrix: **SOIL**
Sample Team: DK/BT

QC Partners:
(TB) — **(ER)** — **(FB)** —

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
SEMIVOLATILES3	N	A	1	4	oz	CWM
METALS3	N	B	1	4	oz	CWM
PCB3	N	C	1	4	oz	CWM
EXPLOSIVES	N	D	1	4	oz	CWM
TOC-B	N	E	1	4	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments:
0.0-0.2'; decaying leaves, roots
0.2-0.4'; fine grain SAND, trace silt, grayish br, wet
0.4-0.7'; fine grain SAND/gRAVEL, trace silt, wet

Sketch Location:

see SW SCL AP2000 for sketch

Logged BY / Date: David Kessler 5/24/09 *Reviewed BY / Date:* Edward Schweer 11-8-09

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB052609-ACCT

Location Code: **ASH PIT 2-SD02**
Sample Number: **AP1001**
Sample Name: **PBOW-09-SD-AP2-SD02-AP1001-(0-0.5)-RE(**
Sampling Method: **GRAB**
Sample Type: **SD** *Sample Purpose:* **REG**
Sampling Equip: nitrile glove grab, zip-lock bag composite

Task: **AP2-SED**
Collection Date: 5-24-09
Collection Time: 1415
Start Depth: 0.0'
End Depth: 0.5'
Sample Matrix: **SOIL**
Sample Team: DK/BT

QC Partners:
(TB) — **(ER)** — **(FB)** —

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
SEMIVOLATILES3	N	A	1	4	oz	CWM
METALS3	N	B	1	4	oz	CWM
PCB3	N	C	1	4	oz	CWM
EXPLOSIVES	N	D	1	4	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: 0.0-0.5': Dark gray, CLAY, trace sand, wet

Sketch Location:

See SW SCL ~~[illegible]~~ DKK AP2001 for sketch

Logged BY / Date: David Kessler 5/24/09 *Reviewed BY / Date:* Edward J. Weaver 11-8-09

Shaw™
Shaw E & I, Inc.

Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB052609-ACCT

Location Code: **ASH PIT 2-SD03**
Sample Number: **AP1002**
Sample Name: **PBOW-09-SD-AP2-SD03-AP1002-(0-0.5)-RE(**
Sampling Method: **GRAB**
Sample Type: **SD** *Sample Purpose:* **REG**
Sampling Equip: nitrile gloves grab/zip-lock bag composite

Task: **AP2-SED**
Collection Date: 5/24/09
Collection Time: 1550
Start Depth: 0.0 Ft
End Depth: 0.5 Ft
Sample Matrix: **SOIL**
Sample Team: DK/DJ

QC Partners:
(TB) — (ER) — (FB) —

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
SEMIVOLATILES3	N	A	1	4	oz	CWM
METALS3	N	B	1	4	oz	CWM
PCB3	N	C	1	4	oz	CWM
EXPLOSIVES	N	D	1	4	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: NA

Sketch Location:

See SW SCL AP2002 for sketch

Logged BY / Date: David Kesch 5/24/09 *Reviewed BY / Date:* Edward [illegible] 11-8-0

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB 052609-ACCT

Location Code: **ASH PIT 2-SD03**
Sample Number: **AP1002MS**
Sample Name: **PBOW-09-SD-AP2-SD03-AP1002MS-(0-0.5)-I**
Sampling Method: **GRAB**
Sample Type: **SD** *Sample Purpose:* **MS**
Sampling Equip: nitrile glove grab, zip-lock bag composite

Task: **AP2-SED**
Collection Date: 5/24/09
Collection Time: 1550
Start Depth: 0.0 Ft
End Depth: ~~0.0~~ 0.5 Ft
Sample Matrix: **SOIL**
Sample Team: DK/BT

QC Partners:
(TB) — (ER) — (FB) —

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
SEMIVOLATILES3	N	A	1	4	oz	CWM
METALS3	N	B	1	4	oz	CWM
PCB3	N	C	1	4	oz	CWM
EXPLOSIVES	N	D	1	4	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: 0.0 - 0.5 Ft : Dark gray, CLAY, little gravel (20%), trace sand (5%), wet

Sketch Location:

See SW SCL AP2002 for sketch

Logged BY / Date: David Kresh 5/24/09 *Reviewed BY / Date:* Edward Kwan 11-8-09

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB052609-ACCT

Location Code: **ASH PIT 2-SD03**
Sample Number: **AP1002MSD**
Sample Name: **PBOW-09-SD-AP2-SD03-AP1002MSD-(0-0.5)**
Sampling Method: **GRAB**
Sample Type: **SD** *Sample Purpose:* **MSD**
Sampling Equip: nitrile glove grab, zip lock bag composite

Task: **AP2-SED**
Collection Date: 5/24/09
Collection Time: 1550
Start Depth: 0.0 ft
End Depth: ~~0.0~~ 0.5 ft
Sample Matrix: **SOIL**
Sample Team: DK/BT

QC Partners:
(TB) — (ER) — (FB) —

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
SEMIVOLATILES3	N	A	1	4	oz	CWM
METALS3	N	B	1	4	oz	CWM
PCB3	N	C	1	4	oz	CWM
EXPLOSIVES	N	D	1	4	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: NA

Sketch Location:

See SW SCL AP2002 for sketch

Logged BY / Date: David Kersh 5/24/09 *Reviewed BY / Date:* Edward E Wade 11-8-09

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB152609-ACCT

Location Code: **ASH PIT 2-SD04**
Sample Number: **AP1003**
Sample Name: **PBOW-09-SD-AP2-SD04-AP1003-(0-0.5)-REG**
Sampling Method: **GRAB**
Sample Type: **SD** *Sample Purpose:* **REG**
Sampling Equip: nitrile glove grab/zip lock bag composite

Task: **AP2-SED**
Collection Date: 5/25/09
Collection Time: 1020
Start Depth: 0.0'
End Depth: 0.5'
Sample Matrix: **SOIL**
Sample Team: DKBT

QC Partners:
(TB) — (ER) — (FB) —

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
SEMIVOLATILES3	N	A	1	4	oz	CWM
METALS3	N	B	1	4	oz	CWM
PCB3	N	C	1	4	oz	CWM
EXPLOSIVES	N	D	1	4	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: 0.0-0.5': Brown; silty CLAY, trace sand, wet, stiff

Sketch Location:

See SW SCL AP2005 for collocated sample sketch

Logged BY / Date: David Kersh 5/25/09 *Reviewed BY / Date:* Edward [illegible] 11-8-09

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB052609-ACCT

Location Code: **ASH PIT 2-SD04**

Sample Number: **AP1004**

Sample Name: **PBOW-09-SD-AP2-SD04-AP1004-(0-0.5)-REC**

Sampling Method: **GRAB**

Sample Type: **SD** *Sample Purpose:* **FD**

Sampling Equip: nitrile glove grab/zip-lock bag composite

QC Partners:

(TB) — **(ER)** — **(FB)** —

Task: **AP2-SED**

Collection Date: 5/25/09

Collection Time: 1020

Start Depth: 0.0'

End Depth: 0.5'

Sample Matrix: **SOIL**

Sample Team: DK/BT

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
SEMIVOLATILES3	N	A	1	4	oz	CWM
METALS3	N	B	1	4	oz	CWM
PCB3	N	C	1	4	oz	CWM
EXPLOSIVES	N	D	1	4	oz	CWM

ERPIMS Values:

Sacode:

Lot Control#:

Comments: NA

Sketch Location:

See SW SCL AP2005 for collocated sample sketch

Logged BY / Date: David Kessler 5/25/09 *Reviewed BY / Date:* Edward A. Weaver 11-8-09

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB05 26 09-TA

Location Code: **ASH PIT 2-SD04**
Sample Number: **AP1005**
Sample Name: **PBOW-09-SD-AP2-SD04-AP1005-(0-0.5)-RE(**
Sampling Method: **GRAB**
Sample Type: **SD** *Sample Purpose:* **FS**
Sampling Equip: nitrile glove grab, zip lock bag composite

Task: **AP2-SED**
Collection Date: 5/25/09
Collection Time: 1020
Start Depth: 0.0'
End Depth: 0.5'
Sample Matrix: **SOIL**
Sample Team: DK/BJ

QC Partners:
(TB) — (ER) — (FB) —

ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
METALS	N	A	2	4	oz	CWM
PCBS	N	A	2	4	oz	CWM
SEMIVOLATILES	N	A	2	4	oz	CWM
EXPLOSIVES	N	B	1	4	oz	CWM

Comments: NA

Sketch Location:

see SW SCL AP2005 for sketch

Logged BY / Date: David Kessler 5/25/09 *Reviewed BY / Date:* Edward [illegible] 1-8-0

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB052609-ACCT

Location Code: **ASH PIT 2-SD05**
Sample Number: **AP1006**
Sample Name: **PBOW-09-SD-AP2-SD05-AP1006-(0-0.5)-RE(**
Sampling Method: **GRAB**
Sample Type: **SD** *Sample Purpose:* **REG**
Sampling Equip: nitrile glove grab, zip-lock bag composite

Task: **AP2-SED**
Collection Date: 5/25/09
Collection Time: 1215
Start Depth: 0.1 ft
End Depth: 0.6 ft
Sample Matrix: **SOIL**
Sample Team: DK/DT

QC Partners:
(TB) — (ER) — (FB) —

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
SEMIVOLATILES3	N	A	1	4	oz	CWM
METALS3	N	B	1	4	oz	CWM
PCB3	N	C	1	4	oz	CWM
EXPLOSIVES	N	D	1	4	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: 0.0-0.1': leaves, roots
0.1-0.6': Black, very soft, SILT (at 0.5' soft, gray CLAY)
↳ little lots vfg sand

Sketch Location:

See SW SCL AP2006 for sketch

Logged BY / Date: David Kessler 5/25/09 *Reviewed BY / Date:* Edward G Wa 11-8-09

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW 052609 - ACCT

Location Code: **AP2-MW01**
Sample Number: **AP3057**
Sample Name: **PBOW-09-GW-AP2-MW01-AP3057-REG**
Sampling Method: **GRAB**
Sample Type: **GW** *Sample Purpose:* **REG**
Sampling Equip: YSI 6820 / Bladder pump

Task: **TPAPLBRC**
Collection Date: 5/23/09
Collection Time: ~~1055~~ MK 1055
Start Depth: 11.20' btoc
End Depth: 11.20' btoc
Sample Matrix: **WATER**
Sample Team: M. Yantin / E. Weaver

QC Partners:
(TB) 052609-TB (ER) ER 2 (FB) ——

ERPIMS Values:
Sacode:
Lot Control#:

Containers

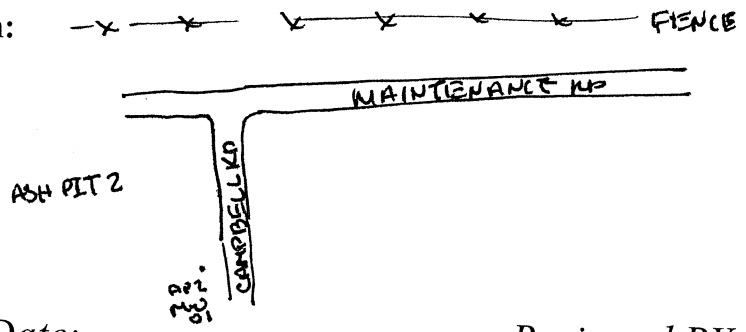
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
~~PCB3~~	~~N~~	~~H~~	~~2~~	~~1~~	~~L~~	~~Amb. Glass~~ DFK
CYANIDE	N	I	1	500	mL	HDPE
HARDNESS	N	J	1	500	mL	HDPE

Groundwater Information:

Measured Well Depth: 19.35' btoc **Depth To Water:** 11.20' btoc

Comments: Low flow @ 70 mL/min.
Iron Hach Test: 0.0 mg/L

Sketch Location:



Logged BY / Date: M. Yantin / 05/23/09 *Reviewed BY / Date:* Edward Weaver 11-6-09

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GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Area or Site ID: PBOW
Sample ID: AP3057
Weather: Sunny 70°

Sampling location ID: AP2-MW01
Collection Time/Date: 5/23/09 1055

Pump Installation (Bladder/Fultz/Peristaltic/Grundfos/Other_____ (circle or add one)

Pump installation crew: H. Yantin / E. Weaver
Casing diameter (inches): 2
Total well depth (ft. BTOC): 19.35
Bladder pump settings: CPM 2-2-2-2
Refill (seconds): 28-29-28-29
Discharge (seconds): 2-1-2-1
Throttle (psi): 20-20-20-20
Discharge tube length (ft.): 17

Screen Interval (ft. BTOC): 11.64 to 21.64
Pump intake depth (ft BTOC): 11.7
Max. sustainable pump rate (mL/min): _____
Appearance of product: clear
Discharge tube diameter: 1/4" ID
Inlet reducer used (Y/N): N
PID: 0 ppm H_2S: 0
LEL: LEL: 0 %; Oxygen: 21.4 %; Carbon: 0 ppm

Purging

Purging/sampling crew: H. Yantin / E. Weaver
Purge date/beginning time: 5/23/09 1015
Initial (pre-purging) DTW (ft. BTOC): 10.83

Purge date/completion time: 5/23/09
Final (post-purging) DTW (ft. BTOC): 11.20

Low Flow purge tubing volume calculations

Volume of Water in Tubing:

Bladder pump volume = 0.3 Liters
Tubing Liters/ft. (1/4" ID tubing) = 0.01 Liters/ft. 0.02 L for a 3/8" I.D. tube
Tubing length = 17 ft.
Tubing volume (Liters)= (Tubing Liters/ft. x Tubing length) + Pump volume = (0.01 L/ft x 17 ft) + 0.3 L = .47 L
No. of tubing volumes purged: 3
Total purge volume: Tubing volume (L) x No. of tubing volumes purged = .47 L x 3 = 1.41 L

Monitoring well purge volume calculations

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (2)^2) = .164 gal/ft
Well volume (gallons) = Water Column (ft) x Gal/ft = 8.52 ft x .164 Gal/ft = 1.39 gallons

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. In inches & d is casing dia. in inches
= 0.041 x ((8)^2 - (2)^2) = 2.46 gal/ft
Filter Pack Volume (gal) = ((Screen Height + water column above screen to below bent.) x gal/ft) x porosity (0.3)
= ((Screen Height 10 ft + 8.52 ft - 20 ft) x 2.46 gal/ft) x 0.3 = 1.03 gallons

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = 1.39 gal + 1.03 gal = 2.42 gal X 3.785 L/gal = 9.16 L

1 x Well Purge Volume	2 x Well Purge Volume	3 x Well Purge Volume	4 x Well Purge Volume	5 x Well Purge Volume
9.16	18.32	27.49	36.65	45.81

Purge Rate

	Initial	2	3	4	5	6	7	8	Final
Flow rate (L/min)	.052	.06	.07						0.70

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidiy (NTU)
5/23/09	1025	11.19	NA	1L	14.90	0.899	-131.8	6.41	10.49	3.1
"	1030	11.14	.052	1.26	14.30	0.901	-138.7	6.39	10.55	2.8
"	1035	11.22	.060	1.56	13.70	0.900	-141.8	6.35	10.58	2.1
"	1040	11.21	.070	1.81	13.55	0.899	-140.9	6.35	10.49	2.5
"	1045	11.20	.070	2.16	13.60	0.894	-141.1	6.36	10.38	2.7
"	1050	11.20	.070	2.51	13.57	0.895	-141.6	6.36	10.30	2.7
"	1055	11.20	.070	2.86	13.59	0.895	-141.3	6.35	10.27	2.5

HRM 5/23/09

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GROUNDWATER SAMPLING FORM

Sheet 2 of 2

Water Quality Parameter Measurements (continued)

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)

MPM 5/23/09

Sampling

Sampling beginning time: 1055

Sampling completion time: 1240

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
5/23/09	1055	11.20	.070	2.86	13.59	0.895	-141.3	6.35	10.27	2.5

Sample Information

Sample ID: AP 3057

Sample collection date/time: 5/23/09 1055

Duplicate sample collected (Y/N): N

Duplicate sample ID: NA

Split sample collected (Y/N): N

Split sample ID: NA

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers

MPM 5/23/09

Comments: Low flow @ 70mL/min.

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter;

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW 052609-ACCT

Location Code: **AP2-MW02**

Sample Number: **AP3058**

Sample Name: **PBOW-09-GW-AP2-MW02-AP3058-REG**

Sampling Method: **GRAB**

Sample Type: **GW** *Sample Purpose:* **REG**

Sampling Equip: YSI 6820/ Bladder pump

QC Partners:

(TB) 052609-TB (ER) — (FB) —

Task: **TPAPLBRC**

Collection Date: 5/25/09

Collection Time: 0932

Start Depth: 7.40' btoc

End Depth: 7.40' btoc

Sample Matrix: **WATER**

Sample Team: M. Yantin / E. Weaver

ERPIMS Values:

Sacode:

Lot Control#:

Containers

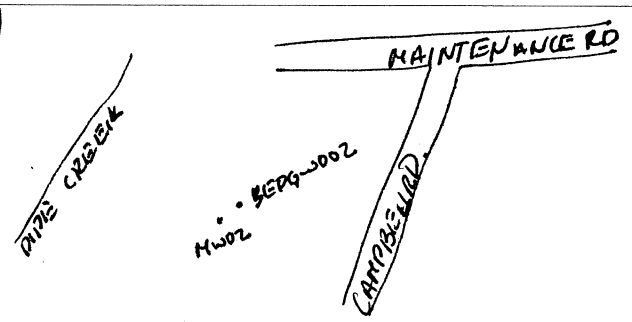
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
~~PCB3~~	~~N~~	~~H~~	~~2~~	~~1~~	~~L~~	~~Amb. Glass~~
CYANIDE	N	I	1	500	mL	HDPE
HARDNESS	N	J	1	500	mL	HDPE

Groundwater Information:

Measured Well Depth: 15.35' btoc **Depth To Water:** 7.40' btoc

Comments: Sampled @ 130 mL/min
Iron Hach Test: 0.0 mg/L

Sketch Location:



Logged BY / Date: M. Yantin 5/25/09 *Reviewed BY / Date:* Edward Weaver 11-8-09

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW-052609-ACCT

Location Code: **AP2-MW02**
Sample Number: **AP3059**
Sample Name: **PBOW-09-GW-AP2-MW02-AP3059-REG**
Sampling Method: **GRAB**
Sample Type: **GW** *Sample Purpose:* **FD**
Sampling Equip: YSI 6820 / Bladder pump

Task: **TPAPLBRC**
Collection Date: 5/25/09
Collection Time: 0932
Start Depth: 7.40' btoc
End Depth: 7.40' btoc
Sample Matrix: **WATER**
Sample Team: M. Yantin / E. Weaver

QC Partners:
(TB) 052609-TB (ER) — (FB) —

ERPIMS Values:
Sacode:
Lot Control#:

Containers

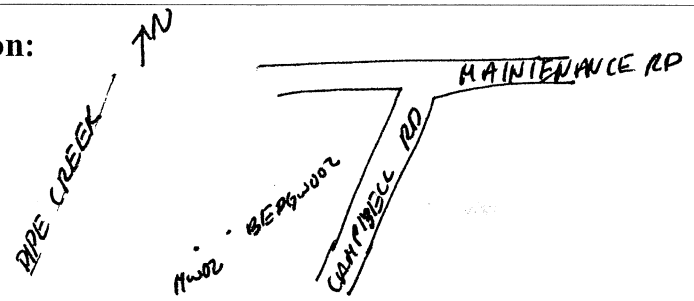
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
~~PCB3~~	~~N~~	~~H~~	~~2~~	~~1~~	~~L~~	~~Amb. Glass~~ DKK
CYANIDE	N	I	1	500	mL	HDPE
HARDNESS	N	J	1	500	mL	HDPE

Groundwater Information:

Measured Well Depth: 15.35' btoc **Depth To Water:** 7.40' btoc

Comments: Sampled @ 130 mL/min.
Iron Hach Test: 0.0 mg/L

Sketch Location:



Logged BY / Date: M. Yantin 5/25/09 *Reviewed BY / Date:* Edward [illegible] 11-9-09

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: DHK PW052609-TA

Location Code: **AP2-MW02**

Sample Number: **AP3060**

Sample Name: **PBOW-09-GW-AP2-MW02-AP3060-REG**

Sampling Method: **GRAB**

Sample Type: **GW** *Sample Purpose:* **FS**

Sampling Equip: YSI 6820 / Bladder pump

QC Partners:

(TB) 052609-TB (ER) (FB) —

Task: **TPAPLBRC**

Collection Date: 5/25/09

Collection Time: 0932

Start Depth: 7.40' btoc

End Depth: 7.40' btoc

Sample Matrix: **WATER**

Sample Team: M. Yantin / E. Weaver

ERPIMS Values:

Sacode:

Lot Control#:

Containers

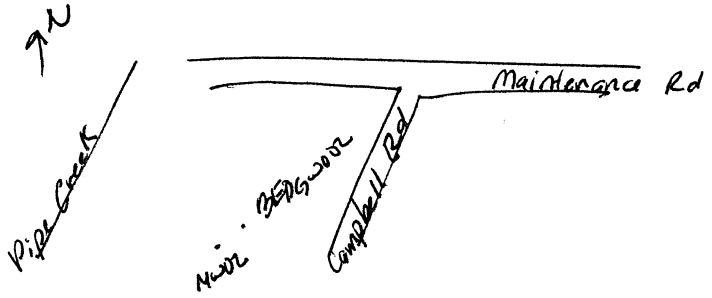
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
METALS3-W	N	D	1	1	L	HDPE
METALS3-W-F	Y	E	1	1	L	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
~~PCB3~~	~~N~~	~~G~~	~~2~~	~~1~~	~~L~~	~~Amb. Glass~~ DHK
NO2/NO3	N	H	1	250	mL	HDPE
CYANIDE	N	I	1	250	mL	HDPE
HARDNESS	N	J	1	250	mL	HDPE

Groundwater Information:

Measured Well Depth: 15.35' btoc **Depth To Water:** 7.40' btoc

Comments: Sampled @ 130 mL/min
Iron Hach Test: mg/L (0.0)

Sketch Location:



Logged BY / Date: M. Yantin 5/25/09 *Reviewed BY / Date:* Edward Weaver 11-8-09

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GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Area or Site ID: PBOW
Sample ID: AP3058
Weather: Partly cloudy 65°

Sampling location ID: AP2 MW02
Collection Time/Date: 5/25/09 0932

Pump Installation (~~Bladder~~/Fultz/Peristaltic/Grundfos/Other_____ (circle or add one)

Pump installation crew: M. Yantin / E. Weaver
Casing diameter (inches): 2
Total well depth (ft. BTOC): 15.35
Bladder pump settings: CPM 2-2
Refill (seconds): 28 - 28
Discharge (seconds): 2-2
Throttle (psi): 20 - 18
Discharge tube length (ft.): 16

Screen Interval (ft. BTOC): 5.35 to 15.35
Pump intake depth (ft BTOC): 8.8
Max. sustainable pump rate (mL/min):
Appearance of product: clear
Discharge tube diameter: 1/4" ID
Inlet reducer used (Y/N): N
PID: 0 ppm H_2S: 0
LEL: LEL: ~~20.7~~ 0 %; Oxygen: 20.8 %; Carbon: 0 ppm

Purging

Purging/sampling crew: M. Yantin / E. Weaver
Purge date/beginning time: 5/25/09 0852
Initial (pre-purging) DTW (ft. BTOC): 7.29'

Purge date/completion time: 5/25/09
Final (post-purging) DTW (ft. BTOC): 7.40

Low Flow purge tubing volume calculations

Volume of Water in Tubing:

Bladder pump volume = 0.3 Liters
Tubing Liters/ft. (1/4" ID tubing) = 0.01 Liters/ft. 0.02 L for a 3/8" I.D. tube
Tubing length = 16 ft.
Tubing volume (Liters)= (Tubing Liters/ft. x Tubing length) + Pump volume = (0.01 L/ft x 16 ft) + 0.3 L = .46 L
No. of tubing volumes purged: 3
Total purge volume: Tubing volume (L) x No. of tubing volumes purged = .46 L x 3 = 1.38 L

Monitoring well purge volume calculations

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (_____)^2) = _____ gal/ft
Well volume (gallons) = Water Column (ft) x Gal/ft = _____ ft x _____ Gal/ft = _____ gallons

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. in inches & d is casing dia. in inches
= 0.041 x ((8)^2 - (2)^2) = 1.23 gal/ft
Filter Pack Volume (gal) = ((Screen Height + water column above screen to below bent.) x gal/ft) x porosity (0.3)
= ((Screen Height 10 ft + 1.525 ft) x _____ gal/ft) x 0.3 = _____ gallons

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = _____ gal + _____ gal = _____ gal X 3.785 L/gal = _____ L

1 x Well Purge Volume	2 x Well Purge Volume	3 x Well Purge Volume	4 x Well Purge Volume	5 x Well Purge Volume

Purge Rate

	Initial	2	3	4	5	6	7	8	Final
Flow rate (L/min)	.170	.150	.130						

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidiy (NTU)
5/25/09	0902	7.37	.170	1.7	12.31	0.808	3073.1	5.55	3.57	3.8
"	0907	7.38	.170	2.55	11.95	0.829	1361.8	5.66	2.66	2.8
"	0912	7.40	.150	3.30	11.84	0.842	693.8	5.70	2.29	3.3
"	0917	7.39	.130	3.95	11.72	0.853	630.2	5.75	2.00	2.0
"	0922	7.40	.130	4.6	11.72	0.854	625.2	5.74	1.91	2.0
"	0927	7.40	.130	5.25	11.69	0.855	624.1	5.72	1.91	1.9
"	0932	7.40	.130	5.90	11.69	0.856	623.8	5.72	1.92	1.7
					MDM 5/25/09					

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GROUNDWATER SAMPLING FORM

Water Quality Parameter Measurements (continued)

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)

HPM 5/25/09

Sampling

Sampling beginning time: 0932

Sampling completion time: 1200

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
5/25/09	0932	7.40	.130	5.90	11.69	0.856	623.8	5.72	1.92	1.7

Sample Information

Sample ID: AP3058

Sample collection date/time: 5/25/09 0932

Duplicate sample collected (Y/N): Y

Duplicate sample ID: AP3059

Split sample collected (Y/N): Y

Split sample ID: AP 3060

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers

HPM 5/25/09

Comments: Low flow @ 130 mL/min

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter;

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW 052609 - ACCT

Location Code: **AP2-MW03**
Sample Number: **AP3061**
Sample Name: **PBOW-09-GW-AP2-MW03-AP3061-REG**
Sampling Method: **GRAB**
Sample Type: **GW** *Sample Purpose:* **REG**
Sampling Equip: Bladder pump 1451 6820

Task: **TPAPLBRC**
Collection Date: 5/24/09
Collection Time: 1058
Start Depth: 6.21' btoc
End Depth: 6.21 btoc
Sample Matrix: **WATER**
Sample Team: M. Yantin / E. Weaver

QC Partners:
(TB) 052609-TB (ER) — (FB) —

ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
~~PCB3~~	~~N~~	~~H~~	~~2~~	~~1~~	~~L~~	~~Amb. Glass~~ DKK
CYANIDE	N	I	1	500	mL	HDPE
HARDNESS	N	J	1	500	mL	HDPE

Groundwater Information:

Measured Well Depth: 12.45' btoc **Depth To Water:** 6.21' btoc

Comments: Sampled @ 40 mL/min
Iron Hach Test: 0.0 mg/L

Sketch Location:

Logged BY / Date: M. Yantin / 5/24/09 *Reviewed BY / Date:* Edward Weaver 11-8-09

Shaw Environmental, Inc.

GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Area or Site ID: PBOW
Sample ID: AP 3061
Weather: Partly cloudy 65°

Sampling location ID: AP2-MW03
Collection Time/Date: 5/24/09 1058

Pump Installation (Bladder/Fultz/Peristaltic/Grundfos/Other_____ (circle or add one)

Pump installation crew: M. Martin / E. Weaver
Casing diameter (inches): 2
Total well depth (ft. BTOC): 12.45
Bladder pump settings: CPM 2-2
Refill (seconds): 28-29
Discharge (seconds): 2-1
Throttle (psi): 20-20
Discharge tube length (ft.): 15

Screen Interval (ft. BTOC): 7.4 to 12.4
Pump intake depth (ft BTOC): 9.9
Max. sustainable pump rate (mL/min): 40
Appearance of product: clear
Discharge tube diameter: 1/4" ID
Inlet reducer used (Y/N): N
PID: 0 ppm
LEL: LEL: 0 %; Oxygen: 20.8%; Carbon: 0 ppm

Purging

Purging/sampling crew: M. Martin / E. Weaver
Purge date/beginning time: 5/24/09 1008
Initial (pre-purging) DTW (ft. BTOC): 4.81

Purge date/completion time: 5/24/09
Final (post-purging) DTW (ft. BTOC): 6.21 btoc

Low Flow purge tubing volume calculations

Volume of Water in Tubing:

Bladder pump volume = 0.3 Liters
Tubing Liters/ft. (1/4" ID tubing) = 0.01 Liters/ft. 0.02 L for a 3/8" I.D. tube
Tubing length = 15 ft.
Tubing volume (Liters)= (Tubing Liters/ft. x Tubing length) + Pump volume = (0.01 L/ft x 15 ft) + 0.3 L = .45 L
No. of tubing volumes purged: 3
Total purge volume: Tubing volume (L) x No. of tubing volumes purged = .45 L x 3 = 1.35 L

Monitoring well purge volume calculations

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (2)^2) = .164 gal/ft
Well volume (gallons) = Water Column (ft) x Gal/ft = 7.64 ft x .164 Gal/ft = 1.25 gallons

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. in inches & d is casing dia. in inches
= 0.041 x ((8)^2 - (2)^2) = 2.46 gal/ft
Filter Pack Volume (gal) = ((Screen Height + water column above screen to below bent.) x gal/ft) x porosity (0.3)
= ((Screen Height 5 ft + 2.5 ft) x 2.46 gal/ft) x 0.3 = 5.166 gallons

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = 1.25 gal + 5.166 gal = 6.42 gal X 3.785 L/gal = 24.28

1 x Well Purge Volume	2 x Well Purge Volume	3 x Well Purge Volume	4 x Well Purge Volume	5 x Well Purge Volume
24.28	48.56	72.84	97.12	121.4

Purge Rate

	Initial	2	3	4	5	6	7	8	Final
Flow rate (L/min)	.120	.068	.058	.044					0.044

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidiy (NTU)
5/24/09	1018	6.0	.120	1.20	13.04	1.416	-385.9	6.30	6.28	10.6
"	1023	6.12	.068	1.37	12.86	1.456	-540.8	6.29	5.20	13.7
"	1028	6.15	.068	1.71	12.98	1.432	-395.8	6.29	5.36	15.0
"	1033	6.20	.058	2.00	13.11	1.382	-398.4	6.30	5.60	14.7
"	1038	6.22	.044	2.22	13.14	1.371	-399.6	6.31	5.61	14.5
"	1043	6.23	.050	2.47	13.15	1.369	-398.2	6.31	5.63	14.9
"	1048	6.22	.045	2.92	13.18	1.367	-394.6	6.31	5.62	12.8
"	1053	6.21	.040	3.32	13.20	1.367	-393.1	6.30	5.58	11.6
"	1058	6.21	.040	3.72	13.20	1.368	-394.8	6.29	5.60	10.1

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GROUNDWATER SAMPLING FORM

Water Quality Parameter Measurements (continued)

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)

5/24/09

Sampling

Sampling beginning time: 1058

Sampling completion time: 1300

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
5/24/09	1058	6.21	.040	3.72	13.20	1.368	-394.8	6.29	5.60	10.1

Sample Information

Sample ID: AP3061

Sample collection date/time: 5/24/09 1058

Duplicate sample collected (Y/N): N

Duplicate sample ID: NA

Split sample collected (Y/N): N

Split sample ID: NA

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers

5/24/09

Comments: Low-flow @ 40 mL/min

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter;

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: NA

Location Code: **AP2-BEDGW-001**
Sample Number: **AP3062**
Sample Name: **PBOW-09-GW-AP2-BEDGW-001-AP3062-R1**
Sampling Method: **GRAB**
Sample Type: **GW** *Sample Purpose:* **REG**
Sampling Equip: NA

Task: **TPAPLBRC**
Collection Date:
Collection Time: NA
Start Depth:
End Depth:
Sample Matrix: **WATER**
Sample Team: M. Yantin/E. Weaver

QC Partners:
(TB) NA (ER) — (FB) —

ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
~~PCB3~~	~~N~~	~~H~~	~~2~~	~~1~~	~~L~~	~~Amb. Glass~~ DKK
CYANIDE	N	I	1	500	mL	HDPE
HARDNESS	N	J	1	500	mL	HDPE

Groundwater Information:

Measured Well Depth: 88.50' btoc **Depth To Water:** 87.17' btoc

Comments:

DRY WELL

Sketch Location:

See bore log.

Logged BY / Date: M. Yantin 5/23/09 *Reviewed BY / Date:* Edward Weaver 6-8

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GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Area or Site ID: PBOW
Sample ID: DP3062
Weather: Sunny 70°

Sampling location ID: AP2-BIDGW 001
Collection Time/Date: NA

Pump Installation (Bladder/Fultz/Peristaltic/Grundfos/Other NA (circle or add one)

Pump installation crew: E. Weaver / M. Yantin
Casing diameter (inches): 2
Total well depth (ft. BTOC): 88.53
Bladder pump settings: CPM NA
Refill (seconds): NA
Discharge (seconds): NA
Throttle (psi): NA
Discharge tube length (ft.): NA

Screen Interval (ft. BTOC): 73.50 to 88.50
Pump intake depth (ft BTOC): NA
Max. sustainable pump rate (mL/min): NA
Appearance of product: NA
Discharge tube diameter: 1/4" ID
Inlet reducer used (Y/N): N
PID : ____ ppm
LEL: LEL: %; Oxygen: %; Carbon: ppm

Purging

Purging/sampling crew: M. Yantin / E. Weaver
Purge date/beginning time: NA
Initial (pre-purging) DTW (ft. BTOC): 87.17

Purge date/completion time: NA
Final (post-purging) DTW (ft. BTOC): NA

Low Flow purge tubing volume calculations

Volume of Water in Tubing:

Bladder pump volume = 0.3 Liters
Tubing Liters/ft. (1/4" ID tubing) = 0.01 Liters/ft. 0.02 L for a 3/8" I.D. tube
Tubing length = ____ ft.
Tubing volume (Liters)= (Tubing Liters/ft. x Tubing length) + Pump volume = (0.01 L/ft x ____ ft) + 0.3 L = ____ L
No. of tubing volumes purged: ____
Total purge volume: Tubing volume (L) x No. of tubing volumes purged = ____ L x ____ = ____ L

MPM 5/23/09

Monitoring well purge volume calculations

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (____)^2) = ____ gal/ft
Well volume (gallons) = Water Column (ft) x Gal/ft = ____ ft x ____ Gal/ft = ____ gallons

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. in inches & d is casing dia. in inches
= 0.041 x ((____)^2 - (____)^2) = ____ gal/ft
Filter Pack Volume (gal) = ((Screen Height + water column above screen to below bent.) x gal/ft) x porosity (0.3)
= ((Screen Height ____ ft + ____ ft) x ____ gal/ft) x 0.3 = ____ gallons

MPM 5/23/09

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = ____ gal + ____ gal = ____ gal X 3.785 L/gal = ____ L

1 x Well Purge Volume	2 x Well Purge Volume	3 x Well Purge Volume	4 x Well Purge Volume	5 x Well Purge Volume

Purge Rate

	Initial	2	3	4	5	6	7	8	Final
Flow rate (L/min)				MPM	05/23/09				

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidiy (NTU)

MPM 5/23/09

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GROUNDWATER SAMPLING FORM

Sheet 2 of 2

Water Quality Parameter Measurements (continued)

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)

UMM 5/23/09

Sampling

Sampling beginning time: _____ Sampling completion time: VMK

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)

UMM 5/23/09

Sample Information

Sample ID: AP3062

Sample collection date/time: NA

Duplicate sample collected (Y/N): N

Duplicate sample ID: NA

Split sample collected (Y/N): N

Split sample ID: NA

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers

UMM 5/23/09

Comments:

Well is dry.

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter;

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW 052609-ACCT

Location Code: **AP2-BEDGW-002**
Sample Number: **AP3063**
Sample Name: **PBOW-09-GW-AP2-BEDGW-002-AP3063-R1**
Sampling Method: **GRAB**
Sample Type: **GW** *Sample Purpose:* **REG**
Sampling Equip: YSI 6820 / Bladder pump

QC Partners:
(TB) 052609TB (ER) — (FB) —

Task: **TPAPLBRC**
Collection Date: 5/24/09
Collection Time: 1531
Start Depth: 23.1' btoc
End Depth: 23.1' btoc
Sample Matrix: **WATER**
Sample Team: H. Yantin / E. Weaver

ERPIMS Values:
Sacode:
Lot Control#:

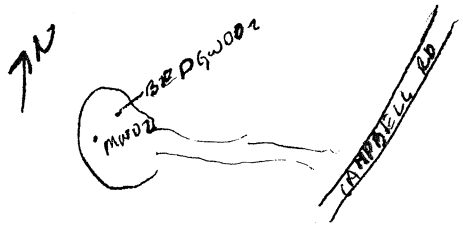
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
~~PCB3~~	~~N~~	~~H~~	~~2~~	~~1~~	~~L~~	~~Amb. Glass~~ DKR
CYANIDE	N	I	1	500	mL	HDPE
HARDNESS	N	J	1	500	mL	HDPE

Groundwater Information:
Measured Well Depth: 85.35' btoc **Depth To Water:** 23.1' btoc

Comments: Low flow @ 92 mL/min

Sketch Location:



Logged BY / Date: H. Yantin 5/26/09 *Reviewed BY / Date:* Edward Weaver 1/28/10

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GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Area or Site ID: PBOW
Sample ID: AB3063
Weather: Sunny 70°

Sampling location ID: AP2. BEDGW002
Collection Time/Date: 5/24/09 1531

Pump Installation (Bladder/Fultz/Peristaltic/Grundfos/Other_____ (circle or add one)

Pump installation crew: M. Martin / E. Weaver
Casing diameter (inches): 2
Total well depth (ft. BTOC): ~~77.23~~ 85.35
Bladder pump settings: CPM 2
Refill (seconds): 25
Discharge (seconds): 5
Throttle (psi): 40
Discharge tube length (ft.): 80

Screen Interval (ft. BTOC): 70 to 85.0
Pump intake depth (ft BTOC): 75.7
Max. sustainable pump rate (mL/min):
Appearance of product: clear
Discharge tube diameter: 1/4" ID
Inlet reducer used (Y/N): N
PID: 2.5 ppm H_2S: 5
LEL: LEL: 0 %; Oxygen: 20.8 %; Carbon: 0 ppm

Purging

Purging/sampling crew: M. Martin / E. Weaver
Purge date/beginning time: 5/24/09 1441
Initial (pre-purging) DTW (ft. BTOC): 23.05

Purge date/completion time: 5/24/09 1531
Final (post-purging) DTW (ft. BTOC): 23.1

Low Flow purge tubing volume calculations

Volume of Water in Tubing:

Bladder pump volume = 0.3 Liters
Tubing Liters/ft. (1/4" ID tubing) = 0.01 Liters/ft. 0.02 L for a 3/8" I.D. tube
Tubing length = 80 ft.
Tubing volume (Liters)= (Tubing Liters/ft. x Tubing length) + Pump volume = (0.01 L/ft x 80 ft) + 0.3 L = 1.1 L
No. of tubing volumes purged: 3
Total purge volume: Tubing volume (L) x No. of tubing volumes purged = 1.1 L x 3 = 3.3 L

Monitoring well purge volume calculations

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (2)^2) = .164 gal/ft
Well volume (gallons) = Water Column (ft) x Gal/ft = _____ ft x _____ Gal/ft = _____ gallons

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. in inches & d is casing dia. in inches
= 0.041 x ((6)^2 - (2)^2) = _____ gal/ft
Filter Pack Volume (gal) = ((Screen Height + water column above screen to below bent.) x gal/ft) x porosity (0.3)
= ((Screen Height _____ ft + _____ ft x _____ gal/ft) x 0.3 = _____ gallons

5/24/09

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = _____ gal + _____ gal = _____ gal X 3.785 L/gal = _____ L

1 x Well Purge Volume	2 x Well Purge Volume	3 x Well Purge Volume	4 x Well Purge Volume	5 x Well Purge Volume

Purge Rate

	Initial	2	3	4	5	6	7	8	Final
Flow rate (L/min)	.092	—	—	—	05/24/09	—	—	—	0.092

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min) 0.092	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidiy (NTU)
5/24/09	1501	23.1	~~0.084~~	1.84	16.95	0.746	-396.9	6.27	1.80	54.4
"	1506	"	0.092	2.30	16.88	2.905	-168.7	6.21	1.10	33.6
"	1511	"	0.092	2.76	16.91	2.930	-154.4	6.21	1.79	30.1
"	1516	"	0.092	3.22	16.88	2.957	-148.9	6.20	1.70	24.2
"	1521	"	0.092	3.68	16.92	2.965	-142.8	6.20	1.68	20.1
"	1526	"	0.092	4.14	16.98	2.964	-144.6	6.20	1.65	18.8
"	1531	"	0.092	4.60	17.00	2.968	-144.8	6.20	1.64	16.2

5/24/09

Shaw Environmental, Inc.

GROUNDWATER SAMPLING FORM

Sheet 2 of 2

Water Quality Parameter Measurements (continued)

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)

HPA
5/24/09

Sampling

Sampling beginning time: 1531

Sampling completion time: 1640

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
5/24/09	1531	23.1	0.092	4.60	17.00	2.968	-144.8	6.20	1.64	16.2

Sample Information

Sample ID: AP 3063

Sample collection date/time: 5/24/09

Duplicate sample collected (Y/N): N

Duplicate sample ID: NA

Split sample collected (Y/N): N

Split sample ID: NA

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers

HPA
5/24/09.

Comments: water level stable @ 92 mL/min.

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter;

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW-052609-ACCT

Location Code: **AP2-BEDGW-003**
Sample Number: **AP3064**
Sample Name: **PBOW-09-GW-AP2-BEDGW-003-AP3064-R1**
Sampling Method: **GRAB**
Sample Type: **GW** *Sample Purpose:* **REG**
Sampling Equip: YSI 6820 / Bladder pump

QC Partners:
(TB) 052609-TB (ER) — (FB) —

Task: **TPAPLBRC**
Collection Date: 5/23/09
Collection Time: 1550
Start Depth: 27.85' btoc
End Depth: 27.85' btoc
Sample Matrix: **WATER**
Sample Team: M. Yantin / E. Weaver

ERPIMS Values:
Sacode:
Lot Control#:

Containers

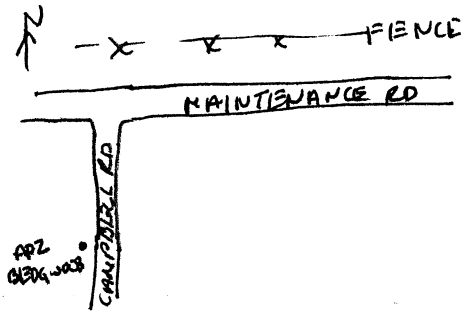
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
~~PCB3~~	~~N~~	~~H~~	~~2~~	~~1~~	~~L~~	~~Amb. Glass~~
CYANIDE	N	I	1	500	mL	HDPE
HARDNESS	N	J	1	500	mL	HDPE

Groundwater Information:

Measured Well Depth: 62.65' btoc **Depth To Water:** 27.85' btoc

Comments: Well sampled @ 114 mL/min
Iron Hach Test: 0.0 mg/L

Sketch Location:



Logged BY / Date: M. Yantin 5/23/09 *Reviewed BY / Date:* Edward Weaver 11-8-09

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW-052609-ACCT

Location Code: **AP2-BEDGW-003**
Sample Number: **AP3064MS**
Sample Name: **PBOW-09-GW-AP2-BEDGW-003-AP3064MS**
Sampling Method: **GRAB**
Sample Type: **GW** *Sample Purpose:* **MS**
Sampling Equip: YSI 6820 / Bladder Pump
QC Partners: 052909-TB
(TB) ~~052609-TB~~ MB **(ER)** — **(FB)** —

Task: **TPAPLBRC**
Collection Date: 5/23/09
Collection Time: 1550
Start Depth: 27.85' btoc
End Depth: 27.85' btoc
Sample Matrix: **WATER**
Sample Team: M. Yantin / E. Weaver

ERPIMS Values:
Sacode:
Lot Control#:

Containers

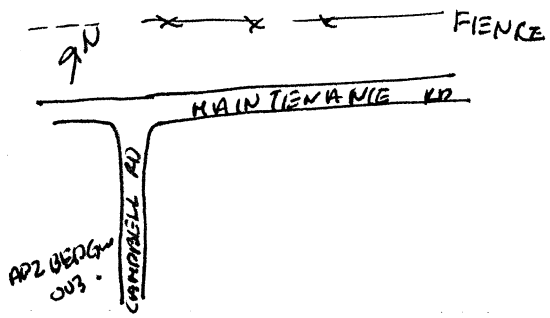
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
~~PCB3~~	~~N~~	~~H~~	~~2~~	~~1~~	~~L~~	~~Amb. Glass~~ DKK
CYANIDE	N	I	1	500	mL	HDPE
HARDNESS	N	J	1	500	mL	HDPE

Groundwater Information:

Measured Well Depth: 62.65' btoc **Depth To Water:** 27.85' btoc

Comments: Well sampled @ 114 mL/min
Iron Hach Test: mg/L (0.0)

Sketch Location:



Logged BY / Date: M. Yantin 5/23/09 *Reviewed BY / Date:* Edward Weaver 11-8-09

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW052609 -ACCT

Location Code: **AP2-BEDGW-003**
Sample Number: **AP3064MSD**
Sample Name: **PBOW-09-GW-AP2-BEDGW-003-AP3064MS**
Sampling Method: **GRAB**
Sample Type: **GW** *Sample Purpose:* **MSD**
Sampling Equip: YSI 6820 / Bladder Pump

Task: **TPAPLBRC**
Collection Date: 5/23/09
Collection Time: 1550
Start Depth: 27.85' btoc
End Depth: 27.85' btoc
Sample Matrix: **WATER**
Sample Team: M. Yantin / E. Weaver

QC Partners:
(TB) 052609 -TB (ER) — (FB) —

ERPIMS Values:
Sacode:
Lot Control#:

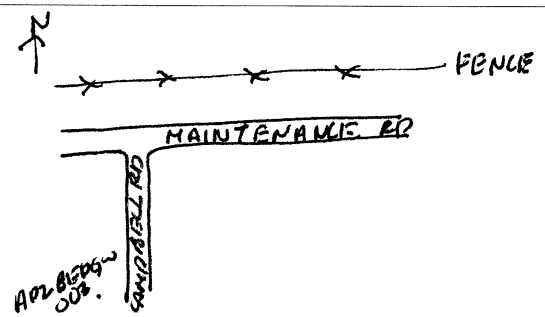
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
~~PCB3~~	~~N~~	~~H~~	~~2~~	~~1~~	~~L~~	~~Amb. Glass~~ DKK
CYANIDE	N	I	1	500	mL	HDPE
HARDNESS	N	J	1	500	mL	HDPE

Groundwater Information:
Measured Well Depth: 62.65' btoc **Depth To Water:** 27.85' btoc

Comments: Well sampled @ 114 mL/min
Iron Hach Test: 0.0 mg/L

Sketch Location:



Logged BY / Date: M. Yantin 5/23/09 *Reviewed BY / Date:* Edward G. Weaver 11-8-09

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW 052609-ACCT

Location Code: **AP2-BEDGW-003**
Sample Number: **AP3065**
Sample Name: **PBOW-09-GW-AP2-BEDGW-003-AP3065-R1**
Sampling Method: **GRAB**
Sample Type: **GW** *Sample Purpose:* **FD**
Sampling Equip: YSI 6820 / Bladder pump

Task: **TPAPLBRC**
Collection Date: 5/23/09
Collection Time: 1550
Start Depth: 27.85' btoc
End Depth: 27.85' btoc
Sample Matrix: **WATER**
Sample Team: M. Yantin / E. Weaver

QC Partners:
(TB) 052609-TB (ER) — (FB) —

ERPIMS Values:
Sacode:
Lot Control#:

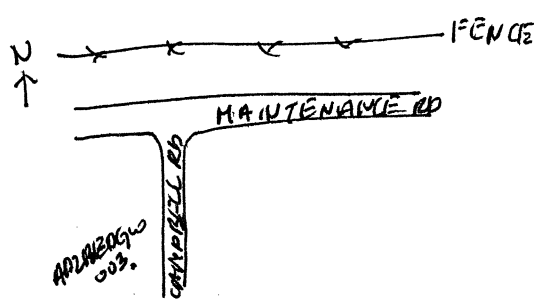
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
~~PCB3~~	~~N~~	~~H~~	~~2~~	~~1~~	~~L~~	~~Amb. Glass~~ DKK
CYANIDE	N	I	1	500	mL	HDPE
HARDNESS	N	J	1	500	mL	HDPE

Groundwater Information:
Measured Well Depth: 62.65' btoc ~~btoc~~ **Depth To Water:** 27.85' btoc

Comments: well sampled @ 114 mL/min.
Iron Hach Test: 0.0 mg/L

Sketch Location:



Logged BY / Date: M. Yantin 5/23/09 *Reviewed BY / Date:* Edward Weaver 11-8-09

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW-052609-TA

Location Code: **AP2-BEDGW-003**
Sample Number: **AP3066**
Sample Name: **PBOW-09-GW-AP2-BEDGW-003-AP3066-R1**
Sampling Method: **GRAB**
Sample Type: **GW** *Sample Purpose:* **FS**
Sampling Equip: YSI 6820 / Bladder pump

Task: **TPAPLBRC**
Collection Date: 5/23/09
Collection Time: 1550
Start Depth: 27.85' btoc
End Depth: 27.85' btoc
Sample Matrix: **WATER**
Sample Team: H. Yantin / E. Weaver

QC Partners:
(TB) 052609-TB (ER) — (FB) —

ERPIMS Values:
Sacode:
Lot Control#:

Containers

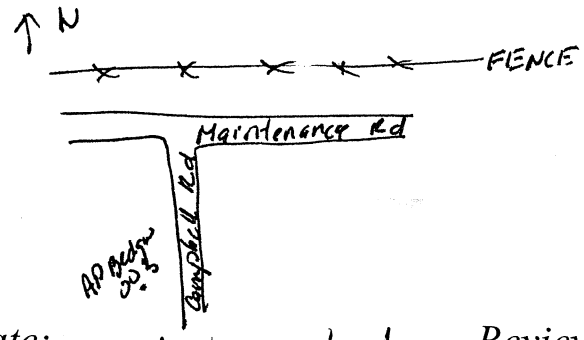
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
METALS3-W	N	D	1	1	L	HDPE
METALS3-W-F	Y	E	1	1	L	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
~~PCB3~~	~~N~~	~~G~~	~~2~~	~~1~~	~~L~~	~~Amb. Glass~~ DKK
NO2/NO3	N	H	1	250	mL	HDPE
CYANIDE	N	I	1	250	mL	HDPE
HARDNESS	N	J	1	250	mL	HDPE

Groundwater Information:

Measured Well Depth: 62.65' btoc **Depth To Water:** 27.85' btoc

Comments: well sampled @ 114 mL/min.
Iron Hach Test: 0.0 mg/L

Sketch Location:



Logged BY / Date: H. Yantin 5/23/09 *Reviewed BY / Date:* Edward Weaver 11-8-09

Shaw Shaw Environmental, Inc.

GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Area or Site ID: PBOW
Sample ID:
Weather: Sunny 80°

Sampling location ID: AP2 BLDG 003
Collection Time/Date: 5/23/09 1550

Pump Installation (Bladder/Fultz/Peristaltic/Grundfos/Other_____ (circle or add one)

Pump installation crew: M. Yantin / E. Weaver
Casing diameter (inches): 2
Total well depth (ft. BTOC): 62.65
Bladder pump settings: CPM 22-2
Refill (seconds): 28-27-27
Discharge (seconds): 2-3-3
Throttle (psi): 30-30-35
Discharge tube length (ft.): 56

Screen Interval (ft. BTOC): _____ to _____
Pump intake depth (ft BTOC): 51.0
Max. sustainable pump rate (mL/min): _____
Appearance of product: clear
Discharge tube diameter: 1/4" ID
Inlet reducer used (Y/N): N
PID: 25.3 ppm 128.0
LEL: LEL: 3 %; Oxygen: 20.8%; Carbon: 0 ppm

Purging

Purging/sampling crew: M. Yantin / E. Weaver
Purge date/beginning time: 5/23/09 1430
Initial (pre-purging) DTW (ft. BTOC): 27.55

Purge date/completion time: _____
Final (post-purging) DTW (ft. BTOC): _____

Low Flow purge tubing volume calculations

Volume of Water in Tubing:

Bladder pump volume = 0.3 Liters
Tubing Liters/ft. (1/4" ID tubing) = 0.01 Liters/ft. 0.02 L for a 3/8" I.D. tube
Tubing length = 56 ft.
Tubing volume (Liters)= (Tubing Liters/ft. x Tubing length) + Pump volume = (0.01 L/ft x 56 ft) + 0.3 L = .86 L
No. of tubing volumes purged: 3
Total purge volume: Tubing volume (L) x No. of tubing volumes purged = .86 L x 3 = 2.58 L

Monitoring well purge volume calculations

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (_____)^2) = _____ gal/ft
Well volume (gallons) = Water Column (ft) x Gal/ft = _____ ft x _____ Gal/ft = _____ gallons

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. in inches & d is casing dia. in inches
= 0.041 x ((_____)^2 - (_____)^2) = _____ gal/ft
Filter Pack Volume (gal) = ((Screen Height + water column above screen to below bent.) x gal/ft) x porosity (0.3)
= ((Screen Height 10.9 ft + _____ ft) x _____ gal/ft) x 0.3 = _____ gallons

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = _____ gal + _____ gal = _____ gal X 3.785 L/gal = _____ L

1 x Well Purge Volume	2 x Well Purge Volume	3 x Well Purge Volume	4 x Well Purge Volume	5 x Well Purge Volume

5/23/09

Purge Rate

	Initial	2	3	4	5	6	7	8	Final
Flow rate (L/min)	.036	.086	.114						.114

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidiy (NTU)
5/23/09	1450	27.65	.036	.72	26.78	1.201	-344.8	6.30	0.78	15.9
"	1500	27.65	"	1.08	26.06	2.099	-407.6	6.25	0.26	15.6
"	1510	27.65	"	1.44	25.90	2.122	-323.8	6.23	0.24	15.8
"	1515	27.70	.086	1.87	25.86	2.131	-319.6	6.21	0.24	13.8
"	1520	27.77	.086	2.30	25.80	2.140	-316.9	6.21	0.23	11.8
"	1525	27.75	.086	2.73	25.78	2.142	-320.6	6.20	0.23	9.1
"	1530	27.81	.114	3.3	25.61	2.139	-319.8	6.18	0.23	7.9
"	1535	27.85	.114	3.87	25.60	2.140	-315.6	6.16	0.22	7.5
"	1540	27.85	.114	4.44	25.60	2.141	-312.8	6.15	0.22	7.1

Shaw Shaw Environmental, Inc.

GROUNDWATER SAMPLING FORM

Water Quality Parameter Measurements (continued)

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
5/23/09	1545	27.85	.114	5.01	25.59	2.143	-313.6	6.15	0.22	6.1
"	1550	27.85	.114	5.58	25.59	2.141	-315.1	6.15	0.22	5.9

MN 5/23/09

Sampling

Sampling beginning time: 1550 Sampling completion time: 1605

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
5/23/09	1550	27.85	.114	5.58	25.59	2.141	-315.1	6.15	0.22	5.9

Sample Information

Sample ID: AP 3064

Duplicate sample collected (Y/N): Y

Split sample collected (Y/N): Y

Sample collection date/time: 5/23/09 1550

Duplicate sample ID: MS+MSD AP3065

Split sample ID: AP3066

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers

MN 5/23/09

Comments:
- Low flow is possible @ 36 mL/min.
- Well recharged @ 114 mL/min.

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter;

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW 052609-ACCT

Location Code: **FIELDQC-AP2**
Sample Number: **ER2**
Sample Name: **FIELDQC-AP2-ER2**
Sampling Method: **QC**
Sample Type: **BW** *Sample Purpose:* **ER**
Sampling Equip: NA

Task: **MW-RINSATES**
Collection Date: 5/23/09
Collection Time: 1400
Start Depth: NA
End Depth: NA
Sample Matrix: **WATER**

QC Partners:
(TB) 052609-TB (ER) — (FB) —

Sample Team: H. Yantin/E. Weaver

ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
HARDNESS	N	D	1	500	mL	HDPE
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
CYANIDE	N	H	1	500	mL	HDPE

Comments: Sample collected after decontamination of bladder pump from well number: AP2 MW01. Lot number of DI water is 012809A and was distributed by VWR International.

Sketch Location:

NA

Logged BY / Date: M. Yantin 5/23/09

Reviewed BY / Date: Edward Weaver 11-8-0

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW111309ACCT

Location Code: **AP2-MW01**
Sample Number: **AP3075**
Sample Name: **PBOW-09-GW-AP2-MW01-AP3075-REG**
Sampling Method: **BP**
Sample Type: **GW** *Sample Purpose:* **REG**
Sampling Equip: bailer

Task: **OCT09-GW**
Collection Date: 11/13/09
Collection Time: 0900
Start Depth: —
End Depth: —
Sample Matrix: **WATER**
Sample Team: JAB, CPS

QC Partners:
(TB) — (ER) — (FB) —

ERPIMS Values:
Sacode:
Lot Control#:

Containers

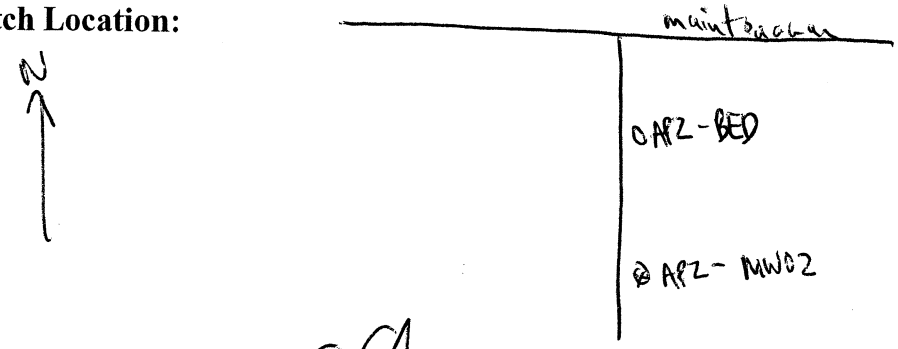
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
~~VOLATILES~~	~~N~~	~~A~~	~~3~~	~~40~~	~~mL~~	~~VOA VIAL~~
~~SEMIVOLATILES3~~	~~N~~	~~B~~	~~2~~	~~1~~	~~L~~	~~Amb. Glass~~
EXPLOSIVES	N	C	2	1	L	Amb. Glass
~~HARDNESS~~	~~N~~	~~D~~	~~1~~	~~500~~	~~mL~~	~~HDPE~~
~~METALS3-W~~	~~N~~	~~D~~	~~1~~	~~500~~	~~mL~~	~~HDPE~~
~~METALS3-W-F~~	~~Y~~	~~E~~	~~1~~	~~500~~	~~mL~~	~~HDPE~~
~~ALKALINITY~~	~~N~~	~~F~~	~~1~~	~~1~~	~~L~~	~~HDPE~~
~~CHLORIDE~~	~~N~~	~~F~~	~~1~~	~~1~~	~~L~~	~~HDPE~~
~~SULFATE~~	~~N~~	~~F~~	~~1~~	~~1~~	~~L~~	~~HDPE~~
~~TDS~~	~~N~~	~~F~~	~~1~~	~~1~~	~~L~~	~~HDPE~~
~~TSS~~	~~N~~	~~F~~	~~1~~	~~1~~	~~L~~	~~HDPE~~
~~TURB 180.1~~	~~N~~	~~F~~	~~1~~	~~1~~	~~L~~	~~HDPE~~
~~NO2/NO3~~	~~N~~	~~G~~	~~1~~	~~500~~	~~mL~~	~~HDPE~~
~~CYANIDE~~	~~N~~	~~H~~	~~1~~	~~500~~	~~mL~~	~~HDPE~~

CPS

Groundwater Information:
Measured Well Depth: 22.22 **Depth To Water:** 17.00

Comments: Well did not recharge. could only collect 2 1L ambers for explosives analysis.

Sketch Location:



Logged BY / Date: 11/13/09 *Reviewed BY / Date:* 2/18/10

ROUNDWATER SAMPLING FORM

Sheet 1 of 2

Shaw™ Shaw Environmental, Inc.

Area or Site ID: AP2

Sample ID: AP3075

Weather: clear, 50°, slight breeze

Sampling location ID: AP2-MW01

Collection Time/Date: 11/12/09 1300

Pump Installation (Bladder/Fultz/Peristaltic/Grundfos/Other Bailer (circle or add one)

Pump installation crew: JAB, CPS

Casing diameter (inches): 2

Total well depth (ft. BTOC): 22.22

Bladder pump settings: CPM

Refill (seconds):

Discharge (seconds):

Throttle (psi):

Discharge tube length (ft.): 25

Screen Interval (ft. BTOC): 11.64 to 21.64

Pump intake depth (ft BTOC): —

Max. sustainable pump rate (mL/min): —

Appearance of product: —

Discharge tube diameter: 1/4" ID

Inlet reducer used (Y/N): —

PID: — ppm H_2S: 0 ppm

LEL: LEL: 0 %; Oxygen: 20.9 %; Carbon: 0 ppm

Purging

Purging/sampling crew: JAB

Purge date/beginning time: 11/12/09 1315

Initial (pre-purging) DTW (ft. BTOC): 17.00

Purge date/completion time: 11/12/09 1430

Final (post-purging) DTW (ft. BTOC): ~~21.0~~ dry

Low Flow purge tubing volume calculations

Volume of Water in Tubing:

Bladder pump volume = 0.3 Liters

Tubing Liters/ft. (1/4" ID tubing) = 0.01 Liters/ft. 0.02 L for a 3/8" I.D. tube

Tubing length = 25 ft.

Tubing volume (Liters)= (Tubing Liters/ft. x Tubing length) + Pump volume = (0.01 L/ft x 25 ft) + 0.3 L = 0.55 L

No. of tubing volumes purged: 3

Total purge volume: Tubing volume (L) x No. of tubing volumes purged = 0.55 L x 3 = 1.65 L

Monitoring well purge volume calculations

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (2)^2) = 0.164 gal/ft

Well volume (gallons) = Water Column (ft) x Gal/ft = 5.22 ft x 0.164 Gal/ft = 0.86 gallons

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. In inches & d is casing dia. in inches

= 0.041 x ((8)^2 - (2)^2) = 2.46 gal/ft

Filter Pack Volume (gal) = ((Screen Height + water column above screen to below bent.) x gal/ft) x porosity (0.3)

= ((Screen Height 10 ft + 0 ft) x 2.46 gal/ft) x 0.3 = 7.38 gallons

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = 7.38 gal + 0.86 gal = 8.24 gal X 3.785 L/gal = 31.2 L

1 x Well Purge Volume	2 x Well Purge Volume	3 x Well Purge Volume	4 x Well Purge Volume	5 x Well Purge Volume

Purge Rate

	Initial	2	3	4	5	6	7	8	Final
Flow rate (L/min)									
				±1	±3	±10	±0.1	±10	3 < 100

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidiy (NTU)
11/12/09	1329	17.31	42	1L	12.82	0.958	-10.7	7.04	2.24	22.2
		~~17~~ 17.40	40		13.34	0.970	-10.3	7.03	1.72	24.0
	1347	17.51	32	1.65L	13.76	0.979	-10.0	7.02	1.45	13.7
	1353	17.60	42	1.98L	13.90	0.979	-9.6	7.01	1.43	8.8
	1402	17.62	32		14.45	0.983	-8.3	~~7.00~~ 6.99	1.41	7.3
	1409	17.70	32	2.41L	14.59	0.990	-8.3	6.99	1.32	7.8
			Low Flow Not possible							

GROUNDWATER SAMPLING FORM

Water Quality Parameter Measurements (continued)

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
			AP2-MW04							

Sampling

Shaw™ Shaw Environmental, Inc. _____ Sampling completion time: _____

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
11/13/09	0900	20.62								

Sample Information

Sample ID: AP3075

Duplicate sample collected (Y/N): N

Split sample collected (Y/N): N

Sample collection date/time: 11/13/09 0900

Duplicate sample ID: N

Split sample ID: N

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
Explosive	8330				

Comments:

Well did not recharge. Only 2 1L ambers could be collected for explosive analysis.

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter;

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: ~~PWACCT~~ CPS PW111309 ACCT

Location Code: **AP2-MW02**

Sample Number: **AP3076**

Sample Name: **PBOW-09-GW-AP2-MW02-AP3076-REG**

Sampling Method: **BP**

Sample Type: **GW** *Sample Purpose:* **REG**

Sampling Equip: bladder purge / bailer - sample

QC Partners:

(TB) N (ER) N (FB) N

Task: **OCT09-GW**

Collection Date: 11/13/09

Collection Time: 0830

Start Depth: —

End Depth: —

Sample Matrix: **WATER**

Sample Team: JAB, CPS

ERPIMS Values:

Sacode:

Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type	
~~VOLATILES~~	~~N~~	~~A~~	~~3~~	~~40~~	~~mL~~	~~VOA VIAL~~	CPS
~~SEMIVOLATILES3~~	~~N~~	~~B~~	~~2~~	~~1~~	~~L~~	~~Amb. Glass~~	CPS
EXPLOSIVES	N	C	2	1	L	Amb. Glass	
~~HARDNESS~~	~~N~~	~~D~~	~~1~~	~~500~~	~~mL~~	~~HDPE~~	
~~METALS3-W~~	~~N~~	~~D~~	~~1~~	~~500~~	~~mL~~	~~HDPE~~	
~~METALS3-W-F~~	~~Y~~	~~E~~	~~1~~	~~500~~	~~mL~~	~~HDPE~~	
~~ALKALINITY~~	~~N~~	~~F~~	~~1~~	~~1~~	~~L~~	~~HDPE~~	
~~CHLORIDE~~	~~N~~	~~F~~	~~1~~	~~1~~	~~L~~	~~HDPE~~	
~~SULFATE~~	~~N~~	~~F~~	~~1~~	~~1~~	~~L~~	~~HDPE~~	
~~TDS~~	~~N~~	~~F~~	~~1~~	~~1~~	~~L~~	~~HDPE~~	
~~TSS~~	~~N~~	~~F~~	~~1~~	~~1~~	~~L~~	~~HDPE~~	
~~TURB 180.1~~	~~N~~	~~F~~	~~1~~	~~1~~	~~L~~	~~HDPE~~	
~~NO2/NO3~~	~~N~~	~~G~~	~~1~~	~~500~~	~~mL~~	~~HDPE~~	
~~CYANIDE~~	~~N~~	~~H~~	~~1~~	~~500~~	~~mL~~	~~HDPE~~	

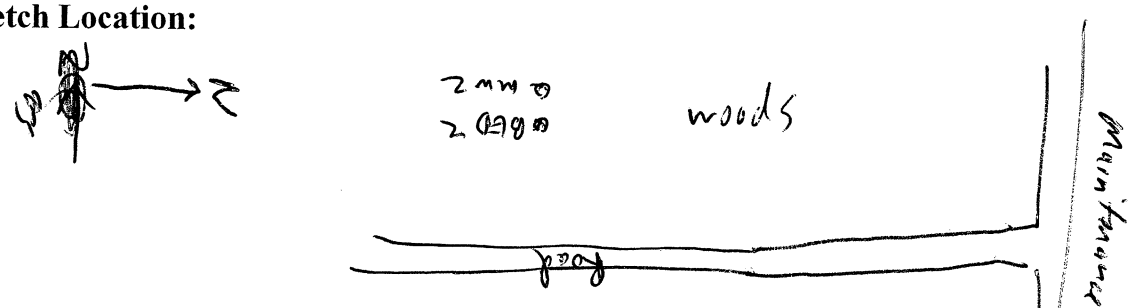
CPS

Groundwater Information:

Measured Well Depth: 18.52 **Depth To Water:** 14.08

Comments: Well did not recharge. Only Explosives could be collected. Well water was highly turbid and high sediment content.

Sketch Location:



Logged BY / Date: [signature] 11/13/09 *Reviewed BY / Date:* Edward [signature] 2/18/10

ROUNDWATER SAMPLING FORM

Sheet 1 of 2

Shaw Environmental, Inc.

Area or Site ID: AP2

Sample ID: AP3076

Weather: clear 45° slight breeze

Sampling location ID: AP2-MW02

Collection Time/Date: 11/12/09 1100

Pump Installation (Bladder/Fultz/Peristaltic/Grundfos/Other_____ (circle or add one)

Pump installation crew: JAB, CPS

Casing diameter (inches): 2

Total well depth (ft. BTOC): 18.52

Bladder pump settings: CPM

Refill (seconds):

Discharge (seconds):

Throttle (psi):

Discharge tube length (ft.): 25

Screen Interval (ft. BTOC): 5.35 to 15.35

Pump intake depth (ft BTOC): 10.35

Max. sustainable pump rate (mL/min): —

Appearance of product: —

Discharge tube diameter: 1/4" ID

Inlet reducer used (Y/N): —

PID : ppm H_2S: 0 ppm

LEL: LEL: 0 %; Oxygen: 20.8%; Carbon: 0 ppm

Purging

Purging/sampling crew: JAB, CPS

Purge date/beginning time: 11/12/09 1120

Initial (pre-purging) DTW (ft. BTOC): 14.08

Purge date/completion time: 11/12/09 1242

Final (post-purging) DTW (ft. BTOC): dry

Low Flow purge tubing volume calculations

Volume of Water in Tubing:

Bladder pump volume = 0.3 Liters

Tubing Liters/ft. (1/4" ID tubing) = 0.01 Liters/ft. 0.02 L for a 3/8" I.D. tube

Tubing length = 25 ft.

Tubing volume (Liters)= (Tubing Liters/ft. x Tubing length) + Pump volume = (0.01 L/ft x 25 ft) + 0.3 L = 0.55 L

No. of tubing volumes purged: 3

Total purge volume: Tubing volume (L) x No. of tubing volumes purged = 0.55 L x 3 = 1.65 L

No Low Flow

Monitoring well purge volume calculations

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (2)^2) = 0.164 gal/ft

Well volume (gallons) = Water Column (ft) x Gal/ft = 4.44 ft x 0.164 Gal/ft = 0.728 gallons

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. In inches & d is casing dia. in inches

= 0.041 x ((8)^2 - (2)^2) = 2.46 gal/ft

Filter Pack Volume (gal) = ((Screen Height + water column above screen to below bent.) x gal/ft) x porosity (0.3)

= ((Screen Height 10 ft + 0 ft) x 2.46 gal/ft) x 0.3 = 7.38 gallons

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = 7.38 gal + 0.73 gal = 8.11 gal X 3.785 L/gal = 30.1 L

1 x Well Purge Volume	2 x Well Purge Volume	3 x Well Purge Volume	4 x Well Purge Volume	5 x Well Purge Volume
30	60	90		

Purge Rate

	Initial	2	3	4	5	6	7	8	Final
Flow rate (L/min)									
				±1	±3	±10	±0.1	±10	3<100

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidiy (NTU)
11/12/09	1141	14.40	44	1L	10.55	1.43	-9.1	7.01	2.86	124.2
11/12/09	1151	14.53	38	—	10.84	1.46	-8.7	7.00	2.86	189.2
11/12/09	1206	14.74	50	—	10.74	1.41	-8.0	6.99	2.63	363.2
11/12/09	1218	14.95	50	—	10.59	1.40	-7.7	6.98	2.56	356.4
11/12/09	1223	15.10	50	3.1L	10.69	1.39	-7.2	6.98	2.15	72.1
				No Low Flow						

GROUNDWATER SAMPLING FORM

Water Quality Parameter Measurements (continued)

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)

APZ-MW02

Sampling

Shaw Environmental, Inc.

Sampling completion time:

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
11/13/09	0830	16.99								

Sample Information

Sample ID: AP3076

Duplicate sample collected (Y/N): N

Split sample collected (Y/N):

Sample collection date/time: 11/13/09 0830

Duplicate sample ID: N

Split sample ID:

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
Explosives	8330				

Comments: Only 2 1L ambers were collected because well would not recharge. High sediment & Turbidity

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter;

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Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: —

Location Code: **AP2-MW03**
Sample Number: **AP3077**
Sample Name: **PBOW-09-GW-AP2-MW03-AP3077-REG**
Sampling Method: **BP**
Sample Type: **GW** *Sample Purpose:* **REG**
Sampling Equip: —

QC Partners:
(TB) — **(ER)** — **(FB)** —

Task: **OCT09-GW**
Collection Date: —
Collection Time: —
Start Depth: —
End Depth: —
Sample Matrix: **WATER**
Sample Team: JAB / CPS

ERPIMS Values:
Sacode:
Lot Control#:

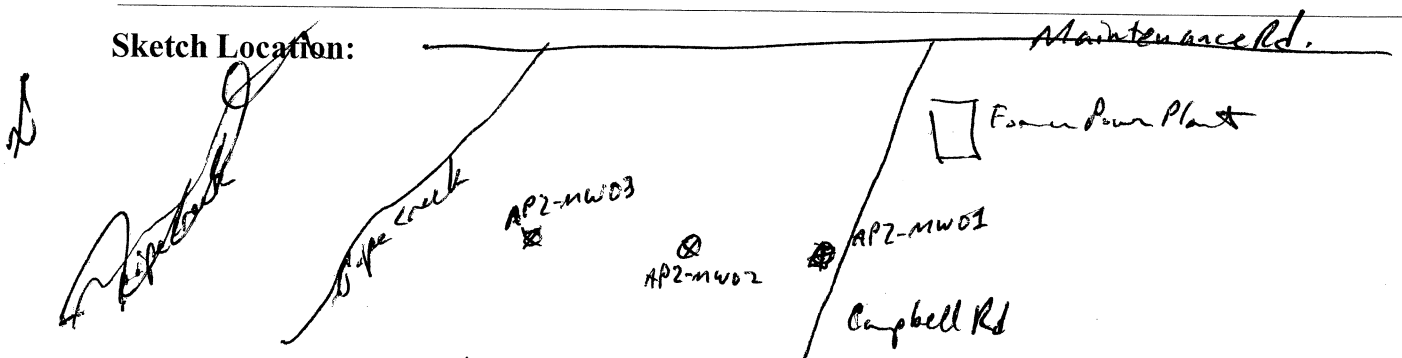
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
HARDNESS	N	D	1	500	mL	HDPE
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
CYANIDE	N	H	1	500	mL	HDPE

Groundwater Information:
Measured Well Depth: 12.45 **Depth To Water:** —

Comments: Dry Well

Sketch Location:



Logged BY / Date: E. W. Weaver 11-12-09 *Reviewed BY / Date:* Edward Gowan 2/18/10

ROUNDWATER SAMPLING FORM

Sheet 1 of 2

Shaw Environmental, Inc.

Area or Site ID: PBOW

Sample ID: —

Weather: —

Sampling location ID: AP2-MW03

Collection Time/Date: —

Pump Installation (Bladder/Fultz/Peristaltic/Grundfos/Other — (circle or add one)

Pump installation crew: —

Casing diameter (inches): 2"

Total well depth (ft. BTOC): 12.45'

Bladder pump settings: CPM —

Refill (seconds): —

Discharge (seconds): —

Throttle (psi): —

Discharge tube length (ft.): —

Screen Interval (ft. BTOC): ____ to ____

Pump intake depth (ft BTOC): —

Max. sustainable pump rate (mL/min): —

Appearance of product: —

Discharge tube diameter: 1/4" ID

Inlet reducer used (Y/N): —

PID: 0 ppm

H_2S: 0 ppm

LEL: LEL: 0 %; Oxygen: 20.9 %; Carbon: 0 ppm

Purging

Purging/sampling crew: ____

Purge date/beginning time: ____

Initial (pre-purging) DTW (ft. BTOC): ____

Purge date/completion time: ____

Final (post-purging) DTW (ft. BTOC): ____

Low Flow purge tubing volume calculations

Volume of Water in Tubing:

Bladder pump volume = 0.3 Liters

Tubing Liters/ft. (1/4" ID tubing) = 0.01 Liters/ft.

0.02 L for a 3/8" I.D. tube

Tubing length = ____ ft.

Tubing volume (Liters)= (Tubing Liters/ft. x Tubing length) + Pump volume = (0.01 L/ft x ____ ft) + 0.3 L = ____ L

No. of tubing volumes purged: ____

Total purge volume: Tubing volume (L) x No. of tubing volumes purged = ____ L x ____ = ____ L

Monitoring well purge volume calculations

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (____)^2) = ____ gal/ft

Well volume (gallons) = Water Column (ft) x Gal/ft = ____ ft x ____ Gal/ft = ____ gallons

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. In inches & d is casing dia. in inches

= 0.041 x ((____)^2 - (____)^2) = ____ gal/ft

Filter Pack Volume (gal) = ((Screen Height + water column above screen to below bent.) x gal/ft) x porosity (0.3)

= ((Screen Height ____ ft + ____ ft) x ____ gal/ft) x 0.3 = ____ gallons

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = ____ gal + ____ gal = ____ gal X 3.785 L/gal = ____ L

1 x Well Purge Volume	2 x Well Purge Volume	3 x Well Purge Volume	4 x Well Purge Volume	5 x Well Purge Volume

Purge Rate

	Initial	2	3	4	5	6	7	8	Final
Flow rate (L/min)									

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidiy (NTU)

Dry well

GROUNDWATER SAMPLING FORM

Sheet 2 of 2

Water Quality Parameter Measurements (continued)

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)

Shaw™ Shaw Environmental, Inc.

Dry Well

Sampling

Sampling completion time: No Sample Collected

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)

Sample Information

Sample ID:_____

Sample collection date/time:_____

Duplicate sample collected (Y/N):_____

Duplicate sample ID:_____

Split sample collected (Y/N):_____

Split sample ID:_____

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers

Comments:

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter;

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: —

Location Code: **AP2-BEDGW-001**
Sample Number: **AP3078**
Sample Name: **PBOW-09-GW-AP2-BEDGW-001-AP3078-R1**
Sampling Method: **BP**
Sample Type: **GW** *Sample Purpose:* **REG**
Sampling Equip: Bailer to purge

Task: **OCT09-GW**
Collection Date: —
Collection Time: —
Start Depth: —
End Depth: —
Sample Matrix: **WATER**
Sample Team: JAB, CPS

QC Partners:
(TB) N (ER) N (FB) N

ERPIMS Values:
Sacode:
Lot Control#:

Containers

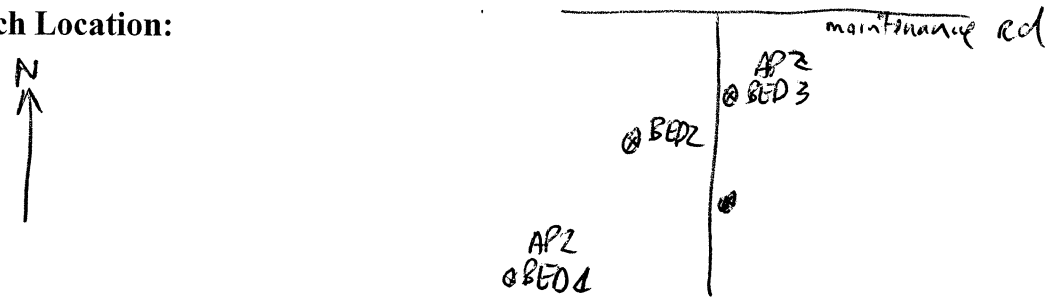
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
HARDNESS	N	D	1	500	mL	HDPE
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
CYANIDE	N	H	1	500	mL	HDPE

CPS

Groundwater Information:
Measured Well Depth: 98.53 **Depth To Water:** 95.52

Comments: Sample not collected. Well does not recharge after removing ~ < 1 gallon of water.

Sketch Location:



Logged BY / Date: CJA 11/12/09 *Reviewed BY / Date:* Edward Gallaher 2/18/10

ROUNDWATER SAMPLING FORM

Sheet 1 of 2

Shaw Shaw Environmental, Inc.

Area or Site ID: AP2

Sample ID: AP3079

Weather: Sunny 50°

Sampling location ID: AP2 - BEDGW001

Collection Time/Date: 11/12/09 1600

Pump Installation (Bladder/Fultz/Peristaltic/Grundfos/Other bailer (circle or add one)

Pump installation crew: JAB, CPS

Casing diameter (inches): 2

Total well depth (ft. BTOC): 88.53

Bladder pump settings: CPM —

Refill (seconds): —

Discharge (seconds): —

Throttle (psi): —

Discharge tube length (ft.): —

Screen Interval (ft. BTOC): 73.50 to 88.53

Pump intake depth (ft BTOC): —

Max. sustainable pump rate (mL/min): —

Appearance of product: None

Discharge tube diameter: 1/4" ID

Inlet reducer used (Y/N):

PID : — ppm H_2S: 0 ppm

LEL: LEL: 0 %; Oxygen: 20.9 %; Carbon: 0 ppm

Purging

Purging/sampling crew:

Purge date/beginning time: 11/12/09 1557

Initial (pre-purging) DTW (ft. BTOC): 85.52

Purge date/completion time:

Final (post-purging) DTW (ft. BTOC):

Low Flow purge tubing volume calculations

Volume of Water in Tubing:

Bladder pump volume = 0.3 Liters

Tubing Liters/ft. (1/4" ID tubing) = 0.01 Liters/ft. 0.02 L for a 3/8" I.D. tube

Tubing length = _____ ft.

Tubing volume (Liters)= (Tubing Liters/ft. x Tubing length) + Pump volume = (0.01 L/ft x ____ ft) + 0.3 L = _____ L

No. of tubing volumes purged: _____

Total purge volume: Tubing volume (L) x No. of tubing volumes purged = _____ L x _____ = _____ L

Monitoring well purge volume calculations

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (2)^2) = 0.164 gal/ft

Well volume (gallons) = Water Column (ft) x Gal/ft = 3.01 ft x 0.164 Gal/ft = 0.49 gallons

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. In inches & d is casing dia. in inches

= 0.041 x ((8)^2 - (2)^2) = 2.46 gal/ft

Filter Pack Volume (gal) = ((Screen Height + water column above screen to below bent.) x gal/ft) x porosity (0.3)

= ((Screen Height 10 ft + 8 ft) x 2.46 gal/ft) x 0.3 = 7.38 gallons

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = 0.49 gal + ____ gal = 7.38 gal X 3.785 L/gal = 7.87 L

1 x Well Purge Volume	2 x Well Purge Volume	3 x Well Purge Volume	4 x Well Purge Volume	5 x Well Purge Volume

well purging dry w/ < 1 gallon

Purge Rate

	Initial	2	3	4	5	6	7	8	Final
Flow rate (L/min)									

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidiy (NTU)
Not enough water to collect a water quality parameter										

GROUNDWATER SAMPLING FORM

Water Quality Parameter Measurements (continued)

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
			APZ - BGPGW001							

Sampling

Shaw™ Shaw Environmental, Inc. _____ Sampling completion time: _____

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)

Sample Information

Sample ID: _____ Sample collection date/time: _____

Duplicate sample collected (Y/N): _____ Duplicate sample ID: _____

Split sample collected (Y/N): _____ Split sample ID: _____

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers

Comments: Well Not sampled due to inadequate recharge.

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter;

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Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW111809 ACCT

Location Code: **AP2-BEDGW-002**
Sample Number: **AP3079**
Sample Name: **PBOW-09-GW-AP2-BEDGW-002-AP3079-R1**
Sampling Method: **BP**
Sample Type: **GW** *Sample Purpose:* **REG**
Sampling Equip: Bladder pump, tubing

Task: **OCT09-GW**
Collection Date: 11-17-09
Collection Time: 0945
Start Depth: 28.20'
End Depth: 28.20'
Sample Matrix: **WATER**
Sample Team: EW/BT

QC Partners:
(TB) _____ **(ER)** AP2- **(FB)** ——

ERPIMS Values:
Sacode:
Lot Control#:

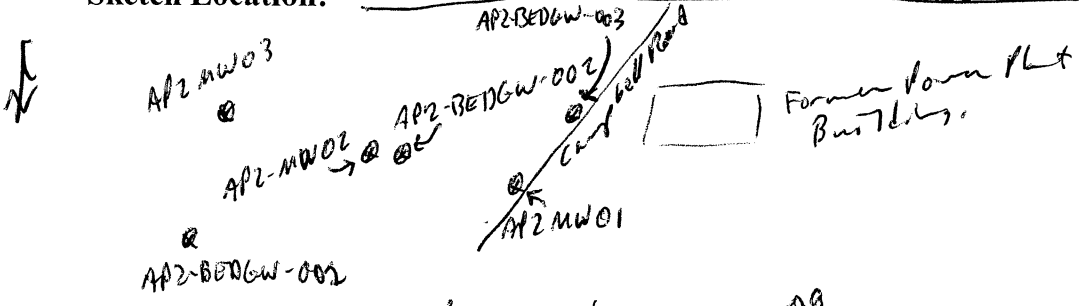
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
HARDNESS	N	D	1	500	mL	HDPE
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
CYANIDE	N	H	1	500	mL	HDPE

Groundwater Information:
Measured Well Depth: 85.35' **Depth To Water:** 28.20'

Comments: Fe^{2+} 0.0 mg/L. Also collected ~~[illegible]~~, AP3079MS, AP3079MSD, AP3081 (FD), and AP3082 (FS) at this location - Equipment Rinsate sample collected after decontamination of pump used at this location

Sketch Location:



Logged BY / Date: [signature] 11-17-09 *Reviewed BY / Date:* [signature] 2/18/10

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW111809 ACCT

Location Code: **AP2-BEDGW-002**

Sample Number: **AP3079-MS**

Sample Name: **PBOW-09-GW-AP2-BEDGW-002-AP3079-M**

Sampling Method: **BP**

Sample Type: **GW** *Sample Purpose:* **MS**

Sampling Equip: Bladder pump tubing

Task: **OCT09-GW**

Collection Date: 11-17-09

Collection Time: 0945

Start Depth: 28.20'

End Depth: 28.20'

Sample Matrix: **WATER**

Sample Team: EW/BT

QC Partners:

(TB) _____ (ER) AP2- (FB) —

ERPIMS Values:

Sacode:

Lot Control#:

Containers

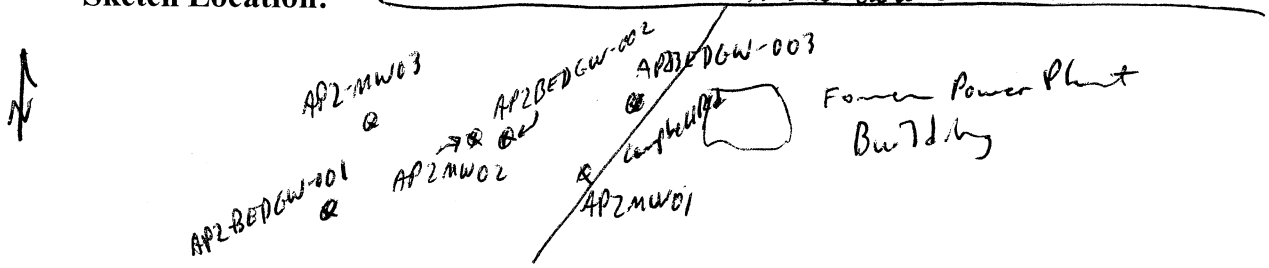
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
HARDNESS	N	D	1	500	mL	HDPE
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
CYANIDE	N	H	1	500	mL	HDPE

Groundwater Information:

Measured Well Depth: 85.35' **Depth To Water:** 28.20'

Comments: Fe^{2+} 0.0 mg/L. Also collected AP3079, AP3079 MSD, AP3081 (FD) and AP3082 (FS) at this location.

Sketch Location:



Logged BY / Date: E W Weaver 11-17-09 *Reviewed BY / Date:* Edward A Weaver 2/18/10

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW118809 ACCT

Location Code: **AP2-BEDGW-002**

Sample Number: **AP3079-MSD**

Sample Name: **PBOW-09-GW-AP2-BEDGW-002-AP3079-M**

Sampling Method: **BP**

Sample Type: **GW** *Sample Purpose:* **MSD**

Sampling Equip: Bladder pump, tubing

Task: **OCT09-GW**

Collection Date: 11-17-09

Collection Time: 0945

Start Depth: 28.20

End Depth: 28.20

Sample Matrix: **WATER**

Sample Team: EW/BT

QC Partners:

(TB) _____ (ER) AP2- _____ (FB) – _____

ERPIMS Values:

Sacode:

Lot Control#:

Containers

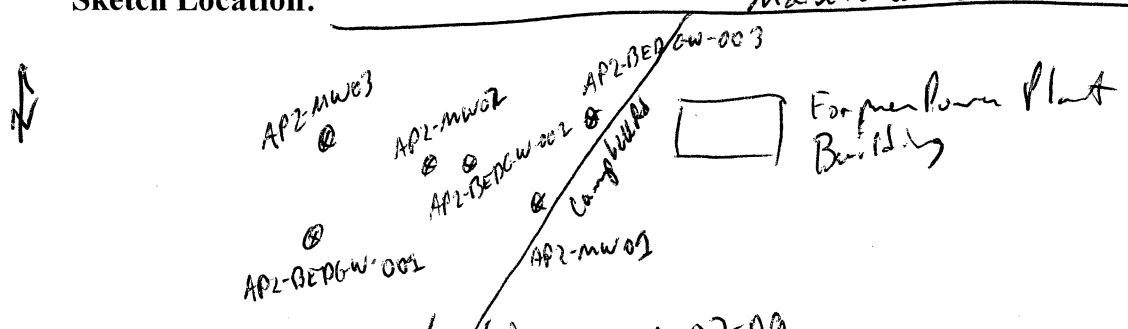
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
HARDNESS	N	D	1	500	mL	HDPE
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
CYANIDE	N	H	1	500	mL	HDPE

Groundwater Information:

Measured Well Depth: 85.35' **Depth To Water:** 28.20'

Comments: Fe^{2+} 0.0 mg/L. Also collected AP3079, AP3079MS, AP3081 (FD) and AP3082 (FS) at this location.

Sketch Location:



Logged BY / Date: E. W. Weaver 11-17-09 *Reviewed BY / Date:* Edward K. Wilson 2/18/10

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW111809ACCT

Location Code: **AP2-BEDGW-002**
Sample Number: **AP3081**
Sample Name: **PBOW-09-GW-AP2-BEDGW-002-AP3081-FI**
Sampling Method: **BP**
Sample Type: **GW** *Sample Purpose:* **FD**
Sampling Equip: Bladder pump, tubing

Task: **OCT09-GW**
Collection Date: 11-17-09
Collection Time: 0945
Start Depth: 28.20'
End Depth: 28.20
Sample Matrix: **WATER**
Sample Team: EW/BT

QC Partners:
(TB) _____ (ER) AP2- (FB) –

ERPIMS Values:
Sacode:
Lot Control#:

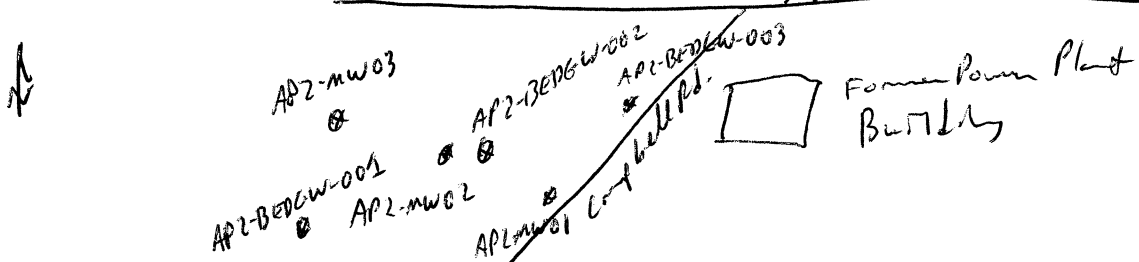
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
HARDNESS	N	D	1	500	mL	HDPE
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
CYANIDE	N	H	1	500	mL	HDPE

Groundwater Information:
Measured Well Depth: 85.35' **Depth To Water:** 28.20'

Comments: Fe^{2+} 0.0 mg/L. Also collected AP3079, AP3079MS, AP3079MSD, and AP3082(FS) at this location.

Sketch Location: Maintenance Road



Logged BY / Date: E. W. Warner 11-17-09 *Reviewed BY / Date:* Edward E. Warner 2/18/10

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW111009TA

Location Code: AP2-BEDGW-00~~1~~2

Sample Number: AP3082

Sample Name: PBOW-09-GW-AP2-BEDGW-00~~1~~2-AP3082

Sampling Method: BP

Sample Type: GW *Sample Purpose:* FS

Sampling Equip: Bladderpump, tubing

Task: OCT09-GW

Collection Date: 11-17-09

Collection Time: 0945

Start Depth: 28.20'

End Depth: 28.20'

Sample Matrix: WATER

Sample Team: EW/BT

QC Partners:

(TB) _____ (ER) AP2- _____ (FB) — _____

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
HARDNESS	N	D	1	250	mL	HDPE
METALS3-W	N	D	1	1	L	HDPE
METALS3-W-F	Y	E	1	1	L	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	250	mL	HDPE
CYANIDE	N	H	1	250	mL	HDPE

ERPIMS Values:

Sacode:

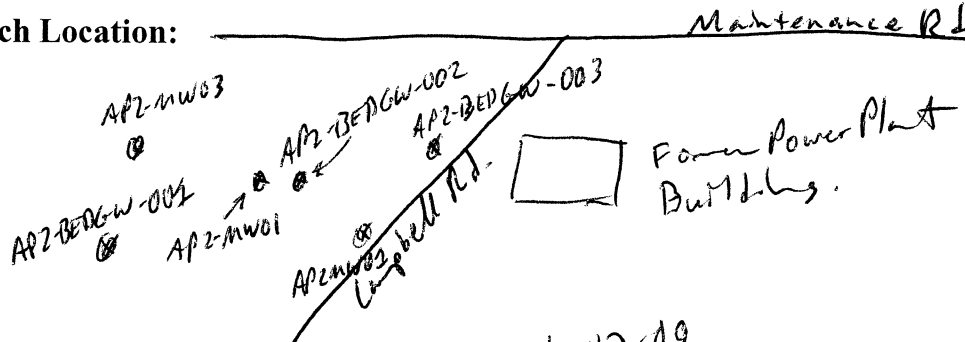
Lot Control#:

Groundwater Information:

Measured Well Depth: 85.35' **Depth To Water:** 28.20'

Comments: Fe^{2+} 0.0 mg/L. Also collected AP3079, AP3079 MS, AP3079 MSD, and AP3081 (FD) at this location

Sketch Location: Maintenance Rd



Logged BY / Date: EW Weaver 11-17-09 *Reviewed BY / Date:* Edward S. Weaver 2/16/10

ROUNDWATER SAMPLING FORM

Sheet 1 of 2

Shaw™ Shaw Environmental, Inc.

Area or Site ID: PB OW
Sample ID: AP3079
Weather: Clear, Sunny ≈ 45°F

Sampling location ID: APZ-BEDGW-002
Collection Time/Date: 11-17-09 / 0945

Pump Installation (Bladder/Fultz/Peristaltic/Grundfos/Other_____ (circle or add one)

Pump installation crew: EW / BT
Casing diameter (inches): 2"
Total well depth (ft. BTOC): 85.35
Bladder pump settings: CPM 2
Refill (seconds): 27 / 26
Discharge (seconds): 3 / 4
Throttle (psi): 40 / 50
Discharge tube length (ft.): 90'

Screen Interval (ft. BTOC): 70 to 85
Pump intake depth (ft BTOC): 75.7
Max. sustainable pump rate (mL/min): 150
Appearance of product: None
Discharge tube diameter: 1/4" ID
Inlet reducer used (Y/N): N
PID : 0 ppm H_2S: 0 ppm
LEL: LEL: 0 %; Oxygen: 20.8 %; Carbon: 0 ppm

Purging

Purging/sampling crew: EW / BT
Purge date/beginning time: 11-17-09 / 0908
Initial (pre-purging) DTW (ft. BTOC): 28.13

Purge date/completion time: 11-17-09 / 0943
Final (post-purging) DTW (ft. BTOC): 28.20

Low Flow purge tubing volume calculations

Volume of Water in Tubing:

Bladder pump volume = 0.3 Liters
Tubing Liters/ft. (1/4" ID tubing) = 0.01 Liters/ft. 0.02 L for a 3/8" I.D. tube
Tubing length = 90 ft.
Tubing volume (Liters)= (Tubing Liters/ft. x Tubing length) + Pump volume = (0.01 L/ft x 90 ft) + 0.3 L = 1.2 L
No. of tubing volumes purged: 4
Total purge volume: Tubing volume (L) x No. of tubing volumes purged = 1.2 L x 4 = 4.8 L

Monitoring well purge volume calculations

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (2)^2) = 0.164 gal/ft
Well volume (gallons) = Water Column (ft) x Gal/ft = 57.22 ft x 0.164 Gal/ft = 9.38 gallons

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. In inches & d is casing dia. in inches
= 0.041 x ((6)^2 - (2)^2) = 1.31 gal/ft
Filter Pack Volume (gal) = ((Screen Height + water column above screen to below bent.) x gal/ft) x porosity (0.3)
= ((Screen Height 15 ft + 3 ft) x 1.31 gal/ft) x 0.3 = 7.07 gallons

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = 7.07 gal + 9.38 gal = 16.45 gal X 3.785 L/gal = 62.26 L

1 x Well Purge Volume	2 x Well Purge Volume	3 x Well Purge Volume	4 x Well Purge Volume	5 x Well Purge Volume

Purge Rate

	Initial	2	3	4	5	6	7	8	Final
Flow rate (L/min)									

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidiy (NTU)
11-17-09	0908	28.13	1.29	0	—	—	—	—	—	—
11-17-09	0928	28.20	~~1.29~~ .150	2.58	9.66	2.484	-15.5	6.92	2.08	15.7
11-17-09	0933	28.20	.150	3.33	9.60	2.578	-11.4	6.84	0.66	8.0
11-17-09	0938	28.20	.150	4.08	9.62	2.621	-8.5	6.79	0.28	5.9
11-17-09	0943	28.20	.150	4.83	9.67	2.635	-6.9	6.78	1.01	3.6

GROUNDWATER SAMPLING FORM

Sheet 2 of 2

Water Quality Parameter Measurements (continued)

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)

EW

Sampling

Shaw Environmental, Inc.

