

**US Army Corps
of Engineers**

HUNTSVILLE ENGINEERING
AND SUPPORT CENTER

Defense Environmental Restoration Program
For
Formerly Used Defense Sites

Ordnance and Explosive Waste Chemical Warfare Materials

ARCHIVES SEARCH REPORT

PLUM BROOK ORD WORKS

SANDUSKY, Ohio

Project No. G05OH001806

FINAL – 9 MARCH 2007

Prepared by
US Army Corps of Engineers
ST. LOUIS DISTRICT



DEPARTMENT OF THE ARMY
HUNTSVILLE CENTER, CORPS OF ENGINEERS
P.O. BOX 1600
HUNTSVILLE, ALABAMA 35807-4301

REPLY TO
ATTENTION OF:

CEHNC-OE-CX

09 March 2007

MEMORANDUM FOR Commander, US Army Engineering District, Louisville
(CELRL-PM-M/Walt Perro), PO Box 59, Louisville, KY 40201-0059

SUBJECT: Defense Environmental Restoration Program, Formerly Used Defense Sites,
Ordnance and Explosives, Chemical Warfare Materials, Archives Search Report (ASR),
Plum Brook Ordnance Works, Sandusky, OH, Project No. G05OH001806

1. Enclosed is the final ASR Technical Advisory Group (TAG) package for the above subject site. In accordance with the TAG review, a RAC 5 has been assigned.
2. Remove the existing "draft" cover from ASR. Replace with enclosed cover and package.
3. A RAC 5 will be entered into FUDSMIS by CEHNC.
4. The District needs to ensure ASR is entered into PIRS.
5. If you disagree or have any questions concerning the action, please call me at 256-895-1797 or DSN 760-1767.

FOR THE DIRECTOR:

DANNY R. MARDIS
Archives Search Report Manager

Encl

CF:
Commander, US Army Engineer District, St Louis (CEMVS-EC-P/Thomas Freeman),
1212 Spruce Street, St Louis, MO 63103-2822 (w/encls)

ED-SY-O
ED
OE-CX
OE-S
OE

DISCLAIMER

The purpose of this archives search report is to present the findings of research undertaken for this specific Formerly Used Defense Site (FUDS) property. All of the factual information found during the research is included in this "Findings" volume. Reference may be made in this volume to a separate "Conclusions and Recommendations" volume. In some instances, the Conclusions and Recommendations volume contained recommendations of individuals performing the analysis that may contain inferences or conjecture not supported in subsequent reviews. Because these statements are not always factual in nature, the U.S. Army Corps of Engineers has determined the Conclusions and Recommendations volumes, where they exist, do not necessarily represent the opinion of the USACE and are not available for public release.

ORDNANCE AND EXPLOSIVE WASTE
CHEMICAL WARFARE MATERIALS
ARCHIVES SEARCH REPORT
For the formerly
PLUMBROOK ORDNANCE WORKS
Sandusky, Ohio
Site Number – G05OH001806

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1.0 Introduction

1.1 Authority

In 1986, Congress established the Defense Environmental Restoration Program (DERP) at 10 United State Code (USC) 2701 et seq. This program directed the Secretary of Defense to “carry out a program of environmental restoration at facilities under the jurisdiction of the Secretary.”

In March 1990, the Environmental Protection Agency (EPA) issued a revised National Contingency Plan (NCP). Under 40 Code of Federal Regulations (CFR) 300.120, EPA designated the Department of the Defense (DoD) to be the removal response authority for incidents involving DoD military weapons and munitions under the jurisdiction, custody and control of DoD.

Since the beginning of this program, the U.S. Army Corps of Engineers acts as the agency responsible for environmental restoration at Formerly Used Defense Sites (FUDS). Beginning in 1990, the U.S. Army Engineering and Support Center, Huntsville (USAESCH) serves as the Center of Expertise (CX) and Design Center for Ordnance and Explosives. In cooperation with The USAESCH, the U.S. Army Corps of Engineers, St. Louis District, prepares Archives Search Reports (ASR) in support of environmental restoration at active DoD installations, Formerly Used Defense Sites (FUDS) and installation transitions under Base Realignment and Closure (BRAC) recommendations.

1.2 Subject

Plumbrook Ordnance Works is located 4.7 miles south of Sandusky, Ohio. Originally consisting of 9,071.06 acres, the site lies in the townships of Huron, Milan, Perkins, and Oxford in Erie County. Constructed in 1940 for the manufacture of explosives during World War 11, it was subsequently renamed the Plum Brook Depot Activity and was also referred to as the Erie Ordnance Depot.

1.3 Purpose

This Archives Search Report (ASR) compiles information obtained through historical research at various archives and records holding facilities, interviews with persons associated with the site or its operations, and personal visits to the site. All efforts were directed towards determining possible use or disposal of chemical warfare materials on the site. Particular emphasis was placed on establishing the type (agent), munitions or container, quantities and area of disposal. Information obtained during this process was used in developing recommendations for further actions at the site.

1.4 Scope

Excluding lands controlled by NASA, the remaining area of the former Plum Brook Ordnance Works site was considered in assessing the potential for chemical warfare material contamination. It is designated as DERP-FUDS OEW Site No. G050H001806.

2.0 Previous Site Investigations

2.1 Findings and Determination

Under the Defense Environmental Restoration Program (DERP), the Huntington District prepared a Findings and Determination of Eligibility (FDE), dated 1 April 1992, and approved 24 December 1992, for Plum Brook Ordnance Works (PBOW). The FDE indicates that the site is comprised of 9,071.06 acres of land (9020.66 acres fee and 50.40 acres easement) acquired by purchase and condemnation from various owners in 1941. The FDE indicates that the site was disposed portions of the lands beginning in 1946 when the War Assets Administration excepted custody of all but 2800.46 acres which constituted the magazine area. In 1958, the Department of the Army transmitted a copy of a permit entered into by NACA (predecessor of NASA) and Army, by which NACA accepted PBOW "subject to existing contamination without fencing of such areas by the Department of the Army." The FDE further provides that the SF 118, excessing 3180.33 acres fee and 50.60 acres easement, and subsequently permitted to NACA, included the proviso that "detailed information regarding contamination is not being furnished as it is understood that NACA is agreeable to the transfer of the installation subject to contamination." The Department of the Army currently retains Parcel Number 62, acreage unknown, for use as a U.S. Army Reserve Center. The report determined that the site, excluding the 3685.977 acres of NASA's research center, was eligible for the Defense Environmental Restoration Program for Formerly Used Defense Sites under 10 U.S.C. 2701 et seq.

Two projects were proposed for the site. One is a HTW project (G05OH001803), consisting of a Remedial Investigation/Feasibility Study (RI/FS) for contaminated areas such as TNT deposits on the site. The other, an OEW project (G05OH001806), involves an on-site inspection and preparation of a report on potential ordnance and explosive waste hazards that may exist. Both projects were authorized by USACE on 13 January 1993.

2.2 Confirmation Study

A Confirmation Study was conducted by the Nashville District in February 1990. Its purpose was to determine if chemical contamination from previous DOD-related activities was present and if groundwater degradation was resulting. The scope of the contamination evaluation included a records review and evaluation, soils and water sampling/analysis/characterization, a site survey, and completion of hazardous ranking forms (utilizing the Navy's HRS scoring system). The resultant hazardous ranking score for chemical contamination was 0 based on no users of the contaminated aquifer. The study issues a caveat that this score may not be accurate when compared with the currently required EPA's HRS scoring method.

The study found extensive contamination of both soil and groundwater. It concluded that no fire or explosion hazard exist as a result of the contamination. The Chemical Contamination

Summary is attached at Appendix C.

2.3 HTW Remedial Investigation and Feasibility Study

The RI/FS for HTW is currently being conducted by the Nashville District, Corps of Engineers.

2.4 NASA Studies

Due to the joint liabilities, as a responsible party for the contamination/remediation of the site, NASA conducted a Preliminary Assessment dated June 1991 and performed a site inspection in October 1993. A copy of applicable sections of both these reports is included at Appendix C.

3.0 Site and Site Area Description

3.1 Location

The Plum Brook site is located in Erie County, Ohio, approximately four miles south of Sandusky, Ohio, in Perkins and Oxford Township. It is comprised of 9,071.06 acres of land (9020.66 acres fee and 50.40 acres easement) acquired by purchase and condemnation from various owners in 1941. The location of Plum Brook is spread over two quadrangle maps with the plant located in Township 6 North, Range 23 West. Sections are not delineated on either quadrangle. The center of the site is located at 41 degrees 22 minutes 30 seconds North and 82 degrees 40 minutes 30 seconds West.

3.2 Past Uses

The area known as Plum Brook Ordnance Works (PBOW) was established in 1941 for the purpose of manufacturing trinitrotoluene (TNT), dinitrotoluene (DNT), pentolite, and nitric and sulfuric acids. Built by E. B. Badger and Sons Company, the facility was operated under contract by the Trojan Powder Company. Production of explosives ceased two weeks after V-J Day, having manufactured in excess of one billion pounds of explosives during the four-year operating period.

By September 1945, the entire Ordnance Inspection Department was abolished. Decontamination of TNT, acid, pentolite, and DNT manufacturing lines was completed during the last quarter of 1945. On 17 December 1945, the physical custody of the plant was transferred from Trojan to the Ordnance Department. The U.S. Corps of Engineers assumed responsibility for maintenance and custodial duties until September 1946 when the property was transferred to the War Assets Administration (predecessor to the Government Services Administration), after it was certified by the U.S. Army to be decontaminated.

The National Aeronautics and Space Administration acquired the Plum Brook Ordnance Works in March 1963 and is presently using the site.

3.3 Current Uses

The site lies in an area that is primarily rural and agricultural with low population density. The NASA Lewis Research Center occupies a majority of the former ordnance works. The Department of the Army maintains a reserve center on the westernmost portion of the site. The remainder of the former installation is in private ownership with the vast majority being cultivated. A tract on the northern boundary is owned by the Perkins Board of Education and is utilized as a bus maintenance facility.

3.4 Demographics of the Area

3.4.1 Center of Activity

Plum Brook Ordnance Plant is located in the vicinity of Sandusky, Ohio. This city has numerous centers of activity such as the Sandusky Library, Follett House Museum, Merry-Go-Round Museum, Sandusky Cultural Center, The Bay Gallery, State Theatre, Sandusky Mall, Providence Hospital, Firelands Community Hospital, Perkins Public Schools, Sandusky City Schools, and Southeastern Business College.

3.4.2 Population Density

City: Sandusky	County: Erie
Area: 14.9 sq.mi.	Area: 264 sq.mi.
POP: 29,764	POP: 76,779
PD: 1,997 people per sq. mi.	PD: 290 people per sq. mi.

Population and area are based on the U.S. Department of Commerce, Bureau of the Census, 1990 statistics, and telephone interviews.