Sampling completion time: 1330

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
11-17-09	0945	28.20	.150	4.83	9.67	2.635	-6.9	6.78	1.01	3.6

Sample Information

Sample ID: AP3079

Duplicate sample collected (Y/N): Y

Split sample collected (Y/N): Y

Sample collection date/time: 11-17-09 / 0945

Duplicate sample ID: AP3081

Split sample ID: AP3082

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
TCL VOC	8260	3x 40ml vials	Turb, Alk, TDS, TSS, Sulfate, Chloride	Various	1x1L HDPE
Explosives	8330	2x1L Amber			
TCL SVOC	8270	2x1L Amber	Cyanide	9010/9012	1x 500ml HDPE
Total TAL Metals	6010/7470	1x 500ml HDPE	Nitrate	-	1x 500ml HDPE
Dissolved TAL Metals	6010/7470	1x 500ml HDPE			

Comments: Fe^{2+} 0.0 mg/L - Also collected AP3079MS, AP3079MSD, AP3081 (FD) and AP3082 (PS) at this location.

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter;

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW 11 18 09 ACCT

Location Code: **AP2-BEDGW-003**
Sample Number: **AP3080**
Sample Name: **PBOW-09-GW-AP2-BEDGW-003-AP3080-R1**
Sampling Method: **BP**
Sample Type: **GW** *Sample Purpose:* **REG**
Sampling Equip: Bladder pump, tubing

Task: **OCT09-GW**
Collection Date: 11-16-09
Collection Time: 1400
Start Depth: 33.92
End Depth: 33.95
Sample Matrix: **WATER**
Sample Team: CW / BT

QC Partners:
(TB) – (ER) – (FB) –

ERPIMS Values:
Sacode:
Lot Control#:

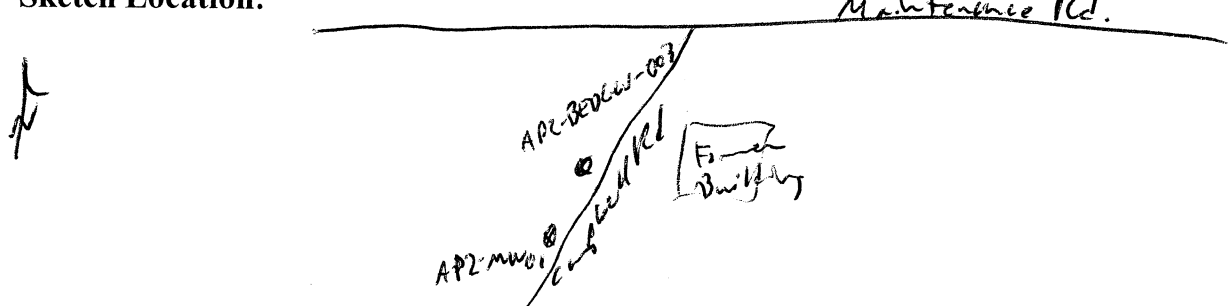
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
HARDNESS	N	D	1	500	mL	HDPE
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
CYANIDE	N	H	1	500	mL	HDPE

Groundwater Information:
Measured Well Depth: 62.65' **Depth To Water:** 33.92'

Comments: Fe^{2+} 0.0 mg/L

Sketch Location:



Logged BY / Date: L.W. Jones 11-16-09 *Reviewed BY / Date:* Edward [illegible] 2/26/10

ROUNDWATER SAMPLING FORM

Sheet 1 of ___

Shaw™ Shaw Environmental, Inc.

Area or Site ID: PBOW

Sample ID: AP3080

Weather: Cloudy Sprinkles ~45°F

Sampling location ID: AP2-BEDGW-003

Collection Time/Date: 11-16-09/1400

Pump Installation (Bladder/Fultz/Peristaltic/Grundfos/Other_____ (circle or add one)

Pump installation crew: EW/BT

Casing diameter (inches): 2"

Total well depth (ft. BTOC): 62.65

Bladder pump settings: CPM 2

Refill (seconds): 27/28

Discharge (seconds): 3/2

Throttle (psi): 30/32

Discharge tube length (ft.): 67'

Screen Interval (ft. BTOC): 42.5 to 62.5

Pump intake depth (ft BTOC): 51.0'

Max. sustainable pump rate (mL/min): ____

Appearance of product: None

Discharge tube diameter: 1/4" ID

Inlet reducer used (Y/N): N

PID : ____ ppm H_2S: ____ ppm

LEL: LEL: ____ %; Oxygen: ____ %; Carbon: ____ ppm

Purging

Purging/sampling crew: EW/BT

Purge date/beginning time: 11-16-09

Initial (pre-purging) DTW (ft. BTOC): 32.92

Purge date/completion time: 11-16-09/1610

Final (post-purging) DTW (ft. BTOC): 33.95

Low Flow purge tubing volume calculations

Volume of Water in Tubing:

Bladder pump volume = 0.3 Liters

Tubing Liters/ft. (1/4" ID tubing) = 0.01 Liters/ft. 0.02 L for a 3/8" I.D. tube

Tubing length = 67 ft.

OK was able to low flow. EW

Tubing volume (Liters)= (Tubing Liters/ft. x Tubing length) + Pump volume = (0.01 L/ft x 67 ft) + 0.3 L = 0.97 L

No. of tubing volumes purged: 4.34

Total purge volume: Tubing volume (L) x No. of tubing volumes purged = 0.97 L x 4.34 = 4.25 L

Monitoring well purge volume calculations

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (2)^2) = 0.164 gal/ft

Well volume (gallons) = Water Column (ft) x Gal/ft = 29.73 ft x 0.164 Gal/ft = 4.88 gallons

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. In inches & d is casing dia. in inches

= 0.041 x ((6)^2 - (2)^2) = 1.31 gal/ft

Filter Pack Volume (gal) = ((Screen Height + water column above screen to below bent.) x gal/ft) x porosity (0.3)

= ((Screen Height 15 ft + 3 ft) x 1.31 gal/ft) x 0.3 = 7.07 gallons

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = 7.07 gal + 4.88 gal = 11.95 gal X 3.785 L/gal = 45.23 L

1 x Well Purge Volume	2 x Well Purge Volume	3 x Well Purge Volume	4 x Well Purge Volume	5 x Well Purge Volume
45.23	90.46	135.69	180.92	226.15

Purge Rate

	Initial	2	3	4	5	6	7	8	Final
Flow rate (L/min)									

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidiy (NTU)
11-16-09	1248	32.92	.106	0	—	—	—	—	—	—
11-16-09	1303	33.80	.046	1.59	9.36	1.728	-27.6	7.20	2.57	7.1
11-16-09	1313	33.70	.066	2.05	9.14	1.864	-18.6	7.04	1.18	0.1
11-16-09	1323	33.80	.050	2.71	8.93	2.080	-8.5	6.85	0.88	0.0
11-16-09	1333	33.91	.050	3.21	8.92	2.203	-2.0	6.72	3.82	0.0
11-16-09	1343	34.00	.050	3.71	8.86	2.241	-1.6	6.71	4.54	0.0
11-16-09	1353	33.95	.050	4.21	8.87	2.202	-1.8	6.72	4.51	0.0

GROUNDWATER SAMPLING FORM

Sheet 2 of 2

Water Quality Parameter Measurements (continued)

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)

Sampling

Shaw™ Shaw Environmental, Inc.

Sampling completion time: 1610

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
11-16-09	1400	33.92	0.050	4.25	8.87	2.202	-1.8	6.72	4.51	0.0

Sample Information

Sample ID: AP3080

Sample collection date/time: 11-16-09/1400

Duplicate sample collected (Y/N): –

Duplicate sample ID: –

Split sample collected (Y/N): –

Split sample ID: –

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
TCL VOC	8260	3 x 40 ml vials	Alk, Total, TDS, TSS, Sulfate, Chloride		1 x 1L HDPE
Explosives	8330	2 x 1L Amber	Nitrate	–	1 x 500 ml HDPE
TCL SVOC	8270	2 x 1L Amber	Cyanide	9010/9012	1 x 500 ml HDPE
Total TAL Metals	6010/7470	1 x 500 ml HDPE			
Dissolved TAL Metals	6010/7470	1 x 500 ml HDPE			

Comments: Fe^{2+} 0.0 mg/L

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter;

APPENDIX C

ROCK CORE PHOTOGRAPHS

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-001

Box:

1 of 8

Depth:

20.5' to 29.9'

Comments:

Photo 1: View of entire box.

Boring:

AP2-BEDGW-001

Box:

1 of 8

Depth:

20.5' to 29.9'

Comments:

Photo 2: Close-up view of left portion of box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE | **Project Number: 133422**

Site Name: Former Plum Brook Works | **Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-001

Box:

1 of 8

Depth:

20.5' to 29.9'

Comments:

Photo 3: Close-up view of right portion of box.

Boring:

AP2-BEDGW-001

Box:

2 of 8

Depth:

29.9' to 37.9'

Comments:

Photo 4: View of entire box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-001

Box:

2 of 8

Depth:

29.9' to 37.9'

Comments:

Photo 5: Close-up view of left portion of box.

Boring:

AP2-BEDGW-001

Box:

2 of 8

Depth:

29.9' to 37.9'

Comments:

Photo 6: Close-up view of right portion of box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-001

Box:

3 of 8

Depth:

37.9' to 46.0'

Comments:

Photo 7: View of entire box.

Note: Box is marked 46.8 but should be 46.0

Boring:

AP2-BEDGW-001

Box:

3 of 8

Depth:

37.9' to 46.0'

Comments:
Photo 8: Close-up view of left portion of box.

Note: Box is marked 46.8 but should be 46.0

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE | **Project Number: 133422**

Site Name: Former Plum Brook Works | **Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-001

Box:

3 of 8

Depth:

37.9' to 46.0'

Comments:
Photo 9: Close-up view of right portion of box.
Note: Box is marked 46.8 but should be 46.0

Boring:

AP2-BEDGW-001

Box:

4 of 8

Depth:

46.0' to 55.9'

Comments:

Photo 10: View of entire box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-001

Box:

4 of 8

Depth:

46.0’ to 55.9’

Comments:

Photo 11: Close-up view of left portion of box.

Boring:

AP2-BEDGW-001

Box:

4 of 8

Depth:

46.0’ to 55.9’

Comments:

Photo 12: Close-up view of right portion of box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-001

Box:

5 of 8

Depth:

55.9' to 65.7'

Comments:

Photo 13: View of entire box.

Boring:

AP2-BEDGW-001

Box:

5 of 8

Depth:

55.9' to 65.7'

Comments:

Photo 14: Close-up view of left portion of box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE **Project Number: 133422**

Boring:

AP2-BEDGW-001

Box:

5 of 8

Depth:

55.9' to 65.7'

Comments:

Photo 15: Close-up view of right portion of box.

Boring:

AP2-BEDGW-001

Box:

6 of 8

Depth:

65.7' to 75.4'

Comments:

Photo 16: View of entire box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE | **Project Number: 133422**

Site Name: Former Plum Brook Works | **Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-001

Box:

6 of 8

Depth:

65.7' to 75.4'

Comments:

Photo 17: Close-up view of left portion of box.

Boring:

AP2-BEDGW-001

Box:

6 of 8

Depth:

65.7' to 75.4'

Comments:

Photo 18: Close-up view of right portion of box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Cient: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-001

Box:

7 of 8

Depth:

75.4' to 84.2'

Comments:

Photo 19: View of entire box.

Boring:

AP2-BEDGW-001

Box:

7 of 8

Depth:

75.4' to 84.2'

Comments:

Photo 20: Close-up view of left portion of box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-001

Box:

7 of 8

Depth:

75.4' to 84.2'

Comments:

Photo 21: Close-up view of right portion of box.

Boring:

AP2-BEDGW-001

Box:

8 of 8

Depth:

84.2' to 87.0'

Comments:

Photo 22: View of entire box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-001

Box:

8 of 8

Depth:

84.2' to 87.0'

Comments:

Photo 23: Close-up view of left portion of box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-002

Box:

1 of 8

Depth:

21.1' to 30.8'

Comments:

Photo 1: View of entire box.

Boring:

AP2-BEDGW-002

Box:

1 of 8

Depth:

21.1' to 30.8'

Comments:

Photo 2: Close-up view of left portion of box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE | **Project Number: 133422**

Site Name: Former Plum Brook Works | **Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-002

Box:

1 of 8

Depth:

21.1' to 30.8'

Comments:

Photo 3: Close-up view of right portion of box.

Boring:

AP2-BEDGW-002

Box:

2 of 8

Depth:

30.8' to 37.6'

Comments:

Photo 4: View of entire box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE | **Project Number: 133422**

Site Name: Former Plum Brook Works | **Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-002

Box:

2 of 8

Depth:

30.8’ to 37.6’

Comments:

Photo 5: Close-up view of left portion of box.

Boring:

AP2-BEDGW-002

Box:

2 of 8

Depth:

30.8’ to 37.6’

Comments:

Photo 6: Close-up view of right portion of box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-002

Box:

3 of 8

Depth:

37.6' to 46.1'

Comments:

Photo 7: View of entire box.

Boring:

AP2-BEDGW-002

Box:

3 of 8

Depth:

37.6' to 46.1'

Comments:
Photo 8: Close-up view of left portion of box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-002

Box:

3 of 8

Depth:

37.6' to 46.1'

Comments:
Photo 9: Close-up view of right portion of box.

Boring:

AP2-BEDGW-002

Box:

4 of 8

Depth:

46.1' to 55.5'

Comments:

Photo 10: View of entire box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-002

Box:

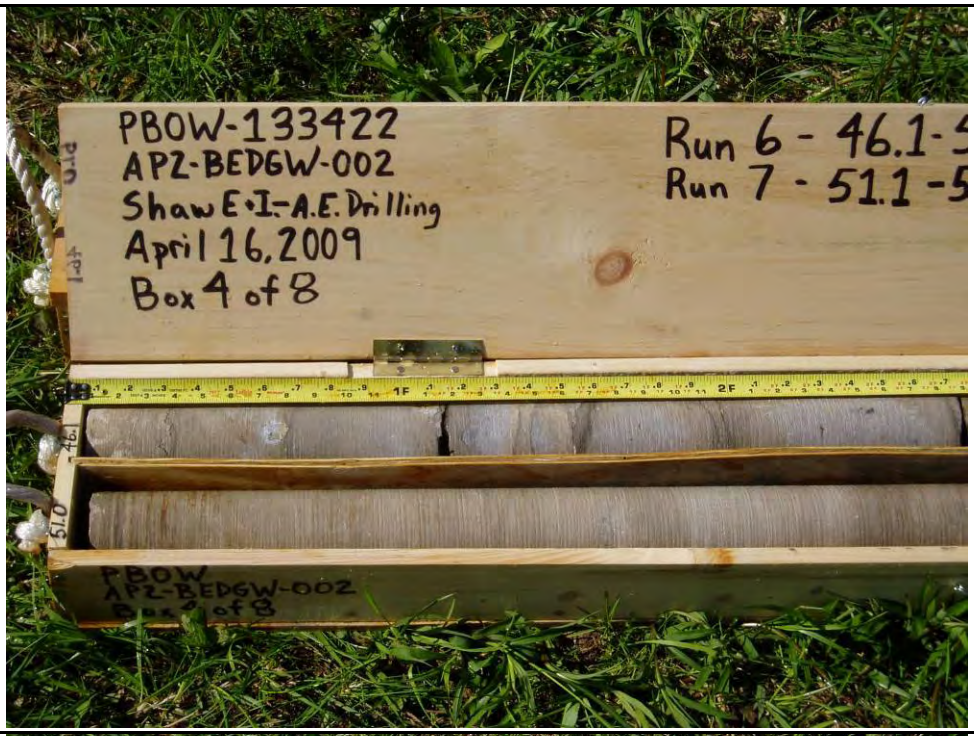
4 of 8

Depth:

46.1' to 55.5'

Comments:

Photo 11: Close-up view of left portion of box.



Boring:

AP2-BEDGW-002

Box:

4 of 8

Depth:

46.1' to 55.5'

Comments:

Photo 12: Close-up view of right portion of box.

Shaw
Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-002

Box:

5 of 8

Depth:

55.5' to 65.3'

Comments:

Photo 13: View of entire box.

Boring:

AP2-BEDGW-002

Box:

5 of 8

Depth:

55.5' to 65.3'

Comments:

Photo 14: Close-up view of left portion of box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-002

Box:

5 of 8

Depth:

55.5’ to 65.3’

Comments:

Photo 15: Close-up view of right portion of box.

Boring:

AP2-BEDGW-002

Box:

6 of 8

Depth:

65.3’ to 74.5’

Comments:

Photo 16: View of entire box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-002

Box:

6 of 8

Depth:

65.3' to 74.5'

Comments:

Photo 17: Close-up view of left portion of box.

Boring:

AP2-BEDGW-002

Box:

6 of 8

Depth:

65.3' to 74.5'

Comments:

Photo 18: Close-up view of right portion of box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-002

Box:

7 of 8

Depth:

74.5' to 83.4'

Comments:

Photo 19: View of entire box.

Boring:

AP2-BEDGW-002

Box:

7 of 8

Depth:

74.5' to 83.4'

Comments:

Photo 20: Close-up view of left portion of box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE | **Project Number: 133422**

Site Name: Former Plum Brook Works | **Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-002

Box:

7 of 8

Depth:

74.5' to 83.4'

Comments:

Photo 21: Close-up view of right portion of box.

Boring:

AP2-BEDGW-002

Box:

8 of 8

Depth:

83.4' to 86.1'

Comments:

Photo 22: View of entire box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-002

Box:

8 of 8

Depth:

83.4' to 86.1'

Comments:

Photo 23: Close-up view of left portion of box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-003

Box:

1 of 5

Depth:

24.5' to 34.0'

Comments:

Photo 1: View of entire box.

Boring:

AP2-BEDGW-003

Box:

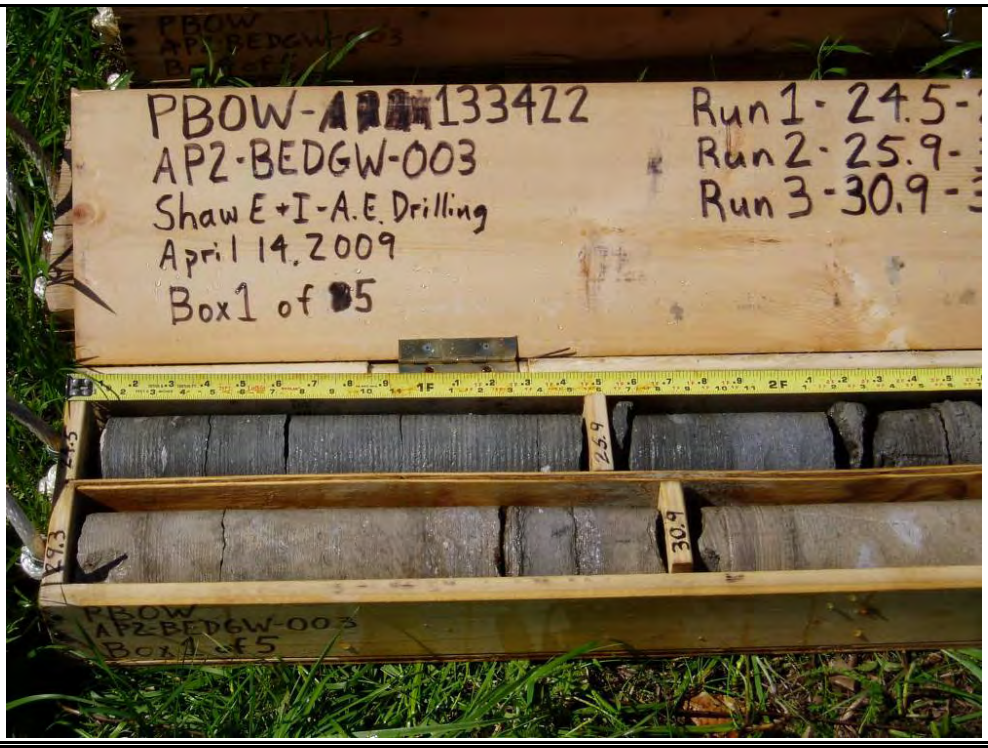
1 of 5

Depth:

24.5' to 34.0'

Comments:

Photo 2: Close-up view of left portion of box.



Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE | **Project Number: 133422**

Site Name: Former Plum Brook Works | **Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-003

Box:

1 of 5

Depth:

24.5' to 34.0'

Comments:

Photo 3: Close-up view of right portion of box.

Boring:

AP2-BEDGW-003

Box:

2 of 5

Depth:

34.0' to 42.4'

Comments:

Photo 4: View of entire box.

Shaw
Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE | **Project Number: 133422**

Site Name: Former Plum Brook Works | **Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-003

Box:

2 of 5

Depth:

34.0' to 42.4'

Comments:

Photo 5: Close-up view of left portion of box.

Boring:

AP2-BEDGW-003

Box:

2 of 5

Depth:

34.0' to 42.4'

Comments:

Photo 6: Close-up view of right portion of box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-003

Box:

3 of 5

Depth:

42.4' to 51.1'

Comments:

Photo 7: View of entire box.

Boring:

AP2-BEDGW-003

Box:

3 of 5

Depth:

42.4' to 51.1'

Comments:
Photo 8: Close-up view of left portion of box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-003

Box:

3 of 5

Depth:

42.4' to 51.1'

Comments:
Photo 9: Close-up view of right portion of box.

Boring:

AP2-BEDGW-003

Box:

4 of 5

Depth:

51.1' to 56.1'

Comments:

Photo 10: View of entire box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-003

Box:

4 of 5

Depth:

51.1' to 56.1'

Comments:

Photo 11: Close-up view of left portion of box.

Boring:

AP2-BEDGW-003

Box:

4 of 5

Depth:

51.1' to 56.1'

Comments:

Photo 12: Close-up view of right portion of box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-003

Box:

5 of 5

Depth:

56.1' to 61.0'

Comments:

Photo 13: View of entire box.

Boring:

AP2-BEDGW-003

Box:

5 of 5

Depth:

56.1' to 61.0'

Comments:

Photo 14: Close-up view of left portion of box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP2-BEDGW-003

Box:

5 of 5

Depth:

56.1’ to 61.0’

Comments:

Photo 15: Close-up view of right portion of box.

Shaw E & I, Inc.

APPENDIX D

WELL DEVELOPMENT LOGS AND WELL DEVELOP WATER PHOTOGRAPHS

Stickup 2.54

Shaw
Shaw E & I, Inc.

Well Development Log

Project Number: 133422
Project Name: PBOW
Form Completed by: David Kessler / B. Tiell
Well Developed by/firm: David Kessler / Shaw
B. Tiell

Site ID: Ash Pit #2
Location ID: AP2-MW01
Date Started: 4/21/09

Monitoring Well Information

Development Method: Pump / Surge
Development Equipment: Waterra Pump
w/ 1/2" OD x 5/8" OD HDPE tubing and YSI 6820

Screen Height (ft): 10
Filter pack length (ft): 13
Casing Diameter (in): 2

Begining Measurements (BTOC)
Depth to Water (ft): 11.03
Total depth of Well (ft): 22.20
water column = 11.17'

Monitoring Well Purge Calculations

Volume of Water in Casing:
Gallons/foot = 0.041 x d^2, where casing diameter in inches = (0.041 x (2)^2) = 0.164 gal/ft.
Well Volume (gallons) = Water Column (ft) x Gal/ft = 11.17 ft x 0.164 gal/ft = 1.83 gallons

Volume of Water in Filter Pack:
Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole diameter in inches & d is casing diameter in inches = 0.041 x ((8.25)^2 - (2)^2) = 2.6 gal/ft.
Filter Pack Volume (gal) = (the less of the filter pack lenght or water column) x gal/ft x porosity (0.3) = (11.17)ft x (2.6) gal/ft x 0.3 = 8.71 gal

Purge Well Volume: Purge well Volume = Filter pack volume + Well Volume = 1.83 gal + 8.71 gal = 10.54 gal.

1 x Purge Well Volume	2 x Purge Well Volume	3 x Purge Well Volume	4 x Purge Well Volume	5 x Purge Well Volume
10.54	21.08	31.62	42.16	52.70

Development Record

	Time (24 hrs)	Volume Removed (gal)	Water Level (ft) (TOC)	Turbidity (NTU)	Clarity (color)	Temp. (C)	pH (Std Units)	Conductivity (mS/cm)	D.O. (mg/L)	Redox (mV)	Comments
4/21/09	1135	0	11.03	—	—	—	—	—	—	—	Began Pumping (Manually Surged Screen Inv.)
	1145	2.5	14.28	193.8	Gray	10.14	7.32	0.702	9.61	-50.0	Pumping at rate of 970 ml/min
	1155	5	16.69	327.3	DK br	8.96	6.92	0.740	8.99	-19.6	
	1210	7.5	20.87	190.5	light gray	8.84	6.98	0.648	9.07	-10.0	
stopped	1215	11	>21.5	—	—	—	—	—	—	—	Well will not dry. Recharging at 100 ml/min
	1320	11	20.10	—	—	—	—	—	—	—	Began pumping
stopped 4/22/09	1355	12	—	37.4	clear	10.84	7.18	0.663	9.61	-32.1	Pumping recharge water.
	1438	—	11.06								start purge
	1500	13.00	12.50	17.3	clear	10.97	7.47	0.675	13.08	-33.6	flow rate @ 200 ml/min

Shaw
Shaw E & I, Inc.

Well Development Log (Continuation)

Site ID: Ash Pit #2
Location ID: AP2-MW01
Date Started: 4/22/09

Development Record (continuation)

Time (24 hrs)	Volume Removed (gal)	Water Level (ft) (TOC)	Turbidity (NTU)	Clarity (color)	Temp. (C)	pH (Std Units)	Conductivity (mS/cm)	D.O. (mg/L)	Redox (mV)	Comments
1511	13.5	13.10	15.1	clear	10.14	7.35	0.669	12.93	-28.6	continue @ 200 ml/min
1540	15.0	14.25	6.3	clear	9.29	7.29	0.696	14.13	-25.4	increase flow
1550		15.00	6.8	clear	9.55	7.32	0.705	13.33	-27.5	flow rate @ 250 ml/min
1635	21.0	20.80	6.8	clear	Development		complete			SHUT DOWN / DRY

Water Added: type None volume — (gal.)
Chemical Added: type None volume — (gal.)
Range and Average Discharge Rate: —
Maximum Drawdown during Development: Dry >22.6 at — gpm.
Disposition of Development Water: Drums Baker Tank Other
Number of Containers for Development Water: 1

Comments:

Final Measurements (BTOC)

Total depth of Well (ft): 22.20

Date Completed: 4-22-2009

Hours Developed: 3 HR. 12 min

Stickup 2.78.

Shaw
Shaw E & I, Inc.

Well Development Log

Page 1 of

Project Number: 133422
Project Name: PBOW
Form Completed by: David Kessler
Well Developed by/firm: David Kessler/Shaw

Site ID: Ash Pit #2
Location ID: AP2-MW02
Date Started: 4/21/09

Monitoring Well Information

Development Method: Pump/Surge
Development Equipment: Waterra Pump w/ 1/2" ID x 5/8" OD HDPE tubing and YSI 6820

Screen Height (ft): 10
Filter pack length (ft): 11.50
Casing Diameter (in): 2

Begining Measurements (BTOC)
Depth to Water (ft): 5.92
Total depth of Well (ft): 18.50
water column 12.58 ft

Monitoring Well Purge Calculations

Volume of Water in Casing:
Gallons/foot = 0.041 x d^2, where casing diameter in inches = (0.041 x (2)^2) = 0.164 gal/ft.
Well Volume (gallons) = Water Column (ft) x Gal/ft = 12.58 ft x 0.164 gal/ft = 2.07 gallons

Volume of Water in Filter Pack:
Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole diameter in inches & d is casing diameter in inches = 0.041 x ((8.25)^2 - (2)^2) = 2.63 gal/ft.
Filter Pack Volume (gal) = (the less of the filter pack lenght or water column) x gal/ft x porosity (0.3) = (11.50)ft x (2.63) gal/ft x 0.3 = 9.08 gal

Purge Well Volume: Purge well Volume = Filter pack volume + Well Volume = 9.08 gal + 2.07 gal = 11.15 gal.

1 x Purge Well Volume	2 x Purge Well Volume	3 x Purge Well Volume	4 x Purge Well Volume	5 x Purge Well Volume
11.15	22.30	33.45	44.60	55.75

Development Record

Time (24 hrs)	Volume Removed (gal)	Water Level (ft) (TOC)	Turbidity (NTU)	Clarity (color)	Temp. (C)	pH (Std Units)	Conductivity (mS/cm)	D.O. (mg/L)	Redox (mV)	Comments
1430	0	5.92	—	—	—	—	—	—	—	Began Manually surged screen interval >1000 NTU
1450	10	7.10	1671.1	Drk Br	8.76	6.70	0.777	5.78	50.8	Pumping 1940 ml/min, making water
1515	20	7.36	1662.2	Drk Br	8.12	6.57	0.747	6.38	66.3	Pumping at same rate.
1540	30	7.37	1461.2	" "	8.01	6.46	0.731	6.66	78.5	Rate decreased on own.
1600	40	7.30	1602.1	Cloudy Br	8.32	6.51	0.724	7.30	80.6	Rate 1280 ml/min. Decreased further. Shaw decreased rate
1630	45	6.71	1067.3	Cloudy Br	8.43	6.51	0.734	7.72	82.7	Slowed to 650 ml/min
1705	50	6.68	670.1	Cloudy Br	8.67	6.83	0.731	7.43	72.6	" "
1720	52.5	6.67	570.4	" "	8.29	6.61	0.713	8.35	75.2	" "
1740	56	6.65	463.0	" "	8.45	6.53	0.707	7.74	80.7	" "

Stopped for day

Shaw
Shaw E & I, Inc.

Well Development Log (Continuation)

Site ID: Ash Pit #2
Location ID: AP2-MW02
Date Started: 4/21/09

Development Record (continuation)

Time (24 hrs)	Volume Removed (gal)	Water Level (ft) (TOC)	Turbidity (NTU)	Clarity (color)	Temp. (C)	pH (Std Units)	Conductivity (mS/cm)	D.O. (mg/L)	Redox (mV)	Comments
1050		5.97	—	—	—	—	—	—	—	Started pump on 4-22-09
1105	57.5	6.27	465	light brown	9.23	6.22	0.835	7.55	25.4	Pumping at ~~[illegible]~~ 520 ml/min
1120	59.0	6.35	386.6	light brown	8.92	6.79	0.789	8.42	-0.3	Pumping at 730 ml/min
1135	~~[illegible]~~ 65.0	6.45	276.9	very light brown	8.57	6.70	0.755	8.02	4.2	Pumping at 760 ml/min
1150	68.5	6.50	249.9	very light brown	8.44	6.53	0.742	8.03	13.6	Pumping @ 760 ml/min

Start 4/22

Water Added: type None volume — (gal.)
Chemical Added: type None volume — (gal.)
Range and Average Discharge Rate: —
Maximum Drawdown during Development: at gpm.
Disposition of Development Water: Drums Baker Tank Other
Number of Containers for Development Water: 1

Comments:

Final Measurements (BTOC)

Total depth of Well (ft):

Date Completed: 4-22-09

Hours Developed: 4 hrs.

~~stickup 2.5~~ TD = 12.55 (should be)

Shaw
Shaw E & I, Inc.

Well Development Log

Project Number: 133422
Project Name: PBOW
Form Completed by: David Keissler / Eric Weaver
Well Developed by/firm: /Shaw

Site ID: Ash Pit #2
Location ID: AP2-MW03
Date Started: 4/22/09

Monitoring Well Information

Development Method: Waterra Pump/Surge
Development Equipment: Waterra Pump w/ 1/2" ID x 5/8" OD HDPE tubing and YSI 6820

Screen Height (ft): 5
Filter pack length (ft): 6.8
Casing Diameter (in): 2

Begining Measurements (BTOC)
Depth to Water (ft): 6.19
Total depth of Well (ft): 12.45
water column

Monitoring Well Purge Calculations

Volume of Water in Casing:
Gallons/foot = 0.041 x d^2, where casing diameter in inches = (0.041 x (2)^2) = 0.164 gal/ft.
Well Volume (gallons) = Water Column (ft) x Gal/ft = 6.26 ft x 0.164 gal/ft = 1.03 gallons

Volume of Water in Filter Pack:
Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole diameter in inches & d is casing diameter in inches = 0.041 x ((8.25)^2 - (2)^2) = 2.63 gal/ft.
Filter Pack Volume (gal) = (the less of the filter pack lenght or water column) x gal/ft x porosity (0.3) = (6.26)ft x (0.164) gal/ft x 0.3 = 0.31 gal

Purge Well Volume: Purge well Volume = Filter pack volume + Well Volume = 0.31 gal + 1.03 gal = 1.34 gal.

1 x Purge Well Volume	2 x Purge Well Volume	3 x Purge Well Volume	4 x Purge Well Volume	5 x Purge Well Volume
1.34	2.68	4.02	5.36	6.7

Development Record

4/22/09

Time (24 hrs)	Volume Removed (gal)	Water Level (ft) (TOC)	Turbidity (NTU)	Clarity (color)	Temp. (C)	pH (Std Units)	Conductivity (mS/cm)	D.O. (mg/L)	Redox (mV)	Comments 51.0
1410	Start	6.19	—	—	—	—	—	—	—	Purged + Surged by hand for 10 minutes
1420	~~Start Pump~~	9.90	~~1701.2~~	~~brown~~	~~8.81~~	~~6.74~~	~~1.339~~	~~7.21~~	~~-1.5~~	Pumping at 220 ml/min
1450	4 gal	9.90	1701.2	brown	8.81	6.74	1.339	7.21	-1.5	Pumping at 220 ml/min
1500	4.5 dry	dry	—	—	—	—	—	—	—	Shut down 20 min.
1520	Restart	10.90	—	—	—	—	—	—	—	Pumping @ 380 ml/min
1540	Dry	—								
1600	5.5	10.9	463.4	brown	8.07	7.47	0.969	11.23	-38.7	Pumping @ 370 ml/min
1625	6.0	>12.0	112.7	~~brown~~ gray	8.49	7.35	0.950	11.42	121.5	Pumping @ 250 ml/min
1630	~~Dry~~ Shutoff	>12.0'	—	—	—	—	—	—	—	

Shaw
Shaw E & I, Inc.

Well Development Log (Continuation)

Site ID: Ash Pit #2
Location ID: AP2-MW03
Date Started: 4-22-09

Development Record (continuation)

Time (24 hrs)	Volume Removed (gal)	Water Level (ft) (TOC)	Turbidity (NTU)	Clarity (color)	Temp. (C)	pH (Std Units)	Conductivity (mS/cm)	D.O. (mg/L)	Redox (mV)	Comments
1650	6	11.0'	—	—	—	—	—	—	—	Start Pump again
1720	7.0'	>12.0'	—	—	—	—	—	—	—	Raining Put YSI away
Start 4/23 0810	Start		—							
0815	7.25	5.0'	138.3	lightgray	6.75	6.04	0.358	11.23	34.7	Pumping @ 300 ml/min
0830	8.0	7.41	565.2	brown	6.28	6.46	0.365	11.33	13.4	Pumping at 160 ml/min
0845	8.5	7.65	496.5	brown	6.42	6.57	0.387	11.55	6.0	Pumping at 140 ml/min
0900	9.0	7.87	303.1	lightbrn	6.56	6.67	0.385	11.14	2.5	Pumping at 140 ml/min
0915	9.5	7.97	178.4	lightbrown	6.81	6.66	0.379	11.18	2.3	130 ml/min
0930	10.0	8.13	117.8	lightgray	6.95	6.64	0.385	11.61	3.6	120 ml/min
0940	10.25	8.17	106.1	very light gray	6.77	6.63	0.391	11.58	4.1	120 ml/min
0950	10.5	8.23	97.5	lightgray	6.87	6.69	0.394	11.66	0.7	110 ml/min
1000	10.75	8.23	81.1	very light gray	6.96	6.69	0.390	11.38	0.1	110 ml/min
1010	11.0	8.24	68.8	very light gray	6.96	6.73	0.397	11.23	-1.5	110 ml/min

Water Added: type — volume — (gal.)
Chemical Added: type — volume — (gal.)
Range and Average Discharge Rate: —
Maximum Drawdown during Development: — at — gpm.
Disposition of Development Water: (Drums) Baker Tank Other
Number of Containers for Development Water: 1

Comments:

Final Measurements (BTOC)

Total depth of Well (ft): 12.45'

Date Completed: 4-23-09

Hours Developed: 4

Shaw
Shaw E & I, Inc.

Well Development Log

Project Number: 133422
Project Name: PBOW
Form Completed by: BRIAN TIEW
Well Developed by/firm: Shaw E+I / A+E Drilling

Site ID: AP2
Location ID: AP2 - BEDGW - 001
Date Started: 04-21-2009

Monitoring Well Information

Development Method: Surge + Purge
Development Equipment: Waterra pump, Honda 2000W generator, YSI 6820 water quality meter, 5/8 OD x 1/2 ID hdpe tubing, Huron WL indicator

Screen Height (ft): 15
Filter pack length (ft): 21
Casing Diameter (in): 2

Begining Measurements (BTOC)
Depth to Water (ft): 4.94
Total depth of Well (ft): 88.06
WC = 83.12

Monitoring Well Purge Calculations

Volume of Water in Casing: Gallons/foot = 0.041 x d^2, where casing diameter in inches = (0.041 x (4)^2) = 0.164 gal/ft.
Well Volume (gallons) = Water Column (ft) x Gal/ft = 83.12 ft x 0.164 gal/ft = 13.63 gallons

Volume of Water in Filter Pack:
Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole diameter in inches & d is casing diameter in inches = 0.041 x ((68.06)^2 - (4)^2) = 2.62 gal/ft.
Filter Pack Volume (gal) = (the less of the filter pack lenght or water column) x gal/ft x porosity (0.3) = (21)ft x (2.62) gal/ft x 0.3 = 16.50 gal

Purge Well Volume: Purge well Volume = Filter pack volume + Well Volume = 16.50 gal + 13.63 gal = 30.13 gal.

1 x Purge Well Volume	2 x Purge Well Volume	3 x Purge Well Volume	4 x Purge Well Volume	5 x Purge Well Volume
30.13	60.26	90.39	120.52	150.65

Development Record

4/21

Time (24 hrs)	Volume Removed (gal)	Water Level (ft) (TOC)	Turbidity (NTU)	Clarity (color)	Temp. (C)	pH (Std Units)	Conductivity (mS/cm)	D.O. (mg/L)	Redox (mV)	Comments
1004	2.0	2.33	high	light Brown	—	—	—	—	—	surge by hand e 2' intervals
1006	3.5	16.86	513.6	light Brown	11.38	7.51	0.434	10.34	-46.3	START purge (waterra 800 ml/min)
1016	4.0	24.60	64.3	cloudy	11.44	8.00	0.413	11.00	-67.7	flow now @ 600 ml/min
1040	6.0	35.50	55.4	clear	11.58	8.12	0.398	12.09	-74.3	readjust flow to 800 ml/min
1054	—	47.90	32.0	clear	11.40	8.16	0.212	12.64	-76.8	—
1105	9.0	53.60	—	clear	Turn pump up full speed					continue purging
1120	15.0	79.80	—	clear	—	—	—	—	—	readjust flow to 800 ml/min
1128	18.0	81.4	22.5	clear	11.12	7.79	0.462	11.26	-55.5	—
1146	23.0	85.1	13.6	clear	11.30	7.75	0.470	12.18	-54.4	continue flowrate 800 ml/min

Shaw
Shaw E & I, Inc.

Well Development Log (Continuation)

Site ID: AP2
Location ID: AP2 - BedGW-001
Date Started: 04-21-2009

Development Record (continuation)

Time (24 hrs)	Volume Removed (gal)	Water Level (ft) (TOC)	Turbidity (NTU)	Clarity (color)	Temp. (C)	pH (Std Units)	Conductivity (mS/cm)	D.O. (mg/L)	Redox (mV)	Comments
cont.. 4/21 1150	25.0	86.10	—	shut DOWN						surge well bottom by hand Then pump aggressively
1310	—	84.46	—	Recharge level after lunch				—	—	—
1320	—	85.40	12.9	clear ~~tint~~	11.22	7.77	0.480	10.90	-55.5	RESTART Purge 1000 ml/min
3 hrs. 39 min 1325	25.5	86.10	18.4	clear	11.25	7.75	0.491	11.77	-54.8	continue @ 1000 ml/min
1335	27.0	87.98	13.5	clear	11.23	7.82	0.493	12.02	-58.0	shut DOWN/Dry sample collected

Water Added: type NO volume — (gal.)
Chemical Added: type NA volume — (gal.)
Range and Average Discharge Rate: —
Maximum Drawdown during Development: — at — gpm.
Disposition of Development Water: (Drums) Baker Tank Other
Number of Containers for Development Water: 1

Comments:

Final Measurements (BTOC)

Total depth of Well (ft): 88.53

Date Completed: 04-21-2009

Hours Developed: 3:65

Shaw
Shaw E & I, Inc.

Well Development Log

Project Number: 133422
Project Name: PBOW
Form Completed by: Shaw Tiew
Well Developed by/firm: Shaw E+I A+E drilling

Site ID: AP2
Location ID: AP2 - Bed GW-002
Date Started: 04-21-2009

Monitoring Well Information

Development Method: surge + purge
Development Equipment: waterra pump, 2000 Honda Generator, YSI 6820 water quality meter, 5/8 OD x 1/2 ID HDPE tubing, Huron WL indicator.

Screen Height (ft): 15
Filter pack length (ft): 20.1
Casing Diameter (in): 2

Begining Measurements (BTOC)
Depth to Water (ft): 22.47
Total depth of Well (ft): 77.23
WC = 54.76

Monitoring Well Purge Calculations

Volume of Water in Casing:
Gallons/foot = 0.041 x d^2, where casing diameter in inches = (0.041 x (4)^2) = 0.164 gal/ft.
Well Volume (gallons) = Water Column (ft) x Gal/ft = 54.76 ft x 0.164 gal/ft = 8.98 gallons

Volume of Water in Filter Pack:
Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole diameter in inches & d is casing diameter in inches = 0.041 x ((6.06)^2 - (4)^2) = 2.62 gal/ft.
Filter Pack Volume (gal) = (the less of the filter pack lenght or water column) x gal/ft x porosity (0.3) = (20.10)ft x (2.62) gal/ft x 0.3 = 15.79 gal

Purge Well Volume: Purge well Volume = Filter pack volume + Well Volume = 15.79 gal + 8.98 gal = 24.77 gal.

1 x Purge Well Volume	2 x Purge Well Volume	3 x Purge Well Volume	4 x Purge Well Volume	5 x Purge Well Volume
24.77	49.54	74.31	99.08	123.85

Development Record

Time (24 hrs)	Volume Removed (gal)	Water Level (ft) (TOC)	Turbidity (NTU)	Clarity (color)	Temp. (C)	pH (Std Units)	Conductivity (mS/cm)	D.O. (mg/L)	Redox (mV)	Comments
4/21 ↓ 1430	3.0	22.52	—	water level after surging by hand						—
1435	—	22.52	High	blnc. Time	—	—	—	—	—	start purge @ 2430 ml/min
1447	10.0	23.60	34.7	clear	11.42	6.81	2.789	3.31	-4.2	flow rate 2400 ml/min
1458	15.0	24.80	10.4	clear	11.20	6.78	2.797	0.25	-2.4	flow rate now 2200 ml/min
1501	20.0	23.90	11.9	clear	11.06	6.76	2.764	2.40	-1.7	—
1515	25.0	24.00	—	clear	—	—	—	—	—	flow rate 2320 ml/min
1520	30.0	24.10	3.1	clear	11.06	6.71	2.813	3.88	0.8	—
1528	35.0	24.08	—	clear	raise tubing up 7' and increase flow rate to 3040 ml/min					
1533	40.0	24.58	7.9	clear	11.13	6.72	2.815	3.65	0.5	—

Shaw
Shaw E & I, Inc.

Well Development Log (Continuation)

Site ID: AP2
Location ID: AP2-BCPGW-002
Date Started: 04-21-2009

Development Record (continuation)

Time (24 hrs)	Volume Removed (gal)	Water Level (ft) (TOC)	Turbidity (NTU)	Clarity (color)	Temp. (C)	pH (Std Units)	Conductivity (mS/cm)	D.O. (mg/L)	Redox (mV)	Comments
cont.— 4/21 ↓ 1540	45.0	24.55	17.5	clear	10.91	6.73	2.808	4.02	0.2	continue 7' up from bottom
1550	50.0	24.70	2.9	clear	11.04	6.71	2.822	4.52	0.9	—
he. 31 min. 1554	55.0	22.70	—	clear	lower	tubing	back	to	bottom	—
1601	60.0	24.10	5.4	clear	11.65	6.75	1.502	5.67	-1.1	SHUT DOWN / collect sample

Water Added: type 0-NA volume — (gal.)
Chemical Added: type NA volume — (gal.)
Range and Average Discharge Rate: —
Maximum Drawdown during Development: — at — gpm.
Disposition of Development Water: Drums Baker Tank Other
Number of Containers for Development Water: 1

Comments:

Final Measurements (BTOC)

Total depth of Well (ft): 77.23

Date Completed: 04-21-2009

Hours Developed: 1.51

Shaw
Shaw E & I, Inc.

Well Development Log

Project Number: 133422
Project Name: PBOW
Form Completed by: E. Weaver
Well Developed by/firm: ~~A.G. Dorthy~~ / Shaw
David Kessler / E Weaver

Site ID: Ash Pit #2
Location ID: AP2-BEDGW-003
Date Started: 4-20-09

Monitoring Well Information

Development Method: Pump / Surge
Development Equipment: Watera Pump (1/2" ID/3/8" OD) check valve, tubing, containers for water
YSI meter, H2O Level indicator

Screen Height (ft): 15'
Filter pack length (ft): 20'
Casing Diameter (in): 2"

Begining Measurements (BTOC)
Depth to Water (ft): 27.14
Total depth of Well (ft): 62.63
water column 35.49

Monitoring Well Purge Calculations

Volume of Water in Casing:
Gallons/foot = 0.041 x d^2, where casing diameter in inches = (0.041 x (2)^2) = 0.164 gal/ft.
Well Volume (gallons) = Water Column (ft) x Gal/ft = 35.49 ft x 0.164 gal/ft = 5.82 gallons

Volume of Water in Filter Pack:
Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole diameter in inches & d is casing diameter in inches = 0.041 x ((6)^2 - (2)^2) = 1.39 gal/ft.
Filter Pack Volume (gal) = (the less of the filter pack lenght or water column) x gal/ft x porosity (0.3) = (20)ft x (1.39) gal/ft x 0.3 = 8.34 gal

Purge Well Volume: Purge well Volume = Filter pack volume + Well Volume = 8.34 gal + 5.82 gal = 14.16 gal.

1 x Purge Well Volume	2 x Purge Well Volume	3 x Purge Well Volume	4 x Purge Well Volume	5 x Purge Well Volume
14.16	28.32	42.48	56.64	70.80

Began 1630

Development Record

Manually surged screen interval.

	Time (24 hrs)	Volume Removed (gal)	Water Level (ft) (TOC)	Turbidity (NTU)	Clarity (color)	Temp. (C)	pH (Std Units)	Conductivity (mS/cm)	D.O. (mg/L)	Redox (mV)	Comments
4/20/09	1640	5	32.10	206.5	gray	11.78	6.98	1.332	8.40	-10.3	Pumping @ 840 ml/min / [illegible]
	1705	~~8~~ 13	35.40	63.8	clear	11.53	6.78	2.017	8.8/8.93	-0.3	1650 Increased pump rate >1000 ml/min.
	1715	18	52.95	82.4	clear	11.50	6.87	1.438	2.30	-5.1	
	1740	23	56.5	98.6	gray	11.51	7.10	1.387	2.70	-17.8	Level dropped to 61'
4/21/09	0900	~~0~~ 31	27.20	—	—	—	—	—	—	—	Began. No YSI available.
	0910	~~0~~ 33	34.75	—	clear	—	—	—	—	—	pumping 720 ml/min → reduced rate
	0940	38	39.40	—	clear	—	—	—	—	—	Making water at flow of 320 ml/min → increased rate
	1005	43	46.25	—							Stopped - ended development
	1050	43	46.25	1.3	clear	13.71	6.49	1.992	3.72	-335.6	yellow tint to water

L.

Shaw
Shaw E & I, Inc.

Well Development Log (Continuation)

Site ID: Ash Pit #2
Location ID: AP2-BEDGW-003
Date Started: 4/20/09

Development Record (continuation)

Time (24 hrs)	Volume Removed (gal)	Water Level (ft) (TOC)	Turbidity (NTU)	Clarity (color)	Temp. (C)	pH (Std Units)	Conductivity (mS/cm)	D.O. (mg/L)	Redox (mV)	Comments

4/21/09
DHR

Water Added: type None volume — (gal.)
Chemical Added: type None volume — (gal.)
Range and Average Discharge Rate: ~840 ml/min
Maximum Drawdown during Development: 61' at >1000 ml/min ~~gpm~~.
Disposition of Development Water: (Drums) Baker Tank Other
Number of Containers for Development Water: 1

Comments: No YSI available 4/21/09. Down due to malfunction
H2S ~ >200 ppm, VOC = 21.5 ppm from water being pumped.

Final Measurements (BTOC)

Total depth of Well (ft): 62.65
Date Completed: 4/21/09
Hours Developed: 2 HR 5 min

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Well:

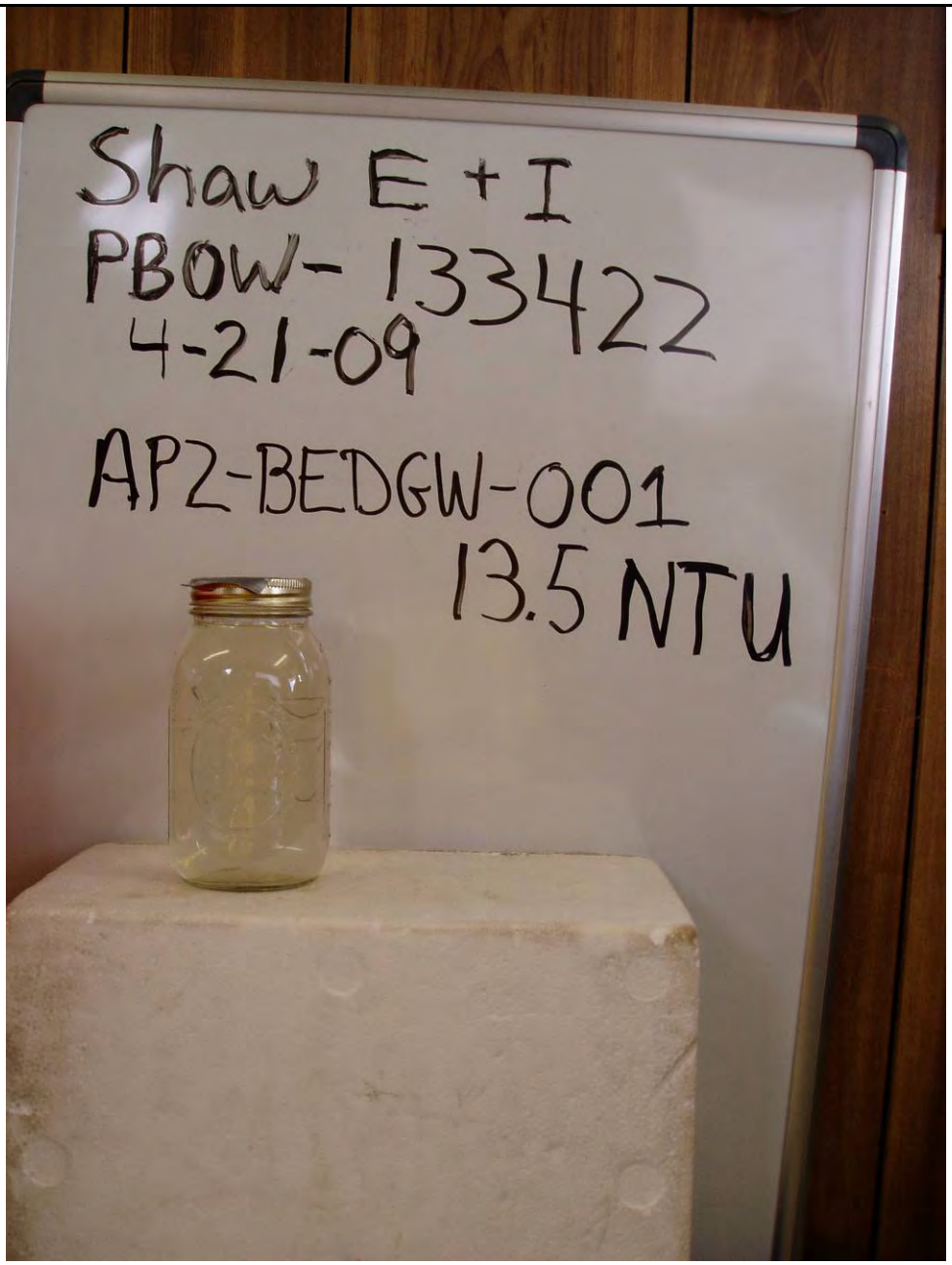
AP2-BEDGW-001

Date:

April 21, 2009

Final reading:

13.5 NTU



Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Well:

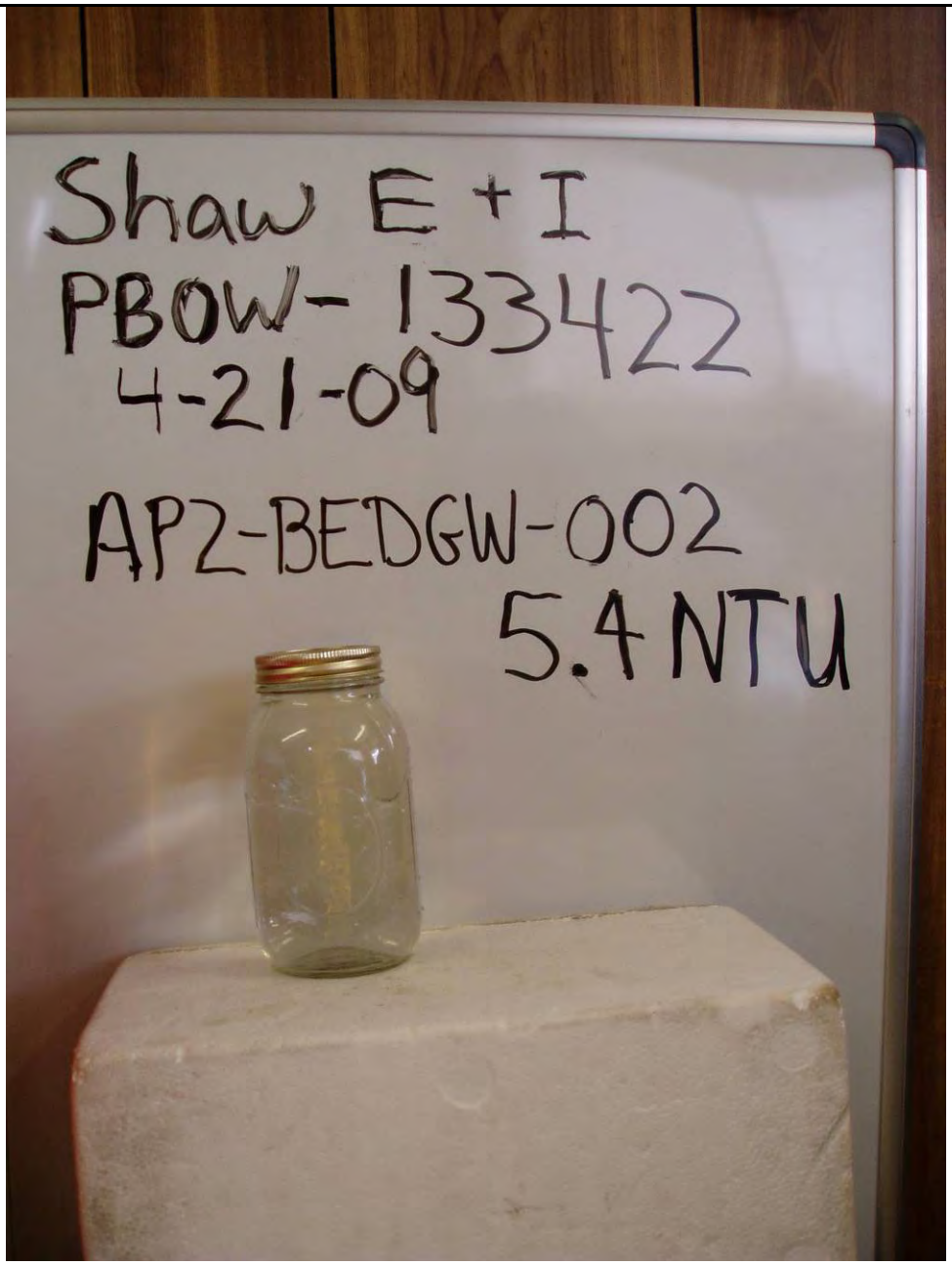
AP2-BEDGW-002

Date:

April 21, 2009

Final Reading:

5.4 NTU



Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Well:

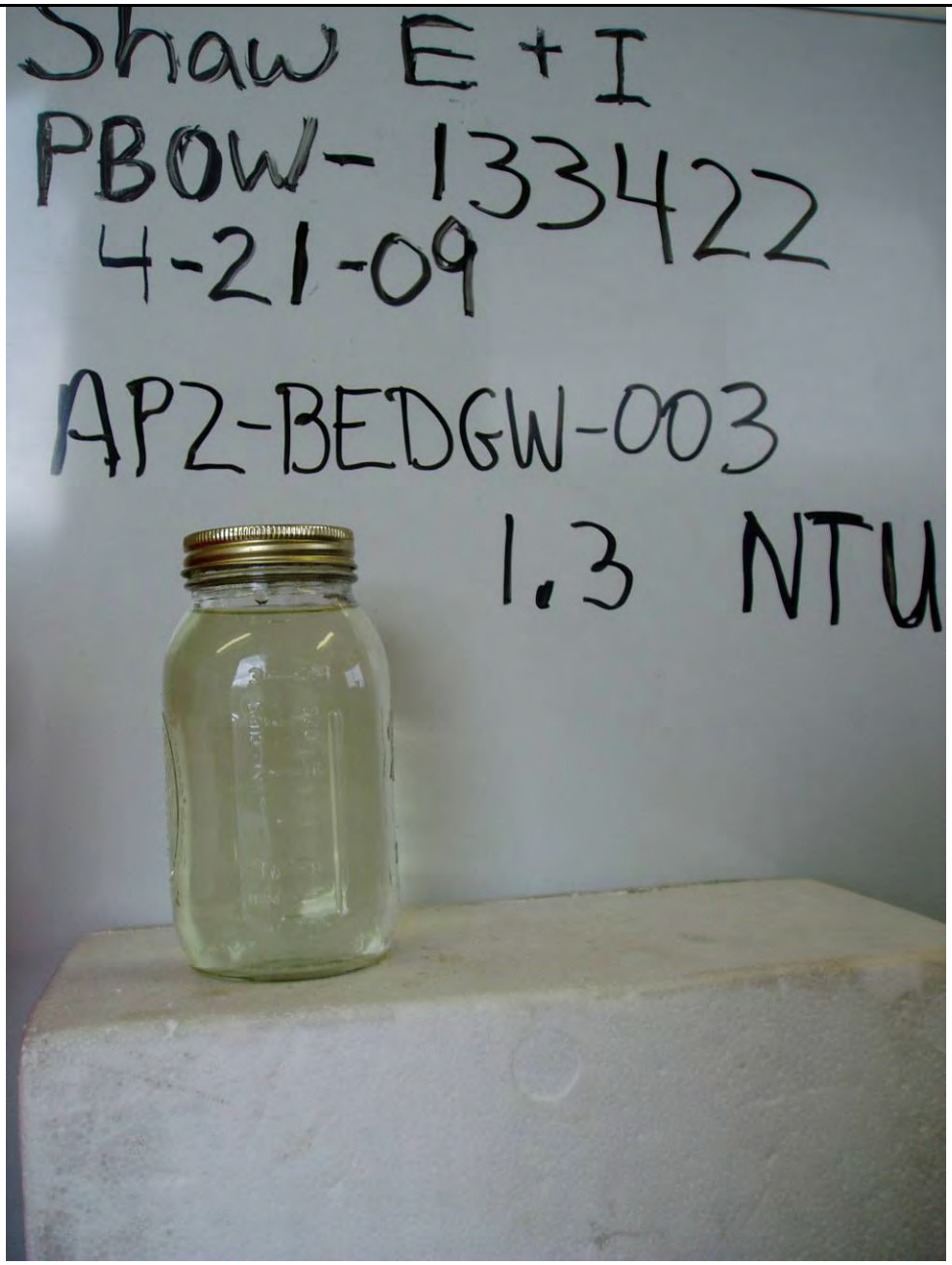
AP2-BEDGW-003

Date:

April 21, 2009

Final Reading:

1.3 NTU



Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Well:

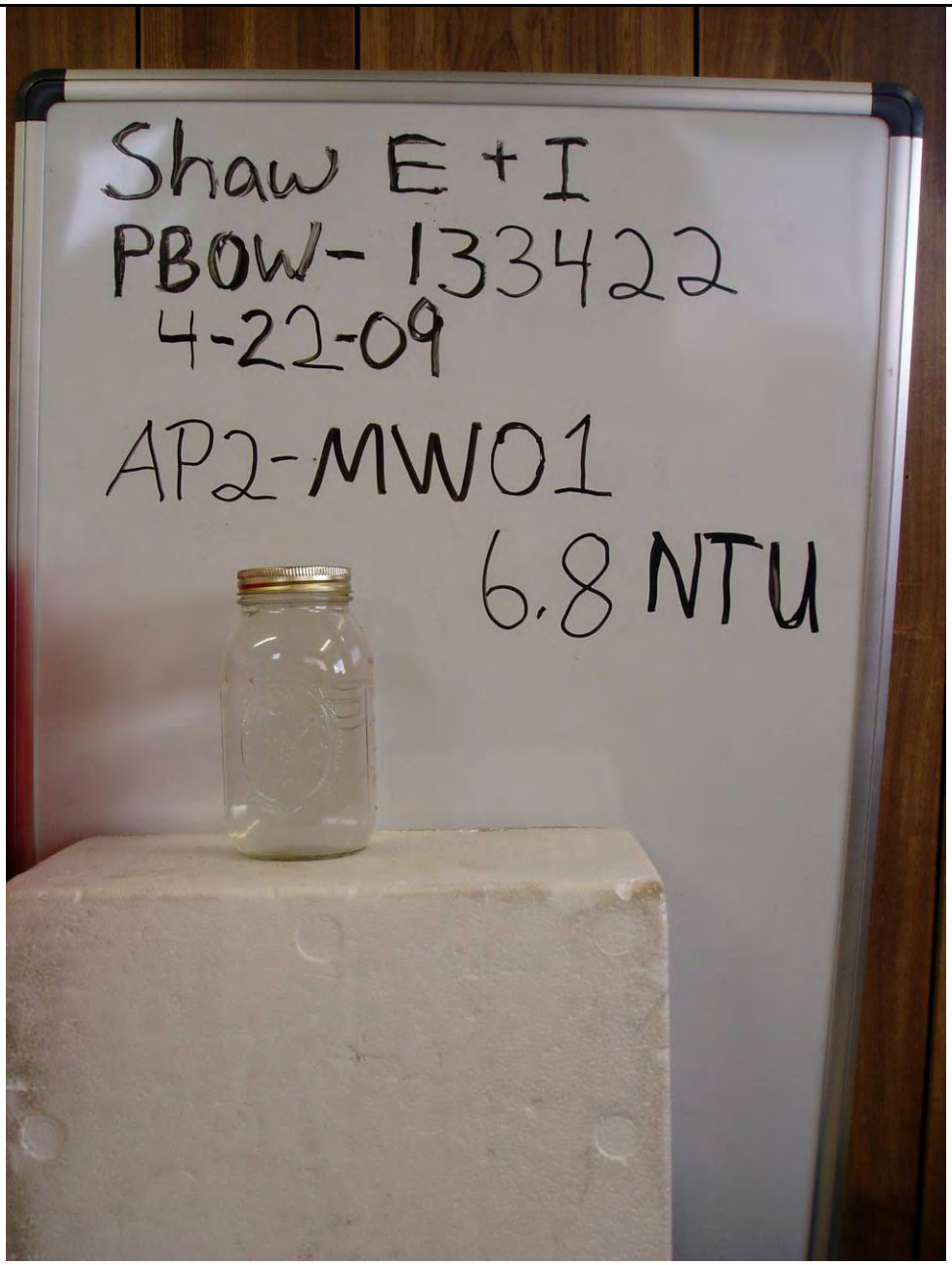
AP2-MW01

Date:

April 22, 2009

Final Reading:

6.8 NTU



Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Well:

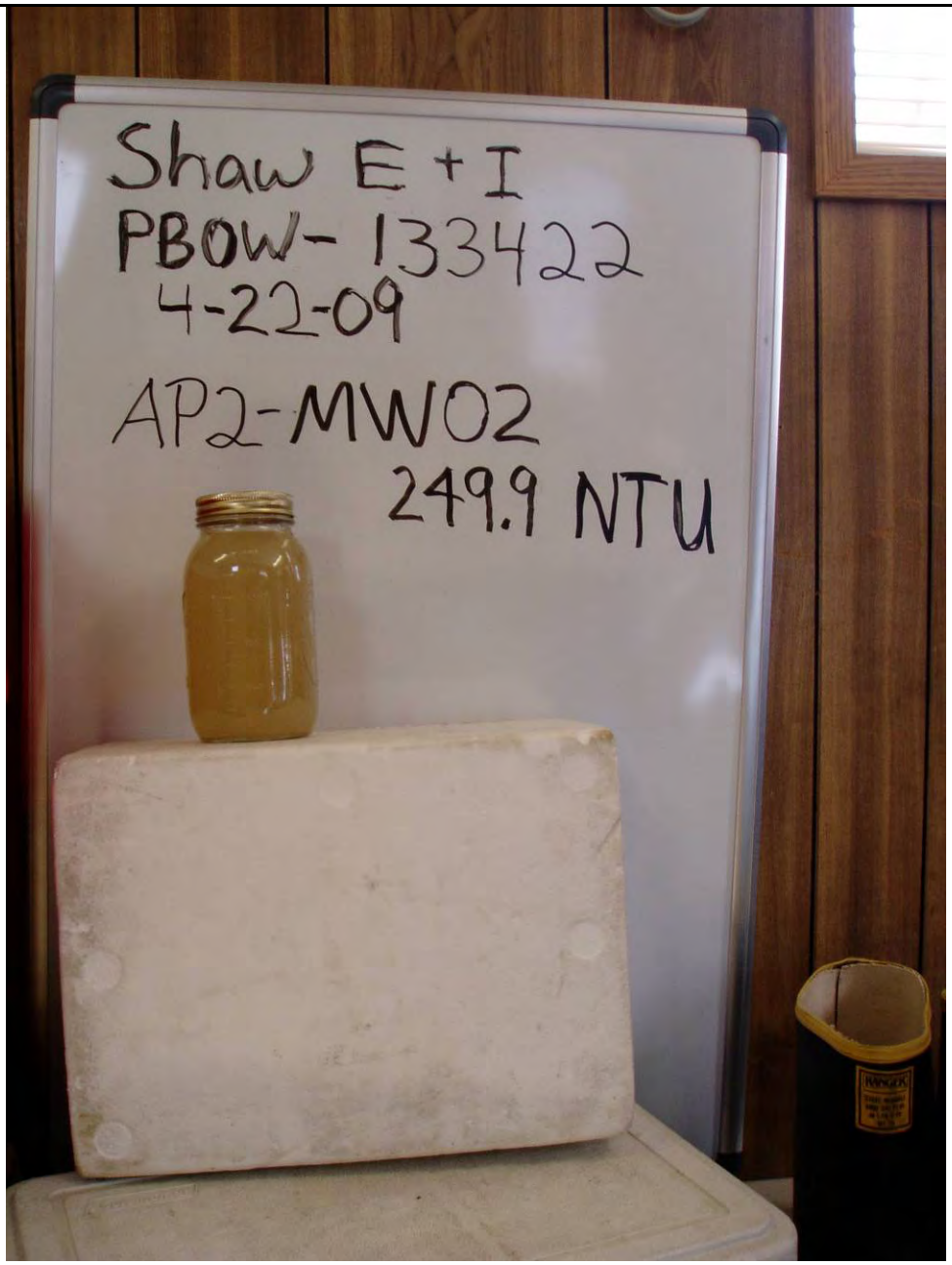
AP2-MW02

Date:

April 22, 2009

Final Reading:

249.9 NTU



Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 133422**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Well:

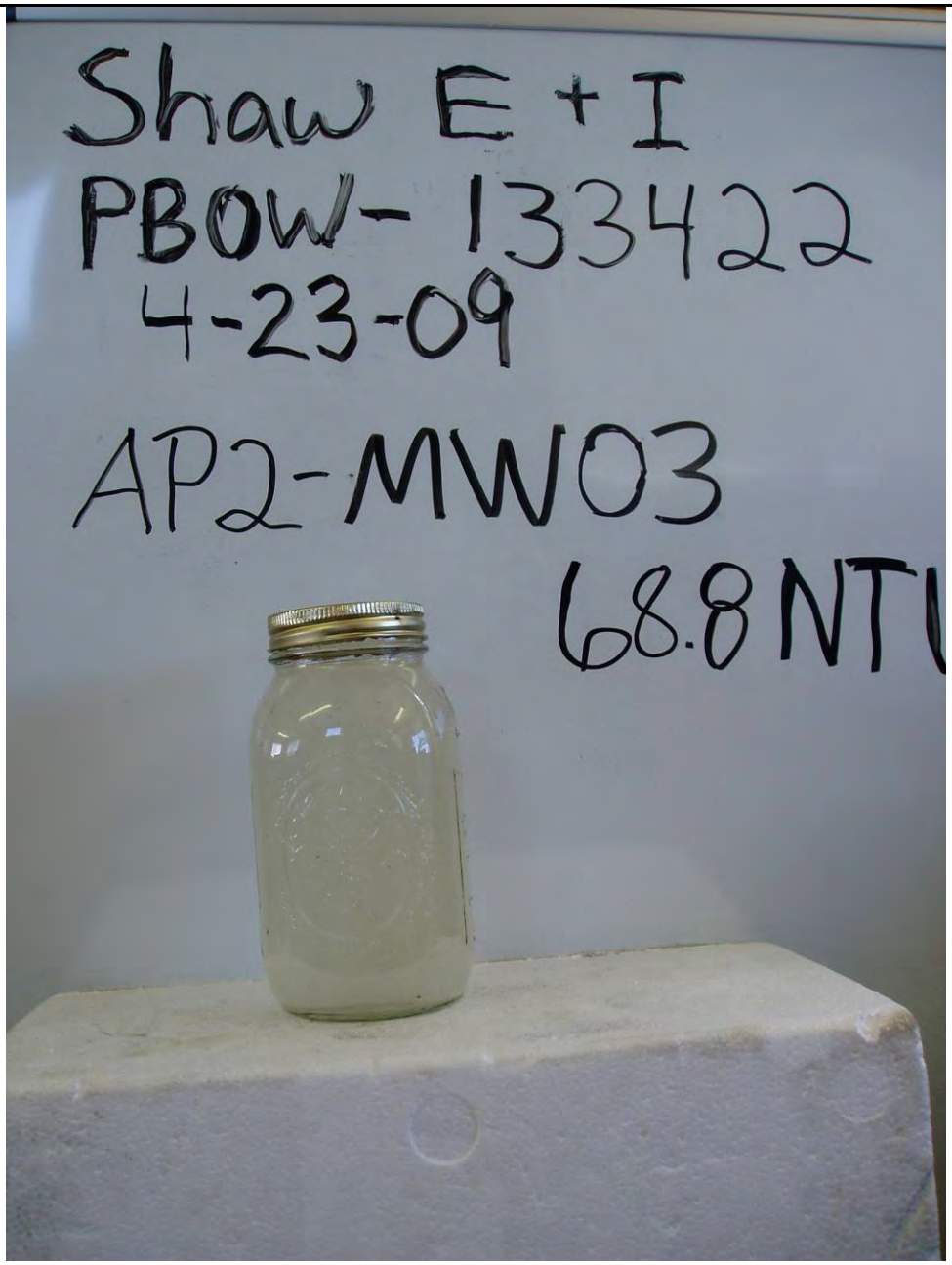
AP2-MW03

Date:

April 23, 2009

Final Reading:

68.8 NTU



Shaw E & I, Inc.

APPENDIX E

LAND SURVEY DATA

FINAL REPORT
of
SURVEYING SERVICES PERFORMED
by
SACKS SURVEYING & MAPPING, P.C. / KUSMER & ASSOCIATES J.V.
at the
PLUMBROOK ORDNANCE WORKS, SANDUSKY, OH
for
SHAW E & I (CONTRACT #W912QR-08-D-0013, D.O. DX03)
JANUARY, 2009

SUMMARY OF WORK PERFORMED

Sacks Surveying & Mapping, PC, in joint venture with Kusmer & Associates, Inc., located 42 soil sample and test pit locations and 43 piezometer locations at seven sites within the Plumbrook Ordnance Works site (Waste Water Treatment Plant #1, Ash Pit #1, Ash Pit #2, Wastewater Treatment Plant #2, Railcar Wash Area, Locomotive Area, and Waste Water Treatment Plant #1 Sewer Line). Work was performed on-site between 27 January, 2009 and 30 January, 2009 in accordance with Shaw E & I R.F.P. 2008-037 under purchase order #470434 OP in support of Shaw E & I contract W912QR-08-D-0013, D.O. DX03.

KEY PERSONNEL

W. Robert Kusmer – Ohio Land Surveyor S-6754
Stanley Robert Sacks – North Carolina Surveyor L-2913
Michael A. McKibbin – North Carolina Surveyor L-4519, Hazmat Project Manager
Jeff Bucholtz – On-site Party Chief *
Steven Chris Shelton – Survey Technician *
* all on-site personnel for this project are OSHA 29 CFR 1910.120 40-hour trained and medically monitored in accordance with Shaw E & I requirements.

FIELD PROCEDURES

All soil sample and piezometer locations reported below were surveyed with a Topcon GTS-235W Total Station using conventional angle and distance measurements to determine the horizontal and vertical position thereof. The survey control points used in this operation were established at each site by direct static differential GPS observation using three Ashtech Promark III GPS receivers. GPS vectors were adjusted holding fixed station "PB 06" using Ashtech post-processing software, producing a least squares adjustment of the WGS 84 positions. A loop using the unadjusted vectors passing the fixed and derived control positions yields a loop precision exceeding 1 part in 100,000. Horizontal and vertical values of Sacks Surveying & Mapping control station "PB 06" were derived by GPS survey in 1996 from NGS Monuments "Skyway RM 2" and "J-318" (a first order benchmark). The horizontal datum is NAD 83. The vertical datum is NGVD 29. Values were scaled to the Ohio State Plane Coordinate System (North Zone) using a combined scale and ellipsoid factor of 0.9999270034. Values for Sacks Surveying & Mapping monument "PB 06" are:

Northing (y) 189,438.4289 m
Easting (x) 585,685.6292 m
Orthometric Elevation 200.5985 m
Geoid Height -35.167 m (Geoid 99)

SAMPLE LOCATIONS

Waste Water Treatment Plant #1

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
3	623,838.916	1,920,186.361	635.762	GPS Pt 2-100
4	624,061.542	1,920,188.546	634.731	GPS Pt 2-101
206	624,221.21	1,919,718.65	639.33 Riser	PZ-01
207			638.0 Ground	
205	624,224.51	1,919,868.74	636.86 Riser	PZ-02
204			635.4 Ground	
210	624,097.22	1,919,768.37	639.67 Riser	SB-01/PZ-06
209			637.3 Ground	
208	624,087.98	1,919,683.02	637.18	SB-02
211	624,057.52	1,919,720.80	636.61	SB-03
213	623,995.17	1,919,709.85	639.26 Riser	SB-04/PZ04
212			638.1 Ground	
214	623,971.71	1,919,679.01	638.50	SB-05
218	623,987.84	1,919,772.77	637.56	SB-06
217	623,963.70	1,919,752.47	638.94 Riser	SB-07/PZ-03
216			638.0 Ground	
215	623,869.76	1,919,685.96	639.94 Riser	SB-08/PZ-05
**			638.8 Ground	

** = measure down from riser to ground supplied by Shaw E & I

Ash Pit #1

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
1	623,657.242	1,919,113.236	639.873	GPS Pt. 1-100
2	623,667.454	1,918,690.125	638.297	GPS Pt. 1-101
122	623,632.54	1,918,680.82	636.00	SB-01 *
111	623,561.23	1,918,686.10	635.92	SB-02
112	623,475.30	1,918,685.16	638.41	SB-03
113	623,463.46	1,918,828.82	638.81	SB-04
116	623,455.17	1,918,962.03	638.35	SB-05
119	623,620.51	1,918,930.44	635.23	SB-06 *

* = Stake missing; field location as directed by Shaw E & I personnel

108	623,724.22	1,918,737.52	637.65 Riser	PZ-01
109			636.8 Ground	

Ash Pit #1 <cont.>

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
107	623,728.76	1,918,855.35	639.11 Riser	PZ-02
106			637.7 Ground	
104	623,715.50	1,919,025.14	640.79 Riser	PZ-03
105			638.7 Ground	
118	623,368.95	1,918,792.10	641.23 Riser	PZ-04
117			640.9 Ground	
115	623,521.04	1,918,801.67	638.30 Riser	SB-08/PZ-05
114			637.5 Ground	
121	623,585.48	1,918,735.41	635.15 Riser	SB-09/PZ-06
120			634.5 Ground	

Ash Pit #2

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
9	622,858.595	1,911,566.119	639.400	GPS Pt 5-100
10	623,115.362	1,911,626.581	638.679	GPS Pt. 5-101
516	622,819.31	1,911,245.10	632.55	SS&M Nail 516
505	623,073.14	1,911,485.20	634.97 Riser	SB-01/PZ-01
504			631.7 Ground	
520	623,041.37	1,911,260.38	630.32 Riser	SB-02/PZ-02
521			627.5 Ground	
519	622,845.22	1,911,148.24	630.69 Riser	SB-03/PZ-03
518			627.7 Ground	
512	622,789.21	1,911,348.96	633.70 Riser	SB-04/PZ-04
511			630.0 Ground	
513	622,901.66	1,911,339.77	633.97 Riser	SB-05/PZ-05
514			631.8 Ground	
508	622,942.86	1,911,404.17	633.42 Riser	SB-06/PZ-06
507	629.7 Ground			
515	622,955.41	1,911,280.43	629.46	SB-07
509	622,840.49	1,911,425.01	632.92 Riser	SB-08/PZ-07
510			629.8 Ground	

Ash Pit #3 not sampled as of this date

Waste Water Treatment Plant #3

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
7	623,379.091	1,914,915.675	637.382	GPS Pt. 4-100
8	623,522.259	1,914,911.296	637.616	GPS Pt. 4-102
401	623,646.21	1,914,907.54		SS&M Nail 401
416	623,616.33	1,914,460.24	639.66 Riser	PZ-01
417			637.2 Ground	
415	623,575.37	1,914,357.85	638.43 Riser	PZ-02
414			636.3 Ground	
413	623,442.78	1,914,322.61	637.56	SB-01
412	623,389.04	1,914,335.44	639.36 Riser	SB-02/PZ-03
411	623,388.62	1,914,335.56	637.2 Ground	
410	623,416.20	1,914,391.06	637.63	SB-03
409	623,455.74	1,914,416.30	640.12 Riser	SB-0~~4~~/PZ-06
408			637.3 Ground	9 DKK
407	623,438.28	1,914,458.72	637.54 Riser	SB-05/PZ-05
**			636.9 Ground	
406	623,406.06	1,914,452.39	637.54	SB-06
405	623,377.78	1,914,453.57	639.72 Riser	SB-07/PZ-04
404			637.3 Ground	

** = measure up from ground to riser supplied by Shaw E & I

Railcar Wash Area (Acid Area)

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
1	623,657.242	1,919,113.236	639.873	GPS Pt. 1-100
2	623,667.454	1,918,690.125	638.297	GPS Pt. 1-101
130	623,882.09	1,918,943.02	638.10 Riser	PZ-01
131			635.4 Ground	
124	623,757.23	1,918,888.90	641.18 Riser	PZ-02
123			638.1 Ground	
127	623,812.43	1,918,868.73	639.85 Riser	PZ-03
126			636.5 Ground	
133	623,890.97	1,918,863.20	636.24 Riser	PZ-04
132			634.4 Ground	
125	623,800.27	1,918,892.60	637.58	SB-10
128	623,790.87	1,918,845.66	637.46	SB-12
129	623,823.32	1,918,836.69	635.39	SB-11

Locomotive Area

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
1	623,657.242	1,919,113.236	639.873	GPS Pt. 1-100
2	623,667.454	1,918,690.125	638.297	GPS Pt. 1-101
135	623,861.73	1,918,349.65	636.41	SS&M Nail 135
142	623,907.99	1,918,641.61	637.93 Riser	PZ-01
141			636.3 Ground	
148	623,862.16	1,918,467.96	640.67 Riser	PZ-02
147			637.0 Ground	
139	623,848.15	1,918,624.77	639.46 Riser	PZ-03
140			636.1 Ground	
138	623,794.37	1,918,550.21	637.50 Riser	SB-03/PZ-04
137			635.6 Ground	
149	623,880.78	1,918,509.04	640.20 Riser	PZ-05
150			637.3 Ground	
151	623,872.89	1,918,595.27	636.69	SB-04
136	623,799.16	1,918,471.15	636.35	SB-05
144	623,853.27	1,918,497.75	636.79	SB-07
145	623,852.71	1,918,515.02	636.82	SB-08
146	623,851.97	1,918,541.10	636.80	SB-09

Waste Water Treatment Plant #1 Sewer Line

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
5	624,284.373	1,923,674.317	635.700	GPS Pt. 3-100
6	624,608.356	1,923,501.823	631.977	GPS Pt. 3-102
301	624,567.58	1,923,502.38		SS&M Nail 301
336	624,601.08	1,921,712.32	628.78	~~SB-01~~ SB-09 DKK
337	624,623.89	1,921,715.45	628.65	~~SB-02~~ SB-10
304	624,517.72	1,923,563.59	632.31	Sth. Line, E. of road
306	624,515.71	1,923,522.82	632.20	Sth. Line, W. of road
305	624,522.75	1,923,560.31	632.08	Nth. Line, E. of road
307	624,568.23	1,923,492.44	632.09	Nth Line, W. of road
341	624,573.46	1,923,373.40	630.32	TP-03
326	624,577.93	1,923,102.28	631.96	TP-04
325	623,998.14	1,920,748.90	637.01	TP-21
324	624,049.00	1,921,018.16	635.54	TP-22
323	624,115.38	1,921,376.89	629.71	TP-23
322	624,170.76	1,921,675.58	632.49	TP-24
321	624,224.10	1,921,958.30	631.21	TP-25

Waste Water Treatment Plant #1 Sewer Line <cont.>

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
320	624,273.74	1,922,226.54	631.87	TP-26
316	624,335.37	1,922,550.74	633.80 Riser	TP-27/PZ-07
317			630.6 Ground	
313	624,383.06	1,922,811.74	630.29	TP-28
312	624,437.18	1,923,095.69	632.12	TP-29
309	624,484.42	1,923,339.45	632.11 Riser	TP-30/PZ-10
308			630.4 Ground	
340	624,616.65	1,921,456.57	628.93	TP-32
334	624,612.42	1,921,713.34	632.08 Riser	TP-33/PZ-03
335			629.0 Ground	
331	624,605.23	1,921,993.22	635.42	TP-34
330	624,595.15	1,922,271.99	636.48	TP-35
329	624,592.56	1,922,545.31	639.03 Riser	TP-36/PZ-05
328			635.7 Ground	
327	624,587.05	1,922,819.39	633.67	TP-37
PZ-01 not recovered at this date				
339	624,614.47	1,921,581.00	632.10 Riser	PZ-02
338			629.4 Ground	
333	624,609.33	1,921,832.45	631.01 Riser	PZ-04
332	624,609.09	1,921,832.50	629.8 Ground	
319	624,306.47	1,922,397.79	634.08 Riser	PZ-06
318	624,306.31	1,922,397.80	631.3 Ground	
315	624,360.52	1,922,687.65	633.93 Riser	PZ-08
314	624,360.83	1,922,687.71	630.9 Ground	
310	624,464.54	1,923,237.32	633.84 Riser	PZ-09
311	624,464.55	1,923,237.28	631.2 Ground	

CERTIFICATION

I, Warren Robert Kusmer, Ohio Professional Surveyor #S-6754, hereby certify that the information in this survey report is true to the best of my knowledge and belief.

W Robert Kusmer

Warren Robert Kusmer,
Ohio Professional Surveyor #S-6754

March 2, 2009
Date

FINAL REPORT
of
SURVEYING SERVICES PERFORMED
by
SACKS SURVEYING & MAPPING, P.C. / KUSMER & ASSOCIATES J.V.
at the
PLUMBROOK ORDNANCE WORKS, SANDUSKY, OH
for
SHAW E & I (CONTRACT #W912QR-08-D-0013, LTMP)
MAY, 2009

SUMMARY OF WORK PERFORMED

Sacks Surveying & Mapping, PC, in joint venture with Kusmer & Associates, Inc., located 39 monitoring wells, 1 bore hole, 4 staff gauges, and 24 surface water/sediment sample locations at seven sites within the Plumbrook Ordnance Works site (Waste Water Treatment Plant #1, Ash Pit #1, Ash Pit #2, Wastewater Treatment Plant #3, Railcar Wash Area, Locomotive Area, and Waste Water Treatment Plant #1 Sewer Line). Work was performed on-site between 18 May, 2009 and 21 May, 2009 in accordance with Shaw E & I R.F.P. 2008-037 under purchase order #499335 OP in support of Shaw E & I contract W912QR-08-D-0013, LTMP.

KEY PERSONNEL

W. Robert Kusmer – Ohio Land Surveyor S-6754
Stanley Robert Sacks – North Carolina Surveyor L-2913
Michael A. McKibbin – North Carolina Surveyor L-4519, Hazmat Project Manager
Jeff Bucholtz – On-site Party Chief *
Steven Chris Shelton – Survey Technician *
* all on-site personnel for this project are OSHA 29 CFR 1910.120 40-hour trained and medically monitored in accordance with Shaw E & I requirements.

FIELD PROCEDURES

All monitoring well and sampling locations reported below were surveyed with a Topcon GTS-235W Total Station using conventional angle and distance measurements to determine the horizontal and vertical position thereof. The survey control points used in this operation were previously established (January, 2009) at each site by direct static differential GPS observation using three Ashtech Promark III GPS receivers. GPS vectors were adjusted holding fixed station "PB 06" using Ashtech post-processing software, producing a least squares adjustment of the WGS 84 positions. A loop using the unadjusted vectors passing the fixed and derived control positions yields a loop precision exceeding 1 part in 100,000. Horizontal and vertical values of Sacks Surveying & Mapping control station "PB 06" were derived by GPS survey in 1996 from NGS Monuments "Sky D" and "J-318" (a first order benchmark). The horizontal datum is NAD 83. The vertical datum is NGVD 29. Values were scaled to the Ohio State Plane Coordinate System (North Zone) using a combined scale and ellipsoid factor of 0.9999270034. Values for Sacks Surveying & Mapping monument "PB 06" are:

Northing (y) 189,438.4289 m
Easting (x) 585,685.6292 m
Orthometric Elevation 200.5985 m
Geoid Height -35.167 m (Geoid 99)

SAMPLE LOCATIONS

Waste Water Treatment Plant #1

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
3	623,838.916	1,920,186.361	635.762	GPS Pt 2-100
4	624,061.542	1,920,188.546	634.731	GPS Pt 2-101
2047	624,015.57	1,919,560.22	639.40 Riser	WTP1-MW01
2048			639.90 Casing	
2046			637.16 Concrete Pad	
2045			636.6 Ground	
2037	623,971.13	1,919,757.79	640.24 Riser	WTP1-MW02
2036			640.64 Casing	
2035			638.02 Concrete Pad	
2034			638.6 Ground	
2029	623,975.45	1,919,998.27	639.68 Riser	WTP1-MW03
2028			640.19 Casing	
2027			637.46 Concrete Pad	
2026			637.0 Ground	
2053	624,011.89	1,919,564.07	636.8	Borehole at proposed WTP1-BEDGW-001
2041	623,957.54	1,919,747.58	640.35 Riser	WTP1-BEDGW-002
2040			640.72 Casing	
2039			638.18 Concrete Pad	
2038			637.8 Ground	
2033	623,962.13	1,919,998.14	639.93 Riser	WTP1-BEDGW-003
2032			640.41 Casing	
2031			637.56 Concrete Pad	
2030			637.1 Ground	
2052	624,243.79	1,919,831.93	631.8	WTP1-SDW01
2049	624,248.32	1,919,717.17	631.8	WTP1-SDW02
2056	624,006.22	1,919,446.79	633.4	WTP1-SDW03
2059	623,929.66	1,919,432.72	634.2	WTP1-SDW04
2051	624,250.91	1,919,716.51	636.11 Top/Pipe	WTP1-SG01
2050			631.7 Creek Bottom	

Ash Pit #1

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
1	623,657.242	1,919,113.236	639.873	GPS Pt. 1-100
2	623,667.454	1,918,690.125	638.297	GPS Pt. 1-101
2150	623,372.09	1,918,800.20	642.93 Riser	AP1-MW01
2149			643.42 Casing	
2148			640.69 Concrete Pad	
2147			640.3 Ground	
2081	623,622.45	1,918,730.13	638.01 Riser	AP1-MW02
2080			638.45 Casing	
2079			635.02 Concrete Pad	
2078			634.7 Ground	
2072	623,723.44	1,918,747.06	639.06 Riser	AP1-MW03
2071			639.54 Casing	
2070			636.65 Concrete Pad	
2069			636.5 Ground	
2145	623,369.01	1,918,892.38	644.28 Riser	AP1-BEDGW-001
2144			644.62 Casing	
2143			641.95 Concrete Pad	
2142			641.8 Ground	
2077	623,620.90	1,918,741.22	637.16 Riser	AP1-BEDGW-002
2076			637.52 Casing	
2075			634.63 Concrete Pad	
2074			634.5 Ground	
2088	623,399.02	1,918,443.98	627.5	AP1-SDW01
2087	623,471.38	1,918,494.34	627.8	AP1-SDW02
2084	623,612.61	1,918,583.19	627.1	AP1-SDW03
2073	623,617.03	1,918,760.43	633.6	AP1-SDW04

Ash Pit #2

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
9	622,858.595	1,911,566.119	639.400	GPS Pt 5-100
10	623,115.362	1,911,626.581	638.679	GPS Pt. 5-101
516	622,819.31	1,911,245.10	632.55	SS&M Nail 516
2159	622,866.25	1,911,550.02	640.94 Riser	AP2-MW01
2158			641.39 Casing	
2157			638.41 Concrete Pad	
2156			638.2 Ground	
2167	622,892.79	1,911,351.16	635.53 Riser	AP2-MW02
2166			635.92 Casing	
2165			632.75 Concrete Pad	
2164			632.5 Ground	
2177	622,973.78	1,911,157.35	632.16 Riser	AP2-MW03
2176			632.45 Casing	
2175			629.84 Concrete Pad	
2174			629.5 Ground	
2173	622,795.83	1,911,202.97	633.46 Riser	AP2-BEDGW-001
2172			633.88 Casing	
2171			630.50 Concrete Pad	
2170			630.4 Ground	
2163	622,887.85	1,911,361.47	635.58 Riser	AP2-BEDGW-002
2162			636.07 Casing	
2161			632.77 Concrete Pad	
2160			632.4 Ground	
2155	623,117.29	1,911,619.32	640.83 Riser	AP2-BEDGW-003
2154			641.17 Casing	
2153			638.57 Concrete Pad	
2152			638.4 Ground	
2190	623,503.16	1,911,303.54	621.2	AP2-SDW01
2187	623,268.84	1,911,230.43	621.8	AP2-SDW02
2184	623,145.14	1,911,134.90	621.8	AP2-SDW03
2193	622,772.78	1,910,936.54	623.1	AP2-SDW04
2194	622,484.96	1,910,811.50	623.0	AP2-SDW05
2189	623,270.04	1,911,226.61	625.46 Top/pipe	AP2-SG04
2188			621.1 Creek Bottom	

Ash Pit #3 not sampled as of this date

Waste Water Treatment Plant #3

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
7	623,379.091	1,914,915.675	637.382	GPS Pt. 4-100
8	623,522.259	1,914,911.296	637.616	GPS Pt. 4-102
401	623,646.21	1,914,907.54		SS&M Nail 401
2215	623,391.43	1,914,527.69	640.00 Riser	WTP3-MW01
2214			640.39 Casing	
2213			637.21 Concrete Pad	
2212			637.0 Ground	
2203	623,447.80	1,914,416.55	640.91 Riser	WTP3-MW02
2202			641.36 Casing	
2201			638.04 Concrete Pad	
2200			637.7 Ground	
2207	623,501.39	1,914,372.79	637.90 Riser	WTP3-MW03
2206			638.40 Casing	
2205			635.72 Concrete Pad	
2204			635.6 Ground	
2218	623,382.22	1,914,531.86	640.15 Riser	WTP3-BEDGW-001
2219			640.64 Casing	
2217			637.30 Concrete Pad	
2216			637.1 Ground	
2199	623,453.92	1,914,407.33	640.9 Riser	WTP3-BEDGW-002
2198			641.38 Casing	
2197			638.02 Concrete Pad	
2196			637.6 Ground	
2222	623,532.48	1,914,302.59	640.21 Riser	WTP3-BEDGW-003
2223			640.66 Casing	
2221			637.43 Concrete Pad	
2220			637.1 Ground	
2225	623,513.33	1,914,357.28	630.6	WTP3-SDW01
2224	623,415.50	1,914,298.15	632.5	WTP3-SDW02
2226	623,667.10	1,914,369.86	629.76	WTP3-SDW03
2211	623,748.43	1,914,383.75	631.00 Top/Pipe	WTP3-SG03
2210			627.3 Creek Bottom	

Railcar Wash Area (Acid Area)

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
1	623,657.242	1,919,113.236	639.873	GPS Pt. 1-100
2	623,667.454	1,918,690.125	638.297	GPS Pt. 1-101
2064	623,724.69	1,919,029.45	641.01 Riser	RCA-MW01
2063			641.44 Casing	
2062			638.63 Concrete Pad	
2061			638.4 Ground	
2124	623,826.40	1,918,834.02	638.15 Riser	RCA-MW02
2123			638.59 Casing	
2122			635.52 Concrete Pad	
2121			635.3 Ground	
2128	623,865.52	1,918,827.90	638.16 Riser	RCA-MW03
2127			638.53 Casing	
2126			635.71 Concrete Pad	
2125			635.3 Ground	
2068	623,709.77	1,919,022.35	641.02 Riser	RCA-BEDGW-001
2067			641.38 Casing	
2066			638.83 Concrete Pad	
2065		638.5 Ground		
2120	623,832.46	1,918,842.57	638.03 Riser	RCA-BEDMW-002
2119			638.42 Casing	
2118			635.71 Concrete Pad	
2117			635.5 Ground	
2108	623,916.92	1,918,767.69	637.00 Riser	RCA-BEDGW-003
2107			637.46 Casing	
2106			634.80 Concrete Pad	
2105			634.3 Ground	

Locomotive Area

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
1	623,657.242	1,919,113.236	639.873	GPS Pt. 1-100
2	623,667.454	1,918,690.125	638.297	GPS Pt. 1-101
135	623,861.73	1,918,349.65	636.41	SS&M Nail 135
2112	623,937.12	1,918,462.09	639.86 Riser	LBA-MW01
2111			640.35 Casing	
2110			637.61 Concrete Pad	
2109			637.2 Ground	
2098	623,827.44	1,918,628.33	639.25 Riser	LBA-MW02
2097			639.71 Casing	
2096			636.39 Concrete Pad	
2095			635.9 Ground	
2104	623,788.63	1,918,684.59	638.18 Riser	LBA-MW03
2103			638.70 Casing	
2102			635.71 Concrete Pad	
2101			635.5 Ground	
2116	623,937.80	1,918,452.89	639.74 Riser	LBA-BEDGW-001
2115			640.23 Casing	
2114			637.65 Concrete Pad	
2113			637.3 Ground	
2094	623,827.05	1,918,614.64	638.62 Riser	LBA-BEDGW-002
2093			639.00 Casing	
2092			636.39 Concrete Pad	
2091			636.3 Ground	
2140	624,006.50	1,918,888.18	626.4	LBA-SDW01
2136	623,880.05	1,918,796.17	627.4	LBA-SDW02
2129	623,829.34	1,918,766.27	626.9	LBA-SDW03
2133	623,782.26	1,918,733.17	627.0	LBA-SDW04
2083	623,719.16	1,918,654.72	627.8	LBA-SDW05
2082	623,716.02	1,918,803.56	630.4	LBA-SDW06
2132	623,815.14	1,918,768.04	632.1 Water level	LBA-SW07
2131			631.1 Pipe invert	
2137	623,939.77	1,918,834.41	627.7	WSD-5
2138	623,781.72	1,918,728.51	630.65 Top/Pipe	LBA-SG05
2139			626.3 Creek Bottom	

Waste Water Treatment Plant #1 Sewer Line

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
5	624,284.373	1,923,674.317	635.700	GPS Pt. 3-100
6	624,608.356	1,923,501.823	631.977	GPS Pt. 3-102
301	624,567.58	1,923,502.38		SS&M Nail 301
2004	624,190.42	1,922,785.52	634.66 Riser	1SLA-MW01
2003			635.11 Casing	
2002			631.85 Concrete Pad	
2001			631.7 Ground	
2012	624,354.65	1,922,688.56	633.93 Riser	1SLA-MW02
2011			634.57 Casing	
2010			630.92 Concrete Pad	
2009			630.8 Ground	
2020	624,654.19	1,922,564.69	639.71 Riser	1SLA-MW03
2019			640.10 Casing	
2018			636.92 Concrete Pad	
2017			636.7 Ground	
2008	624,129.03	1,922,624.33	636.14 Riser	1SLA-BEDGW-001
2007			636.59 Casing	
2006			633.41 Concrete Pad	
2005			633.0 Ground	
2016	624,368.22	1,922,687.20	634.16 Riser	1SLA-BEDGW-002
2015			634.56 Casing	
2014			631.21 Concrete Pad	
2013			630.9 Ground	
2024	624,696.73	1,922,811.24	636.74 Riser	1SLA-BEDGW-003
2023			637.16 Casing	
2022			634.41 Concrete Pad	
2021			634.0 Ground	

CERTIFICATION

I, Warren Robert Kusmer, Ohio Professional Surveyor #S-6754, hereby certify that the information in this survey report is true to the best of my knowledge and belief.

W Robert Kusmer

Warren Robert Kusmer,
Ohio Professional Surveyor #S-6754

June 22, 2009

Date

STATE OF OHIO
W. ROBERT KUSMER
6754
REGISTERED SURVEYOR

APPENDIX F

IDW WASTE MANIFESTS
(APRIL, MAY, JUNE, SEPTEMBER, DECEMBER 2009)

** ALL MANIFESTS MAY OR MAY NOT BE APPROPRIATE FOR DISPOSAL OF WASTES AT POWERHOUSE 2 ASH PITS. DOCUMENTATION OF THE WASTE GENERATION LOCATION WAS NOT MADE, ONLY THE GROSS WEIGHT. THEREFORE, ALL MANIFESTS GENERATED ARE INCLUDED TO DOCUMENT ALL DISPOSAL ACTIVITIES.

006184141JJK

Form Approved. OMB No 2050-0039

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: OH3 800 015 379
2. Page 1 of 1
3. Emergency Response Phone: 800424 9300
4. Manifest Tracking Number: 006184141 JJK

5. Generator's Name and Mailing Address: NASA - PLUMBROOK STATION
6100 COLUMBUS AVE
SANDUSKY OH 44870
Generator's Phone: ~~(216) 642 0800~~ 419-621-3234

Generator's Site Address (if different than mailing address)
6100 COLUMBUS AVE
SANDUSKY OH 44870

6. Transporter 1 Company Name: Triad Transport, Inc.
U.S. EPA ID Number: OKD981588791

7. Transporter 2 Company Name
U.S. EPA ID Number:

8. Designated Facility Name and Site Address: EQ DETROIT, INC
1923 FREDERICK
DETROIT, MI 48211
Facility's Phone: (313) 947 1300
U.S. EPA ID Number: MID 980 991 560

9a. HM	9b. U.S. DOT Description (Including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
	1. UN, NON DOT HAZARDOUS, NON RCRA REGULATED WATER	x 71	DM	35,500	~~500~~ P	D006
	2. UN, NON DOT HAZARDOUS, NON RCRA REGULATED SOIL	x 8	DM	4800	~~600~~ P	D006 NONE
	3.					
	4.					

14. Special Handling Instructions and Additional Information
01 D098220DET / NON HAZARDOUS IDW WATER 02 D098221DET / NON HAZARDOUS SOIL
24 HOUR EMERGENCY RESPONSE NUMBER 1-800-424-9300 PROVIDED BY SHAW E & I VIA CONTRACT
WITH CHEMTREC. NASA Manifest tracking number N09031

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Amy L. Bower
Signature: Amy L. Bower
Month 04 Day 29 Year 09

INT'L
16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit: Date leaving U.S.:
Transporter signature (for exports only):

TRANSPORTER
17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: DAVE GALL
Signature: Dave Gall
Month 04 Day 29 Year 09
Transporter 2 Printed/Typed Name
Signature
Month Day Year

DESIGNATED FACILITY
18. Discrepancy
18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
U.S. EPA ID Number
18b. Alternate Facility (or Generator)
Facility's Phone:
18c. Signature of Alternate Facility (or Generator)
Month Day Year
19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)
1. H111 2. H111 3. 4.
20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a
Printed/Typed Name: Tonya L Ward
Signature
Month Day Year 04 29 09

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

EQ Detroit, Inc.

1923 FREDERICK STREET • DETROIT, MICHIGAN 48211 • tel 313-923-0080 • fax 313-923-3375 • www.eqonline.com

CERTIFICATE OF RECEIPT

This certificate is to verify that the wastes specified on manifest # 006184141551K have been properly received at EQ Detroit and will be properly managed to meet all applicable local, state and federal standards.

FACILITY NAME:	EQ Detroit, Inc. EPA ID # MID 980991566
ADDRESS:	1923 Frederick Street Detroit, MI 48211
PHONE NUMBER:	313-923-0080 800-495-6059
FAX NUMBER:	313-923-3375

Authorized Signature: _____

On behalf of EQ Detroit, Inc.

006184137JJK

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: OH3 800 015 379
2. Page 1 of 1
3. Emergency Response Phone: 800 424-9300
4. Manifest Tracking Number: 006184137 JJK

5. Generator's Name and Mailing Address: NASA - PLUMBROOK STATION
6100 COLUMBUS AVE
SANDUSKY, OH 44870
Generator's Phone: ~~[illegible]~~ 419-621-3294

Generator's Site Address (if different than mailing address):
6100 COLUMBUS AVE
SANDUSKY, OH 44870

6. Transporter 1 Company Name: Triad Transport Inc.
U.S. EPA ID Number: OKD 981588791

7. Transporter 2 Company Name:
U.S. EPA ID Number:

8. Designated Facility Name and Site Address: EQ DETROIT, INC
1923 FREDERICK
DETROIT, MI 48211
Facility's Phone: (313) 347-1300
U.S. EPA ID Number: MID 980 991 556

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
	1. UN, NON DOT HAZARDOUS, NON RCRA REGULATED Water	63	DM	32,720	P	D029L D.G.
	2. UN NON DOT HAZARDOUS NON RCRA REGULATED Soil	17	DM	10,200	P	NONE D.G.
	3.					
	4.					

14. Special Handling Instructions and Additional Information
01. D098220DET / NON HAZARDOUS IDW WATER 02. D098221DET / NON HAZARDOUS SOIL
24 HOUR EMERGENCY RESPONSE NUMBER 1-800-424-9300 PROVIDED BY SHAW E & I VIA CONTRACT WITH CHEMTREC. NASA Tracking number N09032

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Amy L. Bower
Signature: Amy L. Bower
Month 04 Day 30 Year 09

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Dave Gall
Signature: Dave Gall
Month 4 Day 30 Year 09
Transporter 2 Printed/Typed Name:
Signature:
Month Day Year

18. Discrepancy
18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:

18b. Alternate Facility (or Generator)
U.S. EPA ID Number
Facility's Phone:

18c. Signature of Alternate Facility (or Generator)
Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)
1. H111 2. H111 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a
Printed/Typed Name: Tonya Stewart
Signature:
Month Day Year 04 30 09

GENERATOR — INT'L — TRANSPORTER — DESIGNATED FACILITY

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

EQ Detroit, Inc.

1923 FREDERICK STREET • DETROIT, MICHIGAN 48211 • tel 313-923-0080 • fax 313-923-3375 • www.eqonline.com

CERTIFICATE OF RECEIPT

This certificate is to verify that the wastes specified on manifest # 006184137 have been properly received at EQ Detroit and will be properly managed to meet all applicable local, state and federal standards.

FACILITY NAME:	EQ Detroit, Inc. EPA ID # MID 980991566
ADDRESS:	1923 Frederick Street Detroit, MI 48211
PHONE NUMBER:	313-923-0080 800-495-6059
FAX NUMBER:	313-923-3375

Authorized Signature: Mark Hudson

On behalf of EQ Detroit, Inc.

006184138JJK

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: OH3 800 015 379
2. Page 1 of 1
3. Emergency Response Phone: 8004249300
4. Manifest Tracking Number: 006184138 JJK

5. Generator's Name and Mailing Address: NASA - PLUMBROOK STATION
6100 COLUMBUS AVE
SANDUSKY, OH 44870
Generator's Phone: ~~(218) 842-8891~~ 419-621-3234

Generator's Site Address (if different than mailing address):
6100 COLUMBUS AVE
SANDUSKY, OH 44870

6. Transporter 1 Company Name: Triad Transport, Inc.
U.S. EPA ID Number: OKD981588791

7. Transporter 2 Company Name:
U.S. EPA ID Number:

8. Designated Facility Name and Site Address: EQ DETROIT, INC
1923 FREDERICK
DETROIT, MI 48211
Facility's Phone: (313) 347-1300
U.S. EPA ID Number: MID 980 991 566

9a HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes		
	1 UN, NON DOT HAZARDOUS, NON RCRA REGULATED Water	60	DM	23,500	P	D29L		
	2 UN, NON DOT HAZARDOUS, NON RCRA REGULATED Soil	20	DM	18,000	P	NONE		
	3							
	4							

14. Special Handling Instructions and Additional Information:
01 D098220DET / NON HAZARDOUS IDW WATER 02. D098221DET / NON HAZARDOUS SOIL
24 HOUR EMERGENCY RESPONSE NUMBER: 1-800-424-9300 PROVIDED BY SHAW E & I VIA CONTRACT WITH CHEMTREC. NASA tracking number N09033

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Amy L. Bower
Signature: Amy L. Bower
Month Day Year: 05 01 09

16. International Shipments: ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Dave Gall
Signature: Dave Gall
Month Day Year: 05 01 09
Transporter 2 Printed/Typed Name:
Signature:
Month Day Year:

18. Discrepancy
18a. Discrepancy Indication Space: ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
18b. Alternate Facility (or Generator)
U.S. EPA ID Number:
Facility's Phone:
18c. Signature of Alternate Facility (or Generator)
Month Day Year:

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)
1. H111 2. H111 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a
Printed/Typed Name: Tony Stewart
Signature:
Month Day Year: 05 01 09

GENERATOR — INT'L — TRANSPORTER — DESIGNATED FACILITY

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete

DESIGNATED FACILITY TO GENERATOR STATE (IF REQUIRED)

EQ Detroit, Inc.

1923 FREDERICK STREET • DETROIT, MICHIGAN 48211 • tel 313-923-0080 • fax 313-923-3375 • www.eqonline.com

CERTIFICATE OF RECEIPT

This certificate is to verify that the wastes specified on manifest # 006184138 have been properly received at EQ Detroit and will be properly managed to meet all applicable local, state and federal standards.

FACILITY NAME:	EQ Detroit, Inc. EPA ID # MID 980991566
ADDRESS:	1923 Frederick Street Detroit, MI 48211
PHONE NUMBER:	313-923-0080 800-495-6059
FAX NUMBER:	313-923-3375

Authorized Signature: _____
On behalf of EQ Detroit, Inc.

006184139JJK

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: OH3 800 015 379
2. Page 1 of: 1
3. Emergency Response Phone: 800-424-9300
4. Manifest Tracking Number: 006184139 JJK

5. Generator's Name and Mailing Address: NASA - PLUMBROOK STATION
6100 COLUMBUS AVE
SANDUSKY, OH 44870
Generator's Phone: ~~(810) 948-8891~~ 419-621-3234

Generator's Site Address (if different than mailing address):
6100 COLUMBUS AVE
SANDUSKY, OH 44870

6. Transporter 1 Company Name: Triad Trucking Company — U.S. EPA ID Number:
7. Transporter 2 Company Name: — U.S. EPA ID Number:
8. Designated Facility Name and Site Address: EQ DETROIT, INC.
1923 FREDERICK
DETROIT, MI 48211
Facility's Phone: (313) 347-1300
U.S. EPA ID Number: MID 980 991 566

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes		
	1. UN, NON DOT HAZARDOUS, NON RCRA REGULATED Water	56	DM	28,000 est	lbs	D29L		
	2. UN, NON DOT HAZARDOUS, NON RCRA REGULATED Soil	29	DM	14,500 est	lbs	NONE		
	3.							
	4.							

14. Special Handling Instructions and Additional Information
01. D098220DET / NON HAZARDOUS IDW WATER 02. D098221DET / NON HAZARDOUS SOIL
24 HOUR EMERGENCY RESPONSE NUMBER: 1-800-424-9300 PROVIDED BY SHAW E & I VIA CONTRACT WITH CHEMTREC. NASA - N09034

15. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Robert F. Lallior Jr. — Signature: Robert F. Lallior on behalf of Director, GRE — Month 5 Day 5 Year 09

16. International Shipments: ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: DAVE BALL — Signature: Dave Ball — Month 05 Day 05 Year 09
Transporter 2 Printed/Typed Name: — Signature: — Month Day Year

18. Discrepancy
18a. Discrepancy Indication Space: ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
18b. Alternate Facility (or Generator) — Manifest Reference Number: — U.S. EPA ID Number:
Facility's Phone:
18c. Signature of Alternate Facility (or Generator) — Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)
1. H111 2. H111 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a
Printed/Typed Name: Danielle Edwards — Signature: Danielle Edwards — Month 05 Day 05 Year 09

GENERATOR / INT'L / TRANSPORTER / DESIGNATED FACILITY

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO GENERATOR STATE (IF REQUIRED)

EQ Detroit, Inc.

1923 FREDERICK STREET • DETROIT, MICHIGAN 48211 • tel 313-923-0080 • fax 313-923-3375 • www.eqonline.com

CERTIFICATE OF RECEIPT

This certificate is to verify that the wastes specified on manifest # 006184139 have been properly received at EQ Detroit and will be properly managed to meet all applicable local, state and federal standards.

FACILITY NAME:	EQ Detroit, Inc. EPA ID # MID 980991566
ADDRESS:	1923 Frederick Street Detroit, MI 48211
PHONE NUMBER:	313-923-0080 800-495-6059
FAX NUMBER:	313-923-3375

Authorized Signature: _____

On behalf of EQ Detroit, Inc.

000310559FLE

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: OH380001537 9
2. Page 1 of: 1
3. Emergency Response Phone: 1-800-424-9300
4. Manifest Tracking Number: 000310559 FLE

5. Generator's Name and Mailing Address
NASA-Plumbrook Station
6100 Columbus Ave.
Sandusky, OH 44870
Generator's Phone: 216-642-0891

Generator's Site Address (if different than mailing address)
6100 Columbus Ave.
Sandusky, OH 44870

6. Transporter 1 Company Name: Triad Transport, Inc.
U.S. EPA ID Number: OKD981588791

7. Transporter 2 Company Name:
U.S. EPA ID Number:

8. Designated Facility Name and Site Address
EQ Detroit, Inc.
1923 Frederick
Detroit, MI 48211
Facility's Phone: 313-347-1300
U.S. EPA ID Number: MID980991566

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
	1. UN, Non Dot Hazardous, Non RCRA Regulated	19	DM	15,200	lbs	None
	2. UN, Non Dot Hazardous, Non RCRA Regulated	59	DM	23,600	lbs	029L
	3.					
	4.					

14. Special Handling Instructions and Additional Information
1. D098221DET/ Non Hazardous Soil 2. D098220DET/ Non Hazardous IDW Water
24hr Emergency Response: 1-800-424-9300 provided by Shaw E&I via contract with Chemtrec

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Robert F. Lallier Jr.
Signature: Robert F. Lallier on behalf of Director, GRC
Month 06 Day 16 Year 09

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Benjamin D. Rhoads Sr.
Signature: Benjamin D. Rhoads Sr.
Month 06 Day 16 Year 09
Transporter 2 Printed/Typed Name:
Signature:
Month Day Year

18. Discrepancy
18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
OK to change sec. 12 line 1 & 2 per Beth Crawford 6/16/09
Manifest Reference Number:
18b. Alternate Facility (or Generator)
U.S. EPA ID Number:
Facility's Phone:
18c. Signature of Alternate Facility (or Generator)
Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)
1. H111 2. H111 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a
Printed/Typed Name: Tonya L. Stewart
Signature:
Month 06 Day 16 Year 09

GENERATOR — INT'L — TRANSPORTER — DESIGNATED FACILITY

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

000310584FLE

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: OH3800015379
2. Page 1 of 1
3. Emergency Response Phone: 1-800-424-9300
4. Manifest Tracking Number: 000310584 FLE

5. Generator's Name and Mailing Address
NASA-Plumbrook Station
6100 Columbus Ave.
Sandusky, OH 44870
Generator's Phone: 216-642-0891

Generator's Site Address (if different than mailing address)
6100 Columbus Ave.
Sandusky, OH 44870

6. Transporter 1 Company Name: Triad Transport, Inc.
U.S. EPA ID Number: OKD981588791

7. Transporter 2 Company Name:
U.S. EPA ID Number:

8. Designated Facility Name and Site Address
EQ Detroit, Inc.
1923 Frederick
Detroit, MI 48211
Facility's Phone: 313-347-1300
U.S. EPA ID Number: MID980991566

9a HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No	Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
	1 UN, Non Dot Hazardous, Non RCRA Regulated		DM			
	2. UN, Non Dot Hazardous, Non RCRA Regulated	56	DM	22,400	lbs P	D029L
	3.					
	4.					

14. Special Handling Instructions and Additional Information
1. D098221DET/Non Hazardous Soil 2. D098220DET/ Non Hazardous IDW Water
24hr Emergency Response: 1-800-424-9300 provided by Shaw E&I via contract with Chemtrec

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Robert F. Lallier Jr. Signature: Robert F. Lallier on behalf of Director, GRC Month 06 Day 17 Year 09

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.

17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Benjamin D. Rhoads Sr. Signature: Benjamin D. Rhoads Sr. Month 06 Day 17 Year 09
Transporter 2 Printed/Typed Name: Signature: Month Day Year

18. Discrepancy
18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:

18b. Alternate Facility (or Generator) U.S. EPA ID Number
Facility's Phone:
18c. Signature of Alternate Facility (or Generator) Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)
1. 2. H111 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a
Printed/Typed Name: Tonya Stewart Signature: Month 06 Day 17 Year 09

GENERATOR / TRANSPORTER (INT'L) / DESIGNATED FACILITY

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete. DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

EQ Detroit, Inc.

1923 FREDERICK STREET • DETROIT, MICHIGAN 48211 • tel 313-923-0080 • fax 313-923-3375 • www.eqonline.com

CERTIFICATE OF RECEIPT

000310559FLE

This certificate is to verify that the wastes specified on manifest # _____ _ have been properly received at EQ Detroit and will be properly managed to meet all applicable local, state and federal standards.

FACILITY NAME:	EQ Detroit, Inc. EPA ID # MID 980991566
ADDRESS:	1923 Frederick Street Detroit, MI 48211
PHONE NUMBER:	313-923-0080 800-495-6059
FAX NUMBER:	313-923-3375

Authorized Signature: _____

On behalf of EQ Detroit, Inc.

000310583FLE

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) Form Approved OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: OH380001537 9
2. Page 1 of 1
3. Emergency Response Phone: 1-800-424-9300
4. Manifest Tracking Number: 000310583 FLE

5. Generator's Name and Mailing Address
NASA-Plumbrook Station
6100 Columbus Ave.
Sandusky, OH 44870
Generator's Phone: 216-642-0891

Generator's Site Address (if different than mailing address)
6100 Columbus Ave.
Sandusky, OH 44870

6. Transporter 1 Company Name: Triad Transport, Inc.
U.S. EPA ID Number: OKD981588791

7. Transporter 2 Company Name
U.S. EPA ID Number

8. Designated Facility Name and Site Address
EQ, Detroit, Inc.
1923 Frederick
Detroit, MI 48211
Facility's Phone: 313-347-1300
U.S. EPA ID Number: MID980991566

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No	10. Containers Type	11. Total Quantity	12. Unit Wt/Vol	13. Waste Codes
	1. UN, Non Dot Hazardous, Non RCRA Regulated	22	DM	17,600	P	
	2. UN, Non Dot Hazardous, Non RCRA Regulated	20	DM	8,000	P	029L
	3.					
	4.					

14. Special Handling Instructions and Additional Information
1. D098221DET/ Non-Hazardous Soil 2. D098220DET/ Non Hazardous IDW Water
XX 24hr Emergency Response: 1-800-424-9300 provided by Shaw E&I via contract with Chemtrec

15. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Robert F. Lallier Jr.
Signature: Robert F. Lallier Jr. on behalf of Director, GRC
Month 6 Day 18 Year 09

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Benjamin D. Rhoads Sr.
Signature: Benjamin D. Rhoads Sr.
Month 06 Day 18 Year 09
Transporter 2 Printed/Typed Name
Signature
Month Day Year

18. Discrepancy
18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:

18b. Alternate Facility (or Generator)
U.S. EPA ID Number
Facility's Phone:

18c. Signature of Alternate Facility (or Generator)
Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)
1. H111 2. H111 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a
Printed/Typed Name: Craig C. Howard
Signature
Month 6 Day 18 Year 09

GENERATOR — INT'L — TRANSPORTER — DESIGNATED FACILITY

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete. DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

EQ Detroit, Inc.

1923 FREDERICK STREET • DETROIT, MICHIGAN 48211 • tel 313-923-0080 • fax 313-923-3375 • www.eqonline.com

CERTIFICATE OF RECEIPT

This certificate is to verify that the wastes specified on manifest # 000310583FLE have been properly received at EQ Detroit and will be properly managed to meet all applicable local, state and federal standards.

FACILITY NAME:	EQ Detroit, Inc. EPA ID # MID 980991566
ADDRESS:	1923 Frederick Street Detroit, MI 48211
PHONE NUMBER:	313-923-0080 800-495-6059
FAX NUMBER:	313-923-3375

Authorized Signature: _____

On behalf of EQ Detroit, Inc.

000310538FLE

Please print or type (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: OH380001537 9
2. Page 1 of 1
3. Emergency Response Phone: 1-800-424-9300
4. Manifest Tracking Number: 000310538 FLE

5. Generator's Name and Mailing Address
Nasa-Plumbrook Station
6100 Columbus Ave.
Sandusky, OH 44870

Generator's Site Address (if different than mailing address)
6100 Columbus Ave.
Sandusky, OH 44870

Generator's Phone: ~~216-642-0891~~ 419.621-3234

6. Transporter 1 Company Name: EQ Industrial Services — U.S. EPA ID Number: MID 000 263 871

7. Transporter 2 Company Name — U.S. EPA ID Number:

8. Designated Facility Name and Site Address
EQ, Detroit, Inc.,
1923 Frederick
Detroit, MI 48211
Facility's Phone: 313-347-1300
U.S. EPA ID Number: MID 980991566

9a. HM	9b. U.S. DOT Description (Including Proper Shipping Name, Hazard Class, ID Number and Packing Group (if any))	10. Containers No.	Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
	1. UN, Non DOT Hazardous, Non-RCRA Regulated	~~X~~ 3 CYS	D M	1,000 ~~150~~ CYS est.	P	None
	2. UN, Non Dot Hazardous, Non-RCRA Regulated	~~X~~ 4	D M	210 est.	G	029L
	3.					
	4.					

14. Special Handling Instructions and Additional Information
9a1) D098221DET/ Non-Hazardous Soil 9a2) D098220DET/ Non-Hazardous IDW Water
24hr Emergency Response: 1-800-424-9300 provided by Shaw E&I via contract with Chemtrec

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Robert F. Lallier Jr. — Signature: Robert F. Lallier Jr. — Month 9 Day 10 Year 09

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Raymond Root — Signature: Raymond Root — Month 09 Day 10 Year 09
Transporter 2 Printed/Typed Name: — Signature: — Month Day Year

18. Discrepancy
18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:

18b. Alternate Facility (or Generator) — U.S. EPA ID Number:
Facility's Phone:

18c. Signature of Alternate Facility (or Generator) — Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)
1. H111 2. H111 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18b
Printed/Typed Name: David Patton — Signature: — Month 09 Day 10 Year 09

GENERATOR — INT'L — TRANSPORTER — DESIGNATED FACILITY

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

EQ Detroit, Inc.

1923 FREDERICK STREET • DETROIT, MICHIGAN 48211 • tel 313-923-0080 • fax 313-923-3375 • www.eqonline.com

CERTIFICATE OF RECEIPT

This certificate is to verify that the wastes specified on manifest # 000310538FLE have been properly received at EQ Detroit and will be properly managed to meet all applicable local, state and federal standards.

FACILITY NAME:	EQ Detroit, Inc. EPA ID # MID 980991566
ADDRESS:	1923 Frederick Street Detroit, MI 48211
PHONE NUMBER:	313-923-0080 800-495-6059
FAX NUMBER:	313-923-3375

Authorized Signature: _____
On behalf of EQ Detroit, Inc.

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: O H 3 8 0 0 0 1 5 3 7 9
2. Page 1 of: 1
3. Emergency Response Phone: 1-800-424-9300
4. Manifest Tracking Number: 000310647 FLE

5. Generator's Name and Mailing Address
Nasa-Plumbrook Station
6100 Columbus Ave.
Sandusky, OH 44870
Generator's Phone: 216-642-0891

Generator's Site Address (if different than mailing address)
6100 Columbus Ave.
Sandusky, OH 44870

6. Transporter 1 Company Name: EQ Industrial Services
U.S. EPA ID Number: M I 0 0 0 0 2 6 3 8 7 1

7. Transporter 2 Company Name
U.S. EPA ID Number

8. Designated Facility Name and Site Address
Wayne Disposal, Inc.
49350 North I-94 Service Drive.
Belleville, MI 48111
Facility's Phone: 1-800-592-5489
U.S. EPA ID Number: M I D 0 4 8 0 9 0 6 3 3

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes		
X	1. NA3077, Hazardous Waste Solid, n.o.s. (2,4-Dinitrotoluene) 9, PG III	4	D M	240	P	D030		
	2.							
	3.							
	4.							

14. Special Handling Instructions and Additional Information
9a1) Approval #: L098097WDI-OTS ERG #: 171
24hr Emergency Response: 1-800-424-9300 provided by Shaw E&I via contract with Chemtrec
NASA# 09012

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Robert F. Lallier Jr.
Signature: Robert F. Lallier on behalf of Director, GKC
Month 12 Day 17 Year 09

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: DAYLE BLAIR
Signature: Dayle Blair
Month 12 Day 17 Year 09
Transporter 2 Printed/Typed Name
Signature
Month Day Year

18. Discrepancy
18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:

18b. Alternate Facility (or Generator)
U.S. EPA ID Number
Facility's Phone:

18c. Signature of Alternate Facility (or Generator)
Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)
1. 2. 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a
Printed/Typed Name
Signature
Month Day Year

GENERATOR
INT'L
TRANSPORTER
DESIGNATED FACILITY

Land Disposal Restriction & Certification Form

Please check the appropriate facility:

☐ **Michigan Disposal Waste Treatment Plant**	49350 N. I-94 Service Drive, Belleville, MI 48111	EPA ID # MID 000 724 831
☒ **Wayne Disposal, Inc. Site #2 Landfill**	49350 N. I-94 Service Drive, Belleville, MI 48111	EPA ID # MID 048 090 633
☐ **EQ Detroit, Inc.**	1923 Frederick Street, Detroit, MI 48211	EPA ID # MID 980 991 566
☐ **EQ Resource Recovery, Inc.**	36345 Van Born Road, Romulus, MI 48174	EPA ID # MID 060 975 844
☐ **EQ North Carolina**	1005 Investment Blvd, Apex, NC 27502	EPA ID # NCD 982 170 292
☐ **EQ Florida, Inc.**	7202 East 8th Ave, Tampa, FL 33619	EPA ID # FLD 981 932 494

Generator Name: Nasa - Plumbrook **U.S. EPA ID No.:** OH3800015379

Generator Address: 6100 Columbus Ave Sandusky, OH 44870

State Manifest No.: _____ **Manifest Doc. No.:** C003101047 FLE

Instructions

Column 1: Identify all U.S. EPA hazardous waste codes that apply to this waste shipment.
Column 2: Choose the appropriate treatability group: Non-Wastewater (NWW) or Wastewater (WW).
Column 3: Enter the appropriate Subcategory, if applicable. Also enter "Contaminated Soil" or "Debris" if the waste will be treated using one of the alternative treatment technologies provided by 40 CFR 268.49 (c) – soil, or 40 CFR 268.45 – debris.
Column 4: Enter the letter of the appropriate paragraph from pages 1-2 of this form.
Column 5: For F001 – F005, F039, D001 – D043, Debris and Contaminated Soil: please enter the Reference Number(s) for any constituents in your waste stream subject to treatment. The Reference Number(s) can be found in the EQ Resource Guide, LDR/UHC Constituent Table.

Manifest Line Item	U.S. EPA Hazardous Waste Code (s)	NWW or WW	Subcategory	How Must the Waste be Managed?	Reference Number(s) of Hazardous Constituents contained in the waste. Complete for F001-F005, F039, D001-D043, Soil and Debris wastes.
9a ~~11A~~	D030	NWW	—	D	D030
11B					
11C					
11D					

I hereby certify that all information submitted on this and all associated documents is complete and accurate to the best of my knowledge and information.

Generator Signature: Robert F. Lallier **Title:** Env Manager

Printed Name: Robert F. Lallier Jr. **Date:** 12/17/09

How Must the Waste Be Managed?

S. THIS CONTAMINATED SOIL *DOES* / *DOES NOT* (CIRCLE ONE) CONTAIN LISTED HAZARDOUS WASTE AND *DOES* / *DOES NOT* (CIRCLE ONE) EXHIBIT A CHARACTERISTIC OF HAZARDOUS WASTE AND *IS SUBJECT TO* / *COMPLIES WITH* (CIRCLE ONE) THE SOIL TREATMENT STANDARDS AS PROVIDED BY 268.49(c) OR THE UNIVERSAL TREATMENT STANDARDS. I certify under penalty of law that I have personally examined and am familiar with the treatment technology and operation of the treatment process used to support this certification and believe that it has been maintained and operated properly so as to comply with treatment standards specified in 40 CFR 268.49 without impermissible dilution of the prohibited wastes. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment.

000310647 FLE

Land Disposal Restriction & Certification Form

A. THIS RESTRICTED WASTE REQUIRES TREATMENT TO THE APPLICABLE STANDARD. This waste must be treated to the applicable performance based treatment standard set forth in 40CFR Part 268 Subpart C and Subpart D, 268.40 or RCRA Section 3004(d) prior to land disposal.

B. THIS HAZARDOUS DEBRIS IS SUBJECT TO THE ALTERNATIVE TREATMENT STANDARDS OF 40 CFR 268.45.

C. THIS RESTRICTED WASTE HAS BEEN TREATED TO THE PERFORMANCE STANDARDS. I certify under penalty of law that I have personally examined and am familiar with the treatment technology and operation of the treatment process used to support this certification. Based on my inquiry of those individuals immediately responsible for obtaining this information, I believe that the treatment process has been operated and maintained properly so as to comply with the treatment standards specified in 40 CFR 268.40 without impermissible dilution of the prohibited waste. I am aware there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment.

D. THIS RESTRICTED WASTE CAN BE LAND DISPOSED WITHOUT TREATMENT. I certify under penalty of law that I personally have examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in 40 CFR part 268 subpart D. I believe that the information I submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.

E. THIS LAB PACK DOES NOT CONTAIN ANY WASTES IDENTIFIED AT APPENDIX IV TO PART 268. I certify under penalty of law that I personally have examined and am familiar with the waste and that the lab pack contains only wastes that have not been excluded under appendix IV to 40 CFR part 268 and that this lab pack will be sent to a combustion facility in compliance with the alternative treatment standards for lab packs at 40 CFR 268.42(c). I am aware that there are significant penalties for submitting a false certification, including the possibility of fine or imprisonment.

F. THIS RESTRICTED WASTE HAS BEEN TREATED TO REMOVE THE HAZARDOUS CHARACTERISTIC AND CONTAINS UNDERLYING HAZARDOUS CONSTITUENTS THAT REQUIRE FURTHER TREATMENT TO MEET THE UNIVERSAL TREATMENT STANDARDS. I certify under penalty of law that the waste has been treated in accordance with the requirements of 40 CFR 268.40 or 268.49 to remove the hazardous characteristic. This decharacterized waste contains underlying hazardous constituents that require further treatment to meet treatment standards. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment.

G. THIS RESTRICTED WASTE HAS BEEN TREATED TO REMOVE THE HAZARDOUS CHARACTERISTIC AND BEEN TREATED FOR UNDERLYING HAZARDOUS CONSTITUENTS. I certify under penalty of law that the waste has been treated in accordance with the requirements of 40 CFR 268.40 to remove the hazardous characteristic and that underlying hazardous constituents, as defined in §268.2(i) have been treated on-site to meet the §268.48 Universal Treatment Standards. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment..

H. THIS RESTRICTED WASTE IS SUBJECT TO AN EXEMPTION FROM LAND DISPOSAL. *(Please include the date the waste is subject to the prohibitions in Column 5)* This waste is subject to an exemption from a prohibition on the type of land disposal method utilized for the waste (such as, but not limited to, a case-by-case extension under 40 CFR Part 268.5, an exemption under 40 CFR 268.6, or a nationwide capacity variance under 40 CFR 269 Subpart C)

I. THIS RESTRICTED WASTE WITH TREATMENT STANDARDS EXPRESSED AS CONCENTRATIONS IN THE WASTE PURSUANT TO 268.43, IF COMPLIANCE WITH THE TREATMENT STANDARDS IN SUBPART D OF THIS PART IS BASED IN PART OR IN WHOLE ON THE ANALYTICAL DETECTION LIMIT ALTERNATIVE IN 268.439(c). I certify under penalty of law that I have personally examined and am familiar with the treatment technology and operation of the treatment process used to support this certification. Based on my inquiry of those individuals immediately responsible for obtaining this information, I believe that the nonwastewater organic constituents have been treated by combustion units as specified in 268.42, Table 1. I have been unable to detect the nonwastewater organic constituents, despite having used best good-faith efforts to analyze for such constituents. I am aware there are significant penalties for submitting a false certifications, including the possibility of fine and imprisonment.

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: OH380001537 9
2. Page 1 of 1
3. Emergency Response Phone: 1-800-424-9300
4. Manifest Tracking Number: 000310535 FLE

5. Generator's Name and Mailing Address
Nasa-Plumbrook Station
6100 Columbus Ave.
Sandusky, OH 44870
Generator's Phone: 216-642-0891

Generator's Site Address (if different than mailing address)
6100 Columbus Ave.
Sandusky, OH 44870

6. Transporter 1 Company Name: EQ Industrial Services
U.S. EPA ID Number: MI0000263871

7. Transporter 2 Company Name:
U.S. EPA ID Number:

8. Designated Facility Name and Site Address
EQ Detroit Inc.
1923 Frederick
Detroit, MI 48211
Facility's Phone: 313-347-1300
U.S. EPA ID Number: MID980991566

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
	1. UN, Non-DOT Hazardous, Non-RCRA Regulated Liquids	7	DM	300	G	029L
	2. UN, Non-DOT Hazardous, Non-RCRA Regulated Solids	1	DM	200	P	
	3.					
	4.					

14. Special Handling Instructions and Additional Information
NASA # N09103
9a1) D098220DET/Non-Hazardous IDW Water 9a2) D098221DET/Non-Hazardous Soil
24hr Emergency Response: 1-800-424-9300 provided by Shaw E&I via contract with Chemtrec

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Robert F. Lallier Jr. Signature: Robert F. Lallier on behalf of Director GRC Month 12 Day 17 Year 09

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: DAVE BLAIR Signature: Dave Blair Month 12 Day 17 Year 09
Transporter 2 Printed/Typed Name: Signature: Month Day Year

18. Discrepancy
18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
18b. Alternate Facility (or Generator) U.S. EPA ID Number
Facility's Phone:
18c. Signature of Alternate Facility (or Generator) Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)
1. 2. 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a
Printed/Typed Name Signature Month Day Year

GENERATOR INT'L TRANSPORTER DESIGNATED FACILITY

APPENDIX G

DATA VALIDATION SUMMARIES

Data Validation Summary Report
Powerhouse 2 Ash Pits Sampling January – November 2009
Former Plum Brook Ordnance Works
Sandusky, Ohio

1.0 Introduction

Level IV data validation was performed on 100 percent of the environmental samples collected for the January 2009 through November 2009 sampling events. The analytical data consisted of nine sample delivery groups (0901026, 0901027, 0902003, F65476, F65479, F65480, F69338, F69502 and F69607), which were analyzed by AML Scientific of Olathe, Kansas and Accutest of Orlando, Florida. In addition, validation of the field-split data, four SDGs (A9A170114, A9B030206, A9E270266 and A9K190539), which were analyzed by Test America of North Canton, Ohio, was performed and findings are discussed in section 5.0 of this report. Water and soil matrices were validated.

The following samples were validated for this investigation:

SDG Number	Sample Number
0901026	AP0100, AP0101, AP0102, AP0103, AP0104, AP0105, AP0107, AP0114, AP0115, AP0116, AP0117, AP0118, AP0119, AP0120, AP0121, AP0123, AP0124, AP0125, AP0126, AP0127, AP0128
0901027	AP0108, AP0109, AP0110, AP0111, AP0112, AP0113
0902003	AP3015, AP3018, AP3019, AP3022
F65476	AP1000, AP1001, AP1002, AP1003, AP1004, AP1006
F65479	AP2000, AP2001, AP2002, AP2003, AP2005, AP2006
F65480	AP3063, AP3064, AP3065, AP3057, AP3058, AP3059, AP3061
F69338	AP3070
F69502	AP3076
F69607	AP3079, AP3080, AP3081
A9A170114	AP0106, AP0122, AP0129
A9B030206	AP3016
A9E270266	AP1005, AP3066, AP3060, AP2004
A9K190539	AP3082

The chemical parameters, for which the samples were analyzed, are identified below:

Parameter (Prep/Analytical Method)
Volatile Organics by GC/MS SW846 5030/8260B
Semivolatile Organics by GC/MS SW846 3510C/8270C
Total and Dissolved Metals by SW846 3005A/6010B and 7470A/7471
Nitroaromatic and Nitramine Explosives by SW846 8330M
PCBs by SW846 8082
Wet Chemistry (TOC, Sulfate, Nitrate, Chloride, Alkalinity, Turbidity, TDS, TSS, Hardness, Cyanide)

GC/MS – Gas chromatography/mass spectrometry.
TDS - Total dissolved solids.
TOC - Total organic carbon.
TSS – Total suspended solids.

2.0 Procedures

The sample data were validated following the logic identified in the EPA Contract Laboratory Program (CLP) National Functional Guidelines for Inorganic Data Review (October 2004) and the EPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008) for all areas except blanks. EPA Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses (April 1993) and Region III Modifications to National Functional Guidelines for Organic Data Review, Multi-Media, Multi-Concentration (September 1994) were applied to the areas associated with blank contamination. Specific quality control (QC) criteria as identified in the quality assurance plan (QAP), analytical methods, and laboratory standard operating procedures (SOP) were applied to all sample results. As a result of the use of Update III SW846 test methods for the analytical data and the application of the Contract Laboratory Program (CLP) guidelines during the validation process, there were instances where the specific QC requirements for all target compounds were not defined. This primarily occurred in the organic, GC/MS calibration areas and is due to the fact that the analytical methods are performance-based and allow the use of average calibration responses in lieu of individual responses, which are defined by CLP protocol. In light of applying CLP guidelines to SW846 methods and evaluating the usability of the data during the validation process, specific QC criteria were determined to address all target compounds and are identified in this report for each parameter, as well as in the validation checklists, which function as worksheets. For those analytical methods not addressed by the CLP and Region III guidelines, the validation was based on the method requirements (i.e., SW846, Code of Federal Regulations, SOPs) and technical judgment, following the logic of the CLP validation guidelines. Lab-specific criteria may be found in Attachment A.

3.0 Summary of Data Validation Findings

The overall quality of the data was determined to be acceptable with minimal qualifications. The only rejected volatile organic data ("R" qualified) was due to "poor performing" volatile compounds (ketones, some halogenated hydrocarbons, etc.), which experienced poor calibration responses in the associated calibration data. For the Explosive analysis, surrogate recoveries for samples AP0114 and AP0125 and the MS/MSD recoveries for sample AP3079 for Tetryl resulted in those data being rejected. The poor recoveries appear to be associated with matrix interference. Reanalysis of these samples yield the same results. The "R" qualifier was assigned to the samples with more than one set of results to indicate that a given result should not be used to characterize a particular constituent or an analysis for a given sample.

Individual validation reports have been prepared for each parameter, and the overall results of the validation findings are summarized in this report. A listing of the validation qualifiers and the reason codes, along with their definitions, is found in Attachment A. The following section highlights the key findings of the data validation for each analysis.

4.0 Analysis-Specific Data Validation Summaries

4.1 Volatile Organics by GC/MS SW846 8260B

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Holding Times
Technical holding time criteria were met for all samples.

Initial and Continuing Calibration
The initial calibration (ICAL) and continuing calibrations (CCAL) associated with the project samples met QC criteria with the following exception(s):

- The following exhibited individual ICAL/CCAL relative response factor (RRF) <0.1:

SDG Number	Samples Affected	Compound(s)	Validation Qualifier
F65480	AP3057, AP3058, AP3059, AP3061, AP3063, AP3064, AP3065	Acetone	R
F69338	AP3070	Acetone	R

Blanks
The 5X/10X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable with the following exception(s):

SDG Number	Samples Affected	Compounds	Blank Contaminant	Validation Qualifier
F69607	AP3079, AP3080, AP3081	Chloroform	Equipment	B
	AP3080	Methylene Chloride	Trip	B
	AP3081	Carbon Disulfide	Equipment	B

Surrogate Recoveries
All surrogate recoveries were within QC limits.

Matrix Spike/Matrix Spike Duplicate
Matrix Spike/Matrix Spike Duplicate (MS/MSD) analysis was performed for the project samples, and all QC criteria were met with the following exception(s):

SDG Number	Samples Affected	Compound(s)	Validation Qualifier
F65480	AP3064	Cis-1,3-Dichloropropene, trans-1,3-Dichloropropene	UJ
F69607	AP3079	trans-1,3-Dichloropropene, Methyl bromide, Methyl chloride, Vinyl chloride	J/UJ

Laboratory Control Sample
Laboratory Control Sample (LCS) analysis was performed for the project samples and all QC criteria were met.

Field Duplicates
Original and field duplicate results were evaluated and no problems were identified with the following exception(s):

SDG	Samples Affected	Compound(s)	Validation Qualifier
F69607	AP3079(original), AP3081(FD)	Chloroform, Chloromethane, Acetone, Benzene, Ethylbenzene, Toluene, Xylene (total)	J

Internal Standards
All internal standards met QC criteria.

Quantitation
Results quantitated between the method detection limit (MDL) and the reporting limit (RL), which the lab qualified as "J", were qualified as estimated "J" unless blank contamination was present or the results were rejected.

4.2 Semivolatile Organics by GC/MS SW846 8270C
Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following;

Holding Times
Technical holding time criteria were met for all samples, with the following exception(s):

SDG Number	Samples Affected	Analysis	Validation Qualifier
F65480	AP3057	Semivolatiles	UJ

Initial and Continuing Calibration
The initial calibration (ICAL) and continuing calibrations (CCAL) associated with the project samples met QC criteria with the following exception(s):

The following exhibited individual ICAL percent relative standard deviation > 30% and/or CCAL percent difference > 20%:

SDG Number	Samples Affected	Compound(s)	Validation Qualifier
0901026	AP0102, AP0104, AP0107, AP0116, AP0119, AP0121, AP0123, AP0124, AP0127, AP0128	Benzoic Acid	UJ
	AP0105, AP0114, AP0115,	2,4-Dinitrophenol	UJ
0902003	AP3015, AP3018, AP3019, AP3022	Hexachlorocyclopentadiene	UJ
F65476	AP1002, AP1003, AP1004, AP1006	2,4-Dinitrophenol	UJ

Blanks
The 5X/10X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Surrogate Recoveries
All surrogate recoveries were within QC limits.

Matrix Spike/Matrix Spike Duplicate
Matrix Spike/Matrix Spike Duplicate (MS/MSD) analysis was performed for the project samples, and all QC criteria were met with the following exception(s):

SDG Number	Samples Affected	Compound(s)	Validation Qualifier
0901026	AP1000	Hexachlorocyclopentadiene*	UJ

*Hexachlorocyclopentadiene was qualified for %RPD outside QC limits for the MS/MSD analysis.

Laboratory Control Sample
Laboratory Control Sample (LCS) analysis was performed for the project samples and all QC criteria were met.

Field Duplicates
Original and field duplicate results were evaluated and no problems were identified with the following exception(s):

SDG	Samples Affected	Compound(s)	Validation Qualifier
F65480	AP3064(original), AP3065(FD)	2-Methylnaphthalene, Naphthalene	J

Internal Standards
All internal standards met QC criteria.

Quantitation
Results quantitated between the method detection limit (MDL) and the reporting limit (RL), which the lab qualified as "J", were qualified as estimated "J" unless blank contamination was present or the results were rejected.

4.3 Total and Dissolved Metals by SW846 6010B/7470A/7471
Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following;

Holding Times
Technical holding time criteria were met for all samples.

Initial and Continuing Calibration
The initial calibration (ICAL) and continuing calibrations (CCAL) associated with the project samples met QC criteria.

Blanks

The 5X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable, with the following exception(s):

SDG Number	Samples Affected	Analytes	Blank Contaminant	Validation Qualifier
F65480	AP3057, AP3063	Pb (Filtered)	Equipment	B
	AP3061, AP3064, AP3065	Se (Total)	Equipment	B
F69338	AP3070, AP3071, AP3072	Pb (Total)	Method	B
	AP3070, AP3072, AP3073	Zn (Total)	Method	B
F69607	AP3081	Pb (Total)	Equipment	B
	AP3079, AP3080, AP3081	Al (Filtered)	Equipment	B

Matrix Spike/Matrix Spike Duplicate

Matrix Spike/Matrix Spike Duplicate (MS/MSD) analysis was performed for the project samples, and all QC criteria were met with the following exception(s):

SDG Number	Samples Affected	Analyte(s)	Validation Qualifier
0901026	AP0100, AP0101, AP0102, AP0117, AP0118, AP0120, AP0121, AP0123	(Total) Al, Cu, Fe, Mg	J/UJ
	AP0103, AP0104, AP0105, AP0107, AP0114, AP0115, AP0116, AP0119, AP0124, AP0125, AP0126, AP0127, AP0128	(Total) Al, Ba, Co*, Cu, Mg	J/UJ
0901027	AP0108, AP0109, AP0110, AP0111, AP0112, AP0113	(Total) As, Ba*, Co*, Mg, Ni, Se, Ag*	J/UJ
F65480	AP3064	Se (Total and Filtered), Mg (Filtered)	B/J
F69607	AP3079, AP3080, AP3081	Se (Total and Filtered)	J

*Analytes were qualified for %RPD outside QC limits for the MS/MSD analysis.

Laboratory Duplicate Sample Analysis

A Laboratory Duplicate Sample analysis was performed for the project samples, and all QC criteria were met with the following exception(s):

SDG Number	Samples Affected	Analyte(s)	Validation Qualifier
F65476	AP1001, AP1002, AP1003, AP1004, AP1006	(Total) Hg	J
	AP1002	(Total) Sb, Zn, As, Ba, Ca, Fe, Mg, Mn, K, Ag, Na	J
F65479	AP2005	(Total) Al, Co, V	J
F65480	AP3064	Se (Total and Filtered)	B/J
F69338	AP3070, AP3071, AP3072	(Total) Lead	B
	AP3071, AP3072	(Total) Selenium	J
F69607	AP3079, AP3080, AP3081	Se (Total and Filtered), V (Total)	J/UJ

Laboratory Control Sample

Laboratory Control Sample (LCS) analysis was performed for the project samples and all QC criteria were met.

Interference Check Sample

All Interference Check Sample (ICS) percent recoveries were met the following exception(s):

SDG	Samples Affected	Compound(s)	Validation Qualifier
F69607	AP3079, AP3080, AP3081	Ca (Filtered)	J

Inductively Coupled Plasma Serial Dilutions

All QC criteria were met for the serial dilutions associated with the project samples with the following exception(s):

SDG	Samples Affected	Compound(s)	Validation Qualifier
0901026	AP0100	(Total) Al, Fe, Mg, Ba, Ca, Mn, Ni, K	J
	AP0103, AP0104, AP0105, AP0107, AP0114, AP0115, AP0116, AP0119, AP0124, AP0125, AP0126, AP0127, AP0128	(Total) Be, Fe	J
0901027	Total: AP0108, AP0109, AP0110, AP0111, AP0112, AP0113	Ba, Co, Mg, Ni, Be, Ca, Cr, Pb, Zn	J
F65476	AP1002	(Total) Ca, Fe, Mg, Mn, Cr, Co, Pb, Ni, V, Zn	J
F65479	AP2005	(Total) Al	J
F69607	AP3079, AP3080, AP3081	Ca (Total and Filtered), Na (Total), Mg, K (Filtered)	J

Field Duplicates

Original and field duplicate results were evaluated and no problems were identified with the following exception(s):

SDG	Samples Affected	Compound(s)	Validation Qualifier
0901026	AP0104(original), AP0105(FD)	(Total) Magnesium, Arsenic, Manganese	J
0902003	AP3022(original), AP3015(FD)	(Total) Aluminum, Iron	J
F65476	AP1003(original), AP1004(FD)	(Total) Se, Pb	J

SDG	Samples Affected	Compound(s)	Validation Qualifier
F65480	AP3064(original), AP3065(FD)	(Total) Se	J
F69607	AP3079(original), AP3081(FD)	(Filtered) Se	J

Quantitation
Results quantitated between the method detection limit (MDL) and the reporting limit (RL), which the lab qualified as "B", were qualified as estimated "J" unless blank contamination was present or the results were rejected.

4.4 Nitroaromatic and Nitroamine Explosives by SW846 8330
Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following;

Holding Times
Technical holding time criteria were met for all samples.

Initial and Continuing Calibration
The initial calibration (ICAL) and continuing calibrations (CCAL) associated with the project samples met QC criteria.

Blanks
The 5X/10X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Surrogate Recoveries
All surrogate recoveries were within QC limits, with the following exceptions:

SDG Number	Samples Affected	Surrogate	Validation Qualifier
0901026	AP0103, AP0114, AP0117, AP0125	1-Chloro-3-nitrobenzene	UJ/R
0901027	AP0111	1-Chloro-3-nitrobenzene	UJ
F69338	AP3073	1-Chloro-3-nitrobenzene	UJ

Matrix Spike/Matrix Spike Duplicate
Matrix Spike/Matrix Spike Duplicate (MS/MSD) analysis was performed for the project samples, and all QC criteria were met with the following exception(s):

SDG Number	Samples Affected	Compound(s)	Validation Qualifier
0901026	AP1000	4-Amino-2,6-dinitrotoluene, 2-Amino-4,6-dinitrotoluene, 1,3-Dinitrobenzene, 2,4-Dinitrotoluene, 3-Nitrotoluene	UJ
	AP0117	4-Amino-2,6-dinitrotoluene, 2-Amino-4,6-dinitrotoluene, 1,3-Dinitrobenzene, 2,4-Dinitrotoluene, Nitrobenzene, 2- Nitrobenzene, 3- Nitrobenzene, 4- Nitrobenzene,	UJ

		1,3,5-Trinitrobenzene	
	AP0127	2-Amino-4,6-dinitrotoluene, 2,4-Dinitrotoluene, 1,3,5-Trinitrobenzene, 2,4,6-Trinitrotoluene	UJ
F65476	AP1002	2-Amino-4,6-dinitrotoluene	UJ
F65479	AP2005	4-Amino-2,6-dinitrotoluene	UJ
F65480	AP3064	Tetryl, 1,3,5-Trinitrobenzene, 2,4,6-Trinitrotoluene	UJ
F69607	AP3079	Tetryl	R

Laboratory Control Sample
Laboratory Control Sample (LCS) analysis was performed for the project samples and all QC criteria were met.

Field Duplicates
Original and field duplicate results were evaluated and no problems were identified.

Quantitation
Results quantitated between the method detection limit (MDL) and the reporting limit (RL), which the lab qualified as "J", were qualified as estimated "J" unless blank contamination was present or the results were rejected.

4.5 Polychlorinated Biphenyls (PCBs) by SW846 8082
Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following;

Holding Times
Technical holding time criteria were met for all samples.

Initial and Continuing Calibration
The initial calibration (ICAL) and continuing calibrations (CCAL) associated with the project samples met QC criteria.

Blanks
The 5X/10X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Surrogate Recoveries
All surrogate recoveries were within QC limits, with the following exceptions.

SDG Number	Samples Affected	Surrogate	Validation Qualifier
0901026	AP0125	DCB	UJ

Matrix Spike/Matrix Spike Duplicate
Matrix Spike/Matrix Spike Duplicate (MS/MSD) analysis was performed for the project samples, and all QC criteria were met.

Laboratory Control Sample
Laboratory Control Sample (LCS) analysis was performed for the project samples and all QC criteria were met.

Field Duplicates
Original and field duplicate results were evaluated and no problems were identified.

Second Column Confirmation
Samples having analytes with positive detects were verified on a second confirmation column; QC criteria (40% RPD) were met with the following exception(s):

SDG Number	Samples Affected	Analyte	Validation Qualifier
0901026	AP0103	Aroclor 1016	J
0901027	AP0108	Aroclor 1260	J

Quantitation
Results quantitated between the method detection limit (MDL) and the reporting limit (RL), which the lab qualified as "J", were qualified as estimated "J" unless blank contamination was present or the results were rejected.

4.6 Wet Chemistry (TOC, Sulfate, Nitrate, Chloride, Alkalinity, Turbidity, TDS, TSS, Hardness, Cyanide

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Preservation
Preservation criteria were met for all samples.

Holding Times
Technical holding time criteria were met for all samples with the following exception(s):

SDG Number	Samples Affected	Analysis	Validation Qualifier
0902003	AP3018, AP3019	Turbidity	J
F65480	AP3057, AP3058, AP3059, AP3061, AP3063, AP3064, AP3065	Turbidity	J/UJ

Initial and Continuing Calibration
All initial and continuing calibrations associated with the project samples met QC criteria.

Blanks
The 5X rule for contaminants found in the associated equipment rinses and method blanks was applied to all sample results. All were found acceptable with the following exception(s):

SDG Number	Samples Affected	Compounds	Blank Contaminant	Validation Qualifier
F69607	AP3080, AP3081	Nitrate-Nitrite	Equipment	B

Matrix Spike/Matrix Spike Duplicate

MS/MSD analysis was performed for the project samples, and all QC criteria were met with the following exception(s):

SDG Number	Samples Affected	Analytes(s)	Validation Qualifier
0902003	AP3015, AP3018, AP3019, AP3022	Chloride, Nitrate-Nitrite	J/UJ
F65480	AP3057, AP3058, AP3059, AP3061, AP3063, AP3064, AP3065,	Cyanide	J/UJ
	AP3064	Alkalinity	J
F69338	AP3070, AP3071, AP3073	Nitrate-Nitrite, Sulfate	J/UJ
F69607	AP3079, AP3080, AP3081	Alkalinity, Cyanide	J/UJ

Laboratory Duplicate Sample Analysis

A Laboratory Duplicate Sample analysis was performed for the project samples, and all QC criteria were met with the following exception(s):

SDG Number	Samples Affected	Analytes(s)	Validation Qualifier
F65480	AP3057, AP3058, AP3059, AP3061, AP3063, AP3064, AP3065	TDS	J
F69607	AP3079, AP3080, AP3081	TDS, TSS	J/UJ

Laboratory Control Sample

LCS analysis was performed for the project samples, and all QC criteria were met.

Field Duplicates

Original and field duplicate results were evaluated and no problems were identified with the following exception(s):

SDG	Samples Affected	Compound(s)	Validation Qualifier
F69607	AP3079(original), AP3081(FD)	Chloride, Nitrate-Nitrite, Sulfate, Turbidity	J

Quantitation

Results quantified between the MDL and RL which the lab qualified as "J", were qualified as estimated "J" unless blank contamination was present or the results were rejected.

5.0 Quality Assurance Field Split Sample Data Evaluation

Data from the quality assurance split samples, (SDGs: A9A170114, A9B030206, A9E270266 and A9K190539), were validated. The field split (FS) samples were analyzed for Volatiles by SW846 8260B, Semivolatiles by SW846 8270C, Explosives by SW846 8330, Polychlorinated Biphenyls (PCBs) by SW846 8280, Total and Dissolved Metals by SW 846 6010B and 7471A, and Wet Chemistry Analyses (TOC, Sulfate, Nitrate, Chloride, Alkalinity, Turbidity, TDS, TSS, Hardness, Cyanide). The following section highlights the key findings of the data validation for each analysis.

The following samples were validated for this site investigation:

SDG Number	Sample Number
A9A170114	AP0106, AP0122, AP0129
A9B030206	AP3016
A9E270266	AP1005, AP3066, AP3060, AP2004
A9K190539	AP3082

5.1 Volatile Organics by GC/MS SW846 8260B

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Holding Times

Technical holding time criteria were met for all samples.

Initial and Continuing Calibration

The initial calibration (ICAL) and continuing calibrations (CCAL) associated with the project samples met QC criteria with the following exception(s):

- The following exhibited individual ICAL/CCAL relative response factor (RRF) <0.1:

SDG Number	Samples Affected	Compound(s)	Validation Qualifier
A9E270266	AP3060, AP3066	2-Butanone, Chloroethane, 1,2-Dibromo-3-chloropropane	R

The following exhibited individual ICAL percent relative standard deviation > 30% and/or CCAL percent difference > 20%:

SDG Number	Samples Affected	Compound(s)	Validation Qualifier
A9E270266	AP3060, AP3066	2-Butanone, Chloroethane, Acetone, Chloromethane, 4-Methyl-2-pentanone	UJ/R
A9K190539	AP3082	Bromoform, 1,2-Dibromo-3-chloropropane, cis-1,3-Dichloropropene, trans-1,3-Dichloropropene	UJ

Blanks
The 5X/10X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Surrogate Recoveries
All surrogate recoveries were within QC limits.

Matrix Spike/Matrix Spike Duplicate
Matrix Spike/Matrix Spike Duplicate (MS/MSD) analysis was performed for the project samples, and all QC criteria were met.

Laboratory Control Sample
Laboratory Control Sample (LCS) analysis was performed for the project samples and all QC criteria were met.

Internal Standards
All internal standards met QC criteria.

Field Split/Original Sample Comparison
Table 2 shows the Regular/Field Duplicate/Field Split comparison of the data. A Relative Percent Difference is calculated for the analytes that were positive detects. Volatile analysis was performed on the field splits listed below.

Sample/FD/FS
AP3058 (Original) / AP3059 (FD) / AP3060(FS)
AP3064 (Original) / AP3065 (FD) / AP3066(FS)
AP3079 (Original) / AP3081 (FD) / AP3082(FS)

Quantitation
Results quantitated between the MDL and the RL, which the lab qualified as "J", were qualified as estimated "J" unless blank contamination was present or the results were rejected.

5.2 Semivolatile Organics by GC/MS SW846 8270C

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following;

Holding Times
Technical holding time criteria were met for all samples.

Initial and Continuing Calibration
The initial calibration (ICAL) and continuing calibrations (CCAL) associated with the project samples met QC criteria with the following exception(s):

The following exhibited individual ICAL percent relative standard deviation > 30% and/or CCAL percent difference > 20%:

SDG Number	Samples Affected	Compound(s)	Validation Qualifier
A9B030206	AP3016	Bis(2-Chloroethyl)ether	UJ

Blanks
The 5X/10X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Surrogate Recoveries
All surrogate recoveries were within QC limits.

Matrix Spike/Matrix Spike Duplicate
Matrix Spike/Matrix Spike Duplicate (MS/MSD) analysis was performed for the project samples, and all QC criteria were met.

Laboratory Control Sample
Laboratory Control Sample (LCS) analysis was performed for the project samples and all QC criteria were met.

Internal Standards
All internal standards met QC criteria.

Field Splits
The following table lists the Original/Field Duplicate/Field Split samples that were analyzed for semivolatiles. All analytes were non-detect in the field split samples; Naphthalene and 2-Methylnaphthalene were detected in original samples AP3064 and AP3079 at values less than the reporting limit.

Sample/FD/FS
AP0104 (Original) / AP0105 (FD) / AP0106 (FS)
AP0120 (Original) / AP0121 (FD) / AP0122 (FS)
AP0127 (Original) / AP0128 (FD) / AP0129 (FS)
AP3022 (Original) / AP3015 (FD / AP3016 (FS)
AP1003 (Original) / AP1004 (FD) / AP1005 (FS)
AP2002 (Original) / AP2003 (FD) / AP2004 (FS)
AP3058 (Original) / AP3059 (FD) / AP3060 (FS)
AP3064 (Original) / AP3065 (FD / AP3066 (FS)
AP3079 (Original / AP3081 (FD) / AP3082 (FS)

Quantitation
Results quantitated between the method detection limit (MDL) and the reporting limit (RL), which the lab qualified as "J", were qualified as estimated "J" unless blank contamination was present or the results were rejected.

5.3 Total and Dissolved Metals by SW846 6010B/7470A/7471

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following;

Holding Times
Technical holding time criteria were met for all samples.

Initial and Continuing Calibration
The initial calibration (ICAL) and continuing calibrations (CCAL) associated with the project samples met QC criteria with the following exception(s):

The following exhibited individual ICAL percent relative standard deviation > 10% and/or CCAL percent difference > 10% (±20% for mercury):

SDG Number	Samples Affected	Compound(s)	Validation Qualifier
A9E270266	AP2004 (Total), AP3060 (Filtered)	Magnesium	J

Blanks
The 5X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Matrix Spike/Matrix Spike Duplicate
Matrix Spike/Matrix Spike Duplicate (MS/MSD) analysis was performed for the project samples, and all QC criteria were met with the following exception(s):

SDG Number	Samples Affected	Analyte(s)	Validation Qualifier
A9E270266	AP1005	Sb*	UJ

*Analyte was qualified for %RPD outside QC limits for the MS/MSD analysis.

Laboratory Control Sample
Laboratory Control Sample (LCS) analysis was performed for the project samples and all QC criteria were met.

Interference Check Sample
All Interference Check Sample (ICS) percent recoveries were acceptable. All QC criteria were met.

Inductively Coupled Plasma Serial Dilutions
All QC criteria were met for the serial dilutions associated with the project samples with the following exception(s):

SDG	Samples Affected	Compound(s)	Validation Qualifier
A9A170114	AP0106, AP0122, AP0129	(Total) Ca, K	J

Field Splits
Table 2 shows the Regular/Field Duplicate/Field Split comparison of the data. A Relative Percent Difference is calculated for the analytes that were positive detects. The samples (Original/FD/FS) that had a metal analysis performed are listed below:

Sample/FD/FS
AP0104 (Original) / AP0105 (FD) / AP0106 (FS)
AP0120 (Original) / AP0121 (FD) / AP0122 (FS)
AP0127 (Original) / AP0128 (FD) / AP0129 (FS)
AP3022 (Original) / AP3015 (FD / AP3016 (FS)
AP1003 (Original) / AP1004 (FD) / AP1005 (FS)
AP2002 (Original) / AP2003 (FD) / AP2004 (FS)
AP3058 (Original) / AP3059 (FD) / AP3060 (FS)
AP3064 (Original) / AP3065 (FD / AP3066 (FS)
AP3079 (Original / AP3081 (FD) / AP3082 (FS)

Quantitation
Results quantitated between the method detection limit (MDL) and the reporting limit (RL), which the lab qualified as "B", were qualified as estimated "J" unless blank contamination was present or the results were rejected.

5.4 Nitroaromatic and Nitroamine Explosives by SW846 8330

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following;

Holding Times
Technical holding time criteria were met for all samples.

Initial and Continuing Calibration
The initial calibration (ICAL) and continuing calibrations (CCAL) associated with the project samples met QC criteria.

Blanks
The 5X/10X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Surrogate Recoveries
All surrogate recoveries were within QC limits.

Matrix Spike/Matrix Spike Duplicate
Matrix Spike/Matrix Spike Duplicate (MS/MSD) analysis was performed for the project samples, and all QC criteria were met.

Laboratory Control Sample
Laboratory Control Sample (LCS) analysis was performed for the project samples and all QC criteria were met.

Field Splits
Original and field split results were evaluated and no problems were identified. All analytes were non-detect in the original and field split samples. Explosives by SW846 8330 analysis was performed on the original and field split samples listed below.

Original/Field Split Pair
AP0104 (Original) / AP0106 (FS)
AP0120 (Original) / AP0122 (FS)
AP0127 (Original) / AP0129 (FS)
AP3022 (Original) / AP3016 (FS)
AP1003 (Original) / AP1005 (FS)
AP2002 (Original) / AP2004 (FS)
AP3058 (Original) / AP3060 (FS)
AP3064 (Original) / AP3066 (FS)
AP3079 (Original) / AP3082 (FS)

Quantitation
Results quantitated between the method detection limit (MDL) and the reporting limit (RL), which the lab qualified as "J", were qualified as estimated "J" unless blank contamination was present or the results were rejected.

5.5 Polychlorinated Biphenyls (PCBs) by SW846 8082

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following;

Holding Times
Technical holding time criteria were met for all samples.

Initial and Continuing Calibration
The initial calibration (ICAL) and continuing calibrations (CCAL) associated with the project samples met QC criteria.

Blanks
The 5X/10X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Surrogate Recoveries
All surrogate recoveries were within QC limits.

Matrix Spike/Matrix Spike Duplicate
Matrix Spike/Matrix Spike Duplicate (MS/MSD) analysis was performed for the project samples, and all QC criteria were met.

Laboratory Control Sample
Laboratory Control Sample (LCS) analysis was performed for the project samples and all QC criteria were met.

Second Column Confirmation
Samples having analytes with positive detects were verified on a second confirmation column; QC criteria (40% RPD) were met.

Field Splits
Original and field split results were evaluated and no problems were identified. All analytes were non-detect in the original and field split samples. A PCB analysis was performed on the original and field split samples listed below.

Original/Field Split Pair
AP0104 (Original) / AP0106 (FS)
AP0120 (Original) / AP0122 (FS)
AP1003 (Original) / AP1005 (FS)
AP2002 (Original) / AP2004 (FS)
AP3058 (Original) / AP3060 (FS)
AP3064 (Original) / AP3066 (FS)

Quantitation
Results quantitated between the method detection limit (MDL) and the reporting limit (RL), which the lab qualified as "J", were qualified as estimated "J" unless blank contamination was present or the results were rejected.

5.6 Wet Chemistry (TOC, Sulfate, Nitrate, Chloride, Alkalinity, Turbidity, TDS, TSS, Hardness, Cyanide

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Preservation
Preservation criteria were met for all samples.

Holding Times
Technical holding time criteria were met for all samples with the following exception(s):

SDG Number	Samples Affected	Analysis	Validation Qualifier
A9K190539	AP3082(FS)	Nitrate	UJ

Initial and Continuing Calibration
All initial and continuing calibrations associated with the project samples met QC criteria.

Blanks
The 5X rule for contaminants found in the associated equipment rinses and method blanks was applied to all sample results. All were found acceptable.

Matrix Spike/Matrix Spike Duplicate
MS/MSD analysis was performed for the project samples, and all QC criteria were met.

Laboratory Control Sample
LCS analysis was performed for the project samples, and all QC criteria were met.

Field Splits
The original, field duplicate and field splits are listed in the below. Table 2 shows the comparison for original, field duplicate and field split samples that has positive detects.

Sample/FD/FS
AP3022 (Original) / AP3015 (FD / AP3016 (FS)
AP3058 (Original) / AP3059 (FD) / AP3060(FS)
AP3064 (Original) / AP3065 (FD / AP3066(FS)
AP3079 (Original / AP3081 (FD) / AP3082(FS)

Quantitation
Results quantified between the MDL and RL which the lab qualified as "J", were qualified as estimated "J" unless blank contamination was present or the results were rejected.

Laboratory and Validation Qualifier Definitions
Former Plum Brook Ordnance Works
Sandusky, Ohio

Qualifier	Definition
Laboratory	
B (metals)	The analyte was detected; the concentration is below the reporting limit.
B (organics)	Indicates analyte is found in associated method blank.
J (metals)	The compound was detected in the blank.
J (organics)	The compound was positively identified; the reported value is below the reporting limit.
U	Not detected. The compound was analyzed for, but not detected above the associated reporting limit.
E	Indicates that the result is above the maximum calibration range.
N	Indicates presumptive evidence of a compound.
P	RPD > 40% between the primary and confirmation column results for dual column chromatographic method (e.g. GC and HPLC methods).
*	Exceeds QC limit.
Q1	The %D or %Drift for the associated CCV is outside the method QC limit.
ME	Marginal Exceedence of the 3-sigma QC limits.
ME*	Exceedence of the 4-sigma QC limits.
Validation	
B	The compound/analyte was detected in a lab or field blank.
J	The compound/analyte was positively identified; the reported value is an estimated concentration.
U	Not detected. The compound/analyte was analyzed for, but not detected above the associated reporting limit.
UJ	The analyte is not detected; the result is an estimated value.
R	Analyte is rejected.

Summary of Data Validation Reason Codes
Former Plum Brook Ordnance Works
Sandusky, Ohio

Reason Code	Description
01	Sample received outside of 4+/-2 degrees Celsius
01A	Improper sample preservation
02	Holding Time Exceeded
02A	Extraction
02B	Analysis
03	Instrument Performance - Outside Criteria
03A	BFB
03B	DFTPP
03C	DDT and/or Endrin % breakdown exceeds criteria
03D	retention time windows
03E	Resolution
04	Initial Calibration results outside specified criteria
04A	Compound mean RRF<0.05
04B	Compound %RSD>30
04C	Correlation Coefficient<0.995
05	Continuing Calibration results outside specified criteria
05A	Compound mean RRF<0.05
05B	Compound %D>25
06	Result qualified as a result of the 5x/10x blank correction
06A	Method or Preparation Blank
06B	ICB or CCB
06C	ER
06D	TB
06E	FB
07	Surrogate Recoveries outside control limits
07A	Sample
07B	Associated method blank or LCS
08	MS/MSD/Duplicate results outside criteria
08A	MS and/or MSD recovery not within control limits (accuracy)
08B	%RPD outside acceptance criteria (precision)
09	Post Digestion Spike outside criteria (GFAA)
10	Internal Standards outside specified control limits
10A	Recovery
10B	Retention Time
11	Laboratory Control Sample recoveries outside specified control limits
11A	Recovery
11B	%RPD (if run in duplicate)
12	Interference Check Standard
13	Serial Dilution
14	Tentatively Identified Compounds
15	Quantitation
16	Multiple results available; alternate analysis preferred
17	Field duplicate RPD criteria exceeded
18	Percent difference between original and second column > 25%
19	Professional judgement was used to qualify the data
20	Pesticide clean-up checks
21	Target compound identification
22	Radiological calibration
23	Radiological quantitation
24	Reported result and/or lab qualifier revised to reflect validation findings
999	See hard copy for details.

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works

Spiked Compound	Accutest			AML Scientific, LLC			Test America		
	Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
Volatile Organic Compounds, SW846 8260B									
Acetone	61 - 144	61 - 144	29	20 - 160	20 - 160	30	N/A	N/A	N/A
Acrolein	N/A	N/A	N/A	64 - 130	64 - 130	30	N/A	N/A	N/A
Acrylonitrile	N/A	N/A	N/A	72 - 129	72 - 129	30	N/A	N/A	N/A
Benzene	78 - 130	78 - 130	25	75 - 125	75 - 125	30	75 - 129	75 - 129	N/A
Bromobenzene	N/A	N/A	N/A	65 - 120	65 - 120	30	N/A	N/A	N/A
Bromochloromethane	N/A	N/A	N/A	70 - 125	70 - 125	30	N/A	N/A	N/A
Bromodichloromethane	73 - 122	73 - 122	25	70 - 130	70 - 130	30	N/A	N/A	N/A
Bromoform	70 - 139	70 - 139	26	55 - 135	55 - 135	30	N/A	N/A	N/A
Bromomethane	N/A	N/A	N/A	30 - 160	30 - 160	30	N/A	N/A	N/A
2-Butanone	N/A	N/A	N/A	30 - 160	30 - 160	30	N/A	N/A	N/A
Chlorobenzene	83 - 122	83 - 122	23	75 - 125	75 - 125	30	75 - 127	75 - 127	N/A
Chloroethane	61 - 153	61 - 153	31	40 - 155	40 - 155	30	N/A	N/A	N/A
Chloromethane	N/A	N/A	N/A	50 - 130	50 - 130	30	N/A	N/A	N/A
Chloroform	79 - 129	79 - 129	27	70 - 125	70 - 125	30	N/A	N/A	N/A
2-Chlorotoluene	N/A	N/A	N/A	70 - 130	70 - 130	30	N/A	N/A	N/A
4-Chlorotoluene	N/A	N/A	N/A	75 - 125	75 - 125	30	N/A	N/A	N/A
Carbon disulfide	61 - 142	61 - 142	27	45 - 160	45 - 160	30	N/A	N/A	N/A
Carbon tetrachloride	79 - 135	79 - 135	29	65 - 135	65 - 135	30	N/A	N/A	N/A
1,2-Dibromoethane	N/A	N/A	N/A	70 - 125	70 - 125	30	N/A	N/A	N/A
1,2-Dibromo-3-chloropropane	N/A	N/A	N/A	40 - 135	40 - 135	30	N/A	N/A	N/A
1,1-Dichloroethane	77 - 132	77 - 132	26	75 - 125	75 - 125	30	N/A	N/A	N/A
1,1-Dichloroethylene	66 - 132	66 - 132	27	65 - 135	65 - 135	30	55 - 142	55 - 142	N/A
1,2-Dichloroethane	78 - 129	78 - 129	24	70 - 135	70 - 135	30	N/A	N/A	N/A
1,2-Dichloropropane	74 - 127	74 - 127	27	70 - 120	70 - 120	30	N/A	N/A	N/A
1,3-Dichloropropane	N/A	N/A	N/A	75 - 125	75 - 125	30	N/A	N/A	N/A
2,2-Dichloropropane	N/A	N/A	N/A	65 - 135	65 - 135	30	N/A	N/A	N/A
1,1-Dichloropropene	N/A	N/A	N/A	70 - 135	70 - 135	30	N/A	N/A	N/A
1,2-Dichlorobenzene	N/A	N/A	N/A	75 - 120	75 - 120	30	N/A	N/A	N/A
1,3-Dichlorobenzene	N/A	N/A	N/A	70 - 125	70 - 125	30	N/A	N/A	N/A
1,4-Dichlorobenzene	N/A	N/A	N/A	70 - 125	70 - 125	30	N/A	N/A	N/A
Dibromochloromethane	78 - 117	78 - 117	27	65 - 130	65 - 130	30	N/A	N/A	N/A
Dibromomethane	N/A	N/A	N/A	75 - 130	75 - 130	30	N/A	N/A	N/A
Dichlorodifluoromethane	N/A	N/A	N/A	35 - 135	35 - 135	30	N/A	N/A	N/A
cis-1,2-Dichloroethylene	74 - 123	74 - 123	26	65 - 125	65 - 125	30	N/A	N/A	N/A
cis-1,3-Dichloropropene	79 - 130	79 - 130	23	70 - 125	70 - 125	30	N/A	N/A	N/A
trans-1,2-Dichloroethylene	77 - 129	77 - 129	27	65 - 135	65 - 135	30	N/A	N/A	N/A
trans-1,3-Dichloropropene	87 - 131	87 - 131	27	65 - 125	65 - 125	30	N/A	N/A	N/A
Ethylbenzene	82 - 124	82 - 124	25	75 - 125	75 - 125	30	N/A	N/A	N/A

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works

Spiked Compound	Accutest			AML Scientific, LLC			Test America		
	Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
2-Hexanone	67 - 130	67 - 130	29	45 - 145	45 - 145	30	N/A	N/A	N/A
Hexachlorobutadiene	N/A	N/A	N/A	55 - 140	55 - 140	30	N/A	N/A	N/A
Isopropylbenzene	N/A	N/A	N/A	75 - 130	75 - 130	30	N/A	N/A	N/A
4-Isopropyltoluene	N/A	N/A	N/A	75 - 135	75 - 135	30	N/A	N/A	N/A
4-Methyl-2-pentanone	69 - 125	69 - 125	24	45 - 145	45 - 145	30	N/A	N/A	N/A
Methyl bromide	60 - 146	60 - 146	31	N/A	N/A	N/A	N/A	N/A	N/A
Methyl chloride	58 - 163	58 - 163	26	N/A	N/A	N/A	N/A	N/A	N/A
Methylene chloride	62 - 140	62 - 140	25	55 - 140	55 - 140	30	N/A	N/A	N/A
Methyl ethyl ketone	66 - 134	66 - 134	23	N/A	N/A	N/A	N/A	N/A	N/A
Methyl tert-Butyl ether	N/A	N/A	N/A	81 - 126	81 - 126	30	N/A	N/A	N/A
Naphthalene	N/A	N/A	N/A	40 - 125	40 - 125	30	N/A	N/A	N/A
n-Butylbenzene	N/A	N/A	N/A	65 - 140	65 - 140	30	N/A	N/A	N/A
n-Propylbenzene	N/A	N/A	N/A	65 - 135	65 - 135	30	N/A	N/A	N/A
Styrene	79 - 123	79 - 123	28	75 - 125	75 - 125	30	N/A	N/A	N/A
sec-Butylbenzene	N/A	N/A	N/A	65 - 130	65 - 130	30	N/A	N/A	N/A
1,1,1-Trichloroethane	80 - 133	80 - 133	27	70 - 135	70 - 135	30	N/A	N/A	N/A
1,2,3-Trichloropropane	N/A	N/A	N/A	65 - 130	65 - 130	30	N/A	N/A	N/A
1,1,1,2-Tetrachloroethane	N/A	N/A	N/A	75 - 125	75 - 125	30	N/A	N/A	N/A
1,1,2,2-Tetrachloroethane	70 - 128	70 - 128	30	55 - 130	55 - 130	30	N/A	N/A	N/A
1,1,2-Trichloroethane	76 - 118	76 - 118	28	60 - 125	60 - 125	30	N/A	N/A	N/A
1,3,5-Trimethylbenzene	N/A	N/A	N/A	65 - 135	65 - 135	30	N/A	N/A	N/A
1,2,3-Trichlorobenzene	N/A	N/A	N/A	60 - 135	60 - 135	30	N/A	N/A	N/A
1,2,4-Trichlorobenzene	N/A	N/A	N/A	65 - 130	65 - 130	30	N/A	N/A	N/A
1,2,4-Trimethylbenzene	N/A	N/A	N/A	65 - 135	65 - 135	30	N/A	N/A	N/A
tert-Butylbenzene	N/A	N/A	N/A	65 - 130	65 - 130	30	N/A	N/A	N/A
Tetrachloroethylene	79 - 132	79 - 132	27	65 - 140	65 - 140	30	N/A	N/A	N/A
Toluene	80 - 123	80 - 123	26	70 - 125	70 - 125	30	71 - 130	71 - 130	N/A
Trichloroethylene	78 - 132	78 - 132	28	75 - 125	75 - 125	30	70 - 131	70 - 131	N/A
Trichlorofluoromethane	N/A	N/A	N/A	25 - 185	25 - 185	30	N/A	N/A	N/A
Vinyl acetate	N/A	N/A	N/A	71 - 126	71 - 126	30	N/A	N/A	N/A
Vinyl chloride	60 - 145	60 - 145	29	60 - 125	60 - 125	30	N/A	N/A	N/A
m-Xylene/p-Xylene	N/A	N/A	N/A	80 - 125	80 - 125	30	N/A	N/A	N/A
o-Xylene	N/A	N/A	N/A	75 - 125	75 - 125	30	N/A	N/A	N/A
Xylene (total)	83 - 127	83 - 127	24	N/A	N/A	N/A	N/A	N/A	N/A
Semivolatile Organic Compounds, SW-846 8270C									
Benzoic Acid	44 - 116	44 - 116	36	0 - 110	0 - 110	25	N/A	N/A	N/A
2-Chlorophenol	54 - 97	54 - 97	31	45 - 105	45 - 105	25	32 - 110	32 - 110	30
4-Chloro-3-methyl phenol	59 - 102	59 - 102	27	45 - 115	45 - 115	25	32 - 117	32 - 117	30
2,4-Dichlorophenol	60 - 101	60 - 101	30	45 - 110	45 - 110	25	N/A	N/A	N/A

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works

Spiked Compound	Accutest			AML Scientific, LLC			Test America		
	Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
2,4-Dimethylphenol	49 - 89	49 - 89	31	30 - 105	30 - 105	25	N/A	N/A	N/A
2,4-Dinitrophenol	39 - 107	39 - 107	40	15 - 130	15 - 130	25	N/A	N/A	N/A
4,6-Dinitro-o-cresol	58 - 109	58 - 109	37	30 - 135	30 - 135	25	N/A	N/A	N/A
2-Methylphenol	53 - 94	53 - 94	29	40 - 105	40 - 105	25	N/A	N/A	N/A
3&4-Methylphenol	54 - 95	54 - 95	31	N/A	N/A	25	N/A	N/A	N/A
4-Methylphenol	N/A	N/A	N/A	40 - 105	40 - 105	25	N/A	N/A	N/A
2-Nitrophenol	55 - 96	55 - 96	30	40 - 110	40 - 110	25	N/A	N/A	N/A
4-Nitrophenol	56 - 106	56 - 106	29	15 - 140	15 - 140	25	10 - 125	10 - 125	30
Pentachlorophenol	50 - 115	50 - 115	33	25 - 120	25 - 120	25	10 - 182	10 - 182	30
Phenol	55 - 99	55 - 99	28	40 - 100	40 - 100	25	10 - 144	10 - 144	30
2,4,5-Trichlorophenol	60 - 101	60 - 101	28	50 - 110	50 - 110	25	N/A	N/A	N/A
2,4,6-Trichlorophenol	60 - 100	60 - 100	27	45 - 110	45 - 110	25	N/A	N/A	N/A
Acenaphthene	59 - 97	59 - 97	29	45 - 110	45 - 110	25	10 - 200	10 - 200	30
Acenaphthylene	58 - 98	58 - 98	30	45 - 105	45 - 105	25	N/A	N/A	N/A
Anthracene	61 - 104	61 - 104	29	55 - 105	55 - 105	25	N/A	N/A	N/A
Benzo(a)anthracene	60 - 106	60 - 106	31	50 - 110	50 - 110	25	N/A	N/A	N/A
Benzo(a)pyrene	59 - 102	59 - 102	32	50 - 110	50 - 110	25	N/A	N/A	N/A
Benzo(b)fluoranthene	60 - 107	60 - 107	31	45 - 115	45 - 115	25	N/A	N/A	N/A
Benzo(g,h,i)perylene	56 - 103	56 - 103	32	40 - 125	40 - 125	25	N/A	N/A	N/A
Benzo(k)fluoranthene	61 - 107	61 - 107	30	45 - 125	45 - 125	25	N/A	N/A	N/A
4-Bromophenol phenyl ether	60 - 104	60 - 104	26	45 - 115	45 - 115	25	N/A	N/A	N/A
Butyl benzyl phthalate	57 - 110	57 - 110	28	50 - 125	50 - 125	25	N/A	N/A	N/A
Benzyl Alcohol	N/A	N/A	N/A	20 - 125	20 - 125	25	N/A	N/A	N/A
Butyl Alcohol	51 - 102	51 - 102	34	N/A	N/A	N/A	N/A	N/A	N/A
2-Chloronaphthalene	57 - 95	57 - 95	28	45 - 105	45 - 105	25	N/A	N/A	N/A
4-Chloroaniline	19 - 85	19 - 85	34	10 - 95	10 - 95	25	N/A	N/A	N/A
Carbazole	60 - 106	60 - 106	30	45 - 115	45 - 115	25	N/A	N/A	N/A
Chrysene	60 - 107	60 - 107	31	55 - 110	55 - 110	25	N/A	N/A	N/A
bis(2-Chloroethyoxy)methane	51 - 89	51 - 89	30	45 - 110	45 - 110	25	N/A	N/A	N/A
bis(2-Chloroethyl)ether	50 - 96	50 - 96	33	40 - 105	40 - 105	25	N/A	N/A	N/A
bis(2-Chloroisopropyl)ether	44 - 94	44 - 94	32	20 - 115	20 - 115	25	N/A	N/A	N/A
4-Chlorophenyl phenyl ether	60 - 101	60 - 101	26	45 - 110	45 - 110	25	N/A	N/A	N/A
1,2-Dichlorobenzene	47 - 91	47 - 91	35	45 - 95	45 - 95	25	N/A	N/A	N/A
1,3-Dichlorobenzene	45 - 86	45 - 86	36	40 - 100	40 - 100	25	N/A	N/A	N/A
1,4-Dichlorobenzene	45 - 88	45 - 88	36	35 - 105	35 - 105	25	26 - 110	26 - 110	30
2,4-Dinitrotoluene	59 - 103	59 - 103	30	50 - 115	50 - 115	25	42 - 118	42 - 118	30
2,6-Dinitrotoluene	57 - 99	57 - 99	30	50 - 110	50 - 110	25	N/A	N/A	N/A
3,3'-Dichlorobenzidine	34 - 88	34 - 88	31	10 - 130	10 - 130	25	N/A	N/A	N/A
Dibenzo(a,h)antracene	57 - 105	57 - 105	29	40 - 125	40 - 125	25	N/A	N/A	N/A

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works

Spiked Compound	Accutest			AML Scientific, LLC			Test America		
	Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
Dibenzofuran	58 - 103	58 - 103	27	50 - 105	50 - 105	25	N/A	N/A	N/A
Di-n-butyl phthalate	59 - 105	59 - 105	27	55 - 110	55 - 110	25	N/A	N/A	N/A
Di-n-octyl phthalate	59 - 117	59 - 117	28	40 - 130	40 - 130	25	N/A	N/A	N/A
Diethyl phthalate	59 - 106	59 - 106	27	50 - 115	50 - 115	25	N/A	N/A	N/A
Dimethyl phthalate	60 - 100	60 - 100	26	50 - 110	50 - 110	25	N/A	N/A	N/A
bis(2-Ethylhexyl)phthalate	57 - 111	57 - 111	29	45 - 125	45 - 125	25	N/A	N/A	N/A
Fluoranthene	60 - 110	60 - 110	32	55 - 115	55 - 115	25	N/A	N/A	N/A
Fluorene	60 - 99	60 - 99	30	50 - 110	50 - 110	25	N/A	N/A	N/A
Hexachlorobenzene	58 - 103	58 - 103	27	45 - 120	45 - 120	25	N/A	N/A	N/A
Hexachlorobutadiene	49 - 95	49 - 95	33	40 - 115	40 - 115	25	N/A	N/A	N/A
Hexachlorocyclopentadiene	36 - 94	36 - 94	41	45 - 135	45 - 135	25	N/A	N/A	N/A
Hexachloroethane	44 - 89	44 - 89	38	35 - 110	35 - 110	25	N/A	N/A	N/A
Indeno(1,2,3-cd)pyrene	57 - 104	57 - 104	33	40 - 120	40 - 120	25	N/A	N/A	N/A
Isophorone	58 - 97	58 - 97	30	45 - 110	45 - 110	25	N/A	N/A	N/A
2-Methylnaphthalene	57 - 103	57 - 103	32	45 - 105	45 - 105	25	N/A	N/A	N/A
2-Nitroaniline	53 - 106	53 - 106	29	45 - 120	45 - 120	25	N/A	N/A	N/A
3-Nitroaniline	29 - 85	29 - 85	31	25 - 110	25 - 110	25	N/A	N/A	N/A
4-Nitroaniline	49 - 104	49 - 104	31	35 - 115	35 - 115	25	N/A	N/A	N/A
Naphthalene	54 - 93	54 - 93	32	40 - 105	40 - 105	25	N/A	N/A	N/A
Nitrobenzene	53 - 92	53 - 92	32	40 - 115	40 - 115	25	N/A	N/A	N/A
N-Nitroso-di-n-propylamine	49 - 94	49 - 94	28	40 - 115	40 - 115	25	30 - 121	30 - 121	30
N-Nitrosodimethylamine	N/A	N/A	N/A	20 - 115	20 - 115	25	N/A	N/A	N/A
N-Nitrosodiphenylamine	53 - 107	53 - 107	28	50 - 115	50 - 115	25	N/A	N/A	N/A
Phenanthrene	61 - 103	61 - 103	32	50 - 110	50 - 110	25	N/A	N/A	N/A
Pyrene	58 - 109	58 - 109	33	45 - 125	45 - 125	25	10 - 200	10 - 200	30
Diphenylamine	N/A	N/A	N/A	45 - 135	45 - 135	25	N/A	N/A	N/A
1,2,4-Trichlorobenzene	52 - 93	52 - 93	32	45 - 110	45 - 110	25	33 - 110	33 - 110	30
Nitroaromatics and Nitroamines, SW-846 8330									
HMX	75 - 156	75 - 156	27	75 - 125	75 - 125	50	75 - 125	75 - 125	N/A
RDX	77 - 131	77 - 131	28	70 - 135	70 - 135	50	70 - 135	70 - 135	N/A
1,3-Dinitrobenzene	82 - 134	82 - 134	20	80 - 125	80 - 125	50	80 - 125	80 - 125	N/A
2,6-Dinitrotoluene	86 - 142	86 - 142	17	80 - 120	80 - 120	50	80 - 120	80 - 120	N/A
2,4-Dinitrotoluene	74 - 129	74 - 129	18	80 - 125	80 - 125	50	80 - 125	80 - 125	N/A
2-amino-4,6-Dinitrotoluene	83 - 123	83 - 123	22	80 - 125	80 - 125	50	80 - 125	80 - 125	N/A
4-amino-2,6-Dinitrotoluene	85 - 137	85 - 137	18	80 - 125	80 - 125	50	80 - 125	80 - 125	N/A
Nitrobenzene	82 - 138	82 - 138	19	75 - 125	75 - 125	50	75 - 125	75 - 125	N/A
o-Nitrotoluene	85 - 129	85 - 129	21	75 - 120	75 - 120	50	75 - 120	75 - 120	N/A
m-Nitrotoluene	85 - 136	85 - 136	22	80 - 125	80 - 125	50	80 - 125	80 - 125	N/A
p-Nitrotoluene	86 - 133	86 - 133	19	75 - 125	75 - 125	50	75 - 125	75 - 125	N/A

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works

Spiked Compound	Accutest			AML Scientific, LLC			Test America		
	Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
Tetryl	53 - 124	53 - 124	22	10 - 150	10 - 150	50	10 - 150	10 - 150	N/A
1,3,5-Trinitrobenzene	81 - 138	81 - 138	24	75 - 125	75 - 125	50	75 - 125	75 - 125	N/A
2,4,6-Trinitrotoluene	70 - 137	70 - 137	29	55 - 140	55 - 140	50	55 - 140	55 - 140	N/A
PCBs, SW-846 8082									
Aroclor-1016	69 - 117	69 - 117	26	40 - 140	40 - 140	20	10 - 199	10 - 199	30
Aroclor-1260	71 - 121	71 - 121	30	60 - 130	60 - 130	20	10 - 199	10 - 199	30
Metals, SW-846 6010B/7470A									
Aluminum	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Antimony	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Arsenic	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Barium	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Beryllium	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Cadmium	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Calcium	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Chromium	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Cobalt	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Copper	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Iron	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Lead	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Magnesium	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Manganese	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Nickel	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Potassium	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Selenium	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Silver	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Sodium	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Thallium	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Vanadium	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Zinc	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Mercury	80 - 120	80 - 120	20	75 - 125	75 - 125	35	80 - 120	75 - 125	20
Total Organic Carbon (TOC) SW-846 9060									
TOC			25	70 - 130					

LCS - Laboratory Control Sample
MS/MSD - Matrix Spike/Matrix Spike Duplicate
RPD - Relative Percent Difference
N/A - Not Applicable

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works

Spiked Compound	Accutest			AML			Test America Laboratories, Inc.		
	Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
Volatile Organic Compounds, SW846 8260B									
Acetone	59 - 134	59 - 134	14	40 - 140	40 - 140	30	N/A	N/A	N/A
Acrolein	N/A	N/A	N/A	54 - 142	54 - 142	30	N/A	N/A	N/A
Acrylonitrile	N/A	N/A	N/A	40 - 140	40 - 140	30	N/A	N/A	N/A
Benzene	83 - 124	83 - 124	11	80 - 120	80 - 120	30	78 - 118	78 - 118	N/A
Bromobenzene	N/A	N/A	N/A	75 - 125	75 - 125	30	N/A	N/A	N/A
Bromochloromethane	N/A	N/A	N/A	65 - 130	65 - 130	30	N/A	N/A	N/A
Bromodichloromethane	76 - 116	76 - 116	10	75 - 120	75 - 120	30	N/A	N/A	N/A
Bromomethane	N/A	N/A	N/A	30 - 145	30 - 145	30	N/A	N/A	N/A
Bromoform	68 - 128	68 - 128	11	70 - 130	70 - 130	30	N/A	N/A	N/A
2-Butanone	N/A	N/A	N/A	30 - 150	30 - 150	30	N/A	N/A	N/A
Chlorobenzene	87 - 115	87 - 115	9	80 - 120	80 - 120	30	76 - 117	76 - 117	N/A
Chloroethane	54 - 166	54 - 166	20	60 - 135	60 - 135	30	N/A	N/A	N/A
Chloromethane	N/A	N/A	N/A	40 - 125	40 - 125	30	N/A	N/A	N/A
Chloroform	85 - 123	85 - 123	10	65 - 135	65 - 135	30	N/A	N/A	N/A
2-Chlorotoluene	N/A	N/A	N/A	75 - 125	75 - 125	30	N/A	N/A	N/A
4-Chlorotoluene	N/A	N/A	N/A	75 - 130	75 - 130	30	N/A	N/A	N/A
Carbon disulfide	67 - 147	67 - 147	12	35 - 160	35 - 160	30	N/A	N/A	N/A
Carbon tetrachloride	74 - 139	74 - 139	13	65 - 140	65 - 140	30	N/A	N/A	N/A
1,2-Dibromoethane	N/A	N/A	N/A	80 - 120	80 - 120	30	N/A	N/A	N/A
1,1-Dichloroethane	82 - 127	82 - 127	10	70 - 135	70 - 135	30	N/A	N/A	N/A
1,1-Dichloroethylene	75 - 133	75 - 133	13	70 - 130	70 - 130	30	62 - 130	62 - 130	N/A
1,1-Dichloropropene	N/A	N/A	N/A	75 - 130	75 - 130	30	N/A	N/A	N/A
1,2-Dichloroethane	76 - 122	76 - 122	11	70 - 130	70 - 130	30	N/A	N/A	N/A
1,2-Dichloropropane	81 - 120	81 - 120	11	75 - 125	75 - 125	30	N/A	N/A	N/A
1,2-Dichlorobenzene	N/A	N/A	N/A	70 - 120	70 - 120	30	N/A	N/A	N/A
1,3-Dichlorobenzene	N/A	N/A	N/A	75 - 125	75 - 125	30	N/A	N/A	N/A
1,4-Dichlorobenzene	N/A	N/A	N/A	75 - 125	75 - 125	30	N/A	N/A	N/A
1,3-Dichloropropane	N/A	N/A	N/A	75 - 125	75 - 125	30	N/A	N/A	N/A
2,2-Dichloropropane	N/A	N/A	N/A	70 - 135	70 - 135	30	N/A	N/A	N/A
Dibromochloromethane	74 - 116	74 - 116	11	60 - 135	60 - 135	30	N/A	N/A	N/A
Dibromomethane	N/A	N/A	N/A	75 - 125	75 - 125	30	N/A	N/A	N/A
Dichlorodifluoromethane	N/A	N/A	N/A	30 - 155	30 - 155	30	N/A	N/A	N/A
1,2-Dibromo-3-chloropropane	N/A	N/A	N/A	50 - 130	50 - 130	30	N/A	N/A	N/A
cis-1,2-Dichloroethylene	81 - 114	81 - 114	10	70 - 125	70 - 125	30	N/A	N/A	N/A
cis-1,3-Dichloropropene	83 - 119	83 - 119	10	70 - 130	70 - 130	30	N/A	N/A	N/A
trans-1,2-Dichloroethylene	82 - 126	82 - 126	10	60 - 140	60 - 140	30	N/A	N/A	N/A
trans-1,3-Dichloropropene	87 - 123	87 - 123	10	55 - 140	55 - 140	30	N/A	N/A	N/A