3.4.3 Types of Businesses

A review of both telephone interviews and County Business Patterns (1990) assisted in developing a business profile of the area. Sandusky is a diversified community. Sandusky Mall, San Marco Plaza, Sandusky Plaza, Perkins Plaza and Park Place Plaza are the commercialized areas that include retail, services and trade establishments. Light industry is established in the area. Industrial Nut Corporation, is the manufacturer of special and lock nuts. The Sandusky plastics plant, owned by Ford Motor company, manufactures and supplies headlamps, signal lamps, air handling systems, and fuel vapor containment systems.

3.4.4 Types of Industry

See item #3.

3.4.5 Types of Housing

Housing in the Sandusky area is composed of single and multi-family housing.

3.4.6 New Development in the Area

Development in the Sandusky area is associated with residential and commercial development. Numerous residential areas have been established along the lake. In addition, of the five shopping areas, three have been established in the past five years.



**PLUMBROOK ORDNANCE WORKS
 ERIE COUNTY
 SANDUSKY, OHIO
 DERP-FUDS# G050H001806
 PROJECT LOCATION MAP**

PROJ. DATE: DEC 1993	DATE OF MAP: 1993
22-DEC-1993 09:30	517225G/MSF/D0018

NOT TO SCALE

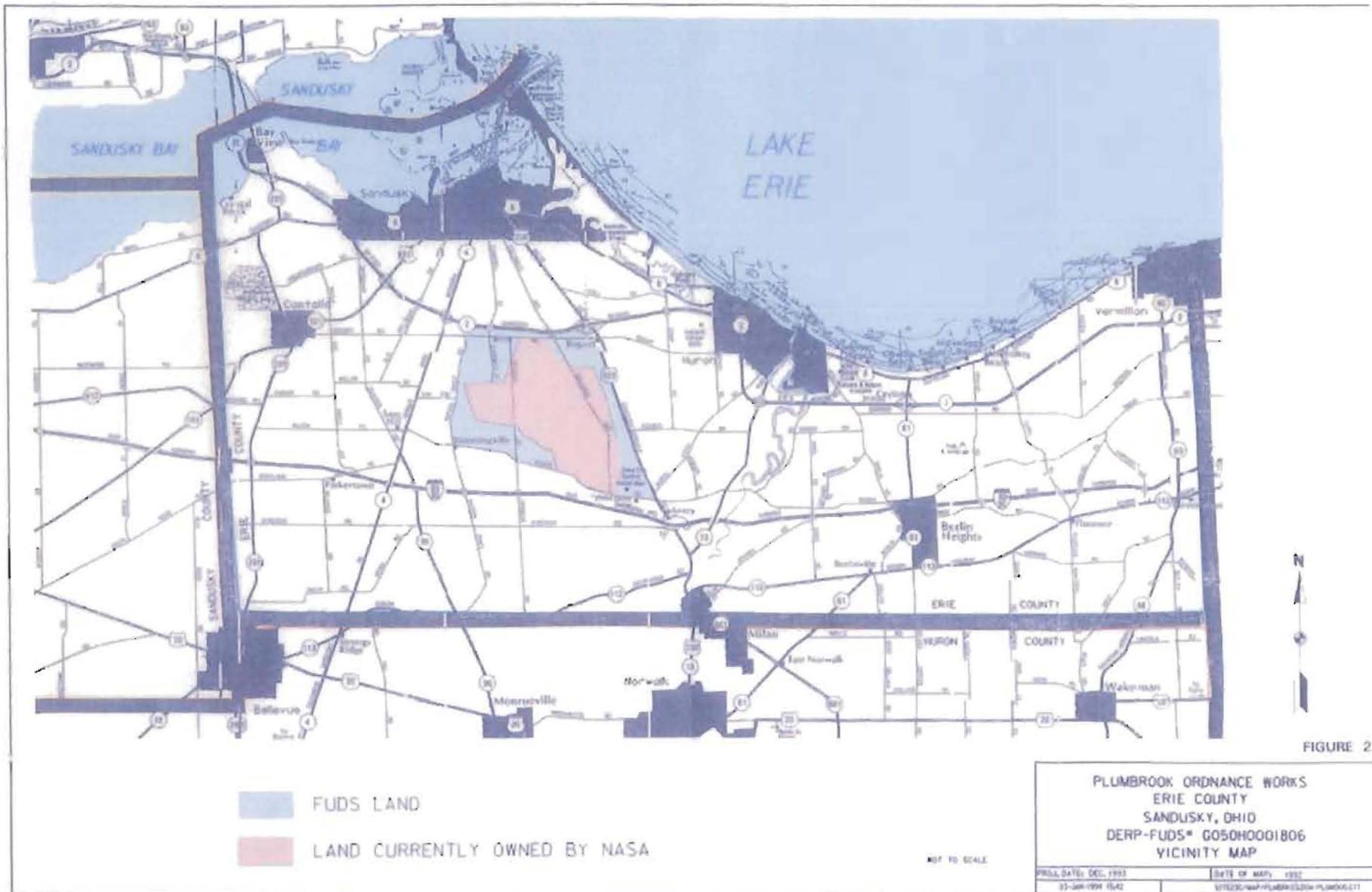


FIGURE 2

3.4.7 Cross-section of the Population

The ancestry of Sandusky is diverse. The community is largely composed of English, German, and Irish descendants. There are approximately 12,053 households with a median household income of \$22,532. In addition, there are 13,416 housing units in Sandusky. The work force of the Erie county is broken down into the following: manufacturing, 15.4%; non-manufacturing, 79.7%; agriculture, 1.3%; and other non-agriculture 3.6%.

4.0 Physical Characteristics of the Site

4.1 Geology\Physiography

Although the Plum Brook Ordnance Works is located within the Till Plain Section of the Central Lowlands province, the site lies within the lacustrine plain of ancient Lake Erie. The site favors the topography of the Great Lakes Section rather than the Till Plain Section. The Great Lakes Section topography characterized by large lakes, (four of the Great Lakes), and thousands of smaller lakes. The site is situated on an old glacial lacustrine plain of ancient Lake Maumee. Lake Maumee was the forerunner of present Lake Erie. The basins now occupied by the Great Lakes were weak rock lowlands in pre-glacial time. It appears that intense, local, glacial scouring deepened these lowlands considerably. This deepening, along with the depression of the area under the ice sheet provided the proper conditions for ice marginal lakes to develop. As the cycles of the four glaciations occurred, the area was repeatedly covered by various ice marginal lakes, the first being Lake Maumee (Thornbury, 1965). The glacial deposits are mostly clay-rich lacustrine and till. The drift is commonly stratified and has an average thickness of 50 feet near the site.

Below the glacial deposits, Middle Devonian strata of the Detroit River Group and younger units including the Columbus Limestone are the principal near-surface rocks. These units provide a karst region in western Erie County, Ohio.

4.2 Soils

The site surficial soils at the Plum Brook Ordnance Works consist of deep, nearly level to moderately sloping, well drained to moderately well drained soils. They have a subsoil of silty clayey fine sand and are mostly found on hills and ridges.

These soils formed in very fine sand deposited by the wind and water as beaches, sandbars, or dunes. Therefore, both wind erosion and sheet and rill erosion by water present a hazard.

4.3 Hydrology

The site is located approximately 4.0 miles south of Lake Erie. Pipe Creek, Ransom Ditch, Taylor Ditch, Hemming Ditch, Plum Brook, Lindsley Ditch, Schlessman Ditch, Scheid Ditch, Kuebelar Ditch, Olemacher Ditch, Sherer Ditch, and Beutal Ditch drain storm runoff from the site north to Lake Erie.

4.3.1 Ground Water

Below the glacial deposits, Middle Devonian strata of the Detroit River Group and younger units including the Columbus Limestone are the principal near-surface rocks. These units provide a karst region in western Erie County, Ohio.

Groundwater is available from two sources: the drift deposits and the karst aquifer. The variable thickness of drift above the carbonate aquifer, which is locally thin (<20') makes it an unreliable source of groundwater.

Potentiometric contours indicate that flow is diffuse flow (rather than conduit flow common in karst areas), towards Sandusky Bay. Reports that some parts of the surface of Sandusky Bay remain unfrozen in winter indicate that the bay also could receive subsurface groundwater discharge. Similar water-level altitudes in the carbonate aquifer and Sandusky Bay indicate a hydraulic connection between the bay and the aquifer.

Transmissivity values of the carbonate aquifer in nearby Sandusky County range from 3500 ft²/d at the northern end of Sandusky County to 13,000 ft²/d at a well in Green Springs, which is southwest of the site area.

Recharge to the carbonate aquifer is by three primary processes:

1. Precipitation leaking through the semi-confining layer of drift overlying the carbonate rocks.
2. Infiltration by surface water and precipitation in areas where the drift is thin or absent.
3. Induced infiltration of surface water through riverbeds and streambeds as a result of groundwater withdrawals (Breen and Dumouchelle, 1991).

4.4 Weather

The climate is continental in character but with strong modifying influences by Lake Erie. West to northerly winds blowing off Lake Erie tend to lower daily high temperatures in summer and raise temperatures in winter. In this area, summers are moderately warm and humid with occasional days when temperatures exceed 90 degrees. Winters are relatively cold and cloudy with an average of 5 days with sub-zero temperatures. Weather changes occur every few days from the passing of cold fronts.

The daily range in temperature is usually greatest in late summer and least in winter. Annual extremes in temperature normally occur soon after late June and December. Maximum temperatures below freezing occur most often in December, January, and February. Temperatures of 100 degrees or higher are rare. On the average, freezing temperatures in fall are first recorded in October while the last freezing temperature in spring occurs in April.

As is characteristic of continental climates, precipitation varies widely from year to year. However, it is normally abundant and well distributed throughout the year with spring being the wettest season. Showers and thunderstorms account for most of the rainfall during the growing season. Thunderstorms are most frequent from April through August. Damaging winds of 50 mph or greater are usually associated with these thunderstorms.

Climatological data for the area are summarized in TABLE 1. Data was collected at the National Weather Service meteorological station at Sandusky, Ohio and the Cleveland Airport.

CLIMATOLOGICAL DATA FOR
SANDUSKY, OHIO AND CLEVELAND, OHIO
TABLE 1

Month	Temperature ¹		Precipitation ¹	Wind ²	
	Average Minimum	Average Maximum		Average Speed	Average Direction
	(°F)	(°F)	(Inches)	Miles/Hour	
January	19.0	33.0	2.04	12.3	SW
February	21.0	35.0	1.90	11.9	S
March	29.0	45.0	2.68	12.2	W
April	40.0	57.0	3.06	11.5	S
May	51.0	69.0	3.51	10.0	S
June	61.0	79.0	4.11	9.3	S
July	65.0	83.0	3.67	8.6	S
August	64.0	82.0	3.38	8.3	S
September	56.0	75.0	2.95	9.0	S
October	46.0	63.0	2.12	9.9	S
November	35.0	49.0	2.55	11.8	S
December	24.0	37.0	2.36	12.1	S
Annual	42.0	59.0	33.99	10.6	S

¹ SANDUSKY, OHIO

² CLEVELAND, OHIO

4.5 Ecology

The information provided for this site has been compiled from the U. S. Fish and Wildlife Service and the Ohio Department of Natural Resources.