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works

Spiked Compound	Accutest			AML			Test America Laboratories, Inc.		
	Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
Ethylbenzene	87 - 118	87 - 118	10	75 - 125	75 - 125	30	N/A	N/A	N/A
Hexachlorobutadiene	N/A	N/A	N/A	50 - 140	50 - 140	30	N/A	N/A	N/A
2-Hexanone	58 - 125	58 - 125	14	55 - 130	55 - 130	30	N/A	N/A	N/A
Isopropylbenzene	N/A	N/A	N/A	75 - 125	75 - 125	30	N/A	N/A	N/A
4-Isopropyltoluene	N/A	N/A	N/A	75 - 130	75 - 130	30	N/A	N/A	N/A
4-Methyl-2-pentanone	62 - 125	62 - 125	13	60 - 135	60 - 135	30	N/A	N/A	N/A
Methyl bromide	55 - 151	55 - 151	21	N/A	N/A	N/A	N/A	N/A	N/A
Methyl chloride	55 - 173	55 - 173	22	N/A	N/A	N/A	N/A	N/A	N/A
Methylene chloride	69 - 125	69 - 125	11	55 - 140	55 - 140	30	N/A	N/A	N/A
Methyl ethyl ketone	61 - 127	61 - 127	13	N/A	N/A	N/A	N/A	N/A	N/A
Methyl tert-Butyl Ether	N/A	N/A	N/A	65 - 125	65 - 125	30	N/A	N/A	N/A
n-Butylbenzene	N/A	N/A	N/A	70 - 135	70 - 135	30	N/A	N/A	N/A
Naphthalene	N/A	N/A	N/A	55 - 140	55 - 140	30	N/A	N/A	N/A
n- Propylbenzene	N/A	N/A	N/A	70 - 130	70 - 130	30	N/A	N/A	N/A
sec-Butylbenzene	N/A	N/A	N/A	70 - 125	70 - 125	30	N/A	N/A	N/A
Styrene	78 - 118	78 - 118	11	65 - 135	65 - 135	30	N/A	N/A	N/A
1,1,1-Trichloroethane	79 - 133	79 - 133	11	65 - 130	65 - 130	30	N/A	N/A	N/A
1,1.1,2-Tetrachloroethane	N/A	N/A	N/A	80 - 130	80 - 130	30	N/A	N/A	N/A
1,1,2,2-Tetrachloroethane	71 - 120	71 - 120	11	65 - 130	65 - 130	30	N/A	N/A	N/A
1,1,2-Trichloroethane	80 - 114	80 - 114	11	75 - 125	75 - 125	30	N/A	N/A	N/A
1,2,3-Trichlorobenzene	N/A	N/A	N/A	55 - 140	55 - 140	30	N/A	N/A	N/A
1,2,3-Trichloropropane	N/A	N/A	N/A	75 - 125	75 - 125	30	N/A	N/A	N/A
1,3,5-Trimethylbenzene	N/A	N/A	N/A	75 - 130	75 - 130	30	N/A	N/A	N/A
1,2,4-Trichlorobenzene	N/A	N/A	N/A	65 - 135	65 - 135	30	N/A	N/A	N/A
1,2,4-Trimethylbenzene	N/A	N/A	N/A	75 - 130	75 - 130	30	N/A	N/A	N/A
Tetrachloroethylene	80 - 131	80 - 131	12	45 - 150	45 - 150	30	N/A	N/A	N/A
tert-Butylbenzene	N/A	N/A	N/A	70 - 130	70 - 130	30	N/A	N/A	N/A
Toluene	86 - 116	86 - 116	10	75 - 120	75 - 120	30	70 - 119	70 - 119	N/A
Trichloroethylene	85 - 124	85 - 124	10	70 - 125	70 - 125	30	62 - 130	62 - 130	N/A
Trichlorofluoromethane	N/A	N/A	N/A	60 - 145	60 - 145	30	N/A	N/A	N/A
Vinyl chloride	57 - 153	57 - 153	22	50 - 145	50 - 145	30	N/A	N/A	N/A
Vinyl acetate	N/A	N/A	N/A	72 - 121	72 - 121	30	N/A	N/A	N/A
m-Xylene/p-Xylene	N/A	N/A	N/A	75 - 130	75 - 130	30	N/A	N/A	N/A
o-Xylene	N/A	N/A	N/A	80 - 120	80 - 120	30	N/A	N/A	N/A
Xylene (total)	86 - 120	86 - 120	10	N/A	N/A	N/A	N/A	N/A	N/A
Semivolatile Organic Compounds, SW-846 8270C									
Benzoic Acid	10 - 50	10 - 50	40	20 - 145	20 - 145	50	N/A	N/A	N/A
2-Chlorophenol	44 - 103	44 - 103	29	35 - 105	35 - 105	50	27 - 110	27 - 110	30

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works

Spiked Compound	Accutest			AML			Test America Laboratories, Inc.		
	Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
4-Chloro-3-methyl phenol	53 - 105	53 - 105	24	45 - 110	45 - 110	50	39 - 110	39 - 110	30
2,4-Dichlorophenol	53 - 108	53 - 108	26	50 - 105	50 - 105	50	N/A	N/A	N/A
2,4-Dimethylphenol	37 - 91	37 - 91	28	30 - 110	30 - 110	50	N/A	N/A	N/A
2,4-Dinitrophenol	37 - 111	37 - 111	30	15 - 140	15 - 140	50	N/A	N/A	N/A
4,6-Dinitro-o-cresol	62 - 115	62 - 115	26	N/A	N/A	N/A	N/A	N/A	N/A
2-Methylphenol	35 - 91	35 - 91	30	40 - 110	40 - 110	50	N/A	N/A	N/A
4-Methylphenol	N/A	N/A	N/A	45 - 135	45 - 135	50	N/A	N/A	N/A
3&4-Methylphenol	32 - 85	32 - 85	29	N/A	N/A	N/A	N/A	N/A	N/A
2-Nitrophenol	49 - 111	49 - 111	30	40 - 115	40 - 115	50	N/A	N/A	N/A
4-Nitrophenol	13 - 55	13 - 55	31	10 - 85	10 - 85	50	12 - 130	12 - 130	30
Pentachlorophenol	57 118	57 118	26	40 - 115	40 - 115	50	26 - 110	26 - 110	30
Phenol	13 - 54	13 - 54	34	21 - 50	21 - 50	50	14 - 112	14 - 112	30
2,4,5-Trichlorophenol	59 - 106	59 - 106	23	50 - 110	50 - 110	50	N/A	N/A	N/A
2,4,6-Trichlorophenol	58 - 107	58 - 107	24	50 - 115	50 - 115	50	N/A	N/A	N/A
Acenaphthene	58 - 106	58 - 106	21	45 - 110	45 - 110	50	40 - 110	40 - 110	30
Acenaphthylene	58 - 105	58 - 105	21	50 - 105	50 - 105	50	N/A	N/A	N/A
Anthracene	65 - 108	65 - 108	19	55 - 110	55 - 110	50	N/A	N/A	N/A
Benzo(a)anthracene	63 - 111	63 - 111	19	55 - 110	55 - 110	50	N/A	N/A	N/A
Benzo(a)pyrene	62 - 106	62 - 106	20	55 - 110	55 - 110	50	N/A	N/A	N/A
Benzo(b)fluoranthene	63 - 109	63 - 109	20	45 - 120	45 - 120	50	N/A	N/A	N/A
Benzo(g,h,i)perylene	61 - 111	61 - 111	21	40 - 125	40 - 125	50	N/A	N/A	N/A
Benzo(k)fluoranthene	64 - 111	64 - 111	20	45 - 125	45 - 125	50	N/A	N/A	N/A
4-Bromophenol phenyl ether	64 - 107	64 - 107	20	50 - 115	50 - 115	50	N/A	N/A	N/A
Butyl benzyl phthalate	59 - 114	59 - 114	20	45 - 115	45 - 115	50	N/A	N/A	N/A
Benzyl Alcohol	34 - 98	34 - 98	27	45 - 135	45 - 135	50	N/A	N/A	N/A
2-Chloronaphthalene	54 - 105	54 - 105	24	50 - 105	50 - 105	50	N/A	N/A	N/A
4-Chloroaniline	53 - 103	53 - 103	22	15 - 110	15 - 110	50	N/A	N/A	N/A
Carbazole	66 - 109	66 - 109	20	50 - 115	50 - 115	50	N/A	N/A	N/A
Chrysene	64 - 111	64 - 111	19	55 - 110	55 - 110	50	N/A	N/A	N/A
bis(2-Chloroethyoxy)methane	48 - 101	48 - 101	28	45 - 105	45 - 105	50	N/A	N/A	N/A
bis(2-Chloroethyl)ether	51 - 108	51 - 108	27	35 - 110	35 - 110	50	N/A	N/A	N/A
bis(2-Chloroisopropyl)ether	43 - 106	43 - 106	27	25 - 130	25 - 130	50	N/A	N/A	N/A
4-Chlorophenyl pheny ether	61 - 107	61 - 107	20	50 - 110	50 - 110	50	N/A	N/A	N/A
1,2-Dichlorobenzene	41 - 102	41 - 102	28	35 - 100	35 - 100	50	N/A	N/A	N/A
1,3-Dichlorobenzene	38 - 100	38 - 100	28	30 - 100	30 - 100	50	N/A	N/A	N/A
1,4-Dichlorobenzene	40 - 100	40 - 100	28	30 - 100	30 - 100	50	19 - 110	19 - 110	30
2,4-Dinitrotoluene	60 - 109	60 - 109	20	50 - 120	50 - 120	50	52 - 123	52 - 123	30
2,6-Dinitrotoluene	58 - 104	58 - 104	21	50 - 115	50 - 115	50	N/A	N/A	N/A
3,3'-Dichlorobenzidine	57 - 105	57 - 105	25	20 - 110	20 - 110	50	N/A	N/A	N/A

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works

Spiked Compound	Accutest			AML			Test America Laboratories, Inc.		
	Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
Dibenzo(a,h)antracene	62 - 112	62 - 112	20	40 - 125	40 - 125	50	N/A	N/A	N/A
Dibenzofuran	61 - 108	61 - 108	20	55 - 105	55 - 105	50	N/A	N/A	N/A
Di-n-butyl phthalate	62 - 109	62 - 109	20	55 - 115	55 - 115	50	N/A	N/A	N/A
Di-n-octyl phthalate	60 - 120	60 - 120	24	35 - 135	35 - 135	50	N/A	N/A	N/A
Diethyl phthalate	62 - 109	62 - 109	19	40 - 120	40 - 120	50	N/A	N/A	N/A
Dimethyl phthalate	63 - 106	63 - 106	19	25 - 125	25 - 125	50	N/A	N/A	N/A
Diphenylamine	N/A	N/A	N/A	45 - 135	45 - 135	50	N/A	N/A	N/A
bis(2-Ethylhexyl)phthalate	59 - 116	59 - 116	21	40 - 125	40 - 125	50	N/A	N/A	N/A
Fluoranthene	65 - 114	65 - 114	21	55 - 115	55 - 115	50	N/A	N/A	N/A
Fluorene	61 - 106	61 - 106	19	50 - 110	50 - 110	50	N/A	N/A	N/A
Hexachlorobenzene	62 - 107	62 - 107	20	50 - 110	50 - 110	50	N/A	N/A	N/A
Hexachlorobutadiene	38 - 107	38 - 107	30	25 - 105	25 - 105	50	N/A	N/A	N/A
Hexachlorocyclopentadiene	19 - 84	19 - 84	35	30 - 145	30 - 145	50	N/A	N/A	N/A
Hexachloroethane	35 - 101	30 - 101	29	30 - 95	30 - 95	50	N/A	N/A	N/A
Indeno(1,2,3-cd)pyrene	61 - 113	61 - 113	20	45 - 125	45 - 125	50	N/A	N/A	N/A
Isophorone	56 - 111	56 - 111	26	50 - 110	50 - 110	50	N/A	N/A	N/A
2-Metlhyl-4,6-dinitrophenol	N/A	N/A	N/A	45 - 135	45 - 135	50	N/A	N/A	N/A
2-Methylnaphthalene	56 - 112	56 - 112	26	45 - 105	45 - 105	50	N/A	N/A	N/A
2-Nitroaniline	60 - 109	60 - 109	20	50 - 115	50 - 115	50	N/A	N/A	N/A
3-Nitroaniline	52 - 107	52 - 107	21	20 - 125	20 - 125	50	N/A	N/A	N/A
4-Nitroaniline	59 - 111	59 - 111	21	35 - 120	35 - 120	50	N/A	N/A	N/A
Naphthalene	50 - 104	50 - 104	28	40 - 100	40 - 100	50	N/A	N/A	N/A
Nitrobenzene	52 - 105	52 - 105	28	45 - 110	45 - 110	50	N/A	N/A	N/A
N-Nitroso-di-n-propylamine	51 - 104	51 - 104	28	35 - 130	35 - 130	50	37 - 121	37 - 121	30
N-Nitrosodimethylamine	N/A	N/A	N/A	20 - 115	20 - 115	50	N/A	N/A	N/A
N-Nitrosodiphenylamine	57 - 110	57 - 110	19	50 - 110	50 - 110	50	N/A	N/A	N/A
Phenanthrene	65 - 108	65 - 108	20	50 - 115	50 - 115	50	N/A	N/A	N/A
Pyrene	60 - 113	60 - 113	20	50 - 130	50 - 130	50	55 - 120	55 - 120	30
1,2,4-Trichlorobenzene	45 - 104	45 - 104	28	35 - 105	35 - 105	50	25 - 110	25 - 110	30
Nitroaromatics and Nitroamines, SW-846 8330									
HMX	74 - 152	74 - 152	21	80 - 115	80 - 115	30	80 - 115	80 - 115	30
RDX	80 - 124	80 - 124	20	50 - 160	50 - 160	30	50 - 160	50 - 160	30
1,3-Dinitrobenzene	84 - 123	84 - 123	23	45 - 160	45 - 160	30	45 - 160	45 - 160	30
2,6-Dinitrotoluene	84 - 133	84 - 133	23	60 - 135	60 - 135	30	60 - 135	60 - 135	30
2,4-Dinitrotoluene	77 - 116	77 - 116	26	60 - 135	60 - 135	30	60 - 135	60 - 135	30
2-amino-4,6-Dinitrotoluene	78 - 117	78 - 117	28	55 - 155	55 - 155	30	55 - 155	55 - 155	30
4-amino-2,6-Dinitrotoluene	84 - 123	84 - 123	27	55 - 155	55 - 155	30	55 - 155	55 - 155	30
Nitrobenzene	76 - 128	76 - 128	28	50 - 140	50 - 140	30	50 - 140	50 - 140	30

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works

Spiked Compound	Accutest			AML			Test America Laboratories, Inc.		
	Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
o-Nitrotoluene	76 - 120	76 - 120	30	50 - 130	50 - 130	30	50 - 130	50 - 130	30
m-Nitrotoluene	74 - 124	74 - 124	32	45 - 135	45 - 135	30	45 - 135	45 - 135	30
p-Nitrotoluene	81 - 125	81 - 125	34	50 - 130	50 - 130	30	50 - 130	50 - 130	30
Tetryl	62 - 117	62 - 117	28	20 - 175	20 - 175	30	20 - 175	20 - 175	30
1,3,5-Trinitrobenzene	85 - 127	85 - 127	21	65 - 140	65 - 140	30	65 - 140	65 - 140	30
2,4,6-Trinitrotoluene	71 - 128	71 - 128	21	50 - 145	50 - 145	30	50 - 145	50 - 145	30
Nitroglycerin	N/A	N/A	N/A	N/A	N/A	N/A	76 - 116	76 - 116	30
PETN	N/A	N/A	N/A	N/A	N/A	N/A	69 - 117	69 - 117	30
PCBs, SW-846 8082									
Aroclor-1016	76 - 117	76 - 117	16	N/A	N/A	N/A	44 - 119	10 - 199	30
Aroclor-1260	65 - 117	65 - 117	23	N/A	N/A	N/A	41 - 118	10 - 199	30
Metals, SW-846 6010B/6020A/7470A									
Aluminum	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Antimony	80 - 120	80 - 120	20	80 - 120	75 - 125	20	80 - 120	75 - 125	20
Arsenic	80 - 120	80 - 120	20	80 - 120	75 - 125	20	80 - 120	75 - 125	20
Barium	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Beryllium	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Cadmium	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Calcium	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Chromium	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Cobalt	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Copper	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Iron	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Lead	80 - 120	80 - 120	20	80 - 120	75 - 125	20	80 - 120	75 - 125	20
Magnesium	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Manganese	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Nickel	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Potassium	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Selenium	80 - 120	80 - 120	20	80 - 120	75 - 125	20	80 - 120	75 - 125	20
Silver	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Sodium	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Thallium	80 - 120	80 - 120	20	80 - 120	75 - 125	20	80 - 120	75 - 125	20
Vanadium	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Zinc	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Mercury	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Water Quality									
Chloride	90 - 110	90 - 110	20	90 - 110	90 - 110	20	90 - 110	80 - 120	20
Hardness as CaCO3	N/A	N/A	N/A	N/A	N/A	N/A	88 - 110	87 - 114	20

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works

Spiked Compound	Accutest			AML			Test America Laboratories, Inc.		
	Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
Nitrate	90 - 110	90 - 110	20	80 - 120	80 - 120	20	90 - 110	34 - 125	20
Sulfate	90 - 110	90 - 110	20	90 - 110	90 - 110	20	90 - 110	80 - 120	20
Total Alkalinity	90 - 113	90 - 113	20	70 - 130	N/A	N/A	90 - 127	10 - 160	24
Total Cyanide	90 - 110	90 - 110	20	75 - 125	75 - 125	25	69 - 118	42 - 140	20
Total Dissolved Solids	N/A	N/A	5	75 - 125	N/A	N/A	88 - 110	N/A	20
Total Suspended Solids	N/A	N/A	5	75 - 125	N/A	N/A	73 - 113	N/A	20
Turbidity	N/A	N/A	8	N/A	N/A	N/A	75 - 125	N/A	20

LCS - Laboratory Control Sample
MS/MSD - Matrix Spike/Matrix Spike Duplicate
RPD - Relative Percent Difference
N/A - Not Applicable

APPENDIX H

CHEMICAL ANALYTICAL DATA SUMMARY

Appendix H

Chemical Analytical Data Summary
Soil
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	ASH PIT 2-SB01		ASH PIT 2-SB01		ASH PIT 2-SB01		ASH PIT 2-SB02		ASH PIT 2-SB02		ASH PIT 2-SB02	
			SAMPLE_NO	AP0100		AP0101		AP0102		AP0103		AP0104		AP0105	
			SAMPLE_DATE	15-Jan-09		15-Jan-09		15-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09	
			FK_DEPTH	0 - 1 Ft		3 - 5 Ft		8 - 10 Ft		0 - 1 Ft		3 - 5 Ft		3 - 5 Ft	
			SAMPLE_PURPOSE	REG		REG		REG		REG		REG		FD	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	mg/kg	0.147	UJ	0.149	U	0.144	U	0.149	UJ	0.148	U	0.146	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	mg/kg	0.147	UJ	0.149	U	0.144	U	0.149	UJ	0.148	U	0.146	U
Explosives	Dinitrobenzene, 1,3-	N	mg/kg	0.147	UJ	0.149	U	0.144	U	0.149	UJ	0.148	U	0.146	U
Explosives	Dinitrotoluene, 2,4-	N	mg/kg	0.147	UJ	0.149	U	0.144	U	0.149	UJ	0.148	U	0.146	U
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.147	U	0.149	U	0.144	U	0.149	UJ	0.148	U	0.146	U
Explosives	HMX	N	mg/kg	0.147	U	0.149	U	0.144	U	0.149	UJ	0.148	U	0.146	U
Explosives	Nitrobenzene	N	mg/kg	0.147	U	0.149	U	0.144	U	0.149	UJ	0.148	U	0.146	U
Explosives	Nitrotoluene, 2-	N	mg/kg	0.147	U	0.149	U	0.144	U	0.149	UJ	0.148	U	0.146	U
Explosives	Nitrotoluene, 3-	N	mg/kg	0.147	UJ	0.149	U	0.144	U	0.149	UJ	0.148	U	0.146	U
Explosives	Nitrotoluene, 4-	N	mg/kg	0.147	U	0.149	U	0.144	U	0.149	UJ	0.148	U	0.146	U
Explosives	RDX	N	mg/kg	0.147	U	0.149	U	0.144	U	0.149	UJ	0.148	U	0.146	U
Explosives	Tetryl	N	mg/kg	0.147	U	0.149	U	0.144	U	0.149	UJ	0.148	U	0.146	U
Explosives	Trinitrobenzene, 1,3,5-	N	mg/kg	0.147	U	0.149	U	0.144	U	0.149	UJ	0.148	U	0.146	U
Explosives	Trinitrotoluene, 2,4,6-	N	mg/kg	0.147	U	0.149	U	0.144	U	0.149	UJ	0.148	U	0.146	U
Semivolatiles	Acenaphthene	N	mg/kg	0.00737	U	0.00709	U	0.00675	U	0.00899	U	0.00754	U	0.00748	U
Semivolatiles	Acenaphthylene	N	mg/kg	0.00491	U	0.00472	U	0.0045	U	0.00599	U	0.00502	U	0.00498	U
Semivolatiles	ACETOPHENONE	N	mg/kg												
Semivolatiles	Anthracene	N	mg/kg	0.00884	U	0.0085	U	0.0081	U	0.0108	U	0.00904	U	0.00897	U
Semivolatiles	Atrazine	N	mg/kg												
Semivolatiles	Benzaldehyde	N	mg/kg												
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.0827	J	0.0259	U	0.0246	U	0.0464	J	0.0275	U	0.0273	U
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.0844	J	0.0259	U	0.0246	U	0.0328	U	0.0275	U	0.0273	U
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.13	J	0.0655	U	0.0624	U	0.0831	U	0.0697	U	0.0692	U
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	0.0997	U	0.0959	U	0.0914	U	0.122	U	0.102	U	0.101	U
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	0.124	U	0.119	U	0.114	U	0.151	U	0.127	U	0.126	U
Semivolatiles	Benzoic acid	N	mg/kg	0.0997	U	0.0959	U	0.0914	UJ	1.43		0.102	UJ	0.101	U
Semivolatiles	Benzyl alcohol	N	mg/kg	0.0997	U	0.0959	U	0.0914	U	0.122	U	0.102	U	0.101	U
Semivolatiles	BIBENZENE	N	mg/kg												
Semivolatiles	Bis(2-chloroethoxy)methane	N	mg/kg	0.0086	U	0.00827	U	0.00788	U	0.0105	U	0.00879	U	0.00872	U
Semivolatiles	Bis(2-chloroethyl)ether	N	mg/kg	0.0104	U	0.01	U	0.00956	U	0.0127	U	0.0107	U	0.0106	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	mg/kg	0.0178	U	0.0171	U	0.0163	U	0.0217	U	0.0182	U	0.0181	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	mg/kg	0.0378	U	0.0364	U	0.0347	U	0.0461	U	0.0387	U	0.0384	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	mg/kg	0.0146	U	0.0141	U	0.0134	U	0.0178	U	0.0149	U	0.0148	U
Semivolatiles	Butyl benzyl phthalate	N	mg/kg	0.0166	U	0.0159	U	0.0152	U	0.0202	U	0.017	U	0.0168	U
Semivolatiles	Caprolactam	N	mg/kg												
Semivolatiles	Carbazole	N	mg/kg	0.0409	U	0.0393	U	0.0375	U	0.0499	U	0.0418	U	0.0415	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	mg/kg	0.0101	U	0.00968	U	0.00923	U	0.0123	U	0.0103	U	0.0102	U
Semivolatiles	Chloroaniline, 4-	N	mg/kg	0.0355	U	0.0341	U	0.0325	U	0.0433	U	0.0363	U	0.036	U
Semivolatiles	Chloronaphthalene, 2-	N	mg/kg	0.00651	U	0.00626	U	0.00596	U	0.00794	U	0.00666	U	0.0066	U
Semivolatiles	Chlorophenol, 2-	N	mg/kg	0.00504	U	0.00484	U	0.00461	U	0.00614	U	0.00515	U	0.00511	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	mg/kg	0.0313	U	0.0301	U	0.0287	U	0.0382	U	0.032	U	0.0318	U
Semivolatiles	Chrysene	N	mg/kg	0.0979	J	0.0156	U	0.0149	U	0.0639	J	0.0166	U	0.0164	U
Semivolatiles	Dibenz(a,h)anthracene	N	mg/kg	0.0925	U	0.0889	U	0.0847	U	0.113	U	0.0946	U	0.0938	U
Semivolatiles	Dibenzofuran	N	mg/kg	0.00688	U	0.00661	U	0.0063	U	0.00839	U	0.00703	U	0.00698	U

Appendix H

Chemical Analytical Data Summary
Soil
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	ASH PIT 2-SB01		ASH PIT 2-SB01		ASH PIT 2-SB01		ASH PIT 2-SB02		ASH PIT 2-SB02		ASH PIT 2-SB02	
			SAMPLE_NO	AP0100		AP0101		AP0102		AP0103		AP0104		AP0105	
			SAMPLE_DATE	15-Jan-09		15-Jan-09		15-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09	
			FK_DEPTH	0 - 1 Ft		3 - 5 Ft		8 - 10 Ft		0 - 1 Ft		3 - 5 Ft		3 - 5 Ft	
			SAMPLE_PURPOSE	REG		REG		REG		REG		REG		FD	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Semivolatiles	Dichlorobenzene, 1,2-	N	mg/kg	0.00946	U	0.00909	U	0.00866	U	0.0115	U	0.00967	U	0.00959	U
Semivolatiles	Dichlorobenzene, 1,3-	N	mg/kg	0.0149	U	0.0143	U	0.0136	U	0.0181	U	0.0152	U	0.0151	U
Semivolatiles	Dichlorobenzene, 1,4-	N	mg/kg	0.00798	U	0.00768	U	0.00731	U	0.00974	U	0.00816	U	0.0081	U
Semivolatiles	Dichlorobenzidine, 3,3'-	N	mg/kg	0.0405	U	0.039	U	0.0371	U	0.0494	U	0.0415	U	0.0411	U
Semivolatiles	Dichlorophenol, 2,4-	N	mg/kg	0.0146	U	0.0141	U	0.0134	U	0.0178	U	0.0149	U	0.0148	U
Semivolatiles	Diethyl phthalate	N	mg/kg	0.0166	U	0.0159	U	0.0152	U	0.0202	U	0.017	U	0.0168	U
Semivolatiles	Dimethyl phthalate	N	mg/kg	0.0125	U	0.012	U	0.0115	U	0.0153	U	0.0128	U	0.0127	U
Semivolatiles	Dimethylphenol, 2,4-	N	mg/kg	0.0108	U	0.0104	U	0.0099	U	0.0132	U	0.0111	U	0.011	U
Semivolatiles	Di-n-butyl phthalate	N	mg/kg	0.00884	U	0.0085	U	0.0081	U	0.0108	U	0.00904	U	0.00897	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	mg/kg	0.0412	U	0.0396	U	0.0377	U	0.0502	U	0.0421	U	0.0417	U
Semivolatiles	Dinitrophenol, 2,4-	N	mg/kg	0.0652	U	0.0627	U	0.0597	U	0.0795	U	0.0667	U	0.0662	UJ
Semivolatiles	Dinitrotoluene, 2,4-	N	mg/kg	0.0144	U	0.0138	U	0.0132	U	0.0175	U	0.0147	U	0.0146	U
Semivolatiles	Dinitrotoluene, 2,6-	N	mg/kg	0.00983	U	0.00945	U	0.009	U	0.012	U	0.01	U	0.00997	U
Semivolatiles	Di-n-octyl phthalate	N	mg/kg	0.077	U	0.074	U	0.0705	U	0.0939	U	0.0788	U	0.0781	U
Semivolatiles	DIPHENYLAMINE	N	mg/kg	0.0405	U	0.039	U	0.0371	U	0.0494	U	0.0415	U	0.0411	U
Semivolatiles	Fluoranthene	N	mg/kg	0.132	J	0.0085	U	0.0081	U	0.131	J	0.00904	U	0.00897	U
Semivolatiles	Fluorene	N	mg/kg	0.0173	U	0.0167	U	0.0159	U	0.0211	U	0.0177	U	0.0176	U
Semivolatiles	Hexachlorobenzene	N	mg/kg	0.0254	U	0.0244	U	0.0233	U	0.031	U	0.026	U	0.0258	U
Semivolatiles	Hexachlorobutadiene	N	mg/kg	0.0388	U	0.0373	U	0.0356	U	0.0473	U	0.0397	U	0.0394	U
Semivolatiles	Hexachlorocyclopentadiene	N	mg/kg	0.013	UJ	0.0125	U	0.0119	U	0.0159	U	0.0133	U	0.0132	U
Semivolatiles	Hexachloroethane	N	mg/kg	0.0125	U	0.012	U	0.0115	U	0.0153	U	0.0128	U	0.0127	U
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.133	U	0.128	U	0.122	U	0.162	U	0.136	U	0.135	U
Semivolatiles	Isophorone	N	mg/kg	0.00491	U	0.00472	U	0.0045	U	0.00599	U	0.00502	U	0.00498	U
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	0.107	U	0.103	U	0.0983	U	0.131	U	0.11	U	0.109	U
Semivolatiles	Methylphenol, 2-	N	mg/kg	0.00614	U	0.0059	U	0.00563	U	0.00749	U	0.00628	U	0.00623	U
Semivolatiles	Methylphenol, 4-	N	mg/kg	0.0128	U	0.0123	U	0.0117	U	0.0156	U	0.0131	U	0.013	U
Semivolatiles	Naphthalene	N	mg/kg	0.0446	J	0.00933	U	0.00889	U	0.0559	J	0.00992	U	0.00984	U
Semivolatiles	Nitroaniline, 2-	N	mg/kg	0.0177	U	0.017	U	0.0162	U	0.0216	U	0.0181	U	0.0179	U
Semivolatiles	Nitroaniline, 3-	N	mg/kg	0.0139	U	0.0133	U	0.0127	U	0.0169	U	0.0142	U	0.0141	U
Semivolatiles	Nitroaniline, 4-	N	mg/kg	0.145	U	0.139	U	0.133	U	0.177	U	0.148	U	0.147	U
Semivolatiles	Nitrobenzene	N	mg/kg	0.0134	U	0.0129	U	0.0123	U	0.0163	U	0.0137	U	0.0136	U
Semivolatiles	Nitrophenol, 2-	N	mg/kg	0.0145	U	0.0139	U	0.0133	U	0.0177	U	0.0148	U	0.0147	U
Semivolatiles	Nitrophenol, 4-	N	mg/kg	0.0332	U	0.0319	U	0.0304	U	0.0404	U	0.0339	U	0.0336	U
Semivolatiles	n-Nitrosodimethylamine	N	mg/kg	0.0123	U	0.0118	U	0.0113	U	0.015	U	0.0126	U	0.0125	U
Semivolatiles	n-Nitroso-di-n-propylamine	N	mg/kg	0.0146	U	0.0141	U	0.0134	U	0.0178	U	0.0149	U	0.0148	U
Semivolatiles	n-Nitrosodiphenylamine	N	mg/kg	0.00577	U	0.00555	U	0.00529	U	0.00704	U	0.0059	U	0.00586	U
Semivolatiles	Pentachlorophenol	N	mg/kg	0.0367	U	0.0353	U	0.0336	U	0.0448	U	0.0376	U	0.0373	U
Semivolatiles	Phenanthrene	N	mg/kg	0.0733	J	0.00957	U	0.0855	J	0.0964	J	0.0102	U	0.0101	U
Semivolatiles	Phenol	N	mg/kg	0.00491	U	0.00472	U	0.0045	U	0.00599	U	0.00502	U	0.00498	U
Semivolatiles	Pyrene	N	mg/kg	0.111	J	0.0157	U	0.015	U	0.0894	J	0.0167	U	0.0166	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	mg/kg	0.0101	U	0.00968	U	0.00923	U	0.0123	U	0.0103	U	0.0102	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	mg/kg	0.0351	U	0.0338	U	0.0322	U	0.0428	U	0.0359	U	0.0356	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	mg/kg	0.0276	U	0.0266	U	0.0253	U	0.0337	U	0.0283	U	0.028	U
Pesticides/PCBs	Aroclor 1016	N	mg/kg	0.00825	U	0.00788	U			0.525	J	0.00838	U	0.0082	U

Appendix H

Chemical Analytical Data Summary
Soil
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	ASH PIT 2-SB01		ASH PIT 2-SB01		ASH PIT 2-SB01		ASH PIT 2-SB02		ASH PIT 2-SB02		ASH PIT 2-SB02	
			SAMPLE_NO	AP0100		AP0101		AP0102		AP0103		AP0104		AP0105	
			SAMPLE_DATE	15-Jan-09		15-Jan-09		15-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09	
			FK_DEPTH	0 - 1 Ft		3 - 5 Ft		8 - 10 Ft		0 - 1 Ft		3 - 5 Ft		3 - 5 Ft	
			SAMPLE_PURPOSE	REG		REG		REG		REG		REG		FD	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Pesticides/PCBs	Aroclor 1221	N	mg/kg	0.00825	U	0.00788	U			0.00999	U	0.00838	U	0.0082	U
Pesticides/PCBs	Aroclor 1232	N	mg/kg	0.00825	U	0.00788	U			0.00999	U	0.00838	U	0.0082	U
Pesticides/PCBs	Aroclor 1242	N	mg/kg	0.00825	U	0.00788	U			0.00999	U	0.00838	U	0.0082	U
Pesticides/PCBs	Aroclor 1248	N	mg/kg	0.00825	U	0.00788	U			0.00999	U	0.00838	U	0.0082	U
Pesticides/PCBs	Aroclor 1254	N	mg/kg	0.00825	U	0.00788	U			0.00999	U	0.00838	U	0.0082	U
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.00825	U	0.00788	U			0.00999	U	0.00838	U	0.0082	U
Metals - Unfiltered	Aluminum	N	mg/kg	6460	J	6420	J	8750	J	9310	J	12700	J	8930	J
Metals - Unfiltered	Antimony	N	mg/kg	0.81		0.269	J	0.355	J	0.958		0.362	J	0.287	J
Metals - Unfiltered	Arsenic	N	mg/kg	11.6		4.93		11.3		15.3		15.7	J	8.31	J
Metals - Unfiltered	Barium	N	mg/kg	55.7	J	45.6		26.8		84.4	J	85.3	J	59.4	J
Metals - Unfiltered	Beryllium	N	mg/kg	4.74		5.97		6.72		15.3	J	9.06	J	6.76	J
Metals - Unfiltered	Cadmium	N	mg/kg	0.436	J	0.229	U	0.227	U	0.381	J	0.255	U	0.238	U
Metals - Unfiltered	Calcium	N	mg/kg	47200	J	4310		47400		7110		23300		16100	
Metals - Unfiltered	Chromium	N	mg/kg	8.64		11.5		13		11.1		19.8		13.7	
Metals - Unfiltered	Cobalt	N	mg/kg	7.74		8.32		11.9		14.6	J	13.4	J	10.9	J
Metals - Unfiltered	Copper	N	mg/kg	23.6	J	18.3	J	32	J	33.7	J	28.9	J	20.9	J
Metals - Unfiltered	Iron	N	mg/kg	14300	J	16500	J	23100	J	61300	J	30500	J	19400	J
Metals - Unfiltered	Lead	N	mg/kg	50.7		8.39		13		22.5		13.8		11.9	
Metals - Unfiltered	Magnesium	N	mg/kg	8960	J	2350	J	11400	J	1560	J	8640	J	4940	J
Metals - Unfiltered	Manganese	N	mg/kg	354	J	172		386		546		726	J	351	J
Metals - Unfiltered	Mercury	N	mg/kg	0.0959		0.0245		0.0128	J	0.0539		0.0162	J	0.0164	J
Metals - Unfiltered	Nickel	N	mg/kg	18.3	J	20.2		32.6		35.5		35.6		26.9	
Metals - Unfiltered	Potassium	N	mg/kg	893	J	589		1160		587		1170		803	
Metals - Unfiltered	Selenium	N	mg/kg	0.727	J	0.458	U	0.455	U	1.36		0.511	U	0.476	U
Metals - Unfiltered	Silver	N	mg/kg	0.254	U	0.229	U	0.231	U	0.3	U	0.255	U	0.238	U
Metals - Unfiltered	Sodium	N	mg/kg	55.1		68.7		107		60.4		93.9		64.9	
Metals - Unfiltered	Thallium	N	mg/kg	0.425	J	0.229	U	0.423	J	0.416	J	0.3	J	0.238	U
Metals - Unfiltered	Vanadium	N	mg/kg	15.9		16.5		17.3		21.4		26.2		18.1	
Metals - Unfiltered	Zinc	N	mg/kg	64		67.4		59.1		88.6		74.6		66.2	
Water Quality Parameters	% Solids	N	Percent												
Water Quality Parameters	Total organic carbon	N	mg/kg							11400					

Appendix H

Chemical Analytical Data Summary
Soil
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	ASH PIT 2-SB02		ASH PIT 2-SB02		ASH PIT 2-SB03		ASH PIT 2-SB03		ASH PIT 2-SB03		ASH PIT 2-SB04	
			SAMPLE_NO	AP0106		AP0107		AP0108		AP0109		AP0110		AP0111	
			SAMPLE_DATE	16-Jan-09		16-Jan-09		18-Jan-09		18-Jan-09		18-Jan-09		18-Jan-09	
			FK_DEPTH	3 - 5 Ft		8 - 10 Ft		0 - 1 Ft		3 - 5 Ft		8 - 10 Ft		0 - 1 Ft	
			SAMPLE_PURPOSE	FS		REG		REG		REG		REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	mg/kg	0.2	U	0.147	U	0.148	U	0.149	U	0.144	U	0.15	UJ
Explosives	Amino-4,6-dinitrotoluene, 2-	N	mg/kg	0.2	U	0.147	U	0.148	U	0.149	U	0.144	U	0.15	UJ
Explosives	Dinitrobenzene, 1,3-	N	mg/kg	0.2	U	0.147	U	0.148	U	0.149	U	0.144	U	0.15	UJ
Explosives	Dinitrotoluene, 2,4-	N	mg/kg	0.2	U	0.147	U	0.148	U	0.149	U	0.144	U	0.15	UJ
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.2	U	0.147	U	0.148	U	0.149	U	0.144	U	0.15	UJ
Explosives	HMX	N	mg/kg	0.2	U	0.147	U	0.148	U	0.149	U	0.144	U	0.15	UJ
Explosives	Nitrobenzene	N	mg/kg	0.2	U	0.147	U	0.148	U	0.149	U	0.144	U	0.15	UJ
Explosives	Nitrotoluene, 2-	N	mg/kg	0.2	U	0.147	U	0.148	U	0.149	U	0.144	U	0.15	UJ
Explosives	Nitrotoluene, 3-	N	mg/kg	0.2	U	0.147	U	0.148	U	0.149	U	0.144	U	0.15	UJ
Explosives	Nitrotoluene, 4-	N	mg/kg	0.2	U	0.147	U	0.148	U	0.149	U	0.144	U	0.15	UJ
Explosives	RDX	N	mg/kg	0.2	U	0.147	U	0.148	U	0.149	U	0.144	U	0.15	UJ
Explosives	Tetryl	N	mg/kg	0.3	U	0.147	U	0.148	U	0.149	U	0.144	U	0.15	UJ
Explosives	Trinitrobenzene, 1,3,5-	N	mg/kg	0.2	U	0.147	U	0.148	U	0.149	U	0.144	U	0.15	UJ
Explosives	Trinitrotoluene, 2,4,6-	N	mg/kg	0.2	U	0.147	U	0.148	U	0.149	U	0.144	U	0.15	UJ
Semivolatiles	Acenaphthene	N	mg/kg	0.4	U	0.00705	U	0.00842	U	0.00805	U	0.00682	U	0.00796	U
Semivolatiles	Acenaphthylene	N	mg/kg	0.4	U	0.0047	U	0.00562	U	0.00537	U	0.00455	U	0.00531	U
Semivolatiles	ACETOPHENONE	N	mg/kg	0.081	U										
Semivolatiles	Anthracene	N	mg/kg	0.4	U	0.00846	U	0.0101	U	0.00966	U	0.00818	U	0.00956	U
Semivolatiles	Atrazine	N	mg/kg	0.4	U										
Semivolatiles	Benzaldehyde	N	mg/kg	0.4	U										
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.4	U	0.0257	U	0.0307		0.0294	U	0.0249	U	0.0291	U
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.4	U	0.0257	U	0.0307	U	0.0294	U	0.0249	U	0.0291	U
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.4	U	0.0652	U	0.0779	U	0.0745	U	0.0631	U	0.0737	U
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	0.4	U	0.0954	U	0.114	U	0.109	U	0.0923	U	0.108	U
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	0.4	U	0.119	U	0.142	U	0.135	U	0.115	U	0.134	U
Semivolatiles	Benzoic acid	N	mg/kg			0.0954	UJ	0.114	U	0.109	U	0.0923	U	0.108	U
Semivolatiles	Benzyl alcohol	N	mg/kg			0.0954	U	0.114	U	0.109	U	0.0923	U	0.108	U
Semivolatiles	BIBENZENE	N	mg/kg	0.4	U										
Semivolatiles	Bis(2-chloroethoxy)methane	N	mg/kg	0.4	U	0.00822	U	0.00983	U	0.00939	U	0.00795	U	0.00929	U
Semivolatiles	Bis(2-chloroethyl)ether	N	mg/kg	0.4	U	0.00999	U	0.0119	U	0.0114	U	0.00966	U	0.0113	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	mg/kg	0.4	U	0.017	U	0.0204	U	0.0195	U	0.0165	U	0.0192	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	mg/kg	0.4	U	0.0362	U	0.0432	U	0.0413	U	0.035	U	0.0409	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	mg/kg	0.4	U	0.014	U	0.0167	U	0.016	U	0.0135	U	0.0158	U
Semivolatiles	Butyl benzyl phthalate	N	mg/kg	0.4	U	0.0159	U	0.019	U	0.0181	U	0.0153	U	0.0179	U
Semivolatiles	Caprolactam	N	mg/kg	0.4	U										
Semivolatiles	Carbazole	N	mg/kg	0.4	U	0.0391	U	0.0468	U	0.0447	U	0.0378	U	0.0442	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	mg/kg	0.4	U	0.00963	U	0.0115	U	0.011	U	0.00932	U	0.0109	U
Semivolatiles	Chloroaniline, 4-	N	mg/kg	0.4	U	0.034	U	0.0406	U	0.0388	U	0.0328	U	0.0384	U
Semivolatiles	Chloronaphthalene, 2-	N	mg/kg	0.4	U	0.00623	U	0.00744	U	0.00711	U	0.00602	U	0.00703	U
Semivolatiles	Chlorophenol, 2-	N	mg/kg	0.4	U	0.00482	U	0.00576	U	0.0055	U	0.00466	U	0.00544	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	mg/kg	0.4	U	0.03	U	0.0358	U	0.0342	U	0.029	U	0.0338	U
Semivolatiles	Chrysene	N	mg/kg	0.4	U	0.0155	U	0.0185	U	0.0177	U	0.015	U	0.0175	U
Semivolatiles	Dibenz(a,h)anthracene	N	mg/kg	0.4	U	0.0885	U	0.106	U	0.101	U	0.0856	U	0.0999	U
Semivolatiles	Dibenzofuran	N	mg/kg	0.4	U	0.00658	U	0.00786	U	0.00751	U	0.00636	U	0.00743	U

Appendix H

Chemical Analytical Data Summary
Soil
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	ASH PIT 2-SB02		ASH PIT 2-SB02		ASH PIT 2-SB03		ASH PIT 2-SB03		ASH PIT 2-SB03		ASH PIT 2-SB04	
			SAMPLE_NO	AP0106		AP0107		AP0108		AP0109		AP0110		AP0111	
			SAMPLE_DATE	16-Jan-09		16-Jan-09		18-Jan-09		18-Jan-09		18-Jan-09		18-Jan-09	
			FK_DEPTH	3 - 5 Ft		8 - 10 Ft		0 - 1 Ft		3 - 5 Ft		8 - 10 Ft		0 - 1 Ft	
			SAMPLE_PURPOSE	FS		REG		REG		REG		REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Semivolatiles	Dichlorobenzene, 1,2-	N	mg/kg			0.00905	U	0.0108	U	0.0103	U	0.00875	U	0.0102	U
Semivolatiles	Dichlorobenzene, 1,3-	N	mg/kg			0.0142	U	0.017	U	0.0162	U	0.0138	U	0.0161	U
Semivolatiles	Dichlorobenzene, 1,4-	N	mg/kg			0.00764	U	0.00913	U	0.00872	U	0.00739	U	0.00863	U
Semivolatiles	Dichlorobenzidine, 3,3'-	N	mg/kg	1.9	U	0.0388	U	0.0463	U	0.0443	U	0.0375	U	0.0438	U
Semivolatiles	Dichlorophenol, 2,4-	N	mg/kg	0.4	U	0.014	U	0.0167	U	0.016	U	0.0135	U	0.0158	U
Semivolatiles	Diethyl phthalate	N	mg/kg	0.4	U	0.0159	U	0.019	U	0.0181	U	0.0153	U	0.0179	U
Semivolatiles	Dimethyl phthalate	N	mg/kg	0.4	U	0.012	U	0.0143	U	0.0137	U	0.0116	U	0.0135	U
Semivolatiles	Dimethylphenol, 2,4-	N	mg/kg	0.4	U	0.0103	U	0.0124	U	0.0118	U	0.01	U	0.0117	U
Semivolatiles	Di-n-butyl phthalate	N	mg/kg	0.4	U	0.00846	U	0.0101	U	0.00966	U	0.00818	U	0.00956	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	mg/kg	1.9	U	0.0394	U	0.047	U	0.0449	U	0.0381	U	0.0445	U
Semivolatiles	Dinitrophenol, 2,4-	N	mg/kg	1.9	U	0.0624	U	0.0746	U	0.0712	U	0.0603	U	0.0705	U
Semivolatiles	Dinitrotoluene, 2,4-	N	mg/kg	0.4	U	0.0137	U	0.0164	U	0.0157	U	0.0133	U	0.0155	U
Semivolatiles	Dinitrotoluene, 2,6-	N	mg/kg	0.4	U	0.0094	U	0.0112	U	0.0107	U	0.00909	U	0.0106	U
Semivolatiles	Di-n-octyl phthalate	N	mg/kg	0.4	U	0.0737	U	0.088	U	0.0841	U	0.0712	U	0.0832	U
Semivolatiles	DIPHENYLAMINE	N	mg/kg			0.0388	U	0.0463	U	0.0443	U	0.0375	U	0.0438	U
Semivolatiles	Fluoranthene	N	mg/kg	0.4	U	0.00846	U	0.0599	J	0.00966	U	0.00818	U	0.00956	U
Semivolatiles	Fluorene	N	mg/kg	0.4	U	0.0166	U	0.0198	U	0.0189	U	0.016	U	0.0187	U
Semivolatiles	Hexachlorobenzene	N	mg/kg	0.4	U	0.0243	U	0.0291	U	0.0278	U	0.0235	U	0.0275	U
Semivolatiles	Hexachlorobutadiene	N	mg/kg	0.4	U	0.0371	U	0.0444	U	0.0424	U	0.0359	U	0.0419	U
Semivolatiles	Hexachlorocyclopentadiene	N	mg/kg	1.9	U	0.0125	U	0.0149	U	0.0142	U	0.012	U	0.0141	U
Semivolatiles	Hexachloroethane	N	mg/kg	0.4	U	0.012	U	0.0143	U	0.0137	U	0.0116	U	0.0135	U
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.4	U	0.127	U	0.152	U	0.145	U	0.123	U	0.143	U
Semivolatiles	Isophorone	N	mg/kg	0.4	U	0.0047	U	0.00562	U	0.00537	U	0.00455	U	0.00531	U
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	0.4	U	0.103	U	0.123	U	0.117	U	0.0993	U	0.116	U
Semivolatiles	Methylphenol, 2-	N	mg/kg	0.4	U	0.00587	U	0.00702	U	0.00671	U	0.00568	U	0.00664	U
Semivolatiles	Methylphenol, 4-	N	mg/kg	0.4	U	0.0122	U	0.0146	U	0.014	U	0.0118	U	0.0138	U
Semivolatiles	Naphthalene	N	mg/kg	0.4	U	0.00928	U	0.0111	U	0.0106	U	0.00898	U	0.0105	U
Semivolatiles	Nitroaniline, 2-	N	mg/kg	1.9	U	0.0169	U	0.0202	U	0.0193	U	0.0164	U	0.0191	U
Semivolatiles	Nitroaniline, 3-	N	mg/kg	1.9	U	0.0133	U	0.0159	U	0.0152	U	0.0128	U	0.015	U
Semivolatiles	Nitroaniline, 4-	N	mg/kg	1.9	U	0.139	U	0.166	U	0.158	U	0.134	U	0.157	U
Semivolatiles	Nitrobenzene	N	mg/kg	0.4	U	0.0128	U	0.0153	U	0.0146	U	0.0124	U	0.0145	U
Semivolatiles	Nitrophenol, 2-	N	mg/kg	0.4	U	0.0139	U	0.0166	U	0.0158	U	0.0134	U	0.0157	U
Semivolatiles	Nitrophenol, 4-	N	mg/kg	1.9	U	0.0317	U	0.0379	U	0.0362	U	0.0307	U	0.0358	U
Semivolatiles	n-Nitrosodimethylamine	N	mg/kg			0.0117	U	0.014	U	0.0134	U	0.0114	U	0.0133	U
Semivolatiles	n-Nitroso-di-n-propylamine	N	mg/kg	0.4	U	0.014	U	0.0167	U	0.016	U	0.0135	U	0.0158	U
Semivolatiles	n-Nitrosodiphenylamine	N	mg/kg	0.4	U	0.00552	U	0.0066	U	0.00631	U	0.00534	U	0.00624	U
Semivolatiles	Pentachlorophenol	N	mg/kg	0.4	U	0.0351	U	0.042	U	0.0401	U	0.034	U	0.0397	U
Semivolatiles	Phenanthrene	N	mg/kg	0.4	U	0.0544	J	0.0114	U	0.0109	U	0.0667	J	0.0107	U
Semivolatiles	Phenol	N	mg/kg	0.4	U	0.0047	U	0.00562	U	0.00537	U	0.00455	U	0.00531	U
Semivolatiles	Pyrene	N	mg/kg	0.4	U	0.0156	U	0.044	J	0.0178	U	0.0151	U	0.0177	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	mg/kg			0.00963	U	0.0115	U	0.011	U	0.00932	U	0.0109	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	mg/kg	0.4	U	0.0336	U	0.0402	U	0.0384	U	0.0325	U	0.038	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	mg/kg	0.4	U	0.0264	U	0.0316	U	0.0302	U	0.0256	U	0.0299	U
Pesticides/PCBs	Aroclor 1016	N	mg/kg	0.04	U			0.00937	U	0.00886	U			0.00891	U

Appendix H

Chemical Analytical Data Summary
Soil
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	ASH PIT 2-SB02		ASH PIT 2-SB02		ASH PIT 2-SB03		ASH PIT 2-SB03		ASH PIT 2-SB03		ASH PIT 2-SB04	
			SAMPLE_NO	AP0106		AP0107		AP0108		AP0109		AP0110		AP0111	
			SAMPLE_DATE	16-Jan-09		16-Jan-09		18-Jan-09		18-Jan-09		18-Jan-09		18-Jan-09	
			FK_DEPTH	3 - 5 Ft		8 - 10 Ft		0 - 1 Ft		3 - 5 Ft		8 - 10 Ft		0 - 1 Ft	
			SAMPLE_PURPOSE	FS		REG		REG		REG		REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Pesticides/PCBs	Aroclor 1221	N	mg/kg	0.04	U			0.00937	U	0.00886	U			0.00891	U
Pesticides/PCBs	Aroclor 1232	N	mg/kg	0.04	U			0.00937	U	0.00886	U			0.00891	U
Pesticides/PCBs	Aroclor 1242	N	mg/kg	0.04	U			0.00937	U	0.00886	U			0.00891	U
Pesticides/PCBs	Aroclor 1248	N	mg/kg	0.04	U			0.00937	U	0.00886	U			0.00891	U
Pesticides/PCBs	Aroclor 1254	N	mg/kg	0.04	U			0.00937	U	0.00886	U			0.00891	U
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.04	U			0.0162	J	0.00886	U			0.00891	U
Metals - Unfiltered	Aluminum	N	mg/kg	6930		10700	J	8070		15000		7720		7130	
Metals - Unfiltered	Antimony	N	mg/kg	7.3	U	0.626		0.637		0.257	J	0.329	J	0.485	
Metals - Unfiltered	Arsenic	N	mg/kg	4		12.1		7.71	J	5.27	J	12.6	J	26.8	J
Metals - Unfiltered	Barium	N	mg/kg	54.4		41.2	J	69.4	J	98.9	J	18.6	J	98.4	J
Metals - Unfiltered	Beryllium	N	mg/kg	0.61	U	7.06	J	6.46	J	7.43	J	6.35	J	16.3	J
Metals - Unfiltered	Cadmium	N	mg/kg	0.61	U	0.224	U	0.558		0.23	U	0.214	U	0.237	U
Metals - Unfiltered	Calcium	N	mg/kg	7170	J	46600		3430	J	36500	J	54300	J	2160	J
Metals - Unfiltered	Chromium	N	mg/kg	10.6		16		12	J	22.1	J	11.8	J	10.5	J
Metals - Unfiltered	Cobalt	N	mg/kg	8.3		11.7	J	8.68	J	10.8	J	10.7	J	5.96	J
Metals - Unfiltered	Copper	N	mg/kg	13.4		27.8	J	22.5		29.8		29.6		26	
Metals - Unfiltered	Iron	N	mg/kg	13300		23200	J	19100		24900		22100		109000	
Metals - Unfiltered	Lead	N	mg/kg	7.5		18.9		27.7	J	16.7	J	15.8	J	10.1	J
Metals - Unfiltered	Magnesium	N	mg/kg	3340		10800	J	2150	J	10100	J	10400	J	442	J
Metals - Unfiltered	Manganese	N	mg/kg	320		431		211		436		414		116	
Metals - Unfiltered	Mercury	N	mg/kg	0.12	U	0.0101	U	0.0642		0.013	J	0.0132	J	0.0265	
Metals - Unfiltered	Nickel	N	mg/kg	18.7		30.8		21.7	J	31.5	J	27.4	J	17.1	J
Metals - Unfiltered	Potassium	N	mg/kg	1070	J	1450		745		1570		1110		827	
Metals - Unfiltered	Selenium	N	mg/kg	0.61	U	0.448	U	0.928	J	0.459	UJ	0.427	UJ	0.678	J
Metals - Unfiltered	Silver	N	mg/kg	1.2	U	0.224	U	0.24	UJ	0.23	UJ	0.214	UJ	0.237	UJ
Metals - Unfiltered	Sodium	N	mg/kg	609	U	152		36.3		119		120		55.7	
Metals - Unfiltered	Thallium	N	mg/kg	1.2	U	0.343	J	0.47	J	0.35	J	0.336	J	0.468	J
Metals - Unfiltered	Vanadium	N	mg/kg	13		20.2		18.7		25.3		15.4		26.9	
Metals - Unfiltered	Zinc	N	mg/kg	43.5		62.9		80	J	68.5	J	61.5	J	57	J
Water Quality Parameters	% Solids	N	Percent	82.2											
Water Quality Parameters	Total organic carbon	N	mg/kg												

Appendix H

Chemical Analytical Data Summary
Soil
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	ASH PIT 2-SB04		ASH PIT 2-SB04		ASH PIT 2-SB05		ASH PIT 2-SB05		ASH PIT 2-SB05		ASH PIT 2-SB06	
			SAMPLE_NO	AP0112		AP0113		AP0114		AP0115		AP0116		AP0117	
			SAMPLE_DATE	18-Jan-09		19-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09		15-Jan-09	
			FK_DEPTH	3 - 5 Ft		8 - 10 Ft		0 - 1 Ft		3 - 5 Ft		8 - 10 Ft		0 - 1 Ft	
			SAMPLE_PURPOSE	REG		REG		REG		REG		REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	mg/kg	0.146	U	0.146	U	0.15	R	0.148	U	0.145	U	0.149	UJ
Explosives	Amino-4,6-dinitrotoluene, 2-	N	mg/kg	0.146	U	0.146	U	0.15	R	0.148	U	0.145	U	0.149	UJ
Explosives	Dinitrobenzene, 1,3-	N	mg/kg	0.146	U	0.146	U	0.15	R	0.148	U	0.145	U	0.149	UJ
Explosives	Dinitrotoluene, 2,4-	N	mg/kg	0.146	U	0.146	U	0.15	R	0.148	U	0.145	U	0.149	UJ
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.146	U	0.146	U	0.15	R	0.148	U	0.145	U	0.149	UJ
Explosives	HMX	N	mg/kg	0.146	U	0.146	U	0.15	R	0.148	U	0.145	U	0.149	UJ
Explosives	Nitrobenzene	N	mg/kg	0.146	U	0.146	U	0.15	R	0.148	U	0.145	U	0.149	UJ
Explosives	Nitrotoluene, 2-	N	mg/kg	0.146	U	0.146	U	0.15	R	0.148	U	0.145	U	0.149	UJ
Explosives	Nitrotoluene, 3-	N	mg/kg	0.146	U	0.146	U	0.15	R	0.148	U	0.145	U	0.149	UJ
Explosives	Nitrotoluene, 4-	N	mg/kg	0.146	U	0.146	U	0.15	R	0.148	U	0.145	U	0.149	UJ
Explosives	RDX	N	mg/kg	0.146	U	0.146	U	0.15	R	0.148	U	0.145	U	0.149	UJ
Explosives	Tetryl	N	mg/kg	0.146	U	0.146	U	0.15	R	0.148	U	0.145	U	0.149	UJ
Explosives	Trinitrobenzene, 1,3,5-	N	mg/kg	0.146	U	0.146	U	0.15	R	0.148	U	0.145	U	0.149	UJ
Explosives	Trinitrotoluene, 2,4,6-	N	mg/kg	0.146	U	0.146	U	0.15	R	0.148	U	0.145	U	0.149	UJ
Semivolatiles	Acenaphthene	N	mg/kg	0.00812	U	0.00715	U	0.00879	U	0.00775	U	0.00691	U	0.00752	U
Semivolatiles	Acenaphthylene	N	mg/kg	0.00541	U	0.00477	U	0.00586	U	0.00517	U	0.0046	U	0.00501	U
Semivolatiles	ACETOPHENONE	N	mg/kg												
Semivolatiles	Anthracene	N	mg/kg	0.00975	U	0.00858	U	0.0105	U	0.0093	U	0.00829	U	0.00902	U
Semivolatiles	Atrazine	N	mg/kg												
Semivolatiles	Benzaldehyde	N	mg/kg												
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.0296	U	0.0261	U	0.0321	U	0.0283	U	0.0252	U	0.0274	U
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.0296	U	0.0261	U	0.0321	U	0.0283	U	0.0252	U	0.0274	U
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.0751	U	0.0662	U	0.0813	U	0.0717	U	0.0639	U	0.0695	U
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	0.11	U	0.0968	U	0.119	U	0.105	U	0.0935	U	0.102	U
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	0.137	U	0.12	U	0.148	U	0.13	U	0.116	U	0.127	U
Semivolatiles	Benzoic acid	N	mg/kg	0.11	U	0.0968	U	0.119	U	0.105	U	0.0935	UJ	0.622	
Semivolatiles	Benzyl alcohol	N	mg/kg	0.11	U	0.0968	U	0.119	U	0.105	U	0.0935	U	0.102	U
Semivolatiles	BIBENZENE	N	mg/kg												
Semivolatiles	Bis(2-chloroethoxy)methane	N	mg/kg	0.00948	U	0.00834	U	0.0103	U	0.00904	U	0.00806	U	0.00877	U
Semivolatiles	Bis(2-chloroethyl)ether	N	mg/kg	0.0115	U	0.0101	U	0.0124	U	0.011	U	0.00978	U	0.0107	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	mg/kg	0.0196	U	0.0173	U	0.0212	U	0.0187	U	0.0167	U	0.0182	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	mg/kg	0.0417	U	0.0367	U	0.0451	U	0.0398	U	0.0355	U	0.0386	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	mg/kg	0.0161	U	0.0142	U	0.0174	U	0.0154	U	0.0137	U	0.0149	U
Semivolatiles	Butyl benzyl phthalate	N	mg/kg	0.0183	U	0.0161	U	0.0198	U	0.0174	U	0.0155	U	0.0169	U
Semivolatiles	Caprolactam	N	mg/kg												
Semivolatiles	Carbazole	N	mg/kg	0.0451	U	0.0397	U	0.0488	U	0.043	U	0.0383	U	0.0417	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	mg/kg	0.0111	U	0.00977	U	0.012	U	0.0106	U	0.00944	U	0.0103	U
Semivolatiles	Chloroaniline, 4-	N	mg/kg	0.0391	U	0.0345	U	0.0423	U	0.0373	U	0.00333	U	0.0362	U
Semivolatiles	Chloronaphthalene, 2-	N	mg/kg	0.00717	U	0.00632	U	0.00776	U	0.00684	U	0.0061	U	0.00664	U
Semivolatiles	Chlorophenol, 2-	N	mg/kg	0.00555	U	0.00489	U	0.006	U	0.00529	U	0.00472	U	0.00514	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	mg/kg	0.0345	U	0.0304	U	0.0373	U	0.0329	U	0.0294	U	0.032	U
Semivolatiles	Chrysene	N	mg/kg	0.0179	U	0.0157	U	0.0193	U	0.017	U	0.0152	U	0.0165	U
Semivolatiles	Dibenz(a,h)anthracene	N	mg/kg	0.102	U	0.0898	U	0.11	U	0.0972	U	0.0867	U	0.0944	U
Semivolatiles	Dibenzofuran	N	mg/kg	0.00758	U	0.00668	U	0.0082	U	0.00723	U	0.00645	U	0.00702	U

Appendix H

Chemical Analytical Data Summary
Soil
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	ASH PIT 2-SB04		ASH PIT 2-SB04		ASH PIT 2-SB05		ASH PIT 2-SB05		ASH PIT 2-SB05		ASH PIT 2-SB06	
			SAMPLE_NO	AP0112		AP0113		AP0114		AP0115		AP0116		AP0117	
			SAMPLE_DATE	18-Jan-09		19-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09		15-Jan-09	
			FK_DEPTH	3 - 5 Ft		8 - 10 Ft		0 - 1 Ft		3 - 5 Ft		8 - 10 Ft		0 - 1 Ft	
			SAMPLE_PURPOSE	REG		REG		REG		REG		REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Semivolatiles	Dichlorobenzene, 1,2-	N	mg/kg	0.0104	U	0.00918	U	0.0113	U	0.00994	U	0.00886	U	0.00965	U
Semivolatiles	Dichlorobenzene, 1,3-	N	mg/kg	0.0164	U	0.0144	U	0.0177	U	0.0156	U	0.0139	U	0.0152	U
Semivolatiles	Dichlorobenzene, 1,4-	N	mg/kg	0.0088	U	0.00775	U	0.00952	U	0.00839	U	0.00748	U	0.00815	U
Semivolatiles	Dichlorobenzidine, 3,3'-	N	mg/kg	0.0447	U	0.0393	U	0.0483	U	0.0426	U	0.038	U	0.0414	U
Semivolatiles	Dichlorophenol, 2,4-	N	mg/kg	0.0161	U	0.0142	U	0.0174	U	0.0154	U	0.0137	U	0.0149	U
Semivolatiles	Diethyl phthalate	N	mg/kg	0.0183	U	0.0161	U	0.0198	U	0.0174	U	0.0155	U	0.0169	U
Semivolatiles	Dimethyl phthalate	N	mg/kg	0.0138	U	0.0122	U	0.0149	U	0.0132	U	0.0117	U	0.0128	U
Semivolatiles	Dimethylphenol, 2,4-	N	mg/kg	0.0119	U	0.0105	U	0.0129	U	0.0114	U	0.0101	U	0.011	U
Semivolatiles	Di-n-butyl phthalate	N	mg/kg	0.00975	U	0.00858	U	0.0105	U	0.0093	U	0.00829	U	0.00902	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	mg/kg	0.0453	U	0.0399	U	0.0491	U	0.0433	U	0.0386	U	0.042	U
Semivolatiles	Dinitrophenol, 2,4-	N	mg/kg	0.0719	U	0.0633	U	0.0778	UJ	0.0686	UJ	0.0611	U	0.0665	U
Semivolatiles	Dinitrotoluene, 2,4-	N	mg/kg	0.0158	U	0.0139	U	0.0171	U	0.0151	U	0.0135	U	0.0147	U
Semivolatiles	Dinitrotoluene, 2,6-	N	mg/kg	0.0108	U	0.00954	U	0.0117	U	0.0103	U	0.00921	U	0.01	U
Semivolatiles	Di-n-octyl phthalate	N	mg/kg	0.0849	U	0.0747	U	0.0918	U	0.081	U	0.0722	U	0.0786	U
Semivolatiles	DIPHENYLAMINE	N	mg/kg	0.0447	U	0.0393	U	0.0483	U	0.0426	U	0.038	U	0.0414	U
Semivolatiles	Fluoranthene	N	mg/kg	0.00975	U	0.00858	U	0.0105	U	0.0093	U	0.00829	U	0.00902	U
Semivolatiles	Fluorene	N	mg/kg	0.0191	U	0.0168	U	0.0206	U	0.0182	U	0.0162	U	0.0177	U
Semivolatiles	Hexachlorobenzene	N	mg/kg	0.028	U	0.0247	U	0.0303	U	0.0267	U	0.0238	U	0.0259	U
Semivolatiles	Hexachlorobutadiene	N	mg/kg	0.0428	U	0.0377	U	0.0463	U	0.0408	U	0.0364	U	0.0396	U
Semivolatiles	Hexachlorocyclopentadiene	N	mg/kg	0.0143	U	0.0126	U	0.0155	U	0.0137	U	0.0122	U	0.0133	U
Semivolatiles	Hexachloroethane	N	mg/kg	0.0138	U	0.0122	U	0.0149	U	0.0132	U	0.0117	U	0.0128	U
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.146	U	0.129	U	0.158	U	0.139	U	0.124	U	0.135	U
Semivolatiles	Isophorone	N	mg/kg	0.00541	U	0.00477	U	0.00586	U	0.00517	U	0.0046	U	0.00501	U
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	0.118	U	0.104	U	0.128	U	0.113	U	0.101	U	0.11	U
Semivolatiles	Methylphenol, 2-	N	mg/kg	0.00677	U	0.00596	U	0.00732	U	0.00646	U	0.00576	U	0.00627	U
Semivolatiles	Methylphenol, 4-	N	mg/kg	0.0141	U	0.0124	U	0.0152	U	0.0134	U	0.012	U	0.013	U
Semivolatiles	Naphthalene	N	mg/kg	0.0107	U	0.00942	U	0.0444	J	0.0102	U	0.00909	U	0.0099	U
Semivolatiles	Nitroaniline, 2-	N	mg/kg	0.0195	U	0.0172	U	0.0211	U	0.0186	U	0.0166	U	0.018	U
Semivolatiles	Nitroaniline, 3-	N	mg/kg	0.0153	U	0.0135	U	0.0165	U	0.0146	U	0.013	U	0.0142	U
Semivolatiles	Nitroaniline, 4-	N	mg/kg	0.16	U	0.141	U	0.173	U	0.152	U	0.136	U	0.148	U
Semivolatiles	Nitrobenzene	N	mg/kg	0.0148	U	0.013	U	0.016	U	0.0141	U	0.0125	U	0.0137	U
Semivolatiles	Nitrophenol, 2-	N	mg/kg	0.016	U	0.0141	U	0.0173	U	0.0152	U	0.0136	U	0.0148	U
Semivolatiles	Nitrophenol, 4-	N	mg/kg	0.0366	U	0.0322	U	0.0395	U	0.0349	U	0.0311	U	0.0338	U
Semivolatiles	n-Nitrosodimethylamine	N	mg/kg	0.0135	U	0.0119	U	0.0146	U	0.0129	U	0.0115	U	0.0125	U
Semivolatiles	n-Nitroso-di-n-propylamine	N	mg/kg	0.0161	U	0.0142	U	0.0174	U	0.0154	U	0.0137	U	0.0149	U
Semivolatiles	n-Nitrosodiphenylamine	N	mg/kg	0.00636	U	0.0056	U	0.00688	U	0.00607	U	0.00541	U	0.00589	U
Semivolatiles	Pentachlorophenol	N	mg/kg	0.0405	U	0.0356	U	0.0438	U	0.0386	U	0.0344	U	0.0375	U
Semivolatiles	Phenanthrene	N	mg/kg	0.011	U	0.0453	J	0.0119	U	0.0105	U	0.0491	J	0.0102	U
Semivolatiles	Phenol	N	mg/kg	0.00541	U	0.00477	U	0.00586	U	0.00517	U	0.0046	U	0.00501	U
Semivolatiles	Pyrene	N	mg/kg	0.018	U	0.0159	U	0.0195	U	0.0172	U	0.0153	U	0.0167	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	mg/kg	0.0111	U	0.00977	U	0.012	U	0.0106	U	0.00944	U	0.0103	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	mg/kg	0.0387	U	0.0341	U	0.0419	U	0.0369	U	0.0329	U	0.0358	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	mg/kg	0.0305	U	0.0268	U	0.0329	U	0.0291	U	0.0259	U	0.0282	U
Pesticides/PCBs	Aroclor 1016	N	mg/kg	0.00897	U			0.00964	U	0.00861	U			0.00825	U

Appendix H

Chemical Analytical Data Summary
Soil
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	ASH PIT 2-SB04		ASH PIT 2-SB04		ASH PIT 2-SB05		ASH PIT 2-SB05		ASH PIT 2-SB05		ASH PIT 2-SB06	
			SAMPLE_NO	AP0112		AP0113		AP0114		AP0115		AP0116		AP0117	
			SAMPLE_DATE	18-Jan-09		19-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09		15-Jan-09	
			FK_DEPTH	3 - 5 Ft		8 - 10 Ft		0 - 1 Ft		3 - 5 Ft		8 - 10 Ft		0 - 1 Ft	
			SAMPLE_PURPOSE	REG		REG		REG		REG		REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Pesticides/PCBs	Aroclor 1221	N	mg/kg	0.00897	U			0.00964	U	0.00861	U			0.00825	U
Pesticides/PCBs	Aroclor 1232	N	mg/kg	0.00897	U			0.00964	U	0.00861	U			0.00825	U
Pesticides/PCBs	Aroclor 1242	N	mg/kg	0.00897	U			0.00964	U	0.00861	U			0.00825	U
Pesticides/PCBs	Aroclor 1248	N	mg/kg	0.00897	U			0.00964	U	0.00861	U			0.00825	U
Pesticides/PCBs	Aroclor 1254	N	mg/kg	0.00897	U			0.00964	U	0.00861	U			0.00825	U
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.00897	U			0.00964	U	0.00861	U			0.00825	U
Metals - Unfiltered	Aluminum	N	mg/kg	7830		8670		8800	J	8060	J	9300	J	7150	J
Metals - Unfiltered	Antimony	N	mg/kg	0.312	J	0.392	J	0.922		0.259	J	0.486		0.708	
Metals - Unfiltered	Arsenic	N	mg/kg	4.51	J	12.1	J	24.4		6.27		11.1		11.4	
Metals - Unfiltered	Barium	N	mg/kg	61.5	J	35.6	J	109	J	68.2	J	49	J	98.7	
Metals - Unfiltered	Beryllium	N	mg/kg	6.68	J	7.02	J	15.5	J	7.61	J	7.53	J	12.1	
Metals - Unfiltered	Cadmium	N	mg/kg	0.271	U	0.245	U	0.716		0.241	U	0.276	J	0.423	J
Metals - Unfiltered	Calcium	N	mg/kg	3010	J	50700	J	4140		351		42300		2830	
Metals - Unfiltered	Chromium	N	mg/kg	11.9	J	12.7	J	12.8		11.7		14.4		7.84	
Metals - Unfiltered	Cobalt	N	mg/kg	7.88	J	11	J	8.29	J	6.67	J	14	J	4.64	
Metals - Unfiltered	Copper	N	mg/kg	20.9		38.4		31.3	J	15.6	J	33.6	J	22.2	J
Metals - Unfiltered	Iron	N	mg/kg	19200		24400		61600	J	22100	J	24500	J	51800	J
Metals - Unfiltered	Lead	N	mg/kg	18.9	J	16	J	27.4		12.2		13.4		12.5	
Metals - Unfiltered	Magnesium	N	mg/kg	2530	J	10800	J	1320	J	1980	J	8760	J	819	J
Metals - Unfiltered	Manganese	N	mg/kg	87.4		522		319		100		551		243	
Metals - Unfiltered	Mercury	N	mg/kg	0.0352		0.0147	J	0.118		0.0242	J	0.011	U	0.0688	
Metals - Unfiltered	Nickel	N	mg/kg	24.8	J	28.8	J	20.5		18		36.8		13.7	
Metals - Unfiltered	Potassium	N	mg/kg	705		1150		837		513		990		616	
Metals - Unfiltered	Selenium	N	mg/kg	0.859	J	0.49	UJ	1.44		0.482	U	0.779	J	0.737	J
Metals - Unfiltered	Silver	N	mg/kg	0.271	UJ	0.245	UJ	0.284	U	0.241	U	0.238	U	0.227	U
Metals - Unfiltered	Sodium	N	mg/kg	43.6		119		79.2		18.4		91.4		76.3	
Metals - Unfiltered	Thallium	N	mg/kg	0.271	U	0.315	J	0.939		0.241	U	0.347	J	0.312	J
Metals - Unfiltered	Vanadium	N	mg/kg	17.8		17.5		23		17		18.2		17.3	
Metals - Unfiltered	Zinc	N	mg/kg	64.4	J	60.4	J	102		68.9		85.3		53.2	
Water Quality Parameters	% Solids	N	Percent												
Water Quality Parameters	Total organic carbon	N	mg/kg												

Appendix H

Chemical Analytical Data Summary
Soil
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	ASH PIT 2-SB06		ASH PIT 2-SB06		ASH PIT 2-SB07		ASH PIT 2-SB07		ASH PIT 2-SB07		ASH PIT 2-SB07	
			SAMPLE_NO	AP0118		AP0119		AP0120		AP0121		AP0122		AP0123	
			SAMPLE_DATE	15-Jan-09		15-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09	
			FK_DEPTH	3 - 5 Ft		8 - 10 Ft		0 - 1 Ft		0 - 1 Ft		0 - 1 Ft		3 - 5 Ft	
			SAMPLE_PURPOSE	REG		REG		REG		FD		FS		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	mg/kg	0.146	U	0.149	U	0.148	U	0.149	U	0.2	U	0.149	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	mg/kg	0.146	U	0.149	U	0.148	U	0.149	U	0.2	U	0.149	U
Explosives	Dinitrobenzene, 1,3-	N	mg/kg	0.146	U	0.149	U	0.148	U	0.149	U	0.2	U	0.149	U
Explosives	Dinitrotoluene, 2,4-	N	mg/kg	0.146	U	0.149	U	0.148	U	0.149	U	0.2	U	0.149	U
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.146	U	0.149	U	0.148	U	0.149	U	0.2	U	0.149	U
Explosives	HMX	N	mg/kg	0.146	U	0.149	U	0.148	U	0.149	U	0.2	U	0.149	U
Explosives	Nitrobenzene	N	mg/kg	0.146	U	0.149	U	0.148	U	0.149	U	0.2	U	0.149	U
Explosives	Nitrotoluene, 2-	N	mg/kg	0.146	U	0.149	U	0.148	U	0.149	U	0.2	U	0.149	U
Explosives	Nitrotoluene, 3-	N	mg/kg	0.146	U	0.149	U	0.148	U	0.149	U	0.2	U	0.149	U
Explosives	Nitrotoluene, 4-	N	mg/kg	0.146	U	0.149	U	0.148	U	0.149	U	0.2	U	0.149	U
Explosives	RDX	N	mg/kg	0.146	U	0.149	U	0.148	U	0.149	U	0.2	U	0.149	U
Explosives	Tetryl	N	mg/kg	0.146	U	0.149	U	0.148	U	0.149	U	0.3	U	0.149	U
Explosives	Trinitrobenzene, 1,3,5-	N	mg/kg	0.146	U	0.149	U	0.148	U	0.149	U	0.2	U	0.149	U
Explosives	Trinitrotoluene, 2,4,6-	N	mg/kg	0.146	U	0.149	U	0.148	U	0.149	U	0.2	U	0.149	U
Semivolatiles	Acenaphthene	N	mg/kg	0.0071	U	0.00771	U	0.00739	U	0.00719	U	0.41	U	0.00684	U
Semivolatiles	Acenaphthylene	N	mg/kg	0.00474	U	0.00514	U	0.00493	U	0.00479	U	0.41	U	0.00456	U
Semivolatiles	ACETOPHENONE	N	mg/kg									0.083	U		
Semivolatiles	Anthracene	N	mg/kg	0.00852	U	0.00925	U	0.00887	U	0.00862	U	0.41	U	0.00821	U
Semivolatiles	Atrazine	N	mg/kg									0.41	U		
Semivolatiles	Benzaldehyde	N	mg/kg									0.41	U		
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.0259	U	0.0281	U	0.027	U	0.0262	U	0.41	U	0.025	U
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.0259	U	0.0281	U	0.027	U	0.0262	U	0.41	U	0.025	U
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.0657	U	0.0713	U	0.0683	U	0.0665	U	0.41	U	0.0633	U
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	0.0961	U	0.104	U	0.1	U	0.0973	U	0.41	U	0.0926	U
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	0.12	U	0.13	U	0.124	U	0.121	U	0.41	U	0.115	U
Semivolatiles	Benzoic acid	N	mg/kg	0.0961	U	0.104	UJ	0.1	U	0.0973	UJ			0.0926	UJ
Semivolatiles	Benzyl alcohol	N	mg/kg	0.0961	U	0.104	U	0.1	U	0.0973	U			0.0926	U
Semivolatiles	BIBENZENE	N	mg/kg									0.41	U		
Semivolatiles	Bis(2-chloroethoxy)methane	N	mg/kg	0.00829	U	0.009	U	0.00862	U	0.00838	U	0.41	U	0.00798	U
Semivolatiles	Bis(2-chloroethyl)ether	N	mg/kg	0.0101	U	0.0109	U	0.0105	U	0.0102	U	0.41	U	0.00969	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	mg/kg	0.0172	U	0.0186	U	0.0179	U	0.0174	U	0.41	U	0.0165	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	mg/kg	0.0365	U	0.0396	U	0.0379	U	0.0369	U	0.41	U	0.0351	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	mg/kg	0.0141	U	0.0153	U	0.0147	U	0.0143	U	0.41	U	0.0136	U
Semivolatiles	Butyl benzyl phthalate	N	mg/kg	0.016	U	0.0173	U	0.0166	U	0.0162	U	0.41	U	0.0154	U
Semivolatiles	Caprolactam	N	mg/kg									0.41	U		
Semivolatiles	Carbazole	N	mg/kg	0.0394	U	0.0428	U	0.041	U	0.0399	U	0.41	U	0.038	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	mg/kg	0.00971	U	0.0105	U	0.0101	U	0.00982	U	0.41	U	0.00935	U
Semivolatiles	Chloroaniline, 4-	N	mg/kg	0.0342	U	0.0371	U	0.0356	U	0.0346	U	0.41	U	0.0329	U
Semivolatiles	Chloronaphthalene, 2-	N	mg/kg	0.00627	U	0.00681	U	0.00653	U	0.00635	U	0.41	U	0.00604	U
Semivolatiles	Chlorophenol, 2-	N	mg/kg	0.00485	U	0.00527	U	0.00505	U	0.00491	U	0.41	U	0.00467	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	mg/kg	0.0302	U	0.0328	U	0.0314	U	0.0305	U	0.41	U	0.0291	U
Semivolatiles	Chrysene	N	mg/kg	0.0156	U	0.017	U	0.0163	U	0.0158	U	0.41	U	0.015	U
Semivolatiles	Dibenz(a,h)anthracene	N	mg/kg	0.0891	U	0.0968	U	0.0927	U	0.0902	U	0.41	U	0.0859	U
Semivolatiles	Dibenzofuran	N	mg/kg	0.00663	U	0.0072	U	0.0069	U	0.00671	U	0.41	U	0.00638	U

Appendix H

Chemical Analytical Data Summary
Soil
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	ASH PIT 2-SB06		ASH PIT 2-SB06		ASH PIT 2-SB07		ASH PIT 2-SB07		ASH PIT 2-SB07		ASH PIT 2-SB07	
			SAMPLE_NO	AP0118		AP0119		AP0120		AP0121		AP0122		AP0123	
			SAMPLE_DATE	15-Jan-09		15-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09	
			FK_DEPTH	3 - 5 Ft		8 - 10 Ft		0 - 1 Ft		0 - 1 Ft		0 - 1 Ft		3 - 5 Ft	
			SAMPLE_PURPOSE	REG		REG		REG		FD		FS		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Semivolatiles	Dichlorobenzene, 1,2-	N	mg/kg	0.00912	U	0.0099	U	0.00948	U	0.00922	U			0.00878	U
Semivolatiles	Dichlorobenzene, 1,3-	N	mg/kg	0.0143	U	0.0156	U	0.0149	U	0.0145	U			0.0138	U
Semivolatiles	Dichlorobenzene, 1,4-	N	mg/kg	0.0077	U	0.00835	U	0.008	U	0.00779	U			0.00741	U
Semivolatiles	Dichlorobenzidine, 3,3'-	N	mg/kg	0.0391	U	0.0424	U	0.0406	U	0.0395	U	2	U	0.0376	U
Semivolatiles	Dichlorophenol, 2,4-	N	mg/kg	0.0141	U	0.0153	U	0.0147	U	0.0143	U	0.41	U	0.0136	U
Semivolatiles	Diethyl phthalate	N	mg/kg	0.016	U	0.0173	U	0.0166	U	0.0162	U	0.41	U	0.0154	U
Semivolatiles	Dimethyl phthalate	N	mg/kg	0.0121	U	0.0131	U	0.0126	U	0.0122	U	0.41	U	0.0116	U
Semivolatiles	Dimethylphenol, 2,4-	N	mg/kg	0.0104	U	0.0113	U	0.0108	U	0.0105	U	0.41	U	0.01	U
Semivolatiles	Di-n-butyl phthalate	N	mg/kg	0.00852	U	0.00925	U	0.00887	U	0.00862	U	0.41	U	0.00821	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	mg/kg	0.0397	U	0.0431	U	0.0413	U	0.0401	U	2	U	0.0382	U
Semivolatiles	Dinitrophenol, 2,4-	N	mg/kg	0.0629	U	0.0682	U	0.0654	U	0.0636	U	2	U	0.0605	U
Semivolatiles	Dinitrotoluene, 2,4-	N	mg/kg	0.0139	U	0.015	U	0.0144	U	0.014	U	0.41	U	0.0133	U
Semivolatiles	Dinitrotoluene, 2,6-	N	mg/kg	0.00947	U	0.0103	U	0.00985	U	0.00958	U	0.41	U	0.00912	U
Semivolatiles	Di-n-octyl phthalate	N	mg/kg	0.0742	U	0.0806	U	0.0772	U	0.0751	U	0.41	U	0.0715	U
Semivolatiles	DIPHENYLAMINE	N	mg/kg	0.0391	U	0.0424	U	0.0406	U	0.0395	U			0.0376	U
Semivolatiles	Fluoranthene	N	mg/kg	0.00852	U	0.00925	U	0.00887	U	0.00862	U	0.41	U	0.00821	U
Semivolatiles	Fluorene	N	mg/kg	0.0167	U	0.0181	U	0.0174	U	0.0169	U	0.41	U	0.0161	U
Semivolatiles	Hexachlorobenzene	N	mg/kg	0.0245	U	0.0266	U	0.0255	U	0.0248	U	0.41	U	0.0236	U
Semivolatiles	Hexachlorobutadiene	N	mg/kg	0.0374	U	0.0406	U	0.0389	U	0.0378	U	0.41	U	0.036	U
Semivolatiles	Hexachlorocyclopentadiene	N	mg/kg	0.0125	U	0.0136	U	0.0131	U	0.0127	U	2	U	0.0121	U
Semivolatiles	Hexachloroethane	N	mg/kg	0.0121	U	0.0131	U	0.0126	U	0.0122	U	0.41	U	0.0116	U
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.128	U	0.139	U	0.133	U	0.129	U	0.41	U	0.123	U
Semivolatiles	Isophorone	N	mg/kg	0.00474	U	0.00514	U	0.00493	U	0.00479	U	0.41	U	0.00456	U
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	0.103	U	0.112	U	0.108	U	0.105	U	0.41	U	0.0996	U
Semivolatiles	Methylphenol, 2-	N	mg/kg	0.00592	U	0.00643	U	0.00616	U	0.00599	U	0.41	U	0.0057	U
Semivolatiles	Methylphenol, 4-	N	mg/kg	0.0123	U	0.0134	U	0.0128	U	0.0125	U	0.41	U	0.0119	U
Semivolatiles	Naphthalene	N	mg/kg	0.00935	U	0.0102	U	0.00973	U	0.00946	U	0.41	U	0.00901	U
Semivolatiles	Nitroaniline, 2-	N	mg/kg	0.017	U	0.0185	U	0.0177	U	0.0172	U	2	U	0.0164	U
Semivolatiles	Nitroaniline, 3-	N	mg/kg	0.0134	U	0.0145	U	0.0139	U	0.0135	U	2	U	0.0129	U
Semivolatiles	Nitroaniline, 4-	N	mg/kg	0.14	U	0.152	U	0.145	U	0.141	U	2	U	0.135	U
Semivolatiles	Nitrobenzene	N	mg/kg	0.0129	U	0.014	U	0.0134	U	0.0131	U	0.41	U	0.0124	U
Semivolatiles	Nitrophenol, 2-	N	mg/kg	0.014	U	0.0152	U	0.0145	U	0.0141	U	0.41	U	0.0135	U
Semivolatiles	Nitrophenol, 4-	N	mg/kg	0.032	U	0.0347	U	0.0332	U	0.0324	U	2	U	0.0308	U
Semivolatiles	n-Nitrosodimethylamine	N	mg/kg	0.0118	U	0.0129	U	0.0123	U	0.012	U			0.0114	U
Semivolatiles	n-Nitroso-di-n-propylamine	N	mg/kg	0.0141	U	0.0153	U	0.0147	U	0.0143	U	0.41	U	0.0136	U
Semivolatiles	n-Nitrosodiphenylamine	N	mg/kg	0.00556	U	0.00604	U	0.00579	U	0.00563	U	0.41	U	0.00536	U
Semivolatiles	Pentachlorophenol	N	mg/kg	0.0354	U	0.0384	U	0.0368	U	0.0358	U	0.41	U	0.0341	U
Semivolatiles	Phenanthrene	N	mg/kg	0.00959	U	0.0403	J	0.00997	U	0.0097	U	0.41	U	0.00923	U
Semivolatiles	Phenol	N	mg/kg	0.00474	U	0.00514	U	0.00493	U	0.00479	U	0.41	U	0.00456	U
Semivolatiles	Pyrene	N	mg/kg	0.0157	U	0.0171	U	0.0164	U	0.0159	U	0.41	U	0.0152	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	mg/kg	0.00971	U	0.0105	U	0.0101	U	0.00982	U			0.00935	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	mg/kg	0.0339	U	0.0368	U	0.0352	U	0.0343	U	0.41	U	0.0326	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	mg/kg	0.0266	U	0.0289	U	0.0277	U	0.0269	U	0.41	U	0.0257	U
Pesticides/PCBs	Aroclor 1016	N	mg/kg	0.00782	U			0.00821	U	0.00799	U	0.041	U	0.00748	U

Appendix H

Chemical Analytical Data Summary
Soil
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	ASH PIT 2-SB06		ASH PIT 2-SB06		ASH PIT 2-SB07		ASH PIT 2-SB07		ASH PIT 2-SB07		ASH PIT 2-SB07	
			SAMPLE_NO	AP0118		AP0119		AP0120		AP0121		AP0122		AP0123	
			SAMPLE_DATE	15-Jan-09		15-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09	
			FK_DEPTH	3 - 5 Ft		8 - 10 Ft		0 - 1 Ft		0 - 1 Ft		0 - 1 Ft		3 - 5 Ft	
			SAMPLE_PURPOSE	REG		REG		REG		FD		FS		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Pesticides/PCBs	Aroclor 1221	N	mg/kg	0.00782	U			0.00821	U	0.00799	U	0.041	U	0.00748	U
Pesticides/PCBs	Aroclor 1232	N	mg/kg	0.00782	U			0.00821	U	0.00799	U	0.041	U	0.00748	U
Pesticides/PCBs	Aroclor 1242	N	mg/kg	0.00782	U			0.00821	U	0.00799	U	0.041	U	0.00748	U
Pesticides/PCBs	Aroclor 1248	N	mg/kg	0.00782	U			0.00821	U	0.00799	U	0.041	U	0.00748	U
Pesticides/PCBs	Aroclor 1254	N	mg/kg	0.00782	U			0.00821	U	0.00799	U	0.041	U	0.00748	U
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.00782	U			0.00821	U	0.00799	U	0.041	U	0.00748	U
Metals - Unfiltered	Aluminum	N	mg/kg	6750	J	13200	J	7100	J	8180	J	7200		5250	J
Metals - Unfiltered	Antimony	N	mg/kg	0.412	J	0.44	J	0.336	J	0.291	J	7.5	U	0.269	J
Metals - Unfiltered	Arsenic	N	mg/kg	6.33		3.55		6.09		6.04		5.5		6.18	
Metals - Unfiltered	Barium	N	mg/kg	58.3		53.4	J	44.5		56.7		48.6		43.7	
Metals - Unfiltered	Beryllium	N	mg/kg	6.9		7.73	J	6.01		6.41		0.63	U	5.46	
Metals - Unfiltered	Cadmium	N	mg/kg	0.293	J	0.247	U	0.226	U	0.232	U	0.63	U	0.219	U
Metals - Unfiltered	Calcium	N	mg/kg	2090		44000		2100		2270		1820	J	1840	
Metals - Unfiltered	Chromium	N	mg/kg	10.1		19.4		10.6		11.8		10.4		8.82	
Metals - Unfiltered	Cobalt	N	mg/kg	8.93		14.6	J	8.14		8.99		7.7		7.46	
Metals - Unfiltered	Copper	N	mg/kg	12.6	J	32.1	J	18	J	16.5	J	14.6		13.8	J
Metals - Unfiltered	Iron	N	mg/kg	19900	J	24000	J	17600	J	19100	J	16600		15500	J
Metals - Unfiltered	Lead	N	mg/kg	11.2		14.3		12.5		12.8		9.3		9.74	
Metals - Unfiltered	Magnesium	N	mg/kg	2110	J	12000	J	2100	J	2350	J	1880		1730	J
Metals - Unfiltered	Manganese	N	mg/kg	234		392		198		226		169		152	
Metals - Unfiltered	Mercury	N	mg/kg	0.0156	J	0.0132	J	0.0203	J	0.0193	J	0.13	U	0.0112	J
Metals - Unfiltered	Nickel	N	mg/kg	21.8		36.7		19.1		20.2		17.9		18.5	
Metals - Unfiltered	Potassium	N	mg/kg	426		1730		450		470		703	J	323	
Metals - Unfiltered	Selenium	N	mg/kg	0.497	U	0.494	U	0.453	U	0.464	U	0.63	U	0.439	U
Metals - Unfiltered	Silver	N	mg/kg	0.249	U	0.263	U	0.226	U	0.232	U	1.3	U	0.219	U
Metals - Unfiltered	Sodium	N	mg/kg	37.1		135		28.4		28		626	U	43.3	
Metals - Unfiltered	Thallium	N	mg/kg	0.249	U	0.293	J	0.226	U	0.232	U	1.3	U	0.219	U
Metals - Unfiltered	Vanadium	N	mg/kg	15.5		23.2		15.4		17.4		14.1		13.6	
Metals - Unfiltered	Zinc	N	mg/kg	63.7		73		63.2		27.8		51.4		55.4	
Water Quality Parameters	% Solids	N	Percent									79.9			
Water Quality Parameters	Total organic carbon	N	mg/kg												

Appendix H

Chemical Analytical Data Summary
Soil
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	ASH PIT 2-SB07		ASH PIT 2-SB08		ASH PIT 2-SB08		ASH PIT 2-SB08		ASH PIT 2-SB08		ASH PIT 2-SB08	
			SAMPLE_NO	AP0124		AP0125		AP0126		AP0127		AP0128		AP0129	
			SAMPLE_DATE	16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09	
			FK_DEPTH	8 - 10 Ft		0 - 1 Ft		3 - 5 Ft		8 - 10 Ft		8 - 10 Ft		8 - 10 Ft	
			SAMPLE_PURPOSE	REG		REG		REG		REG		FD		FS	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	mg/kg	0.144	U	0.149	R	0.145	U	0.149	U	0.146	U	0.2	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	mg/kg	0.144	U	0.149	R	0.145	U	0.149	UJ	0.146	U	0.2	U
Explosives	Dinitrobenzene, 1,3-	N	mg/kg	0.144	U	0.149	R	0.145	U	0.149	U	0.146	U	0.2	U
Explosives	Dinitrotoluene, 2,4-	N	mg/kg	0.144	U	0.149	R	0.145	U	0.149	UJ	0.146	U	0.2	U
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.144	U	0.149	R	0.145	U	0.149	U	0.146	U	0.2	U
Explosives	HMX	N	mg/kg	0.144	U	0.149	R	0.145	U	0.149	U	0.146	U	0.2	U
Explosives	Nitrobenzene	N	mg/kg	0.144	U	0.149	R	0.145	U	0.149	U	0.146	U	0.2	U
Explosives	Nitrotoluene, 2-	N	mg/kg	0.144	U	0.149	R	0.145	U	0.149	U	0.146	U	0.2	U
Explosives	Nitrotoluene, 3-	N	mg/kg	0.144	U	0.149	R	0.145	U	0.149	U	0.146	U	0.2	U
Explosives	Nitrotoluene, 4-	N	mg/kg	0.144	U	0.149	R	0.145	U	0.149	U	0.146	U	0.2	U
Explosives	RDX	N	mg/kg	0.144	U	0.149	R	0.145	U	0.149	U	0.146	U	0.2	U
Explosives	Tetryl	N	mg/kg	0.144	U	0.149	R	0.145	U	0.149	U	0.146	U	0.3	U
Explosives	Trinitrobenzene, 1,3,5-	N	mg/kg	0.144	U	0.149	R	0.145	U	0.149	UJ	0.146	U	0.2	U
Explosives	Trinitrotoluene, 2,4,6-	N	mg/kg	0.144	U	0.149	R	0.145	U	0.149	UJ	0.146	U	0.2	U
Semivolatiles	Acenaphthene	N	mg/kg	0.00684	U	0.00779	U	0.00714	U	0.00805	U	0.00813	U	0.45	U
Semivolatiles	Acenaphthylene	N	mg/kg	0.00456	U	0.00519	U	0.00476	U	0.00536	U	0.00542	U	0.45	U
Semivolatiles	ACETOPHENONE	N	mg/kg											0.091	U
Semivolatiles	Anthracene	N	mg/kg	0.00821	U	0.00934	U	0.00857	U	0.00966	U	0.00975	U	0.45	U
Semivolatiles	Atrazine	N	mg/kg											0.45	U
Semivolatiles	Benzaldehyde	N	mg/kg											0.45	U
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.025	U	0.0284	U	0.0261	U	0.0294	U	0.0297	U	0.45	U
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.025	U	0.0284	U	0.0261	U	0.0294	U	0.0297	U	0.45	U
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.0633	U	0.072	U	0.0661	U	0.0744	U	0.0752	U	0.45	U
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	0.0926	U	0.105	U	0.0967	U	0.109	U	0.11	U	0.45	U
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	0.115	U	0.131	U	0.12	U	0.135	U	0.137	U	0.45	U
Semivolatiles	Benzoic acid	N	mg/kg	0.0926	UJ	0.105	U	0.0967	U	0.109	UJ	0.11	UJ		
Semivolatiles	Benzyl alcohol	N	mg/kg	0.0926	U	0.105	U	0.0967	U	0.109	U	0.11	U		
Semivolatiles	BIBENZENE	N	mg/kg											0.45	U
Semivolatiles	Bis(2-chloroethoxy)methane	N	mg/kg	0.00798	U	0.00908	U	0.00833	U	0.00939	U	0.00948	U	0.45	U
Semivolatiles	Bis(2-chloroethyl)ether	N	mg/kg	0.0097	U	0.011	U	0.0101	U	0.0114	U	0.0115	U	0.45	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	mg/kg	0.0165	U	0.0188	U	0.0173	U	0.0194	U	0.0196	U	0.45	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	mg/kg	0.0351	U	0.04	U	0.0367	U	0.0413	U	0.0417	U	0.45	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	mg/kg	0.0136	U	0.0154	U	0.0142	U	0.016	U	0.0161	U	0.45	U
Semivolatiles	Butyl benzyl phthalate	N	mg/kg	0.0154	U	0.0175	U	0.0161	U	0.0181	U	0.0183	U	0.45	U
Semivolatiles	Caprolactam	N	mg/kg											0.45	U
Semivolatiles	Carbazole	N	mg/kg	0.038	U	0.0432	U	0.0396	U	0.0447	U	0.0451	U	0.45	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	mg/kg	0.00935	U	0.0106	U	0.00976	U	0.011	U	0.0111	U	0.45	U
Semivolatiles	Chloroaniline, 4-	N	mg/kg	0.033	U	0.0375	U	0.0344	U	0.0388	U	0.0391	U	0.45	U
Semivolatiles	Chloronaphthalene, 2-	N	mg/kg	0.00605	U	0.00688	U	0.00631	U	0.00711	U	0.00718	U	0.45	U
Semivolatiles	Chlorophenol, 2-	N	mg/kg	0.00468	U	0.00532	U	0.00488	U	0.0055	U	0.00555	U	0.45	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	mg/kg	0.0291	U	0.0331	U	0.0304	U	0.0342	U	0.0345	U	0.45	U
Semivolatiles	Chrysene	N	mg/kg	0.0151	U	0.0171	U	0.0157	U	0.0177	U	0.0179	U	0.45	U
Semivolatiles	Dibenz(a,h)anthracene	N	mg/kg	0.0859	U	0.0977	U	0.0897	U	0.101	U	0.102	U	0.45	U
Semivolatiles	Dibenzofuran	N	mg/kg	0.00639	U	0.00727	U	0.00667	U	0.00751	U	0.00758	U	0.45	U

Appendix H

Chemical Analytical Data Summary
Soil
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	ASH PIT 2-SB07		ASH PIT 2-SB08		ASH PIT 2-SB08		ASH PIT 2-SB08		ASH PIT 2-SB08		ASH PIT 2-SB08	
			SAMPLE_NO	AP0124		AP0125		AP0126		AP0127		AP0128		AP0129	
			SAMPLE_DATE	16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09	
			FK_DEPTH	8 - 10 Ft		0 - 1 Ft		3 - 5 Ft		8 - 10 Ft		8 - 10 Ft		8 - 10 Ft	
			SAMPLE_PURPOSE	REG		REG		REG		REG		FD		FS	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Semivolatiles	Dichlorobenzene, 1,2-	N	mg/kg	0.00878	U	0.00999	U	0.00917	U	0.0103	U	0.0104	U		
Semivolatiles	Dichlorobenzene, 1,3-	N	mg/kg	0.0138	U	0.0157	U	0.0144	U	0.0162	U	0.0164	U		
Semivolatiles	Dichlorobenzene, 1,4-	N	mg/kg	0.00741	U	0.00843	U	0.00774	U	0.00872	U	0.0088	U		
Semivolatiles	Dichlorobenzidine, 3,3'-	N	mg/kg	0.0376	U	0.0428	U	0.0393	U	0.0443	U	0.0447	U	2.2	U
Semivolatiles	Dichlorophenol, 2,4-	N	mg/kg	0.0136	U	0.0154	U	0.0142	U	0.016	U	0.0161	U	0.45	U
Semivolatiles	Diethyl phthalate	N	mg/kg	0.0154	U	0.0175	U	0.0161	U	0.0181	U	0.0183	U	0.45	U
Semivolatiles	Dimethyl phthalate	N	mg/kg	0.0116	U	0.0132	U	0.0121	U	0.0137	U	0.0138	U	0.45	U
Semivolatiles	Dimethylphenol, 2,4-	N	mg/kg	0.01	U	0.0114	U	0.0105	U	0.0118	U	0.0119	U	0.45	U
Semivolatiles	Di-n-butyl phthalate	N	mg/kg	0.00821	U	0.00934	U	0.00857	U	0.00966	U	0.00975	U	0.45	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	mg/kg	0.0382	U	0.0435	U	0.0399	U	0.0449	U	0.0454	U	2.2	U
Semivolatiles	Dinitrophenol, 2,4-	N	mg/kg	0.0606	U	0.0689	U	0.0632	U	0.0712	U	0.0719	U	2.2	U
Semivolatiles	Dinitrotoluene, 2,4-	N	mg/kg	0.0133	U	0.0152	U	0.0139	U	0.0157	U	0.0158	U	0.45	U
Semivolatiles	Dinitrotoluene, 2,6-	N	mg/kg	0.00913	U	0.0104	U	0.00952	U	0.0107	U	0.0108	U	0.45	U
Semivolatiles	Di-n-octyl phthalate	N	mg/kg	0.0715	U	0.0814	U	0.0747	U	0.0841	U	0.0849	U	0.45	U
Semivolatiles	DIPHENYLAMINE	N	mg/kg	0.0376	U	0.0428	U	0.0393	U	0.0443	U	0.0447	U		
Semivolatiles	Fluoranthene	N	mg/kg	0.00821	U	0.00934	U	0.00857	U	0.00966	U	0.00975	U	0.45	U
Semivolatiles	Fluorene	N	mg/kg	0.0161	U	0.0183	U	0.0168	U	0.0189	U	0.0191	U	0.45	U
Semivolatiles	Hexachlorobenzene	N	mg/kg	0.0236	U	0.0269	U	0.0246	U	0.0278	U	0.028	U	0.45	U
Semivolatiles	Hexachlorobutadiene	N	mg/kg	0.036	U	0.041	U	0.0376	U	0.0424	U	0.0428	U	0.45	U
Semivolatiles	Hexachlorocyclopentadiene	N	mg/kg	0.0121	U	0.0138	U	0.0126	U	0.0142	U	0.0144	U	2.2	U
Semivolatiles	Hexachloroethane	N	mg/kg	0.0116	U	0.0132	U	0.0121	U	0.0137	U	0.0138	U	0.45	U
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.123	U	0.14	U	0.129	U	0.145	U	0.146	U	0.45	U
Semivolatiles	Isophorone	N	mg/kg	0.00456	U	0.00519	U	0.00476	U	0.00536	U	0.00542	U	0.45	U
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	0.0997	U	0.113	U	0.104	U	0.117	U	0.118	U	0.45	U
Semivolatiles	Methylphenol, 2-	N	mg/kg	0.0057	U	0.00649	U	0.00595	U	0.00671	U	0.00677	U	0.45	U
Semivolatiles	Methylphenol, 4-	N	mg/kg	0.0119	U	0.0135	U	0.0124	U	0.0139	U	0.0141	U	0.45	U
Semivolatiles	Naphthalene	N	mg/kg	0.00901	U	0.0103	U	0.00941	U	0.0106	U	0.0107	U	0.45	U
Semivolatiles	Nitroaniline, 2-	N	mg/kg	0.0164	U	0.0187	U	0.0171	U	0.0193	U	0.0195	U	2.2	U
Semivolatiles	Nitroaniline, 3-	N	mg/kg	0.0129	U	0.0147	U	0.0135	U	0.0152	U	0.0153	U	2.2	U
Semivolatiles	Nitroaniline, 4-	N	mg/kg	0.135	U	0.153	U	0.14	U	0.158	U	0.16	U	2.2	U
Semivolatiles	Nitrobenzene	N	mg/kg	0.0124	U	0.0141	U	0.013	U	0.0146	U	0.0148	U	0.45	U
Semivolatiles	Nitrophenol, 2-	N	mg/kg	0.0135	U	0.0153	U	0.014	U	0.0158	U	0.016	U	0.45	U
Semivolatiles	Nitrophenol, 4-	N	mg/kg	0.0308	U	0.035	U	0.0321	U	0.0362	U	0.0366	U	2.2	U
Semivolatiles	n-Nitrosodimethylamine	N	mg/kg	0.0114	U	0.013	U	0.0119	U	0.0134	U	0.0135	U		
Semivolatiles	n-Nitroso-di-n-propylamine	N	mg/kg	0.0136	U	0.0154	U	0.0142	U	0.016	U	0.0161	U	0.45	U
Semivolatiles	n-Nitrosodiphenylamine	N	mg/kg	0.00536	U	0.0061	U	0.0056	U	0.0063	U	0.00637	U	0.45	U
Semivolatiles	Pentachlorophenol	N	mg/kg	0.0341	U	0.0388	U	0.0356	U	0.0401	U	0.0405	U	0.45	U
Semivolatiles	Phenanthrene	N	mg/kg	0.0798	J	0.0105	U	0.00964	U	0.0109	U	0.011	U	0.45	U
Semivolatiles	Phenol	N	mg/kg	0.00456	U	0.00519	U	0.00476	U	0.00536	U	0.00542	U	0.45	U
Semivolatiles	Pyrene	N	mg/kg	0.0152	U	0.0173	U	0.0158	U	0.0178	U	0.018	U	0.45	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	mg/kg	0.00935	U	0.0106	U	0.00976	U	0.011	U	0.0111	U		
Semivolatiles	Trichlorophenol, 2,4,5-	N	mg/kg	0.0326	U	0.0371	U	0.0341	U	0.0384	U	0.0387	U	0.45	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	mg/kg	0.0257	U	0.0292	U	0.0268	U	0.0302	U	0.0305	U	0.45	U
Pesticides/PCBs	Aroclor 1016	N	mg/kg			0.00848	UJ	0.00794	U						

Appendix H

Chemical Analytical Data Summary
Soil
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	ASH PIT 2-SB07		ASH PIT 2-SB08		ASH PIT 2-SB08		ASH PIT 2-SB08		ASH PIT 2-SB08		ASH PIT 2-SB08	
			SAMPLE_NO	AP0124		AP0125		AP0126		AP0127		AP0128		AP0129	
			SAMPLE_DATE	16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09	
			FK_DEPTH	8 - 10 Ft		0 - 1 Ft		3 - 5 Ft		8 - 10 Ft		8 - 10 Ft		8 - 10 Ft	
			SAMPLE_PURPOSE	REG		REG		REG		REG		FD		FS	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Pesticides/PCBs	Aroclor 1221	N	mg/kg			0.00848	UJ	0.00794	U						
Pesticides/PCBs	Aroclor 1232	N	mg/kg			0.00848	UJ	0.00794	U						
Pesticides/PCBs	Aroclor 1242	N	mg/kg			0.00848	UJ	0.00794	U						
Pesticides/PCBs	Aroclor 1248	N	mg/kg			0.00848	UJ	0.00794	U						
Pesticides/PCBs	Aroclor 1254	N	mg/kg			0.00848	UJ	0.00794	U						
Pesticides/PCBs	Aroclor 1260	N	mg/kg			0.00848	UJ	0.00794	U						
Metals - Unfiltered	Aluminum	N	mg/kg	7150	J	4070	J	5350	J	15100	J	14900	J	12100	
Metals - Unfiltered	Antimony	N	mg/kg	0.479		0.27	U	0.227	J	0.254	U	0.248	J	8.2	U
Metals - Unfiltered	Arsenic	N	mg/kg	10.9		12.8		12.6		6.16		6.61		7	
Metals - Unfiltered	Barium	N	mg/kg	20.8	J	73.2	J	56	J	81	J	83.7	J	85	
Metals - Unfiltered	Beryllium	N	mg/kg	6.31	J	16.9	J	8.48	J	8.51	J	8.11	J	0.69	U
Metals - Unfiltered	Cadmium	N	mg/kg	0.207	U	0.27	U	0.222	U	0.254	U	0.248	U	0.69	U
Metals - Unfiltered	Calcium	N	mg/kg	153000		1650		1860		44800		45500		45000	J
Metals - Unfiltered	Chromium	N	mg/kg	11		6.13		8.82		22.4		21.9		18.5	
Metals - Unfiltered	Cobalt	N	mg/kg	11	J	3.9	J	8.7	J	15.6	J	14.6	J	12.4	
Metals - Unfiltered	Copper	N	mg/kg	31.5	J	21.3	J	11	J	31.1	J	30.1	J	23.9	
Metals - Unfiltered	Iron	N	mg/kg	55100	J	72600	J	28000	J	26600	J	28500	J	23900	
Metals - Unfiltered	Lead	N	mg/kg	15.9		4.64		9.05		11.6		14.1		10.7	
Metals - Unfiltered	Magnesium	N	mg/kg	9490	J	312	J	1730	J	12200	J	11500	J	10100	
Metals - Unfiltered	Manganese	N	mg/kg	372		98.2		196		473		432		363	
Metals - Unfiltered	Mercury	N	mg/kg	0.00984	U	0.034		0.0151	J	0.0123	U	0.0127	U	0.14	U
Metals - Unfiltered	Nickel	N	mg/kg	32.5		10.5		22		39.7		38		32.8	
Metals - Unfiltered	Potassium	N	mg/kg	1060		477		371		1980		1990		2870	J
Metals - Unfiltered	Selenium	N	mg/kg	0.413	U	0.914	J	0.444	U	0.508	U	0.495	U	0.69	U
Metals - Unfiltered	Silver	N	mg/kg	0.207	U	0.27	U	0.222	U	0.254	U	0.248	U	1.4	U
Metals - Unfiltered	Sodium	N	mg/kg	116		36.4		27.4		145		134		686	U
Metals - Unfiltered	Thallium	N	mg/kg	0.316	J	0.308	J	0.222	U	0.254	U	0.248	U	1.4	U
Metals - Unfiltered	Vanadium	N	mg/kg	13.6		18.8		15.1		25.4		24.7		20.5	
Metals - Unfiltered	Zinc	N	mg/kg	52.7		41.4		58.9		76.6		73.4		61.3	
Water Quality Parameters	% Solids	N	Percent											72.9	
Water Quality Parameters	Total organic carbon	N	mg/kg												

Appendix H

Chemical Analytical Data Summary
Surface Water
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	AP2-SW01		AP2-SW02		AP2-SW03		AP2-SW03		AP2-SW03	
			SAMPLE_NO	AP2000		AP2001		AP2002		AP2003		AP2004	
			SAMPLE_DATE	24-May-09		24-May-09		24-May-09		24-May-09		24-May-09	
			FK_DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
			SAMPLE_PURPOSE	REG		REG		REG		FD		FS	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	µg/L	0.19	U	0.19	U	0.19	U	0.19	U	0.2	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	µg/L	0.19	U	0.19	U	0.19	U	0.19	U	0.2	U
Explosives	Dinitrobenzene, 1,3-	N	µg/L	0.19	U	0.19	U	0.19	U	0.19	U	0.2	U
Explosives	Dinitrotoluene, 2,4-	N	µg/L	0.19	U	0.19	U	0.19	U	0.19	U	0.2	U
Explosives	Dinitrotoluene, 2,6-	N	µg/L	0.19	U	0.19	U	0.19	U	0.19	U	0.2	U
Explosives	HMX	N	µg/L	0.19	U	0.19	U	0.19	U	0.19	U	0.5	U
Explosives	Nitrobenzene	N	µg/L	0.19	U	0.19	U	0.19	U	0.19	U	0.2	U
Explosives	Nitrotoluene, 2-	N	µg/L	0.19	U	0.19	U	0.19	U	0.19	U	0.2	U
Explosives	Nitrotoluene, 3-	N	µg/L	0.19	U	0.19	U	0.19	U	0.19	U	0.2	U
Explosives	Nitrotoluene, 4-	N	µg/L	0.19	U	0.19	U	0.19	U	0.19	U	0.2	U
Explosives	RDX	N	µg/L	0.19	U	0.19	U	0.19	U	0.19	U	0.5	U
Explosives	Tetryl	N	µg/L	0.19	U	0.19	U	0.19	U	0.19	U	0.2	U
Explosives	Trinitrobenzene, 1,3,5-	N	µg/L	0.19	U	0.19	U	0.19	U	0.19	U	0.2	U
Explosives	Trinitrotoluene, 2,4,6-	N	µg/L	0.19	U	0.19	U	0.19	U	0.19	U	0.2	U
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U		
Semivolatiles	Acenaphthene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Acenaphthylene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	ACETOPHENONE	N	µg/L									10	U
Semivolatiles	Anthracene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Atrazine	N	µg/L									10	U
Semivolatiles	Benzaldehyde	N	µg/L									10	U
Semivolatiles	Benzo(a)anthracene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Benzo(a)pyrene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Benzo(b)fluoranthene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Benzo(ghi)perylene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Benzo(k)fluoranthene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Benzoic acid	N	µg/L	24	U	24	U	24	U	24	U		
Semivolatiles	Benzyl alcohol	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U		
Semivolatiles	BIBENZENE	N	µg/L									10	U
Semivolatiles	Bis(2-chloroethoxy)methane	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Bis(2-chloroethyl)ether	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	µg/L	4.8	U	4.8	U	4.8	U	2	J	10	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Butyl benzyl phthalate	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Caprolactam	N	µg/L									10	U
Semivolatiles	Carbazole	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Chloroaniline, 4-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Chloronaphthalene, 2-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Chlorophenol, 2-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Chrysene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U

Appendix H

Chemical Analytical Data Summary
Surface Water
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	AP2-SW01		AP2-SW02		AP2-SW03		AP2-SW03		AP2-SW03	
			SAMPLE_NO	AP2000		AP2001		AP2002		AP2003		AP2004	
			SAMPLE_DATE	24-May-09		24-May-09		24-May-09		24-May-09		24-May-09	
			FK_DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
			SAMPLE_PURPOSE	REG		REG		REG		FD		FS	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Semivolatiles	Dibenz(a,h)anthracene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Dibenzofuran	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Dichlorobenzene, 1,2-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U		
Semivolatiles	Dichlorobenzene, 1,3-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U		
Semivolatiles	Dichlorobenzene, 1,4-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U		
Semivolatiles	Dichlorobenzidine, 3,3'-	N	µg/L	9.6	U	9.6	U	9.6	U	9.6	U	50	U
Semivolatiles	Dichlorophenol, 2,4-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Diethyl phthalate	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Dimethyl phthalate	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Dimethylphenol, 2,4-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Di-n-butyl phthalate	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	µg/L	9.6	U	9.6	U	9.6	U	9.6	U	50	U
Semivolatiles	Dinitrophenol, 2,4-	N	µg/L	24	U	24	U	24	U	24	U	50	U
Semivolatiles	Dinitrotoluene, 2,4-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Dinitrotoluene, 2,6-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Di-n-octyl phthalate	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Fluoranthene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Fluorene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Hexachlorobenzene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Hexachlorobutadiene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Hexachlorocyclopentadiene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Hexachloroethane	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Isophorone	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Methylnaphthalene, 2-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Methylphenol, 2-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Methylphenol, 4-	N	µg/L									10	U
Semivolatiles	Naphthalene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Nitroaniline, 2-	N	µg/L	9.6	U	9.6	U	9.6	U	9.6	U	50	U
Semivolatiles	Nitroaniline, 3-	N	µg/L	9.6	U	9.6	U	9.6	U	9.6	U	50	U
Semivolatiles	Nitroaniline, 4-	N	µg/L	9.6	U	9.6	U	9.6	U	9.6	U	50	U
Semivolatiles	Nitrobenzene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Nitrophenol, 2-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Nitrophenol, 4-	N	µg/L	24	U	24	U	24	U	24	U	50	U
Semivolatiles	n-Nitroso-di-n-propylamine	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	n-Nitrosodiphenylamine	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Pentachlorophenol	N	µg/L	24	U	24	U	24	U	24	U	10	U
Semivolatiles	Phenanthrene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Phenol	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Pyrene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U		
Semivolatiles	Trichlorophenol, 2,4,5-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U

Appendix H

Chemical Analytical Data Summary
Surface Water
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	AP2-SW01		AP2-SW02		AP2-SW03		AP2-SW03		AP2-SW03	
			SAMPLE_NO	AP2000		AP2001		AP2002		AP2003		AP2004	
			SAMPLE_DATE	24-May-09		24-May-09		24-May-09		24-May-09		24-May-09	
			FK_DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
			SAMPLE_PURPOSE	REG		REG		REG		FD		FS	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Pesticides/PCBs	Aroclor 1016	N	µg/L	0.48	U	0.48	U	0.48	U	0.48	U	1	U
Pesticides/PCBs	Aroclor 1221	N	µg/L	0.48	U	0.48	U	0.48	U	0.48	U	1	U
Pesticides/PCBs	Aroclor 1232	N	µg/L	0.48	U	0.48	U	0.48	U	0.48	U	1	U
Pesticides/PCBs	Aroclor 1242	N	µg/L	0.48	U	0.48	U	0.48	U	0.48	U	1	U
Pesticides/PCBs	Aroclor 1248	N	µg/L	0.48	U	0.48	U	0.48	U	0.48	U	1	U
Pesticides/PCBs	Aroclor 1254	N	µg/L	0.48	U	0.48	U	0.48	U	0.48	U	1	U
Pesticides/PCBs	Aroclor 1260	N	µg/L	0.48	U	0.48	U	0.48	U	0.48	U	1	U
Metals - Unfiltered	Aluminum	N	µg/L	720		531		357		377		368	
Metals - Unfiltered	Antimony	N	µg/L	6	U	6	U	6	U	6	U	60	U
Metals - Unfiltered	Arsenic	N	µg/L	10	U	10	U	10	U	10	U	10	U
Metals - Unfiltered	Barium	N	µg/L	48.4	J	46.8	J	44.7	J	45.3	J	200	U
Metals - Unfiltered	Beryllium	N	µg/L	4	U	4	U	4	U	4	U	5	U
Metals - Unfiltered	Cadmium	N	µg/L	5	U	5	U	5	U	5	U	5	U
Metals - Unfiltered	Calcium	N	µg/L	79100		78800		76400		77400		80900	
Metals - Unfiltered	Chromium	N	µg/L	10	U	10	U	10	U	10	U	10	U
Metals - Unfiltered	Cobalt	N	µg/L	50	U	50	U	50	U	50	U	50	U
Metals - Unfiltered	Copper	N	µg/L	25	U	25	U	25	U	25	U	25	U
Metals - Unfiltered	Iron	N	µg/L	1060		700		451		455		546	
Metals - Unfiltered	Lead	N	µg/L	5	U	5	U	2.9	J	5	U	3	U
Metals - Unfiltered	Magnesium	N	µg/L	21400		21200		20500		20800		22300	J
Metals - Unfiltered	Manganese	N	µg/L	102		63		52.6		52.9		53.4	
Metals - Unfiltered	Mercury	N	µg/L	1	U	1	U	1	U	1	U	0.2	U
Metals - Unfiltered	Nickel	N	µg/L	40	U	40	U	40	U	40	U	40	U
Metals - Unfiltered	Potassium	N	µg/L	3290	J	3340	J	3150	J	3190	J	5000	U
Metals - Unfiltered	Selenium	N	µg/L	10	U	10	U	10	U	10	U	5	U
Metals - Unfiltered	Silver	N	µg/L	10	U	10	U	10	U	10	U	10	U
Metals - Unfiltered	Sodium	N	µg/L	32800		32700		32100		32800		40000	
Metals - Unfiltered	Thallium	N	µg/L	10	U	10	U	10	U	10	U	10	U
Metals - Unfiltered	Vanadium	N	µg/L	2.6	J	1.8	J	1.7	J	1.6	J	50	U
Metals - Unfiltered	Zinc	N	µg/L	12.1	J	12.4	J	20	U	8.1	J	20	U
Water Quality Parameters	HARDNESS (as CaCO3)	N	ppm	286									

Appendix H

Chemical Analytical Data Summary
Surface Water
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	AP2-SW04		AP2-SW05	
			SAMPLE_NO	AP2005		AP2006	
			SAMPLE_DATE	25-May-09		25-May-09	
			FK_DEPTH	0 - 0 Ft		0 - 0 Ft	
			SAMPLE_PURPOSE	REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	µg/L	0.19	UJ	0.19	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	µg/L	0.19	U	0.19	U
Explosives	Dinitrobenzene, 1,3-	N	µg/L	0.19	U	0.19	U
Explosives	Dinitrotoluene, 2,4-	N	µg/L	0.19	U	0.19	U
Explosives	Dinitrotoluene, 2,6-	N	µg/L	0.19	U	0.19	U
Explosives	HMX	N	µg/L	0.19	U	0.19	U
Explosives	Nitrobenzene	N	µg/L	0.19	U	0.19	U
Explosives	Nitrotoluene, 2-	N	µg/L	0.19	U	0.19	U
Explosives	Nitrotoluene, 3-	N	µg/L	0.19	U	0.19	U
Explosives	Nitrotoluene, 4-	N	µg/L	0.19	U	0.19	U
Explosives	RDX	N	µg/L	0.19	U	0.19	U
Explosives	Tetryl	N	µg/L	0.19	U	0.19	U
Explosives	Trinitrobenzene, 1,3,5-	N	µg/L	0.19	U	0.19	U
Explosives	Trinitrotoluene, 2,4,6-	N	µg/L	0.19	U	0.19	U
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	µg/L	4.8	U	4.8	U
Semivolatiles	Acenaphthene	N	µg/L	4.8	U	4.8	U
Semivolatiles	Acenaphthylene	N	µg/L	4.8	U	4.8	U
Semivolatiles	ACETOPHENONE	N	µg/L				
Semivolatiles	Anthracene	N	µg/L	4.8	U	4.8	U
Semivolatiles	Atrazine	N	µg/L				
Semivolatiles	Benzaldehyde	N	µg/L				
Semivolatiles	Benzo(a)anthracene	N	µg/L	4.8	U	4.8	U
Semivolatiles	Benzo(a)pyrene	N	µg/L	4.8	U	4.8	U
Semivolatiles	Benzo(b)fluoranthene	N	µg/L	4.8	U	4.8	U
Semivolatiles	Benzo(ghi)perylene	N	µg/L	4.8	U	4.8	U
Semivolatiles	Benzo(k)fluoranthene	N	µg/L	4.8	U	4.8	U
Semivolatiles	Benzoic acid	N	µg/L	24	U	24	U
Semivolatiles	Benzyl alcohol	N	µg/L	4.8	U	4.8	U
Semivolatiles	BIBENZENE	N	µg/L				
Semivolatiles	Bis(2-chloroethoxy)methane	N	µg/L	4.8	U	4.8	U
Semivolatiles	Bis(2-chloroethyl)ether	N	µg/L	4.8	U	4.8	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	µg/L	4.8	U	4.8	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	µg/L	4.8	U	4.8	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	µg/L	4.8	U	4.8	U
Semivolatiles	Butyl benzyl phthalate	N	µg/L	4.8	U	4.8	U
Semivolatiles	Caprolactam	N	µg/L				
Semivolatiles	Carbazole	N	µg/L	4.8	U	4.8	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	µg/L	4.8	U	4.8	U
Semivolatiles	Chloroaniline, 4-	N	µg/L	4.8	U	4.8	U
Semivolatiles	Chloronaphthalene, 2-	N	µg/L	4.8	U	4.8	U
Semivolatiles	Chlorophenol, 2-	N	µg/L	4.8	U	4.8	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	µg/L	4.8	U	4.8	U
Semivolatiles	Chrysene	N	µg/L	4.8	U	4.8	U

Appendix H

Chemical Analytical Data Summary
Surface Water
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	AP2-SW04		AP2-SW05	
			SAMPLE_NO	AP2005		AP2006	
			SAMPLE_DATE	25-May-09		25-May-09	
			FK_DEPTH	0 - 0 Ft		0 - 0 Ft	
			SAMPLE_PURPOSE	REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual
Semivolatiles	Dibenz(a,h)anthracene	N	µg/L	4.8	U	4.8	U
Semivolatiles	Dibenzofuran	N	µg/L	4.8	U	4.8	U
Semivolatiles	Dichlorobenzene, 1,2-	N	µg/L	4.8	U	4.8	U
Semivolatiles	Dichlorobenzene, 1,3-	N	µg/L	4.8	U	4.8	U
Semivolatiles	Dichlorobenzene, 1,4-	N	µg/L	4.8	U	4.8	U
Semivolatiles	Dichlorobenzidine, 3,3'-	N	µg/L	9.6	U	9.6	U
Semivolatiles	Dichlorophenol, 2,4-	N	µg/L	4.8	U	4.8	U
Semivolatiles	Diethyl phthalate	N	µg/L	4.8	U	4.8	U
Semivolatiles	Dimethyl phthalate	N	µg/L	4.8	U	4.8	U
Semivolatiles	Dimethylphenol, 2,4-	N	µg/L	4.8	U	4.8	U
Semivolatiles	Di-n-butyl phthalate	N	µg/L	4.8	U	4.8	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	µg/L	9.6	U	9.6	U
Semivolatiles	Dinitrophenol, 2,4-	N	µg/L	24	U	24	U
Semivolatiles	Dinitrotoluene, 2,4-	N	µg/L	4.8	U	4.8	U
Semivolatiles	Dinitrotoluene, 2,6-	N	µg/L	4.8	U	4.8	U
Semivolatiles	Di-n-octyl phthalate	N	µg/L	4.8	U	4.8	U
Semivolatiles	Fluoranthene	N	µg/L	4.8	U	4.8	U
Semivolatiles	Fluorene	N	µg/L	4.8	U	4.8	U
Semivolatiles	Hexachlorobenzene	N	µg/L	4.8	U	4.8	U
Semivolatiles	Hexachlorobutadiene	N	µg/L	4.8	U	4.8	U
Semivolatiles	Hexachlorocyclopentadiene	N	µg/L	4.8	U	4.8	U
Semivolatiles	Hexachloroethane	N	µg/L	4.8	U	4.8	U
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	µg/L	4.8	U	4.8	U
Semivolatiles	Isophorone	N	µg/L	4.8	U	4.8	U
Semivolatiles	Methylnaphthalene, 2-	N	µg/L	4.8	U	4.8	U
Semivolatiles	Methylphenol, 2-	N	µg/L	4.8	U	4.8	U
Semivolatiles	Methylphenol, 4-	N	µg/L				
Semivolatiles	Naphthalene	N	µg/L	4.8	U	4.8	U
Semivolatiles	Nitroaniline, 2-	N	µg/L	9.6	U	9.6	U
Semivolatiles	Nitroaniline, 3-	N	µg/L	9.6	U	9.6	U
Semivolatiles	Nitroaniline, 4-	N	µg/L	9.6	U	9.6	U
Semivolatiles	Nitrobenzene	N	µg/L	4.8	U	4.8	U
Semivolatiles	Nitrophenol, 2-	N	µg/L	4.8	U	4.8	U
Semivolatiles	Nitrophenol, 4-	N	µg/L	24	U	24	U
Semivolatiles	n-Nitroso-di-n-propylamine	N	µg/L	4.8	U	4.8	U
Semivolatiles	n-Nitrosodiphenylamine	N	µg/L	4.8	U	4.8	U
Semivolatiles	Pentachlorophenol	N	µg/L	24	U	24	U
Semivolatiles	Phenanthrene	N	µg/L	4.8	U	4.8	U
Semivolatiles	Phenol	N	µg/L	4.8	U	4.8	U
Semivolatiles	Pyrene	N	µg/L	4.8	U	4.8	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	µg/L	4.8	U	4.8	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	µg/L	4.8	U	4.8	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	µg/L	4.8	U	4.8	U

Appendix H

Chemical Analytical Data Summary
Surface Water
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	AP2-SW04		AP2-SW05	
			SAMPLE_NO	AP2005		AP2006	
			SAMPLE_DATE	25-May-09		25-May-09	
			FK_DEPTH	0 - 0 Ft		0 - 0 Ft	
			SAMPLE_PURPOSE	REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual
Pesticides/PCBs	Aroclor 1016	N	µg/L	0.48	U	0.48	U
Pesticides/PCBs	Aroclor 1221	N	µg/L	0.48	U	0.48	U
Pesticides/PCBs	Aroclor 1232	N	µg/L	0.48	U	0.48	U
Pesticides/PCBs	Aroclor 1242	N	µg/L	0.48	U	0.48	U
Pesticides/PCBs	Aroclor 1248	N	µg/L	0.48	U	0.48	U
Pesticides/PCBs	Aroclor 1254	N	µg/L	0.48	U	0.48	U
Pesticides/PCBs	Aroclor 1260	N	µg/L	0.48	U	0.48	U
Metals - Unfiltered	Aluminum	N	µg/L	1030	J	359	
Metals - Unfiltered	Antimony	N	µg/L	6	U	6	U
Metals - Unfiltered	Arsenic	N	µg/L	10	U	10	U
Metals - Unfiltered	Barium	N	µg/L	50.9	J	43.9	
Metals - Unfiltered	Beryllium	N	µg/L	4	U	4	U
Metals - Unfiltered	Cadmium	N	µg/L	5	U	5	U
Metals - Unfiltered	Calcium	N	µg/L	80700		75900	
Metals - Unfiltered	Chromium	N	µg/L	10	U	10	U
Metals - Unfiltered	Cobalt	N	µg/L	1.2	J	50	U
Metals - Unfiltered	Copper	N	µg/L	25	U	25	U
Metals - Unfiltered	Iron	N	µg/L	1020		376	
Metals - Unfiltered	Lead	N	µg/L	2.9	J	5	U
Metals - Unfiltered	Magnesium	N	µg/L	20700		19800	
Metals - Unfiltered	Manganese	N	µg/L	83.1		53.3	
Metals - Unfiltered	Mercury	N	µg/L	1	U	1	U
Metals - Unfiltered	Nickel	N	µg/L	6.2	J	40	U
Metals - Unfiltered	Potassium	N	µg/L	4400	J	2900	
Metals - Unfiltered	Selenium	N	µg/L	10	U	10	U
Metals - Unfiltered	Silver	N	µg/L	10	U	10	U
Metals - Unfiltered	Sodium	N	µg/L	34800		30300	
Metals - Unfiltered	Thallium	N	µg/L	10	U	10	U
Metals - Unfiltered	Vanadium	N	µg/L	3.1	J	2	
Metals - Unfiltered	Zinc	N	µg/L	10.6	J	9.9	
Water Quality Parameters	HARDNESS (as CaCO3)	N	ppm				

Appendix H

Chemical Analytical Data Summary
Sediment
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	ASH PIT 2-SD01		ASH PIT 2-SD02		ASH PIT 2-SD03		ASH PIT 2-SD04		ASH PIT 2-SD04	
			SAMPLE_NO	AP1000		AP1001		AP1002		AP1003		AP1004	
			SAMPLE_DATE	24-May-09		24-May-09		24-May-09		25-May-09		25-May-09	
			FK_DEPTH	0 - _5 Ft		0 - _5 Ft		0 - _5 Ft		0 - _5 Ft		0 - _5 Ft	
			SAMPLE_PURPOSE	REG		REG		REG		REG		FD	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	mg/kg	0.17	U	0.17	U	0.17	U	0.16	U	0.15	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	mg/kg	0.17	U	0.17	U	0.17	UJ	0.16	U	0.15	U
Explosives	Dinitrobenzene, 1,3-	N	mg/kg	0.17	U	0.17	U	0.17	U	0.16	U	0.15	U
Explosives	Dinitrotoluene, 2,4-	N	mg/kg	0.17	U	0.17	U	0.17	U	0.16	U	0.15	U
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.17	U	0.17	U	0.17	U	0.16	U	0.15	U
Explosives	HMX	N	mg/kg	0.17	U	0.17	U	0.17	U	0.16	U	0.15	U
Explosives	Nitrobenzene	N	mg/kg	0.17	U	0.17	U	0.17	U	0.16	U	0.15	U
Explosives	Nitrotoluene, 2-	N	mg/kg	0.17	U	0.17	U	0.17	U	0.16	U	0.15	U
Explosives	Nitrotoluene, 3-	N	mg/kg	0.17	U	0.17	U	0.17	U	0.16	U	0.15	U
Explosives	Nitrotoluene, 4-	N	mg/kg	0.17	U	0.17	U	0.17	U	0.16	U	0.15	U
Explosives	RDX	N	mg/kg	0.17	U	0.17	U	0.17	U	0.16	U	0.15	U
Explosives	Tetryl	N	mg/kg	0.17	U	0.17	U	0.17	U	0.16	U	0.15	U
Explosives	Trinitrobenzene, 1,3,5-	N	mg/kg	0.17	U	0.17	U	0.17	U	0.16	U	0.15	U
Explosives	Trinitrotoluene, 2,4,6-	N	mg/kg	0.17	U	0.17	U	0.0647	J	0.16	U	0.15	U
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Acenaphthene	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Acenaphthylene	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	ACETOPHENONE	N	mg/kg										
Semivolatiles	Anthracene	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Atrazine	N	mg/kg										
Semivolatiles	Benzaldehyde	N	mg/kg										
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Benzoic acid	N	mg/kg	1.1	U	1.1	U	1	U	1	U	1	U
Semivolatiles	Benzyl alcohol	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	BIBENZENE	N	mg/kg										
Semivolatiles	Bis(2-chloroethoxy)methane	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Bis(2-chloroethyl)ether	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	mg/kg	0.44	U	0.43	U	0.41	U	0.41	U	0.42	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Butyl benzyl phthalate	N	mg/kg	0.44	U	0.43	U	0.41	U	0.41	U	0.42	U
Semivolatiles	Caprolactam	N	mg/kg										
Semivolatiles	Carbazole	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Chloroaniline, 4-	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Chloronaphthalene, 2-	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Chlorophenol, 2-	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Chrysene	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U

Appendix H

Chemical Analytical Data Summary
Sediment
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	ASH PIT 2-SD01		ASH PIT 2-SD02		ASH PIT 2-SD03		ASH PIT 2-SD04		ASH PIT 2-SD04	
			SAMPLE_NO	AP1000		AP1001		AP1002		AP1003		AP1004	
			SAMPLE_DATE	24-May-09		24-May-09		24-May-09		25-May-09		25-May-09	
			FK_DEPTH	0 - _5 Ft		0 - _5 Ft		0 - _5 Ft		0 - _5 Ft		0 - _5 Ft	
			SAMPLE_PURPOSE	REG		REG		REG		REG		FD	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Semivolatiles	Dibenz(a,h)anthracene	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Dibenzofuran	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Dichlorobenzene, 1,2-	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Dichlorobenzene, 1,3-	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Dichlorobenzene, 1,4-	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Dichlorobenzidine, 3,3'-	N	mg/kg	0.44	U	0.43	U	0.41	U	0.41	U	0.42	U
Semivolatiles	Dichlorophenol, 2,4-	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Diethyl phthalate	N	mg/kg	0.44	U	0.43	U	0.41	U	0.41	U	0.42	U
Semivolatiles	Dimethyl phthalate	N	mg/kg	0.44	U	0.43	U	0.41	U	0.41	U	0.42	U
Semivolatiles	Dimethylphenol, 2,4-	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Di-n-butyl phthalate	N	mg/kg	0.44	U	0.43	U	0.41	U	0.41	U	0.42	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	mg/kg	0.44	U	0.43	U	0.41	U	0.41	U	0.42	U
Semivolatiles	Dinitrophenol, 2,4-	N	mg/kg	1.1	U	1.1	U	1	UJ	1	UJ	1	UJ
Semivolatiles	Dinitrotoluene, 2,4-	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Dinitrotoluene, 2,6-	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Di-n-octyl phthalate	N	mg/kg	0.44	U	0.43	U	0.41	U	0.41	U	0.42	U
Semivolatiles	Fluoranthene	N	mg/kg	0.22	U	0.21	U	0.0525	J	0.2	U	0.21	U
Semivolatiles	Fluorene	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Hexachlorobenzene	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Hexachlorobutadiene	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Hexachlorocyclopentadiene	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Hexachloroethane	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Isophorone	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Methylphenol, 2-	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Methylphenol, 4-	N	mg/kg										
Semivolatiles	Naphthalene	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Nitroaniline, 2-	N	mg/kg	0.44	U	0.43	U	0.41	U	0.41	U	0.42	U
Semivolatiles	Nitroaniline, 3-	N	mg/kg	0.44	U	0.43	U	0.41	U	0.41	U	0.42	U
Semivolatiles	Nitroaniline, 4-	N	mg/kg	0.44	U	0.43	U	0.41	U	0.41	U	0.42	U
Semivolatiles	Nitrobenzene	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Nitrophenol, 2-	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Nitrophenol, 4-	N	mg/kg	1.1	U	1.1	U	1	U	1	U	1	U
Semivolatiles	n-Nitroso-di-n-propylamine	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	n-Nitrosodiphenylamine	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Pentachlorophenol	N	mg/kg	1.1	U	1.1	U	1	U	1	U	1	U
Semivolatiles	Phenanthrene	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Phenol	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Pyrene	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	mg/kg	0.22	U	0.21	U	0.21	U	0.2	U	0.21	U

Appendix H

Chemical Analytical Data Summary
Sediment
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	ASH PIT 2-SD01		ASH PIT 2-SD02		ASH PIT 2-SD03		ASH PIT 2-SD04		ASH PIT 2-SD04	
			SAMPLE_NO	AP1000		AP1001		AP1002		AP1003		AP1004	
			SAMPLE_DATE	24-May-09		24-May-09		24-May-09		25-May-09		25-May-09	
			FK_DEPTH	0 - _5 Ft		0 - _5 Ft		0 - _5 Ft		0 - _5 Ft		0 - _5 Ft	
			SAMPLE_PURPOSE	REG		REG		REG		REG		FD	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Pesticides/PCBs	Aroclor 1016	N	mg/kg	0.023	U	0.021	U	0.021	U	0.02	U	0.021	U
Pesticides/PCBs	Aroclor 1221	N	mg/kg	0.023	U	0.021	U	0.021	U	0.02	U	0.021	U
Pesticides/PCBs	Aroclor 1232	N	mg/kg	0.023	U	0.021	U	0.021	U	0.02	U	0.021	U
Pesticides/PCBs	Aroclor 1242	N	mg/kg	0.023	U	0.021	U	0.021	U	0.02	U	0.021	U
Pesticides/PCBs	Aroclor 1248	N	mg/kg	0.023	U	0.021	U	0.021	U	0.02	U	0.021	U
Pesticides/PCBs	Aroclor 1254	N	mg/kg	0.023	U	0.021	U	0.021	U	0.02	U	0.021	U
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.023	U	0.021	U	0.021	U	0.02	U	0.021	U
Metals - Unfiltered	Aluminum	N	mg/kg	3640		6310		7220		8000		6840	
Metals - Unfiltered	Antimony	N	mg/kg	4	U	3.9	U	7.2	UJ	3.5	U	3.6	U
Metals - Unfiltered	Arsenic	N	mg/kg	4.1		5.1		10.1	J	9.3		7.8	
Metals - Unfiltered	Barium	N	mg/kg	22.8		43.5		67.1	J	59.8		50	
Metals - Unfiltered	Beryllium	N	mg/kg	0.36		0.49		0.52		0.59		0.53	
Metals - Unfiltered	Cadmium	N	mg/kg	0.24	J	0.37		0.48	U	0.6		0.53	
Metals - Unfiltered	Calcium	N	mg/kg	7660		26000		12900	J	28700		25200	
Metals - Unfiltered	Chromium	N	mg/kg	6.4		10.5		8.6	J	12.8		10.5	
Metals - Unfiltered	Cobalt	N	mg/kg	7.4		7.4		6.2	J	14.1		9.8	
Metals - Unfiltered	Copper	N	mg/kg	9.6		14.2		17.2		23.7		20.4	
Metals - Unfiltered	Iron	N	mg/kg	10400		14000		39100	J	19400		17700	
Metals - Unfiltered	Lead	N	mg/kg	7.9		7.9		10.6	J	15.2	J	9.1	J
Metals - Unfiltered	Magnesium	N	mg/kg	1950		7440		7470	J	6110		6040	
Metals - Unfiltered	Manganese	N	mg/kg	127		379		151	J	668		547	
Metals - Unfiltered	Mercury	N	mg/kg	0.11	U	0.018	J	0.016	J	0.015	J	0.019	J
Metals - Unfiltered	Nickel	N	mg/kg	15.7		16.1		16	J	27.6		22.6	
Metals - Unfiltered	Potassium	N	mg/kg	498	J	1300		1060	J	1850		1470	
Metals - Unfiltered	Selenium	N	mg/kg	1	J	0.39	J	0.92	J	0.83	J	0.48	J
Metals - Unfiltered	Silver	N	mg/kg	0.66	U	0.64	U	0.083	J	0.59	U	0.6	U
Metals - Unfiltered	Sodium	N	mg/kg	85.2	J	157	J	54.8	J	170	J	157	J
Metals - Unfiltered	Thallium	N	mg/kg	0.66	U	0.64	U	6	U	3	U	3	U
Metals - Unfiltered	Vanadium	N	mg/kg	9.4		15.2		13.6	J	14.9		12.5	
Metals - Unfiltered	Zinc	N	mg/kg	34.7		38.9		27	J	59.7		54.9	
Water Quality Parameters	% Solids	N	Percent	74.2		77.9		79.9		80.5		79.7	
Water Quality Parameters	Total organic carbon	N	mg/kg	0.57									

Appendix H

Chemical Analytical Data Summary
Sediment
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	ASH PIT 2-SD04		ASH PIT 2-SD05	
			SAMPLE_NO	AP1005		AP1006	
			SAMPLE_DATE	25-May-09		25-May-09	
			FK_DEPTH	0 - _5 Ft		0 - _5 Ft	
			SAMPLE_PURPOSE	FS		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	mg/kg	0.2	U	0.19	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	mg/kg	0.2	U	0.19	U
Explosives	Dinitrobenzene, 1,3-	N	mg/kg	0.2	U	0.19	U
Explosives	Dinitrotoluene, 2,4-	N	mg/kg	0.2	U	0.19	U
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.2	U	0.19	U
Explosives	HMX	N	mg/kg	0.2	U	0.19	U
Explosives	Nitrobenzene	N	mg/kg	0.2	U	0.19	U
Explosives	Nitrotoluene, 2-	N	mg/kg	0.2	U	0.19	U
Explosives	Nitrotoluene, 3-	N	mg/kg	0.2	U	0.19	U
Explosives	Nitrotoluene, 4-	N	mg/kg	0.2	U	0.19	U
Explosives	RDX	N	mg/kg	0.2	U	0.19	U
Explosives	Tetryl	N	mg/kg	0.3	U	0.19	U
Explosives	Trinitrobenzene, 1,3,5-	N	mg/kg	0.2	U	0.19	U
Explosives	Trinitrotoluene, 2,4,6-	N	mg/kg	0.2	U	0.19	U
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	mg/kg			0.26	U
Semivolatiles	Acenaphthene	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Acenaphthylene	N	mg/kg	0.41	U	0.26	U
Semivolatiles	ACETOPHENONE	N	mg/kg	0.083	U		
Semivolatiles	Anthracene	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Atrazine	N	mg/kg	0.41	U		
Semivolatiles	Benzaldehyde	N	mg/kg	0.41	U		
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Benzoic acid	N	mg/kg			1.3	U
Semivolatiles	Benzyl alcohol	N	mg/kg			0.26	U
Semivolatiles	BIBENZENE	N	mg/kg	0.41	U		
Semivolatiles	Bis(2-chloroethoxy)methane	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Bis(2-chloroethyl)ether	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	mg/kg	0.41	U	0.51	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Butyl benzyl phthalate	N	mg/kg	0.41	U	0.51	U
Semivolatiles	Caprolactam	N	mg/kg	0.41	U		
Semivolatiles	Carbazole	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Chloroaniline, 4-	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Chloronaphthalene, 2-	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Chlorophenol, 2-	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Chrysene	N	mg/kg	0.41	U	0.26	U

Appendix H

Chemical Analytical Data Summary
Sediment
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	ASH PIT 2-SD04		ASH PIT 2-SD05	
			SAMPLE_NO	AP1005		AP1006	
			SAMPLE_DATE	25-May-09		25-May-09	
			FK_DEPTH	0 - _5 Ft		0 - _5 Ft	
			SAMPLE_PURPOSE	FS		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual
Semivolatiles	Dibenz(a,h)anthracene	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Dibenzofuran	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Dichlorobenzene, 1,2-	N	mg/kg			0.26	U
Semivolatiles	Dichlorobenzene, 1,3-	N	mg/kg			0.26	U
Semivolatiles	Dichlorobenzene, 1,4-	N	mg/kg			0.26	U
Semivolatiles	Dichlorobenzidine, 3,3'-	N	mg/kg	2	U	0.51	U
Semivolatiles	Dichlorophenol, 2,4-	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Diethyl phthalate	N	mg/kg	0.41	U	0.51	U
Semivolatiles	Dimethyl phthalate	N	mg/kg	0.41	U	0.51	U
Semivolatiles	Dimethylphenol, 2,4-	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Di-n-butyl phthalate	N	mg/kg	0.41	U	0.51	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	mg/kg	2	U	0.51	U
Semivolatiles	Dinitrophenol, 2,4-	N	mg/kg	2	U	1.3	UJ
Semivolatiles	Dinitrotoluene, 2,4-	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Dinitrotoluene, 2,6-	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Di-n-octyl phthalate	N	mg/kg	0.41	U	0.51	U
Semivolatiles	Fluoranthene	N	mg/kg	0.41	U	0.0547	J
Semivolatiles	Fluorene	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Hexachlorobenzene	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Hexachlorobutadiene	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Hexachlorocyclopentadiene	N	mg/kg	2	U	0.26	U
Semivolatiles	Hexachloroethane	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Isophorone	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Methylphenol, 2-	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Methylphenol, 4-	N	mg/kg	0.41	U		
Semivolatiles	Naphthalene	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Nitroaniline, 2-	N	mg/kg	2	U	0.51	U
Semivolatiles	Nitroaniline, 3-	N	mg/kg	2	U	0.51	U
Semivolatiles	Nitroaniline, 4-	N	mg/kg	2	U	0.51	U
Semivolatiles	Nitrobenzene	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Nitrophenol, 2-	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Nitrophenol, 4-	N	mg/kg	2	U	1.3	U
Semivolatiles	n-Nitroso-di-n-propylamine	N	mg/kg	0.41	U	0.26	U
Semivolatiles	n-Nitrosodiphenylamine	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Pentachlorophenol	N	mg/kg	0.41	U	1.3	U
Semivolatiles	Phenanthrene	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Phenol	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Pyrene	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	mg/kg			0.26	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	mg/kg	0.41	U	0.26	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	mg/kg	0.41	U	0.26	U

Appendix H

Chemical Analytical Data Summary
Sediment
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	ASH PIT 2-SD04		ASH PIT 2-SD05	
			SAMPLE_NO	AP1005		AP1006	
			SAMPLE_DATE	25-May-09		25-May-09	
			FK_DEPTH	0 - _5 Ft		0 - _5 Ft	
			SAMPLE_PURPOSE	FS		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual
Pesticides/PCBs	Aroclor 1016	N	mg/kg	0.041	U	0.025	U
Pesticides/PCBs	Aroclor 1221	N	mg/kg	0.041	U	0.025	U
Pesticides/PCBs	Aroclor 1232	N	mg/kg	0.041	U	0.025	U
Pesticides/PCBs	Aroclor 1242	N	mg/kg	0.041	U	0.025	U
Pesticides/PCBs	Aroclor 1248	N	mg/kg	0.041	U	0.025	U
Pesticides/PCBs	Aroclor 1254	N	mg/kg	0.041	U	0.025	U
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.041	U	0.025	U
Metals - Unfiltered	Aluminum	N	mg/kg	6780		4690	
Metals - Unfiltered	Antimony	N	mg/kg	7.5	UJ	4.4	U
Metals - Unfiltered	Arsenic	N	mg/kg	8.8		3.9	
Metals - Unfiltered	Barium	N	mg/kg	53		43.1	
Metals - Unfiltered	Beryllium	N	mg/kg	0.62	U	0.42	
Metals - Unfiltered	Cadmium	N	mg/kg	0.62	U	0.26	J
Metals - Unfiltered	Calcium	N	mg/kg	37600		9790	
Metals - Unfiltered	Chromium	N	mg/kg	11.6		7.7	
Metals - Unfiltered	Cobalt	N	mg/kg	9.9		8	
Metals - Unfiltered	Copper	N	mg/kg	22.8		12.2	
Metals - Unfiltered	Iron	N	mg/kg	20700		10400	
Metals - Unfiltered	Lead	N	mg/kg	11		9.7	
Metals - Unfiltered	Magnesium	N	mg/kg	8170		2450	
Metals - Unfiltered	Manganese	N	mg/kg	413		187	
Metals - Unfiltered	Mercury	N	mg/kg	0.12	U	0.025	J
Metals - Unfiltered	Nickel	N	mg/kg	27.1		17.8	
Metals - Unfiltered	Potassium	N	mg/kg	1420		628	J
Metals - Unfiltered	Selenium	N	mg/kg	0.62	U	0.96	J
Metals - Unfiltered	Silver	N	mg/kg	1.2	U	0.73	U
Metals - Unfiltered	Sodium	N	mg/kg	625	U	123	J
Metals - Unfiltered	Thallium	N	mg/kg	1.2	U	0.73	U
Metals - Unfiltered	Vanadium	N	mg/kg	13.3		11.1	
Metals - Unfiltered	Zinc	N	mg/kg	62.5		45.1	
Water Quality Parameters	% Solids	N	Percent	80		65.4	
Water Quality Parameters	Total organic carbon	N	mg/kg				

Appendix H

Chemical Analytical Data Summary
Groundwater
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	AP2-BEDGW-002		AP2-BEDGW-002		AP2-BEDGW-003		AP2-BEDGW-003		AP2-BEDGW-003	
			SAMPLE_NO	AP3063		AP3079		AP3064		AP3065		AP3066	
			SAMPLE_DATE	24-May-09		17-Nov-09		23-May-09		23-May-09		23-May-09	
			FK_DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
			SAMPLE_PURPOSE	REG		REG		REG		FD		FS	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	µg/L	0.19	U	0.19	U	0.19	U	0.19	U	0.2	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	µg/L	0.19	U	0.19	U	0.19	U	0.19	U	0.2	U
Explosives	Dinitrobenzene, 1,3-	N	µg/L	0.19	U	0.19	U	0.19	U	0.19	U	0.2	U
Explosives	Dinitrotoluene, 2,4-	N	µg/L	0.19	U	0.19	U	0.19	U	0.19	U	0.2	U
Explosives	Dinitrotoluene, 2,6-	N	µg/L	0.19	U	0.19	U	0.19	U	0.19	U	0.2	U
Explosives	HMX	N	µg/L	0.19	U	0.19	U	0.19	U	0.19	U	0.5	U
Explosives	Nitrobenzene	N	µg/L	0.19	U	0.19	U	0.19	U	0.19	U	0.2	U
Explosives	Nitrotoluene, 2-	N	µg/L	0.19	U	0.19	U	0.19	U	0.19	U	0.2	U
Explosives	Nitrotoluene, 3-	N	µg/L	0.19	U	0.19	U	0.19	U	0.19	U	0.2	U
Explosives	Nitrotoluene, 4-	N	µg/L	0.19	U	0.19	U	0.19	U	0.19	U	0.2	U
Explosives	RDX	N	µg/L	0.19	U	0.19	U	0.19	U	0.19	U	0.5	U
Explosives	Tetryl	N	µg/L	0.19	U	0.19	R	0.19	UJ	0.19	U	0.41	
Explosives	Trinitrobenzene, 1,3,5-	N	µg/L	0.19	U	0.19	U	0.19	UJ	0.19	U	0.2	U
Explosives	Trinitrotoluene, 2,4,6-	N	µg/L	0.19	U	0.19	U	0.19	UJ	0.19	U	0.2	U
Volatiles	Acetone	N	µg/L	25	R	50.6	J	25	R	25	R	50	UJ
Volatiles	Benzene	N	µg/L	8.5		9.4	J	94.1		91.3		100	
Volatiles	Bromodichloromethane	N	µg/L	1	U	1	U	1	U	1	U	5	U
Volatiles	Bromoform	N	µg/L	1	U	1	U	1	U	1	U	5	U
Volatiles	Bromomethane	N	µg/L	2	U	2	UJ	2	U	2	U	5	U
Volatiles	Butanone, 2-	N	µg/L	7.4		2.4	J	4.3	J	4.9	J	50	R
Volatiles	Carbon disulfide	N	µg/L	2	U	2	U	2	U	2	U	5.2	
Volatiles	Carbon tetrachloride	N	µg/L	1	U	1	U	1	U	1	U	5	U
Volatiles	Chlorobenzene	N	µg/L	1	U	1	U	1	U	1	U	5	U
Volatiles	Chloroethane	N	µg/L	2	U	2	U	2	U	2	U	5	R
Volatiles	Chloroform	N	µg/L	1	U	5.6	B	1	U	1	U	5	U
Volatiles	Chloromethane	N	µg/L	2	U	7.7	J	2	U	2	U	5	UJ
Volatiles	Cyclohexane	N	µg/L									74	
Volatiles	Dibromo-3-chloropropane, 1,2-	N	µg/L									10	R
Volatiles	Dibromochloromethane	N	µg/L	1	U	1	U	1	U	1	U	5	U
Volatiles	Dibromoethane, 1,2-	N	µg/L									5	U
Volatiles	Dichlorobenzene, 1,2-	N	µg/L									5	U
Volatiles	Dichlorobenzene, 1,3-	N	µg/L									5	U
Volatiles	Dichlorobenzene, 1,4-	N	µg/L									5	U
Volatiles	Dichlorodifluoromethane	N	µg/L									5	U
Volatiles	Dichloroethane, 1,1-	N	µg/L	1	U	1	U	1	U	1	U	5	U
Volatiles	Dichloroethane, 1,2-	N	µg/L	1	U	1	U	1	U	1	U	5	U
Volatiles	Dichloroethene, 1,1-	N	µg/L	1	U	1	U	1	U	1	U	5	U
Volatiles	Dichloroethene, cis-1,2-	N	µg/L	1	U	1	U	1	U	1	U	5	U
Volatiles	Dichloroethene, trans-1,2-	N	µg/L	1	U	1	U	1	U	1	U	5	U
Volatiles	Dichloropropane, 1,2-	N	µg/L	1	U	1	U	1	U	1	U	5	U
Volatiles	Dichloropropene, cis-1,3-	N	µg/L	1	U	1	U	1	UJ	1	U	5	U
Volatiles	Dichloropropene, trans-1,3-	N	µg/L	1	U	1	UJ	1	UJ	1	U	5	U
Volatiles	Ethylbenzene	N	µg/L	9.6		9.7	J	17.7		17.2		21	

Appendix H

Chemical Analytical Data Summary
Groundwater
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	AP2-BEDGW-002		AP2-BEDGW-002		AP2-BEDGW-003		AP2-BEDGW-003		AP2-BEDGW-003	
			SAMPLE_NO	AP3063		AP3079		AP3064		AP3065		AP3066	
			SAMPLE_DATE	24-May-09		17-Nov-09		23-May-09		23-May-09		23-May-09	
			FK_DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
			SAMPLE_PURPOSE	REG		REG		REG		FD		FS	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Volatiles	Hexanone, 2-	N	µg/L	10	U	10	U	10	U	10	U	50	U
Volatiles	Isopropylbenzene	N	µg/L									5.8	
Volatiles	METHYL ACETATE	N	µg/L									50	U
Volatiles	Methyl Tertiary Butyl Ether	N	µg/L									25	U
Volatiles	Methyl-2-pentanone, 4-	N	µg/L	5	U	5	U	5	U	5	U	50	UJ
Volatiles	Methylcyclohexane	N	µg/L									29	
Volatiles	Methylene chloride	N	µg/L	5	U	5	U	5	U	5	U	5	U
Volatiles	Styrene	N	µg/L	1	U	1	U	1	U	1	U	5	U
Volatiles	Tetrachloroethane, 1,1,2,2-	N	µg/L	1	U	1	U	1	U	1	U	5	U
Volatiles	Tetrachloroethene	N	µg/L	1	U	1	U	1	U	1	U	5	U
Volatiles	Toluene	N	µg/L	5.3		4.8	J	41.3		39.6		54	
Volatiles	Trichlorobenzene, 1,2,4-	N	µg/L									5	U
Volatiles	Trichloroethane, 1,1,1-	N	µg/L	1	U	1	U	1	U	1	U	5	U
Volatiles	Trichloroethane, 1,1,2-	N	µg/L	1	U	1	U	1	U	1	U	5	U
Volatiles	Trichloroethene	N	µg/L	1	U	1	U	1	U	1	U	5	U
Volatiles	Trichlorofluoromethane	N	µg/L									5	U
Volatiles	Trichlorotrifluoroethane	N	µg/L									5	U
Volatiles	Vinyl chloride	N	µg/L	1	U	1	UJ	1	U	1	U	5	U
Volatiles	Xylenes, total	N	µg/L	63.2		55.7	J	193		185		260	
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U		
Semivolatiles	Acenaphthene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Acenaphthylene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	ACETOPHENONE	N	µg/L									10	U
Semivolatiles	Anthracene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Atrazine	N	µg/L									10	U
Semivolatiles	Benzaldehyde	N	µg/L									10	U
Semivolatiles	Benzo(a)anthracene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Benzo(a)pyrene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Benzo(b)fluoranthene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Benzo(ghi)perylene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Benzo(k)fluoranthene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Benzoic acid	N	µg/L	24	U	24	U	24	U	24	U		
Semivolatiles	Benzyl alcohol	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U		
Semivolatiles	BIBENZENE	N	µg/L									10	U
Semivolatiles	Bis(2-chloroethoxy)methane	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Bis(2-chloroethyl)ether	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Butyl benzyl phthalate	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Caprolactam	N	µg/L									10	U
Semivolatiles	Carbazole	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U

Appendix H

Chemical Analytical Data Summary
Groundwater
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	AP2-BEDGW-002		AP2-BEDGW-002		AP2-BEDGW-003		AP2-BEDGW-003		AP2-BEDGW-003	
			SAMPLE_NO	AP3063		AP3079		AP3064		AP3065		AP3066	
			SAMPLE_DATE	24-May-09		17-Nov-09		23-May-09		23-May-09		23-May-09	
			FK_DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
			SAMPLE_PURPOSE	REG		REG		REG		FD		FS	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Semivolatiles	Chloroaniline, 4-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Chloronaphthalene, 2-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Chlorophenol, 2-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Chrysene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Dibenz(a,h)anthracene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Dibenzofuran	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Dichlorobenzene, 1,2-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U		
Semivolatiles	Dichlorobenzene, 1,3-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U		
Semivolatiles	Dichlorobenzene, 1,4-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U		
Semivolatiles	Dichlorobenzidine, 3,3'-	N	µg/L	9.6	U	9.5	U	9.6	U	9.6	U	50	U
Semivolatiles	Dichlorophenol, 2,4-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Diethyl phthalate	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Dimethyl phthalate	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Dimethylphenol, 2,4-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Di-n-butyl phthalate	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	µg/L	9.6	U	9.5	U	9.6	U	9.6	U	50	U
Semivolatiles	Dinitrophenol, 2,4-	N	µg/L	24	U	24	U	24	U	24	U	50	U
Semivolatiles	Dinitrotoluene, 2,4-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Dinitrotoluene, 2,6-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Di-n-octyl phthalate	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	DIPHENYLAMINE	N	µg/L										
Semivolatiles	Fluoranthene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Fluorene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Hexachlorobenzene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Hexachlorobutadiene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Hexachlorocyclopentadiene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Hexachloroethane	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Isophorone	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Methylnaphthalene, 2-	N	µg/L	2.8	J	2.8	J	1.9	J	1.3	J	10	U
Semivolatiles	Methylphenol, 2-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Methylphenol, 4-	N	µg/L									10	U
Semivolatiles	Naphthalene	N	µg/L	2	J	1.9	J	2.9	J	1.9	J	10	U
Semivolatiles	Nitroaniline, 2-	N	µg/L	9.6	U	9.5	U	9.6	U	9.6	U	50	U
Semivolatiles	Nitroaniline, 3-	N	µg/L	9.6	U	9.5	U	9.6	U	9.6	U	50	U
Semivolatiles	Nitroaniline, 4-	N	µg/L	9.6	U	9.5	U	9.6	U	9.6	U	50	U
Semivolatiles	Nitrobenzene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Nitrophenol, 2-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Nitrophenol, 4-	N	µg/L	24	U	24	U	24	U	24	U	50	U
Semivolatiles	n-Nitrosodimethylamine	N	µg/L										
Semivolatiles	n-Nitroso-di-n-propylamine	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	n-Nitrosodiphenylamine	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U

Appendix H

Chemical Analytical Data Summary
Groundwater
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	AP2-BEDGW-002		AP2-BEDGW-002		AP2-BEDGW-003		AP2-BEDGW-003		AP2-BEDGW-003	
			SAMPLE_NO	AP3063		AP3079		AP3064		AP3065		AP3066	
			SAMPLE_DATE	24-May-09		17-Nov-09		23-May-09		23-May-09		23-May-09	
			FK_DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
			SAMPLE_PURPOSE	REG		REG		REG		FD		FS	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Semivolatiles	Pentachlorophenol	N	µg/L	24	U	24	U	24	U	24	U	10	U
Semivolatiles	Phenanthrene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Phenol	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Pyrene	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U		
Semivolatiles	Trichlorophenol, 2,4,5-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	µg/L	4.8	U	4.8	U	4.8	U	4.8	U	10	U
Pesticides/PCBs	Aroclor 1016	N	µg/L	0.48	U			0.5	U	0.48	U	10	U
Pesticides/PCBs	Aroclor 1221	N	µg/L	0.48	U			0.5	U	0.48	U	10	U
Pesticides/PCBs	Aroclor 1232	N	µg/L	0.48	U			0.5	U	0.48	U	10	U
Pesticides/PCBs	Aroclor 1242	N	µg/L	0.48	U			0.5	U	0.48	U	10	U
Pesticides/PCBs	Aroclor 1248	N	µg/L	0.48	U			0.5	U	0.48	U	10	U
Pesticides/PCBs	Aroclor 1254	N	µg/L	0.48	U			0.5	U	0.48	U	10	U
Pesticides/PCBs	Aroclor 1260	N	µg/L	0.48	U			0.5	U	0.48	U	10	U
Metals - Unfiltered	Aluminum	N	µg/L	42.8	J	46.7	J	200	U	17.4	J	200	U
Metals - Unfiltered	Antimony	N	µg/L	6	U	6	U	6	U	6	U	60	U
Metals - Unfiltered	Arsenic	N	µg/L	10	U	10	U	10	U	10	U	10	U
Metals - Unfiltered	Barium	N	µg/L	22.7	J	21.1	J	175	J	184	J	200	U
Metals - Unfiltered	Beryllium	N	µg/L	4	U	4	U	4	U	4	U	5	U
Metals - Unfiltered	Cadmium	N	µg/L	5	U	5	U	5	U	5	U	5	U
Metals - Unfiltered	Calcium	N	µg/L	377000		392000	J	266000	J	275000		317000	
Metals - Unfiltered	Chromium	N	µg/L	10	U	10	U	10	U	10	U	10	U
Metals - Unfiltered	Cobalt	N	µg/L	50	U	50	U	50	U	50	U	50	U
Metals - Unfiltered	Copper	N	µg/L	25	U	25	U	25	U	25	U	25	U
Metals - Unfiltered	Iron	N	µg/L	283	J	300	U	600	U	33	J	100	U
Metals - Unfiltered	Lead	N	µg/L	5	U	10	U	10	U	5	U	3	U
Metals - Unfiltered	Magnesium	N	µg/L	121000		124000		103000	J	110000		120000	
Metals - Unfiltered	Manganese	N	µg/L	53.7		11.1	J	5.9	J	5.4	J	15	U
Metals - Unfiltered	Mercury	N	µg/L	1	U	1	U	1	U	1	U	0.2	U
Metals - Unfiltered	Nickel	N	µg/L	40	U	40	U	40	U	40	U	40	U
Metals - Unfiltered	Potassium	N	µg/L	7740	J	10900		13300		11500	J	11300	
Metals - Unfiltered	Selenium	N	µg/L	10	U	21.3	J	6.7	B	14.3	B	5	U
Metals - Unfiltered	Silver	N	µg/L	10	U	10	U	10	U	10	U	10	U
Metals - Unfiltered	Sodium	N	µg/L	26400		32100	J	56600	J	58500		63000	
Metals - Unfiltered	Thallium	N	µg/L	10	U	10	U	10	U	10	U	10	U
Metals - Unfiltered	Vanadium	N	µg/L	1.6	J	1.1	J	1	J	1.3	J	50	U
Metals - Unfiltered	Zinc	N	µg/L	20	U	20	U	20	U	20	U	20	U
Metals - Filtered	Aluminum	Y	µg/L	16.2	J	37.4	B	200	U	12.4	J	200	U
Metals - Filtered	Antimony	Y	µg/L	6	U	6	U	6	U	6	U	60	U
Metals - Filtered	Arsenic	Y	µg/L	10	U	10	U	10	U	10	U	10	U
Metals - Filtered	Barium	Y	µg/L	22.6	J	19.8	J	171	J	186	J	200	U
Metals - Filtered	Beryllium	Y	µg/L	4	U	4	U	4	U	4	U	5	U
Metals - Filtered	Cadmium	Y	µg/L	5	U	5	U	5	U	5	U	5	U

Appendix H

Chemical Analytical Data Summary
Groundwater
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	AP2-BEDGW-002		AP2-BEDGW-002		AP2-BEDGW-003		AP2-BEDGW-003		AP2-BEDGW-003	
			SAMPLE_NO	AP3063		AP3079		AP3064		AP3065		AP3066	
			SAMPLE_DATE	24-May-09		17-Nov-09		23-May-09		23-May-09		23-May-09	
			FK_DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
			SAMPLE_PURPOSE	REG		REG		REG		FD		FS	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Metals - Filtered	Calcium	Y	µg/L	389000		347000	J	257000		281000		323000	
Metals - Filtered	Chromium	Y	µg/L	10	U	10	U	10	U	10	U	10	U
Metals - Filtered	Cobalt	Y	µg/L	50	U	50	U	50	U	50	U	50	U
Metals - Filtered	Copper	Y	µg/L	25	U	25	U	25	U	25	U	25	U
Metals - Filtered	Iron	Y	µg/L	600	U	36.1	J	600	U	300	U	100	U
Metals - Filtered	Lead	Y	µg/L	2.1	B	10	U	10	U	10	U	3	U
Metals - Filtered	Magnesium	Y	µg/L	119000		118000	J	98700	J	108000		123000	
Metals - Filtered	Manganese	Y	µg/L	52.4		9.6	J	5.6	J	6.1	J	15	U
Metals - Filtered	Mercury	Y	µg/L	1	U	1	U	1	U	1	U	0.2	U
Metals - Filtered	Nickel	Y	µg/L	40	U	40	U	40	U	40	U	40	U
Metals - Filtered	Potassium	Y	µg/L	9790	J	11500	J	13000		13800		11800	
Metals - Filtered	Selenium	Y	µg/L	10	U	74.9	J	8.1	J	8.8	J	5	U
Metals - Filtered	Silver	Y	µg/L	10	U	10	U	10	U	10	U	10	U
Metals - Filtered	Sodium	Y	µg/L	28900		33100		55700		58700		65900	
Metals - Filtered	Thallium	Y	µg/L	10	U	10	U	10	U	10	U	10	U
Metals - Filtered	Vanadium	Y	µg/L	1.1	J	2	J	1.2	J	1.1	J	50	U
Metals - Filtered	Zinc	Y	µg/L	20	U	20	U	20	U	20	U	20	U
Cyanide	Cyanide, total	N	ppm										
Water Quality Parameters	Alkalinity	N	ppm	417		472	J	649	J	632		590	
Water Quality Parameters	Chloride	N	ppm	40.6		74.2	J	111		105		93.6	
Water Quality Parameters	Cyanide, total	N	ppm	0.0072	J	0.01	UJ	0.01	UJ	0.01	UJ	0.71	
Water Quality Parameters	Hardness	N	ppm									1200	
Water Quality Parameters	HARDNESS (as CaCO3)	N	ppm	1440		1490		1090		1140			
Water Quality Parameters	Nitrate	N	ppm										
Water Quality Parameters	Nitrate-Nitrite	N	ppm	2	U	2	J	0.76	J	2	U	0.1	U
Water Quality Parameters	Sulfate	N	ppm	946		776	J	519		476		626	
Water Quality Parameters	Total dissolved solids	N	ppm	2240	J	2200	J	1900	J	1740	J	1500	
Water Quality Parameters	Total suspended solids	N	ppm	18		4	UJ	10	U	17		4	U
Water Quality Parameters	Turbidity	N	NTU	38.2	J	1.7	J	14	J	1	UJ	94	

Appendix H

Chemical Analytical Data Summary
Groundwater
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	AP2-BEDGW-003		AP2-BEDGW-003		AP2-BEDGW-003		AP2-MW01		AP2-MW01	
			SAMPLE_NO	AP3080		AP3081		AP3082		AP3057		AP3075	
			SAMPLE_DATE	16-Nov-09		17-Nov-09		17-Nov-09		23-May-09		13-Nov-09	
			FK_DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
			SAMPLE_PURPOSE	REG		FD		FS		REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	µg/L	0.2	U	0.19	U			0.19	U	0.19	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	µg/L	0.2	U	0.19	U			0.19	U	0.19	U
Explosives	Dinitrobenzene, 1,3-	N	µg/L	0.2	U	0.19	U			0.19	U	0.19	U
Explosives	Dinitrotoluene, 2,4-	N	µg/L	0.2	U	0.19	U			0.19	U	0.19	U
Explosives	Dinitrotoluene, 2,6-	N	µg/L	0.2	U	0.19	U			0.19	U	0.19	U
Explosives	HMX	N	µg/L	0.2	U	0.19	U			0.19	U	0.19	U
Explosives	Nitrobenzene	N	µg/L	0.2	U	0.19	U			0.19	U	0.19	U
Explosives	Nitrotoluene, 2-	N	µg/L	0.2	U	0.19	U			0.19	U	0.19	U
Explosives	Nitrotoluene, 3-	N	µg/L	0.2	U	0.19	U			0.19	U	0.19	U
Explosives	Nitrotoluene, 4-	N	µg/L	0.2	U	0.19	U			0.19	U	0.19	U
Explosives	RDX	N	µg/L	0.2	U	0.19	U			0.19	U	0.19	U
Explosives	Tetryl	N	µg/L	0.2	U	0.19	U			0.19	U	0.19	U
Explosives	Trinitrobenzene, 1,3,5-	N	µg/L	0.2	U	0.19	U			0.19	U	0.19	U
Explosives	Trinitrotoluene, 2,4,6-	N	µg/L	0.2	U	0.19	U			0.19	U	0.19	U
Volatiles	Acetone	N	µg/L	86.1	J	34.4	J	10	U	25	R		
Volatiles	Benzene	N	µg/L	336		6.2	J	4.1		1	U		
Volatiles	Bromodichloromethane	N	µg/L	5	U	1	U	1	U	1	U		
Volatiles	Bromoform	N	µg/L	5	U	1	U	1	UJ	1	U		
Volatiles	Bromomethane	N	µg/L	10	U	2	U	1	U	2	U		
Volatiles	Butanone, 2-	N	µg/L	25	U	5	U	10	U	5	U		
Volatiles	Carbon disulfide	N	µg/L	3.7	J	1.2	B	1.3		2	U		
Volatiles	Carbon tetrachloride	N	µg/L	5	U	1	U	1	U	1	U		
Volatiles	Chlorobenzene	N	µg/L	5	U	1	U	1	U	1	U		
Volatiles	Chloroethane	N	µg/L	10	U	2	U	1	U	2	U		
Volatiles	Chloroform	N	µg/L	14.6	B	4	B	1	U	1	U		
Volatiles	Chloromethane	N	µg/L	44.9	J	3.5	J	1	U	2	U		
Volatiles	Cyclohexane	N	µg/L					54					
Volatiles	Dibromo-3-chloropropane, 1,2-	N	µg/L					2	UJ				
Volatiles	Dibromochloromethane	N	µg/L	5	U	1	U	1	U	1	U		
Volatiles	Dibromoethane, 1,2-	N	µg/L					1	U				
Volatiles	Dichlorobenzene, 1,2-	N	µg/L					1	U				
Volatiles	Dichlorobenzene, 1,3-	N	µg/L					1	U				
Volatiles	Dichlorobenzene, 1,4-	N	µg/L					1	U				
Volatiles	Dichlorodifluoromethane	N	µg/L					1	U				
Volatiles	Dichloroethane, 1,1-	N	µg/L	5	U	1	U	1	U	1	U		
Volatiles	Dichloroethane, 1,2-	N	µg/L	5	U	1	U	1	U	1	U		
Volatiles	Dichloroethene, 1,1-	N	µg/L	5	U	1	U	1	U	1	U		
Volatiles	Dichloroethene, cis-1,2-	N	µg/L	5	U	1	U	1	U	1	U		
Volatiles	Dichloroethene, trans-1,2-	N	µg/L	5	U	1	U	1	U	1	U		
Volatiles	Dichloropropane, 1,2-	N	µg/L	5	U	1	U	1	U	1	U		
Volatiles	Dichloropropene, cis-1,3-	N	µg/L	5	U	1	U	1	UJ	1	U		
Volatiles	Dichloropropene, trans-1,3-	N	µg/L	1.7	J	1	U	1	UJ	1	U		
Volatiles	Ethylbenzene	N	µg/L	57.1		6.6	J	5		1	U		

Appendix H

Chemical Analytical Data Summary
Groundwater
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	AP2-BEDGW-003		AP2-BEDGW-003		AP2-BEDGW-003		AP2-MW01		AP2-MW01	
			SAMPLE_NO	AP3080		AP3081		AP3082		AP3057		AP3075	
			SAMPLE_DATE	16-Nov-09		17-Nov-09		17-Nov-09		23-May-09		13-Nov-09	
			FK_DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
			SAMPLE_PURPOSE	REG		FD		FS		REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Volatiles	Hexanone, 2-	N	µg/L	50	U	10	U	10	U	10	U		
Volatiles	Isopropylbenzene	N	µg/L					2.5					
Volatiles	METHYL ACETATE	N	µg/L					10	U				
Volatiles	Methyl Tertiary Butyl Ether	N	µg/L					5	U				
Volatiles	Methyl-2-pentanone, 4-	N	µg/L	25	U	5	U	10	U	5	U		
Volatiles	Methylcyclohexane	N	µg/L					39					
Volatiles	Methylene chloride	N	µg/L	13.4	B	5	U	1	U	5	U		
Volatiles	Styrene	N	µg/L	5	U	1	U	1	U	1	U		
Volatiles	Tetrachloroethane, 1,1,2,2-	N	µg/L	5	U	1	U	1	U	1	U		
Volatiles	Tetrachloroethene	N	µg/L	5	U	1	U	1	U	1	U		
Volatiles	Toluene	N	µg/L	147		3.3	J	2.3		1	U		
Volatiles	Trichlorobenzene, 1,2,4-	N	µg/L					1	U				
Volatiles	Trichloroethane, 1,1,1-	N	µg/L	5	U	1	U	1	U	1	U		
Volatiles	Trichloroethane, 1,1,2-	N	µg/L	5	U	1	U	1	U	1	U		
Volatiles	Trichloroethene	N	µg/L	5	U	1	U	1	U	1	U		
Volatiles	Trichlorofluoromethane	N	µg/L					1	U				
Volatiles	Trichlorotrifluoroethane	N	µg/L					1	U				
Volatiles	Vinyl chloride	N	µg/L	5	U	1	U	1	U	1	U		
Volatiles	Xylenes, total	N	µg/L	630		36.8	J	29		3	U		
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	µg/L	4.8	U	4.8	U			4.8	UJ		
Semivolatiles	Acenaphthene	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Acenaphthylene	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	ACETOPHENONE	N	µg/L					10	U				
Semivolatiles	Anthracene	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Atrazine	N	µg/L					10	U				
Semivolatiles	Benzaldehyde	N	µg/L					10	U				
Semivolatiles	Benzo(a)anthracene	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Benzo(a)pyrene	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Benzo(b)fluoranthene	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Benzo(ghi)perylene	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Benzo(k)fluoranthene	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Benzoic acid	N	µg/L	24	U	24	U			24	UJ		
Semivolatiles	Benzyl alcohol	N	µg/L	4.8	U	4.8	U			4.8	UJ		
Semivolatiles	BIBENZENE	N	µg/L					10	U				
Semivolatiles	Bis(2-chloroethoxy)methane	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Bis(2-chloroethyl)ether	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Bis(2-chloroisopropyl)ether	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Bromophenyl phenyl ether, 4-	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Butyl benzyl phthalate	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Caprolactam	N	µg/L					10	U				
Semivolatiles	Carbazole	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Chloro-3-methylphenol, 4-	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		

Appendix H

Chemical Analytical Data Summary
Groundwater
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	AP2-BEDGW-003		AP2-BEDGW-003		AP2-BEDGW-003		AP2-MW01		AP2-MW01	
			SAMPLE_NO	AP3080		AP3081		AP3082		AP3057		AP3075	
			SAMPLE_DATE	16-Nov-09		17-Nov-09		17-Nov-09		23-May-09		13-Nov-09	
			FK_DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
			SAMPLE_PURPOSE	REG		FD		FS		REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Semivolatiles	Chloroaniline, 4-	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Chloronaphthalene, 2-	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Chlorophenol, 2-	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Chrysene	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Dibenz(a,h)anthracene	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Dibenzofuran	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Dichlorobenzene, 1,2-	N	µg/L	4.8	U	4.8	U			4.8	UJ		
Semivolatiles	Dichlorobenzene, 1,3-	N	µg/L	4.8	U	4.8	U			4.8	UJ		
Semivolatiles	Dichlorobenzene, 1,4-	N	µg/L	4.8	U	4.8	U			4.8	UJ		
Semivolatiles	Dichlorobenzidine, 3,3'-	N	µg/L	9.5	U	9.5	U	50	U	9.6	UJ		
Semivolatiles	Dichlorophenol, 2,4-	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Diethyl phthalate	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Dimethyl phthalate	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Dimethylphenol, 2,4-	N	µg/L	1.7	J	4.8	U	10	U	4.8	UJ		
Semivolatiles	Di-n-butyl phthalate	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	µg/L	9.5	U	9.5	U	50	U	9.6	UJ		
Semivolatiles	Dinitrophenol, 2,4-	N	µg/L	24	U	24	U	50	U	24	UJ		
Semivolatiles	Dinitrotoluene, 2,4-	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Dinitrotoluene, 2,6-	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Di-n-octyl phthalate	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	DIPHENYLAMINE	N	µg/L										
Semivolatiles	Fluoranthene	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Fluorene	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Hexachlorobenzene	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Hexachlorobutadiene	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Hexachlorocyclopentadiene	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Hexachloroethane	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Isophorone	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Methylnaphthalene, 2-	N	µg/L	6.3		2.5	J	10	U	4.8	UJ		
Semivolatiles	Methylphenol, 2-	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Methylphenol, 4-	N	µg/L					10	U				
Semivolatiles	Naphthalene	N	µg/L	7.4		1.6	J	10	U	4.8	UJ		
Semivolatiles	Nitroaniline, 2-	N	µg/L	9.5	U	9.5	U	50	U	9.6	UJ		
Semivolatiles	Nitroaniline, 3-	N	µg/L	9.5	U	9.5	U	50	U	9.6	UJ		
Semivolatiles	Nitroaniline, 4-	N	µg/L	9.5	U	9.5	U	50	U	9.6	UJ		
Semivolatiles	Nitrobenzene	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Nitrophenol, 2-	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Nitrophenol, 4-	N	µg/L	24	U	24	U	50	U	24	UJ		
Semivolatiles	n-Nitrosodimethylamine	N	µg/L										
Semivolatiles	n-Nitroso-di-n-propylamine	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	n-Nitrosodiphenylamine	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		

Appendix H

Chemical Analytical Data Summary
Groundwater
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	AP2-BEDGW-003		AP2-BEDGW-003		AP2-BEDGW-003		AP2-MW01		AP2-MW01	
			SAMPLE_NO	AP3080		AP3081		AP3082		AP3057		AP3075	
			SAMPLE_DATE	16-Nov-09		17-Nov-09		17-Nov-09		23-May-09		13-Nov-09	
			FK_DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
			SAMPLE_PURPOSE	REG		FD		FS		REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Semivolatiles	Pentachlorophenol	N	µg/L	24	U	24	U	10	U	24	UJ		
Semivolatiles	Phenanthrene	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Phenol	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Pyrene	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Trichlorobenzene, 1,2,4-	N	µg/L	4.8	U	4.8	U			4.8	UJ		
Semivolatiles	Trichlorophenol, 2,4,5-	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Semivolatiles	Trichlorophenol, 2,4,6-	N	µg/L	4.8	U	4.8	U	10	U	4.8	UJ		
Pesticides/PCBs	Aroclor 1016	N	µg/L							0.48	U		
Pesticides/PCBs	Aroclor 1221	N	µg/L							0.48	U		
Pesticides/PCBs	Aroclor 1232	N	µg/L							0.48	U		
Pesticides/PCBs	Aroclor 1242	N	µg/L							0.48	U		
Pesticides/PCBs	Aroclor 1248	N	µg/L							0.48	U		
Pesticides/PCBs	Aroclor 1254	N	µg/L							0.48	U		
Pesticides/PCBs	Aroclor 1260	N	µg/L							0.48	U		
Metals - Unfiltered	Aluminum	N	µg/L	33.9	J	45.5	J	200	U	133	J		
Metals - Unfiltered	Antimony	N	µg/L	6	U	6	U	60	U	6	U		
Metals - Unfiltered	Arsenic	N	µg/L	10	U	10	U	10	U	10	U		
Metals - Unfiltered	Barium	N	µg/L	161	J	21.3	J	200	U	98	J		
Metals - Unfiltered	Beryllium	N	µg/L	4	U	4	U	5	U	4	U		
Metals - Unfiltered	Cadmium	N	µg/L	5	U	5	U	5	U	5	U		
Metals - Unfiltered	Calcium	N	µg/L	280000	J	385000	J	404000		112000			
Metals - Unfiltered	Chromium	N	µg/L	10	U	10	U	10	U	10	U		
Metals - Unfiltered	Cobalt	N	µg/L	50	U	50	U	50	U	50	U		
Metals - Unfiltered	Copper	N	µg/L	25	U	25	U	25	U	25	U		
Metals - Unfiltered	Iron	N	µg/L	300	U	300	U	194		80.8	J		
Metals - Unfiltered	Lead	N	µg/L	10	U	2.4	B	3	U	2.4	J		
Metals - Unfiltered	Magnesium	N	µg/L	112000		123000		119000		38700			
Metals - Unfiltered	Manganese	N	µg/L	7.1	J	10.7	J	15	U	82.2			
Metals - Unfiltered	Mercury	N	µg/L	1	U	1	U	0.2	U	1	U		
Metals - Unfiltered	Nickel	N	µg/L	40	U	40	U	40	U	40	U		
Metals - Unfiltered	Potassium	N	µg/L	15600		11000		7380		4150	J		
Metals - Unfiltered	Selenium	N	µg/L	12.4	J	17.7	J	5	U	10	U		
Metals - Unfiltered	Silver	N	µg/L	10	U	10	U	10	U	10	U		
Metals - Unfiltered	Sodium	N	µg/L	61100	J	32100	J	28500		7440	J		
Metals - Unfiltered	Thallium	N	µg/L	10	U	10	U	10	U	10	U		
Metals - Unfiltered	Vanadium	N	µg/L	50	UJ	50	UJ	50	U	3.7	J		
Metals - Unfiltered	Zinc	N	µg/L	20	U	20	U	20	U	20	U		
Metals - Filtered	Aluminum	Y	µg/L	40.8	B	39.3	B	200	U	200	U		
Metals - Filtered	Antimony	Y	µg/L	6	U	6	U	60	U	6	U		
Metals - Filtered	Arsenic	Y	µg/L	10	U	10	U	10	U	10	U		
Metals - Filtered	Barium	Y	µg/L	164	J	18.8	J	200	U	88.1	J		
Metals - Filtered	Beryllium	Y	µg/L	4	U	4	U	5	U	4	U		
Metals - Filtered	Cadmium	Y	µg/L	5	U	5	U	5	U	5	U		

Appendix H

Chemical Analytical Data Summary
Groundwater
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	AP2-BEDGW-003		AP2-BEDGW-003		AP2-BEDGW-003		AP2-MW01		AP2-MW01	
			SAMPLE_NO	AP3080		AP3081		AP3082		AP3057		AP3075	
			SAMPLE_DATE	16-Nov-09		17-Nov-09		17-Nov-09		23-May-09		13-Nov-09	
			FK_DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
			SAMPLE_PURPOSE	REG		FD		FS		REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Metals - Filtered	Calcium	Y	µg/L	256000	J	335000	J	411000		102000			
Metals - Filtered	Chromium	Y	µg/L	10	U	10	U	10	U	10	U		
Metals - Filtered	Cobalt	Y	µg/L	50	U	50	U	50	U	50	U		
Metals - Filtered	Copper	Y	µg/L	25	U	25	U	25	U	25	U		
Metals - Filtered	Iron	Y	µg/L	65.5	J	46.5	J	100	U	300	U		
Metals - Filtered	Lead	Y	µg/L	10	U	10	U	3	U	2.1	B		
Metals - Filtered	Magnesium	Y	µg/L	109000	J	113000	J	121000		34100			
Metals - Filtered	Manganese	Y	µg/L	7.2	J	9.3	J	15	U	72.3			
Metals - Filtered	Mercury	Y	µg/L	1	U	1	U	0.2	U	1	U		
Metals - Filtered	Nickel	Y	µg/L	40	U	40	U	40	U	40	U		
Metals - Filtered	Potassium	Y	µg/L	16300	J	11000	J	7540		5030	J		
Metals - Filtered	Selenium	Y	µg/L	22.4	J	14.3	J	5	U	3.5	J		
Metals - Filtered	Silver	Y	µg/L	10	U	10	U	10	U	10	U		
Metals - Filtered	Sodium	Y	µg/L	63100		31400		29100		8520	J		
Metals - Filtered	Thallium	Y	µg/L	10	U	10	U	10	U	10	U		
Metals - Filtered	Vanadium	Y	µg/L	2.6	J	2.3	J	50	U	3.5			
Metals - Filtered	Zinc	Y	µg/L	20	U	20	U	20	U	20	U		
Cyanide	Cyanide, total	N	ppm										
Water Quality Parameters	Alkalinity	N	ppm	662	J	492	J	490		362			
Water Quality Parameters	Chloride	N	ppm	118		46.9	J	48.8		4.6			
Water Quality Parameters	Cyanide, total	N	ppm	0.01	UJ	0.01	UJ	0.51		0.01	UJ		
Water Quality Parameters	Hardness	N	ppm					1600					
Water Quality Parameters	HARDNESS (as CaCO3)	N	ppm	1160		1460				439			
Water Quality Parameters	Nitrate	N	ppm					0.1	UJ				
Water Quality Parameters	Nitrate-Nitrite	N	ppm	0.047	B	0.054	B			0.065	J		
Water Quality Parameters	Sulfate	N	ppm	496		1070	J	1080		81.5			
Water Quality Parameters	Total dissolved solids	N	ppm	1570	J	2050	J	2000		294	J		
Water Quality Parameters	Total suspended solids	N	ppm	10	UJ	10	UJ	4	U	10	U		
Water Quality Parameters	Turbidity	N	NTU	51.2		21.4	J	110		1	UJ		

Appendix H

Chemical Analytical Data Summary
Groundwater
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	AP2-MW02		AP2-MW02		AP2-MW02		AP2-MW02		AP2-MW03	
			SAMPLE_NO	AP3058		AP3059		AP3060		AP3076		AP3061	
			SAMPLE_DATE	25-May-09		25-May-09		26-May-09		13-Nov-09		24-May-09	
			FK_DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
			SAMPLE_PURPOSE	REG		FD		FS		REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	µg/L	0.19	U	0.19	U	0.2	U	0.2	U	0.19	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	µg/L	0.19	U	0.19	U	0.2	U	0.2	U	0.19	U
Explosives	Dinitrobenzene, 1,3-	N	µg/L	0.19	U	0.19	U	0.2	U	0.2	U	0.19	U
Explosives	Dinitrotoluene, 2,4-	N	µg/L	0.19	U	0.19	U	0.2	U	0.2	U	0.19	U
Explosives	Dinitrotoluene, 2,6-	N	µg/L	0.19	U	0.19	U	0.2	U	0.2	U	0.19	U
Explosives	HMX	N	µg/L	0.19	U	0.19	U	0.5	U	0.2	U	0.19	U
Explosives	Nitrobenzene	N	µg/L	0.19	U	0.19	U	0.2	U	0.2	U	0.19	U
Explosives	Nitrotoluene, 2-	N	µg/L	0.19	U	0.19	U	0.2	U	0.2	U	0.19	U
Explosives	Nitrotoluene, 3-	N	µg/L	0.19	U	0.19	U	0.2	U	0.2	U	0.19	U
Explosives	Nitrotoluene, 4-	N	µg/L	0.19	U	0.19	U	0.2	U	0.2	U	0.19	U
Explosives	RDX	N	µg/L	0.19	U	0.19	U	0.5	U	0.2	U	0.19	U
Explosives	Tetryl	N	µg/L	0.19	U	0.19	U	0.2	U	0.2	U	0.19	U
Explosives	Trinitrobenzene, 1,3,5-	N	µg/L	0.19	U	0.19	U	0.2	U	0.2	U	0.19	U
Explosives	Trinitrotoluene, 2,4,6-	N	µg/L	0.19	U	0.19	U	0.2	U	0.2	U	0.19	U
Volatiles	Acetone	N	µg/L	25	R	25	R	10	UJ			25	R
Volatiles	Benzene	N	µg/L	1	U	1	U	1	U			1	U
Volatiles	Bromodichloromethane	N	µg/L	1	U	1	U	1	U			1	U
Volatiles	Bromoform	N	µg/L	1	U	1	U	1	U			1	U
Volatiles	Bromomethane	N	µg/L	2	U	2	U	1	U			2	U
Volatiles	Butanone, 2-	N	µg/L	5	U	5	U	10	R			5	U
Volatiles	Carbon disulfide	N	µg/L	2	U	2	U	1	U			2	U
Volatiles	Carbon tetrachloride	N	µg/L	1	U	1	U	1	U			1	U
Volatiles	Chlorobenzene	N	µg/L	1	U	1	U	1	U			1	U
Volatiles	Chloroethane	N	µg/L	2	U	2	U	1	R			2	U
Volatiles	Chloroform	N	µg/L	1	U	1	U	1	U			1	U
Volatiles	Chloromethane	N	µg/L	2	U	2	U	1	UJ			2	U
Volatiles	Cyclohexane	N	µg/L					1	U				
Volatiles	Dibromo-3-chloropropane, 1,2-	N	µg/L					2	R				
Volatiles	Dibromochloromethane	N	µg/L	1	U	1	U	1	U			1	U
Volatiles	Dibromoethane, 1,2-	N	µg/L					1	U				
Volatiles	Dichlorobenzene, 1,2-	N	µg/L					1	U				
Volatiles	Dichlorobenzene, 1,3-	N	µg/L					1	U				
Volatiles	Dichlorobenzene, 1,4-	N	µg/L					1	U				
Volatiles	Dichlorodifluoromethane	N	µg/L					1	U				
Volatiles	Dichloroethane, 1,1-	N	µg/L	1	U	1	U	1	U			1	U
Volatiles	Dichloroethane, 1,2-	N	µg/L	1	U	1	U	1	U			1	U
Volatiles	Dichloroethene, 1,1-	N	µg/L	1	U	1	U	1	U			1	U
Volatiles	Dichloroethene, cis-1,2-	N	µg/L	1	U	1	U	1	U			1	U
Volatiles	Dichloroethene, trans-1,2-	N	µg/L	1	U	1	U	1	U			1	U
Volatiles	Dichloropropane, 1,2-	N	µg/L	1	U	1	U	1	U			1	U
Volatiles	Dichloropropene, cis-1,3-	N	µg/L	1	U	1	U	1	U			1	U
Volatiles	Dichloropropene, trans-1,3-	N	µg/L	1	U	1	U	1	U			1	U
Volatiles	Ethylbenzene	N	µg/L	1	U	1	U	1	U			1	U

Appendix H

Chemical Analytical Data Summary
Groundwater
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	AP2-MW02		AP2-MW02		AP2-MW02		AP2-MW02		AP2-MW03	
			SAMPLE_NO	AP3058		AP3059		AP3060		AP3076		AP3061	
			SAMPLE_DATE	25-May-09		25-May-09		26-May-09		13-Nov-09		24-May-09	
			FK_DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
			SAMPLE_PURPOSE	REG		FD		FS		REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Volatiles	Hexanone, 2-	N	µg/L	10	U	10	U	10	U			10	U
Volatiles	Isopropylbenzene	N	µg/L					1	U				
Volatiles	METHYL ACETATE	N	µg/L					10	U				
Volatiles	Methyl Tertiary Butyl Ether	N	µg/L					5	U				
Volatiles	Methyl-2-pentanone, 4-	N	µg/L	5	U	5	U	10	UJ			5	U
Volatiles	Methylcyclohexane	N	µg/L					1	U				
Volatiles	Methylene chloride	N	µg/L	5	U	5	U	1	U			5	U
Volatiles	Styrene	N	µg/L	1	U	1	U	1	U			1	U
Volatiles	Tetrachloroethane, 1,1,2,2-	N	µg/L	1	U	1	U	1	U			1	U
Volatiles	Tetrachloroethene	N	µg/L	1	U	1	U	1	U			1	U
Volatiles	Toluene	N	µg/L	1	U	1	U	1	U			1	U
Volatiles	Trichlorobenzene, 1,2,4-	N	µg/L					1	U				
Volatiles	Trichloroethane, 1,1,1-	N	µg/L	1	U	1	U	1	U			1	U
Volatiles	Trichloroethane, 1,1,2-	N	µg/L	1	U	1	U	1	U			1	U
Volatiles	Trichloroethene	N	µg/L	1	U	1	U	1	U			1	U
Volatiles	Trichlorofluoromethane	N	µg/L					1	U				
Volatiles	Trichlorotrifluoroethane	N	µg/L					1	U				
Volatiles	Vinyl chloride	N	µg/L	1	U	1	U	1	U			1	U
Volatiles	Xylenes, total	N	µg/L	3	U	3	U	2	U			3	U
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	µg/L	5	U	5	U					5	U
Semivolatiles	Acenaphthene	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Acenaphthylene	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	ACETOPHENONE	N	µg/L					10	U				
Semivolatiles	Anthracene	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Atrazine	N	µg/L					10	U				
Semivolatiles	Benzaldehyde	N	µg/L					10	U				
Semivolatiles	Benzo(a)anthracene	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Benzo(a)pyrene	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Benzo(b)fluoranthene	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Benzo(ghi)perylene	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Benzo(k)fluoranthene	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Benzoic acid	N	µg/L	25	U	25	U					25	U
Semivolatiles	Benzyl alcohol	N	µg/L	5	U	5	U					5	U
Semivolatiles	BIBENZENE	N	µg/L					10	U				
Semivolatiles	Bis(2-chloroethoxy)methane	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Bis(2-chloroethyl)ether	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Butyl benzyl phthalate	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Caprolactam	N	µg/L					10	U				
Semivolatiles	Carbazole	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	µg/L	5	U	5	U	10	U			5	U

Appendix H

Chemical Analytical Data Summary
Groundwater
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	AP2-MW02		AP2-MW02		AP2-MW02		AP2-MW02		AP2-MW03	
			SAMPLE_NO	AP3058		AP3059		AP3060		AP3076		AP3061	
			SAMPLE_DATE	25-May-09		25-May-09		26-May-09		13-Nov-09		24-May-09	
			FK_DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
			SAMPLE_PURPOSE	REG		FD		FS		REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Semivolatiles	Chloroaniline, 4-	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Chloronaphthalene, 2-	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Chlorophenol, 2-	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Chrysene	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Dibenz(a,h)anthracene	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Dibenzofuran	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Dichlorobenzene, 1,2-	N	µg/L	5	U	5	U					5	U
Semivolatiles	Dichlorobenzene, 1,3-	N	µg/L	5	U	5	U					5	U
Semivolatiles	Dichlorobenzene, 1,4-	N	µg/L	5	U	5	U					5	U
Semivolatiles	Dichlorobenzidine, 3,3'-	N	µg/L	10	U	10	U	50	U			10	U
Semivolatiles	Dichlorophenol, 2,4-	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Diethyl phthalate	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Dimethyl phthalate	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Dimethylphenol, 2,4-	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Di-n-butyl phthalate	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	µg/L	10	U	10	U	50	U			10	U
Semivolatiles	Dinitrophenol, 2,4-	N	µg/L	25	U	25	U	50	U			25	U
Semivolatiles	Dinitrotoluene, 2,4-	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Dinitrotoluene, 2,6-	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Di-n-octyl phthalate	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	DIPHENYLAMINE	N	µg/L										
Semivolatiles	Fluoranthene	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Fluorene	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Hexachlorobenzene	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Hexachlorobutadiene	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Hexachlorocyclopentadiene	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Hexachloroethane	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Isophorone	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Methylnaphthalene, 2-	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Methylphenol, 2-	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Methylphenol, 4-	N	µg/L					10	U				
Semivolatiles	Naphthalene	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Nitroaniline, 2-	N	µg/L	10	U	10	U	50	U			10	U
Semivolatiles	Nitroaniline, 3-	N	µg/L	10	U	10	U	50	U			10	U
Semivolatiles	Nitroaniline, 4-	N	µg/L	10	U	10	U	50	U			10	U
Semivolatiles	Nitrobenzene	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Nitrophenol, 2-	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Nitrophenol, 4-	N	µg/L	25	U	25	U	50	U			25	U
Semivolatiles	n-Nitrosodimethylamine	N	µg/L										
Semivolatiles	n-Nitroso-di-n-propylamine	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	n-Nitrosodiphenylamine	N	µg/L	5	U	5	U	10	U			5	U