The U.S. Fish and Wildlife Service lists the Indiana bat (Myotis sodalis), bald eagle (Haliaeetus leucocephalus), and lakeside daisy (Hymenoxys acaulis var. glabra) as Federally endangered or threatened species that may be found in Erie County. Federal candidate species include: Lake Erie water snake (Nerodia sipedon insularum), Kirtland's snake (Clonophis kirtlandii), Blanding's turtle (Emydoidea blandingii), and common tern (Sterna hirundo).

State listed threatened, endangered, or sensitive species found to occur near Plumbrook Ordnance Works include: Ashy sunflower (Helianthus mollis), lance-leaved violet (Viola lanceolata), Prairie false indigo (Baptisia lactea), round-fruited hedge-hyssop (Gratiola virginiana), grooved flax (Linum sulcatum), field sedge (Carex conoidea), twisted yellow-eyed-grass (Xyris torta), Virginia meadow-beauty (Rhexia virginica), dwarf bulrush (Hemicarpha micrantha), tall St. John's-wort (Hypericum majus), broad-winged sedge (Carex alata), and upland sandpiper (Bartramia longicauda).

No additional information on the occurrence of rare or endangered species or natural communities is known at this time. This does not mean that other state or federally-listed species may not be present within the areas of interest. An on site inspection by appropriate state and federal personnel may be necessary to verify the presence, absence or location of listed species, or natural communities if remedial action is recommended as part of the final ASR.

5.0 Real Estate

5.1 Present Ownership

The Findings and Determination of Eligibility (FDE), cited in Paragraph 2.0, indicates that the former Plum Brook site was disposed of in "...several, fairly complicated stages." The disposal is summarized as follows:

- a. NASA Lewis Research Center maintains a 3685.977 acre installation.
- b. GSA controls several tracts totalling approximately 2090 acres.
- c. 46.023 acres was quitclaimed unto the Perkins Board of Education by the Secretary of Health, Education, and Welfare.
- d. In 1954 and 1983, an aggregate approximating 3250 acres were sold to third parties.

5.2 DOD Ownership

Based on data contained in the FDE:

"The Plum Brook Ordnance Works consisted originally of 9071.06 acres of land [9020.66 acres fee, 50.40 acres easement] acquired by purchase and condemnation from various owners in 1941."

5.3 Significant Past Ownership Other Than DOD

The only historically significant ownership with respect to possible contamination is found to be NASA, as documented in this report.

6.0 OEW/CWM Site Analysis

6.1 Historical Summary of OEW/CWM Activities

Plum Brook Ordnance Works (PBOW) was built in 1940 by E. B. Badger and Son under a government contract. Located 4.7 miles south of Sandusky, Ohio, the entire site consisted of 9,071.06 acres. Upon completion, the PBOW included 528 buildings with a total floor area of 1,069,957 square feet, of which 318,660 was dedicated to production.

The Trojan Powder Company, Allentown, PA, operated PBOW during World War II, manufacturing explosives. The works included production lines for trinitrotoluene (TNT), dinitrotoluene (DNT), pentolite, nitric, and sulfuric acids. Between December 1941 and December 1945 PBOW produced more than one billion pounds of ordnance. Per 24 hour day, the plant had the capacity to produce 900,000 pounds of TNT, 105,000 pounds of DNT, and 21,000 pounds of Pentolite. Auxiliary facilities for this production included: three acid areas for the production and concentration of nitric acid, and for the concentration of sulfuric acid; three power houses; a large maintenance area; a magazine area consisting of 99 igloo type magazines of 250,000 pounds capacity each; utility and service systems, including water supply and electrical systems, railroads, waste disposal, both process and domestic and overhead and underground process lines for steam, air and liquids, and an administration area.

Production ceased in August 1945, two weeks after V-J Day. The physical custody of the plant was transferred from Trojan to the Ordnance Department in December 1945. At this time PBOW was renamed the Plum Brook Depot. Portions of the depot were used as an ammunition storage facility for Erie Ordnance Depot. The Plum Brook Depot was placed in inactive status in 1961.

The land disposal occurred in several fairly complicated stages. At the end of World War II, continued use of the works by the Department of War was not contemplated, therefore the entire facility, except for 52.74 acres which was previously quitclaimed to the Baltimore and Ohio Railroad Company on 27 March 1943, was declared excess. Later, the Department of Army decided that it was best to withdraw the magazine area [2800.46 acres fee] from excess, and on 11 March 1946 this withdrawal was approved. The War Assets Administration (WAA) accepted custody of the remainder on 6 September 1946.

In 1947 the magazine area was redesignated the Plum Brook Depot Activity. It was to become known as the "retained area" and was not a part of the surplus to WAA. This acreage, also known as the Erie Ordnance Depot, was used for powder storage.

By the evidence of documents found at the Great Lakes Regional Branch of the National Archives and the National Personnel Records Center, post-war decontamination of the site was left incomplete. A report from 8 December 1948, by Francis H. Miles, Jr., details

considerable chemical contamination in and around the manufacturing buildings. Another document, a letter by Colonel Ronald B. Currens from 24 December 1957, states that decontamination activities were suspended but gives no reason. (See sections 6.2.2 and 6.2.5 for help in locating these documents.)

In June 1954 the Department of the Army reacquired 3180.33 acres ordnance works and 50.40 acres of easements. The rest of the original site, previously declared excess to WAA, was disposed of either to NASA or third party grantees.

A Use Agreement was obtained from the Department of the Army on 5 July 1956, for approximately 500 acres (Pentolite Area, Plum Brook Ordnance Works). The reactor facility was constructed on this site with National Advisory Committee for Aeronautics (NACA), C&E appropriation of Fiscal Years 1956, 1958, and 1960. On 22 January 1958 the balance of the land (2700 acres) and structures of PBOW was turned over to NASA (formerly NACA) under a Use Agreement from the Department of the Army. NASA constructed rocket research facilities on the site.

NASA acquired the ordnance works in March 1963 and is still using the site (6,453.5 acres). In April 1978 NASA declared as excess approximately 2,152 acres. The Perkins Board of Education acquired 46 acres and uses it as a bus transportation center. The remaining 600 acres is retained by GSA with a use agreement to the Ohio National Guard.

Archival research and interviews revealed no evidence of any chemical warfare materials (CWM) ever being shipped through or stored at the Plum Brook Ordnance Works. Our archival research did reveal problems with explosive waste at PBOW, in the residue of TNT and DNT production. These problems, however, are being handled as a hazardous, toxic, and radioactive waste (HTRW) project by the Nashville District--U.S. Army Corps of Engineers.

6.2 Records Review

Records concerning the history of Plum Brook Ordnance Works, Sandusky, Ohio, were reviewed from September through December, 1993, at the following locations. At the National Archives and Records Centers, St. Louis District personnel examined the following record groups if they were present and if initial inquiry led them to believe the groups contained useful information. As at all repositories, finding aids, archivists, and records managers were used to locate portions of the records relevant to the research.

- RG 18 - Records of Army Air Forces
- RG 48 - Records of the Office of the Secretary of the Interior
- RG 49 - Records of the Bureau of Land Management
- RG 61 - Records of the War Industries Board

RG 70 - Records of the Bureau of Mines
 RG 71 - Records of the Bureau of Yards and Docks
 RG 77 - Records of the Office of the Chief of Engineers
 RG 79 - Records of the National Park Service
 RG 95 - Records of the Forest Service
 RG 107 - Records of the Office of the Secretary of War
 RG 115 - Records of the Bureau of Reclamation
 RG 121 - Records of the Public Buildings Service
 RG 156 - Records of the Chief of Ordnance
 RG 160 - Records of Headquarters Army Service forces
 RG 175 - Records of the Chemical Warfare Service
 RG 179 - Records of the War Production Board
 RG 181 - Records of Naval Districts and Shore Establishments
 RG 269 - Records of the General Services Administration
 RG 270 - Records of the War Assets Administration
 RG 291 - Records of the Property Management and Disposal
 Service
 RG 338 - Records of United States Army Commands
 RG 342 - Records of US Air Force Commands, Activities,
 Organizations
 RG 407 - Records of the Adjutant General's Office

6.2.1 National Archives and Records Administration, Suitland, MD: In RG 159; Entry 26E, "General Correspondence 1939-1947"; Box 326; Folder, "Plum Brook Ordnance Works", we found an Inspection Report of the Activities in Connection with Operation and Construction of Additional Facilities, 2 March 1945.

6.2.2 National Archives and Records Administration, Great Lakes Region, Chicago, IL: In RG 270, WAA Real Property Case Files, we reviewed boxes 195-200 (record center cartons). We found: histories, maps, plans, acquisition and disposal records (boxes 195 and 196): engineering appraisal reports (box 197); an industrial survey final report (box 198); information and bids on excessed equipment (box 199); and a Corps of Engineers Industrial Facilities Report (box 200). We found nothing to indicate the presence of ordnance at the site, but definite indications of OEW/HTRW from the production of TNT and DNT. We also looked at two Hollinger boxes of records relating to Plum Brook, RG 270, boxes 37 and 38. These contained nothing relating to OEW/CWM.

6.2.3 National Archives and Record Administration, Federal Records Center, Dayton, OH: This facility contained no information relating to the Plum Brook Ordnance Depot.

6.2.4 Historical Division--Chemical and Biological Defense Agency, Aberdeen Proving Ground, Edgewood MD: This facility contained no information relating to the Plum Brook Ordnance Depot.

6.2.5 National Personnel Record Center, St. Louis, MO: In Accession 61A3161, Box 14, Folder 600, we found a letter of 4 Mar 1957 regarding an inventory of Military Real Property at PBOW. The letter dealt with the status of the magazine area. In Box 15, File 601: "Army Com., Joliet, IL.," we found a letter from 13 Sep 1957, subject: "Disposal of Plum Brook Ordnance Works." Another letter, dated 24 Dec 1957, from Colonel Ronald B. Currens, Ordnance Corps, reported on a safety survey of decontamination activities at PBOW. It says that the safety measures at PBOW were effective, but also that decontamination activities had been suspended after one area, Area "A," had been decontaminated. It gives no reason, or duration, for the suspension.

6.2.6 US Army Armament, Munitions, and Chemical Command, Rock Island, IL: This facility contains information about many arsenals and Army ammunition plants, but nothing about the PBOW.

6.2.7 Ohio Historical Society, Columbus, Ohio: Here we consulted with archivists and perused the card catalog and other findings aids. In the Records of the War History Commission we found copies of the PBOW NEWS, the facility newspaper. The index to the Records of the War History Commission mentioned a history of PBOW, but this was missing from the box. The index said that another copy of this history could be found at the Sandusky Public Library, and it was.

6.2.8 University Library, Ohio State University, Columbus, OH: In the library we found Sanborn maps for sites in Cleveland and Willoughby, Ohio, but no maps or other information relating to the Plum Brook Ordnance Works.

6.2.9 Sandusky Library, Sandusky, OH: The History Department maintains a historical file on the Plum Brook Ordnance Depot. From the file we copied several articles concerning the history, operations, and disposal/transfer of the facility. The relevant information was copied for use in preparing the ASR.

6.2.10 National Aeronautics and Space Administration, Sandusky, OH: Ms. Amy Bower of the Safety and Quality Assurance Office provided us with aerial photographs and drawings showing the facility before and after NASA took possession. At the NASA office we copied a photograph, (#P631237) 1963, of a person holding a 12-15 pound chunk of TNT found in B Area. It is reproduced in Appendix D.

6.3 Interpretation of Aerial Photographs

Photo analysis and land use interpretation was performed at the site with the use of aerial photography from 1969. The Sandusky, Ohio 1969, photorevised 1979, and the Kimball, Ohio 1969 quadrangle maps were used as a reference for the photography. The approximate negative scale of the photography is as follows:

<u>Photography Date</u>	<u>Scale</u>	<u>Source</u>	<u>Identifier(s) Frame(s)</u>
18 Mar 1969	1" = 2,000'	EROS	2-25 thru 2-28 2-76 thru 2-78

On the 1969 photography the Plum Brook Ordnance Depot is still well defined with roads and buildings. The most noticeable feature, within the southeast portion of the site, is the magazine area that is approximately 1 mile wide, east to west and 1.2 miles wide north to south. Approximately 100 storage bunkers are aligned along the parallel roads that traverse this area. There are three reservoirs located through the north central portion of the site. Five building complexes on the site are located in the central and eastern portions of the site north and northeast of the magazine area. An additional large structure with a domed center is located at the south end of the magazine area. No other determination can be made in regard to chemical warfare material (CWM) or ordnance manufacturing. CWM or ordnance storage is assumed to have taken place in the magazine area.

6.3.1 Map Analysis

The site was analyzed by referencing the following USGS 7.5 minute quadrangle maps: Sandusky, Ohio 1969, photorevised 1979, and Kimball, Ohio, 1969. The site is spread over both of the quadrangle maps above with the plant located in Township 6 North, Range 23 West. Sections are not delineated on either quadrangle. Further, the center of the site is located at 41 degrees 22 minutes 30 seconds North and 82 degrees 40 minutes 30 seconds West.

The portion of the site located on the southern portion of the Sandusky quadrangle labels the boundary road as a patrol road. Several water towers, water tanks, and reservoirs are positioned throughout the site. Topographic features are well defined by 5 foot contour lines. The infrastructure is well defined by light-duty roads, railroad spurs, aqueducts leading from a pumping station and a reservoir, and an electric substation. There are no indications of CWM or ordnance storage or disposal on the Sandusky, Ohio quadrangle map.

The portion of the site located on the Kimball quadrangle, along the northern edge, is labeled as the National Aeronautics and Space Administration - Lewis Research Center. The patrol road continues to follow the boundary on this quadrangle. Numerous light-duty roads also dissect this portion of the site and two water tanks are noted along the northern edge. The southeast portion of the site on the Kimball quadrangle is an apparent magazine area. The magazine area is bounded by a labeled North and South Magazine Road with eight parallel roads between the two showing approximately 100 storage bunkers spread at equal distances along the roads. Railroad spurs also extend into the magazine area from the north and south. There is no evidence of CWM or ordnance disposal sites on the Kimball, Ohio quadrangle.

6.4 Interviews

6.4.1 General

Interviews were conducted by telephone both prior to and after the site inspection.

6.4.2 Ms Amy Bower

On 18 October 1993, Dennis Gilmore called Ms. Bower, 419-621-3233, of the Safety and Quality Assurance Office - NASA Lewis Research Center. She was listed as the POC in information received from the Huntingto District. I explained my purpose (she's very familiar with DERPS/FUDS).

Ms. Bower provided that she knew of no ordnance having been discovered on the site or adjacent properties. Chemical contamination exists as outlined in the INPRS. She also informed me that NASA is currently performing a Site Investigation (SI) of those areas identified in the INPR's as NASA's responsibility for remediation. The first draft of the SI is due out. She suggested that I contact Pete McCallum (Chief Environmental Programs Office at NASA, phone number 216-433-8852) to request a copy. Additionally, she informed me that NASA's coordination with the Corps has been with Vince O'Dell of the Cincinnati District (no phone number given).

Asked her if any special coordination would be required for me to visit the site. She said no and that if I would give her a few days notice, she would make the necessary arrangements for access and escort me.

6.4.3 Mr. Doug Webb

On 24 November 1993, Mr. Webb of the COE, Nashville District, 615-736-7140, called me, Dennis Gilmore, to discuss the focus of my investigation of Plum Brook. Informed him that we were conducting an archive search pursuant to the provisions of DERPS/FUDS, relative to OEW/CWM. He is the project manager of the HTW investigation. He informed me that he has available a confirmation study (PA/SI) performed in 1989, at which time they addressed not only HTW, but OEW also. Currently, he is doing a RI/FS.

I asked for a copy of the confirmation study, and any other information he may have relative to the site. He has found no evidence of OEW/CWM contamination.

6.5 Site Inspection

6.5.1 General

The site inspection was performed on 26 August 1993 by the following St. Louis District personnel:

Dennis W. Gilmore	Project Manager
	Site Safety Officer
Nancy B. Gerth	Historian/Archivist

6.5.2 Detailed Site Inspection

Prior to departing for the subject site, I gave Nancy the Site Specific Safety Plan and safety aspects related to the site were discussed.

Our first stop was the Erie County Public Library. They provided us with a file on the Plum Brook site which provided several articles of information on the history, operations, and disposal/transfer of the facility. The relevant information was copied for our use in preparing the ASR.

Next, we visited the County Engineer who made available to us copies of aerial photographs, focusing on the magazine area, from 1958. This date coincides with the transfer of the property to NASA.

From here we proceeded to the NASA-Lewis Research Center (formerly the Plum Brook Ordnance Works). We met with Ms. Amy Bowers of the Safety and Quality Assurance Office whom I had interviewed previously via telephone. She is also responsible for environmental compliance. As such, Ms. Bowers is well aware of the contaminants present on the facility as documented in the numerous reports and studies which have been conducted by both the Corps and NASA. The studies mentioned above documents the presence of residual trinitrotoluene (TNT) and dinitrotoluene (DNT), and their constituents. This contamination is considered, and will be addressed through Hazardous and Toxic Waste programs.

The magazine area (focus of our archives search), was visited and photographs taken. Previously, this area was utilized as an ammunition storage facility known as the Plum Brook Depot and subsequently, as the Erie Ordnance Depot. Ms. Bowers informed us that when NASA took over the site, the igloos were empty. NASA currently uses them for miscellaneous storage, two of which are used by the National Guard for ammunition storage.

Ms. Bowers provided us with aerial photographs and drawings which show the facility before and after NASA took possession. One of the photographs shows a NASA employee holding a 12-15 pound chunk of TNT which was found in "barricades" in the TNT B area.

This concluded our site inspection of the former Plum Brook Ordnance Works. At no time during the inspection did we note any physical indications of anything suggesting CWM or OEW contamination of the site.

7.0 Evaluation of Ordnance Contamination

Based on the extensive archive searches performed, the interviews with the owners and/or occupants of major portions of the former Plum Brook Ordnance Works site, and the results of the site investigation, there are no indications as to any CWM contamination of the FUDS portion of the former Plum Brook Ordnance Works. There is, as documented in several reports, chemical contamination of an HTW nature (primarily TNT, DNT and their constituents), resulting from previous DOD operations at the site.

The only evidence of OEW contamination was found in the photo depicting TNT chunks found when NASA acquired the site in 1963. NASA accepted transfer of the former facility subject to existing contamination. As such it was their responsibility to remediate the hazard. No record of this remedial action was found nor has any additional "chunks" been discovered.

All of the contamination, i.e. explosive residuals, is located on the areas of the former production plants and exhibit no signs of migrating. These contaminated areas remain in possession of the United States and as such are not addressed in this report. Additionally, the explosive residues were determined not to pose a fire or explosion hazard and as such does not constitute an OEW hazard. No evidence of OEW/CWM was found on lands now in private ownership.

8.0 Conclusions and Recommendations

The Technical Advisory Group Risk Assessment Code (TAG RAC) Form, dated 3 November 2006, is included at Appendix I. Based on the best available data and ongoing actions to remediate the property, a TAG RAC score of 5 has been developed. TAG RAC 5 indicates that no further action is recommended. Even though the available documents established the presence of explosive residues on the current NASA site, no evidence of contamination was found on the adjacent, formerly used lands and no migration of the contaminants was evident.

Although this site was identified on the CEHND DERP-FUDS list as a possible CWM site, no information was developed during this archives search that indicates a plausible reason for its inclusion.

APPENDIX A
REFERENCES

REFERENCES FOR GEOLOGY AND SOILS

Thornbury, Wm. D., Regional Geomorphology of the United States, John D. Wiley and Sons, Inc., 1965

Breen, Kevin J. and Dumouchelle, Denise H., Geohydrology and Quality of Water in Aquifers in Lucas, Sandusky, and Wood counties, Northwestern Ohio, U.S. Geological Survey Water-Resources Investigations Report 91-4024, 1991.