Appendix H

Chemical Analytical Data Summary
Groundwater
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	AP2-MW02		AP2-MW02		AP2-MW02		AP2-MW02		AP2-MW03	
			SAMPLE_NO	AP3058		AP3059		AP3060		AP3076		AP3061	
			SAMPLE_DATE	25-May-09		25-May-09		26-May-09		13-Nov-09		24-May-09	
			FK_DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
			SAMPLE_PURPOSE	REG		FD		FS		REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Semivolatiles	Pentachlorophenol	N	µg/L	25	U	25	U	10	U			25	U
Semivolatiles	Phenanthrene	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Phenol	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Pyrene	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	µg/L	5	U	5	U					5	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	µg/L	5	U	5	U	10	U			5	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	µg/L	5	U	5	U	10	U			5	U
Pesticides/PCBs	Aroclor 1016	N	µg/L	0.48	U	0.48	U	1	U			0.48	U
Pesticides/PCBs	Aroclor 1221	N	µg/L	0.48	U	0.48	U	1	U			0.48	U
Pesticides/PCBs	Aroclor 1232	N	µg/L	0.48	U	0.48	U	1	U			0.48	U
Pesticides/PCBs	Aroclor 1242	N	µg/L	0.48	U	0.48	U	1	U			0.48	U
Pesticides/PCBs	Aroclor 1248	N	µg/L	0.48	U	0.48	U	1	U			0.48	U
Pesticides/PCBs	Aroclor 1254	N	µg/L	0.48	U	0.48	U	1	U			0.48	U
Pesticides/PCBs	Aroclor 1260	N	µg/L	0.48	U	0.48	U	1	U			0.48	U
Metals - Unfiltered	Aluminum	N	µg/L	79.1	J	77.6	J	200	U			47.1	J
Metals - Unfiltered	Antimony	N	µg/L	6	U	6	U	60	U			6	U
Metals - Unfiltered	Arsenic	N	µg/L	10	U	10	U	10	U			10	U
Metals - Unfiltered	Barium	N	µg/L	25.3	J	24.5	J	200	U			25.2	J
Metals - Unfiltered	Beryllium	N	µg/L	4	U	4	U	5	U			4	U
Metals - Unfiltered	Cadmium	N	µg/L	1.1	J	1	J	5	U			5	U
Metals - Unfiltered	Calcium	N	µg/L	102000		102000		94900				54400	
Metals - Unfiltered	Chromium	N	µg/L	10	U	10	U	10	U			10	U
Metals - Unfiltered	Cobalt	N	µg/L	7.9	J	8.3	J	50	U			50	U
Metals - Unfiltered	Copper	N	µg/L	25	U	25	U	25	U			25	U
Metals - Unfiltered	Iron	N	µg/L	300	U	300	U	100	U			37	J
Metals - Unfiltered	Lead	N	µg/L	5	U	5	U	3	U			5	U
Metals - Unfiltered	Magnesium	N	µg/L	11600		11600		10800				12700	
Metals - Unfiltered	Manganese	N	µg/L	229		229		212				173	
Metals - Unfiltered	Mercury	N	µg/L	1	U	1	U	0.2	U			1	U
Metals - Unfiltered	Nickel	N	µg/L	74.2		74.2		68.9				40	U
Metals - Unfiltered	Potassium	N	µg/L	7690	J	7410	J	8940				1500	J
Metals - Unfiltered	Selenium	N	µg/L	10	U	10	U	5	U			5.7	B
Metals - Unfiltered	Silver	N	µg/L	10	U	10	U	10	U			10	U
Metals - Unfiltered	Sodium	N	µg/L	2560	J	2460	J	5000	U			10200	J
Metals - Unfiltered	Thallium	N	µg/L	10	U	10	U	10	U			10	U
Metals - Unfiltered	Vanadium	N	µg/L	50	U	50	U	50	U			1.4	J
Metals - Unfiltered	Zinc	N	µg/L	42.6		33.9		29.9				20	U
Metals - Filtered	Aluminum	Y	µg/L	45.4	J	44	J	200	U			200	U
Metals - Filtered	Antimony	Y	µg/L	6	U	6	U	60	U			6	U
Metals - Filtered	Arsenic	Y	µg/L	10	U	10	U	10	U			10	U
Metals - Filtered	Barium	Y	µg/L	23.9	J	23.6	J	200	U			22.3	J
Metals - Filtered	Beryllium	Y	µg/L	4	U	4	U	5	U			4	U
Metals - Filtered	Cadmium	Y	µg/L	5	U	5	U	5	U			5	U

Appendix H

Chemical Analytical Data Summary
Groundwater
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	AP2-MW02		AP2-MW02		AP2-MW02		AP2-MW02		AP2-MW03	
			SAMPLE_NO	AP3058		AP3059		AP3060		AP3076		AP3061	
			SAMPLE_DATE	25-May-09		25-May-09		26-May-09		13-Nov-09		24-May-09	
			FK_DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
			SAMPLE_PURPOSE	REG		FD		FS		REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Metals - Filtered	Calcium	Y	µg/L	96400		93100		103000				47200	
Metals - Filtered	Chromium	Y	µg/L	10	U	10	U	10	U			10	U
Metals - Filtered	Cobalt	Y	µg/L	8.9	J	8.7	J	50	U			50	U
Metals - Filtered	Copper	Y	µg/L	25	U	25	U	25	U			25	U
Metals - Filtered	Iron	Y	µg/L	300	U	300	U	100	U			300	U
Metals - Filtered	Lead	Y	µg/L	10	U	10	U	3	U			10	U
Metals - Filtered	Magnesium	Y	µg/L	11000		10600		11900	J			11500	
Metals - Filtered	Manganese	Y	µg/L	220		214		218				171	
Metals - Filtered	Mercury	Y	µg/L	1	U	1	U	0.2	U			1	U
Metals - Filtered	Nickel	Y	µg/L	74.5		72.1		72.6				40	U
Metals - Filtered	Potassium	Y	µg/L	9090	J	8950	J	9500				1950	J
Metals - Filtered	Selenium	Y	µg/L	10	U	10	U	5	U			10	U
Metals - Filtered	Silver	Y	µg/L	10	U	10	U	10	U			10	U
Metals - Filtered	Sodium	Y	µg/L	3030	J	2930	J	5000	U			11000	
Metals - Filtered	Thallium	Y	µg/L	10	U	10	U	10	U			10	U
Metals - Filtered	Vanadium	Y	µg/L	50	U	50	U	50	U			50	U
Metals - Filtered	Zinc	Y	µg/L	33.6		32.4		31				20	U
Cyanide	Cyanide, total	N	ppm										
Water Quality Parameters	Alkalinity	N	ppm	70.3		73.4		72				116	
Water Quality Parameters	Chloride	N	ppm	4.1		3.6		12.6				6.5	
Water Quality Parameters	Cyanide, total	N	ppm	0.01	UJ	0.01	UJ	0.01	U			0.01	UJ
Water Quality Parameters	Hardness	N	ppm					330					
Water Quality Parameters	HARDNESS (as CaCO3)	N	ppm	300		302						188	
Water Quality Parameters	Nitrate	N	ppm										
Water Quality Parameters	Nitrate-Nitrite	N	ppm	10.9		10.9		8.7				0.61	
Water Quality Parameters	Sulfate	N	ppm	165		159		173				94.9	
Water Quality Parameters	Total dissolved solids	N	ppm	507	J	508	J	460				295	J
Water Quality Parameters	Total suspended solids	N	ppm	10	U	4	J	4	U			10	U
Water Quality Parameters	Turbidity	N	NTU	1	UJ	1	UJ	0.5	U			1	J

Appendix H

Chemical Analytical Data Summary
Groundwater
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	ASH PIT 2-PZ01		ASH PIT 2-PZ01		ASH PIT 2-PZ01		ASH PIT 2-PZ03		ASH PIT 2-PZ04	
			SAMPLE_NO	AP3015		AP3016		AP3022		AP3018		AP3019	
			SAMPLE_DATE	2-Feb-09		2-Feb-09		2-Feb-09		31-Jan-09		1-Feb-09	
			FK_DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
			SAMPLE_PURPOSE	FD		FS		REG		REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	µg/L	0.316	U	0.2	U	0.324	U	0.333	U	0.333	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	µg/L	0.316	U	0.2	U	0.324	U	0.333	U	0.333	U
Explosives	Dinitrobenzene, 1,3-	N	µg/L	0.316	U	0.2	U	0.324	U	0.333	U	0.333	U
Explosives	Dinitrotoluene, 2,4-	N	µg/L	0.316	U	0.2	U	0.324	U	0.333	U	0.333	U
Explosives	Dinitrotoluene, 2,6-	N	µg/L	0.316	U	0.2	U	0.324	U	0.333	U	0.333	U
Explosives	HMX	N	µg/L	0.316	U	0.5	U	0.324	U	0.333	U	0.333	U
Explosives	Nitrobenzene	N	µg/L	0.316	U	0.2	U	0.324	U	0.333	U	0.333	U
Explosives	Nitrotoluene, 2-	N	µg/L	0.316	U	0.2	U	0.324	U	0.333	U	0.333	U
Explosives	Nitrotoluene, 3-	N	µg/L	0.316	U	0.2	U	0.324	U	0.333	U	0.333	U
Explosives	Nitrotoluene, 4-	N	µg/L	0.316	U	0.2	U	0.324	U	0.333	U	0.333	U
Explosives	RDX	N	µg/L	0.316	U	0.5	U	0.324	U	0.333	U	0.333	U
Explosives	Tetryl	N	µg/L	0.316	U	0.2	U	0.324	U	0.333	U	0.333	U
Explosives	Trinitrobenzene, 1,3,5-	N	µg/L	0.316	U	0.2	U	0.324	U	0.333	U	0.333	U
Explosives	Trinitrotoluene, 2,4,6-	N	µg/L	0.316	U	0.2	U	0.324	U	0.333	U	0.333	U
Volatiles	Acetone	N	µg/L										
Volatiles	Benzene	N	µg/L										
Volatiles	Bromodichloromethane	N	µg/L										
Volatiles	Bromoform	N	µg/L										
Volatiles	Bromomethane	N	µg/L										
Volatiles	Butanone, 2-	N	µg/L										
Volatiles	Carbon disulfide	N	µg/L										
Volatiles	Carbon tetrachloride	N	µg/L										
Volatiles	Chlorobenzene	N	µg/L										
Volatiles	Chloroethane	N	µg/L										
Volatiles	Chloroform	N	µg/L										
Volatiles	Chloromethane	N	µg/L										
Volatiles	Cyclohexane	N	µg/L										
Volatiles	Dibromo-3-chloropropane, 1,2-	N	µg/L										
Volatiles	Dibromochloromethane	N	µg/L										
Volatiles	Dibromoethane, 1,2-	N	µg/L										
Volatiles	Dichlorobenzene, 1,2-	N	µg/L										
Volatiles	Dichlorobenzene, 1,3-	N	µg/L										
Volatiles	Dichlorobenzene, 1,4-	N	µg/L										
Volatiles	Dichlorodifluoromethane	N	µg/L										
Volatiles	Dichloroethane, 1,1-	N	µg/L										
Volatiles	Dichloroethane, 1,2-	N	µg/L										
Volatiles	Dichloroethene, 1,1-	N	µg/L										
Volatiles	Dichloroethene, cis-1,2-	N	µg/L										
Volatiles	Dichloroethene, trans-1,2-	N	µg/L										
Volatiles	Dichloropropane, 1,2-	N	µg/L										
Volatiles	Dichloropropene, cis-1,3-	N	µg/L										
Volatiles	Dichloropropene, trans-1,3-	N	µg/L										
Volatiles	Ethylbenzene	N	µg/L										

Appendix H

Chemical Analytical Data Summary
Groundwater
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	ASH PIT 2-PZ01		ASH PIT 2-PZ01		ASH PIT 2-PZ01		ASH PIT 2-PZ03		ASH PIT 2-PZ04	
			SAMPLE_NO	AP3015		AP3016		AP3022		AP3018		AP3019	
			SAMPLE_DATE	2-Feb-09		2-Feb-09		2-Feb-09		31-Jan-09		1-Feb-09	
			FK_DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
			SAMPLE_PURPOSE	FD		FS		REG		REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Volatiles	Hexanone, 2-	N	µg/L										
Volatiles	Isopropylbenzene	N	µg/L										
Volatiles	METHYL ACETATE	N	µg/L										
Volatiles	Methyl Tertiary Butyl Ether	N	µg/L										
Volatiles	Methyl-2-pentanone, 4-	N	µg/L										
Volatiles	Methylcyclohexane	N	µg/L										
Volatiles	Methylene chloride	N	µg/L										
Volatiles	Styrene	N	µg/L										
Volatiles	Tetrachloroethane, 1,1,2,2-	N	µg/L										
Volatiles	Tetrachloroethene	N	µg/L										
Volatiles	Toluene	N	µg/L										
Volatiles	Trichlorobenzene, 1,2,4-	N	µg/L										
Volatiles	Trichloroethane, 1,1,1-	N	µg/L										
Volatiles	Trichloroethane, 1,1,2-	N	µg/L										
Volatiles	Trichloroethene	N	µg/L										
Volatiles	Trichlorofluoromethane	N	µg/L										
Volatiles	Trichlorotrifluoroethane	N	µg/L										
Volatiles	Vinyl chloride	N	µg/L										
Volatiles	Xylenes, total	N	µg/L										
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	µg/L										
Semivolatiles	Acenaphthene	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Acenaphthylene	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	ACETOPHENONE	N	µg/L			10	U						
Semivolatiles	Anthracene	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Atrazine	N	µg/L			10	U						
Semivolatiles	Benzaldehyde	N	µg/L			10	U						
Semivolatiles	Benzo(a)anthracene	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Benzo(a)pyrene	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Benzo(b)fluoranthene	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Benzo(ghi)perylene	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Benzo(k)fluoranthene	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Benzoic acid	N	µg/L	10.3	U			10.1	U	10.1	U	10	U
Semivolatiles	Benzyl alcohol	N	µg/L	10.3	U			10.1	U	10.1	U	10	U
Semivolatiles	BIBENZENE	N	µg/L			10	U						
Semivolatiles	Bis(2-chloroethoxy)methane	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Bis(2-chloroethyl)ether	N	µg/L	10.3	U	10	UJ	10.1	U	10.1	U	10	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Butyl benzyl phthalate	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Caprolactam	N	µg/L			10	U						
Semivolatiles	Carbazole	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U

Appendix H

Chemical Analytical Data Summary
Groundwater
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	ASH PIT 2-PZ01		ASH PIT 2-PZ01		ASH PIT 2-PZ01		ASH PIT 2-PZ03		ASH PIT 2-PZ04	
			SAMPLE_NO	AP3015		AP3016		AP3022		AP3018		AP3019	
			SAMPLE_DATE	2-Feb-09		2-Feb-09		2-Feb-09		31-Jan-09		1-Feb-09	
			FK_DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
			SAMPLE_PURPOSE	FD		FS		REG		REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Semivolatiles	Chloroaniline, 4-	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Chloronaphthalene, 2-	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Chlorophenol, 2-	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Chrysene	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Dibenz(a,h)anthracene	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Dibenzofuran	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Dichlorobenzene, 1,2-	N	µg/L	10.3	U			10.1	U	10.1	U	10	U
Semivolatiles	Dichlorobenzene, 1,3-	N	µg/L	10.3	U			10.1	U	10.1	U	10	U
Semivolatiles	Dichlorobenzene, 1,4-	N	µg/L	10.3	U			10.1	U	10.1	U	10	U
Semivolatiles	Dichlorobenzidine, 3,3'-	N	µg/L	10.3	U	50	U	10.1	U	10.1	U	10	U
Semivolatiles	Dichlorophenol, 2,4-	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Diethyl phthalate	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Dimethyl phthalate	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Dimethylphenol, 2,4-	N	µg/L	3.38	J	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Di-n-butyl phthalate	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	µg/L	10.3	U	50	U	10.1	U	10.1	U	10	U
Semivolatiles	Dinitrophenol, 2,4-	N	µg/L	20.6	U	50	U	20.2	U	20.2	U	20	U
Semivolatiles	Dinitrotoluene, 2,4-	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Dinitrotoluene, 2,6-	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Di-n-octyl phthalate	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	DIPHENYLAMINE	N	µg/L	10.3	U			10.1	U	10.1	U	10	U
Semivolatiles	Fluoranthene	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Fluorene	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Hexachlorobenzene	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Hexachlorobutadiene	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Hexachlorocyclopentadiene	N	µg/L	10.3	UJ	10	U	10.1	UJ	10.1	UJ	10	UJ
Semivolatiles	Hexachloroethane	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Isophorone	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Methylnaphthalene, 2-	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Methylphenol, 2-	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Methylphenol, 4-	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Naphthalene	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Nitroaniline, 2-	N	µg/L	10.3	U	50	U	10.1	U	10.1	U	10	U
Semivolatiles	Nitroaniline, 3-	N	µg/L	10.3	U	50	U	10.1	U	10.1	U	10	U
Semivolatiles	Nitroaniline, 4-	N	µg/L	10.3	U	50	U	10.1	U	10.1	U	10	U
Semivolatiles	Nitrobenzene	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Nitrophenol, 2-	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Nitrophenol, 4-	N	µg/L	10.3	U	50	U	10.1	U	10.1	U	10	U
Semivolatiles	n-Nitrosodimethylamine	N	µg/L	10.3	U			10.1	U	10.1	U	10	U
Semivolatiles	n-Nitroso-di-n-propylamine	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	n-Nitrosodiphenylamine	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U

Appendix H

Chemical Analytical Data Summary
Groundwater
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	ASH PIT 2-PZ01		ASH PIT 2-PZ01		ASH PIT 2-PZ01		ASH PIT 2-PZ03		ASH PIT 2-PZ04	
			SAMPLE_NO	AP3015		AP3016		AP3022		AP3018		AP3019	
			SAMPLE_DATE	2-Feb-09		2-Feb-09		2-Feb-09		31-Jan-09		1-Feb-09	
			FK_DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
			SAMPLE_PURPOSE	FD		FS		REG		REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Semivolatiles	Pentachlorophenol	N	µg/L	20.6	U	10	U	20.2	U	20.2	U	20	U
Semivolatiles	Phenanthrene	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Phenol	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Pyrene	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	µg/L	10.3	U			10.1	U	10.1	U	10	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	µg/L	10.3	U	10	U	10.1	U	10.1	U	10	U
Pesticides/PCBs	Aroclor 1016	N	µg/L										
Pesticides/PCBs	Aroclor 1221	N	µg/L										
Pesticides/PCBs	Aroclor 1232	N	µg/L										
Pesticides/PCBs	Aroclor 1242	N	µg/L										
Pesticides/PCBs	Aroclor 1248	N	µg/L										
Pesticides/PCBs	Aroclor 1254	N	µg/L										
Pesticides/PCBs	Aroclor 1260	N	µg/L										
Metals - Unfiltered	Aluminum	N	µg/L	93.3	J	200	U	147	J	2400		74.3	j
Metals - Unfiltered	Antimony	N	µg/L	5.56	U	60	U	5.56	U	5.56	U	5.56	U
Metals - Unfiltered	Arsenic	N	µg/L	11.1	U	10	U	11.1	U	11.1	U	11.1	U
Metals - Unfiltered	Barium	N	µg/L	31.3		200	U	31.9		51.1		24	
Metals - Unfiltered	Beryllium	N	µg/L	4.44	U	5	U	4.44	U	4.44	U	4.44	U
Metals - Unfiltered	Cadmium	N	µg/L	4.27	J	5	U	3.91	J	4.16	J	4.28	J
Metals - Unfiltered	Calcium	N	µg/L	110000		101000		110000		179000		135000	
Metals - Unfiltered	Chromium	N	µg/L	11.1	U	10	U	11.1	U	11.1	U	11.1	U
Metals - Unfiltered	Cobalt	N	µg/L	8.89	U	50	U	8.89	U	8.89	U	8.89	U
Metals - Unfiltered	Copper	N	µg/L	5.71	J	25	U	11.1	U	12.3		5.63	J
Metals - Unfiltered	Iron	N	µg/L	325	J	191		593	J	5060		203	
Metals - Unfiltered	Lead	N	µg/L	5.56	U	3	U	5.56	U	3.02	J	5.56	U
Metals - Unfiltered	Magnesium	N	µg/L	32200		29200		31900		42700		39600	
Metals - Unfiltered	Manganese	N	µg/L	21.6		20.7		24.5		51.8		22.1	
Metals - Unfiltered	Mercury	N	µg/L	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
Metals - Unfiltered	Nickel	N	µg/L	4	J	40	U	6.67	U	6.28	J	5.36	J
Metals - Unfiltered	Potassium	N	µg/L	521	J	5000	U	548	J	1260		405	J
Metals - Unfiltered	Selenium	N	µg/L	11.1	U	5	U	11.1	U	7.55	J	11.1	U
Metals - Unfiltered	Silver	N	µg/L	11.1	U	10	U	11.1	U	11.1	U	11.1	U
Metals - Unfiltered	Sodium	N	µg/L	6860		6380		6990		12200		9150	
Metals - Unfiltered	Thallium	N	µg/L	5.56	U	10	U	5.56	U	5.56	U	5.56	U
Metals - Unfiltered	Vanadium	N	µg/L	4.44	U	50	U	4.44	U	5.39		4.44	U
Metals - Unfiltered	Zinc	N	µg/L	55.6	U	20	U	55.6	U	55.6	U	55.6	U
Metals - Filtered	Aluminum	Y	µg/L	88.9	U	200	U	88.9	U	88.9	U	88.9	U
Metals - Filtered	Antimony	Y	µg/L	5.56	U	60	U	5.56	U	5.56	U	5.56	U
Metals - Filtered	Arsenic	Y	µg/L	11.1	U	10	U	11.1	U	11.1	U	11.1	U
Metals - Filtered	Barium	Y	µg/L	29.3		200	U	28.2		34.9		22.8	
Metals - Filtered	Beryllium	Y	µg/L	4.44	U	5	U	4.44	U	4.44	U	4.44	U
Metals - Filtered	Cadmium	Y	µg/L	3.98	J	5	U	3.9	J	4.36	J	4.13	J

Appendix H

Chemical Analytical Data Summary
Groundwater
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION_CODE	ASH PIT 2-PZ01		ASH PIT 2-PZ01		ASH PIT 2-PZ01		ASH PIT 2-PZ03		ASH PIT 2-PZ04	
			SAMPLE_NO	AP3015		AP3016		AP3022		AP3018		AP3019	
			SAMPLE_DATE	2-Feb-09		2-Feb-09		2-Feb-09		31-Jan-09		1-Feb-09	
			FK_DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
			SAMPLE_PURPOSE	FD		FS		REG		REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Metals - Filtered	Calcium	Y	µg/L	108000		103000		103000		172000		135000	
Metals - Filtered	Chromium	Y	µg/L	11.1	U	10	U	11.1	U	11.1	U	11.1	U
Metals - Filtered	Cobalt	Y	µg/L	8.89	U	50	U	8.89	U	8.89	U	8.89	U
Metals - Filtered	Copper	Y	µg/L	11.1	U	25	U	11.1	U	6.9	J	11.1	U
Metals - Filtered	Iron	Y	µg/L	88.9	U	100	U	88.9	U	88.9	U	88.9	U
Metals - Filtered	Lead	Y	µg/L	5.56	U	3	U	5.56	U	5.56	U	5.56	U
Metals - Filtered	Magnesium	Y	µg/L	31100		29900		31400		42800		40800	
Metals - Filtered	Manganese	Y	µg/L	17.1		30.7		19		4.44	U	16.2	
Metals - Filtered	Mercury	Y	µg/L	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
Metals - Filtered	Nickel	Y	µg/L	6.67	U	40	U	6.67	U	6.67	U	6.67	U
Metals - Filtered	Potassium	Y	µg/L	445	J	5000	U	460	J	510	J	346	J
Metals - Filtered	Selenium	Y	µg/L	11.1	U	5	U	11.1	U	6.82	J	11.1	U
Metals - Filtered	Silver	Y	µg/L	11.1	U	10	U	11.1	U	11.1	U	11.1	U
Metals - Filtered	Sodium	Y	µg/L	6840		6180		7000		12500		9280	
Metals - Filtered	Thallium	Y	µg/L	5.56	U	10	U	5.56	U	5.56	U	5.56	U
Metals - Filtered	Vanadium	Y	µg/L	4.44	U	50	U	4.44	U	4.44	U	4.44	U
Metals - Filtered	Zinc	Y	µg/L	55.6	U	20	U	55.6	U	55.6	U	55.6	U
Cyanide	Cyanide, total	N	ppm	0.025	U			0.025	U	0.025	U	0.025	U
Water Quality Parameters	Alkalinity	N	ppm	222		260		169		231		132	
Water Quality Parameters	Chloride	N	ppm	2.81	J	2.1		3.04	J	11.6	J	5.14	J
Water Quality Parameters	Cyanide, total	N	ppm			0.044							
Water Quality Parameters	Hardness	N	ppm	408		620		407		622		501	
Water Quality Parameters	HARDNESS (as CaCO3)	N	ppm										
Water Quality Parameters	Nitrate	N	ppm			0.1	U						
Water Quality Parameters	Nitrate-Nitrite	N	ppm	0.4	UJ			0.028	J	0.566	J	0.049	J
Water Quality Parameters	Sulfate	N	ppm	79.6		177		80.6		341		236	
Water Quality Parameters	Total dissolved solids	N	ppm	442		450		450		804		619	
Water Quality Parameters	Total suspended solids	N	ppm	4	U	4	U	4		59		3	J
Water Quality Parameters	Turbidity	N	NTU	4.93		1.3		4.52		51.5	J	4.56	J

APPENDIX I

DETECTED HITS SUMMARY

Appendix I

Detected Hits Summary Excluding "B" Qualifiers
Plum Brook Ordnance Works

[SAMPLE_TYPE] = DS or SS

LOCATION_CODE				ASH PIT 2-SB01			ASH PIT 2-SB01			ASH PIT 2-SB01			ASH PIT 2-SB02			ASH PIT 2-SB02		
SAMPLE_NO				AP0100			AP0101			AP0102			AP0103			AP0104		
SAMPLE_DATE				15-Jan-09			15-Jan-09			15-Jan-09			16-Jan-09			16-Jan-09		
FK_DEPTH				0 - 1 Ft			3 - 5 Ft			8 - 10 Ft			0 - 1 Ft			3 - 5 Ft		
SAMPLE_PURPOSE				REG			REG			REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
EXPLOSIVES	Trinitrotoluene, 2,4,6-	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
GEN CHEMISTRY	% Solids	N	Percent															
GEN CHEMISTRY	Total organic carbon	N	mg/kg										11400	B				
METALS	Aluminum	N	mg/kg	6460		J	6420		J	8750		J	9310		J	12700		J
METALS	Antimony	N	mg/kg	0.81			0.269	J	J	0.355	J	J	0.958			0.362	J	J
METALS	Arsenic	N	mg/kg	11.6			4.93			11.3			15.3			15.7		J
METALS	Barium	N	mg/kg	55.7		J	45.6			26.8			84.4		J	85.3		J
METALS	Beryllium	N	mg/kg	4.74			5.97			6.72			15.3		J	9.06		J
METALS	Cadmium	N	mg/kg	0.436	J	J	- -		-	- -		-	0.381	J	J	- -		-
METALS	Calcium	N	mg/kg	47200		J	4310			47400			7110			23300		
METALS	Chromium	N	mg/kg	8.64			11.5			13			11.1			19.8		
METALS	Cobalt	N	mg/kg	7.74			8.32			11.9			14.6		J	13.4		J
METALS	Copper	N	mg/kg	23.6		J	18.3		J	32		J	33.7		J	28.9		J
METALS	Iron	N	mg/kg	14300		J	16500		J	23100		J	61300		J	30500		J
METALS	Lead	N	mg/kg	50.7			8.39			13			22.5			13.8		
METALS	Magnesium	N	mg/kg	8960		J	2350		J	11400		J	1560		J	8640		J
METALS	Manganese	N	mg/kg	354		J	172			386			546			726		J
METALS	Mercury	N	mg/kg	0.0959			0.0245			0.0128	J	J	0.0539			0.0162	J	J
METALS	Nickel	N	mg/kg	18.3		J	20.2			32.6			35.5			35.6		
METALS	Potassium	N	mg/kg	893		J	589			1160			587			1170		
METALS	Selenium	N	mg/kg	0.727	J	J	- -		-	- -		-	1.36			- -		-
METALS	Silver	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Sodium	N	mg/kg	55.1			68.7			107			60.4			93.9		
METALS	Thallium	N	mg/kg	0.425	J	J	- -		-	0.423	J	J	0.416	J	J	0.3	J	J
METALS	Vanadium	N	mg/kg	15.9			16.5			17.3			21.4			26.2		
METALS	Zinc	N	mg/kg	64			67.4			59.1			88.6			74.6		
PEST/PCB	Aroclor 1016	N	mg/kg	- -		-	- -		-				0.525	P	J	- -		-
PEST/PCB	Aroclor 1260	N	mg/kg	- -		-	- -		-				- -		-	- -		-
SEMIVOLATILES	Benzo(a)anthracene	N	mg/kg	0.0827	J	J	- -		-	- -		-	0.0464	J	J	- -		-
SEMIVOLATILES	Benzo(a)pyrene	N	mg/kg	0.0844	J	J	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(b)fluoranthene	N	mg/kg	0.13	J	J	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzoic acid	N	mg/kg	- -		-	- -		-	- -		-	1.43			- -		-
SEMIVOLATILES	Bis(2-ethylhexyl)phthalate	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Chrysene	N	mg/kg	0.0979	J	J	- -		-	- -		-	0.0639	J	J	- -		-
SEMIVOLATILES	Dimethylphenol, 2,4-	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Fluoranthene	N	mg/kg	0.132	J	J	- -		-	- -		-	0.131	J	J	- -		-
SEMIVOLATILES	Methylnaphthalene, 2-	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Naphthalene	N	mg/kg	0.0446	J	J	- -		-	- -		-	0.0559	J	J	- -		-
SEMIVOLATILES	Phenanthrene	N	mg/kg	0.0733	J	J	- -		-	0.0855	J	J	0.0964	J	J	- -		-
SEMIVOLATILES	Pyrene	N	mg/kg	0.111	J	J	- -		-	- -		-	0.0894	J	J	- -		-

Appendix I

Detected Hits Summary Excluding "B" Qualifiers
Plum Brook Ordnance Works

[SAMPLE_TYPE] = DS or SS

LOCATION_CODE				ASH PIT 2-SB02			ASH PIT 2-SB02			ASH PIT 2-SB02			ASH PIT 2-SB03			ASH PIT 2-SB03		
SAMPLE_NO				AP0105			AP0106			AP0107			AP0108			AP0109		
SAMPLE_DATE				16-Jan-09			16-Jan-09			16-Jan-09			18-Jan-09			18-Jan-09		
FK_DEPTH				3 - 5 Ft			3 - 5 Ft			8 - 10 Ft			0 - 1 Ft			3 - 5 Ft		
SAMPLE_PURPOSE				FD			FS			REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
EXPLOSIVES	Trinitrotoluene, 2,4,6-	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
GEN CHEMISTRY	% Solids	N	Percent				82.2											
GEN CHEMISTRY	Total organic carbon	N	mg/kg															
METALS	Aluminum	N	mg/kg	8930		J	6930			10700		J	8070			15000		
METALS	Antimony	N	mg/kg	0.287	J	J	- -		-	0.626			0.637			0.257	J	J
METALS	Arsenic	N	mg/kg	8.31		J	4			12.1			7.71		J	5.27		J
METALS	Barium	N	mg/kg	59.4		J	54.4			41.2		J	69.4		J	98.9		J
METALS	Beryllium	N	mg/kg	6.76		J	- -		-	7.06		J	6.46		J	7.43		J
METALS	Cadmium	N	mg/kg	- -		-	- -		-	- -		-	0.558			- -		-
METALS	Calcium	N	mg/kg	16100			7170		J	46600			3430		J	36500		J
METALS	Chromium	N	mg/kg	13.7			10.6			16			12		J	22.1		J
METALS	Cobalt	N	mg/kg	10.9		J	8.3			11.7		J	8.68		J	10.8		J
METALS	Copper	N	mg/kg	20.9		J	13.4			27.8		J	22.5			29.8		
METALS	Iron	N	mg/kg	19400		J	13300			23200		J	19100			24900		
METALS	Lead	N	mg/kg	11.9			7.5			18.9			27.7		J	16.7		J
METALS	Magnesium	N	mg/kg	4940		J	3340			10800		J	2150		J	10100		J
METALS	Manganese	N	mg/kg	351		J	320			431			211			436		
METALS	Mercury	N	mg/kg	0.0164	J	J	- -		-	- -		-	0.0642			0.013	J	J
METALS	Nickel	N	mg/kg	26.9			18.7			30.8			21.7		J	31.5		J
METALS	Potassium	N	mg/kg	803			1070		J	1450			745			1570		
METALS	Selenium	N	mg/kg	- -		-	- -		-	- -		-	0.928	J	J	- -		-
METALS	Silver	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Sodium	N	mg/kg	64.9			- -		-	152			36.3			119		
METALS	Thallium	N	mg/kg	- -		-	- -		-	0.343	J	J	0.47	J	J	0.35	J	J
METALS	Vanadium	N	mg/kg	18.1			13			20.2			18.7			25.3		
METALS	Zinc	N	mg/kg	66.2			43.5			62.9			80		J	68.5		J
PEST/PCB	Aroclor 1016	N	mg/kg	- -		-	- -		-				- -		-	- -		-
PEST/PCB	Aroclor 1260	N	mg/kg	- -		-	- -		-				0.0162	P,J	J	- -		-
SEMIVOLATILES	Benzo(a)anthracene	N	mg/kg	- -		-	- -		-	- -		-	0.0307	K		- -		-
SEMIVOLATILES	Benzo(a)pyrene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(b)fluoranthene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzoic acid	N	mg/kg	- -		-				- -		-	- -		-	- -		-
SEMIVOLATILES	Bis(2-ethylhexyl)phthalate	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Chrysene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Dimethylphenol, 2,4-	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Fluoranthene	N	mg/kg	- -		-	- -		-	- -		-	0.0599	J	J	- -		-
SEMIVOLATILES	Methylnaphthalene, 2-	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Naphthalene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Phenanthrene	N	mg/kg	- -		-	- -		-	0.0544	J	J	- -		-	- -		-
SEMIVOLATILES	Pyrene	N	mg/kg	- -		-	- -		-	- -		-	0.044	J	J	- -		-

Appendix I

Detected Hits Summary Excluding "B" Qualifiers
Plum Brook Ordnance Works

[SAMPLE_TYPE] = DS or SS

LOCATION_CODE				ASH PIT 2-SB03			ASH PIT 2-SB04			ASH PIT 2-SB04			ASH PIT 2-SB04			ASH PIT 2-SB05		
SAMPLE_NO				AP0110			AP0111			AP0112			AP0113			AP0114		
SAMPLE_DATE				18-Jan-09			18-Jan-09			18-Jan-09			19-Jan-09			16-Jan-09		
FK_DEPTH				8 - 10 Ft			0 - 1 Ft			3 - 5 Ft			8 - 10 Ft			0 - 1 Ft		
SAMPLE_PURPOSE				REG			REG			REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
EXPLOSIVES	Trinitrotoluene, 2,4,6-	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
GEN CHEMISTRY	% Solids	N	Percent															
GEN CHEMISTRY	Total organic carbon	N	mg/kg															
METALS	Aluminum	N	mg/kg	7720			7130			7830			8670			8800		J
METALS	Antimony	N	mg/kg	0.329	J	J	0.485			0.312	J	J	0.392	J	J	0.922		
METALS	Arsenic	N	mg/kg	12.6		J	26.8		J	4.51		J	12.1		J	24.4		
METALS	Barium	N	mg/kg	18.6		J	98.4		J	61.5		J	35.6		J	109		J
METALS	Beryllium	N	mg/kg	6.35		J	16.3		J	6.68		J	7.02		J	15.5		J
METALS	Cadmium	N	mg/kg	- -		-	- -		-	- -		-	- -		-	0.716		
METALS	Calcium	N	mg/kg	54300		J	2160		J	3010		J	50700		J	4140		
METALS	Chromium	N	mg/kg	11.8		J	10.5		J	11.9		J	12.7		J	12.8		
METALS	Cobalt	N	mg/kg	10.7		J	5.96		J	7.88		J	11		J	8.29		J
METALS	Copper	N	mg/kg	29.6			26			20.9			38.4			31.3		J
METALS	Iron	N	mg/kg	22100			109000			19200			24400			61600		J
METALS	Lead	N	mg/kg	15.8		J	10.1		J	18.9		J	16		J	27.4		
METALS	Magnesium	N	mg/kg	10400		J	442		J	2530		J	10800		J	1320		J
METALS	Manganese	N	mg/kg	414			116			87.4			522			319		
METALS	Mercury	N	mg/kg	0.0132	J	J	0.0265			0.0352			0.0147	J	J	0.118		
METALS	Nickel	N	mg/kg	27.4		J	17.1		J	24.8		J	28.8		J	20.5		
METALS	Potassium	N	mg/kg	1110			827			705			1150			837		
METALS	Selenium	N	mg/kg	- -		-	0.678	J	J	0.859	J	J	- -		-	1.44		
METALS	Silver	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Sodium	N	mg/kg	120			55.7			43.6			119			79.2		
METALS	Thallium	N	mg/kg	0.336	J	J	0.468	J	J	- -		-	0.315	J	J	0.939		
METALS	Vanadium	N	mg/kg	15.4			26.9			17.8			17.5			23		
METALS	Zinc	N	mg/kg	61.5		J	57		J	64.4		J	60.4		J	102		
PEST/PCB	Aroclor 1016	N	mg/kg				- -		-	- -		-				- -		-
PEST/PCB	Aroclor 1260	N	mg/kg				- -		-	- -		-				- -		-
SEMIVOLATILES	Benzo(a)anthracene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(a)pyrene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(b)fluoranthene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzoic acid	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Bis(2-ethylhexyl)phthalate	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Chrysene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Dimethylphenol, 2,4-	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Fluoranthene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Methylnaphthalene, 2-	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Naphthalene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	0.0444	J	J
SEMIVOLATILES	Phenanthrene	N	mg/kg	0.0667	J	J	- -		-	- -		-	0.0453	J	J	- -		-
SEMIVOLATILES	Pyrene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-

Appendix I

Detected Hits Summary Excluding "B" Qualifiers
Plum Brook Ordnance Works

[SAMPLE_TYPE] = DS or SS

LOCATION_CODE				ASH PIT 2-SB05			ASH PIT 2-SB05			ASH PIT 2-SB06			ASH PIT 2-SB06			ASH PIT 2-SB06		
SAMPLE_NO				AP0115			AP0116			AP0117			AP0118			AP0119		
SAMPLE_DATE				16-Jan-09			16-Jan-09			15-Jan-09			15-Jan-09			15-Jan-09		
FK_DEPTH				3 - 5 Ft			8 - 10 Ft			0 - 1 Ft			3 - 5 Ft			8 - 10 Ft		
SAMPLE_PURPOSE				REG			REG			REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
EXPLOSIVES	Trinitrotoluene, 2,4,6-	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
GEN CHEMISTRY	% Solids	N	Percent															
GEN CHEMISTRY	Total organic carbon	N	mg/kg															
METALS	Aluminum	N	mg/kg	8060		J	9300		J	7150		J	6750		J	13200		J
METALS	Antimony	N	mg/kg	0.259	J	J	0.486			0.708			0.412	J	J	0.44	J	J
METALS	Arsenic	N	mg/kg	6.27			11.1			11.4			6.33			3.55		
METALS	Barium	N	mg/kg	68.2		J	49		J	98.7			58.3			53.4		J
METALS	Beryllium	N	mg/kg	7.61		J	7.53		J	12.1			6.9			7.73		J
METALS	Cadmium	N	mg/kg	- -		-	0.276	J	J	0.423	J	J	0.293	J	J	- -		-
METALS	Calcium	N	mg/kg	351			42300			2830			2090			44000		
METALS	Chromium	N	mg/kg	11.7			14.4			7.84			10.1			19.4		
METALS	Cobalt	N	mg/kg	6.67		J	14		J	4.64			8.93			14.6		J
METALS	Copper	N	mg/kg	15.6		J	33.6		J	22.2		J	12.6		J	32.1		J
METALS	Iron	N	mg/kg	22100		J	24500		J	51800		J	19900		J	24000		J
METALS	Lead	N	mg/kg	12.2			13.4			12.5			11.2			14.3		
METALS	Magnesium	N	mg/kg	1980		J	8760		J	819		J	2110		J	12000		J
METALS	Manganese	N	mg/kg	100			551			243			234			392		
METALS	Mercury	N	mg/kg	0.0242	J	J	- -		-	0.0688			0.0156	J	J	0.0132	J	J
METALS	Nickel	N	mg/kg	18			36.8			13.7			21.8			36.7		
METALS	Potassium	N	mg/kg	513			990			616			426			1730		
METALS	Selenium	N	mg/kg	- -		-	0.779	J	J	0.737	J	J	- -		-	- -		-
METALS	Silver	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Sodium	N	mg/kg	18.4			91.4			76.3			37.1			135		
METALS	Thallium	N	mg/kg	- -		-	0.347	J	J	0.312	J	J	- -		-	0.293	J	J
METALS	Vanadium	N	mg/kg	17			18.2			17.3			15.5			23.2		
METALS	Zinc	N	mg/kg	68.9			85.3			53.2			63.7			73		
PEST/PCB	Aroclor 1016	N	mg/kg	- -		-				- -		-	- -		-			
PEST/PCB	Aroclor 1260	N	mg/kg	- -		-				- -		-	- -		-			
SEMIVOLATILES	Benzo(a)anthracene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(a)pyrene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(b)fluoranthene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzoic acid	N	mg/kg	- -		-	- -		-	0.622			- -		-	- -		-
SEMIVOLATILES	Bis(2-ethylhexyl)phthalate	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Chrysene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Dimethylphenol, 2,4-	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Fluoranthene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Methylnaphthalene, 2-	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Naphthalene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Phenanthrene	N	mg/kg	- -		-	0.0491	J	J	- -		-	- -		-	0.0403	J	J
SEMIVOLATILES	Pyrene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-

Appendix I

Detected Hits Summary Excluding "B" Qualifiers
Plum Brook Ordnance Works

[SAMPLE_TYPE] = DS or SS

LOCATION_CODE				ASH PIT 2-SB07			ASH PIT 2-SB07			ASH PIT 2-SB07			ASH PIT 2-SB07			ASH PIT 2-SB07		
SAMPLE_NO				AP0120			AP0121			AP0122			AP0123			AP0124		
SAMPLE_DATE				16-Jan-09			16-Jan-09			16-Jan-09			16-Jan-09			16-Jan-09		
FK_DEPTH				0 - 1 Ft			0 - 1 Ft			0 - 1 Ft			3 - 5 Ft			8 - 10 Ft		
SAMPLE_PURPOSE				REG			FD			FS			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
EXPLOSIVES	Trinitrotoluene, 2,4,6-	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
GEN CHEMISTRY	% Solids	N	Percent							79.9								
GEN CHEMISTRY	Total organic carbon	N	mg/kg															
METALS	Aluminum	N	mg/kg	7100		J	8180		J	7200			5250		J	7150		J
METALS	Antimony	N	mg/kg	0.336	J	J	0.291	J	J	- -		-	0.269	J	J	0.479		
METALS	Arsenic	N	mg/kg	6.09			6.04			5.5			6.18			10.9		
METALS	Barium	N	mg/kg	44.5			56.7			48.6			43.7			20.8		J
METALS	Beryllium	N	mg/kg	6.01			6.41			- -		-	5.46			6.31		J
METALS	Cadmium	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Calcium	N	mg/kg	2100			2270			1820		J	1840			153000		
METALS	Chromium	N	mg/kg	10.6			11.8			10.4			8.82			11		
METALS	Cobalt	N	mg/kg	8.14			8.99			7.7			7.46			11		J
METALS	Copper	N	mg/kg	18		J	16.5		J	14.6			13.8		J	31.5		J
METALS	Iron	N	mg/kg	17600		J	19100		J	16600			15500		J	55100		J
METALS	Lead	N	mg/kg	12.5			12.8			9.3			9.74			15.9		
METALS	Magnesium	N	mg/kg	2100		J	2350		J	1880			1730		J	9490		J
METALS	Manganese	N	mg/kg	198			226			169			152			372		
METALS	Mercury	N	mg/kg	0.0203	J	J	0.0193	J	J	- -		-	0.0112	J	J	- -		-
METALS	Nickel	N	mg/kg	19.1			20.2			17.9			18.5			32.5		
METALS	Potassium	N	mg/kg	450			470			703		J	323			1060		
METALS	Selenium	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Silver	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Sodium	N	mg/kg	28.4			28			- -		-	43.3			116		
METALS	Thallium	N	mg/kg	- -		-	- -		-	- -		-	- -		-	0.316	J	J
METALS	Vanadium	N	mg/kg	15.4			17.4			14.1			13.6			13.6		
METALS	Zinc	N	mg/kg	63.2			27.8			51.4			55.4			52.7		
PEST/PCB	Aroclor 1016	N	mg/kg	- -		-	- -		-	- -		-	- -		-			
PEST/PCB	Aroclor 1260	N	mg/kg	- -		-	- -		-	- -		-	- -		-			
SEMIVOLATILES	Benzo(a)anthracene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(a)pyrene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(b)fluoranthene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzoic acid	N	mg/kg	- -		-	- -		-				- -		-	- -		-
SEMIVOLATILES	Bis(2-ethylhexyl)phthalate	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Chrysene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Dimethylphenol, 2,4-	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Fluoranthene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Methylnaphthalene, 2-	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Naphthalene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Phenanthrene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	0.0798	J	J
SEMIVOLATILES	Pyrene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-

Appendix I

Detected Hits Summary Excluding "B" Qualifiers
Plum Brook Ordnance Works

[SAMPLE_TYPE] = DS or SS

LOCATION_CODE				ASH PIT 2-SB08			ASH PIT 2-SB08			ASH PIT 2-SB08			ASH PIT 2-SB08			ASH PIT 2-SB08		
SAMPLE_NO				AP0125			AP0126			AP0127			AP0128			AP0129		
SAMPLE_DATE				16-Jan-09			16-Jan-09			16-Jan-09			16-Jan-09			16-Jan-09		
FK_DEPTH				0 - 1 Ft			3 - 5 Ft			8 - 10 Ft			8 - 10 Ft			8 - 10 Ft		
SAMPLE_PURPOSE				REG			REG			REG			FD			FS		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
EXPLOSIVES	Trinitrotoluene, 2,4,6-	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
GEN CHEMISTRY	% Solids	N	Percent													72.9		
GEN CHEMISTRY	Total organic carbon	N	mg/kg															
METALS	Aluminum	N	mg/kg	4070		J	5350		J	15100		J	14900		J	12100		
METALS	Antimony	N	mg/kg	- -		-	0.227	J	J	- -		-	0.248	J	J	- -		-
METALS	Arsenic	N	mg/kg	12.8			12.6			6.16			6.61			7		
METALS	Barium	N	mg/kg	73.2		J	56		J	81		J	83.7		J	85		
METALS	Beryllium	N	mg/kg	16.9		J	8.48		J	8.51		J	8.11		J	- -		-
METALS	Cadmium	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Calcium	N	mg/kg	1650			1860			44800			45500			45000	E	J
METALS	Chromium	N	mg/kg	6.13			8.82			22.4			21.9			18.5		
METALS	Cobalt	N	mg/kg	3.9		J	8.7		J	15.6		J	14.6		J	12.4		
METALS	Copper	N	mg/kg	21.3		J	11		J	31.1		J	30.1		J	23.9		
METALS	Iron	N	mg/kg	72600		J	28000		J	26600		J	28500		J	23900		
METALS	Lead	N	mg/kg	4.64			9.05			11.6			14.1			10.7		
METALS	Magnesium	N	mg/kg	312		J	1730		J	12200		J	11500		J	10100		
METALS	Manganese	N	mg/kg	98.2			196			473			432			363		
METALS	Mercury	N	mg/kg	0.034			0.0151	J	J	- -		-	- -		-	- -		-
METALS	Nickel	N	mg/kg	10.5			22			39.7			38			32.8		
METALS	Potassium	N	mg/kg	477			371			1980			1990			2870	E	J
METALS	Selenium	N	mg/kg	0.914	J	J	- -		-	- -		-	- -		-	- -		-
METALS	Silver	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Sodium	N	mg/kg	36.4			27.4			145			134			- -		-
METALS	Thallium	N	mg/kg	0.308	J	J	- -		-	- -		-	- -		-	- -		-
METALS	Vanadium	N	mg/kg	18.8			15.1			25.4			24.7			20.5		
METALS	Zinc	N	mg/kg	41.4			58.9			76.6			73.4			61.3		
PEST/PCB	Aroclor 1016	N	mg/kg	- -		-	- -		-									
PEST/PCB	Aroclor 1260	N	mg/kg	- -		-	- -		-									
SEMIVOLATILES	Benzo(a)anthracene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(a)pyrene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(b)fluoranthene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzoic acid	N	mg/kg	- -		-	- -		-	- -		-	- -		-			
SEMIVOLATILES	Bis(2-ethylhexyl)phthalate	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Chrysene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Dimethylphenol, 2,4-	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Fluoranthene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Methylnaphthalene, 2-	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Naphthalene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Phenanthrene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Pyrene	N	mg/kg	- -		-	- -		-	- -		-	- -		-	- -		-

Appendix I

Detected Hits Summary Excluding "B" Qualifiers
Plum Brook Ordnance Works

[SAMPLE_TYPE] = GW

LOCATION_CODE				AP2-BEDGW-002			AP2-BEDGW-002			AP2-BEDGW-002			AP2-BEDGW-002		
SAMPLE_NO				AP3063			AP3079			AP3081			AP3082		
SAMPLE_DATE				24-May-09			17-Nov-09			17-Nov-09			17-Nov-09		
FK_DEPTH				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
SAMPLE_PURPOSE				REG			REG			FD			FS		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
EXPLOSIVES	Trinitrotoluene, 2,4,6-	N	ug/L	- -		-	- -		-	- -		-			
FIELD TESTS	Dissolved Oxygen	N	ppm	1.64			1.01						1.01		
FIELD TESTS	FERROUS IRON	N	mg/L				2						0		
FIELD TESTS	Oxidation Reduction Potential	N	mV	-144.8			-6.9						-6.9		
FIELD TESTS	pH	N	pH_units	6.2			6.78						6.78		
FIELD TESTS	Specific Conductivity	N	mS/cm	2.968			2.635						2.635		
FIELD TESTS	Temperature	N	C	17			9.67						9.67		
FIELD TESTS	Turbidity	N	NTU	16.2			3.6						3.6		
GEN CHEMISTRY	Alkalinity	N	ppm	417			472		J	492		J			
GEN CHEMISTRY	Chloride	N	ppm	40.6			74.2		J	46.9		J			
GEN CHEMISTRY	Cyanide, total	N	ppm	0.0072	B	J	- -		-	- -		-			
GEN CHEMISTRY	Hardness	N	ppm												
GEN CHEMISTRY	HARDNESS (as CaCO3)	N	ppm	1440			1490			1460					
GEN CHEMISTRY	Nitrate-Nitrite	N	ppm	- -		-	2		J						
GEN CHEMISTRY	Sulfate	N	ppm	946			776		J	1070		J			
GEN CHEMISTRY	Total dissolved solids	N	ppm	2240		J	2200		J	2050		J			
GEN CHEMISTRY	Total suspended solids	N	ppm	18			4	B	UJ	- -		-			
GEN CHEMISTRY	Turbidity	N	NTU	38.2		J	1.7		J	21.4		J			
METALS	Aluminum	N	ug/L	42.8	B	J	46.7	B	J	45.5	B	J			
METALS	Aluminum	Y	ug/L	16.2	B	J									
METALS	Antimony	N	ug/L	- -		-	- -		-	- -		-			
METALS	Antimony	Y	ug/L	- -		-	- -		-	- -		-			
METALS	Arsenic	N	ug/L	- -		-	- -		-	- -		-			
METALS	Arsenic	Y	ug/L	- -		-	- -		-	- -		-			
METALS	Barium	N	ug/L	22.7	B	J	21.1	B	J	21.3	B	J			
METALS	Barium	Y	ug/L	22.6	B	J	19.8	B	J	18.8	B	J			
METALS	Beryllium	N	ug/L	- -		-	- -		-	- -		-			
METALS	Beryllium	Y	ug/L	- -		-	- -		-	- -		-			
METALS	Cadmium	N	ug/L	- -		-	- -		-	- -		-			
METALS	Cadmium	Y	ug/L	- -		-	- -		-	- -		-			
METALS	Calcium	N	ug/L	377000			392000		J	385000		J			
METALS	Calcium	Y	ug/L	389000			347000		J	335000		J			
METALS	Chromium	N	ug/L	- -		-	- -		-	- -		-			
METALS	Chromium	Y	ug/L	- -		-	- -		-	- -		-			
METALS	Cobalt	N	ug/L	- -		-	- -		-	- -		-			
METALS	Cobalt	Y	ug/L	- -		-	- -		-	- -		-			
METALS	Copper	N	ug/L	- -		-	- -		-	- -		-			
METALS	Copper	Y	ug/L	- -		-	- -		-	- -		-			
METALS	Iron	N	ug/L	283	B	J	- -		-	- -		-			
METALS	Iron	Y	ug/L	- -		-	36.1	B	J	46.5	B	J			
METALS	Lead	N	ug/L	- -		-	- -		-						

Appendix I

Detected Hits Summary Excluding "B" Qualifiers
Plum Brook Ordnance Works

[SAMPLE_TYPE] = GW

LOCATION_CODE				AP2-BEDGW-002			AP2-BEDGW-002			AP2-BEDGW-002			AP2-BEDGW-002		
SAMPLE_NO				AP3063			AP3079			AP3081			AP3082		
SAMPLE_DATE				24-May-09			17-Nov-09			17-Nov-09			17-Nov-09		
FK_DEPTH				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
SAMPLE_PURPOSE				REG			REG			FD			FS		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
METALS	Lead	Y	ug/L				- -		-	- -		-			
METALS	Magnesium	N	ug/L	121000			124000			123000					
METALS	Magnesium	Y	ug/L	119000			118000		J	113000		J			
METALS	Manganese	N	ug/L	53.7			11.1	B	J	10.7	B	J			
METALS	Manganese	Y	ug/L	52.4			9.6	B	J	9.3	B	J			
METALS	Mercury	N	ug/L	- -		-	- -		-	- -		-			
METALS	Mercury	Y	ug/L	- -		-	- -		-	- -		-			
METALS	Nickel	N	ug/L	- -		-	- -		-	- -		-			

Appendix I

Detected Hits Summary Excluding "B" Qualifiers
Plum Brook Ordnance Works

[SAMPLE_TYPE] = GW

LOCATION_CODE				AP2-BEDGW-002			AP2-BEDGW-002			AP2-BEDGW-002			AP2-BEDGW-002		
SAMPLE_NO				AP3063			AP3079			AP3081			AP3082		
SAMPLE_DATE				24-May-09			17-Nov-09			17-Nov-09			17-Nov-09		
FK_DEPTH				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
SAMPLE_PURPOSE				REG			REG			FD			FS		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
METALS	Nickel	Y	ug/L	- -		-	- -		-	- -		-			
METALS	Potassium	N	ug/L	7740	B	J	10900			11000					
METALS	Potassium	Y	ug/L	9790	B	J	11500		J	11000		J			
METALS	Selenium	N	ug/L	- -		-	21.3		J	17.7		J			
METALS	Selenium	Y	ug/L	- -		-	74.9		J	14.3		J			
METALS	Silver	N	ug/L	- -		-	- -		-	- -		-			
METALS	Silver	Y	ug/L	- -		-	- -		-	- -		-			
METALS	Sodium	N	ug/L	26400			32100		J	32100		J			
METALS	Sodium	Y	ug/L	28900			33100			31400					
METALS	Thallium	N	ug/L	- -		-	- -		-	- -		-			
METALS	Thallium	Y	ug/L	- -		-	- -		-	- -		-			
METALS	Vanadium	N	ug/L	1.6	B	J	1.1	B	J	- -		-			
METALS	Vanadium	Y	ug/L	1.1	B	J	2	B	J	2.3	B	J			
METALS	Zinc	N	ug/L	- -		-	- -		-	- -		-			
METALS	Zinc	Y	ug/L	- -		-	- -		-	- -		-			
PEST/PCB	Aroclor 1016	N	ug/L	- -		-									
PEST/PCB	Aroclor 1260	N	ug/L	- -		-									
SEMIVOLATILES	Benzo(a)anthracene	N	ug/L	- -		-	- -		-	- -		-			
SEMIVOLATILES	Benzo(a)pyrene	N	ug/L	- -		-	- -		-	- -		-			
SEMIVOLATILES	Benzo(b)fluoranthene	N	ug/L	- -		-	- -		-	- -		-			
SEMIVOLATILES	Benzoic acid	N	ug/L	- -		-	- -		-	- -		-			
SEMIVOLATILES	Bis(2-ethylhexyl)phthalate	N	ug/L	- -		-	- -		-	- -		-			
SEMIVOLATILES	Chrysene	N	ug/L	- -		-	- -		-	- -		-			
SEMIVOLATILES	Dimethylphenol, 2,4-	N	ug/L	- -		-	- -		-	- -		-			
SEMIVOLATILES	Fluoranthene	N	ug/L	- -		-	- -		-	- -		-			
SEMIVOLATILES	Methylnaphthalene, 2-	N	ug/L	2.8	J	J	2.8	J	J	2.5	J	J			
SEMIVOLATILES	Naphthalene	N	ug/L	2	J	J	1.9	J	J	1.6	J	J			
SEMIVOLATILES	Phenanthrene	N	ug/L	- -		-	- -		-	- -		-			
SEMIVOLATILES	Pyrene	N	ug/L	- -		-	- -		-	- -		-			
VOLATILES	Acetone	N	ug/L	- -		-	50.6		J	34.4		J			
VOLATILES	Benzene	N	ug/L	8.5			9.4		J	6.2		J			
VOLATILES	Butanone, 2-	N	ug/L	7.4			2.4	J	J	- -		-			
VOLATILES	Carbon disulfide	N	ug/L	- -		-	- -		-						
VOLATILES	Chloroform	N	ug/L	- -		-									
VOLATILES	Chloromethane	N	ug/L	- -		-	7.7	J	J	3.5	J	J			
VOLATILES	Cyclohexane	N	ug/L												
VOLATILES	Dichloropropene, trans-1,3-	N	ug/L	- -		-	- -		-	- -		-			
VOLATILES	Ethylbenzene	N	ug/L	9.6			9.7		J	6.6		J			
VOLATILES	Isopropylbenzene	N	ug/L												
VOLATILES	Methylcyclohexane	N	ug/L												
VOLATILES	Methylene chloride	N	ug/L	- -		-	- -		-	- -		-			

Appendix I

Detected Hits Summary Excluding "B" Qualifiers
Plum Brook Ordnance Works

[SAMPLE_TYPE] = GW

LOCATION_CODE				AP2-BEDGW-002			AP2-BEDGW-002			AP2-BEDGW-002			AP2-BEDGW-002		
SAMPLE_NO				AP3063			AP3079			AP3081			AP3082		
SAMPLE_DATE				24-May-09			17-Nov-09			17-Nov-09			17-Nov-09		
FK_DEPTH				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
SAMPLE_PURPOSE				REG			REG			FD			FS		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
VOLATILES	Toluene	N	ug/L	5.3			4.8		J	3.3		J			
VOLATILES	Xylenes, total	N	ug/L	63.2			55.7		J	36.8		J			

Appendix I

Detected Hits Summary Excluding "B" Qualifiers
Plum Brook Ordnance Works

[SAMPLE_TYPE] = GW

LOCATION_CODE				AP2-BEDGW-003			AP2-BEDGW-003			AP2-BEDGW-003			AP2-BEDGW-003			AP2-MW01		
SAMPLE_NO				AP3064			AP3065			AP3066			AP3080			AP3057		
SAMPLE_DATE				23-May-09			23-May-09			23-May-09			16-Nov-09			23-May-09		
FK_DEPTH				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
SAMPLE_PURPOSE				REG			FD			FS			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
EXPLOSIVES	Trinitrotoluene, 2,4,6-	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
FIELD TESTS	Dissolved Oxygen	N	ppm	0.22									4.51			10.27		
FIELD TESTS	FERROUS IRON	N	mg/L	0									0			0		
FIELD TESTS	Oxidation Reduction Potential	N	mV	-315.1									-1.8			-141.3		
FIELD TESTS	pH	N	pH_units	6.15									6.72			6.35		
FIELD TESTS	Specific Conductivity	N	mS/cm	2.141									2.202			0.895		
FIELD TESTS	Temperature	N	C	25.59									8.87			13.59		
FIELD TESTS	Turbidity	N	NTU	5.9									0			2.5		
GEN CHEMISTRY	Alkalinity	N	ppm	649		J	632			590			662		J	362		
GEN CHEMISTRY	Chloride	N	ppm	111			105			93.6			118			4.6		
GEN CHEMISTRY	Cyanide, total	N	ppm	- -		-	- -		-	0.71			- -		-	- -		-
GEN CHEMISTRY	Hardness	N	ppm							1200								
GEN CHEMISTRY	HARDNESS (as CaCO3)	N	ppm	1090			1140						1160			439		
GEN CHEMISTRY	Nitrate-Nitrite	N	ppm	0.76	B	J	- -		-	- -		-				0.065	B	J
GEN CHEMISTRY	Sulfate	N	ppm	519			476			626			496			81.5		
GEN CHEMISTRY	Total dissolved solids	N	ppm	1900		J	1740		J	1500			1570		J	294		J
GEN CHEMISTRY	Total suspended solids	N	ppm	- -		-	17			- -		-	- -		-	- -		-
GEN CHEMISTRY	Turbidity	N	NTU	14		J	- -		-	94			51.2			- -		-
METALS	Aluminum	N	ug/L	- -		-	17.4	B	J	- -		-	33.9	B	J	133	B	J
METALS	Aluminum	Y	ug/L	- -		-	12.4	B	J	- -		-				- -		-
METALS	Antimony	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Antimony	Y	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Arsenic	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Arsenic	Y	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Barium	N	ug/L	175	B	J	184	B	J	- -		-	161	B	J	98	B	J
METALS	Barium	Y	ug/L	171	B	J	186	B	J	- -		-	164	B	J	88.1	B	J
METALS	Beryllium	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Beryllium	Y	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Cadmium	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Cadmium	Y	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Calcium	N	ug/L	266000		J	275000			317000			280000		J	112000		
METALS	Calcium	Y	ug/L	257000			281000			323000			256000		J	102000		
METALS	Chromium	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Chromium	Y	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Cobalt	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Cobalt	Y	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Copper	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Copper	Y	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Iron	N	ug/L	- -		-	33	B	J	- -		-	- -		-	80.8	B	J
METALS	Iron	Y	ug/L	- -		-	- -		-	- -		-	65.5	B	J	- -		-
METALS	Lead	N	ug/L	- -		-	- -		-	- -		-	- -		-	2.4	B	J

Appendix I

Detected Hits Summary Excluding "B" Qualifiers
Plum Brook Ordnance Works

[SAMPLE_TYPE] = GW

LOCATION_CODE				AP2-BEDGW-003			AP2-BEDGW-003			AP2-BEDGW-003			AP2-BEDGW-003			AP2-MW01		
SAMPLE_NO				AP3064			AP3065			AP3066			AP3080			AP3057		
SAMPLE_DATE				23-May-09			23-May-09			23-May-09			16-Nov-09			23-May-09		
FK_DEPTH				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
SAMPLE_PURPOSE				REG			FD			FS			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
METALS	Lead	Y	ug/L	- -		-	- -		-	- -		-	- -		-			
METALS	Magnesium	N	ug/L	103000		J	110000			120000			112000			38700		
METALS	Magnesium	Y	ug/L	98700		J	108000			123000			109000		J	34100		
METALS	Manganese	N	ug/L	5.9	B	J	5.4	B	J	- -		-	7.1	B	J	82.2		
METALS	Manganese	Y	ug/L	5.6	B	J	6.1	B	J	- -		-	7.2	B	J	72.3		
METALS	Mercury	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Mercury	Y	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Nickel	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-

Appendix I

Detected Hits Summary Excluding "B" Qualifiers
Plum Brook Ordnance Works

[SAMPLE_TYPE] = GW

LOCATION_CODE				AP2-BEDGW-003			AP2-BEDGW-003			AP2-BEDGW-003			AP2-BEDGW-003			AP2-MW01		
SAMPLE_NO				AP3064			AP3065			AP3066			AP3080			AP3057		
SAMPLE_DATE				23-May-09			23-May-09			23-May-09			16-Nov-09			23-May-09		
FK_DEPTH				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
SAMPLE_PURPOSE				REG			FD			FS			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
METALS	Nickel	Y	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Potassium	N	ug/L	13300			11500	B	J	11300			15600			4150	B	J
METALS	Potassium	Y	ug/L	13000			13800			11800			16300		J	5030	B	J
METALS	Selenium	N	ug/L							- -		-	12.4		J	- -		-
METALS	Selenium	Y	ug/L	8.1	B	J	8.8	B	J	- -		-	22.4		J	3.5	B	J
METALS	Silver	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Silver	Y	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Sodium	N	ug/L	56600		J	58500			63000			61100		J	7440	B	J
METALS	Sodium	Y	ug/L	55700			58700			65900			63100			8520	B	J
METALS	Thallium	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Thallium	Y	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Vanadium	N	ug/L	1	B	J	1.3	B	J	- -		-	- -		-	3.7	B	J
METALS	Vanadium	Y	ug/L	1.2	B	J	1.1	B	J	- -		-	2.6	B	J	3.5	B	
METALS	Zinc	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Zinc	Y	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
PEST/PCB	Aroclor 1016	N	ug/L	- -		-	- -		-	- -		-				- -		-
PEST/PCB	Aroclor 1260	N	ug/L	- -		-	- -		-	- -		-				- -		-
SEMIVOLATILES	Benzo(a)anthracene	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(a)pyrene	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(b)fluoranthene	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzoic acid	N	ug/L	- -		-	- -		-				- -		-	- -		-
SEMIVOLATILES	Bis(2-ethylhexyl)phthalate	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Chrysene	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Dimethylphenol, 2,4-	N	ug/L	- -		-	- -		-	- -		-	1.7	J	J	- -		-
SEMIVOLATILES	Fluoranthene	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Methylnaphthalene, 2-	N	ug/L	1.9	J	J	1.3	J	J	- -		-	6.3			- -		-
SEMIVOLATILES	Naphthalene	N	ug/L	2.9	J	J	1.9	J	J	- -		-	7.4			- -		-
SEMIVOLATILES	Phenanthrene	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Pyrene	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
VOLATILES	Acetone	N	ug/L	- -		-	- -		-	- -		-	86.1	J	J	- -		-
VOLATILES	Benzene	N	ug/L	94.1			91.3			100			336			- -		-
VOLATILES	Butanone, 2-	N	ug/L	4.3	J	J	4.9	J	J	- -		-	- -		-	- -		-
VOLATILES	Carbon disulfide	N	ug/L	- -		-	- -		-	5.2			3.7	J	J	- -		-
VOLATILES	Chloroform	N	ug/L	- -		-	- -		-	- -		-				- -		-
VOLATILES	Chloromethane	N	ug/L	- -		-	- -		-	- -		-	44.9	J	J	- -		-
VOLATILES	Cyclohexane	N	ug/L							74								
VOLATILES	Dichloropropene, trans-1,3-	N	ug/L	- -		-	- -		-	- -		-	1.7	J	J	- -		-
VOLATILES	Ethylbenzene	N	ug/L	17.7			17.2			21			57.1			- -		-
VOLATILES	Isopropylbenzene	N	ug/L							5.8								
VOLATILES	Methylcyclohexane	N	ug/L							29								
VOLATILES	Methylene chloride	N	ug/L	- -		-	- -		-	- -		-				- -		-

Appendix I

Detected Hits Summary Excluding "B" Qualifiers
Plum Brook Ordnance Works

[SAMPLE_TYPE] = GW

LOCATION_CODE				AP2-BEDGW-003			AP2-BEDGW-003			AP2-BEDGW-003			AP2-BEDGW-003			AP2-MW01		
SAMPLE_NO				AP3064			AP3065			AP3066			AP3080			AP3057		
SAMPLE_DATE				23-May-09			23-May-09			23-May-09			16-Nov-09			23-May-09		
FK_DEPTH				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
SAMPLE_PURPOSE				REG			FD			FS			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
VOLATILES	Toluene	N	ug/L	41.3			39.6			54			147			- -		-
VOLATILES	Xylenes, total	N	ug/L	193			185			260			630			- -		-

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Detected Hits Summary Excluding "B" Qualifiers
Plum Brook Ordnance Works

[SAMPLE_TYPE] = GW

LOCATION_CODE				AP2-MW01			AP2-MW02			AP2-MW02			AP2-MW02			AP2-MW03		
SAMPLE_NO				AP3075			AP3058			AP3059			AP3060			AP3061		
SAMPLE_DATE				13-Nov-09			25-May-09			25-May-09			26-May-09			24-May-09		
FK_DEPTH				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
SAMPLE_PURPOSE				REG			REG			FD			FS			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
EXPLOSIVES	Trinitrotoluene, 2,4,6-	N	ug/L				- -		-	- -		-	- -		-	- -		-
FIELD TESTS	Dissolved Oxygen	N	ppm	1.32			1.92									5.6		
FIELD TESTS	FERROUS IRON	N	mg/L				0									0		
FIELD TESTS	Oxidation Reduction Potential	N	mV	-8.3			623.8									-394.8		
FIELD TESTS	pH	N	pH_units	6.99			5.72									6.29		
FIELD TESTS	Specific Conductivity	N	mS/cm	0.98			0.856									1.368		
FIELD TESTS	Temperature	N	C	14.59			11.69									13.2		
FIELD TESTS	Turbidity	N	NTU	7.8			1.7									10.1		
GEN CHEMISTRY	Alkalinity	N	ppm				70.3			73.4			72			116		
GEN CHEMISTRY	Chloride	N	ppm				4.1			3.6			12.6			6.5		
GEN CHEMISTRY	Cyanide, total	N	ppm				- -		-	- -		-	- -		-	- -		-
GEN CHEMISTRY	Hardness	N	ppm										330					
GEN CHEMISTRY	HARDNESS (as CaCO3)	N	ppm				300			302						188		
GEN CHEMISTRY	Nitrate-Nitrite	N	ppm				10.9			10.9			8.7			0.61		
GEN CHEMISTRY	Sulfate	N	ppm				165			159			173			94.9		
GEN CHEMISTRY	Total dissolved solids	N	ppm				507		J	508		J	460			295		J
GEN CHEMISTRY	Total suspended solids	N	ppm				- -		-	4	B	J	- -		-	- -		-
GEN CHEMISTRY	Turbidity	N	NTU				- -		-	- -		-	- -		-	1	B	J
METALS	Aluminum	N	ug/L				79.1	B	J	77.6	B	J	- -		-	47.1	B	J
METALS	Aluminum	Y	ug/L				45.4	B	J	44	B	J	- -		-	- -		-
METALS	Antimony	N	ug/L				- -		-	- -		-	- -		-	- -		-
METALS	Antimony	Y	ug/L				- -		-	- -		-	- -		-	- -		-
METALS	Arsenic	N	ug/L				- -		-	- -		-	- -		-	- -		-
METALS	Arsenic	Y	ug/L				- -		-	- -		-	- -		-	- -		-
METALS	Barium	N	ug/L				25.3	B	J	24.5	B	J	- -		-	25.2	B	J
METALS	Barium	Y	ug/L				23.9	B	J	23.6	B	J	- -		-	22.3	B	J
METALS	Beryllium	N	ug/L				- -		-	- -		-	- -		-	- -		-
METALS	Beryllium	Y	ug/L				- -		-	- -		-	- -		-	- -		-
METALS	Cadmium	N	ug/L				1.1	B	J	1	B	J	- -		-	- -		-
METALS	Cadmium	Y	ug/L				- -		-	- -		-	- -		-	- -		-
METALS	Calcium	N	ug/L				102000			102000			94900			54400		
METALS	Calcium	Y	ug/L				96400			93100			103000			47200		
METALS	Chromium	N	ug/L				- -		-	- -		-	- -		-	- -		-
METALS	Chromium	Y	ug/L				- -		-	- -		-	- -		-	- -		-
METALS	Cobalt	N	ug/L				7.9	B	J	8.3	B	J	- -		-	- -		-
METALS	Cobalt	Y	ug/L				8.9	B	J	8.7	B	J	- -		-	- -		-
METALS	Copper	N	ug/L				- -		-	- -		-	- -		-	- -		-
METALS	Copper	Y	ug/L				- -		-	- -		-	- -		-	- -		-
METALS	Iron	N	ug/L				- -		-	- -		-	- -		-	37	B	J
METALS	Iron	Y	ug/L				- -		-	- -		-	- -		-	- -		-
METALS	Lead	N	ug/L				- -		-	- -		-	- -		-	- -		-

Appendix I

Detected Hits Summary Excluding "B" Qualifiers
Plum Brook Ordnance Works

[SAMPLE_TYPE] = GW

LOCATION_CODE				AP2-MW01			AP2-MW02			AP2-MW02			AP2-MW02			AP2-MW03		
SAMPLE_NO				AP3075			AP3058			AP3059			AP3060			AP3061		
SAMPLE_DATE				13-Nov-09			25-May-09			25-May-09			26-May-09			24-May-09		
FK_DEPTH				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
SAMPLE_PURPOSE				REG			REG			FD			FS			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
METALS	Lead	Y	ug/L				- -		-	- -		-	- -		-	- -		-
METALS	Magnesium	N	ug/L				11600			11600			10800			12700		
METALS	Magnesium	Y	ug/L				11000			10600			11900		J	11500		
METALS	Manganese	N	ug/L				229			229			212			173		
METALS	Manganese	Y	ug/L				220			214			218			171		
METALS	Mercury	N	ug/L				- -		-	- -		-	- -		-	- -		-
METALS	Mercury	Y	ug/L				- -		-	- -		-	- -		-	- -		-
METALS	Nickel	N	ug/L				74.2			74.2			68.9			- -		-

Appendix I

Detected Hits Summary Excluding "B" Qualifiers
Plum Brook Ordnance Works

[SAMPLE_TYPE] = GW

LOCATION_CODE				AP2-MW01			AP2-MW02			AP2-MW02			AP2-MW02			AP2-MW03		
SAMPLE_NO				AP3075			AP3058			AP3059			AP3060			AP3061		
SAMPLE_DATE				13-Nov-09			25-May-09			25-May-09			26-May-09			24-May-09		
FK_DEPTH				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
SAMPLE_PURPOSE				REG			REG			FD			FS			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
METALS	Nickel	Y	ug/L				74.5			72.1			72.6			- -		-
METALS	Potassium	N	ug/L				7690	B	J	7410	B	J	8940			1500	B	J
METALS	Potassium	Y	ug/L				9090	B	J	8950	B	J	9500			1950	B	J
METALS	Selenium	N	ug/L				- -		-	- -		-	- -		-			
METALS	Selenium	Y	ug/L				- -		-	- -		-	- -		-	- -		-
METALS	Silver	N	ug/L				- -		-	- -		-	- -		-	- -		-
METALS	Silver	Y	ug/L				- -		-	- -		-	- -		-	- -		-
METALS	Sodium	N	ug/L				2560	B	J	2460	B	J	- -		-	10200	B	J
METALS	Sodium	Y	ug/L				3030	B	J	2930	B	J	- -		-	11000		
METALS	Thallium	N	ug/L				- -		-	- -		-	- -		-	- -		-
METALS	Thallium	Y	ug/L				- -		-	- -		-	- -		-	- -		-
METALS	Vanadium	N	ug/L				- -		-	- -		-	- -		-	1.4	B	J
METALS	Vanadium	Y	ug/L				- -		-	- -		-	- -		-	- -		-
METALS	Zinc	N	ug/L				42.6			33.9			29.9			- -		-
METALS	Zinc	Y	ug/L				33.6			32.4			31			- -		-
PEST/PCB	Aroclor 1016	N	ug/L				- -		-	- -		-	- -		-	- -		-
PEST/PCB	Aroclor 1260	N	ug/L				- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(a)anthracene	N	ug/L				- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(a)pyrene	N	ug/L				- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(b)fluoranthene	N	ug/L				- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzoic acid	N	ug/L				- -		-	- -		-				- -		-
SEMIVOLATILES	Bis(2-ethylhexyl)phthalate	N	ug/L				- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Chrysene	N	ug/L				- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Dimethylphenol, 2,4-	N	ug/L				- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Fluoranthene	N	ug/L				- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Methylnaphthalene, 2-	N	ug/L				- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Naphthalene	N	ug/L				- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Phenanthrene	N	ug/L				- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Pyrene	N	ug/L				- -		-	- -		-	- -		-	- -		-
VOLATILES	Acetone	N	ug/L				- -		-	- -		-	- -		-	- -		-
VOLATILES	Benzene	N	ug/L				- -		-	- -		-	- -		-	- -		-
VOLATILES	Butanone, 2-	N	ug/L				- -		-	- -		-	- -		-	- -		-
VOLATILES	Carbon disulfide	N	ug/L				- -		-	- -		-	- -		-	- -		-
VOLATILES	Chloroform	N	ug/L				- -		-	- -		-	- -		-	- -		-
VOLATILES	Chloromethane	N	ug/L				- -		-	- -		-	- -		-	- -		-
VOLATILES	Cyclohexane	N	ug/L										- -		-			
VOLATILES	Dichloropropene, trans-1,3-	N	ug/L				- -		-	- -		-	- -		-	- -		-
VOLATILES	Ethylbenzene	N	ug/L				- -		-	- -		-	- -		-	- -		-
VOLATILES	Isopropylbenzene	N	ug/L										- -		-			
VOLATILES	Methylcyclohexane	N	ug/L										- -		-			
VOLATILES	Methylene chloride	N	ug/L				- -		-	- -		-	- -		-	- -		-

Appendix I

Detected Hits Summary Excluding "B" Qualifiers
Plum Brook Ordnance Works

[SAMPLE_TYPE] = GW

LOCATION_CODE				AP2-MW01			AP2-MW02			AP2-MW02			AP2-MW02			AP2-MW03		
SAMPLE_NO				AP3075			AP3058			AP3059			AP3060			AP3061		
SAMPLE_DATE				13-Nov-09			25-May-09			25-May-09			26-May-09			24-May-09		
FK_DEPTH				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
SAMPLE_PURPOSE				REG			REG			FD			FS			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
VOLATILES	Toluene	N	ug/L				- -		-	- -		-	- -		-	- -		-
VOLATILES	Xylenes, total	N	ug/L				- -		-	- -		-	- -		-	- -		-

Appendix I

Detected Hits Summary Excluding "B" Qualifiers
Plum Brook Ordnance Works

[SAMPLE_TYPE] = GW

LOCATION_CODE				ASH PIT 2-PZ03			ASH PIT 2-PZ04			ASH PIT 2-PZ07			ASH PIT 2-PZ07			ASH PIT 2-PZ07		
SAMPLE_NO				AP3018			AP3019			AP3015			AP3016			AP3022		
SAMPLE_DATE				31-Jan-09			1-Feb-09			2-Feb-09			2-Feb-09			2-Feb-09		
FK_DEPTH				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
SAMPLE_PURPOSE				REG			REG			FD			FS			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
EXPLOSIVES	Trinitrotoluene, 2,4,6-	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
FIELD TESTS	Dissolved Oxygen	N	ppm	2.02			1.1									0.5		
FIELD TESTS	FERROUS IRON	N	mg/L				0									0		
FIELD TESTS	Oxidation Reduction Potential	N	mV	14.4			23.7									20.4		
FIELD TESTS	pH	N	pH_units	6.77			6.55									6.53		
FIELD TESTS	Specific Conductivity	N	mS/cm	1.251			0.958									0.778		
FIELD TESTS	Temperature	N	C	1.52			7.31									6.19		
FIELD TESTS	Turbidity	N	NTU	60.1			26.6									28.2		
GEN CHEMISTRY	Alkalinity	N	ppm	231			132			222			260			169		
GEN CHEMISTRY	Chloride	N	ppm	11.6		J	5.14		J	2.81		J	2.1			3.04		J
GEN CHEMISTRY	Cyanide, total	N	ppm										0.044					
GEN CHEMISTRY	Hardness	N	ppm	622			501			408			620			407		
GEN CHEMISTRY	HARDNESS (as CaCO3)	N	ppm															
GEN CHEMISTRY	Nitrate-Nitrite	N	ppm	0.566		J	0.049		J	- -		-				0.028	J	J
GEN CHEMISTRY	Sulfate	N	ppm	341			236			79.6			177			80.6		
GEN CHEMISTRY	Total dissolved solids	N	ppm	804			619			442			450			450		
GEN CHEMISTRY	Total suspended solids	N	ppm	59			3	J	J	- -		-	- -		-	4		
GEN CHEMISTRY	Turbidity	N	NTU	51.5		J	4.56		J	4.93			1.3			4.52		
METALS	Aluminum	N	ug/L	2400			74.3	J	j	93.3		J	- -		-	147		J
METALS	Aluminum	Y	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Antimony	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Antimony	Y	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Arsenic	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Arsenic	Y	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Barium	N	ug/L	51.1			24			31.3			- -		-	31.9		
METALS	Barium	Y	ug/L	34.9			22.8			29.3			- -		-	28.2		
METALS	Beryllium	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Beryllium	Y	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Cadmium	N	ug/L	4.16	J	J	4.28	J	J	4.27	J	J	- -		-	3.91	J	J
METALS	Cadmium	Y	ug/L	4.36	J	J	4.13	J	J	3.98	J	J	- -		-	3.9	J	J
METALS	Calcium	N	ug/L	179000			135000			110000			101000			110000		
METALS	Calcium	Y	ug/L	172000			135000			108000			103000			103000		
METALS	Chromium	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Chromium	Y	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Cobalt	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Cobalt	Y	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Copper	N	ug/L	12.3			5.63	J	J	5.71	J	J	- -		-	- -		-
METALS	Copper	Y	ug/L	6.9	J	J	- -		-	- -		-	- -		-	- -		-
METALS	Iron	N	ug/L	5060			203			325		J	191			593		J
METALS	Iron	Y	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Lead	N	ug/L	3.02	J	J	- -		-	- -		-	-		-	- -		-

Appendix I

Detected Hits Summary Excluding "B" Qualifiers
Plum Brook Ordnance Works

[SAMPLE_TYPE] = GW

LOCATION_CODE				ASH PIT 2-PZ03			ASH PIT 2-PZ04			ASH PIT 2-PZ07			ASH PIT 2-PZ07			ASH PIT 2-PZ07		
SAMPLE_NO				AP3018			AP3019			AP3015			AP3016			AP3022		
SAMPLE_DATE				31-Jan-09			1-Feb-09			2-Feb-09			2-Feb-09			2-Feb-09		
FK_DEPTH				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
SAMPLE_PURPOSE				REG			REG			FD			FS			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
METALS	Lead	Y	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
METALS	Magnesium	N	ug/L	42700			39600			32200			29200			31900		
METALS	Magnesium	Y	ug/L	42800			40800			31100			29900			31400		
METALS	Manganese	N	ug/L	51.8			22.1			21.6			20.7			24.5		
METALS	Manganese	Y	ug/L	-	-	-	16.2			17.1			30.7			19		
METALS	Mercury	N	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
METALS	Mercury	Y	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
METALS	Nickel	N	ug/L	6.28	J	J	5.36	J	J	4	J	J	-	-	-	-	-	-

Appendix I

Detected Hits Summary Excluding "B" Qualifiers
Plum Brook Ordnance Works

[SAMPLE_TYPE] = GW

LOCATION_CODE				ASH PIT 2-PZ03			ASH PIT 2-PZ04			ASH PIT 2-PZ07			ASH PIT 2-PZ07			ASH PIT 2-PZ07		
SAMPLE_NO				AP3018			AP3019			AP3015			AP3016			AP3022		
SAMPLE_DATE				31-Jan-09			1-Feb-09			2-Feb-09			2-Feb-09			2-Feb-09		
FK_DEPTH				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
SAMPLE_PURPOSE				REG			REG			FD			FS			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
METALS	Nickel	Y	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Potassium	N	ug/L	1260			405	J	J	521	J	J	- -		-	548	J	J
METALS	Potassium	Y	ug/L	510	J	J	346	J	J	445	J	J	- -		-	460	J	J
METALS	Selenium	N	ug/L	7.55	J	J	- -		-	- -		-	- -		-	- -		-
METALS	Selenium	Y	ug/L	6.82	J	J	- -		-	- -		-	- -		-	- -		-
METALS	Silver	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Silver	Y	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Sodium	N	ug/L	12200			9150			6860			6380			6990		
METALS	Sodium	Y	ug/L	12500			9280			6840			6180			7000		
METALS	Thallium	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Thallium	Y	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Vanadium	N	ug/L	5.39			- -		-	- -		-	- -		-	- -		-
METALS	Vanadium	Y	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Zinc	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
METALS	Zinc	Y	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
PEST/PCB	Aroclor 1016	N	ug/L															
PEST/PCB	Aroclor 1260	N	ug/L															
SEMIVOLATILES	Benzo(a)anthracene	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(a)pyrene	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(b)fluoranthene	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzoic acid	N	ug/L	- -		-	- -		-	- -		-				- -		-
SEMIVOLATILES	Bis(2-ethylhexyl)phthalate	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Chrysene	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Dimethylphenol, 2,4-	N	ug/L	- -		-	- -		-	3.38	J	J	- -		-	- -		-
SEMIVOLATILES	Fluoranthene	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Methylnaphthalene, 2-	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Naphthalene	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Phenanthrene	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Pyrene	N	ug/L	- -		-	- -		-	- -		-	- -		-	- -		-
VOLATILES	Acetone	N	ug/L															
VOLATILES	Benzene	N	ug/L															
VOLATILES	Butanone, 2-	N	ug/L															
VOLATILES	Carbon disulfide	N	ug/L															
VOLATILES	Chloroform	N	ug/L															
VOLATILES	Chloromethane	N	ug/L															
VOLATILES	Cyclohexane	N	ug/L															
VOLATILES	Dichloropropene, trans-1,3-	N	ug/L															
VOLATILES	Ethylbenzene	N	ug/L															
VOLATILES	Isopropylbenzene	N	ug/L															
VOLATILES	Methylcyclohexane	N	ug/L															
VOLATILES	Methylene chloride	N	ug/L															

Appendix I

Detected Hits Summary Excluding "B" Qualifiers
Plum Brook Ordnance Works

[SAMPLE_TYPE] = GW

LOCATION_CODE				ASH PIT 2-PZ03			ASH PIT 2-PZ04			ASH PIT 2-PZ07			ASH PIT 2-PZ07			ASH PIT 2-PZ07		
SAMPLE_NO				AP3018			AP3019			AP3015			AP3016			AP3022		
SAMPLE_DATE				31-Jan-09			1-Feb-09			2-Feb-09			2-Feb-09			2-Feb-09		
FK_DEPTH				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
SAMPLE_PURPOSE				REG			REG			FD			FS			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
VOLATILES	Toluene	N	ug/L															
VOLATILES	Xylenes, total	N	ug/L															

Appendix I

Detected Hits Summary Excluding "B" Qualifiers
Plum Brook Ordnance Works

[SAMPLE_TYPE] = SD

LOCATION_CODE				ASH PIT 2-SD01			ASH PIT 2-SD02			ASH PIT 2-SD03		
SAMPLE_NO				AP1000			AP1001			AP1002		
SAMPLE_DATE				24-May-09			24-May-09			24-May-09		
FK_DEPTH				0 - _5 Ft			0 - _5 Ft			0 - _5 Ft		
SAMPLE_PURPOSE				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
EXPLOSIVES	Trinitrotoluene, 2,4,6-	N	mg/kg	- -		-	- -		-	0.0647	J	J
GEN CHEMISTRY	% Solids	N	Percent	74.2			77.9			79.9		
GEN CHEMISTRY	Total organic carbon	N	mg/kg	0.57								
METALS	Aluminum	N	mg/kg	3640			6310			7220		
METALS	Antimony	N	mg/kg	- -		-	- -		-	- -		-
METALS	Arsenic	N	mg/kg	4.1			5.1			10.1		J
METALS	Barium	N	mg/kg	22.8			43.5			67.1		J
METALS	Beryllium	N	mg/kg	0.36			0.49			0.52		
METALS	Cadmium	N	mg/kg	0.24	B	J	0.37			- -		-
METALS	Calcium	N	mg/kg	7660			26000			12900		J
METALS	Chromium	N	mg/kg	6.4			10.5			8.6		J
METALS	Cobalt	N	mg/kg	7.4			7.4			6.2		J
METALS	Copper	N	mg/kg	9.6			14.2			17.2		
METALS	Iron	N	mg/kg	10400			14000			39100		J
METALS	Lead	N	mg/kg	7.9			7.9			10.6	B	J
METALS	Magnesium	N	mg/kg	1950			7440			7470		J
METALS	Manganese	N	mg/kg	127			379			151		J
METALS	Mercury	N	mg/kg	- -		-	0.018	B	J	0.016	B	J
METALS	Nickel	N	mg/kg	15.7			16.1			16		J
METALS	Potassium	N	mg/kg	498	B	J	1300			1060		J
METALS	Selenium	N	mg/kg	1	B	J	0.39	B	J	0.92	B	J
METALS	Silver	N	mg/kg	- -		-	- -		-	0.083	B	J
METALS	Sodium	N	mg/kg	85.2	B	J	157	B	J	54.8	B	J
METALS	Thallium	N	mg/kg	- -		-	- -		-	- -		-
METALS	Vanadium	N	mg/kg	9.4			15.2			13.6		J
METALS	Zinc	N	mg/kg	34.7			38.9			27		J
PEST/PCB	Aroclor 1016	N	mg/kg	- -		-	- -		-	- -		-
PEST/PCB	Aroclor 1260	N	mg/kg	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(a)anthracene	N	mg/kg	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(a)pyrene	N	mg/kg	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(b)fluoranthene	N	mg/kg	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzoic acid	N	mg/kg	- -		-	- -		-	- -		-
SEMIVOLATILES	Bis(2-ethylhexyl)phthalate	N	mg/kg	- -		-	- -		-	- -		-
SEMIVOLATILES	Chrysene	N	mg/kg	- -		-	- -		-	- -		-
SEMIVOLATILES	Dimethylphenol, 2,4-	N	mg/kg	- -		-	- -		-	- -		-
SEMIVOLATILES	Fluoranthene	N	mg/kg	- -		-	- -		-	0.0525	J	J
SEMIVOLATILES	Methylnaphthalene, 2-	N	mg/kg	- -		-	- -		-	- -		-
SEMIVOLATILES	Naphthalene	N	mg/kg	- -		-	- -		-	- -		-
SEMIVOLATILES	Phenanthrene	N	mg/kg	- -		-	- -		-	- -		-
SEMIVOLATILES	Pyrene	N	mg/kg	- -		-	- -		-	- -		-

Appendix I

Detected Hits Summary Excluding "B" Qualifiers
Plum Brook Ordnance Works

[SAMPLE_TYPE] = SD

LOCATION_CODE				ASH PIT 2-SD04			ASH PIT 2-SD04			ASH PIT 2-SD04			ASH PIT 2-SD05		
SAMPLE_NO				AP1003			AP1004			AP1005			AP1006		
SAMPLE_DATE				25-May-09			25-May-09			25-May-09			25-May-09		
FK_DEPTH				0 - _5 Ft			0 - _5 Ft			0 - _5 Ft			0 - _5 Ft		
SAMPLE_PURPOSE				REG			FD			FS			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
EXPLOSIVES	Trinitrotoluene, 2,4,6-	N	mg/kg	- -		-	- -		-	- -		-	- -		-
GEN CHEMISTRY	% Solids	N	Percent	80.5			79.7			80			65.4		
GEN CHEMISTRY	Total organic carbon	N	mg/kg												
METALS	Aluminum	N	mg/kg	8000			6840			6780			4690		
METALS	Antimony	N	mg/kg	- -		-	- -		-	- -		-	- -		-
METALS	Arsenic	N	mg/kg	9.3			7.8			8.8			3.9		
METALS	Barium	N	mg/kg	59.8			50			53			43.1		
METALS	Beryllium	N	mg/kg	0.59			0.53			- -		-	0.42		
METALS	Cadmium	N	mg/kg	0.6			0.53			- -		-	0.26	B	J
METALS	Calcium	N	mg/kg	28700			25200			37600			9790		
METALS	Chromium	N	mg/kg	12.8			10.5			11.6			7.7		
METALS	Cobalt	N	mg/kg	14.1			9.8			9.9			8		
METALS	Copper	N	mg/kg	23.7			20.4			22.8			12.2		
METALS	Iron	N	mg/kg	19400			17700			20700			10400		
METALS	Lead	N	mg/kg	15.2		J	9.1		J	11			9.7		
METALS	Magnesium	N	mg/kg	6110			6040			8170			2450		
METALS	Manganese	N	mg/kg	668			547			413			187		
METALS	Mercury	N	mg/kg	0.015	B	J	0.019	B	J	- -		-	0.025	B	J
METALS	Nickel	N	mg/kg	27.6			22.6			27.1			17.8		
METALS	Potassium	N	mg/kg	1850			1470			1420			628	B	J
METALS	Selenium	N	mg/kg	0.83	B	J	0.48	B	J	- -		-	0.96	B	J
METALS	Silver	N	mg/kg	- -		-	- -		-	- -		-	- -		-
METALS	Sodium	N	mg/kg	170	B	J	157	B	J	- -		-	123	B	J
METALS	Thallium	N	mg/kg	- -		-	- -		-	- -		-	- -		-
METALS	Vanadium	N	mg/kg	14.9			12.5			13.3			11.1		
METALS	Zinc	N	mg/kg	59.7			54.9			62.5			45.1		
PEST/PCB	Aroclor 1016	N	mg/kg	- -		-	- -		-	- -		-	- -		-
PEST/PCB	Aroclor 1260	N	mg/kg	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(a)anthracene	N	mg/kg	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(a)pyrene	N	mg/kg	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(b)fluoranthene	N	mg/kg	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzoic acid	N	mg/kg	- -		-	- -		-				- -		-
SEMIVOLATILES	Bis(2-ethylhexyl)phthalate	N	mg/kg	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Chrysene	N	mg/kg	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Dimethylphenol, 2,4-	N	mg/kg	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Fluoranthene	N	mg/kg	- -		-	- -		-	- -		-	0.0547	J	J
SEMIVOLATILES	Methylnaphthalene, 2-	N	mg/kg	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Naphthalene	N	mg/kg	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Phenanthrene	N	mg/kg	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Pyrene	N	mg/kg	- -		-	- -		-	- -		-	- -		-

Appendix I

Detected Hits Summary Excluding "B" Qualifiers
Plum Brook Ordnance Works

[SAMPLE_TYPE] = SW

LOCATION_CODE				AP2-SW01			AP2-SW02			AP2-SW03		
SAMPLE_NO				AP2000			AP2001			AP2002		
SAMPLE_DATE				24-May-09			24-May-09			24-May-09		
FK_DEPTH				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
SAMPLE_PURPOSE				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
EXPLOSIVES	Trinitrotoluene, 2,4,6-	N	ug/L	- -		-	- -		-	- -		-
FIELD TESTS	Dissolved Oxygen	N	ppm	7.55			7.81			7.94		
FIELD TESTS	Oxidation Reduction Potential	N	mV	163.5			124.3			113.8		
FIELD TESTS	pH	N	pH_units	7.28			7.42			7.6		
FIELD TESTS	Specific Conductivity	N	mS/cm	0.924			0.912			0.908		
FIELD TESTS	Temperature	N	C	17.45			18.94			19.16		
FIELD TESTS	Turbidity	N	NTU	12.9			12.5			17.7		
GEN CHEMISTRY	HARDNESS (as CaCO3)	N	ppm	286								
METALS	Aluminum	N	ug/L	720			531			357		
METALS	Antimony	N	ug/L	- -		-	- -		-	- -		-
METALS	Arsenic	N	ug/L	- -		-	- -		-	- -		-
METALS	Barium	N	ug/L	48.4	B	J	46.8	B	J	44.7	B	J
METALS	Beryllium	N	ug/L	- -		-	- -		-	- -		-
METALS	Cadmium	N	ug/L	- -		-	- -		-	- -		-
METALS	Calcium	N	ug/L	79100			78800			76400		
METALS	Chromium	N	ug/L	- -		-	- -		-	- -		-
METALS	Cobalt	N	ug/L	- -		-	- -		-	- -		-
METALS	Copper	N	ug/L	- -		-	- -		-	- -		-
METALS	Iron	N	ug/L	1060			700			451		
METALS	Lead	N	ug/L	- -		-	- -		-	2.9	B	J
METALS	Magnesium	N	ug/L	21400			21200			20500		
METALS	Manganese	N	ug/L	102			63			52.6		
METALS	Mercury	N	ug/L	- -		-	- -		-	- -		-
METALS	Nickel	N	ug/L	- -		-	- -		-	- -		-
METALS	Potassium	N	ug/L	3290	B	J	3340	B	J	3150	B	J
METALS	Selenium	N	ug/L	- -		-	- -		-	- -		-
METALS	Silver	N	ug/L	- -		-	- -		-	- -		-
METALS	Sodium	N	ug/L	32800			32700			32100		
METALS	Thallium	N	ug/L	- -		-	- -		-	- -		-
METALS	Vanadium	N	ug/L	2.6	B	J	1.8	B	J	1.7	B	J
METALS	Zinc	N	ug/L	12.1	B	J	12.4	B	J	- -		-
PEST/PCB	Aroclor 1016	N	ug/L	- -		-	- -		-	- -		-
PEST/PCB	Aroclor 1260	N	ug/L	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(a)anthracene	N	ug/L	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(a)pyrene	N	ug/L	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(b)fluoranthene	N	ug/L	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzoic acid	N	ug/L	- -		-	- -		-	- -		-
SEMIVOLATILES	Bis(2-ethylhexyl)phthalate	N	ug/L	- -		-	- -		-	- -		-
SEMIVOLATILES	Chrysene	N	ug/L	- -		-	- -		-	- -		-
SEMIVOLATILES	Dimethylphenol, 2,4-	N	ug/L	- -		-	- -		-	- -		-
SEMIVOLATILES	Fluoranthene	N	ug/L	- -		-	- -		-	- -		-

Appendix I

Detected Hits Summary Excluding "B" Qualifiers
Plum Brook Ordnance Works

[SAMPLE_TYPE] = SW

LOCATION_CODE				AP2-SW01		AP2-SW02		AP2-SW03	
SAMPLE_NO				AP2000		AP2001		AP2002	
SAMPLE_DATE				24-May-09		24-May-09		24-May-09	
FK_DEPTH				0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
SAMPLE_PURPOSE				REG		REG		REG	
SEMIVOLATILES	Methylnaphthalene, 2-	N	ug/L	- -	-	- -	-	- -	-
SEMIVOLATILES	Naphthalene	N	ug/L	- -	-	- -	-	- -	-
SEMIVOLATILES	Phenanthrene	N	ug/L	- -	-	- -	-	- -	-
SEMIVOLATILES	Pyrene	N	ug/L	- -	-	- -	-	- -	-

Appendix I

Detected Hits Summary Excluding "B" Qualifiers
Plum Brook Ordnance Works

[SAMPLE_TYPE] = SW

LOCATION_CODE				AP2-SW03			AP2-SW03			AP2-SW04			AP2-SW05		
SAMPLE_NO				AP2003			AP2004			AP2005			AP2006		
SAMPLE_DATE				24-May-09			24-May-09			25-May-09			25-May-09		
FK_DEPTH				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
SAMPLE_PURPOSE				FD			FS			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
EXPLOSIVES	Trinitrotoluene, 2,4,6-	N	ug/L	- -		-	- -		-	- -		-	- -		-
FIELD TESTS	Dissolved Oxygen	N	ppm							7.4			8.37		
FIELD TESTS	Oxidation Reduction Potential	N	mV							193.5			157.8		
FIELD TESTS	pH	N	pH_units							7.43			7.66		
FIELD TESTS	Specific Conductivity	N	mS/cm							0.885			0.9		
FIELD TESTS	Temperature	N	C							15.93			16.26		
FIELD TESTS	Turbidity	N	NTU							24.6			11.7		
GEN CHEMISTRY	HARDNESS (as CaCO3)	N	ppm												
METALS	Aluminum	N	ug/L	377			368			1030		J	359		
METALS	Antimony	N	ug/L	- -		-	- -		-	- -		-	- -		-
METALS	Arsenic	N	ug/L	- -		-	- -		-	- -		-	- -		-
METALS	Barium	N	ug/L	45.3	B	J	- -		-	50.9	B	J	43.9	B	
METALS	Beryllium	N	ug/L	- -		-	- -		-	- -		-	- -		-
METALS	Cadmium	N	ug/L	- -		-	- -		-	- -		-	- -		-
METALS	Calcium	N	ug/L	77400			80900			80700			75900		
METALS	Chromium	N	ug/L	- -		-	- -		-	- -		-	- -		-
METALS	Cobalt	N	ug/L	- -		-	- -		-	1.2	B	J	- -		-
METALS	Copper	N	ug/L	- -		-	- -		-	- -		-	- -		-
METALS	Iron	N	ug/L	455			546			1020			376		
METALS	Lead	N	ug/L	- -		-	- -		-	2.9	B	J	- -		-
METALS	Magnesium	N	ug/L	20800			22300		J	20700			19800		
METALS	Manganese	N	ug/L	52.9			53.4			83.1			53.3		
METALS	Mercury	N	ug/L	- -		-	- -		-	- -		-	- -		-
METALS	Nickel	N	ug/L	- -		-	- -		-	6.2	B	J	- -		-
METALS	Potassium	N	ug/L	3190	B	J	- -		-	4400	B	J	2900	B	
METALS	Selenium	N	ug/L	- -		-	- -		-	- -		-	- -		-
METALS	Silver	N	ug/L	- -		-	- -		-	- -		-	- -		-
METALS	Sodium	N	ug/L	32800			40000			34800			30300		
METALS	Thallium	N	ug/L	- -		-	- -		-	- -		-	- -		-
METALS	Vanadium	N	ug/L	1.6	B	J	- -		-	3.1	B	J	2	B	
METALS	Zinc	N	ug/L	8.1	B	J	- -		-	10.6	B	J	9.9	B	
PEST/PCB	Aroclor 1016	N	ug/L	- -		-	- -		-	- -		-	- -		-
PEST/PCB	Aroclor 1260	N	ug/L	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(a)anthracene	N	ug/L	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(a)pyrene	N	ug/L	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzo(b)fluoranthene	N	ug/L	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Benzoic acid	N	ug/L	- -		-				- -		-	- -		-
SEMIVOLATILES	Bis(2-ethylhexyl)phthalate	N	ug/L	2	J	J	- -		-	- -		-	- -		-
SEMIVOLATILES	Chrysene	N	ug/L	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Dimethylphenol, 2,4-	N	ug/L	- -		-	- -		-	- -		-	- -		-
SEMIVOLATILES	Fluoranthene	N	ug/L	- -		-	- -		-	- -		-	- -		-

Appendix I

Detected Hits Summary Excluding "B" Qualifiers
Plum Brook Ordnance Works

[SAMPLE_TYPE] = SW

LOCATION_CODE				AP2-SW03		AP2-SW03		AP2-SW04		AP2-SW05	
SAMPLE_NO				AP2003		AP2004		AP2005		AP2006	
SAMPLE_DATE				24-May-09		24-May-09		25-May-09		25-May-09	
FK_DEPTH				0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
SAMPLE_PURPOSE				FD		FS		REG		REG	
SEMIVOLATILES	Methylnaphthalene, 2-	N	ug/L	- -	-	- -	-	- -	-	- -	-
SEMIVOLATILES	Naphthalene	N	ug/L	- -	-	- -	-	- -	-	- -	-
SEMIVOLATILES	Phenanthrene	N	ug/L	- -	-	- -	-	- -	-	- -	-
SEMIVOLATILES	Pyrene	N	ug/L	- -	-	- -	-	- -	-	- -	-

APPENDIX J

DATA QUALITY EVALUATIONS

MARCH 2010
POWERHOUSE 2 ASH PITS SAMPLING
DATA QUALITY EVALUATION

DATA QUALITY EVALUATION

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List of Acronyms

AR/COC	analysis request/chain of custody
CCAL	continuing calibration
CFR	Code of Federal Regulations
CI	chemical investigation
DI	deionized
DQO	data quality objectives
EPA	U.S. Environmental Protection Agency
ICAL	initial calibration
ICS	Interference Check Sample
ID	identification
LCS	laboratory control sample
MB	material blank or method blank
MDL	method detection limit
MQL	method quantitation limit
MRL	method reporting limit
MS	matrix spike
MSD	matrix spike duplicate
NFG	national functional guidelines
PBOW	Plum Brook Ordnance Works
PQL	practical quanitation limit
QA/QC	quality assurance/quality control
SAP	quality assurance project plan
RI	remedial investigation
RL	reporting limit
RPD	relative percent difference
SDG	sample delivery group
SOP	standard operating procedures
USACE	U.S. Army Corps of Engineers
VOC	volatile organic compounds

1.0 Introduction

This appendix presents results of the quality assurance/quality control (QA/QC) measures implemented for the sampling and analysis activities at the Plum Brook Ordnance Works (PBOW), Sandusky, Ohio. The quality indicators from every aspect of the data collection were reviewed, and an assessment of the data with regard to project-specific objectives is presented. Successful execution of project-specific objectives and procedures provides strong support for the acceptance of the data generated as adequate for the purpose of evaluating the analytical results from this assessment at PBOW.