APPENDIX B

ACRONYMS

Ordnance and Explosive Waste
Chemical Warfare Materials
Archives Search Report
for
Plum Brook Ordnance Works
Sandusky, Ohio
Site Number - G05OH001806

APPENDIX B

ACRONYMS

ASR	Archives Search Report
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CEHND	Corps of Engineers, Huntsville Division
CSM	Chemical Surety Material
CWM	Chemical Warfare Material
DERA	Defense Environmental Restoration Account
DERP	Defense Environmental Restoration Program
DLA	Defense Logistics Agency
DNT	Dinitrotoluene
DOD	Department of Defense
EOD	Explosives Ordnance Disposal
EPA	Environmental Protection Agency
ERDA	Environmental Restoration Defense Account
FDE	Findings and Determination of Eligibility
FUDS	Formerly Used Defense Sites
FWS	U. S. Fish and Wildlife Service
GSA	General Services Administration
HTW	Hazardous and Toxic Waste
INPR	Inventory Project Report
IRP	Installation Restoration Program
MCP	Mandatory Center of Expertise
NACA	National Advisory Committee for Aeronautics
NASA	National Aeronautical and Space Administration
NCP	National Contingency Plan
OEW	Ordnance and Explosive Waste
PBOW	Plum Brook Ordnance Works
RAC	Risk Assessment Code
RI/FS	Remedial Investigation/Feasibility Study
SARA	Superfund Amendments and Reauthorization Act
TNT	Trinitrotoluene
USACE	U.S. Army Corps of Engineers
USADACS	U.S. Army Defense Ammunition Center and School

USAED	U.S. Army Engineer District
USAEDH	U.S. Army Engineer Division, Huntsville, AL
USATHMA	U.S. Army, Corps of Engineers, Toxic and Hazardous Materials Agency
UXO	Unexploded Ordnance
WAA	War Assets Administration
WRNC	Washington National Records Center

APPENDIX C

REPORTS/STUDIES/LETTERS/MEMORANDUMS

Ordnance and Explosive Waste
Chemical Warfare Materials
Archives Search Report
for
PLUMB BROOK ORDNANCE WORKS
Sandusky, Ohio
Site Number - G050H001800

APPENDIX C

REPORTS/STUDIES/LETTERS/MEMORANDUMS

Accident Prevention Plan (APP), Standard Operating Procedures (SOP)	C-1
Memorandum, CELMS-PM-M, 3 December 1993, Subject: Trip Report, Site Inspection, Plum Brook, Sandusky, Ohio, Site No. G050H001800	C-2
Site Survey Summary Sheet, 20 March 1992, Subject: Plum Brook Ordnance Works, Plum Brook, Sandusky, Ohio, Site No. G050H001800	C-3
Findings of Fact, Plum Brook Ordnance Works, Plum Brook, Sandusky, Ohio, Site No. G050H001800	C-4
Chemical Contamination Summary for Plum Brook Ordnance Works, Sandusky, Ohio	C-5
Potential Hazardous Waste Site Preliminary Assessment, EPA Form 2070-12	C-6
Site Inspection Report, NASA Lewis Research Center, October 1993	C-7
Plum Brook Station Preliminary Assessment, NASA Lewis Research Center, June 1991	C-8
INPR Documentation Obtained from PIRS	C-9

ACCIDENT PREVENTION PLAN (APP)
STANDARD OPERATING PROCEDURES (SOP)

C-1

ORDNANCE AND EXPLOSIVE WASTE
CHEMICAL WARFARE MATERIALS
ARCHIVES SEARCH REPORT
for the formerly
PLUMBROOK ORDNANCE WORKS
Sandusky, Ohio
Site Number - G050H001800

APPENDIX C

ACCIDENT PREVENTION PLAN

ACCIDENT PREVENTION PLAN (APP): STANDARD OPERATING PROCEDURES

I. This SOP establishes team policies and procedures to be utilized in the conduct of site investigations. It outlines the general hazards associated with site investigations and the preventive measures to be employed to minimize the potential risks. It is a generic plan which will be tailored to each specific site as required.

II. Administrative Plan

Team Leader and Safety Officer:

Dennis W. Gilmore

Team Members:

Michael Tarabulski
Nancy Gerth
Rosemary Bubnick

Reporting of incidents of a serious nature shall be by the most expedient means available, (usually telephonic), to the St. Louis District PM-M (Mike Dace) at (314)331-8036. If unavailable, contact CEHND-ED-SY, at (205) 955-4968 for further guidance.

A. Equipment: see checklist

(1) Team equipment will be checked for completeness and operability by the team leader, or his designated representative, prior to departure from the office. Any deficiencies or shortcomings will be corrected at this time.

(2) Personal Protective Equipment is the responsibility of each individual team

member. As a minimum, safety shoes, safety glasses, and gloves will be required. No outer or undergarments made of wool, silk, or synthetic textiles such as rayon and nylon shall be worn on the site.

B. Site Control Program

(1) A site map, identifying site work zones will be prepared and reviewed by each team member prior to entering the site.

(2) Prior to movement to the potential OEW site, the team leader will provide each member with the phone number and location of the local emergency assistance services i.e., hospital, police, fire, EOD, etc.

(3) The primary means of communications will be voice. The following standard hand signals will be used when distances are too great for voice communications.

Hand gripping throat.....Can't breathe, out of air
Both hands around waist...Leave area immediately
Hands on top of head.....Help; I need assistance
Thumbs up.....I'm alright, I understand
Thumbs down.....No, negative reply

(4) Only personnel essential to the mission will be permitted on the site during the survey. A minimum of two team members shall be required to perform the survey and shall remain in visual contact with each other at all times.

C. Conduct of the Site Survey

Our mission is to reconnoiter potential OEW sites to determine the presence of ordnance and explosive waste from conventional munitions and/or chemical warfare materials through the conduct of a visual search (**NO DIGGING ALLOWED**).

(1) Prior to initiating the survey, the surrounding area shall be surveyed for the presence of antennas, and communication and radar devices.

(2) Each site identified for reconnoitering will be divided into lanes of not more than thirty foot widths. The team members performing the survey will traverse each lane lengthwise, at an interval not less than the minimum burst radius of the suspected munitions type. Adjacent lanes will not be surveyed simultaneously.

(3) The location of suspected ordnance discovered will be marked to facilitate recording of pertinent data upon completion of a thorough sweep of the site. **SUSPECTED ORDNANCE AND OTHER SUSPICIOUS ITEMS WILL NOT BE DISTURBED IN ANY MANNER.** If we suspect OEW, DO NOT TOUCH IT, immediately notify the local EOD, Huntsville, and the local authorities.

and assist, as may be required, from outside the boundaries of the survey area.

III. General Safety Precautions of Restricted Area Operations

(1) All OEW or other suspicious items will be considered as extremely hazardous. Do not touch, directly or indirectly, any piece of ordnance at any time.

(2) If you suspect chemicals to be present in the area, all field operations must be halted immediately. Notification requirements are the same as that of a serious incident.

(3) Dead vegetation and/or animals could indicate the presence of chemical agents, be on the alert.

(4) No smoking, fire or spark-producing devices will be allowed on the site.

(5) Consider all practice ordnance to contain a live charge.

(6) Always approach a suspected piece of ordnance from the rear, at a 45 degree angle.

(7) Never spend more time near a suspected piece of ordnance than is absolutely necessary.

(8) Never assume that the color code on an item is accurate. If suspected ordnance has green marking bands, evacuate the area immediately and report through channels.

(9) Surveys will not be conducted during periods of inclement weather or limited visibility.

(10) Prior to entering any abandoned structure on the site, the team leader shall conduct a survey to determine the layout, the condition of the framing, floors, walls, etc.

(11) Do not drive a vehicle into a suspected OEW site.

(12) Be aware of vegetation. Do not walk across areas where the ground cannot be seen.

(13) Other hazards, as appropriate, shall be addressed, for each specific site.

**Plumbrook Ordnance Works
G050H001800**

ASR Site Visit

This document constitutes the team site specific safety plan for the subject site visit. It incorporates by reference the team's Accident Prevention Plan (APP), a copy of which has been reviewed and acknowledged by all attendees.

Purpose: This site visit is being conducted to document the presence or absence of ordinance and/or explosive wastes (OEW) contamination of the formally used defense site (FUDS).

Mission: During the site survey we will be reconnoitering the former site of the an explosives manufacturing plant, which was engaged in the production of trinitrotoluene (TNT), dinitrotoluene (DNT), peniolite and nitric and sulfuric acid. The purpose of our site inspection is to determine the presence of OEW from conventional munitions and/or chemical warfare materials(CWM). From the information already gathered the site is contaminated with various explosive residues and components.

Site Description: The site is located approximately four miles south of Sandusky, Ohio. The site is bounded on the north by Bogart Road, on the south by Mason Road, on the East by U.S. Highway 250, and on the west by County Road 43 (see site location map). The former Plum Brook site consists of 9,009 acres and lies in an area that is primarily rural and agricultural.

Reconnaissance Procedures: The team will, accompanied by Amy Bowers (NASA), walk the grounds surrounding the magazine area and inspect the interior of each structure, observing for signs of possible OEW contamination. The focus of our effort will be to identify possible explosives and/or components which may remain on the site. If such an area is discovered it will be cardoned off and local authorities immediately notified.

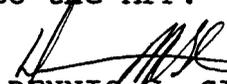
Possible Hazards: The major potential hazard involves the discovery of unstable explosives (due to age, weathering, chemical decomposition etc.) This site is known to be contaminated with nitro-aromatic explosive compounds, sulfates and nitrates. Therefore, the presence of any standing substance and/or leachate

will be noted and investigated. Team members will not come into contact with any liquid, semi-solid, or other unnatural substance which may be found on the site. Additional precautions may be required depending on the weather encountered (i.e. extreme cold). We must at all times remain cognizant of these potential hazards.

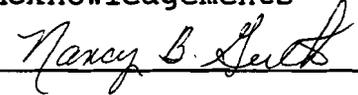
EMERGENCY RESPONSE: The site is located on the NASA Lewis Research Center which has emergency response facilities. The nearest hospital is:

LOCATION AND NUMBER TO BE BRIEFED

There are no additions or changes to the APP.


DENNIS W. GILMORE
Project Manager

Acknowledgements



MEMORANDUM, CELMS-PM-M, 3 DECEMBER 1993
SUBJECT: TRIP REPORT, SITE INSPECTION
PLUM BROOK
SANDUSKY, OHIO
SITE NO. G05OH001800

C-2

MEMORANDUM FOR FILE

1. The subject site inspection was performed on 1 December 1993 by the following St. Louis District personnel:

Dennis W. Gilmore	Project Manager
	Site Safety Officer
Nancy B. Gerth	Historian/Archivist and

2. Prior to departing for the subject site, I gave Nancy the Site Specific Safety Plan and safety aspects related to the site were discussed.

3. Our first stop was the Erie County Public Library. They provided us with a file on the Plumbrook site which provided several articles of information on the history, operations, and disposal/transfer of the facility. The relevant information was copied for our use in preparing the ASR.

4. Next, we visited the County Engineer who made available to us copies of aerial photographs, focusing on the magazine area, from 1958. This date coincides with the transfer of the property to NASA.

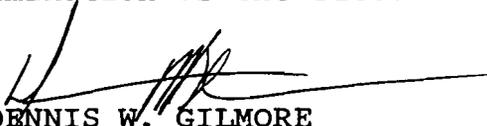
5. From here we proceeded to the NASA-Lewis Research Center (formerly the Plum Brook Ordnance Works). We met with Ms. Amy Bowers of the Safety and Quality Assurance Office whom I had interviewed previously via telephone. She is also responsible for environmental compliance. As such, Ms. Bowers is well aware of the contaminants present on the facility as documented in the numerous reports and studies which have been conducted by both the Corps and NASA. The studies mentioned above documents the presence of residual trinitrotoluene (TNT) and dinitrotoluene (DNT), and their constituents. This contamination is considered, and will be addressed through Hazardous and Toxic Waste programs.

6. The magazine area, (focus of our archives search), was visited and photographs taken. Previously, this area was utilized as an ammunition storage facility known as the Plum Brook Depot and subsequently, as the Erie Ordnance Depot. Ms. Bowers informed us that when NASA took over the site, the igloos were empty. NASA currently use them for miscellaneous storage with two in use by the National Guard for storage of their ammunition.

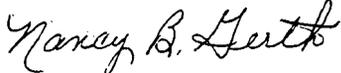
7. Ms. Bowers provided us with aerial photographs and drawings which show the facility before and after NASA took possession.

SUBJECT: Trip Report, Site Inspection, Plum Brook Ordnance Works,
Sandusky, OH, DERPS Site No. G05OH001800

8. This concluded our site inspection of the former Plum Brook
Ordnance Works. At no time during the inspection did we note first
hand anything suggesting CWM or OEW contamination of the site.



DENNIS W. GILMORE
Project Manager



NANCY B. GERTH
Historian/Archivist

CF:
CELMS-PM-M (Dace)
CELMS-PD-A (Groh)

SITE SURVEY SUMMARY SHEET, 20 MARCH 1992
SUBJECT: PLUM BROOK ORDNANCE WORKS
PLUM BROOK
SANDSKY, OHIO
SITE NO. G05OH001800

C-3

SITE SURVEY SUMMARY SHEET
FOR
DERP-FUDS SITE NO. G05OH001800
PLUM BROOK ORDNANCE WORKS, OHIO
20 March 1992

SITE NAME: Plum Brook Ordnance Works

LOCATION: Sandusky, Ohio

SITE HISTORY: Property was acquired in 1941 by purchase and condemnation for the construction and operations of an ordnance works. The site was excessed to GSA in various phases. The current major owner is NASA.

SITE VISIT: A site visit was conducted on 8 May 1985 by Robert P. Johannsen, CEORH-ED-D.

CATEGORY OF HAZARD: HTW and OEW

PROJECT DESCRIPTION:

a. HTW. The project consists of the preparation of a Remedial Investigation/Feasibility Study (RI/FS) for contaminated areas such as TNT deposits on the site.

b. OEW. Work involves a site inspection and preparation of a report on potential ordnance and explosive waste hazards that may exist at the site.

AVAILABLE STUDIES AND REPORTS: Confirmation Study by CEORN, February 1990. The Chemical Contamination Summary is attached.

PA POC: Frank R. Albert, Jr., (304) 529-5194, CEORH-ED-DC.

FINDINGS OF FACT
PLUM BROOK ORDNANCE WORKS
PLUM BROOK
SANDUSKY, OHIO
SITE NO. G05OH001800

**DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
FOR
FORMERLY USED DEFENSE SITES
FINDINGS AND DETERMINATION OF ELIGIBILITY**

PLUM BROOK ORD WORKS

Sandusky, Erie County, Ohio

Site No. G050H001800

FINDINGS OF FACT

1. The Plum Brook Ordnance Works consisted originally of 9,071.06 acres of land [9020.66 acres fee, 50.40 acres easement] acquired by purchase and condemnation from various owners in 1941. The site, located 4.7 miles south of Sandusky, Ohio, and 59 miles west of Cleveland, lies in the townships of Huron, Milan, Perkins, and Oxford, in Erie County, Ohio.
2. The Plum Brook Ordnance Works was used by the Trojan Powder Company for the manufacture of explosives during World War II. The works was constructed by the U. S. Army in 1940 and operated by the Army until 1945. The works included production lines for TNT, DNT, and pentolites.
3. The Plum Brook Ordnance works ceased operations in 1945, and the area was renamed the Plum Brook Depot. Portions of the depot were operated as an ammunition storage facility for Erie Ordnance Depot. The Plum Brook Depot was placed in inactive status in 1961.

The land disposal occurred in several, fairly complicated, stages. At the end of World War II, continued use of the works by the Department of War was not contemplated, so the entire facility, except for 52.74 acres which was previously quitclaimed to the Baltimore and Ohio Railroad Company on 27 March 1943, was declared excess. Later, the Department of the Army decided that it was best to withdraw the magazine area [2800.46 acres fee] from excess, and on 11 March 1946 this withdrawal was approved. The War Assets Administration accepted custody of the remainder on 6 September 1946.

In 1947, the magazine area, 2800.46 acres fee, was redesignated The Plum Brook Depot Activity [hereinafter PBDA]. It was to become known also as the "retained area" and was not a part of the surplus to WAA. This acreage was also referred to as the Erie Ordnance Depot, and was utilized for powder storage.

On 15 March 1949, the retained magazine area was 2800.46 acres, and the surplus in the custody of WAA/GSA was 6167.86 acres, fee; and 50.40 acres, easement.

By letter of transfer dated 16 June 1954, effective 30 June 1954, the Department of the Army reacquired from GSA the 3180.33 acres ordnance works and 50.40 acres easements, which thereafter was known as Plum Brook Ordnance Works [hereinafter PBOW]. The rest of the original site, previously declared excess to WAA, was disposed of to either NASA or third party grantees. This area, referred to as the WAA net disposal area, contained 2987.13 acres. No work is proposed in the net disposal area, which is now largely a subdivision of residential properties, so it is unknown if any conditions, etc., are present in those disposal transactions.

By letter dated 24 January 1958, the Department of the Army transmitted a copy of a permit entered into by NACA [predecessor of NASA] and Army, by which NACA accepted Plum Brook Ordnance Works [PBOW] "subject to existing contamination without fencing of such areas by the Department of the Army."

By SF 118 dated 3 October 1958, as amended 3 August 1959, the Department of the Army declared excess 3180.33 acres fee and 50.60 acres easements [PBOW]. The SF 118 states that "detailed information regarding contamination is not being furnished as it is understood that NACA is agreeable to the transfer of the installation subject to contamination." At the time of this excess, PBOW was permitted to NACA, as noted in the preceding paragraph.

By SF 118 dated 22 September 1961, the Department of the Army declared excess the magazine area, [PBDA], 2800.46 acres fee. The SF 118 states that "neutralization of any contamination has been completed." At the time of excessing, this area was subject to 8 revocable at will agricultural leases.

On 23 October 1961, NASA-Lewis Research Center requested transfer of all lands covered by SF118 dated 3 October 1958 as amended [PBOW], and of the PBDA, SF 118 as listed in the preceding paragraph, for a total of 6031.39 acres of land, of which 5980.79 acres were fee, 50.40 acres easement, and 0.2 acres license. [Figures do not add up to acquisition figures exactly due to differences in survey and to rounding] A Statement of Justification attached thereto reads:

A Use Agreement was obtained from the Department of the Army on July 5, 1956, for approximately 500 acres (Pentolite Area, Plum Brook Ordnance Works). The reactor facility was constructed on this site with NACA, C&E appropriation of Fiscal Years 1956, 1958, and 1960. Subsequently, the balance of the land and structures of the Plum Brook Ordnance Works (excluding the Igloo Area) was turned over to NASA under a Use Agreement from the Department of the Army on January 22, 1958. This latter area (approximately 2700 acres) was and is used by the NASA for the construction of many rocket research facilities with NASA C&E and R&D appropriations of Fiscal Years 1958 and 1959.

...The current major research programs being conducted at Plum Brook include the following:

1. Effect of radiation on materials.
2. Research on components for nuclear propulsion systems.
3. High energy chemical propulsion systems.
4. Nuclear rocket component research.

On 22 July 1962, NACA requested transfer of the entire 5980.79 acre fee and 50.40 acres easements [PBDA and PDOW]. The property was transferred to NACA on 15 March 1963 without reimbursement. NACA assumed accountability for and custody of the property on that date.

By corrected SF 118 dated 18 April 1978, NASA-Lewis Research Center declared excess 2152.15 acres of land and the structures thereon. Within this area lies two sites, both part of the old PBOW, which NASA accepted subject to contamination. The first of these was the Perkins School site. By indenture dated 2 June 1978, the Secretary of HEW quitclaimed unto the Perkins Board of Education, Sandusky, Ohio, 46.023 acres of land, subject to all legal highways. Exceptions included a right for the Government to maintain utilities; the exclusive use of the grantor and its assigns, together with rights of access, to a water reservoir and pumping station. Further, the grantee assumed maintenance of the roadways until they are dedicated. The Government also reserved for ten years the ownership of certain telephone equipment, the exclusive use thereof, and access to repair it. The restricted use of the property to educational purposes for thirty years. There was no recapture clause, nor did the Government promise to clean up the property, nor was any other type of restoration clause included in the deed. Also within the PBOW which NASA accepted subject to contamination was NASA designated Tract No. 59, consisting of 603.98 acres, which at the time of excess was under permit by NASA to EPA. This tract is currently under GSA control, but the SF118 indicates that EPA has a continuing need for all real property and improvements thereon, including buildings, roadways, utilities, and fencing. The Ohio National Guard has made it known to GSA that it has an interest in acquiring this property. Finally, GSA has indicated that should DoD restore or decontaminate this property, it contemplates sale to private parties. GSA has indicated that it is now their policy to not dispose of property which is or may be contaminated, so they are awaiting corrective action on the red water basins in order to process and dispose of this tract.

By SF 118 dated 10 October 1980, NASA-Lewis Research Center declared excess 142.663 acres of land and roadways, identified by NASA as parcels numbers 61 and 62. No work is contemplated by this report for either of these two parcels. Parcel Number 62, acreage unknown, was disposed of by GSA to the

Department of the Army for use as an U. S. Army Reserve Center. GSA also has made two other disposals in recent years, to Wensink Seed Farms on 19 December 1989, quitclaiming 5.63 acres, and to Edward Scott Schenk, on 25 October 1989, quitclaiming 10.3 acres. Both of these disposals were subject to certain covenants intended to maintain the archeological integrity of the sites, but to no other significant covenants or restrictions. There were no recapture clauses or reversions in these two disposals, and GSA required the clean-up of these sites prior to its disposal of them. GSA apparently has approximately 2090.2 acres plus parcel number 61 still in its current inventory, as no further disposal information was found.

NASA-Lewis Research Center remains a 3685.977 acre installation owned by the United States, and as such, is not eligible for DERP-FUDS under existing program guidelines.

DETERMINATION

Based on the foregoing findings of fact, the site has been determined to be formerly used by DoD. It is therefore eligible [with the exception of the active installation] for the Defense Environmental Restoration Program - Formerly Used Defense Sites established under 10 USC 2701 et seq.