Shaw Environmental, Inc. (Shaw) conducted investigative work at the Ash Pit 2 area in January, February, May, and November of 2009. Primary and field duplicate project samples collected in January and February 2009 were analyzed by AML Scientific, LLC of Olathe, Kansas. AML Scientific ceased operations at the end of February 2009. Regular and field duplicate project samples collected after February 2009 were analyzed by Accutest Laboratories, of Orlando, Florida. Field splits were analyzed by Test America, Inc., Canton, Ohio. Analysis for nitroaromatic field split samples was performed by Test America of Knoxville, Tennessee and Test America of Denver, Colorado. One hundred percent of the data analyzed were subjected to data validation following the guidelines in the *EPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review*, June 2008 (EPA, 2008) and *EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, October 2004 (EPA, 2004), the QAPP (Shaw, 2008c), and specific analytical method requirements. Data were evaluated against specific criteria to verify the achievement of precision, accuracy, representativeness, completeness, and comparability goals established to meet the project data quality objectives (DQO). The criteria for blank evaluation were based on those detailed in *Region III Modifications to National Functional Guidelines for Organic Data Review,* September 1994 (EPA, 1994b) and *Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses* (EPA, 1993). Since these documents specify procedures for Contract Laboratory Program (CLP) data, they are used as guidelines only. Method and laboratory quality assurance and quality control requirements supercede these guidelines, where applicable. Data were evaluated against specific criteria to verify the achievement of precision, accuracy, representativeness, completeness and comparability goals established to meet the project data quality objectives (DQO). To verify that these DQOs were met, field measurements, sampling and handling procedures, laboratory analysis and reporting, and all nonconformances and discrepancies in the data were examined to determine compliance with the appropriate and applicable procedures defined in the SAP. The results of this review are

presented in the following sections, with all analytical outliers or nonconformances discussed where they occurred.

This report is divided into three subsections. Section 2.0 discusses the field investigation and QC procedures used during the sampling effort. Section 3.0 outlines the analytical program and the associated QC activities performed. The final part of this document, Section 4.0, summarizes the data findings and their overall impact on the usability of the analytical data.

2.0 Field Sampling and QC Activities

Shaw was retained by the U. S. Army Corps of Engineers, Nashville District to conduct investigative and sampling activities at PBOW. Field activities at this site included collection of soil, sediment, surface water and groundwater samples. The collection of these samples and their associated QC samples are discussed in this section of the Data Quality Evaluation (DQE).

Twenty-four project and three field duplicate soil samples, five project and one field duplicate sediment samples, five project and one field duplicate surface water samples, and twelve project and four field duplicate groundwater samples were submitted to AML and Accutest for analysis. Sample shipments from the field were performed under custody and documented using standard Shaw Analysis Request/Chain of Custody (AR/COC) forms. These forms provided project-specific analytical specifications and QC instructions to the laboratory. A formal COC transfer record was prepared and included with these forms to document custody during sample transportation, storage, and disposition by the laboratory. Table 1 summarizes the field sample number, location, sample type, date of collection, lot number, and laboratory for each sample collected.

2.1 Trip Blanks

Aqueous samples designated for volatile organic compound (VOC) analysis may be susceptible to contamination by diffusion of organic compounds into the sample container. Trip blanks are analyzed in order to assess the potential for contamination to be introduced to an aqueous volatile sample during transport and handling procedures. A trip blank is a sample of analyte free deionized (DI) water that is prepared at the laboratory, shipped to the field with sample containers, and returned to the laboratory with the water matrix samples receiving VOC analysis. A trip blank is then analyzed for volatile organics using the same sample preparation and analysis procedures used for the actual field samples.

The data validator applied the 5X-10X rule to the samples for the analytes detected. The 10 times limit is applicable only for common laboratory contaminants such as acetone, methylene chloride, and 2-butanone.

VOC constituents qualified due to associated trip blank contamination are listed below:

SDG Number	Samples Affected	Compounds	Blank Contaminant	Validation Qualifier
F69607	AP3080	Methylene Chloride	Trip	B

2.2 Equipment Rinsates

Equipment rinsates are used to assess the effectiveness of the decontamination procedures used by the sampling team on reusable sampling equipment. Three equipment rinsate samples collected were associated with Ash Pit 2.

The following samples were qualified due to contamination detected in associated equipment rinsates:

SDG Number	Samples Affected	Analytes	Blank Contaminant	Validation Qualifier
F69607	AP3079, AP3080, AP3081	Chloroform	Equipment	B
	AP3081	Carbon Disulfide	Equipment	B
F65480	AP3057, AP3063	Pb (Filtered)	Equipment	B
	AP3061, AP3064, AP3065	Se (Total)	Equipment	B
F69607	AP3081	Pb (Total)	Equipment	B
	AP3079, AP3080, AP3081	Al (Filtered)	Equipment	B
	AP3080, AP3081	Nitrate-Nitrite	Equipment	B

2.3 Field Duplicates

Field duplicate samples are collected and submitted to the laboratory for analysis along with their corresponding original sample. The data generated from the analysis of field duplicate samples are used to evaluate the precision of the sample collection and analysis procedures. It is difficult to collect and analyze sediment samples in duplicate due to the heterogeneous nature of sediment. High relative percent difference (RPD) between an original sample and its field duplicate may indicate a difference in sample matrix or sample collection rather than true problems with precision of sample analysis. Also, when estimated "J" or nondetected "U" results are reported, there is a potential for increased variability between the primary and duplicate sample results

Field duplicate samples were collected at a frequency of one for every ten samples (10 percent). Nine field duplicate samples were collected during this sampling event: three soils, one sediment, one surface water, and four groundwaters. Table 2 compares the original and field duplicate results and shows the RPDs calculated for those detected compounds. Compounds not presented in the table were not detected in either the original or field duplicate samples. Sample sets with no detections are not presented in the table. In cases where duplicates were performed and one result is less than the reporting limit, but greater than the method detection limit, the RPD is reported, but is of limited value. Only samples with detections in both the regular and the duplicate were qualified for high RPDs.

The acceptance criterion of 30 percent RPD for waters and 50 percent RPD for soils was used to evaluate these sample results. The data compared well when detected concentrations were greater than the reporting limit. RPD is calculated by using the following formula:

$$RPD = \left| \frac{A - B}{(A + B)/2} \right| \quad x \quad 100$$

where:

RPD	=	relative percent difference
A	=	original result
B	=	field duplicate result.

2.4 Field Split Samples

Split samples were collected in conjunction with field duplicate samples and sent to Test America Laboratories, Inc. of North Canton. The split samples were submitted to the laboratory for the same analysis as their corresponding field duplicates and original field samples. The split samples are used to determine if data results are reproducible when analyzed by two different laboratories. Results are also evaluated to determine if a contracted laboratory's preparation and analysis procedures are in control and meet the approved method criteria.

Field split samples were collected at a frequency of approximately one for every ten regular samples. Nine splits were collected during this sampling event: three soils, one sediment, one surface water, and four groundwaters.

Table 2 compares the original and field split results and shows the RPDs calculated for those detected compounds. Compounds not presented in the table were not detected in either the

original or field split samples. Samples with no detections are not presented in the table. Samples were not qualified because of sample RPDs.

3.0 Analytical Program and QC Activities

The project QA/QC program described in the SAP was followed for the collection and laboratory analysis of samples. Each of the analytical methods used require that method-specific QA/QC protocols be followed during sample analysis. These protocols are a critical part of the methods employed and were followed by the laboratory during sample analysis. Specific measures included detailed record keeping procedures, instrument calibrations, and analysis of method blanks, blank spikes, MS/MSD, surrogates, and internal standards. The following SW-846 and USEPA methods were used to analyze PBOW samples:

Analysis	Method
Semivolatiles	SW-846 8270C
Nitroaromatics	SW-846 8330
Volatiles	SW-846 8260B
Metals	SW-846 6010B/7470A
Polychlorinated Biphenyls	SW-846 8082
Wet Chemistry	MCAWW 300.0A (Chloride, Sulfate and Nitrate as N), MCAWW 310.1 (Alkalinity), MCAWW 180.1 (Turbidity), MCAWW 160.1 (TDS), MCAWW 160.2 (TSS), MCAWW 130.2 (Hardness), SW846 9012A (Cyanide), TOC by Walkley Black (Total Organic Carbon)

The validator used the QA/QC criteria defined in the SAP, laboratory-derived acceptance criteria, and analytical method criteria to qualify data. Any qualifiers added to these data by the data validator are included in the data summary report.

3.1 Laboratory QA/QC Procedures

The following sections discuss specific QA/QC protocols required and performed by the laboratory during this investigation.

3.1.1 Calibration

The calibration of instruments is required to ensure that the instruments are operating properly. Calibration is achieved when instrument response can be related to the concentration of an analyte. Several analytes were qualified because of unacceptable performance in the initial and

continuing calibration standards. The following analytes exhibited initial calibration individual relative response factors <0.1.

These analytes are qualified as follows:

SDG Number	Samples Affected	Analyte(s)	Validation Qualifier
F65480	AP3057, AP3058, AP3059, AP3061, AP3063, AP3064, AP3065	Acetone	R
F69338	AP3070	Acetone	R
A9E270266	AP3060, AP3066	2-Butanone, Chloroethane, 1,2-Dibromo-3-chloropropane	R

The table below lists the analytes that exhibited individual ICAL percent relative standard deviation and/or CCAL percent difference outside QC criteria. The criteria used to evaluate these data are: individual ICAL percent relative standard deviation > 30% and/or CCAL percent difference > 20% (volatile and semivolatile organics); >15% (explosives); for metals, individual ICAL/CCAL percent relative standard deviation > 10%; and for mercury, individual ICAL/CCAL percent relative standard deviation > 20%.

SDG Number	Samples Affected	Analyte(s)	Validation Qualifier
0901026	AP0102, AP0104, AP0107, AP0116, AP0119, AP0121, AP0123, AP0124, AP0127, AP0128	Benzoic Acid	UJ
	AP0105, AP0114, AP0115,	2,4-Dinitrophenol	UJ
0902003	AP3015, AP3018, AP3019, AP3022	Hexachlorocyclopentadiene	UJ
F65476	AP1002, AP1003, AP1004, AP1006	2,4-Dinitrophenol	UJ
A9E270266	AP3060, AP3066	2-Butanone, Chloroethane, Acetone, Chloromethane, 4-Methyl-2-pentanone	UJ/R
	AP2004 (Total), AP3060 (Filtered)	Magnesium	J
A9K190539	AP3082	Bromoform, 1,2-Dibromo-3-chloropropane, cis-1,3-Dichloropropene, trans-1,3-Dichloropropene	UJ
A9B030206	AP3016	Bis(2-Chloroethyl)ether	UJ

3.1.2 Method/Calibration Blanks

Method blanks are analyzed with each analytical "batch" processed on a per matrix (i.e., soil and water) basis. Method blanks are carried step-wise through the same analytical procedure as their associated field samples including the addition of solvents, surrogate and standard spikes, and reagents as required in the analysis process. The purpose of a method blank is to identify any contaminants that may be introduced to the sample as a result of the analytical process. The data validator evaluated all blank data associated with each sample.

The following analytes were qualified because of detections in the method or calibration blanks:

SDG Number	Samples Affected	Analytes	Blank Contaminant	Validation Qualifier
F69338	AP3070, AP3071, AP3072	Pb (Total)	Method	B
	AP3070, AP3072, AP3073	Zn (Total)	Method	B

3.1.3 Surrogate Recoveries

Surrogate standards are defined as non-target compounds added to standards, blanks, and samples prior to extraction or purging. They are used in organic analyses to monitor the percent recovery efficiencies of the sample preparation and analytical procedures.

The following samples were qualified due to surrogate recoveries outside of QC limits:

SDG Number	Samples Affected	Surrogate	Validation Qualifier
0901026	AP0103, AP0114, AP0117, AP0125	1-Chloro-3-nitrobenzene	UJ/R
0901026	AP0125	DCB	UJ
0901027	AP0111	1-Chloro-3-nitrobenzene	UJ
F69338	AP3073	1-Chloro-3-nitrobenzene	UJ

3.1.4 Matrix Spikes and Laboratory Control Spikes

Two types of spikes were performed for all analyses: matrix spikes (MS) and laboratory control samples (LCS). MS compounds are spiked into an aliquot of a field sample. LCS compounds are spiked into a blank matrix. The spiked compounds are representative compounds that are quantified during performance of the method. Recovery of the spiked compound is used as an assessment of analytical accuracy for the sample matrix analyzed. These results are useful in distinguishing sample matrix interferences from analysis interferences through a comparison of MS and LCS recovery data. Often, spikes are performed in duplicate as a matrix spike duplicate (MSD) or LCS duplicate. In this manner, the precision of the assessment can be quantified as the RPD of the original and duplicate spike.

Matrix spikes were assigned at a frequency of at least 1 for every 20 field samples collected. Ten MS/MSD pairs were assigned to samples. Additional sample volume was provided to the laboratory for the MS/MSD analyses. This sampling frequency meets the collection criteria for this program as specified in the SAP. In addition to the overall collection frequency, the analytical method requires that the laboratory analyze 1 set of spikes per analytical batch. To comply with this method requirement, the laboratory may analyze additional MS/MSD pairs. The validator evaluated all batch QC. The laboratory's statistically determined target acceptance limits were used to assess the spike recovery and RPD.

The following MS/MSD recoveries are outside of established QC criteria:

SDG Number	Samples Affected	Analytes(s)	Validation Qualifier
F65480	AP3064	Cis-1,3-Dichloropropene, trans-1,3-Dichloropropene	UJ
	AP3064	Se (Total and Filtered), Mg (Filtered)	B/J
	AP3064	Tetryl, 1,3,5-Trinitrobenzene, 2,4,6-Trinitrotoluene	UJ
	AP3057, AP3058, AP3059, AP3061, AP3063, AP3064, AP3065	Cyanide	J/UJ
	AP3064	Alkalinity	J
F69607	AP3079	trans-1,3-Dichloropropene, Methyl bromide, Methyl chloride, Vinyl chloride	J/UJ
	AP3079, AP3080, AP3081	Se (Total and Filtered)	J
	AP3079	Tetryl	R
	AP3079, AP3080, AP3081	Alkalinity, Cyanide	J/UJ
0901026	AP1000	Hexachlorocyclopentadiene*	UJ
	AP0100, AP0101, AP0102, AP0117, AP0118, AP0120, AP0121, AP0123	(Total) Al, Cu, Fe, Mg	J/UJ
	AP0103, AP0104, AP0105, AP0107, AP0114, AP0115, AP0116, AP0119, AP0124, AP0125, AP0126, AP0127, AP0128	(Total) Al, Ba, Co*, Cu, Mg	J/UJ
	AP1000	4-Amino-2,6-dinitrotoluene, 2-Amino-4,6-dinitrotoluene, 1,3-Dinitrobenzene, 2,4-Dinitrotoluene, 3-Nitrotoluene	UJ
	AP0117	4-Amino-2,6-dinitrotoluene, 2-Amino-4,6-dinitrotoluene, 1,3-Dinitrobenzene, 2,4-Dinitrotoluene, Nitrobenzene, 2- Nitrobenzene, 3- Nitrobenzene, 4- Nitrobenzene, 1,3,5-Trinitrobenzene	UJ

SDG Number	Samples Affected	Analytes(s)	Validation Qualifier
0901026 (cont'd)	AP0127	2-Amino-4,6-dinitrotoluene, 2,4-Dinitrotoluene, 1,3,5-Trinitrobenzene, 2,4,6-Trinitrotoluene	UJ
0901027	AP0108, AP0109, AP0110, AP0111, AP0112, AP0113	(Total) As, Ba*, Co*, Mg, Ni, Se, Ag*	J/UJ
0902003	AP3015, AP3018, AP3019, AP3022	Chloride, Nitrate-Nitrite	J/UJ
F65476	AP1002	2-Amino-4,6-dinitrotoluene	UJ
F65479	AP2005	4-Amino-2,6-dinitrotoluene	UJ
F69338	AP3070, AP3071, AP3073	Nitrate-Nitrite, Sulfate	J/UJ
A9E270266	AP1005	Sb*	UJ

*Analytes were qualified for %RPD outside QC limits for the MS/MSD analysis.

LCS results are used to evaluate lab method performance in the same manner as the MS/MSD results except the LCS is not performed on an actual field sample matrix. The LCS is prepared for each analytical batch and for each parameter and matrix analyzed. All LCS recoveries met QC criteria.

3.1.5 Laboratory Duplicate Sample Analysis

Laboratory Duplicate determinations are used to demonstrate acceptable method precision by the laboratory at the time of analysis. Duplicate Sample analyses are also performed to generate data in order to determine the long-term precision of the analytical method on various matrices.

Laboratory duplicate analysis was performed for the project samples, and all QC criteria were met with the following exception(s):

SDG Number	Samples Affected	Analyte(s)	Validation Qualifier
F65476	AP1001, AP1002, AP1003, AP1004, AP1006	(Total) Hg	J
	AP1002	(Total) Sb, Zn, As, Ba, Ca, Fe, Mg, Mn, K, Ag, Na	J
F65479	AP2005	(Total) Al, Co, V	J
F65480	AP3064	Se (Total and Filtered)	B/J
	AP3057, AP3058, AP3059, AP3061, AP3063, AP3064, AP3065	TDS	J
F69338	AP3070, AP3071, AP3072	(Total) Lead	B
	AP3071, AP3072	(Total) Selenium	J
F69607	AP3079, AP3080, AP3081	Se (Total and Filtered), V (Total)	J/UJ
	AP3079, AP3080, AP3081	TDS, TSS	J/UJ

3.1.6 Column Agreement

For high performance liquid chromatography (HPLC) analyses, sample results are confirmed using two dissimilar columns. In order for an analyte to be reported, it must be detected on both columns. Results differing by greater than 40 percent are qualified estimated, "J".

All detections were in agreement with the exception of the following:

SDG Number	Samples Affected	Analyte(s)	Validation Qualifier
0901026	AP0103	Aroclor 1016	J
0901027	AP0108	Aroclor 1260	J

3.1.7 Interference Check Sample

The ICP Interference Check Sample (ICS) verifies the contract laboratory's interelement and background correction factors. The ICS consists of two solutions: Solution A and Solution AB. Solution A consists of the interferents, and solution AB consists of the analytes mixed with the interferents. An ICS analysis consists of analyzing both solutions consecutively, starting with solution A, for all wavelengths used for each analyte reported by ICP. Results for the ICP analysis of the ICS solution AB must fall within the control limits of $\pm$ 20% of the true value for the analytes included in the solution.

All Interference Check Sample (ICS) percent recoveries were acceptable with the following exception(s):

SDG	Samples Affected	Compound(s)	Validation Qualifier
F69607	AP3079, AP3080, AP3081	Ca (Filtered)	J

3.1.8 Inductively Coupled Plasma Serial Dilutions

The ICP serial dilution analysis is performed to determine whether or not significant physical or chemical interferences exist due to sample matrix.

All QC criteria were met for the serial dilutions associated with the project samples, with the following exception(s):

SDG	Samples Affected	Compound(s)	Validation Qualifier
0901026	AP0100	(Total) Al, Fe, Mg, Ba, Ca, Mn, Ni, K	J
	AP0103, AP0104, AP0105, AP0107, AP0114, AP0115, AP0116, AP0119, AP0124, AP0125, AP0126, AP0127, AP0128	(Total) Be, Fe	J
0901027	Total: AP0108, AP0109, AP0110, AP0111, AP0112, AP0113	Ba, Co, Mg, Ni, Be, Ca, Cr, Pb, Zn	J
F65476	AP1002	(Total) Ca, Fe, Mg, Mn, Cr, Co, Pb, Ni, V, Zn	J
F65479	AP2005	(Total) Al	J
F69607	AP3079, AP3080, AP3081	Ca (Total and Filtered), Na (Total), Mg, K (Filtered)	J
A9A170114	AP0106, AP0122, AP0129	(Total) Ca, K	J

3.2 Reporting Limits

Limits have been established to describe project sensitivity requirements. Each laboratory is required to demonstrate method performance through method detection limit (MDL) studies for every method employed. These studies are required to be laboratory-specific so that individual laboratory variables such as equipment brands, reagent suppliers, and chemist technique are factored into the performance study. MDLs are established using controlled matrices (i.e., DI water). Practical quantitation limits (PQL) or method quantitation limits (MQL), used for this project are those statistically determined by the laboratories. The analytical program executed for this project required the use of SW-846 methods, which specify the procedure for calculating the MDLs. The PQL/MQL calculation adjusts the limit by a predetermined mathematical factor for the analysis of actual environmental sample matrices (i.e. soil, groundwater, etc.). Method reporting limits (MRL) are based on the project action or decision levels.

These limits are generally defined as follows:

- ***MDL.*** The minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the concentration is greater than zero.
- ***MQL/PQL.*** The lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. It is set at the lowest standard used for the calibration curve.

- ***MRL.*** A threshold value below which the laboratory reports a result as non-detected. Ideally, the MRL will be established anywhere between the MDL and 1/2 the project action levels.

An MDL is the lower limit at which the laboratory can differentiate a measurement from background. The MDL is determined in accordance with the procedures in 40 CFR Part 136. If project action levels are near or below the MDL, it is unlikely the sensitivity of the method will be achievable. A compromise must be reached. The PQL/MQL is the lower limit at which a measurement becomes meaningful. This measurement (the PQL or the RL) is generally a multiple of three to five times the MDL.

Most samples were handled and analyzed as expected without significant changes to the anticipated project MQLs. Thirteen samples had elevated MQLs due to dilutions.

3.3 Holding Times/Preservation

All laboratory results submitted for this investigation have been reviewed with respect to laboratory adherence to extraction and analysis holding times. Maximum sample extraction and analysis hold times were those specified in USACE document EM200-1-3.

All results were acceptable with the following exception(s):

SDG Number	Samples Affected	Analysis	Validation Qualifier
F65480	AP3057	Semivolatiles	UJ
0902003	AP3018, AP3019	Turbidity	J
F65480	AP3057, AP3058, AP3059, AP3061, AP3063, AP3064, AP3065	Turbidity	J/UJ
A9K190539	AP3082(FS)	Nitrate	UJ

4.0 Data Evaluation and Usability

The analytical data review process identified a few analytical nonconformance issues that were noted during this analytical program. These anomalies have been discussed in the previous sections of this appendix. Table 3 summarizes all compounds requiring qualifier application due to anomalies discovered during data validation. Table 4 defines the reason codes for qualification and Table 5 defines the data validation qualifiers.

The following definitions are used for defining precision, accuracy, representativeness, completeness, and comparability as they have been applied to this evaluation.

Precision. Precision is a measurement of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions. Precision data were obtained through the analysis and evaluation of duplicate QA samples. Accuracy was determined through the analysis and evaluation of method blanks, LCSs, trip blanks, equipment rinsates, and MS samples.

Accuracy. Accuracy is a measurement of bias in a system and is expressed as a percent recovery. These QA samples were collected and/or analyzed at the frequency established in the SAP, verifying the completeness element of the DQOs along with the evaluation of holding times and reporting limits. Percent recovery is calculated as follows:

$$Percent\ \mathrm{Recov}ery = \left(\frac{(x-s)}{T}\right) * 100$$

Where:

X = the lab determined concentration of a spiked sample
S = the sample native concentration prior to spike
T = the true concentration of the spike

Relative Percent Difference is calculated as follows:

$$\mathrm{Re}lative\ Percent\ Difference = \left[\frac{|D1 - D2|}{\frac{D1 + D2}{2}}\right] * 100$$

Where:

D1 and D2 = the results of duplicate measurements

Representativeness. Representativeness is a qualitative parameter that expresses the degree to which sample data actually represent the matrix and site conditions. For example, in conducting ground water monitoring, representativeness requires proper location of wells and the collection of samples under consistent, documented procedures. Wells are located based upon the results of the hydrological study in progress and are designed to provide maximum coverage of the flow conditions. Requirements and procedures for sample collection and handling are

designed to maximize sample representativeness. Representativeness also can be monitored by reviewing field documentation and by performing field audits.

The samples were collected using Shaw SOPs and were fully documented through the use of standard Shaw field forms. Samples are representative of the matrix and site sampled.

Completeness. Completeness is a measure of the amount of valid data that are obtained during a sampling event as compared to the amount of data planned to be collected under optimum conditions. Some data for this project were qualified as estimated in the validation process because of the outliers noted in the MS recoveries, duplicate results for certain elements, and various other calibration and column confirmation percent difference results. Completeness is calculated as follows:

$$Completeness\ \% = \left(\frac{D_r}{D_c}\right) X\ 100$$

Where:

D_r = the number of data points for which valid results are reported

D_c = the number of valid samples/data points that are collected and reach the laboratory for analysis.

During this task, 46 regular project samples were collected resulting in approximately 5,945 targeted analytical records. 85 results were rejected. Using the above calculation, 98% completeness was achieved for the task.

Comparability. Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. Comparability ensures that results for the sampling event can be compared with data from other past and/or future sampling programs. Comparability for this sampling event was achieved through the use of established and recognized techniques and accepted standard EPA methods. All samples collected and analyzed were subjected to the same sampling, handling, preparation, analysis, reporting, and validation criteria for the purpose of achieving comparability goals within the data set.

4.1 Statement of Data Usability

The overall results of the analyses, as discussed in this evaluation, suggest that representative samples were collected and analyzed, and the results are indicative of the media analyzed, with the exception of the few anomalies noted. The data do reflect expected site conditions and are usable for their intended purpose.

Tables 1 through 5 summarize the analytical program and the results for the data validation effort for all samples collected by Shaw at PBOW.

TABLES

Table 1

Sample Cross-reference
Former Plum Brook Ordnance Works
Sandusky, Ohio

Sample Type	Sample Location	Sample Number	Sample Date	Sample Purpose	Lot Number	Analytical Laboratory
GW	ASH PIT 2-PZ01	AP3015	02/02/2009	FD	0902003	AML
GW	ASH PIT 2-PZ01	AP3016	02/02/2009	FS	A9B030206	Test America
GW	ASH PIT 2-PZ01	AP3022	02/02/2009	REG	0902003	AML
GW	ASH PIT 2-PZ03	AP3018	01/31/2009	REG	0902003	AML
GW	ASH PIT 2-PZ04	AP3019	02/01/2009	REG	0902003	AML
SS	ASH PIT 2-SB01	AP0100	01/15/2009	REG	0901026	AML
DS	ASH PIT 2-SB01	AP0101	01/15/2009	REG	0901026	AML
DS	ASH PIT 2-SB01	AP0102	01/15/2009	REG	0901026	AML
SS	ASH PIT 2-SB02	AP0103	01/16/2009	REG	0901026	AML
DS	ASH PIT 2-SB02	AP0104	01/16/2009	REG	0901026	AML
DS	ASH PIT 2-SB02	AP0105	01/16/2009	FD	0901026	AML
DS	ASH PIT 2-SB02	AP0106	01/16/2009	FS	A9A170114	Test America
DS	ASH PIT 2-SB02	AP0107	01/16/2009	REG	0901026	AML
SS	ASH PIT 2-SB03	AP0108	01/18/2009	REG	0901027	AML
DS	ASH PIT 2-SB03	AP0109	01/18/2009	REG	0901027	AML
DS	ASH PIT 2-SB03	AP0110	01/18/2009	REG	0901027	AML
SS	ASH PIT 2-SB04	AP0111	01/18/2009	REG	0901027	AML
DS	ASH PIT 2-SB04	AP0112	01/18/2009	REG	0901027	AML
DS	ASH PIT 2-SB04	AP0113	01/19/2009	REG	0901027	AML
SS	ASH PIT 2-SB05	AP0114	01/16/2009	REG	0901026	AML
DS	ASH PIT 2-SB05	AP0115	01/16/2009	REG	0901026	AML
DS	ASH PIT 2-SB05	AP0116	01/16/2009	REG	0901026	AML
SS	ASH PIT 2-SB06	AP0117	01/15/2009	REG	0901026	AML
DS	ASH PIT 2-SB06	AP0118	01/15/2009	REG	0901026	AML
DS	ASH PIT 2-SB06	AP0119	01/15/2009	REG	0901026	AML
SS	ASH PIT 2-SB07	AP0120	01/16/2009	REG	0901026	AML
SS	ASH PIT 2-SB07	AP0121	01/16/2009	FD	0901026	AML
SS	ASH PIT 2-SB07	AP0122	01/16/2009	FS	A9A170114	Test America
DS	ASH PIT 2-SB07	AP0123	01/16/2009	REG	0901026	AML
DS	ASH PIT 2-SB07	AP0124	01/16/2009	REG	0901026	AML
SS	ASH PIT 2-SB08	AP0125	01/16/2009	REG	0901026	AML
DS	ASH PIT 2-SB08	AP0126	01/16/2009	REG	0901026	AML
DS	ASH PIT 2-SB08	AP0127	01/16/2009	REG	0901026	AML
DS	ASH PIT 2-SB08	AP0128	01/16/2009	FD	0901026	AML
DS	ASH PIT 2-SB08	AP0129	01/16/2009	FS	A9A170114	Test America
SD	ASH PIT 2-SD01	AP1000	05/24/2009	REG	F65476	Accutest
SD	ASH PIT 2-SD02	AP1001	05/24/2009	REG	F65476	Accutest
SD	ASH PIT 2-SD03	AP1002	05/24/2009	REG	F65476	Accutest
SD	ASH PIT 2-SD04	AP1003	05/25/2009	REG	F65476	Accutest
SD	ASH PIT 2-SD04	AP1004	05/25/2009	FD	F65476	Accutest
SD	ASH PIT 2-SD04	AP1005	05/25/2009	FS	A9E270266	Test America
SD	ASH PIT 2-SD05	AP1006	05/25/2009	REG	F65476	Accutest
GW	AP2-BEDGW-002	AP3063	05/24/2009	REG	F65480	Accutest
GW	AP2-BEDGW-003	AP3064	05/23/2009	REG	F65480	Accutest
GW	AP2-BEDGW-003	AP3065	05/23/2009	FD	F65480	Accutest
GW	AP2-BEDGW-003	AP3066	05/23/2009	FS	A9E270266	Test America
GW	AP2-MW01	AP3057	05/23/2009	REG	F65480	Accutest
GW	AP2-MW02	AP3058	05/25/2009	REG	F65480	Accutest
GW	AP2-MW02	AP3059	05/25/2009	FD	F65480	Accutest
GW	AP2-MW02	AP3060	05/26/2009	FS	A9E270266	Test America

Table 1

Sample Cross-reference
Former Plum Brook Ordnance Works
Sandusky, Ohio

Sample Type	Sample Location	Sample Number	Sample Date	Sample Purpose	Lot Number	Analytical Laboratory
GW	AP2-MW03	AP3061	05/24/2009	REG	F65480	Accutest
SW	AP2-SW01	AP2000	05/24/2009	REG	F65479	Accutest
SW	AP2-SW02	AP2001	05/24/2009	REG	F65479	Accutest
SW	AP2-SW03	AP2002	05/24/2009	REG	F65479	Accutest
SW	AP2-SW03	AP2003	05/24/2009	FD	F65479	Accutest
SW	AP2-SW03	AP2004	05/24/2009	FS	A9E270266	Test America
SW	AP2-SW04	AP2005	05/25/2009	REG	F65479	Accutest
SW	AP2-SW05	AP2006	05/25/2009	REG	F65479	Accutest
GW	AP2-BEDGW-002	AP3079	11/17/2009	REG	F69607	Accutest
GW	AP2-BEDGW-003	AP3080	11/16/2009	REG	F69607	Accutest
GW	AP2-BEDGW-002	AP3081	11/17/2009	FD	F69607	Accutest
GW	AP2-BEDGW-002	AP3082	11/17/2009	FS	A9K190539	Test America
GW	AP2-MW02	AP3076	11/13/2009	REG	F69502	Accutest
GW	AP2-MW01	AP3070	11/04/2009	REG	F69338	Accutest

Table 2

Summary of Original, Field Duplicate, and Field Split Hits with Realtive Percent Difference Calculations
Former Plum Brook Ordnance Works
Sandusky, Ohio

LOCATION_CODE			ASH PIT 2-SB02			ASH PIT 2-SB02			ASH PIT 2-SB02			Relative	Relative
SAMPLE_NO			AP0104			AP0105			AP0106			Percent	Percent
SAMPLE_DATE			16-Jan-09			16-Jan-09			16-Jan-09			Difference	Difference
SAMPLE_PURPOSE			REG			FD			FS			REG and FD	REG and FS
FK.DEPTH			DS			DS			DS				
Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual		
Aluminum	N	mg/kg	12700		J	8930		J	6930			34.86	58.79
Antimony	N	mg/kg	0.362	J	J	0.287	J	J	ND	U	U	23.11	-
Arsenic	N	mg/kg	15.7		J	8.31		J	4			61.56	118.78
Barium	N	mg/kg	85.3		J	59.4		J	54.4			35.80	44.24
Beryllium	N	mg/kg	9.06		J	6.76		J	ND	U	U	29.08	-
Calcium	N	mg/kg	23300			16100			7170		J	36.55	105.87
Chromium	N	mg/kg	19.8			13.7			10.6			36.42	60.53
Cobalt	N	mg/kg	13.4		J	10.9		J	8.3			20.58	47.00
Copper	N	mg/kg	28.9		J	20.9		J	13.4			32.13	73.29
Iron	N	mg/kg	30500		J	19400		J	13300			44.49	78.54
Lead	N	mg/kg	13.8			11.9			7.5			14.79	59.15
Magnesium	N	mg/kg	8640		J	4940		J	3340			54.49	88.48
Manganese	N	mg/kg	726		J	351		J	320			69.64	77.63
Mercury	N	mg/kg	0.0162	J	J	0.0164	J	J	ND	U	U	1.23	-
Nickel	N	mg/kg	35.6			26.9			18.7			27.84	62.25
Potassium	N	mg/kg	1170			803			1070		J	37.20	8.93
Sodium	N	mg/kg	93.9			64.9		B	ND	U	U	36.52	-
Thallium	N	mg/kg	0.3	J	J	ND	U	U	ND	U	U	-	-
Vanadium	N	mg/kg	26.2			18.1			13			36.57	67.35
Zinc	N	mg/kg	74.6			66.2			43.5			11.93	52.67

Table 2

Summary of Original, Field Duplicate, and Field Split Hits with Realtive Percent Difference Calculations
Former Plum Brook Ordnance Works
Sandusky, Ohio

LOCATION_CODE			ASH PIT 2-SB07			ASH PIT 2-SB07			ASH PIT 2-SB07			Relative	Relative
SAMPLE_NO			AP0120			AP0121			AP0122			Percent	Percent
SAMPLE_DATE			16-Jan-09			16-Jan-09			16-Jan-09			Difference	Difference
SAMPLE_PURPOSE			REG			FD			FS			REG and FD	REG and FS
FK.DEPTH			SS			SS			SS				
Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual		
Aluminum	N	mg/kg	7100		J	8180		J	7200			14.14	1.40
Antimony	N	mg/kg	0.336	J	J	0.291	J	J	ND	U	U	14.35	-
Arsenic	N	mg/kg	6.09			6.04			5.5			0.82	10.18
Barium	N	mg/kg	44.5			56.7			48.6			24.11	8.81
Beryllium	N	mg/kg	6.01			6.41			ND	U	U	6.44	-
Calcium	N	mg/kg	2100			2270			1820		J	7.78	14.29
Chromium	N	mg/kg	10.6			11.8			10.4			10.71	1.90
Cobalt	N	mg/kg	8.14			8.99			7.7			9.92	5.56
Copper	N	mg/kg	18		J	16.5		J	14.6			8.70	20.86
Iron	N	mg/kg	17600		J	19100		J	16600			8.17	5.85
Lead	N	mg/kg	12.5			12.8			9.3			2.37	29.36
Magnesium	N	mg/kg	2100		J	2350		J	1880			11.24	11.06
Manganese	N	mg/kg	198			226			169			13.21	15.80
Mercury	N	mg/kg	0.0203	J	J	0.0193	J	J	ND	U	U	5.05	-
Nickel	N	mg/kg	19.1			20.2			17.9			5.60	6.49
Potassium	N	mg/kg	450			470			703		J	4.35	43.89
Sodium	N	mg/kg	28.4		B	28		B	ND	U	U	1.42	-
Vanadium	N	mg/kg	15.4			17.4			14.1			12.20	8.81
Zinc	N	mg/kg	63.2			27.8			51.4			77.80	20.59

Table 2

Summary of Original, Field Duplicate, and Field Split Hits with Realtive Percent Difference Calculations
Former Plum Brook Ordnance Works
Sandusky, Ohio

LOCATION_CODE			ASH PIT 2-SB08			ASH PIT 2-SB08			ASH PIT 2-SB08			Relative	Relative
SAMPLE_NO			AP0127			AP0128			AP0129			Percent	Percent
SAMPLE_DATE			16-Jan-09			16-Jan-09			16-Jan-09			Difference	Difference
SAMPLE_PURPOSE			REG			FD			FS			REG and FD	REG and FS
FK.DEPTH			DS			DS			DS				
Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual		
Aluminum	N	mg/kg	15100		J	14900		J	12100			1.33	22.06
Antimony	N	mg/kg	ND	U	U	0.248	J	J	ND	U	U	-	-
Arsenic	N	mg/kg	6.16			6.61			7			7.05	12.77
Barium	N	mg/kg	81		J	83.7		J	85			3.28	4.82
Beryllium	N	mg/kg	8.51		J	8.11		J	ND	U	U	4.81	-
Calcium	N	mg/kg	44800			45500			45000	E	J	1.55	0.45
Chromium	N	mg/kg	22.4			21.9			18.5			2.26	19.07
Cobalt	N	mg/kg	15.6		J	14.6		J	12.4			6.62	22.86
Copper	N	mg/kg	31.1		J	30.1		J	23.9			3.27	26.18
Iron	N	mg/kg	26600		J	28500		J	23900			6.90	10.69
Lead	N	mg/kg	11.6			14.1			10.7			19.46	8.07
Magnesium	N	mg/kg	12200		J	11500		J	10100			5.91	18.83
Manganese	N	mg/kg	473			432			363			9.06	26.32
Nickel	N	mg/kg	39.7			38			32.8			4.38	19.03
Potassium	N	mg/kg	1980			1990			2870	E	J	0.50	36.70
Sodium	N	mg/kg	145			134			ND	U	U	7.89	-
Vanadium	N	mg/kg	25.4			24.7			20.5			2.79	21.35
Zinc	N	mg/kg	76.6			73.4			61.3			4.27	22.19

Table 2

Summary of Original, Field Duplicate, and Field Split Hits with Realtive Percent Difference Calculations
Former Plum Brook Ordnance Works
Sandusky, Ohio

LOCATION_CODE			ASH PIT 2-SD04			ASH PIT 2-SD04			ASH PIT 2-SD04			Relative	Relative
SAMPLE_NO			AP1003			AP1004			AP1005			Percent	Percent
SAMPLE_DATE			25-May-09			25-May-09			25-May-09			Difference	Difference
SAMPLE_PURPOSE			REG			FD			FS			REG and FD	REG and FS
FK.DEPTH			0 - _5 Ft			0 - _5 Ft			0 - _5 Ft				
Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual		
Aluminum	N	mg/kg	8000			6840			6780			15.63	16.51
Arsenic	N	mg/kg	9.3			7.8			8.8			17.54	5.52
Barium	N	mg/kg	59.8			50			53			17.85	12.06
Beryllium	N	mg/kg	0.59			0.53			ND	U	U	10.71	-
Cadmium	N	mg/kg	0.6			0.53			ND	U	U	12.39	-
Calcium	N	mg/kg	28700			25200			37600			12.99	26.85
Chromium	N	mg/kg	12.8			10.5			11.6			19.74	9.84
Cobalt	N	mg/kg	14.1			9.8			9.9			35.98	35.00
Copper	N	mg/kg	23.7			20.4			22.8			14.97	3.87
Iron	N	mg/kg	19400			17700			20700			9.16	6.48
Lead	N	mg/kg	15.2		J	9.1		J	11			50.21	32.06
Magnesium	N	mg/kg	6110			6040			8170			1.15	28.85
Manganese	N	mg/kg	668			547			413			19.92	47.18
Mercury	N	mg/kg	0.015	B	J	0.019	B	J	ND	U	U	23.53	-
Nickel	N	mg/kg	27.6			22.6			27.1			19.92	1.83
Potassium	N	mg/kg	1850			1470			1420			22.89	26.30
Selenium	N	mg/kg	0.83	B	J	0.48	B	J	ND	U	U	53.44	-
Sodium	N	mg/kg	170	B	J	157	B	J	ND	U	U	7.95	-
Vanadium	N	mg/kg	14.9			12.5			13.3			17.52	11.35
Zinc	N	mg/kg	59.7			54.9			62.5			8.38	4.58

Table 2

Summary of Original, Field Duplicate, and Field Split Hits with Realtive Percent Difference Calculations
Former Plum Brook Ordnance Works
Sandusky, Ohio

LOCATION_CODE			AP2-SW03			AP2-SW03			AP2-SW03			Relative	Relative
SAMPLE_NO			AP2002			AP2003			AP2004			Percent	Percent
SAMPLE_DATE			24-May-09			24-May-09			24-May-09			Difference	Difference
SAMPLE_PURPOSE			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			REG and FD	REG and FS
FK.DEPTH			REG			FD			FS				
Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual		
Aluminum	N	ug/L	357			377			368			5.45	3.03
Barium	N	ug/L	44.7	B	J	45.3	B	J	ND	U	U	1.33	-
Calcium	N	ug/L	76400			77400			80900			1.30	5.72
Iron	N	ug/L	451			455			546			0.88	19.06
Lead	N	ug/L	2.9	B	J	ND	U	U	ND	U	U	-	-
Magnesium	N	ug/L	20500			20800			22300		J	1.45	8.41
Manganese	N	ug/L	52.6			52.9			53.4			0.57	1.51
Potassium	N	ug/L	3150	B	J	3190	B	J	ND	U	U	1.26	-
Sodium	N	ug/L	32100			32800			40000			2.16	21.91
Vanadium	N	ug/L	1.7	B	J	1.6	B	J	ND	U	U	6.06	-
Zinc	N	ug/L	ND	U	U	8.1	B	J	ND	U	U	-	-
Bis(2-ethylhexyl)phthalate	N	ug/L	ND	U	U	2	J	J	ND	U	U	-	-

Table 2

Summary of Original, Field Duplicate, and Field Split Hits with Realtive Percent Difference Calculations
Former Plum Brook Ordnance Works
Sandusky, Ohio

LOCATION_CODE			AP2-BEDGW-002			AP2-BEDGW-002			AP2-BEDGW-002			Relative	Relative
SAMPLE_NO			AP3079			AP3081			AP3082			Percent	Percent
SAMPLE_DATE			17-Nov-09			17-Nov-09			17-Nov-09			Difference	Difference
SAMPLE_PURPOSE			0 - 0 Ft			0 - 0 Ft			0 - 0 Ft			REG and FD	REG and FS
FK.DEPTH			REG			FD			FS				
Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual		
Acetone	N	ug/L	50.6		J	34.4		J	ND		U	38.12	-
Benzene	N	ug/L	9.4		J	6.2		J	4.1			41.03	78.52
Butanone, 2-	N	ug/L	2.4		J	ND		U	ND		U	-	-
Carbon disulfide	N	ug/L	ND		U	1.2		B	1.3			-	-
Chloroform	N	ug/L	5.6		B	4		B	ND		U	33.33	-
Chloromethane	N	ug/L	7.7		J	3.5		J	ND		U	75.00	-
Cyclohexane	N	ug/L							54			-	200.00
Ethylbenzene	N	ug/L	9.7		J	6.6		J	5			38.04	63.95
Isopropylbenzene	N	ug/L							2.5			-	200.00
Methylcyclohexane	N	ug/L							39			-	200.00
Toluene	N	ug/L	4.8		J	3.3		J	2.3			37.04	70.42
Xylenes, total	N	ug/L	55.7		J	36.8		J	29			40.86	63.05
Methylnaphthalene, 2-	N	ug/L	2.8		J	2.5		J	ND		U	11.32	-
Naphthalene	N	ug/L	1.9		J	1.6		J	ND		U	17.14	-
Aluminum	N	ug/L	46.7		J	45.5		J	ND		U	2.60	-
Barium	N	ug/L	21.1		J	21.3		J	ND		U	0.94	-
Calcium	N	ug/L	392000		J	385000		J	404000			1.80	3.02
Iron	N	ug/L	ND		U	ND		U	194			-	-
Lead	N	ug/L	ND		U	2.4		B	ND		U	-	-
Magnesium	N	ug/L	124000			123000			119000			0.81	4.12
Manganese	N	ug/L	11.1		J	10.7		J	ND		U	3.67	-
Potassium	N	ug/L	10900			11000			7380			0.91	38.51
Selenium	N	ug/L	21.3		J	17.7		J	ND		U	18.46	-
Sodium	N	ug/L	32100		J	32100		J	28500			0.00	11.88
Vanadium	N	ug/L	1.1		J	ND		UJ	ND		U	-	-
Aluminum	Y	ug/L	37.4		B	39.3		B	ND		U	4.95	-
Barium	Y	ug/L	19.8		J	18.8		J	ND		U	5.18	-
Calcium	Y	ug/L	347000		J	335000		J	411000			3.52	16.89
Iron	Y	ug/L	36.1		J	46.5		J	ND		U	25.18	-
Magnesium	Y	ug/L	118000		J	113000		J	121000			4.33	2.51
Manganese	Y	ug/L	9.6		J	9.3		J	ND		U	3.17	-
Potassium	Y	ug/L	11500		J	11000		J	7540			4.44	41.60

Table 2

Summary of Original, Field Duplicate, and Field Split Hits with Realtive Percent Difference Calculations
Former Plum Brook Ordnance Works
Sandusky, Ohio

Selenium	Y	ug/L	74.9	J	14.3	J	ND	U	135.87	-
Sodium	Y	ug/L	33100		31400		29100		5.27	12.86
Vanadium	Y	ug/L	2	J	2.3	J	ND	U	13.95	-
Alkalinity	N	ppm	472	J	492	J	490		4.15	3.74
Chloride	N	ppm	74.2	J	46.9	J	48.8		45.09	41.30
Cyanide, total	N	ppm	ND	UJ	ND	UJ	0.51		-	-
Hardness	N	ppm					1600		-	200.00
HARDNESS (as CaCO3)	N	ppm	1490		1460				2.03	200.00
Nitrate-Nitrite	N	ppm	2	J	0.054	B			189.48	200.00
Sulfate	N	ppm	776	J	1070	J	1080		31.85	32.76
Total dissolved solids	N	ppm	2200	J	2050	J	2000		7.06	9.52
Turbidity	N	NTU	1.7	J	21.4	J	110		170.56	193.91

Table 2

Summary of Original, Field Duplicate, and Field Split Hits with Realtive Percent Difference Calculations
Former Plum Brook Ordnance Works
Sandusky, Ohio

LOCATION_CODE			AP2-MW02		AP2-MW02		AP2-MW02		Relative	Relative
SAMPLE_NO			AP3058		AP3059		AP3060		Percent	Percent
SAMPLE_DATE			25-May-09		25-May-09		26-May-09		Difference	Difference
FK_DEPTH			0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		REG and FD	REG and FS
SAMPLE_PURPOSE			REG		FD		FS			
Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual		
Aluminum	N	ug/L	79.1	J	77.6	J	ND	U	1.91	-
Barium	N	ug/L	25.3	J	24.5	J	ND	U	3.21	-
Cadmium	N	ug/L	1.1	J	1	J	ND	U	9.52	-
Calcium	N	ug/L	102000		102000		94900		0.00	7.21
Cobalt	N	ug/L	7.9	J	8.3	J	ND	U	4.94	-
Magnesium	N	ug/L	11600		11600		10800		0.00	7.14
Manganese	N	ug/L	229		229		212		0.00	7.71
Nickel	N	ug/L	74.2		74.2		68.9		0.00	7.41
Potassium	N	ug/L	7690	J	7410	J	8940		3.71	15.03
Sodium	N	ug/L	2560	J	2460	J	ND	U	3.98	-
Zinc	N	ug/L	42.6		33.9		29.9		22.75	35.03
Aluminum	Y	ug/L	45.4	J	44	J	ND	U	3.13	-
Barium	Y	ug/L	23.9	J	23.6	J	ND	U	1.26	-
Calcium	Y	ug/L	96400		93100		103000		3.48	6.62
Cobalt	Y	ug/L	8.9	J	8.7	J	ND	U	2.27	-
Magnesium	Y	ug/L	11000		10600		11900	J	3.70	7.86
Manganese	Y	ug/L	220		214		218		2.76	0.91
Nickel	Y	ug/L	74.5		72.1		72.6		3.27	2.58
Potassium	Y	ug/L	9090	J	8950	J	9500		1.55	4.41
Sodium	Y	ug/L	3030	J	2930	J	ND	U	3.36	-
Zinc	Y	ug/L	33.6		32.4		31		3.64	8.05
Alkalinity	N	ppm	70.3		73.4		72		4.31	2.39
Chloride	N	ppm	4.1		3.6		12.6		12.99	101.80
Hardness	N	ppm					330		-	200.00
HARDNESS (as CaCO3)	N	ppm	300		302				0.66	200.00
Nitrate-Nitrite	N	ppm	10.9		10.9		8.7		0.00	22.45
Sulfate	N	ppm	165		159		173		3.70	4.73
Total dissolved solids	N	ppm	507	J	508	J	460		0.20	9.72
Total suspended solids	N	ppm	ND	U	4	J	ND	U	-	-

Table 2

Summary of Original, Field Duplicate, and Field Split Hits with Realtive Percent Difference Calculations
Former Plum Brook Ordnance Works
Sandusky, Ohio

LOCATION_CODE			AP2-BEDGW-003		AP2-BEDGW-003		AP2-BEDGW-003		Relative	Relative
SAMPLE_NO			AP3064		AP3065		AP3066		Percent	Percent
SAMPLE_DATE			23-May-09		23-May-09		23-May-09		Difference	Difference
FK_DEPTH			0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		REG and FD	REG and FS
SAMPLE_PURPOSE			REG		FD		FS			
Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual		
Tetryl	N	ug/L	ND	UJ	ND	U	0.41		-	-
Acetone	N	ug/L	25	R	25	R	ND	UJ	0.00	-
Benzene	N	ug/L	94.1		91.3		100		3.02	6.08
Butanone, 2-	N	ug/L	4.3	J	4.9	J	50	R	13.04	168.32
Carbon disulfide	N	ug/L	ND	U	ND	U	5.2		-	-
Cyclohexane	N	ug/L					74		-	200.00
Dibromo-3-chloropropane, 1,2-	N	ug/L					10	R	-	200.00
Ethylbenzene	N	ug/L	17.7		17.2		21		2.87	17.05
Isopropylbenzene	N	ug/L					5.8		-	200.00
Toluene	N	ug/L	41.3		39.6		54		4.20	26.65
Xylenes, total	N	ug/L	193		185		260		4.23	29.58
3-Methylphenol and 4-Methylphenol	N	ug/L	ND	U	ND	U			-	-
Methylnaphthalene, 2-	N	ug/L	1.9	J	1.3	J	ND	U	37.50	-
Naphthalene	N	ug/L	2.9	J	1.9	J	ND	U	41.67	-
Aluminum	N	ug/L	ND	U	17.4	J	ND	U	-	-
Barium	N	ug/L	175	J	184	J	ND	U	5.01	-
Calcium	N	ug/L	266000	J	275000		317000		3.33	17.50
Iron	N	ug/L	ND	U	33	J	ND	U	-	-
Magnesium	N	ug/L	103000	J	110000		120000		6.57	15.25
Manganese	N	ug/L	5.9	J	5.4	J	ND	U	8.85	-
Potassium	N	ug/L	13300		11500	J	11300		14.52	16.26
Selenium	N	ug/L	6.7	B	14.3	B	ND	U	72.38	-
Sodium	N	ug/L	56600	J	58500		63000		3.30	10.70
Vanadium	N	ug/L	1	J	1.3	J	ND	U	26.09	-
Aluminum	Y	ug/L	ND	U	12.4	J	ND	U	-	-
Barium	Y	ug/L	171	J	186	J	ND	U	8.40	-
Calcium	Y	ug/L	257000		281000		323000		8.92	22.76
Magnesium	Y	ug/L	98700	J	108000		123000		9.00	21.92
Manganese	Y	ug/L	5.6	J	6.1	J	ND	U	8.55	-
Potassium	Y	ug/L	13000		13800		11800		5.97	9.68
Selenium	Y	ug/L	8.1	J	8.8	J	ND	U	8.28	-
Sodium	Y	ug/L	55700		58700		65900		5.24	16.78

Table 2

Summary of Original, Field Duplicate, and Field Split Hits with Realtive Percent Difference Calculations
Former Plum Brook Ordnance Works
Sandusky, Ohio

Vanadium	Y	ug/L	1.2	J	1.1	J	ND	U	8.70	-
Alkalinity	N	ppm	649	J	632		590		2.65	9.52
Chloride	N	ppm	111		105		93.6		5.56	17.01
Cyanide, total	N	ppm	ND	UJ	ND	UJ	0.71		-	-
Hardness ('HARDNESS (as CaCO3)	N	ppm	1090		1140		1200		4.48	9.61
Nitrate-Nitrite	N	ppm	0.76	J	ND	U	ND	U	-	-
Sulfate	N	ppm	519		476		626		8.64	18.69
Total dissolved solids	N	ppm	1900	J	1740	J	1500		8.79	23.53
Total suspended solids	N	ppm	ND	U	17		ND	U	-	-
Turbidity	N	NTU	14	J	ND	UJ	94		-	148.15

Table 2

Summary of Original, Field Duplicate, and Field Split Hits with Realtive Percent Difference Calculations
Former Plum Brook Ordnance Works
Sandusky, Ohio

LOCATION_CODE			ASH PIT 2-PZ07		ASH PIT 2-PZ07		ASH PIT 2-PZ07		Relative	Relative
SAMPLE_NO			AP3022		AP3015		AP3016		Percent	Percent
SAMPLE_DATE			2-Feb-09		2-Feb-09		2-Feb-09		Difference	Difference
FK_DEPTH			0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		REG and FD	REG and FS
SAMPLE_PURPOSE			REG		FD		FS			
Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual		
Dimethylphenol, 2,4-	N	ug/L	ND	U	3.38	J	ND	U	-	-
Aluminum	N	ug/L	147	J	93.3	J	ND	U	44.69	-
Barium	N	ug/L	31.9		31.3		ND	U	1.90	-
Cadmium	N	ug/L	3.91	J	4.27	J	ND	U	8.80	-
Calcium	N	ug/L	110000		110000		101000		0.00	8.53
Copper	N	ug/L	ND	U	5.71	J	ND	U	-	-
Iron	N	ug/L	593	J	325	J	191		58.39	102.55
Magnesium	N	ug/L	31900		32200		29200		0.94	8.84
Manganese	N	ug/L	24.5		21.6		20.7		12.58	16.81
Nickel	N	ug/L	ND	U	4	J	ND	U	-	-
Potassium	N	ug/L	548	J	521	J	ND	U	5.05	-
Sodium	N	ug/L	6990		6860		6380		1.88	9.12
Barium	Y	ug/L	28.2		29.3		ND	U	3.83	-
Cadmium	Y	ug/L	3.9	J	3.98	J	ND	U	2.03	-
Calcium	Y	ug/L	103000		108000		103000		4.74	0.00
Magnesium	Y	ug/L	31400		31100		29900		0.96	4.89
Manganese	Y	ug/L	19		17.1		30.7		10.53	47.08
Potassium	Y	ug/L	460	J	445	J	ND	U	3.31	-
Sodium	Y	ug/L	7000		6840		6180		2.31	12.44
Alkalinity	N	ppm	169		222		260		27.11	42.42
Chloride	N	ppm	3.04	J	2.81	J	2.1		7.86	36.58
Cyanide, total	N	ppm					0.044		-	200.00
Hardness	N	ppm	407		408		620		0.25	41.48
Nitrate-Nitrite	N	ppm	0.028	J	ND	UJ			-	200.00
Sulfate	N	ppm	80.6		79.6		177		1.25	74.84
Total dissolved solids	N	ppm	450		442		450		1.79	0.00
Total suspended solids	N	ppm	4		ND	U	ND	U	-	-
Turbidity	N	NTU	4.52		4.93		1.3		8.68	110.65

Table 3

Summary of Data Validation Reason Codes
Former Plum Brook Ordnance Works
Sandusky, Ohio

Reason Code	Description
01	Sample received outside of 4+/-2 degrees Celsius
01A	Improper sample preservation
02	Holding Time Exceeded
02A	Extraction
02B	Analysis
03	Instrument Performance - Outside Criteria
03A	BFB
03B	DFTPP
03C	DDT and/or Endrin % breakdown exceeds criteria
03D	retention time windows
03E	Resolution
04	Initial Calibration results outside specified criteria
04A	Compound mean RRF<0.05
04B	Compound %RSD>30
04C	Correlation Coefficient<0.995
05	Continuing Calibration results outside specified criteria
05A	Compound mean RRF<0.05
05B	Compound %D>25
06	Result qualified as a result of the 5x/10x blank correction
06A	Method or Preparation Blank
06B	ICB or CCB
06C	ER
06D	TB
06E	FB
07	Surrogate Recoveries outside control limits
07A	Sample
07B	Associated method blank or LCS
08	MS/MSD/Duplicate results outside criteria
08A	MS and/or MSD recovery not within control limits (accuracy)
08B	%RPD outside acceptance criteria (precision)
09	Post Digestion Spike outside criteria (GFAA)
10	Internal Standards outside specified control limits
10A	Recovery
10B	Retention Time
11	Laboratory Control Sample recoveries outside specified control limits
11A	Recovery
11B	%RPD (if run in duplicate)
12	Interference Check Standard
13	Serial Dilution
14	Tentatively Identified Compounds
15	Quantitation
16	Multiple results available; alternate analysis preferred
17	Field duplicate RPD criteria exceeded
18	Percent difference between original and second column > 25%
19	Professional judgement was used to qualify the data
20	Pesticide clean-up checks
21	Target compound identification
22	Radiological calibration
23	Radiological quantitation
24	Reported result and/or lab qualifier revised to reflect validation findings
999	See hard copy for details.

Table 3

Summary of Data Validation Reason Codes
Former Plum Brook Ordnance Works
Sandusky, Ohio

Reason Code	Description
01	Sample received outside of 4+/-2 degrees Celsius
01A	Improper sample preservation
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04A	Compound mean RRF<0.05
04B	Compound %RSD>30
04C	Correlation Coefficient<0.995
05	Continuing Calibration results outside specified criteria
05A	Compound mean RRF<0.05
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06	Result qualified as a result of the 5x/10x blank correction
06A	Method or Preparation Blank
06B	ICB or CCB
06C	ER
06D	TB
06E	FB
07	Surrogate Recoveries outside control limits
07A	Sample
07B	Associated method blank or LCS
08	MS/MSD/Duplicate results outside criteria
08A	MS and/or MSD recovery not within control limits (accuracy)
08B	%RPD outside acceptance criteria (precision)
09	Post Digestion Spike outside criteria (GFAA)
10	Internal Standards outside specified control limits
10A	Recovery
10B	Retention Time
11	Laboratory Control Sample recoveries outside specified control limits
11A	Recovery
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14	Tentatively Identified Compounds
15	Quantitation
16	Multiple results available; alternate analysis preferred
17	Field duplicate RPD criteria exceeded
18	Percent difference between original and second column > 25%
19	Professional judgement was used to qualify the data
20	Pesticide clean-up checks
21	Target compound identification
22	Radiological calibration
23	Radiological quantitation
24	Reported result and/or lab qualifier revised to reflect validation findings
999	See hard copy for details.

Table 4

Summary of Data Validation Qualifiers Assigned and Reason Codes for Qualification
Plum Brook Ordnance Works, Sandusky, Ohio

SDG	Sample Number	Analysis	Parameter	Validation Qualifier	Reason Code 1	Reason Code 2	Reason Code 3	Reason Code 4
0901026	AP0100	EXPLOSIVES	1,3-DINITROBENZENE	UJ	08A			
0901026	AP0100	EXPLOSIVES	2,4-DINITROTOLUENE	UJ	08A			
0901026	AP0100	EXPLOSIVES	2-AMINO-4,6-DINITROTOLUENE	UJ	08A			
0901026	AP0100	EXPLOSIVES	3-NITROTOLUENE	UJ	08A			
0901026	AP0100	EXPLOSIVES	4-AMINO-2,6-DINITROTOLUENE	UJ	08A			
0901026	AP0100	METALS	ALUMINUM	J	08A	13		
0901026	AP0100	METALS	BARIUM	J	13			
0901026	AP0100	METALS	CADMIUM	J	15			
0901026	AP0100	METALS	CADMIUM	R	16			
0901026	AP0100	METALS	CALCIUM	J	13			
0901026	AP0100	METALS	COPPER	J	08A			
0901026	AP0100	METALS	IRON	J	08A	13		
0901026	AP0100	METALS	LEAD	R	16			
0901026	AP0100	METALS	MAGNESIUM	J	08A	13		
0901026	AP0100	METALS	MANGANESE	J	13			
0901026	AP0100	METALS	NICKEL	J	13			
0901026	AP0100	METALS	POTASSIUM	J	13			
0901026	AP0100	METALS	SELENIUM	J	15			
0901026	AP0100	METALS	THALLIUM	J	15			
0901026	AP0100	SEMIVOLATILES	BENZO(A)ANTHRACENE	J	15			
0901026	AP0100	SEMIVOLATILES	BENZO(A)PYRENE	J	15			
0901026	AP0100	SEMIVOLATILES	BENZO(B)FLUORANTHENE	J	15			
0901026	AP0100	SEMIVOLATILES	CHRYSENE	J	15			
0901026	AP0100	SEMIVOLATILES	FLUORANTHENE	J	15			
0901026	AP0100	SEMIVOLATILES	HEXACHLOROCYCLOPENTADIENE	UJ	08A	08B		
0901026	AP0100	SEMIVOLATILES	NAPHTHALENE	J	15			
0901026	AP0100	SEMIVOLATILES	PHENANTHRENE	J	15			
0901026	AP0100	SEMIVOLATILES	PYRENE	J	15			
0901026	AP0101	METALS	ALUMINUM	J	08A			
0901026	AP0101	METALS	ANTIMONY	J	15			
0901026	AP0101	METALS	CADMIUM	R	16			
0901026	AP0101	METALS	COPPER	J	08A			
0901026	AP0101	METALS	IRON	J	08A			
0901026	AP0101	METALS	LEAD	R	16			
0901026	AP0101	METALS	MAGNESIUM	J	08A			
0901026	AP0102	METALS	ALUMINUM	J	08A			
0901026	AP0102	METALS	ANTIMONY	J	15			
0901026	AP0102	METALS	CADMIUM	R	16			
0901026	AP0102	METALS	COPPER	J	08A			
0901026	AP0102	METALS	IRON	J	08A			
0901026	AP0102	METALS	LEAD	R	16			
0901026	AP0102	METALS	MAGNESIUM	J	08A			
0901026	AP0102	METALS	MERCURY	J	15			
0901026	AP0102	METALS	THALLIUM	J	15			
0901026	AP0102	SEMIVOLATILES	BENZOIC ACID	UJ	05B			
0901026	AP0102	SEMIVOLATILES	PHENANTHRENE	J	15			
0901026	AP0103	EXPLOSIVES	1,3,5-TRINITROBENZENE	UJ	07A			
0901026	AP0103	EXPLOSIVES	1,3-DINITROBENZENE	UJ	07A			
0901026	AP0103	EXPLOSIVES	1-CHLORO-3-NITROBENZENE	UJ	07A			
0901026	AP0103	EXPLOSIVES	2,4,6-TRINITROTOLUENE	UJ	07A			
0901026	AP0103	EXPLOSIVES	2,4-DINITROTOLUENE	UJ	07A			
0901026	AP0103	EXPLOSIVES	2,6-DINITROTOLUENE	UJ	07A			
0901026	AP0103	EXPLOSIVES	2-AMINO-4,6-DINITROTOLUENE	UJ	07A			
0901026	AP0103	EXPLOSIVES	2-NITROTOLUENE	UJ	07A			
0901026	AP0103	EXPLOSIVES	3-NITROTOLUENE	UJ	07A			
0901026	AP0103	EXPLOSIVES	4-AMINO-2,6-DINITROTOLUENE	UJ	07A			
0901026	AP0103	EXPLOSIVES	4-NITROTOLUENE	UJ	07A			
0901026	AP0103	EXPLOSIVES	HMX	UJ	07A			
0901026	AP0103	EXPLOSIVES	NITROBENZENE	UJ	07A			

Table 4

Summary of Data Validation Qualifiers Assigned and Reason Codes for Qualification
Plum Brook Ordnance Works, Sandusky, Ohio

SDG	Sample Number	Analysis	Parameter	Validation Qualifier	Reason Code 1	Reason Code 2	Reason Code 3	Reason Code 4
0901026	AP0103	EXPLOSIVES	RDX	UJ	07A			
0901026	AP0103	EXPLOSIVES	TETRYL	UJ	07A			
0901026	AP0103	METALS	ALUMINUM	J	08A			
0901026	AP0103	METALS	BARIUM	J	08A			
0901026	AP0103	METALS	BERYLLIUM	J	13			
0901026	AP0103	METALS	CADMIUM	J	15			
0901026	AP0103	METALS	CADMIUM	R	16			
0901026	AP0103	METALS	COBALT	J	08A	08B		
0901026	AP0103	METALS	COPPER	J	08A			
0901026	AP0103	METALS	IRON	J	13			
0901026	AP0103	METALS	LEAD	R	16			
0901026	AP0103	METALS	MAGNESIUM	J	08A			
0901026	AP0103	METALS	THALLIUM	J	15			
0901026	AP0103	PEST/PCB	AROCLOR 1016	J	18			
0901026	AP0103	SEMIVOLATILES	BENZO(A)ANTHRACENE	J	15			
0901026	AP0103	SEMIVOLATILES	CHRYSENE	J	15			
0901026	AP0103	SEMIVOLATILES	FLUORANTHENE	J	15			
0901026	AP0103	SEMIVOLATILES	NAPHTHALENE	J	15			
0901026	AP0103	SEMIVOLATILES	PHENANTHRENE	J	15			
0901026	AP0103	SEMIVOLATILES	PYRENE	J	15			
0901026	AP0104	METALS	ALUMINUM	J	08A			
0901026	AP0104	METALS	ANTIMONY	J	15			
0901026	AP0104	METALS	ARSENIC	J	17			
0901026	AP0104	METALS	BARIUM	J	08A			
0901026	AP0104	METALS	BERYLLIUM	J	13			
0901026	AP0104	METALS	CADMIUM	R	16			
0901026	AP0104	METALS	COBALT	J	08A	08B		
0901026	AP0104	METALS	COPPER	J	08A			
0901026	AP0104	METALS	IRON	J	13			
0901026	AP0104	METALS	LEAD	R	16			
0901026	AP0104	METALS	MAGNESIUM	J	08A	17		
0901026	AP0104	METALS	MANGANESE	J	17			
0901026	AP0104	METALS	MERCURY	J	15			
0901026	AP0104	METALS	THALLIUM	J	15			
0901026	AP0104	SEMIVOLATILES	BENZOIC ACID	UJ	05B			
0901026	AP0105	METALS	ALUMINUM	J	08A			
0901026	AP0105	METALS	ANTIMONY	J	15			
0901026	AP0105	METALS	ARSENIC	J	17			
0901026	AP0105	METALS	BARIUM	J	08A			
0901026	AP0105	METALS	BERYLLIUM	J	13			
0901026	AP0105	METALS	CADMIUM	R	16			
0901026	AP0105	METALS	COBALT	J	08A	08B		
0901026	AP0105	METALS	COPPER	J	08A			
0901026	AP0105	METALS	IRON	J	13			
0901026	AP0105	METALS	LEAD	R	16			
0901026	AP0105	METALS	MAGNESIUM	J	08A	17		
0901026	AP0105	METALS	MANGANESE	J	17			
0901026	AP0105	METALS	MERCURY	J	15			
0901026	AP0105	SEMIVOLATILES	2,4-DINITROPHENOL	UJ	05B			
0901026	AP0107	METALS	ALUMINUM	J	08A			
0901026	AP0107	METALS	BARIUM	J	08A			
0901026	AP0107	METALS	BERYLLIUM	J	13			
0901026	AP0107	METALS	CADMIUM	R	16			
0901026	AP0107	METALS	COBALT	J	08A	08B		
0901026	AP0107	METALS	COPPER	J	08A			
0901026	AP0107	METALS	IRON	J	13			
0901026	AP0107	METALS	LEAD	R	16			
0901026	AP0107	METALS	MAGNESIUM	J	08A			
0901026	AP0107	METALS	THALLIUM	J	15			

Table 4

Summary of Data Validation Qualifiers Assigned and Reason Codes for Qualification
Plum Brook Ordnance Works, Sandusky, Ohio

SDG	Sample Number	Analysis	Parameter	Validation Qualifier	Reason Code 1	Reason Code 2	Reason Code 3	Reason Code 4
0901026	AP0107	SEMIVOLATILES	BENZOIC ACID	UJ	05B			
0901026	AP0107	SEMIVOLATILES	PHENANTHRENE	J	15			
0901026	AP0114	EXPLOSIVES	1,3,5-TRINITROBENZENE	R	07A			
0901026	AP0114	EXPLOSIVES	1,3-DINITROBENZENE	R	07A			
0901026	AP0114	EXPLOSIVES	2,4,6-TRINITROTOLUENE	R	07A			
0901026	AP0114	EXPLOSIVES	2,4-DINITROTOLUENE	R	07A			
0901026	AP0114	EXPLOSIVES	2,6-DINITROTOLUENE	R	07A			
0901026	AP0114	EXPLOSIVES	2-AMINO-4,6-DINITROTOLUENE	R	07A			
0901026	AP0114	EXPLOSIVES	2-NITROTOLUENE	R	07A			
0901026	AP0114	EXPLOSIVES	3-NITROTOLUENE	R	07A			
0901026	AP0114	EXPLOSIVES	4-AMINO-2,6-DINITROTOLUENE	R	07A			
0901026	AP0114	EXPLOSIVES	4-NITROTOLUENE	R	07A			
0901026	AP0114	EXPLOSIVES	HMX	R	07A			
0901026	AP0114	EXPLOSIVES	NITROBENZENE	R	07A			
0901026	AP0114	EXPLOSIVES	RDX	R	07A			
0901026	AP0114	EXPLOSIVES	TETRYL	R	07A			
0901026	AP0114	METALS	ALUMINUM	J	08A			
0901026	AP0114	METALS	BARIUM	J	08A			
0901026	AP0114	METALS	BERYLLIUM	J	13			
0901026	AP0114	METALS	CADMIUM	R	16			
0901026	AP0114	METALS	COBALT	J	08A	08B		
0901026	AP0114	METALS	COPPER	J	08A			
0901026	AP0114	METALS	IRON	J	13			
0901026	AP0114	METALS	LEAD	R	16			
0901026	AP0114	METALS	MAGNESIUM	J	08A			
0901026	AP0114	SEMIVOLATILES	2,4-DINITROPHENOL	UJ	05B			
0901026	AP0114	SEMIVOLATILES	NAPHTHALENE	J	15			
0901026	AP0115	METALS	ALUMINUM	J	08A			
0901026	AP0115	METALS	ANTIMONY	J	15			
0901026	AP0115	METALS	BARIUM	J	08A			
0901026	AP0115	METALS	BERYLLIUM	J	13			
0901026	AP0115	METALS	CADMIUM	R	16			
0901026	AP0115	METALS	COBALT	J	08A	08B		
0901026	AP0115	METALS	COPPER	J	08A			
0901026	AP0115	METALS	IRON	J	13			
0901026	AP0115	METALS	LEAD	R	16			
0901026	AP0115	METALS	MAGNESIUM	J	08A			
0901026	AP0115	METALS	MERCURY	J	15			
0901026	AP0115	SEMIVOLATILES	2,4-DINITROPHENOL	UJ	05B			
0901026	AP0116	METALS	ALUMINUM	J	08A			
0901026	AP0116	METALS	BARIUM	J	08A			
0901026	AP0116	METALS	BERYLLIUM	J	13			
0901026	AP0116	METALS	CADMIUM	J	15			
0901026	AP0116	METALS	CADMIUM	R	16			
0901026	AP0116	METALS	COBALT	J	08A	08B		
0901026	AP0116	METALS	COPPER	J	08A			
0901026	AP0116	METALS	IRON	J	13			
0901026	AP0116	METALS	LEAD	R	16			
0901026	AP0116	METALS	MAGNESIUM	J	08A			
0901026	AP0116	METALS	SELENIUM	J	15			
0901026	AP0116	METALS	THALLIUM	J	15			
0901026	AP0116	SEMIVOLATILES	BENZOIC ACID	UJ	05B			
0901026	AP0116	SEMIVOLATILES	PHENANTHRENE	J	15			
0901026	AP0117	EXPLOSIVES	1,3,5-TRINITROBENZENE	UJ	07A	08A		
0901026	AP0117	EXPLOSIVES	1,3-DINITROBENZENE	UJ	07A	08A		
0901026	AP0117	EXPLOSIVES	1-CHLORO-3-NITROBENZENE	UJ	07A			
0901026	AP0117	EXPLOSIVES	2,4,6-TRINITROTOLUENE	UJ	07A			
0901026	AP0117	EXPLOSIVES	2,4-DINITROTOLUENE	UJ	07A	08A		
0901026	AP0117	EXPLOSIVES	2,6-DINITROTOLUENE	UJ	07A			

Table 4

Summary of Data Validation Qualifiers Assigned and Reason Codes for Qualification
Plum Brook Ordnance Works, Sandusky, Ohio

SDG	Sample Number	Analysis	Parameter	Validation Qualifier	Reason Code 1	Reason Code 2	Reason Code 3	Reason Code 4
0901026	AP0117	EXPLOSIVES	2-AMINO-4,6-DINITROTOLUENE	UJ	07A	08A		
0901026	AP0117	EXPLOSIVES	2-NITROTOLUENE	UJ	07A	08A		
0901026	AP0117	EXPLOSIVES	3-NITROTOLUENE	UJ	07A	08A		
0901026	AP0117	EXPLOSIVES	4-AMINO-2,6-DINITROTOLUENE	UJ	07A	08A		
0901026	AP0117	EXPLOSIVES	4-NITROTOLUENE	UJ	07A	08A		
0901026	AP0117	EXPLOSIVES	HMX	UJ	07A			
0901026	AP0117	EXPLOSIVES	NITROBENZENE	UJ	07A	08A		
0901026	AP0117	EXPLOSIVES	RDX	UJ	07A			
0901026	AP0117	EXPLOSIVES	TETRYL	UJ	07A			
0901026	AP0117	METALS	ALUMINUM	J	08A			
0901026	AP0117	METALS	CADMIUM	J	15			
0901026	AP0117	METALS	CADMIUM	R	16			
0901026	AP0117	METALS	COPPER	J	08A			
0901026	AP0117	METALS	IRON	J	08A			
0901026	AP0117	METALS	LEAD	R	16			
0901026	AP0117	METALS	MAGNESIUM	J	08A			
0901026	AP0117	METALS	SELENIUM	J	15			
0901026	AP0117	METALS	THALLIUM	J	15			
0901026	AP0118	METALS	ALUMINUM	J	08A			
0901026	AP0118	METALS	ANTIMONY	J	15			
0901026	AP0118	METALS	CADMIUM	J	15			
0901026	AP0118	METALS	CADMIUM	R	16			
0901026	AP0118	METALS	COPPER	J	08A			
0901026	AP0118	METALS	IRON	J	08A			
0901026	AP0118	METALS	LEAD	R	16			
0901026	AP0118	METALS	MAGNESIUM	J	08A			
0901026	AP0118	METALS	MERCURY	J	15			
0901026	AP0119	METALS	ALUMINUM	J	08A			
0901026	AP0119	METALS	ANTIMONY	J	15			
0901026	AP0119	METALS	BARIUM	J	08A			
0901026	AP0119	METALS	BERYLLIUM	J	13			
0901026	AP0119	METALS	CADMIUM	R	16			
0901026	AP0119	METALS	COBALT	J	08A	08B		
0901026	AP0119	METALS	COPPER	J	08A			
0901026	AP0119	METALS	IRON	J	13			
0901026	AP0119	METALS	LEAD	R	16			
0901026	AP0119	METALS	MAGNESIUM	J	08A			
0901026	AP0119	METALS	MERCURY	J	15			
0901026	AP0119	METALS	THALLIUM	J	15			
0901026	AP0119	SEMIVOLATILES	BENZOIC ACID	UJ	05B			
0901026	AP0119	SEMIVOLATILES	PHENANTHRENE	J	15			
0901026	AP0120	METALS	ALUMINUM	J	08A			
0901026	AP0120	METALS	ANTIMONY	J	15			
0901026	AP0120	METALS	CADMIUM	R	16			
0901026	AP0120	METALS	COPPER	J	08A			
0901026	AP0120	METALS	IRON	J	08A			
0901026	AP0120	METALS	LEAD	R	16			
0901026	AP0120	METALS	MAGNESIUM	J	08A			
0901026	AP0120	METALS	MERCURY	J	15			
0901026	AP0121	METALS	ALUMINUM	J	08A			
0901026	AP0121	METALS	ANTIMONY	J	15			
0901026	AP0121	METALS	CADMIUM	R	16			
0901026	AP0121	METALS	COPPER	J	08A			
0901026	AP0121	METALS	IRON	J	08A			
0901026	AP0121	METALS	LEAD	R	16			
0901026	AP0121	METALS	MAGNESIUM	J	08A			
0901026	AP0121	METALS	MERCURY	J	15			
0901026	AP0121	SEMIVOLATILES	BENZOIC ACID	UJ	05B			
0901026	AP0123	METALS	ALUMINUM	J	08A			

Table 4

Summary of Data Validation Qualifiers Assigned and Reason Codes for Qualification
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SDG	Sample Number	Analysis	Parameter	Validation Qualifier	Reason Code 1	Reason Code 2	Reason Code 3	Reason Code 4
0901026	AP0123	METALS	ANTIMONY	J	15			
0901026	AP0123	METALS	CADMIUM	R	16			
0901026	AP0123	METALS	COPPER	J	08A			
0901026	AP0123	METALS	IRON	J	08A			
0901026	AP0123	METALS	LEAD	R	16			
0901026	AP0123	METALS	MAGNESIUM	J	08A			
0901026	AP0123	METALS	MERCURY	J	15			
0901026	AP0123	SEMIVOLATILES	BENZOIC ACID	UJ	05B			
0901026	AP0124	METALS	ALUMINUM	J	08A			
0901026	AP0124	METALS	BARIUM	J	08A			
0901026	AP0124	METALS	BERYLLIUM	J	13			
0901026	AP0124	METALS	CADMIUM	R	16			
0901026	AP0124	METALS	COBALT	J	08A	08B		
0901026	AP0124	METALS	COPPER	J	08A			
0901026	AP0124	METALS	IRON	J	13			
0901026	AP0124	METALS	LEAD	R	16			
0901026	AP0124	METALS	MAGNESIUM	J	08A			
0901026	AP0124	METALS	THALLIUM	J	15			
0901026	AP0124	SEMIVOLATILES	BENZOIC ACID	UJ	05B			
0901026	AP0124	SEMIVOLATILES	PHENANTHRENE	J	15			
0901026	AP0125	EXPLOSIVES	1,3,5-TRINITROBENZENE	R	07A			
0901026	AP0125	EXPLOSIVES	1,3-DINITROBENZENE	R	07A			
0901026	AP0125	EXPLOSIVES	2,4,6-TRINITROTOLUENE	R	07A			
0901026	AP0125	EXPLOSIVES	2,4-DINITROTOLUENE	R	07A			
0901026	AP0125	EXPLOSIVES	2,6-DINITROTOLUENE	R	07A			
0901026	AP0125	EXPLOSIVES	2-AMINO-4,6-DINITROTOLUENE	R	07A			
0901026	AP0125	EXPLOSIVES	2-NITROTOLUENE	R	07A			
0901026	AP0125	EXPLOSIVES	3-NITROTOLUENE	R	07A			
0901026	AP0125	EXPLOSIVES	4-AMINO-2,6-DINITROTOLUENE	R	07A			
0901026	AP0125	EXPLOSIVES	4-NITROTOLUENE	R	07A			
0901026	AP0125	EXPLOSIVES	HMX	R	07A			
0901026	AP0125	EXPLOSIVES	NITROBENZENE	R	07A			
0901026	AP0125	EXPLOSIVES	RDX	R	07A			
0901026	AP0125	EXPLOSIVES	TETRYL	R	07A			
0901026	AP0125	METALS	ALUMINUM	J	08A			
0901026	AP0125	METALS	BARIUM	J	08A			
0901026	AP0125	METALS	BERYLLIUM	J	13			
0901026	AP0125	METALS	CADMIUM	R	16			
0901026	AP0125	METALS	COBALT	J	08A	08B		
0901026	AP0125	METALS	COPPER	J	08A			
0901026	AP0125	METALS	IRON	J	13			
0901026	AP0125	METALS	LEAD	R	16			
0901026	AP0125	METALS	MAGNESIUM	J	08A			
0901026	AP0125	METALS	SELENIUM	J	15			
0901026	AP0125	METALS	THALLIUM	J	15			
0901026	AP0125	PEST/PCB	AROCLOR 1016	UJ	07A			
0901026	AP0125	PEST/PCB	AROCLOR 1221	UJ	07A			
0901026	AP0125	PEST/PCB	AROCLOR 1232	UJ	07A			
0901026	AP0125	PEST/PCB	AROCLOR 1242	UJ	07A			
0901026	AP0125	PEST/PCB	AROCLOR 1248	UJ	07A			
0901026	AP0125	PEST/PCB	AROCLOR 1254	UJ	07A			
0901026	AP0125	PEST/PCB	AROCLOR 1260	UJ	07A			
0901026	AP0126	METALS	ALUMINUM	J	08A			
0901026	AP0126	METALS	ANTIMONY	J	15			
0901026	AP0126	METALS	BARIUM	J	08A			
0901026	AP0126	METALS	BERYLLIUM	J	13			
0901026	AP0126	METALS	CADMIUM	R	16			
0901026	AP0126	METALS	COBALT	J	08A	08B		
0901026	AP0126	METALS	COPPER	J	08A			

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SDG	Sample Number	Analysis	Parameter	Validation Qualifier	Reason Code 1	Reason Code 2	Reason Code 3	Reason Code 4
0901026	AP0126	METALS	IRON	J	13			
0901026	AP0126	METALS	LEAD	R	16			
0901026	AP0126	METALS	MAGNESIUM	J	08A			
0901026	AP0126	METALS	MERCURY	J	15			
0901026	AP0127	EXPLOSIVES	1,3,5-TRINITROBENZENE	UJ	08A			
0901026	AP0127	EXPLOSIVES	2,4,6-TRINITROTOLUENE	UJ	08A			
0901026	AP0127	EXPLOSIVES	2,4-DINITROTOLUENE	UJ	08A			
0901026	AP0127	EXPLOSIVES	2-AMINO-4,6-DINITROTOLUENE	UJ	08A			
0901026	AP0127	METALS	ALUMINUM	J	08A			
0901026	AP0127	METALS	BARIUM	J	08A			
0901026	AP0127	METALS	BERYLLIUM	J	13			
0901026	AP0127	METALS	CADMIUM	R	16			
0901026	AP0127	METALS	COBALT	J	08A	08B		
0901026	AP0127	METALS	COPPER	J	08A			
0901026	AP0127	METALS	IRON	J	13			
0901026	AP0127	METALS	LEAD	R	16			
0901026	AP0127	METALS	MAGNESIUM	J	08A			
0901026	AP0127	SEMIVOLATILES	BENZOIC ACID	UJ	05B			
0901026	AP0128	METALS	ALUMINUM	J	08A			
0901026	AP0128	METALS	ANTIMONY	J	15			
0901026	AP0128	METALS	BARIUM	J	08A			
0901026	AP0128	METALS	BERYLLIUM	J	13			
0901026	AP0128	METALS	CADMIUM	R	16			
0901026	AP0128	METALS	COBALT	J	08A	08B		
0901026	AP0128	METALS	COPPER	J	08A			
0901026	AP0128	METALS	IRON	J	13			
0901026	AP0128	METALS	LEAD	R	16			
0901026	AP0128	METALS	MAGNESIUM	J	08A			
0901026	AP0128	SEMIVOLATILES	BENZOIC ACID	UJ	05B			
0901027	AP0108	METALS	ARSENIC	J	08A			
0901027	AP0108	METALS	BARIUM	J	08A	08B	13	
0901027	AP0108	METALS	BERYLLIUM	J	13			
0901027	AP0108	METALS	CADMIUM	R	16			
0901027	AP0108	METALS	CALCIUM	J	13			
0901027	AP0108	METALS	CHROMIUM	J	13			
0901027	AP0108	METALS	COBALT	J	08A	08B	13	
0901027	AP0108	METALS	LEAD	J	13			
0901027	AP0108	METALS	LEAD	R	16			
0901027	AP0108	METALS	MAGNESIUM	J	08A	13		
0901027	AP0108	METALS	NICKEL	J	08A	13		
0901027	AP0108	METALS	SELENIUM	J	08A	15		
0901027	AP0108	METALS	SILVER	UJ	08A	08B		
0901027	AP0108	METALS	THALLIUM	J	15			
0901027	AP0108	METALS	ZINC	J	13			
0901027	AP0108	PEST/PCB	AROCLOR 1260	J	18	15		
0901027	AP0108	SEMIVOLATILES	FLUORANTHENE	J	15			
0901027	AP0108	SEMIVOLATILES	PYRENE	J	15			
0901027	AP0109	METALS	ANTIMONY	J	15			
0901027	AP0109	METALS	ARSENIC	J	08A			
0901027	AP0109	METALS	BARIUM	J	08A	08B	13	
0901027	AP0109	METALS	BERYLLIUM	J	13			
0901027	AP0109	METALS	CADMIUM	R	16			
0901027	AP0109	METALS	CALCIUM	J	13			
0901027	AP0109	METALS	CHROMIUM	J	13			
0901027	AP0109	METALS	COBALT	J	08A	08B	13	
0901027	AP0109	METALS	LEAD	J	13			
0901027	AP0109	METALS	LEAD	R	16			
0901027	AP0109	METALS	MAGNESIUM	J	08A	13		
0901027	AP0109	METALS	MERCURY	J	15			

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SDG	Sample Number	Analysis	Parameter	Validation Qualifier	Reason Code 1	Reason Code 2	Reason Code 3	Reason Code 4
0901027	AP0109	METALS	NICKEL	J	08A	13		
0901027	AP0109	METALS	SELENIUM	UJ	08A			
0901027	AP0109	METALS	SILVER	UJ	08A	08B		
0901027	AP0109	METALS	THALLIUM	J	15			
0901027	AP0109	METALS	ZINC	J	13			
0901027	AP0110	METALS	ANTIMONY	J	15			
0901027	AP0110	METALS	ARSENIC	J	08A			
0901027	AP0110	METALS	BARIUM	J	08A	08B	13	
0901027	AP0110	METALS	BERYLLIUM	J	13			
0901027	AP0110	METALS	CADMIUM	R	16			
0901027	AP0110	METALS	CALCIUM	J	13			
0901027	AP0110	METALS	CHROMIUM	J	13			
0901027	AP0110	METALS	COBALT	J	08A	08B	13	
0901027	AP0110	METALS	LEAD	J	13			
0901027	AP0110	METALS	LEAD	R	16			
0901027	AP0110	METALS	MAGNESIUM	J	08A	13		
0901027	AP0110	METALS	MERCURY	J	15			
0901027	AP0110	METALS	NICKEL	J	08A	13		
0901027	AP0110	METALS	SELENIUM	UJ	08A			
0901027	AP0110	METALS	SILVER	UJ	08A	08B		
0901027	AP0110	METALS	THALLIUM	J	15			
0901027	AP0110	METALS	ZINC	J	13			
0901027	AP0110	SEMIVOLATILES	PHENANTHRENE	J	15			
0901027	AP0111	EXPLOSIVES	1,3,5-TRINITROBENZENE	UJ	07A			
0901027	AP0111	EXPLOSIVES	1,3-DINITROBENZENE	UJ	07A			
0901027	AP0111	EXPLOSIVES	2,4,6-TRINITROTOLUENE	UJ	07A			
0901027	AP0111	EXPLOSIVES	2,4-DINITROTOLUENE	UJ	07A			
0901027	AP0111	EXPLOSIVES	2,6-DINITROTOLUENE	UJ	07A			
0901027	AP0111	EXPLOSIVES	2-AMINO-4,6-DINITROTOLUENE	UJ	07A			
0901027	AP0111	EXPLOSIVES	2-NITROTOLUENE	UJ	07A			
0901027	AP0111	EXPLOSIVES	3-NITROTOLUENE	UJ	07A			
0901027	AP0111	EXPLOSIVES	4-AMINO-2,6-DINITROTOLUENE	UJ	07A			
0901027	AP0111	EXPLOSIVES	4-NITROTOLUENE	UJ	07A			
0901027	AP0111	EXPLOSIVES	HMX	UJ	07A			
0901027	AP0111	EXPLOSIVES	NITROBENZENE	UJ	07A			
0901027	AP0111	EXPLOSIVES	RDX	UJ	07A			
0901027	AP0111	EXPLOSIVES	TETRYL	UJ	07A			
0901027	AP0111	METALS	ARSENIC	J	08A			
0901027	AP0111	METALS	BARIUM	J	08A	08B	13	
0901027	AP0111	METALS	BERYLLIUM	J	13			
0901027	AP0111	METALS	CADMIUM	R	16			
0901027	AP0111	METALS	CALCIUM	J	13			
0901027	AP0111	METALS	CHROMIUM	J	13			
0901027	AP0111	METALS	COBALT	J	08A	08B	13	
0901027	AP0111	METALS	LEAD	J	13			
0901027	AP0111	METALS	LEAD	R	16			
0901027	AP0111	METALS	MAGNESIUM	J	08A	13		
0901027	AP0111	METALS	NICKEL	J	08A	13		
0901027	AP0111	METALS	SELENIUM	J	08A	15		
0901027	AP0111	METALS	SILVER	UJ	08A	08B		
0901027	AP0111	METALS	THALLIUM	J	15			
0901027	AP0111	METALS	ZINC	J	13			
0901027	AP0112	METALS	ANTIMONY	J	15			
0901027	AP0112	METALS	ARSENIC	J	08A			
0901027	AP0112	METALS	BARIUM	J	08A	08B	13	
0901027	AP0112	METALS	BERYLLIUM	J	13			
0901027	AP0112	METALS	CADMIUM	R	16			
0901027	AP0112	METALS	CALCIUM	J	13			
0901027	AP0112	METALS	CHROMIUM	J	13			