24 Dec 92
Date


ALBERT J. GENETTI, Jr.
Brigadier General, U.S. Army
Commanding

CHEMICAL CONTAMINATION SUMMARY FOR PLUM BROOK ORDNANCE WORKS
SANDUSKY, OHIO

C-5

CHEMICAL CONTAMINATION SUMMARY
FOR
THE FORMER PLUM BROOK ORDNANCE WORKS
SANDUSKY, OHIO

1. A confirmation study was conducted at the former Plum Brook Ordnance Works, Sandusky, Ohio, to determine if chemical contamination from previous DOD-related activities was present and if groundwater degradation was resulting. The scope of the contamination evaluation included a records review and evaluation; visual site inspection; development of a site specific safety plan, sampling/analysis plan, monitoring well installation plan, and QA/QC plan; soils sampling during the monitoring well installation for geotechnical characterization; installation of four monitoring wells for ground-water sampling, chemical characterization, and in-situ permeability testing; collection of 20 composite soil samples from soil borings for chemical characterization; collection of four surface water samples from the streams at the site for chemical characterization; a site survey; and completion of hazardous ranking forms.

2. A summary of significant chemical concentrations found during this study is provided in Table 1. The overall hazard ranking score for chemical contamination is 0 since no users of this aquifer were found in the area. This score may not be accurate, as it was done using the Navy's HRS scoring thod instead of the EPA's HRS scoring method. This study was begun before the EPA's HRS scoring method was required for confirmation studies.

3. Analytical results of the nitroaromatic analyses indicates extensive soil contamination at both waste disposal areas and minor soil contamination at the Scheid Road Burning Ground. Nitroaromatic contamination was also found in the groundwater at Waste Disposal Area 2. This contamination is directly attributable to past DOD actions at this facility.

4. Results of the volatile organics analyses indicated acetone in the soil and groundwater samples. This can be attributed to the decontamination procedures used during the contamination survey.

5. Analytical results of the metals analyses indicate significant concentrations of manganese in the soil at Waste Disposal Area 2. Elevated sodium levels were also found in the soil at both waste disposal areas. One soil sample from the Scheid Road burning ground also exhibited elevated levels of lead. Substantial concentrations of chromium were found in the groundwater samples. Elevated concentrations of Barium were also found in one groundwater sample. One soil sample from Waste Disposal Area 2 contained a elevated concentration of chromium. All of this contamination is a result of past DOD activities at the site.

6. Elevated sulfate concentrations were found in the groundwater and the soil at the waste disposal areas. Surface water and soil samples from the waste disposal areas exhibited elevated nitrate concentrations. All of this contamination probably resulted from DOD activities at the site.

7. A discrepancy between the contract laboratory results and the Quality Assurance laboratory results for explosives arose during this study. Analytical results were in question from a previous study conducted by the same laboratory. The contract laboratory did not detect TNT while the QA laboratory did. As a result of this conflict, all nitroaromatic analyses for all studies performed by this contractor were examined in detail. Based on this examination, it was determined that the nitroaromatic results for Plum Brook were low. Therefore, the nitroaromatic contamination found during this phase is probably more extensive than the results of this study show. This decision was based on discussions with CEMRD-ED-GL, CERL, and the contract laboratory.

RECOMMENDATION

It is recommended that an Remedial Investigation/Feasibility Study (RI/FS) be conducted at this site. This study should include:

- Installation and sampling of additional monitoring wells to determine the extent of explosives, metals, sulfate, and nitrate contamination.
- Collection of additional soil samples to determine the extent of the explosives and metals contamination at the waste disposal areas and metals contamination at the Scheid Road burning ground.
- Collection of sediment samples from the pond at Waste Disposal Area 2.
- Evaluation of preliminary hazards and a survey of sensitive receptors to determine if immediate action is required at the site.

TABLE 1

SUMMARY OF SIGNIFICANT CONCENTRATIONS FOUND
IN SAMPLES COLLECTED AT THE FORMER PLUM BROOK ORDNANCE WORKS

<u>Constituent</u>	<u>Location</u>	<u>Standard</u>	<u>Concentration (ppb)</u>
Barium	MW02B	1,000 ppb	214,000
Chromium	MW02B		20,000
	SB-07		17,000
	MW-02 (dup)	50 ppb	120
	MW-06		120
1,3 - DNB	SB-12		590
	SB-13		620
	SB-14		3,700
	SB-16		550
	SB-16 (4-6')		6,400
	SB-18		5,000
2,6 - DNT	SB-14		1,700
	SB-16		1,500
	SB-18		1,000
	MW-02		27
	MW-02 (dup)		25
2,4 - DNT	SB-07		230
	SB-12		910
	SB-13		2,200
	SB-14		20,000
	SB-16		3,200
	SB-16 (4-6')		16,300
	SB-17		1,100
	SB-18		19,000
	MW-02		160
	ME-02 (dup)		140
Lead	SB-03		50,000
Manganese	SB-01		300,000
	SB-02		180,000
	SB-03		71,300
	SB-05		35,000
	SB-06		129,000
	MW02B		2,600,000
	SB-07		530,000
	SB-09		104,000
	SB-10		271,000
	SB-11		211,000

TABLE 1 (con't)

SUMMARY OF SIGNIFICANT CONCENTRATIONS FOUND
IN SAMPLES COLLECTED AT THE FORMER PLUM BROOK ORDNANCE WORKS

<u>Constituent</u>	<u>Location</u>	<u>Standard</u>	<u>Concentration (ppb)</u>
Manganese	SB-12		262,000
	SB-13		263,000
	SB-14		146,000
	SB-15		181,000
	SB-15 (4-6')		244,000
	SB-16		78,200
	SB-16 (4-6')		435,000
	SB-17		141,000
	SB-18		97,600
	MW-01	50 ppb	310
	MW-02		2,800
	MW-02 (dup)		3,000
	MW-06		93
Nitrate	SB-01		2,000
	SB-05		2,000
	SB-09		12,000
	SB-11		5,000
	SB-12		7,000
	SB-16 (4-6')		1,800,000
	SB-18		2,500,000
	SW-01		15,000
Nitrobenzene	SB-16		480
Nitrotoluene	SB-16		480
Sodium	SB-02		110,000
	MW02B		578,000
	SB-07		1,360,000
	SB-09		205,000
	SB-10		174,000
	SB-11		539,000
	SB-12		1,660,000
	SB-13		2,590,000
	SB-14		3,420,000
	SB-15		96,900
	SB-15 (4-6')		125,000
	SB-16		1,040,000
	SB-16 (4-6')		2,820,000
	SB-17		1,240,000
	SB-18		1,980,000

TABLE 1 (con't)

SUMMARY OF SIGNIFICANT CONCENTRATIONS FOUND
IN SAMPLES COLLECTED AT THE FORMER PLUM BROOK ORDNANCE WORKS

<u>Constituent</u>	<u>Location</u>	<u>Standard</u>	<u>Concentration (ppb)</u>
Sulfate	SB-12		2,000,000
	SB-13		16,000
	SB-14		15,000
	SB-16		9,000
	SB-16 (4-6')		120,000
	SB-17		10,000
	SB-18		190,000
	MW-01		130,000
	MW-02		950,000
	MW-02 (dup)		950,000
	MW-06		60,000
	SW-01		100,000
	SW-02		110,000
	SW-03		110,000
	SW-04		180,000
	SW-04 (dup)		180,000
1,3,5 - TNB	SB-03		93
	SB-07		410
	SB-12		3,400
	SB-13		730
	SB-14		14,000
	SB-16		1,200
	SB-16 (4-6')		15,000
	SB-17		670
SB-18		10,000	
2,4,6 - TNT	SB-12		680
	SB-16		740

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT
EPA FORM 2070-12

C-6



POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 1 - SITE INFORMATION AND ASSESSMENT

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER

II. SITE NAME AND LOCATION

01 SITE NAME (Use appropriate or descriptive name of site): <u>PLUM BROOK ORDINANCE WORKS</u>		02 STREET, ROUTE NO. OR SPECIFIC LOCATION IDENTIFIER			
03 CITY <u>SANDUSKY</u>	04 STATE <u>OH</u>	05 ZIP CODE	06 COUNTY <u>ERIE</u>	07 COUNTY CODE	08 CONG. DIST. <u>5</u>
09 COORDINATES LATITUDE		LONGITUDE			

10 DIRECTIONS TO SITE (Starting from nearest public road):
I go north 1 mile on RT 4, east .2 mile on RT 13. SITE NORTH NEAR BLOOMINGVILLE

III. RESPONSIBLE PARTIES (FORMER-USE)

01 OWNER (if known): <u>US Army Corps of Engineers</u>		02 STREET (Business mailing residential): <u>502 8TH ST</u>			
03 CITY <u>HUNTINGTON</u>	04 STATE <u>WV</u>	05 ZIP CODE <u>25701</u>	06 TELEPHONE NUMBER <u>304 529-5194</u>		
07 OPERATOR (if known and different from owner): <u>NONE</u>		08 STREET (Business mailing residential):			
09 CITY	10 STATE	11 ZIP CODE	12 TELEPHONE NUMBER		

13 TYPE OF OWNERSHIP (Check one):
 A. PRIVATE B. FEDERAL: NASA (Agency name)
 F. OTHER: FORMER ROAD USE (Specify)
 C. STATE D. COUNTY E. MUNICIPAL G. UNKNOWN

4 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply):
 A RCRA 3001 DATE RECEIVED _____ MONTH DAY YEAR B UNCONTROLLED WASTE SITE (RCRA 103(c)) DATE RECEIVED _____ MONTH DAY YEAR C NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION <input checked="" type="checkbox"/> YES DATE <u>2-90</u> MONTH DAY YEAR <input type="checkbox"/> NO		BY (Check all that apply): <input type="checkbox"/> A. EPA <input type="checkbox"/> B. EPA CONTRACTOR <input type="checkbox"/> C. STATE <input type="checkbox"/> D. OTHER CONTRACTOR <input type="checkbox"/> E. LOCAL HEALTH OFFICIAL <input checked="" type="checkbox"/> F. OTHER: <u>GROUP OF ENGINEERS</u> (Specify) <u>NASHVILLE DIST</u> CONTRACTOR NAME(S)			
02 SITE STATUS (Check one): <input type="checkbox"/> A ACTIVE <input checked="" type="checkbox"/> B INACTIVE <input type="checkbox"/> C UNKNOWN		03 YEARS OF OPERATION BEGINNING YEAR _____ ENDING YEAR _____ <input type="checkbox"/> UNKNOWN			

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN OR ALLEGED
BARIUM; CHROMIUM; ACETONE; MANGANESE; SULFATE; NITRATE; 1,3-DNB; 2,6-DNT; 2,4-DNT; 1,3,5-TNB; 2,4,6-TNT

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION
SOIL AND GROUNDWATER CONTAMINATION

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one if high or medium is checked; complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Picnics):
 A. HIGH (Inspection required immediately) B. MEDIUM (Inspection required) C. LOW (Inspect on site over the next 60 days) D. NONE (No further action needed; conditions currently stable or improving)