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SDG	Sample Number	Analysis	Parameter	Validation Qualifier	Reason Code 1	Reason Code 2	Reason Code 3	Reason Code 4
0901027	AP0112	METALS	COBALT	J	08A	08B	13	
0901027	AP0112	METALS	LEAD	J	13			
0901027	AP0112	METALS	LEAD	R	16			
0901027	AP0112	METALS	MAGNESIUM	J	08A	13		
0901027	AP0112	METALS	NICKEL	J	08A	13		
0901027	AP0112	METALS	SELENIUM	J	08A	15		
0901027	AP0112	METALS	SILVER	UJ	08A	08B		
0901027	AP0112	METALS	ZINC	J	13			
0901027	AP0113	METALS	ANTIMONY	J	15			
0901027	AP0113	METALS	ARSENIC	J	08A			
0901027	AP0113	METALS	BARIUM	J	08A	08B	13	
0901027	AP0113	METALS	BERYLLIUM	J	13			
0901027	AP0113	METALS	CADMIUM	R	16			
0901027	AP0113	METALS	CALCIUM	J	13			
0901027	AP0113	METALS	CHROMIUM	J	13			
0901027	AP0113	METALS	COBALT	J	08A	08B	13	
0901027	AP0113	METALS	LEAD	J	13			
0901027	AP0113	METALS	LEAD	R	16			
0901027	AP0113	METALS	MAGNESIUM	J	08A	13		
0901027	AP0113	METALS	MERCURY	J	15			
0901027	AP0113	METALS	NICKEL	J	08A	13		
0901027	AP0113	METALS	SELENIUM	UJ	08A			
0901027	AP0113	METALS	SILVER	UJ	08A	08B		
0901027	AP0113	METALS	THALLIUM	J	15			
0901027	AP0113	METALS	ZINC	J	13			
0901027	AP0113	SEMIVOLATILES	PHENANTHRENE	J	15			
0902003	AP3015	GEN CHEMISTRY	Chloride	J	08A			
0902003	AP3015	GEN CHEMISTRY	Nitrate/Nitrite as N	UJ	08A			
0902003	AP3015	GEN CHEMISTRY	Sulfate	R	16			
0902003	AP3015	METALS	Aluminum	J	17			
0902003	AP3015	METALS	Cadmium	J	15			
0902003	AP3015	METALS	Copper	J	15			
0902003	AP3015	METALS	Iron	J	17			
0902003	AP3015	METALS	Nickel	J	15			
0902003	AP3015	METALS	Potassium	J	15			
0902003	AP3015	SEMIVOLATILES	2,4-Dimethylphenol	J	15			
0902003	AP3015	SEMIVOLATILES	Hexachlorocyclopentadiene	UJ	05B			
0902003	AP3018	GEN CHEMISTRY	Chloride	J	08A			
0902003	AP3018	GEN CHEMISTRY	Nitrate/Nitrite as N	J	08A			
0902003	AP3018	GEN CHEMISTRY	Sulfate	R	16			
0902003	AP3018	GEN CHEMISTRY	Turbidity	J	02B			
0902003	AP3018	METALS	Cadmium	J	15			
0902003	AP3018	METALS	Copper	J	15			
0902003	AP3018	METALS	Lead	J	15			
0902003	AP3018	METALS	Nickel	J	15			
0902003	AP3018	METALS	Potassium	J	15			
0902003	AP3018	METALS	Selenium	J	15			
0902003	AP3018	SEMIVOLATILES	Hexachlorocyclopentadiene	UJ	05B			
0902003	AP3019	GEN CHEMISTRY	Chloride	J	08A			
0902003	AP3019	GEN CHEMISTRY	Nitrate/Nitrite as N	J	08A			
0902003	AP3019	GEN CHEMISTRY	Sulfate	R	16			
0902003	AP3019	GEN CHEMISTRY	Total Suspended Solids	J	15			
0902003	AP3019	GEN CHEMISTRY	Turbidity	J	02B			
0902003	AP3019	METALS	Aluminum	j	15			
0902003	AP3019	METALS	Cadmium	J	15			
0902003	AP3019	METALS	Copper	J	15			
0902003	AP3019	METALS	Nickel	J	15			
0902003	AP3019	METALS	Potassium	J	15			
0902003	AP3019	SEMIVOLATILES	Hexachlorocyclopentadiene	UJ	05B			

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SDG	Sample Number	Analysis	Parameter	Validation Qualifier	Reason Code 1	Reason Code 2	Reason Code 3	Reason Code 4
0902003	AP3022	GEN CHEMISTRY	Chloride	J	08A			
0902003	AP3022	GEN CHEMISTRY	Nitrate/Nitrite as N	J	08A	15		
0902003	AP3022	GEN CHEMISTRY	Sulfate	R	16			
0902003	AP3022	METALS	Aluminum	J	17			
0902003	AP3022	METALS	Cadmium	J	15			
0902003	AP3022	METALS	Iron	J	17			
0902003	AP3022	METALS	Potassium	J	15			
0902003	AP3022	SEMIVOLATILES	Hexachlorocyclopentadiene	UJ	05B			
A9A17011	AP0106	METALS	CALCIUM	J	13			
A9A17011	AP0106	METALS	POTASSIUM	J	13			
A9A17011	AP0122	METALS	CALCIUM	J	13			
A9A17011	AP0122	METALS	POTASSIUM	J	13			
A9A17011	AP0129	METALS	CALCIUM	J	13			
A9A17011	AP0129	METALS	POTASSIUM	J	13			
A9B03020	AP3016	SEMIVOLATILES	BIS(2-CHLOROETHYL) ETHER	UJ	05B			
A9E27026	AP1005	METALS	ANTIMONY	UJ	08A	08B		
A9E27026	AP2004	METALS	MAGNESIUM	J	05B			
A9E27026	AP3060	METALS	MAGNESIUM	J	05B			
A9E27026	AP3060	VOLATILES	1,2-DIBROMO-3-CHLOROPROPANE	R	04A	05A		
A9E27026	AP3060	VOLATILES	2-BUTANONE	R	04A	05A	05B	
A9E27026	AP3060	VOLATILES	4-METHYL-2-PENTANONE	UJ	05B			
A9E27026	AP3060	VOLATILES	ACETONE	UJ	05B			
A9E27026	AP3060	VOLATILES	CHLOROETHANE	R	04A	05A	05B	
A9E27026	AP3060	VOLATILES	CHLOROMETHANE	UJ	05B			
A9E27026	AP3066	VOLATILES	1,2-DIBROMO-3-CHLOROPROPANE	R	04A	05A		
A9E27026	AP3066	VOLATILES	2-BUTANONE	R	04A	05A	05B	
A9E27026	AP3066	VOLATILES	4-METHYL-2-PENTANONE	UJ	05B			
A9E27026	AP3066	VOLATILES	ACETONE	UJ	05B			
A9E27026	AP3066	VOLATILES	CHLOROETHANE	R	04A	05A	05B	
A9E27026	AP3066	VOLATILES	CHLOROMETHANE	UJ	05B			
A9K19053	AP3082	GEN CHEMISTRY	NITRATE AS N	UJ	02B			
A9K19053	AP3082	VOLATILES	1,2-DIBROMO-3-CHLOROPROPANE	UJ	05B			
A9K19053	AP3082	VOLATILES	BROMOFORM	UJ	05B			
A9K19053	AP3082	VOLATILES	CIS-1,3-DICHLOROPROPENE	UJ	05B			
A9K19053	AP3082	VOLATILES	TRANS-1,3-DICHLOROPROPENE	UJ	05B			
F65476	AP1000	METALS	Cadmium	J	15			
F65476	AP1000	METALS	Potassium	J	15			
F65476	AP1000	METALS	Selenium	J	15			
F65476	AP1000	METALS	Sodium	J	15			
F65476	AP1001	METALS	Mercury	J	08B	15		
F65476	AP1001	METALS	Selenium	J	15			
F65476	AP1001	METALS	Sodium	J	15			
F65476	AP1002	EXPLOSIVES	2,4,6-Trinitrotoluene	J	15			
F65476	AP1002	EXPLOSIVES	2-amino-4,6-Dinitrotoluene	UJ	08A			
F65476	AP1002	METALS	Antimony	UJ	08A			
F65476	AP1002	METALS	Arsenic	J	08B			
F65476	AP1002	METALS	Barium	J	08B	08A		
F65476	AP1002	METALS	Calcium	J	08B	13		
F65476	AP1002	METALS	Chromium	J	13			
F65476	AP1002	METALS	Cobalt	J	13			
F65476	AP1002	METALS	Iron	J	08B	13		
F65476	AP1002	METALS	Lead	J	13	15		
F65476	AP1002	METALS	Magnesium	J	08B	13		
F65476	AP1002	METALS	Manganese	J	08B	13		
F65476	AP1002	METALS	Mercury	J	08B	15		
F65476	AP1002	METALS	Nickel	J	13			
F65476	AP1002	METALS	Potassium	J	08B			
F65476	AP1002	METALS	Selenium	J	15			
F65476	AP1002	METALS	Silver	J	08B	15		

Table 4

Summary of Data Validation Qualifiers Assigned and Reason Codes for Qualification
Plum Brook Ordnance Works, Sandusky, Ohio

SDG	Sample Number	Analysis	Parameter	Validation Qualifier	Reason Code 1	Reason Code 2	Reason Code 3	Reason Code 4
F65476	AP1002	METALS	Sodium	J	08B	15		
F65476	AP1002	METALS	Vanadium	J	13			
F65476	AP1002	METALS	Zinc	J	08A	13		
F65476	AP1002	SEMIVOLATILES	2,4-Dinitrophenol	UJ	05B			
F65476	AP1002	SEMIVOLATILES	Fluoranthene	J	15			
F65476	AP1003	METALS	Lead	J	17			
F65476	AP1003	METALS	Mercury	J	08B	15		
F65476	AP1003	METALS	Selenium	J	15	17		
F65476	AP1003	METALS	Sodium	J	15			
F65476	AP1003	SEMIVOLATILES	2,4-Dinitrophenol	UJ	05B			
F65476	AP1004	METALS	Lead	J	17			
F65476	AP1004	METALS	Mercury	J	08B	15		
F65476	AP1004	METALS	Selenium	J	15	17		
F65476	AP1004	METALS	Sodium	J	15			
F65476	AP1004	SEMIVOLATILES	2,4-Dinitrophenol	UJ	05B			
F65476	AP1006	METALS	Cadmium	J	15			
F65476	AP1006	METALS	Mercury	J	08B	15		
F65476	AP1006	METALS	Potassium	J	15			
F65476	AP1006	METALS	Selenium	J	15			
F65476	AP1006	METALS	Sodium	J	15			
F65476	AP1006	SEMIVOLATILES	2,4-Dinitrophenol	UJ	05B			
F65476	AP1006	SEMIVOLATILES	Fluoranthene	J	15			
F65479	AP2000	METALS	Barium	J	15			
F65479	AP2000	METALS	Potassium	J	15			
F65479	AP2000	METALS	Vanadium	J	15			
F65479	AP2000	METALS	Zinc	J	15			
F65479	AP2001	METALS	Barium	J	15			
F65479	AP2001	METALS	Potassium	J	15			
F65479	AP2001	METALS	Vanadium	J	15			
F65479	AP2001	METALS	Zinc	J	15			
F65479	AP2002	METALS	Barium	J	15			
F65479	AP2002	METALS	Lead	J	15			
F65479	AP2002	METALS	Potassium	J	15			
F65479	AP2002	METALS	Vanadium	J	15			
F65479	AP2003	METALS	Barium	J	15			
F65479	AP2003	METALS	Potassium	J	15			
F65479	AP2003	METALS	Vanadium	J	15			
F65479	AP2003	METALS	Zinc	J	15			
F65479	AP2003	SEMIVOLATILES	bis(2-Ethylhexyl)phthalate	J	15			
F65479	AP2005	EXPLOSIVES	4-amino-2,6-Dinitrotoluene	UJ	08A			
F65479	AP2005	METALS	Aluminum	J	08B	13		
F65479	AP2005	METALS	Barium	J	15			
F65479	AP2005	METALS	Cobalt	J	08B	15		
F65479	AP2005	METALS	Lead	J	15			
F65479	AP2005	METALS	Nickel	J	15			
F65479	AP2005	METALS	Potassium	J	15			
F65479	AP2005	METALS	Vanadium	J	08B	15		
F65479	AP2005	METALS	Zinc	J	15			
F65480	AP3057	GEN CHEMISTRY	Cyanide, Total	UJ	08A			
F65480	AP3057	GEN CHEMISTRY	Nitrogen, Nitrate + Nitrite	J	15			
F65480	AP3057	GEN CHEMISTRY	Solids, Total Dissolved	J	08B			
F65480	AP3057	GEN CHEMISTRY	Turbidity	UJ	02B			
F65480	AP3057	METALS	Aluminum	J	15			
F65480	AP3057	METALS	Barium	J	15			
F65480	AP3057	METALS	Iron	J	15			
F65480	AP3057	METALS	Lead	B	06C	15		
F65480	AP3057	METALS	Lead	J	15			
F65480	AP3057	METALS	Potassium	J	15			
F65480	AP3057	METALS	Selenium	J	15			

Table 4

Summary of Data Validation Qualifiers Assigned and Reason Codes for Qualification
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SDG	Sample Number	Analysis	Parameter	Validation Qualifier	Reason Code 1	Reason Code 2	Reason Code 3	Reason Code 4
F65480	AP3057	METALS	Sodium	J	15			
F65480	AP3057	METALS	Vanadium	J	15			
F65480	AP3057	SEMIVOLATILES	1,2,4-Trichlorobenzene	UJ	02A			
F65480	AP3057	SEMIVOLATILES	1,2-Dichlorobenzene	UJ	02A			
F65480	AP3057	SEMIVOLATILES	1,3-Dichlorobenzene	UJ	02A			
F65480	AP3057	SEMIVOLATILES	1,4-Dichlorobenzene	UJ	02A			
F65480	AP3057	SEMIVOLATILES	2,4,5-Trichlorophenol	UJ	02A			
F65480	AP3057	SEMIVOLATILES	2,4,6-Tribromophenol	UJ	02A			
F65480	AP3057	SEMIVOLATILES	2,4,6-Trichlorophenol	UJ	02A			
F65480	AP3057	SEMIVOLATILES	2,4-Dichlorophenol	UJ	02A			
F65480	AP3057	SEMIVOLATILES	2,4-Dimethylphenol	UJ	02A			
F65480	AP3057	SEMIVOLATILES	2,4-Dinitrophenol	UJ	02A			
F65480	AP3057	SEMIVOLATILES	2,4-Dinitrotoluene	UJ	02A			
F65480	AP3057	SEMIVOLATILES	2,6-Dinitrotoluene	UJ	02A			
F65480	AP3057	SEMIVOLATILES	2-Chloronaphthalene	UJ	02A			
F65480	AP3057	SEMIVOLATILES	2-Chlorophenol	UJ	02A			
F65480	AP3057	SEMIVOLATILES	2-Fluorobiphenyl	UJ	02A			
F65480	AP3057	SEMIVOLATILES	2-Fluorophenol	UJ	02A			
F65480	AP3057	SEMIVOLATILES	2-Methylnaphthalene	UJ	02A			
F65480	AP3057	SEMIVOLATILES	2-Methylphenol	UJ	02A			
F65480	AP3057	SEMIVOLATILES	2-Nitroaniline	UJ	02A			
F65480	AP3057	SEMIVOLATILES	2-Nitrophenol	UJ	02A			
F65480	AP3057	SEMIVOLATILES	3 and 4-Methylphenol	UJ	02A			
F65480	AP3057	SEMIVOLATILES	3,3'-Dichlorobenzidine	UJ	02A			
F65480	AP3057	SEMIVOLATILES	3-Nitroaniline	UJ	02A			
F65480	AP3057	SEMIVOLATILES	4,6-Dinitro-o-cresol	UJ	02A			
F65480	AP3057	SEMIVOLATILES	4-Bromophenyl phenyl ether	UJ	02A			
F65480	AP3057	SEMIVOLATILES	4-Chloro-3-methyl phenol	UJ	02A			
F65480	AP3057	SEMIVOLATILES	4-Chloroaniline	UJ	02A			
F65480	AP3057	SEMIVOLATILES	4-Chlorophenyl phenyl ether	UJ	02A			
F65480	AP3057	SEMIVOLATILES	4-Nitroaniline	UJ	02A			
F65480	AP3057	SEMIVOLATILES	4-Nitrophenol	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Acenaphthene	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Acenaphthylene	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Anthracene	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Benzo(a)anthracene	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Benzo(a)pyrene	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Benzo(b)fluoranthene	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Benzo(g,h,i)perylene	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Benzo(k)fluoranthene	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Benzoic Acid	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Benzyl Alcohol	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Butyl benzyl phthalate	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Carbazole	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Chrysene	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Di-n-butyl phthalate	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Di-n-octyl phthalate	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Dibenzo(a,h)anthracene	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Dibenzofuran	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Diethyl phthalate	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Dimethyl phthalate	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Fluoranthene	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Fluorene	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Hexachlorobenzene	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Hexachlorobutadiene	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Hexachlorocyclopentadiene	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Hexachloroethane	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Indeno(1,2,3-cd)pyrene	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Isophorone	UJ	02A			

Table 4

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SDG	Sample Number	Analysis	Parameter	Validation Qualifier	Reason Code 1	Reason Code 2	Reason Code 3	Reason Code 4
F65480	AP3057	SEMIVOLATILES	N-Nitroso-di-n-propylamine	UJ	02A			
F65480	AP3057	SEMIVOLATILES	N-Nitrosodiphenylamine	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Naphthalene	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Nitrobenzene	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Nitrobenzene-d5	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Pentachlorophenol	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Phenanthrene	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Phenol	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Phenol-d5	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Pyrene	UJ	02A			
F65480	AP3057	SEMIVOLATILES	Terphenyl-d14	UJ	02A			
F65480	AP3057	SEMIVOLATILES	bis(2-Chloroethoxy)methane	UJ	02A			
F65480	AP3057	SEMIVOLATILES	bis(2-Chloroethyl)ether	UJ	02A			
F65480	AP3057	SEMIVOLATILES	bis(2-Chloroisopropyl)ether	UJ	02A			
F65480	AP3057	SEMIVOLATILES	bis(2-Ethylhexyl)phthalate	UJ	02A			
F65480	AP3057	VOLATILES	Acetone	R	04A	05A		
F65480	AP3058	GEN CHEMISTRY	Cyanide, Total	UJ	08A			
F65480	AP3058	GEN CHEMISTRY	Solids, Total Dissolved	J	08B			
F65480	AP3058	GEN CHEMISTRY	Turbidity	UJ	02B			
F65480	AP3058	METALS	Aluminum	J	15			
F65480	AP3058	METALS	Barium	J	15			
F65480	AP3058	METALS	Cadmium	J	15			
F65480	AP3058	METALS	Cobalt	J	15			
F65480	AP3058	METALS	Potassium	J	15			
F65480	AP3058	METALS	Sodium	J	15			
F65480	AP3058	VOLATILES	Acetone	R	04A	05A		
F65480	AP3059	GEN CHEMISTRY	Cyanide, Total	UJ	08A			
F65480	AP3059	GEN CHEMISTRY	Solids, Total Dissolved	J	08B			
F65480	AP3059	GEN CHEMISTRY	Solids, Total Suspended	J	15			
F65480	AP3059	GEN CHEMISTRY	Turbidity	UJ	02B			
F65480	AP3059	METALS	Aluminum	J	15			
F65480	AP3059	METALS	Barium	J	15			
F65480	AP3059	METALS	Cadmium	J	15			
F65480	AP3059	METALS	Cobalt	J	15			
F65480	AP3059	METALS	Potassium	J	15			
F65480	AP3059	METALS	Sodium	J	15			
F65480	AP3059	VOLATILES	Acetone	R	04A	05A		
F65480	AP3061	GEN CHEMISTRY	Cyanide, Total	UJ	08A			
F65480	AP3061	GEN CHEMISTRY	Solids, Total Dissolved	J	08B			
F65480	AP3061	GEN CHEMISTRY	Turbidity	J	02B	15		
F65480	AP3061	METALS	Aluminum	J	15			
F65480	AP3061	METALS	Barium	J	15			
F65480	AP3061	METALS	Iron	J	15			
F65480	AP3061	METALS	Potassium	J	15			
F65480	AP3061	METALS	Selenium	B	06C	15		
F65480	AP3061	METALS	Sodium	J	15			
F65480	AP3061	METALS	Vanadium	J	15			
F65480	AP3061	VOLATILES	Acetone	R	04A	05A		
F65480	AP3063	GEN CHEMISTRY	Cyanide, Total	J	08A	15		
F65480	AP3063	GEN CHEMISTRY	Solids, Total Dissolved	J	08B			
F65480	AP3063	GEN CHEMISTRY	Turbidity	J	02B			
F65480	AP3063	METALS	Aluminum	J	15			
F65480	AP3063	METALS	Barium	J	15			
F65480	AP3063	METALS	Iron	J	15			
F65480	AP3063	METALS	Lead	B	06C	15		
F65480	AP3063	METALS	Potassium	J	15			
F65480	AP3063	METALS	Vanadium	J	15			
F65480	AP3063	SEMIVOLATILES	2-Methylnaphthalene	J	15			
F65480	AP3063	SEMIVOLATILES	Naphthalene	J	15			

Table 4

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SDG	Sample Number	Analysis	Parameter	Validation Qualifier	Reason Code 1	Reason Code 2	Reason Code 3	Reason Code 4
F65480	AP3063	VOLATILES	Acetone	R	04A	05A		
F65480	AP3064	EXPLOSIVES	1,3,5-Trinitrobenzene	UJ	08A			
F65480	AP3064	EXPLOSIVES	2,4,6-Trinitrotoluene	UJ	08A			
F65480	AP3064	EXPLOSIVES	Tetryl	UJ	08A			
F65480	AP3064	GEN CHEMISTRY	Alkalinity, Total as CaCO3	J	08A			
F65480	AP3064	GEN CHEMISTRY	Cyanide, Total	UJ	08A			
F65480	AP3064	GEN CHEMISTRY	Nitrogen, Nitrate + Nitrite	J	15			
F65480	AP3064	GEN CHEMISTRY	Solids, Total Dissolved	J	08B			
F65480	AP3064	GEN CHEMISTRY	Turbidity	J	02B			
F65480	AP3064	METALS	Barium	J	15			
F65480	AP3064	METALS	Calcium	J	13			
F65480	AP3064	METALS	Magnesium	J	08A			
F65480	AP3064	METALS	Magnesium	J	13			
F65480	AP3064	METALS	Manganese	J	15			
F65480	AP3064	METALS	Selenium	B	06C	08A	08B	17
F65480	AP3064	METALS	Selenium	J	08A	08B	15	
F65480	AP3064	METALS	Sodium	J	13			
F65480	AP3064	METALS	Vanadium	J	15			
F65480	AP3064	SEMIVOLATILES	2-Methylnaphthalene	J	15	17		
F65480	AP3064	SEMIVOLATILES	Naphthalene	J	17	15		
F65480	AP3064	VOLATILES	Acetone	R	04A	05A		
F65480	AP3064	VOLATILES	Methyl ethyl ketone	J	15			
F65480	AP3064	VOLATILES	cis-1,3-Dichloropropene	UJ	08A			
F65480	AP3064	VOLATILES	trans-1,3-Dichloropropene	UJ	08A			
F65480	AP3065	GEN CHEMISTRY	Cyanide, Total	UJ	08A			
F65480	AP3065	GEN CHEMISTRY	Solids, Total Dissolved	J	08B			
F65480	AP3065	GEN CHEMISTRY	Turbidity	UJ	02B			
F65480	AP3065	METALS	Aluminum	J	15			
F65480	AP3065	METALS	Barium	J	15			
F65480	AP3065	METALS	Iron	J	15			
F65480	AP3065	METALS	Manganese	J	15			
F65480	AP3065	METALS	Potassium	J	15			
F65480	AP3065	METALS	Selenium	B	06C	17		
F65480	AP3065	METALS	Selenium	J	15			
F65480	AP3065	METALS	Vanadium	J	15			
F65480	AP3065	SEMIVOLATILES	2-Methylnaphthalene	J	15	17		
F65480	AP3065	SEMIVOLATILES	Naphthalene	J	15	17		
F65480	AP3065	VOLATILES	Acetone	R	04A	05A		
F65480	AP3065	VOLATILES	Methyl ethyl ketone	J	15			
F69607	AP3079	EXPLOSIVES	Tetryl	R	08A			
F69607	AP3079	GEN CHEMISTRY	Alkalinity, Total as CaCO3	J	08A			
F69607	AP3079	GEN CHEMISTRY	Chloride	J	17			
F69607	AP3079	GEN CHEMISTRY	Cyanide, Total	UJ	08A			
F69607	AP3079	GEN CHEMISTRY	Nitrogen, Nitrate + Nitrite	J	17			
F69607	AP3079	GEN CHEMISTRY	Solids, Total Dissolved	J	08B			
F69607	AP3079	GEN CHEMISTRY	Solids, Total Suspended	UJ	08B			
F69607	AP3079	GEN CHEMISTRY	Sulfate	J	17			
F69607	AP3079	GEN CHEMISTRY	Turbidity	J	17			
F69607	AP3079	METALS	Aluminum	B	06C	15		
F69607	AP3079	METALS	Aluminum	J	15			
F69607	AP3079	METALS	Barium	J	15			
F69607	AP3079	METALS	Calcium	J	12	13		
F69607	AP3079	METALS	Calcium	J	13			
F69607	AP3079	METALS	Iron	J	15			
F69607	AP3079	METALS	Magnesium	J	13			
F69607	AP3079	METALS	Manganese	J	15			
F69607	AP3079	METALS	Potassium	J	13			
F69607	AP3079	METALS	Selenium	J	08A	08B	17	
F69607	AP3079	METALS	Selenium	J	08A	08B		

Table 4

Summary of Data Validation Qualifiers Assigned and Reason Codes for Qualification
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SDG	Sample Number	Analysis	Parameter	Validation Qualifier	Reason Code 1	Reason Code 2	Reason Code 3	Reason Code 4
F69607	AP3079	METALS	Sodium	J	13			
F69607	AP3079	METALS	Vanadium	J	08B	15		
F69607	AP3079	METALS	Vanadium	J	15			
F69607	AP3079	SEMIVOLATILES	2-Methylnaphthalene	J	15			
F69607	AP3079	SEMIVOLATILES	Naphthalene	J	15			
F69607	AP3079	VOLATILES	Acetone	J	17			
F69607	AP3079	VOLATILES	Benzene	J	17			
F69607	AP3079	VOLATILES	Chloroform	B	06C		17	
F69607	AP3079	VOLATILES	Ethylbenzene	J	17			
F69607	AP3079	VOLATILES	Methyl bromide	UJ	08A			
F69607	AP3079	VOLATILES	Methyl chloride	J	08A	17	15	
F69607	AP3079	VOLATILES	Methyl ethyl ketone	J	15			
F69607	AP3079	VOLATILES	Toluene	J	17			
F69607	AP3079	VOLATILES	Vinyl chloride	UJ	08A			
F69607	AP3079	VOLATILES	Xylene (total)	J	17			
F69607	AP3079	VOLATILES	trans-1,3-Dichloropropene	UJ	08A			
F69607	AP3080	GEN CHEMISTRY	Alkalinity, Total as CaCO3	J	08A			
F69607	AP3080	GEN CHEMISTRY	Cyanide, Total	UJ	08A			
F69607	AP3080	GEN CHEMISTRY	Nitrogen, Nitrate + Nitrite	B	06C	15		
F69607	AP3080	GEN CHEMISTRY	Solids, Total Dissolved	J	08B			
F69607	AP3080	GEN CHEMISTRY	Solids, Total Suspended	UJ	08B			
F69607	AP3080	METALS	Aluminum	B	06C	15		
F69607	AP3080	METALS	Aluminum	J	15			
F69607	AP3080	METALS	Barium	J	15			
F69607	AP3080	METALS	Calcium	J	12	13		
F69607	AP3080	METALS	Calcium	J	13			
F69607	AP3080	METALS	Iron	J	15			
F69607	AP3080	METALS	Magnesium	J	13			
F69607	AP3080	METALS	Manganese	J	15			
F69607	AP3080	METALS	Potassium	J	13			
F69607	AP3080	METALS	Selenium	J	08A	08B		
F69607	AP3080	METALS	Sodium	J	13			
F69607	AP3080	METALS	Vanadium	J	15			
F69607	AP3080	METALS	Vanadium	UJ	08B			
F69607	AP3080	SEMIVOLATILES	2,4-Dimethylphenol	J	15			
F69607	AP3080	VOLATILES	Acetone	J	15			
F69607	AP3080	VOLATILES	Carbon disulfide	J	15			
F69607	AP3080	VOLATILES	Chloroform	B	06C			
F69607	AP3080	VOLATILES	Methyl chloride	J	15			
F69607	AP3080	VOLATILES	Methylene chloride	B	06D	15		
F69607	AP3080	VOLATILES	trans-1,3-Dichloropropene	J	15			
F69607	AP3081	GEN CHEMISTRY	Alkalinity, Total as CaCO3	J	08A			
F69607	AP3081	GEN CHEMISTRY	Chloride	J	17			
F69607	AP3081	GEN CHEMISTRY	Cyanide, Total	UJ	08A			
F69607	AP3081	GEN CHEMISTRY	Nitrogen, Nitrate + Nitrite	B	06C	17	15	
F69607	AP3081	GEN CHEMISTRY	Solids, Total Dissolved	J	08B			
F69607	AP3081	GEN CHEMISTRY	Solids, Total Suspended	UJ	08B			
F69607	AP3081	GEN CHEMISTRY	Sulfate	J	17			
F69607	AP3081	GEN CHEMISTRY	Turbidity	J	17			
F69607	AP3081	METALS	Aluminum	B	06C	15		
F69607	AP3081	METALS	Aluminum	J	15			
F69607	AP3081	METALS	Barium	J	15			
F69607	AP3081	METALS	Calcium	J	12	13		
F69607	AP3081	METALS	Calcium	J	13			
F69607	AP3081	METALS	Iron	J	15			
F69607	AP3081	METALS	Lead	B	06C	15		
F69607	AP3081	METALS	Magnesium	J	13			
F69607	AP3081	METALS	Manganese	J	15			
F69607	AP3081	METALS	Potassium	J	13			

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SDG	Sample Number	Analysis	Parameter	Validation Qualifier	Reason Code 1	Reason Code 2	Reason Code 3	Reason Code 4
F69607	AP3081	METALS	Selenium	J	08A	08B	17	
F69607	AP3081	METALS	Selenium	J	08A	08B		
F69607	AP3081	METALS	Sodium	J	13			
F69607	AP3081	METALS	Vanadium	J	15			
F69607	AP3081	METALS	Vanadium	UJ	08B			
F69607	AP3081	SEMIVOLATILES	2-Methylnaphthalene	J	15			
F69607	AP3081	SEMIVOLATILES	Naphthalene	J	15			
F69607	AP3081	VOLATILES	Acetone	J	17			
F69607	AP3081	VOLATILES	Benzene	J	17			
F69607	AP3081	VOLATILES	Carbon disulfide	B	06C	15		
F69607	AP3081	VOLATILES	Chloroform	B	06C	17		
F69607	AP3081	VOLATILES	Ethylbenzene	J	17			
F69607	AP3081	VOLATILES	Methyl chloride	J	17	15		
F69607	AP3081	VOLATILES	Toluene	J	17			
F69607	AP3081	VOLATILES	Xylene (total)	J	17			

Table 5

Laboratory and Validation Qualifier Definitions
Former Plum Brook Ordnance Works
Sandusky, Ohio

Qualifier	Definition
Laboratory	
B (metals)	The analyte was detected; the concentration is below the reporting limit.
B (organics)	Indicates analyte is found in associated method blank.
J (metals)	The compound was detected in the blank.
J (organics)	The compound was positively identified; the reported value is below the reporting limit.
U	Not detected. The compound was analyzed for, but not detected above the associated reporting limit.
E	Indicates that the result is above the maximum calibration range.
N	Indicates presumptive evidence of a compound.
P	RPD > 40% between the primary and confirmation column results for dual column chromatographic method (e.g. GC and HPLC methods).
*	Exceeds QC limit.
Q1	The %D or %Drift for the associated CCV is outside the method QC limit.
ME	Marginal Exceedence of the 3-sigma QC limits.
ME*	Exceedence of the 4-sigma QC limits.
Validation	
B	The compound/analyte was detected in a lab or field blank.
J	The compound/analyte was positively identified; the reported value is an estimated concentration.
U	Not detected. The compound/analyte was analyzed for, but not detected above the associated reporting limit.
UJ	The analyte is not detected; the result is an estimated value.
R	Analyte is rejected.

APPENDIX K

CHAINS-OF-CUSTODY

0901026

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB01 16 09AML

PAGE 1 OF 5

Project Name No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132458
Required Report Date: 21 DAYS

Sample Shipment Date: 1-16-09
Laboratory Destination: AML Scientific, LLC
Laboratory Contact: Melania Harris
Project Contact Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 84 22553585 74

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
0901026-01	SL0075	SOIL	1-14-09/1035	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0901026-02	SL0076	SOIL	1-14-09/1035	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0901026-03	SL0078	SOIL	1-14-09/1040	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0901026-04	SL0079	SOIL	1-14-09/1140	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0901026-05	SL0080	SOIL	1-14-09/1145	Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: E. W. Weaver Shaw E&I	Date: 1-16-09 Time: 1330	1. Received by: [signature]	Date: 1/19/09 Time: 0800am.
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB01 16 09AML

PAGE 2 OF 5

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133422
Required Report Date: 21 DAYS

Sample Shipment Date: 1-16-09
Laboratory Destination: AML Scientific, LLC
Laboratory Contact: Melania Harris
Project Contact Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

	Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
0901026-06	AP0100	SOIL	1-15-09/830	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0901026-06	AP0100 MS	SOIL	1-15-09/830	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0901026-06	AP0100 MSD	SOIL	1-15-09/830	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0901026-07	AP0101	SOIL	1-15-09/835	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0901026-08	AP0117	SOIL	1-15-09/920	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0901026-09	AP0118	SOIL	1-15-09/923	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0901026-10	AP0120	SOIL	1-16-09/1000	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0901026-11	AP0121	SOIL	1-16-09/1000	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0901026-12	AP0123	SOIL	1-16-09/1003	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		

Special Instructions:

Possible Hazard Identification:
Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: X

Sample Disposal:
Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:
Normal: X Rush: ____

Level of QC Required:
Definitive: X

Project Specific: ____

1. Relinquished by: E. W. Weaver Shaw E&I — Date: 1-16-09 Time: 1730
2. Relinquished by: — Date: ____ Time: ____
3. Relinquished by: — Date: ____ Time: ____

1. Received by: [signature] — Date: 1/19/09 Time: 0800am
2. Received by: — Date: ____ Time: ____
2. Received by: — Date: ____ Time: ____

Comments:

9-10

Shaw
Shaw E & I, Inc.

0901026

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB01 16 09AML

PAGE 3 OF 5

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133422
Required Report Date: 21 DAYS

Sample Shipment Date: 1-16-09
Laboratory Destination: AML Scientific, LLC
Laboratory Contact: Melania Harris
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

	Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
0901026-13	AP0102	SOIL	1-15-09/840	Wide Mouth Glass Jar	9 ~~X~~ oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
0901026-14	AP0119	SOIL	1-15-09/930	Wide Mouth Glass Jar	9 ~~X~~ oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
0901026-15	AP0124	SOIL	1-16-09/1005	Wide Mouth Glass Jar	9 ~~X~~ oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
0901026-16	AP0107	SOIL	1-16-09/1200	Wide Mouth Glass Jar	9 ~~X~~ oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
0901026-17	AP0116	SOIL	1-16-09/1235	Wide Mouth Glass Jar	9 ~~X~~ oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
0901026-18	AP0128	SOIL	1-16-09/1320	Wide Mouth Glass Jar	9 ~~X~~ oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
0901026-19	AP0127	SOIL	1-16-09/1320	Wide Mouth Glass Jar	9 ~~X~~ oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: Eddie W. Weaver Shaw E&I — Date: 1-16-09 Time: 1730
1. Received by: [signature] — Date: 1/19/09 Time: 0800am
2. Relinquished by: ___ Date: ___ Time: ___
2. Received by: ___ Date: ___ Time: ___
3. Relinquished by: ___ Date: ___ Time: ___
2. Received by: ___ Date: ___ Time: ___

Comments:

0901026

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB01 16 09AML

PAGE 4 OF 5

Project Name No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133422
Required Report Date: 21 DAYS

Sample Shipment Date: 1-16-09
Laboratory Destination: AML Scientific, LLC
Laboratory Contact: Melania Harris
Project Contact Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
0901026-20	AP0104	SOIL	1-16-09/1033	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0901026-21	AP0105	SOIL	1-16-09/1033	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0901026-22	AP0114	SOIL	1-16-09/1225	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0901026-23	AP0115	SOIL	1-16-09/1227	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0901026-24	AP0125	SOIL	1-16-09/1305	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0901026-25	AP0126	SOIL	1-16-09/1307	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		

Special Instructions:

Possible Hazard Identification:
Non-haz: Flammable: Poison B: Unknown: K

Sample Disposal:
Return to Client: Disposal by Lab: X Archive:

Turnaround Time:
Normal: X Rush:

Level of QC Required:
Definitive: X Project Specific:

1. Relinquished by: E. W. Weaver - Shaw E&I	Date: 1-16-09 Time: 1730	1. Received by:	Date: 1/19/09 Time: 0800
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

0901026

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB01 16 09AML

PAGE 5 OF 5

Project Name No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133422
Required Report Date: 21 DAYS

Sample Shipment Date: 1-16-09
Laboratory Destination: AML Scientific, LLC
Laboratory Contact: Melania Harris
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
AP0103	SOIL	1-16-09 / 1030	Wide Mouth Glass Jar	9 ~~8~~ oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0901026-26				4 ~~2~~ oz	Cool	TOC by Walkley-Black		
	SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
				2 oz	Cool	TOC by Walkley-Black		

Special Instructions:

Possible Hazard Identification:
Non-haz: Flammable: Poison B: Unknown: X

Sample Disposal:
Return to Client: Disposal by Lab: X Archive:

Turnaround Time:
Normal: X Rush:

Level of QC Required:
Definitive: X Project Specific:

1. Relinquished by: Eddie W. Weaver Shaw E&I Date: 1-16-09 Time: 1930
1. Received by: Date: 1/19/09 Time: 8:00am
2. Relinquished by: Date: Time:
2. Received by: Date: Time:
3. Relinquished by: Date: Time:
2. Received by: Date: Time:

Comments:

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB01 16 09TA

PAGE 1 OF 2

Project Name No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133422
Required Report Date: 21 DAYS

Sample Shipment Date: 1/16/09
Laboratory Destination: Test America
Laboratory Contact: Lois Lizzo
Project Contact Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 842255358585

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
AP0122	SOIL	1-16-09 / 1000	2-Wide Mouth Jars	~~4~~ oz 9 EW	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
			Wide Mouth Glass Jar	~~4~~ oz	Cool	Explosives by 8330		
AP0106	SOIL	1-16-09 / 1033	2-Wide Mouth Jars	~~4~~ oz 9 EW	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
			Wide Mouth Glass Jar	~~4~~ oz	Cool	Explosives by 8330		
	SOIL		2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
	SOIL		2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
	SOIL		2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		

DKK 1/16/09

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: David Kessler - Shaw	Date: 1/16/09 Time: 1800	1. Received by:	Date: 1-17-09 Time: 0935
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB01 16 09TA

PAGE 1 OF 2

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133422
Required Report Date: 21 DAYS

Sample Shipment Date: 1/16/09
Laboratory Destination: Test America
Laboratory Contact: Lois Ezzo
Project Contact Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
AP0129	SOIL	1-16-09 / 1320	2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
	SOIL		2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
	SOIL		2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
	SOIL		2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
	SOIL		2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		

David Kessler

Possible Hazard Identification:
Non-haz: Flammable: Poison B: Unknown:

Sample Disposal:
Return to Client: Disposal by Lab: X Archive:

Turnaround Time:
Normal: X Rush:

Level of QC Required:
Definitive: X Project Specific:

1. Relinquished by: David Kessler - Shaw Date: 1/16/09 Time: 1800
2. Relinquished by: Date: Time:
3. Relinquished by: Date: Time:

1. Received by: Date: 1-17-09 Time: 0935
2. Received by: Date: Time:
2. Received by: Date: Time:

Comments:

North Canton

0901027

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB01 19 09AML

PAGE 1 OF 5

Project Name No.: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133422
Required Report Date: 21 DAYS

Sample Shipment Date: 1-19-09
Laboratory Destination: AML Scientific, LLC
Laboratory Contact: Melania Harris
Project Contact Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8531 9327 9450

Bill To: Accounting, Shaw E & I, 312 Directors Drive, Knoxville, TN 37923
Report To: Eddie Weaver, Shaw E & I, 312 Directors Drive, Knoxville, TN 37923

	Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
0901027-01	AP0108	SOIL	1-18-09/925	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0901027-02	AP0109	SOIL	1-18-09/928	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0901027-03	AP0111	SOIL	1-18-09/845	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0901027-04	AP0112	SOIL	1-18-09/848	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: E. W. Weaver Shaw E&I — Date: 1-19-09 Time: 1700
2. Relinquished by: — Date: Time:
3. Relinquished by: — Date: Time:

1. Received by: [signature] — Date: 1/20/09 Time: 0930AM
2. Received by: — Date: Time:
3. Received by: — Date: Time:

Comments:

0901027

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB01 19 09AML

PAGE 2 OF 5

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name No.: PIDOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133422
Required Report Date: 21 DAYS

Sample Shipment Date: 1-19-09
Laboratory Destination: AML Scientific, LLC
Laboratory Contact: Melania Harris
Project Contact Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8531 9327 9450

	Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
0901027-05	AP0110	SOIL	1-18-09/930	Wide Mouth Glass Jar	9 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
0901027-06	AP0113	SOIL	1-18-09/850	Wide Mouth Glass Jar	9 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: K

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: Eddie W. Weaver Shaw E&I	Date: 1-19-09 Time: 1700	1. Received by:	Date: 1/20/09 Time: 0930am
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

0901027

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB01 19 09AML

PAGE 3 OF 5

Project Name No: PBDW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133767
Required Report Date: 21 DAYS

Sample Shipment Date: 1-19-09
Laboratory Destination: AML Scientific, LLC
Laboratory Contact: Melania Harris
Project Contact Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8531 9327 9450

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
0901027-07	LBA0026	SOIL	1-19-09/1010	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
				Terra Core	5 Grams	Cool	VOC's by 8260		
0901027-08	LBA0027	SOIL	1-19-09/1010	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
				Terra Core	5 Grams	Cool	VOC's by 8260		
0901027-09	LBA0029	SOIL	1-19-09/1013	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
				Terra Core	5 Grams	Cool	VOC's by 8260		
0901027-10	LBA0031	SOIL	1-19-09/0955	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
				Terra Core	5 Grams	Cool	VOC's by 8260		
0901027-11	LBA0032	SOIL	1-19-09/0957	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
				Terra Core	5 Grams	Cool	VOC's by 8260		
0901027-11	LBA0032MS	SOIL	1-19-09/0957	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
				Terra Core	5 Grams	Cool	VOC's by 8260		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: K

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: L. W. Weaver Shaw E&I	Date: 1-19-09 Time: 1700	1. Received by:	Date: 1/20/09 Time: 0930AM
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

0901027

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB01 19 09AML

PAGE 4 OF 5

Project Name No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133767
Required Report Date: 21 DAYS

Sample Shipment Date: 1-19-09
Laboratory Destination: AML Scientific, LLC
Laboratory Contact: Melania Harris
Project Contact Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8531 9327 9450

Bill To: Accounting, Shaw E & I, 312 Directors Drive, Knoxville, TN 37923

Report To: Eddie Weaver, Shaw E & I, 312 Directors Drive, Knoxville, TN 37923

	Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
0901027-12	LBA 0030	SOIL	1-19-09 / 1015	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
				Terra Core	5 Grams	Cool	VOC's by 8260		
0901027-13	LBA0033	SOIL	1-19-09 / 1000	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
				Terra Core	5 Grams	Cool	VOC's by 8260		
0901027-14	LBA0036	SOIL	1-19-09 / 0940	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
				Terra Core	5 Grams	Cool	VOC's by 8260		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
				Terra Core	5 Grams	Cool	VOC's by 8260		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
				Terra Core	5 Grams	Cool	VOC's by 8260		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
				Terra Core	5 Grams	Cool	VOC's by 8260		

Special Instructions:

Possible Hazard Identification: Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal: Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time: Normal: X Rush: ___

Level of QC Required: Definitive: X Project Specific: ___

1. Relinquished by: Eddie W. Weaver Shaw E&I Date: 1-19-09 Time: 1700
1. Received by: [signature] Date: 1/20/09 Time: 0930 am
2. Relinquished by: Date: Time:
2. Received by: Date: Time:
3. Relinquished by: Date: Time:
2. Received by: Date: Time:

Comments:

0901027

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB01 19 09AML

PAGE 5 OF 5

Project Name No: PBDW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133767
Required Report Date: 21 DAYS

Sample Shipment Date: 1-19-09
Laboratory Destination: AML Scientific, LLC
Laboratory Contact: Melania Harris
Project Contact Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 6531 9327 9450

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
0901027-11	LBA0032MSD	SOIL	1-19-09 / 0957	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
				Terra Core	5 Grams	Cool	VOCs by 8260		
0901027-15	LBA0034	SOIL	1-19-09 / 0935	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
				Terra Core	5 Grams	Cool	VOCs by 8260		
0901027-16	LBA0035	SOIL	1-19-09 / 0937	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
				Terra Core	5 Grams	Cool	VOCs by 8260		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
				Terra Core	5 Grams	Cool	VOCs by 8260		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
				Terra Core	5 Grams	Cool	VOCs by 8260		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
				Terra Core	5 Grams	Cool	VOCs by 8260		

Special Instructions:

Possible Hazard Identification:
Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: X

Sample Disposal:
Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:
Normal: X Rush:

Level of QC Required:
Definitive: X Project Specific: ____

1. Relinquished by: E. W. Weaver Shaw E&I	Date: 1-19-09 Time: 1700	1. Received by:	Date: Time:
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: ~~PH0W~~ B2 02 09TA

PAGE 1 OF 1

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name No: PHOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133422
Required Report Date: 21 DAYS

Sample Shipment Date: 2-2-09
Laboratory Destination: Test America
Laboratory Contact: Lois Ezzo
Project Contact Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8672 3651 1856

Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
AP3016	WATER	2-2-09 1030	2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	1 L	HNO3	Total TAL Metals by 6010B 7470A		
			1 - HDPE	1 L	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOC's by 8270C		
			1 - HDPE	250 mL	HNO3	Hardness		
			1 - HDPE	250 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride, Nitrate		

Special Instructions:

Possible Hazard Identification:
Non-haz: Flammable: Poison B: Unknown: X

Sample Disposal:
Return to Client: Disposal by Lab: X Archive:

Turnaround Time
Normal: X Rush:

Level of QC Required:
Definitive: X Project Specific:

1. Relinquished by: Eric W. Weaver Shaw E&I — Date: 2-2-09 Time: 1700
1. Received by: [signature] — Date: 2/3/09 Time: 0940
2. Relinquished by: — Date: Time:
2. Received by: — Date: Time:
3. Relinquished by: — Date: Time:
2. Received by: — Date: Time:

Comments:

17

North Canton

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: EW/ PW18 18 09TA

PAGE 1 OF 1

Shaw™

Shaw E & I, Inc.

Sample Team Member: ~~David Keesler~~ Eric Weaver
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 ~~[illegible]~~ EV
Required Report Date: 21 DAYS

Sample Shipment Date: 11-18-09
Laboratory Destination: Test America,
Laboratory Contact: Lois Ezzo
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8697-5709-6300

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
AP3082	WATER	11-17-09 0945	2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	1 L	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	1 L	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			3 - VOA Vial	40 mL	HCL	VOCs by 8260		
			1 - HDPE	250 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride, Nitrate		
			1 - HDPE	250 mL	HNO3	Hardness		
TB111809TAE (Trip Blank)	Water	11-18-09/1430	2xVOA vial	~~[illegible]~~ 40 ml EW	HCL	VOCs		

Special Instructions:

Possible Hazard Identification:

Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: X

Sample Disposal:

Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:

Normal: X Rush: ____

Level of QC Required:

Definitive: X Project Specific: ____

1. Relinquished by: E. W. Weaver	Date: 11-18-09 Time: 1455	1. Received by: Matthew L. Jones (TEST AMERICA)	Date: 19 NOV 2009 Time: 0915
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

15

North Canton

F69607

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: EW1 PW18 18 09ACCT

PAGE 1 OF 1

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-18-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684-9331-1980

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
1 AP3081	WATER	11-17-09 0945	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~ EW		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER	EW	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:

Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: X

Sample Disposal:

Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:

Normal: X Rush: ____

Level of QC Required:

Definitive: X Project Specific: ____

1. Relinquished by: E. W. Weaver	Date: 11-18-09 Time: 1455	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/19/09 Time: 9:00	2. Received by: Accutest	Date: 11/19/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 3.4 4.0 4.6 3.8 3.0 2.8 4.0 5.2 4.4 4.4

F69607

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW1 18 09ACCT

PAGE 1 OF 1

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-18-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684-4331-1980

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
2 GH-FB1109	WATER	11-18-09 1430	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~ EW		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: [signature]	Date: 11-18-09 Time: 1455	1. Received by: [signature]	Date: Time:
2. Relinquished by: [signature]	Date: 11/19/09 Time: 9:00	2. Received by: [signature] / Accutest	Date: 11/19/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 3.4 4.0 4.6 3.8 3.0 2.8 4.0 5.2 4.4 4/4

F69607

REFERENCE COC NO.: EW1 PW1 12 09ACCT

PAGE 1 OF 1

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-18-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684-4331-1980

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
3 AP3080	WATER	11-16-09 1400	~~3 VOA Vial~~	~~40ml~~	HCL	~~VOCs by 8260~~ EW		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:

Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: X

Sample Disposal:

Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:

Normal: X Rush: ____

Level of QC Required:

Definitive: X Project Specific: ____

1. Relinquished by: E.W. Weaver	Date: 11-18-09 Time: 1455	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/19/09 Time: 9:00	2. Received by: CR/Accutest	Date: 11/19/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 3.4 4.0 4.6 3.8 3.0 2.8 4.0 5.2 4.4 4.4

F69607

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW1 18 09ACCT

PAGE 1 OF 1

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-18-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8604-4331-1980

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
4 APZ-ER1109	WATER	11-18-09 1000	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~ EW		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: E. W. Weaver	Date: 11-18-09 Time: 1455	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/19/09 Time: 9:00	2. Received by: CAR / Accutest	Date: 11/19/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

3.4 4.0 4.6 3.8 3.0 2.8 4.0 5.2 4.4 4.4

F69607

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW1 / 18 09ACCT

PAGE 1 OF 1

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-18-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684-4331-1980

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
5 TNTB-ER1109	WATER	11-18-09 1300	~~3 VOA Vial~~	~~40mL~~	~~HCL~~	~~VOCs by 8260~~ EW		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: X

Sample Disposal:
Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:
Normal: X Rush: ____

Level of QC Required:
Definitive: X Project Specific: ____

1. Relinquished by: E. W. Weaver	Date: 11-18-09 Time: 1955	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/19/09 Time: 9:00	2. Received by: Accutest	Date: 11/19/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

3.4 4.0 4.6 3.8 3.0 2.8 4.0 3.2 4.4 4.4

F69607

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW10 18 09ACCT

PAGE 1 OF 1

Shaw™
Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-18-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684-4331-1980

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
6 SL3100	WATER	11-18-09 1005	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~ EW		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: X

Sample Disposal:
Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:
Normal: X Rush: ____

Level of QC Required:
Definitive: X Project Specific: ____

1. Relinquished by: E. W. Weaver	Date: 11-18-09 Time: 1455	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/19/09 Time: 9:30	2. Received by: Accutest	Date: 11/19/09 Time: 9:30
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 3.4 4.0 4.6 3.8 3.0 2.8 4.0 5.2 4.4 4.4

F64607

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW1 18 09ACCT

PAGE 1 OF

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-18-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684-4331-1980

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
7 AP3079	WATER	11-17-09 0945	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~ EW		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	~~Explosives by 8330~~		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:

Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: X

Sample Disposal:

Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:

Normal: X Rush: ____

Level of QC Required:

Definitive: X Project Specific: ____

1. Relinquished by: E. W. Weaver	Date: 11-18-09	1. Received by: FX	Date:
	Time: 1455		Time:
2. Relinquished by: FX	Date: 11/19/09	2. Received by: Accutest	Date: 11/19/09
	Time: 9:00		Time: 9:00
3. Relinquished by:	Date:	2. Received by:	Date:
	Time:		Time:

Comments: 3.4 4.0 4.6 3.8 3.0 2.8 4.0 5.2 4.4 4.4

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ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW18 18 09ACCT

PAGE 1 OF 1

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-18-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684-4331-1980

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
2 AP3079MS	WATER	11-17-09 0945	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~ EW		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: E. W. Weaver	Date: 11-18-09 Time: 1455	1. Received by: [illegible]	Date: Time:
2. Relinquished by: [illegible]	Date: 11/19/09 Time: 900	2. Received by: [illegible] Accutest	Date: 11/19/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 3.4 4.0 4.6 3.8 3.0 2.8 4.0 5.2 4.4 4.4

F69607

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW1 18 09ACCT

PAGE 1 OF 1

Shaw™
Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-18-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684-4331-1980

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
7 AP3079MSD	WATER	11-17-09 0945	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~ EW		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER	EW	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: E-W. Weaver	Date: 11-18-09 Time: 1455	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/19/09 Time: 9:00	2. Received by: [illegible]	Date: 11/19/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 3.4 4.0 4.6 3.8 3.0 2.8 4.0 5.2 4.9 4.9

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ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW1~~0~~ EW 1 18 09ACCT

PAGE 1 OF 1

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-18-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684-4331-1980

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
8 SL3101	WATER	11-17-09 / 1557	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
~~WATER~~			~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~Explosives by 8330~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Total TAL Metals/Hardness by 6010B/7470A~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Dissolved TAL Metals by 6010B/7470A~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~TCL SVOCs by 8270C~~		
			~~1 - HDPE~~	~~500 mL~~	~~H2SO4~~	~~Nitrate~~		
			~~1 - HDPE~~	~~500 mL~~	~~NaOH~~	~~Cyanide by 9010/9012~~		
			~~1 - HDPE~~	~~1 L~~	~~Cool~~	~~Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride~~		

Special Instructions:

Possible Hazard Identification:

Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: X

Sample Disposal:

Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:

Normal: X Rush: ____

Level of QC Required:

Definitive: X Project Specific: ____

1. Relinquished by: E.W. Weaver	Date: 11-18-09 Time: 1455	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/19/09 Time: 9:00	2. Received by: Accutest	Date: 11/19/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 3.4 4.0 4.6 3.8 3.0 2.8 4.0 5.2 4.4 4.4

F69607

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW18 18 09ACCT

PAGE 1 OF 1

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-18-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 7684-4331-1980

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
9 Trip Blank 11-18-09	WATER		3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: X

Sample Disposal:
Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:
Normal: X Rush: ____

Level of QC Required:
Definitive: X Project Specific: ____

1. Relinquished by: [signature]	Date: 11-18-09 Time: 1455	1. Received by: [signature]	Date: Time:
2. Relinquished by: [signature]	Date: 11/19/09 Time: 9:00	2. Received by: [signature] Accutest	Date: 11/19/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

3.4 4.0 4.6 3.8 3.0 2.8 4.0 5.2 4.4 8.4

P69607

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW1 18 09ACCT

PAGE 1 OF 1

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-18-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 7684-4331-1980

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
1 AP3081	WATER	11-17-09 0945	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
6 SL3100	WATER	11-18-09 1005	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: E-W. Weaver	Date: 11-18-09 Time: 1455	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/19/09 Time: 9:00	2. Received by: Chr Mcartest	Date: 11/19/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 3.4 4.0 4.6 3.8 3.0 2.8 4.0 5.2 4.4 4.4

F69607

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PWI 18 09ACCT

PAGE 1 OF 1

Shaw

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-18-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 7684-4331-1980

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
2GH-FB1109	WATER	11-18-09 1430	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:

Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:

Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:

Normal: X Rush: ___

Level of QC Required:

Definitive: X Project Specific: ___

1. Relinquished by: E. W. Weaver	Date: 11-18-09 Time: 1455	1. Received by: [signature]	Date: Time:
2. Relinquished by: [signature]	Date: 11/19/09 Time: 9:00	2. Received by: [signature] Accutest	Date: 11/19/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 3.4 4.0 4.6 3.8 3.0 2.8 4.0 5.2 4.4 4.9

F69607

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW1 18 09ACCT

PAGE 1 OF 1

Shaw™
Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-18-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 7654-2331-1980

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
3 AP3080	WATER	11-16-09 1400	* 3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
7 AP3079	WATER	11-17-09 0945	* 3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: X

Sample Disposal:
Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:
Normal: X Rush: ____

Level of QC Required:
Definitive: X Project Specific: ____

1. Relinquished by: E. W. Weaver	Date: 11-18-09 Time: 1455	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/19/09 Time: 9:00	2. Received by: Accutest	Date: 11/19/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 3.4 4.0 4.6 3.8 3.0 2.8 4.0 5.2 4.4 4.4

F64607

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW1 18 09ACCT

PAGE 1 OF 1

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-18-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 2654-4331-1980

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
4	APZ-ER1109	WATER	11-18-09 1000	3 VOA Vial	40ml	HCL	VOCs by 8260		
				2 - Amber	1 L	Cool	Explosives by 8330		
				1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
				1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
				1 - HDPE	500 mL	H2SO4	Nitrate		
				1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
				1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
5	TNTB-ER1109	WATER	11-18-09 1300	3 VOA Vial	40ml	HCL	VOCs by 8260		
				2 - Amber	1 L	Cool	Explosives by 8330		
				1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
				1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
				1 - HDPE	500 mL	H2SO4	Nitrate		
				1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
				1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: E. W. Weaver	Date: 11-18-09 Time: 1455	1. Received by: [illegible]	Date: Time:
2. Relinquished by: [illegible]	Date: 11/19/09 Time: 9:00	2. Received by: [illegible] Accutest	Date: 11/19/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 3.4 4.0 4.6 3.8 3.0 2.8 4.0 5.2 4.4 4.4

FL9607

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW1 18 09ACCT

PAGE 1 OF 1

Shaw™
Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-18-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 2654-4331-1980

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
7 AP3079MS	WATER	11-17-09 0945	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
7 AP3079MSD	WATER	11-17-09 0945	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: X

Sample Disposal:
Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:
Normal: X Rush: ____

Level of QC Required:
Definitive: X Project Specific: ____

1. Relinquished by: E. W. Weaver	Date: 11-18-09 Time: 1455	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/19/09 Time: 0605	2. Received by: Accutest	Date: 11/19/09 Time: 0605
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 3.4 4.0 4.6 3.8 3.0 2.8 4.0 5.2 4.4 4.9

Originals

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

0902003

REFERENCE COC NO.: PB0 02 09AML

PAGE 1 OF 4

Project Name No: PB OW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133422
Required Report Date: 21 DAYS

Sample Shipment Date: 2-2-09
Laboratory Destination: AML Scientific, LLC
Laboratory Contact: Melania Harris
Project Contact Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8672 3651 1867

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
AP3022	WATER	2-2-09	2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	500 ml	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOC's by 8270C		
		1030	1 - HDPE	125 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
0902003-01			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
AP3015	WATER	2-2-09	2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOC's by 8270C		
		1030	1 - HDPE	125 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
0902003-02			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: Eddie W. Weaver Shaw E&I — Date: 2-2-09 Time: 1700
1. Received by: [signature] — Date: 2/3/09 Time: 0945am
2. Relinquished by: — Date: Time:
2. Received by: — Date: Time:
3. Relinquished by: — Date: Time:
2. Received by: — Date: Time:

Comments:

9 0 0 1369

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB02 02 09AML

0902003

Project Name No.: PB
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133422
Required Report Date: 21 DAYS

Sample Shipment Date: 2-2-09
Laboratory Destination: AML Scientific, LLC
Laboratory Contact: Melavia Harris
Project Contact Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8672 3651 1867

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
AP3019	WATER	2-1-09 1110	2 - Amber	1 L.	Cool	Explosives by 8330		
			1 - HDPE	500 mL.	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	500 mL.	HNO3	Dissolved TAL Metals by 6010B 7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	125 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL.	NaOH	Cyanide by 9010/9012		
0902003-03			1 - HDPE	1 L.	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
AP3019MS	WATER	2-1-09 1110	2 - Amber	1 L.	Cool	Explosives by 8330		
			1 - HDPE	500 mL.	HNO3	Total TAL Metals by 6010B 7470A		
			1 - HDPE	500 mL.	HNO3	Dissolved TAL Metals by 6010B 7470A		
			2 - Amber	1 L.	Cool	TCL SVOCs by 8270C		
			1 - HDPE	125 mL.	H2SO4	Nitrate		
			1 - HDPE	500 mL.	NaOH	Cyanide by 9010/9012		
0902003-03			1 - HDPE	1 L.	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: E. W. Weaver Shaw E&I	Date: 2-2-09 Time: 1700	1. Received by:	Date: 2/3/09 Time: 0945am
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB0~~1~~2 02 09AML

PAGE 3 OF 4

0902003

Project Name No: ~~MW~~ PB
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133422
Required Report Date: 21 DAYS

Sample Shipment Date: 2-2-09
Laboratory Destination: AML Scientific, LLC
Laboratory Contact: Melania Harris
Project Contact Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8672 3657 1867

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
AP3019MSD 0902003-03	WATER	2-1-09 1110	2 - Amber	1 L.	Cool	Explosives by 8330		
			1 - HDPE	500 mL.	HNO3	Total TAL Metals by 6010B 7470A		
			1 - HDPE	500 mL.	HNO3	Dissolved TAL Metals by 6010B 7470A		
			2 - Amber	1 L.	Cool	TCL SVOC's by 8270C		
			1 - HDPE	125 mL.	H2SO4	Nitrate		
			1 - HDPE	500 mL.	NaOH	Cyanide by 9010 9012		
			1 - HDPE	1 L.	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
AP3018 0202003-04	WATER	1-31-09 1730	2 - Amber	1 L.	Cool	Explosives by 8330		
			1 - HDPE	500 mL.	HNO3	Total TAL Metals by 6010B 7470A		
			1 - HDPE	500 mL.	HNO3	Dissolved TAL Metals by 6010B 7470A		
			2 - Amber	1 L.	Cool	TCL SVOC's by 8270C		
			1 - HDPE	125 mL.	H2SO4	Nitrate		
			1 - HDPE	500 mL.	NaOH	Cyanide by 9010 9012		
			1 - HDPE	1 L.	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: Erin W. Weaver Shaw E&I — Date: 2-2-09 Time: 1700
1. Received by: [signature] — Date: 2/3/09 Time: 0945am
2. Relinquished by: — Date: Time:
2. Received by: — Date: Time:
3. Relinquished by: — Date: Time:
3. Received by: — Date: Time:

Comments:

C1369

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: ~~PAUL~~ B2 02 09AML

PAGE 4 OF 4

0902003

Project Name No: ~~[illegible]~~ PB OW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133767
Required Report Date: 21 DAYS

Sample Shipment Date: 2-2-09
Laboratory Destination: AML
Laboratory Contact: Melania Harris
Project Contact Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8672 3651 1867

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
LBA3000	WATER	1-31-09	3 VOA Vial	40ml	HCL	VOC's by 8260		
			2 - Amber	1 L.	Cool	Explosives by 8330		
			1 - HDPE	500 ml.	HNO3	Total TAL Metals by 6010B 7470A		
			1 - HDPE	500 ml.	HNO3	Dissolved TAL Metals by 6010B 7470A		
		0935	2 - Amber	1 L.	Cool	TCL SVOC's by 8270C		
			1 - HDPE	125 ml.	H2SO4	Nitrate		
			1 - HDPE	500 ml.	NaOH	Cyanide by 9010 9012		
0902003-05			1 - HDPE	1 L.	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
LBA3005	WATER	1-30-09	3 VOA Vial	40ml	HCL	VOC's by 8260		
			2 - Amber	1 L.	Cool	Explosives by 8330		
			1 - HDPE	500 ml.	HNO3	Total TAL Metals by 6010B 7470A		
			1 - HDPE	500 ml.	HNO3	Dissolved TAL Metals by 6010B 7470A		
		1610	2 - Amber	1 L.	Cool	TCL SVOC's by 8270C		
			1 - HDPE	125 ml.	H2SO4	Nitrate		
0902003-06			1 - HDPE	500 ml.	NaOH	Cyanide by 9010 9012		
			1 - HDPE	1 L.	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
Trip Blank	Water	2-2-09	3 VOA vial	40 ml	HCL	VOC by 8260		

Special Instructions: 0902003-07

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X
Project Specific: ___

1. Relinquished by: E. W. Weaver Shaw E&I	Date: 2-2-09 Time: 1700	1. Received by:	Date: 2/3/09 Time: 0945am
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

12 01 1369

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

F6S479

REFERENCE NO.: PB/05-06 09ACCT

PAGE 1 OF 2

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133422 Ash Pit 2
Required Report Date: 21 DAYS

Sample Shipment Date: 5-26-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 4684 4331 1258

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
1	AP2000	Surface Water	5-24-09 1025	2 - Amber	1 L	Cool	Explosives by 8330		
				2 - Amber	1 L	Cool	PCBs by 8082		
				1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
				2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
2	AP2001	"	5/24/09 1350	2 - Amber	1 L	Cool	Explosives by 8330		
				2 - Amber	1 L	Cool	PCBs by 8082		
				1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
3	AP2002	"	5/24/09 1505	2 - Amber	1 L	Cool	Explosives by 8330		
				2 - Amber	1 L	Cool	PCBs by 8082		
				1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
4	AP2003	"	5/24/09 1505	2 - Amber	1 L	Cool	Explosives by 8330		
				2 - Amber	1 L	Cool	PCBs by 8082		
				1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
5	AP2005	"	5/25/09 0925	2 - Amber	1 L	Cool	Explosives by 8330		
				2 - Amber	1 L	Cool	PCBs by 8082		
				1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	TCL SVOCs by 8270C		

Special Instructions:

Possible Hazard Identification:
Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: X

Sample Disposal:
Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:
Normal: X Rush: ____

Level of QC Required:
Definitive: X Project Specific: ____

1. Relinquished by: David Kessler - Shaw	Date: 5-26-09 Time: 1630	1. Received by: [signature]	Date: Time:
2. Relinquished by: [signature]	Date: 5/27/09 Time: 0900	2. Received by: Clk / Accutest	Date: 5/27/09 Time: 0900
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 6 : 4.0 4.2 3.8 3.0 3.4 3.6

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW05-26-09-CCT R65479

PAGE 2 OF 2

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133422 Ash Pit 2
Required Report Date: 21 DAYS

Sample Shipment Date: 5/26/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 4684 4331 1258

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
5	AP2005MS	Surface Water	5/25/09 0925	2 - Amber	1 L	Cool	Explosives by 8330		
				2 - Amber	1 L	Cool	PCBs by 8082		
				1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
5	AP2005MSD	"	5/25/09 0925	2 - Amber	1 L	Cool	Explosives by 8330		
				2 - Amber	1 L	Cool	PCBs by 8082		
				1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
6	AP2006	"	5/25/09 1155	2 - Amber	1 L	Cool	Explosives by 8330		
				2 - Amber	1 L	Cool	PCBs by 8082		
				1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
				2 - Amber	1 L	Cool	Explosives by 8330		
				2 - Amber	1 L	Cool	PCBs by 8082		
				1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
				2 - Amber	1 L	Cool	Explosives by 8330		
				2 - Amber	1 L	Cool	PCBs by 8082		
				1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	TCL SVOCs by 8270C		

Special Instructions:

Possible Hazard Identification:
Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: X

Sample Disposal:
Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:
Normal: X Rush: ____

Level of QC Required:
Definitive: X Project Specific: ____

1. Relinquished by: David Kessler-Shaw	Date: 5-26-09 Time: 1630	1. Received by:	Date: Time:
2. Relinquished by:	Date: 5/27/09 Time: 0800	2. Received by: Accutest	Date: 5/27/09 Time: 0800
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 6: 4.0 4.2 3.8 3.0 3.4 3.6

T65476

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Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB05 26 09ACCT

PAGE 1 OF 2

Project Name/No.: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133422 Ash Pit 2 Sediment
Required Report Date: 21 DAYS

Sample Shipment Date: 5/26/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684 4331 1358

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
5	AP1000	Sediment	5-24-09 1050	CWM	4 oz	Cool	PCBs by 8082		
				CWM	4 oz	Cool	TOC by Walkley Black		
				CWM	4 oz	Cool	SVOCs by 8270C		
				CWM	4 oz	Cool	Explosives by 8330A		
				CWM	4 oz	Cool	TAL Metals 6010/7471		
6	AP1001	Sediment	5-24-09 1415	CWM	4 oz	Cool	PCBs by 8082		
				CWM	4 oz	Cool	SVOCs by 8270C		
				CWM	4 oz	Cool	Explosives by 8330A		
				CWM	4 oz	Cool	TAL Metals 6010/7471		
4	AP1002	Sediment	5-24-09 1550	CWM	4 oz	Cool	PCBs by 8082		
				CWM	4 oz	Cool	SVOCs by 8270C		
				CWM	4 oz	Cool	Explosives by 8330A		
				CWM	4 oz	Cool	TAL Metals 6010/7471		
4	AP1002MS	Sediment	5-24-09 1550	CWM	4 oz	Cool	PCBs by 8082		
				CWM	4 oz	Cool	SVOCs by 8270C		
				CWM	4 oz	Cool	Explosives by 8330A		
				CWM	4 oz	Cool	TAL Metals 6010/7471		

Special Instructions:

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Level of QC Required:
Definitive: X
Project Specific: ___

Turnaround Time:
Normal: X Rush: ___

1. Relinquished by: David Kessler - Shaw Date: 5-26-09 Time: 1600
2. Relinquished by: Date: Time:
3. Relinquished by: Date: Time:

1. Received by: Date: Time:
2. Received by: Date: Time:
2. Received by: Date: Time:

Comments:

F65476

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB05 26 09ACCT

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133422 Ash Pit 2 Sediment
Required Report Date: 21 DAYS

Sample Shipment Date: 5/26/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684 4331 1258

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
4	AP1002MSD	Sediment	5/24/09 1550	CWM	4 oz	Cool	PCBs by 8082		
				CWM	4 oz	Cool	SVOCs by 8270C		
				CWM	4 oz	Cool	Explosives by 8330A		
				CWM	4 oz	Cool	TAL Metals 6010/7471		
1	AP1006	Sediment	5/25/09 1215	CWM	4 oz	Cool	PCBs by 8082		
				CWM	4 oz	Cool	SVOCs by 8270C		
				CWM	4 oz	Cool	Explosives by 8330A		
				CWM	4 oz	Cool	TAL Metals 6010/7471		
2	AP1003	Sediment	5/25/09 1020	CWM	4 oz	Cool	PCBs by 8082		
				CWM	4 oz	Cool	SVOCs by 8270C		
				CWM	4 oz	Cool	Explosives by 8330A		
				CWM	4 oz	Cool	TAL Metals 6010/7471		
3	AP1004	Sediment	5/25/09 1020	CWM	4 oz	Cool	PCBs by 8082		
				CWM	4 oz	Cool	SVOCs by 8270C		
				CWM	4 oz	Cool	Explosives by 8330A		
				CWM	4 oz	Cool	TAL Metals 6010/7471		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: David Kessler-Shaw	Date: 5-26-09 Time: 1630	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: Time:	2. Received by: Accutest	Date: 5-27-09 Time: 0900
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 3.6

TA

PL5476

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ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB05 26 09TA

PAGE 1 OF 1

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133422 Ash Pit 2 Sediment
Required Report Date: 21 DAYS

Sample Shipment Date: 5/26/09
Laboratory Destination: Test America
Laboratory Contact: Lois Ezzo
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8672 3651 2006

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
AP1005	Sediment	5/25/09 1020	Wide Mouth Glass Jar	2 X 4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
				4 oz	Cool	Explosives by 8330A		
			~~Tera Core~~	~~5 grams~~	~~Cool~~	~~VOCs by 8260B~~		
			~~CWM~~	~~2 oz~~	~~Cool~~	~~% Moisture VOCs~~		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: David Kessler - Shaw	Date: 5-26-09 Time: 1630	1. Received by: fx	Date: Time:
2. Relinquished by: fx	Date: Time:	2. Received by: [illegible] /Accutest	Date: 5-27-09 Time: 0900
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

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ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW05 26 09TA

PAGE 1 OF 2

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133422 Ash Pit 2
Required Report Date: 21 DAYS

Sample Shipment Date: 5/26/09
Laboratory Destination: Test America
Laboratory Contact: Lois Ezzo
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 9472 3651 2006

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
AP 3066	WATER	5/26/09 1550	2 - Amber	1 L	Cool	Explosives by 8330		
			2 - Amber	1 L	Cool	PCBs by 8082		
			1 - HDPE	1 L	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	1 L	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			3 - VOA Vial	40 mL	HCL	VOCs by 8260		
			1 - HDPE	250 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride, Nitrate		
			1 - HDPE	250 mL	HNO3	Hardness		
	WATER		2 - Amber	1 L	Cool	Explosives by 8330		
			2 - Amber	1 L	Cool	PCBs by 8082		
			1 - HDPE	1 L	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	1 L	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			3 - VOA Vial	40 mL	HCL	VOCs by 8260		
			1 - HDPE	250 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride, Nitrate		
			1 - HDPE	250 mL	HNO3	Hardness		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific:

1. Relinquished by: M. Yantin-Shaw	Date: 05/26/09 Time: 1800	1. Received by:	Date: 5-27-09 Time: 9:50
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

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Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW05 26 09TA

PAGE 2 OF 2

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133422 Ash Pit 2
Required Report Date: 21 DAYS

Sample Shipment Date: 5/26/09
Laboratory Destination: Test America
Laboratory Contact: Lois Ezzo
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8672 3651 2000

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
052609-TB	WATER	5/26/09 1800	2 - Amber	1 L	Cool	~~Explosives by 8330~~		
			2 - Amber	1 L	Cool	~~PCBs by 8082~~		
			1 - HDPE	1 L	HNO3	~~Total TAL Metals by 6010B/7470A~~		
			1 - HDPE	1 L	HNO3	~~Dissolved TAL Metals by 6010B/7470A~~		
			2 - Amber	1 L	Cool	~~TCL SVOCs by 8270C~~		
			2 3 - VOA Vial	40 mL	HCL	VOCs by 8260 ME		
			1 - HDPE	250 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	~~Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride, Nitrate~~		
			1 - HDPE	250 mL	HNO3	~~Hardness~~		
AP3060	WATER	5/25/09 0932	2 - Amber	1 L	Cool	Explosives by 8330		
			2 - Amber	1 L	Cool	PCBs by 8082		
			1 - HDPE	1 L	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	1 L	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			3 - VOA Vial	40 mL	HCL	VOCs by 8260		
			1 - HDPE	250 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride, Nitrate		
			1 - HDPE	250 mL	HNO3	Hardness		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: M. Yantin - Shaw	Date: 5/26/09 Time: 1800	1. Received by:	Date: 5-27-09 Time: 9:50
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

21

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TA

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Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW05 26 09TA

PAGE 1 OF 1

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133422 Ash Pit 2
Required Report Date: 21 DAYS

Sample Shipment Date: 5-26-09
Laboratory Destination: Test America
Laboratory Contact: Lois Ezzo
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 86072 86051 2006

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
AP2004	WATER	5-24-09 1505	2 - Amber	1 L	Cool	Explosives by 8330		
			2 - Amber	1 L	Cool	PCBs by 8082		
			1 - HDPE	1 L	HNO3	Total TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X
Project Specific: ___

1. Relinquished by: David Kessler-Shaw Date: 5-26-09 Time: 1630
2. Relinquished by: Date: Time:
3. Relinquished by: Date: Time:

1. Received by: Date: 5-27-09 Time: 9:55
2. Received by: Date: Time:
2. Received by: Date: Time:

Comments:

North Canton

7A

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Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB05 26 09TA

PAGE 1 OF 1

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133422 Ash Pit 2 Sediment
Required Report Date: 21 DAYS

Sample Shipment Date: 5/26/09
Laboratory Destination: Test America
Laboratory Contact: Lois Ezzo
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8672 3651 2006

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
AP1005	Sediment	5/25/09 1020	Wide Mouth Glass Jar	2 X 4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
				4 oz	Cool	Explosives by 8330A		
			~~Tera Core~~	~~5-grams~~	~~Cool~~	~~VOCs by 8260B~~		
			~~CWM~~	~~2 oz~~	~~Cool~~	~~% Moisture - VOCs~~		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: David Kessler - Shaw	Date: 5-26-09 Time: 1630	1. Received by: [signature]	Date: 5-27-09 Time: 9:55
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

23

North Canton

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

PL5480

REFERENCE COC NO.: PW05 26 09ACCT

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133422 Ash Pit 2
Required Report Date: 21 DAYS

Sample Shipment Date: 5/26/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684 4331 1258

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
1 AP 3064	WATER	5/23/09 1550	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			2 - Amber	1 L	Cool	PCBs by 8082		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
1 AP 3064 MS	WATER	5/23/09 1550	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			2 - Amber	1 L	Cool	PCBs by 8082		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: M. Martin-Shaw	Date: 05/26/09 Time: 1800	1. Received by:	Date: Time:
2. Relinquished by:	Date: Time:	2. Received by:	Date: 5-27-09 Time: 09:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 4.2 3.4 3.6 4.8 3.0

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

P65480

REFERENCE COC NO.: PW05 26 09ACCT

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133422 Ash Pit 2
Required Report Date: 21 DAYS

Sample Shipment Date: 5/26/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684 4331 1258

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
1	AP 3064 MSD	WATER	5/23/09 1550	3 VOA Vial	40ml	HCL	VOCs by 8260		
				2 - Amber	1 L	Cool	Explosives by 8330		
				2 - Amber	1 L	Cool	PCBs by 8082		
				1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
				1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
				1 - HDPE	500 mL	H2SO4	Nitrate		
				1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
				1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
2	AP 3065	WATER	5/23/09 1550	3 VOA Vial	40ml	HCL	VOCs by 8260		
				2 - Amber	1 L	Cool	Explosives by 8330		
				2 - Amber	1 L	Cool	PCBs by 8082		
				1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
				1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
				1 - HDPE	500 mL	H2SO4	Nitrate		
				1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
				1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: X

Sample Disposal:
Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:
Normal: X Rush: ____

Level of QC Required:
Definitive: X Project Specific: ____

1. Relinquished by: M. Yantin - Shaw	Date: 5/26/09 Time: 1800	1. Received by: fx	Date: Time:
2. Relinquished by: fx	Date: Time:	2. Received by: Accutest	Date: 5-27-09 Time: 09:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 4.2 3.4 3.6 4.8 3.0

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

P65480

REFERENCE COC NO.: PW05 26 09ACCT

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133422 Ash Pit 2
Required Report Date: 21 DAYS

Sample Shipment Date: 5/26/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684 4331 1258

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
3 ER2	WATER	5/26/09 1400	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			2 - Amber	1 L	Cool	PCBs by 8082		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
1 052609-TB	WATER	5/26/09 1800	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~Explosives by 8330~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~PCBs by 8082~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Total TAL Metals/Hardness by 6010B/7470A~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Dissolved TAL Metals by 6010B/7470A~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~TCL SVOCs by 8270C~~		
			~~1 - HDPE~~	~~500 mL~~	~~H2SO4~~	~~Nitrate~~		
			~~1 - HDPE~~	~~500 mL~~	~~NaOH~~	~~Cyanide by 9010/9012~~		
			~~1 - HDPE~~	~~1 L~~	~~Cool~~	~~Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride~~		

2 HDPE 5/26/09

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: M. Martin - Shaw	Date: 05/26/09 Time: 1800	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: Time:	2. Received by: Hunter	Date: 5-27-09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 4.2 3.4 3.6 4.8 3.0

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

P65480

REFERENCE COC NO.: PW05 26 09ACCT

PAGE 4 OF 6

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133422 Ash Pit 2
Required Report Date: 21 DAYS

Sample Shipment Date: 5/26/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684 4331 1258

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
AP3061	WATER	5/24/09 1058	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			2 - Amber	1 L	Cool	PCBs by 8082		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
AP3063	WATER	5/24/09 1531	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			2 - Amber	1 L	Cool	PCBs by 8082		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: X

Sample Disposal:
Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:
Normal: X Rush: ____

Level of QC Required:
Definitive: X Project Specific: ____

1. Relinquished by: H. Yantin	Date: 5/24/09 Time: 1800	1. Received by: fx	Date: Time:
2. Relinquished by: fx	Date: Time:	2. Received by: Accutest	Date: 5-27-09 Time: 0920
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 4.2 3.4 3.6 4.8 5.0

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

P65480

REFERENCE COC NO.: PW05 26 09ACCT

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133422 Ash Pit 2
Required Report Date: 21 DAYS

Sample Shipment Date: 5/26/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684 4331 1258

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
7 AP 3058	WATER	5/25/09 0932	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			2 - Amber	1 L	Cool	PCBs by 8082		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
8 AP 3059	WATER	5/25/09 0932	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			2 - Amber	1 L	Cool	PCBs by 8082		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: X

Sample Disposal:
Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:
Normal: X Rush: ____

Level of QC Required:
Definitive: X Project Specific: ____

1. Relinquished by: M. Martin - Shaw	Date: 05/26/09 Time: 1800	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: Time:	2. Received by: [signature] / Accutest	Date: 5-27-09 Time: 0900
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 4.2 3.4 3.6 4.8 3.0

F65480

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PWDS 26 09ACCT

(PAGE 6 OF 6)

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name/No.: PBOW
Sample Team Member: David Keasler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133422 Ash Pit 2
Required Report Date: 21 DAYS

Sample Shipment Date: 5/26/09
Laboratory Destination: Arcutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 9684 4331 1258

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
9 AP 3057	WATER	5/23/09 1055	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			2 - Amber	1 L	Cool	PCBs by 8082		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER	5/24/09 5/26/09	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			2 - Amber	1 L	Cool	PCBs by 8082		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: M. Yantin	Date: 5/26/09 Time: 1100	1. Received by:	Date: Time:
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

05/27/2009 15:57 4196254438 COMFORT INN MAINGATE PAGE 03/03

F69338

REFERENCE COC NO.: PW~~N~~ 1106 09ACCT

PAGE 1 OF 1

ANALYSIS R EST AND CHAIN-OF-CUS TODY RECORD

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11/6/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
1 LB3076	WATER	11/5/09 0930	~~3 VOA Vial~~	~~40ml~~	HCL	~~VOCs by 8260~~		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		~~3 VOA Vial~~	~~40ml~~	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:

Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:

Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:

Normal: X Rush: ___

Level of QC Required:

Definitive: X Project Specific: ___

1. Relinquished by:	Date: 11/6/09 Time: 1430	1. Received by:	Date: Time:
2. Relinquished by:	Date: 11/7/09 Time: 930	2. Received by: Accutest	Date: 11/7/09 Time: 9:30
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 1 cooler

4.0 4.2 5.0 4.6 3.2 3.4 3.6
5.0 4.8 4.2 3.0 2.0

F69338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW~~B~~ 1106 09ACCT

PAGE 1 OF 1

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11/6/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
1 LB3076-MSD	WATER	11/5/09 0930	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		~~3 VOA Vial~~	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by:	Date: 11/06/09 Time: 1430	1. Received by:	Date: Time:
2. Relinquished by:	Date: 11/7/09 Time: 930	2. Received by: CWR / Accutest	Date: 11/7/09 Time: 930
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 1 cooler

4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0
4.8 4.2 3.0 2.0

A69338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW30 11061 09ACCT

PAGE 1 OF 1

Shaw™
Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11/6/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
1 LB3076-MS	WATER	11/5/09 0930	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
~~WATER~~ CPS			~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~Explosives by 8330~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Total TAL Metals/Hardness by 6010B/7470A~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~ CPS	~~Dissolved TAL Metals by 6010B/7470A~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~TCL SVOCs by 8270C~~		
			~~1 - HDPE~~	~~500 mL~~	~~H2SO4~~	~~Nitrate~~		
			~~1 - HDPE~~	~~500 mL~~	~~NaOH~~	~~Cyanide by 9010/9012~~		
			~~1 - HDPE~~	~~1 L~~	~~Cool~~	~~Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride~~		
		CPS						

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: [signature]	Date: 11/6/09 Time: 1430	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/7/09 Time: 930	2. Received by: [signature] / Accutest	Date: 11/7/09 Time: 930
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 1 cooler

4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

F69338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW10 1106 09ACCT

PAGE 1 OF 1

Shaw™
Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11/6/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
2 RC3084	WATER	11-5-09 / 0830	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~ GW		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: E W Weaver	Date: 11-6-09 Time: 1200	1. Received by: fx	Date: Time:
2. Relinquished by: fx	Date: 11/7/09 Time: 930	2. Received by: Cl Accutest	Date: 11/7/05 Time: 930
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

F69338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW1 06 09ACCT

PAGE ___ OF ___

Shaw™
Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-6-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
3 AP3073	WATER	11-6-09 0945	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
4 Trip Blank (prepared by lab)	WATER	11-6-09 1130	3 VOA Vial	40ml	HCL	VOCs by 8260		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~Explosives by 8330~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Total TAL Metals/Hardness by 6010B/7470A~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Dissolved TAL Metals by 6010B/7470A~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~TCL SVOCs by 8270C~~		
			~~1 - HDPE~~	~~500 mL~~	~~H2SO4~~	~~Nitrate~~		
			~~1 - HDPE~~	~~500 mL~~	~~NaOH~~	~~Cyanide by 9010/9012~~		
			~~1 - HDPE~~	~~1 L~~	~~Cool~~	~~Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride~~		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: E. W. Weaver	Date: 11-6-09 Time: 1200	1. Received by: Fx	Date: Time:
2. Relinquished by: Fx	Date: 11/7/09 Time: 930	2. Received by: Carl Accutest	Date: 11/7/09 Time: 9:30
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

F69338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW10 1106 09ACCT

PAGE 1 OF 1

Shaw™
Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11/6/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
5 AP3070	WATER	11/4/09 1700	~~3-VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		3-VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by:	Date: 11/6/09 Time: 1430	1. Received by:	Date: Time:
2. Relinquished by:	Date: 11/7/09 Time: 9:30	2. Received by: Accutest	Date: 11/7/09 Time: 9:30
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 1 cooler 4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

F69338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

Shaw™
Shaw E & I, Inc.

REFERENCE COC NO.: PW11 06 09ACCT

PAGE 1 OF 2

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11/6/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
6 LB 3077	WATER	11/5/09 0930	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
LB 3080	WATER	11/3/09 1610	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
1 LB 3076-MSD		11/5/09 0930	3 VOA Vial	40 ml	HCL	VOCs by 8260		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: [signature]	Date: 11/6/09 Time: 1430	1. Received by: [signature]	Date: Time:
2. Relinquished by: [signature]	Date: 11/7/09 Time: 930	2. Received by: [signature] / Accutest	Date: 11/7/09 Time: 930
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 1 cooler 4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

F69338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW10 06 09ACCT

PAGE 1 OF 1

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-6-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
7 LBA-ER-1109	WATER	11-4-09 1645	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: ____

Sample Disposal:
Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:
Normal: X Rush: ____

Level of QC Required:
Definitive: X Project Specific: ____

1. Relinquished by: [signature]	Date: 11/6/09 Time: 1630	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/7/09 Time: 930	2. Received by: [signature] / Accutest	Date: 11/7/09 Time: 930
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:
4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

F69338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW1 06 09ACCT

PAGE ___ OF ___

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-6-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
11 LBA-ER 1109	WATER	11-4-09 1700	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
7 WWTP1-ER 1109	WATER	11-4-09 1645	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:

Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:

Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:

Normal: X Rush: ___

Level of QC Required:

Definitive: X Project Specific: ___

1. Relinquished by: C. S	Date: 11/6/09 Time: 1430	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/7/09 Time: 930	2. Received by: Clark Accutest	Date: 11/7/09 Time: 9:30
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 3.0

P69338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW11 09ACCT

PAGE 1 OF 1

Shaw™

Shaw E & I, Inc.

Sample Team Member:
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133767
Required Report Date: 21 DAYS

Sample Shipment Date:
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
8 DI-Water-Blk1	WATER	11-4-09 1630	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	125 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	125 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush:

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: [signature]	Date: 11/6/09 Time: 1430	1. Received by: [signature]	Date: Time:
2. Relinquished by: [signature]	Date: 11/7/09 Time: 930	2. Received by: [signature] Accutest	Date: 11/7/09 Time: 930
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

FL69338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW1~~0~~ 1106 09ACCT

PAGE ___ OF ___

Shaw™
Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11/6/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
8 DI-Water BLK1	WATER	11-4-09 1630	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~ EW		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: [signature]	Date: 11/6/09 Time: 1436	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/7/09 Time: 9:30	2. Received by: [signature] / Accutest	Date: 11/7/09 Time: 930
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

A69338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW10 06 09ACCT

PAGE ___ OF ___

Shaw™
Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-6-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
2 RC3084	WATER	11-5-09 / 0830	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
9 BEDGW-001-ER1	WATER	11-6-09 / 0830	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: Eric W. Weaver	Date: 11-6-09 Time: 1200	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/7/09 Time: 930	2. Received by: Accutest	Date: 11/7/09 Time: 930
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

F69334

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW10 06 09ACCT

PAGE ___ OF ___

Shaw™
Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-6-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
9 BEDGW-001-ER1	WATER	11-6-09 0830	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: C. W. Weaver	Date: 11-6-09 Time: 1200	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/7/09 Time: 9:80	2. Received by: Carl Accutest	Date: 11/7/09 Time: 930
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

A69338

PW1106

REFERENCE COC NO.: ~~PB10~~ 09ACCT

PAGE 2 OF 2

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11/6/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
1	LB3076 - MS	water	11/5/09 0930	3 VOA vial	40 ml	HCL	VOCs by 8260		
1	LB3076		11/5/09 0930						
	LB3075		11/4/09 0945						
10	AP3071		11/6/09 0920						
5	AP3070		11/4/09 1700						
12	AP3072		11/6/09 0830						
13	trip blank	water	11/3/09 1200	3 VOA vial	40 ml	HCL	VOCs by 8260		

Special Instructions:

Possible Hazard Identification:

Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:

Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:

Normal: X Rush: ___

Level of QC Required:

Definitive: X Project Specific: ___

1. Relinquished by:	Date: 11/6/09 Time: 1430	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/7/09 Time: 930	2. Received by: Accutest	Date: 11/7/09 Time: 930
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 1 cooler 4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

F69338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW0110 06 09ACCT

PAGE 1 OF 1

Shaw™
Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11/6/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
10 AP3071	WATER	11/6/09 0920	~~3 VOA Vial~~	~~40ml~~	~~HCL~~ CPS	~~VOCs by 8260~~		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
~~CPS~~	~~WATER~~		~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~Explosives by 8330~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Total TAL Metals/Hardness by 6010B/7470A~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Dissolved TAL Metals by 6010B/7470A~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~TCL SVOCs by 8270C~~		
			~~1 - HDPE~~	~~500 mL~~	~~H2SO4~~	~~Nitrate~~		
			~~1 - HDPE~~	~~500 mL~~	~~NaOH~~	~~Cyanide by 9010/9012~~		
			~~1 - HDPE~~	~~1 L~~	~~Cool~~	~~Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride~~		
			CPS					

Special Instructions:

Possible Hazard Identification:
Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: ____

Sample Disposal:
Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:
Normal: X Rush: ____

Level of QC Required:
Definitive: X Project Specific: ____

1. Relinquished by: CPS	Date: 11/6/09 Time: 1430	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/7/09 Time: 930	2. Received by: CN/Accutest	Date: 11/7/09 Time: 930
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 1 cooler 4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

F64338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW1 EW1 06 09ACCT

PAGE 1 OF 1

Shaw™
Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-6-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
11 LBA-ER-1109	WATER	11-4-09 1700	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~ EW		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: [signature]	Date: 11/6/09 Time: 1430	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/7/09 Time: 930	2. Received by: [signature] Accutest	Date: 11/7/09 Time: 930
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

F69338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW~~08~~ 1106 09ACCT

PAGE 1 OF 1

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11/6/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
12 AP3072	WATER	11/6/09 0830	~~3 VOA Vial~~	~~40ml~~	~~HCL~~ CB	~~VOCs by 8260~~		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			~~1 - HDPE~~	~~500 mL~~	~~NaOH~~	~~Cyanide by 9010/9012~~ CB		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
~~WATER~~ CB		CB	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~Explosives by 8330~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Total TAL Metals/Hardness by 6010B/7470A~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Dissolved TAL Metals by 6010B/7470A~~ CB		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~TCL SVOCs by 8270C~~		
			~~1 - HDPE~~	~~500 mL~~	~~H2SO4~~	~~Nitrate~~		
			~~1 - HDPE~~	~~500 mL~~	~~NaOH~~	~~Cyanide by 9010/9012~~		
			~~1 - HDPE~~	~~1 L~~	~~Cool~~	~~Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride~~		
		CB						

Special Instructions:

Possible Hazard Identification:

Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:

Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:

Normal: X Rush: ___

Level of QC Required:

Definitive: X Project Specific: ___

1. Relinquished by: CB	Date: CB ~~FX~~ 11/6/09	1. Received by: FX	Date:
	Time: 1430		Time:
2. Relinquished by: FX	Date: 11/7/09	2. Received by: Accutest	Date: 11/7/09
	Time: 930		Time: 930
3. Relinquished by:	Date:	2. Received by:	Date:
	Time:		Time:

Comments: 1 cooler 4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

F109502

REFERENCE COC NO.: PW11 13 09ACCT

PAGE 1 OF 1

Shaw™

Shaw E & I, Inc.

Sample Team Member: Joseph Bilte, Chris Strzempka
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: ~~133767~~ 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11/13/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684 4331 1940

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
6 WW 3034	WATER	11/12/09 0900	~~3 VOA Vial~~	~~40ml~~	~~HCL~~ CPS	~~VOCs by 8260~~		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	125 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
~~CPS~~	~~WATER~~		~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~Explosives by 8330~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Total TAL Metals by 6010B/7470A~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Dissolved TAL Metals by 6010B/7470A~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~TCL SVOCs by 8270C~~		
			~~1 - HDPE~~	~~125 mL~~	~~H2SO4~~	~~Nitrate~~ CB		
			~~1 - HDPE~~	~~500 mL~~	~~NaOH~~	~~Cyanide by 9010/9012~~		
			~~1 - HDPE~~	~~1 L~~	~~Cool~~	~~Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride~~		

Special Instructions:

Possible Hazard Identification:

Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: ____

Sample Disposal:

Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:

Normal: X Rush: ____

Level of QC Required:

Definitive: X Project Specific: ____

1. Relinquished by: CB	Date: 11/13/09 Time: 1200	1. Received by: fx	Date: Time:
2. Relinquished by: fx	Date: Time:	2. Received by: [signature]	Date: 11-14-09 Time: 0900
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 1 cooler

4.8 5.6 5.4 ~~5.2~~ 4.2 4.4

3.8 5.0 5.4 5.4

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

F69502

REFERENCE COC NO.: EW1 PW1 13 09ACCT

PAGE 1 OF 1

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-13-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 9664 4331 1990

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
7 WW3035	WATER	11-13-09 0850	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~ EW		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
~~CRS~~	~~WATER~~		~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~Explosives by 8330~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Total TAL Metals/Hardness by 6010B/7470A~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Dissolved TAL Metals by 6010B/7470A~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~ CRS	~~TCL SVOCs by 8270C~~		
			~~1 - HDPE~~	~~500 mL~~	~~H2SO4~~	~~Nitrate~~		
			~~1 - HDPE~~	~~500 mL~~	~~NaOH~~	~~Cyanide by 9010/9012~~		
			~~1 - HDPE~~	~~1 L~~	~~Cool~~	~~Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride~~		

Special Instructions:

Possible Hazard Identification:

Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: X

Sample Disposal:

Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:

Normal: X Rush: ____

Level of QC Required:

Definitive: X Project Specific: ____

1. Relinquished by: Eric W. Weaver	Date: 11-13-09 Time: 1200	1. Received by:	Date: Time:
2. Relinquished by:	Date: Time:	2. Received by: Accutest	Date: 11/14/09 Time: 09:20
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

485.6 5.4 4.2 4.4
5.0 7.8 5.4 5.4

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

F69502

REFERENCE COC NO.: EW1 PW1 13 09ACCT

PAGE 1 OF 1

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-13-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684 4331 1940

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
8 WW3037	WATER	11-12-09 1535	3 VOA Vial	40ml	HCL	VOCs by 8260 EW		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: E. W. Weaver	Date: 11-13-09 Time: 1200	1. Received by:	Date: Time:
2. Relinquished by:	Date: Time:	2. Received by:	Date: 11/14/09 Time: 0900
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

485654424
3.8 5.0 5.4 5.4

F69502

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB~~10~~ 1113 09ACCT

PAGE 1 OF 2

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11/13/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8694 4331 1990

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
6	WW 3034	water	11/12/09, 0900	3 VOA vial	40 ml	HCL	VOCs by 8260		
11	Trip Blank	water	11/13/09, 1200	2 VOA vial	40 ml	HCL	VOCs by 8260		
5	WWTP3-ER1109	water	11/11/09, 1630	3 VOA vial	40 ml	HCL	VOCs by 8260		
2	WW3032	water	11/11/09, 1315	3 VOA vial	40 ml	HCL	VOCs by 8260		
4	WW 3033	water	11/12/09, 0930	3 VOA vial	40 ml	HCL	VOCs by 8260		
9	AP 3075	water	11/13/09, 0900	2 Amber	1 L	Cool	Explosives by 8330		
10	AP 3076	water	11/13/09, 0830	2 Amber	1 L	Cool	Explosives by 8330		
7	WW3035	water	11/13/09, 0850	3 VOA vial	40 ml	HCL	VOCs by 8330		
1	WW3036	water	11/13/09, 1010	3 VOA vial	40 ml	HCL	VOCs by 8330		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by:	Date: 11/13/09 Time: 1200	1. Received by:	Date: Time:
2. Relinquished by:	Date: Time:	2. Received by:	Date: 11.14.09 Time: 0940
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 1 Cooler

4.8 3.8 5.0 5.4 5.4
5.4 4.2 4.4 5.6

SLA

P69502

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PBIX 1113 09ACCT

PAGE 2 OF 2

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11/13/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684 4331 1990

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
8 WW3037	water	11/12/09, 1535	3 VOA vial	40 ml	HCL	VOAs by 8260		
3 SL3094	water	11/11/09, 1638	3 VOA vial	40 ml	HCL	VOAs by 8260		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by:	Date: 11/13/09 Time: 200	1. Received by:	Date: Time:
2. Relinquished by:	Date: Time:	2. Received by: Accutest	Date: 11-14-09 Time: 0900
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 1 cooler

4.8 5.6 5.4 4.2 4.4

3.8 5.0 5.4 5.4

APPENDIX L

COMMENTS AND RESPONSES

RESPONSE TO COMMENTS
OHIO ENVIRONMENTAL PROTECTION AGENCY
POWERHOUSE 2 ASH PITS SITE CHARACTERIZATION REPORT
FORMER PLUM BROOK ORDNANCE WORKS, SANDUSKY, OHIO
(Report dated March 2010)

Reference: Comments from Paul Jayko, OEPA, email dated 06 May 2010.

Comment 1: We have finished looking at Shaw's Powerhouse 2 Ash Pit Site Characterization Report, received March 30, 2010, and have no substantive comments on the document.

Response 1: Accepted.