VI. INFORMATION AVAILABLE FROM

01 CONTACT <u>FRANK ALBERT</u>	02 OF (Agency/Organization): <u>US ARMY COE HUNTINGTON DISTRICT</u>		03 TELEPHONE NUMBER <u>304 529-5194</u>	
04 PERSON RESPONSIBLE FOR ASSESSMENT <u>SAME</u>	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NUMBER	08 DATE <u>3-20-92</u> MONTH DAY YEAR



POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT

PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

STATE | CO. | SITE NUMBER

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 <input checked="" type="checkbox"/> A GROUNDWATER CONTAMINATION 03 POPULATION POTENTIALLY AFFECTED <u>1000</u> 700	02 <input type="checkbox"/> OBSERVED (DATE <u>2/90</u>) 04 NARRATIVE DESCRIPTION	POTENTIAL <input checked="" type="checkbox"/> ALLEGED <input type="checkbox"/>
NASHVILLE DISTRICT CONFIRMATION STUDY FEB 1990		
01 <input checked="" type="checkbox"/> B SURFACE WATER CONTAMINATION 03 POPULATION POTENTIALLY AFFECTED <u>700</u>	02 <input type="checkbox"/> OBSERVED (DATE _____) 04 NARRATIVE DESCRIPTION	POTENTIAL <input checked="" type="checkbox"/> ALLEGED <input type="checkbox"/>
01 <input type="checkbox"/> C CONTAMINATION OF AIR 03 POPULATION POTENTIALLY AFFECTED _____	02 <input type="checkbox"/> OBSERVED (DATE _____) 04 NARRATIVE DESCRIPTION	POTENTIAL <input type="checkbox"/> ALLEGED <input type="checkbox"/>
01 <input checked="" type="checkbox"/> D FIRE EXPLOSIVE CONDITIONS 03 POPULATION POTENTIALLY AFFECTED _____	02 <input type="checkbox"/> OBSERVED (DATE _____) 04 NARRATIVE DESCRIPTION	POTENTIAL <input checked="" type="checkbox"/> ALLEGED <input type="checkbox"/>
01 <input type="checkbox"/> E DIRECT CONTACT 03 POPULATION POTENTIALLY AFFECTED _____	02 <input type="checkbox"/> OBSERVED (DATE _____) 04 NARRATIVE DESCRIPTION	POTENTIAL <input type="checkbox"/> ALLEGED <input type="checkbox"/>
01 <input checked="" type="checkbox"/> F CONTAMINATION OF SOIL 02 AREA POTENTIALLY AFFECTED <u>1.5</u> 1.0 <small>ACRES</small>	02 <input type="checkbox"/> OBSERVED (DATE <u>2/90</u>) 04 NARRATIVE DESCRIPTION	POTENTIAL <input type="checkbox"/> ALLEGED <input checked="" type="checkbox"/>
01 <input checked="" type="checkbox"/> G DRINKING WATER CONTAMINATION 03 POPULATION POTENTIALLY AFFECTED <u>200</u>	02 <input type="checkbox"/> OBSERVED (DATE <u>2/90</u>) 04 NARRATIVE DESCRIPTION	POTENTIAL <input checked="" type="checkbox"/> ALLEGED <input type="checkbox"/>
AQUIFER IN AREA BUT NO USERS FOUND		
01 <input type="checkbox"/> H WORKER EXPOSURE/INJURY 03 WORKERS POTENTIALLY AFFECTED _____	02 <input type="checkbox"/> OBSERVED (DATE _____) 04 NARRATIVE DESCRIPTION	POTENTIAL <input type="checkbox"/> ALLEGED <input type="checkbox"/>
01 <input type="checkbox"/> I POPULATION EXPOSURE/INJURY 03 POPULATION POTENTIALLY AFFECTED _____	02 <input type="checkbox"/> OBSERVED (DATE _____) 04 NARRATIVE DESCRIPTION	POTENTIAL <input type="checkbox"/> ALLEGED <input type="checkbox"/>

SITE INSPECTION REPORT
NASA RESEARCH CENTER
OCTOBER 1993

C-7

DRAFT



NASA Lewis Research Center

Site Inspection Report

Plum Brook Station
Sandusky, Ohio

W.O. #4065-6128-004

October 1993



MORRISON KNUDSEN CORPORATION
MK-FERGUSON GROUP

4.2.2.2 Inorganic Compounds

No inorganics were detected in the groundwater analyses for inorganics at levels above the MCL or SCML for human consumption.

4.2.3 **Surface Water Investigation**

4.2.3.1 Surface Water Sampling Locations

MK sampled four locations along Ransom Brook in PMU 2. SD07 and SW07 were collected near the beginning of Ransom Brook just north of TNT Area "B". This sampling point is near a former location of TNT storage tanks and is considered to be a possible POE for surface water contaminants. The sample was collected to determine if there has been any release to the environment as a result of TNT production in Area "B".

SD- sediment
SW- surface water

SD08 and SW08 were collected from the north side of Fox Road along Ransom Brook. This sampling point is considered to be a possible POE for the Middle Toluene Storage Tanks.

The sampling point for SD09 and SW09 is a possible POE for contaminants from the Rail Unloading Facility. This sampling point is located north of Maintenance Road just off a small service road.

The SD10 and SW10 samples were collected in the northern section of PMU 2 at the NPDES sampling station. The NPDES station is located in Ransom Brook near the Reactor Facilities Loop Road. A concrete weir monitors Ransom Brook for the NPDES program. The samples were collected within the upstream holding area of this weir. See Figure 4-2 for the sampling locations.

4.2.4 **Surface Water Results**

4.2.4.1 Organic Compounds

No organic compounds were detected in the surface water, but numerous organic compounds were detected at low concentrations in the sediments. Acetone was detected in all of the sediment samples collected in PMU 2. Other volatile organic contaminants were detected in the sediments, but most were below the quantitation limit. Table 4-9 illustrates the results of the analyses of the sediment samples for volatile compounds.

TABLE 4-9
VOLATILE ORGANIC COMPOUNDS
SEDIMENT SAMPLE RESULTS IN PMU 2
($\mu\text{g}/\text{kg}$)

	SD07	SD08	SD09	SD10
1,1-Dichloroethane	2J	U	U	U
2-Butanone	10J	U	11J	31J
Acetone	53	21	94	210J
Chloromethane	U	U	4J	U
Methylene Chloride	1J	U	5J	U
Toluene	U	1J	13J	U

U = Compound was analyzed for but not detected

J = Indicates an estimate value. Compound was detected above the Method Detection Limit (MDL) but below the Quantitation Limit (QL)

Semivolatile organic contaminants were detected in PMU 2 sediments, but the levels of contamination were below the quantitation limit. A nitroexplosive was detected in sample SD07. SD07 was located in the general vicinity of the storage tanks used in the production of TNT. Table 4-10 illustrates the results of the semivolatile and nitroexplosive analyses on sediment samples in PMU 2.

4.2.4.2 Inorganic Compounds.

No inorganic compounds were detected in surface water or sediment samples in PMU 2 at levels above the MCL or SMCL for human consumption.

4.2.5 Surface Soil Investigation

A total of 11 surface soil samples were collected within PMU 2. These samples were obtained using both a drill rig and a hand auger. Soil samples collected with a split spoon sampler are associated with monitoring wells in the PMU and are labeled with the letters "SB". Hand augers were used within the source areas and are symbolized by the letters "SS". All soil samples were limited to the first two feet below the ground surface.

PLUM BROOK SITE INVESTIGATION

TABLE 4-10
 SEMIVOLATILE AND NITROEXPLOSIVE COMPOUNDS
 SEDIMENT SAMPLES RESULTS IN PMU 2
 (µg/kg)

PARAMETER	SD07	SD08	SD09	SD10
2-Methylnaphthalene	60J	U	U	U
2,4-Dinitrotoluene	200J	U	U	U
Benzoic Acid	U	U	10J	U
Benzo(a)anthracene	U	60J	46J	U
Benzo(a)pyrene	100J	46J	U	U
Benzo(b)fluoranthene	260J	66J	59J	U
Benzo(ghi)perylene	87J	U	U	U
Benzo(k)fluoranthene	U	28J	26J	U
Bis(2-ethylhexyl)phthalate	3800B	61J	U	U
Chrysene	150J	49J	43J	U
Fluoranthene	240J	100J	U	U
Phenanthrene	140J	26J	23J	U
Pyrene	200J	80J	U	U
2,4,6-Trinitrotoluene	25000	U	U	U

U = Compound was analyzed for but not detected

J = Indicates an estimate value. Compound was detected above the Method Detection Limit (MDL) but below the Quantitation Limit (QL)

B = Compound found in the associated blank as well as in the sample

4.2.6 Surface Soil Sampling Location

SS13 and SB09 were collected in or near TNT Area "B". SS13 was located near a trough used to carry TNT product to the storage areas. This area is heavily covered with tall grass and is approximately 25 feet from an access road. SB09 was collected in the upper two feet of MW17 near the storage tanks for this area. This area is sparsely covered with tall grass.

PLUM BROOK SITE INSPECTION

SS14 and SB10 were collected in the Middle Toluene Tank area on the south section of Taylor Road. These tanks are surrounded by a low soil dike. The samples were collected within the diked area between the two tanks. This area is covered with dense, tall grass with a few hardwood trees nearby.

SB11, SS15 and SS16 were collected near the Rail Unloading Facility west of the Garage Maintenance area along Maintenance Road. These samples were all collected along the rail spur going into the Maintenance Garage Area. This area is covered with tall dense grass. The samples located in the rail unloading area are approximately 50 feet apart.

SS34, SS35 and SS36 were obtained from an area void of vegetation and covered with lumps of sulfur and coke just west of the intersection of Maintenance Road and the rail spur. Broken timbers were found that indicate that a wooden structure of some sort used to exist in this area.

4.2.7 Surface Soil Results

4.2.7.1 Organic Compounds

Organic compounds were detected at low levels in the upper two feet of soil in PMU 2. In TNT Area "B", volatile organic compounds and nitroexplosives were found in the surface soils. A low level of 33 $\mu\text{g}/\text{kg}$, was detected in SS13. Nitroexplosive compounds were found in SB09; 2,4,6-trinitrotoluene was detected at a level of 12000 $\mu\text{g}/\text{kg}$ and 2,6-dinitrotoluene was detected at a level of 60 $\mu\text{g}/\text{kg}$. Table 4-11 illustrates the results of the volatile organic analyses on the surface soil and soil boring samples in PMU 2.

Semivolatiles were also detected in the surface soil and soil boring samples in PMU 2. The waste area west of the rail unloading facility had high levels of Bis(2-ethylhexyl)phthalate and coal tar derivatives. Table 4-12 gives the results of semivolatile constituents detected in the surface soil and soil boring samples in PMU 2.

4.2.7.2 Inorganic Compounds

Inorganic compounds were not detected at levels exceeding the MCL or SMCL for human consumption.

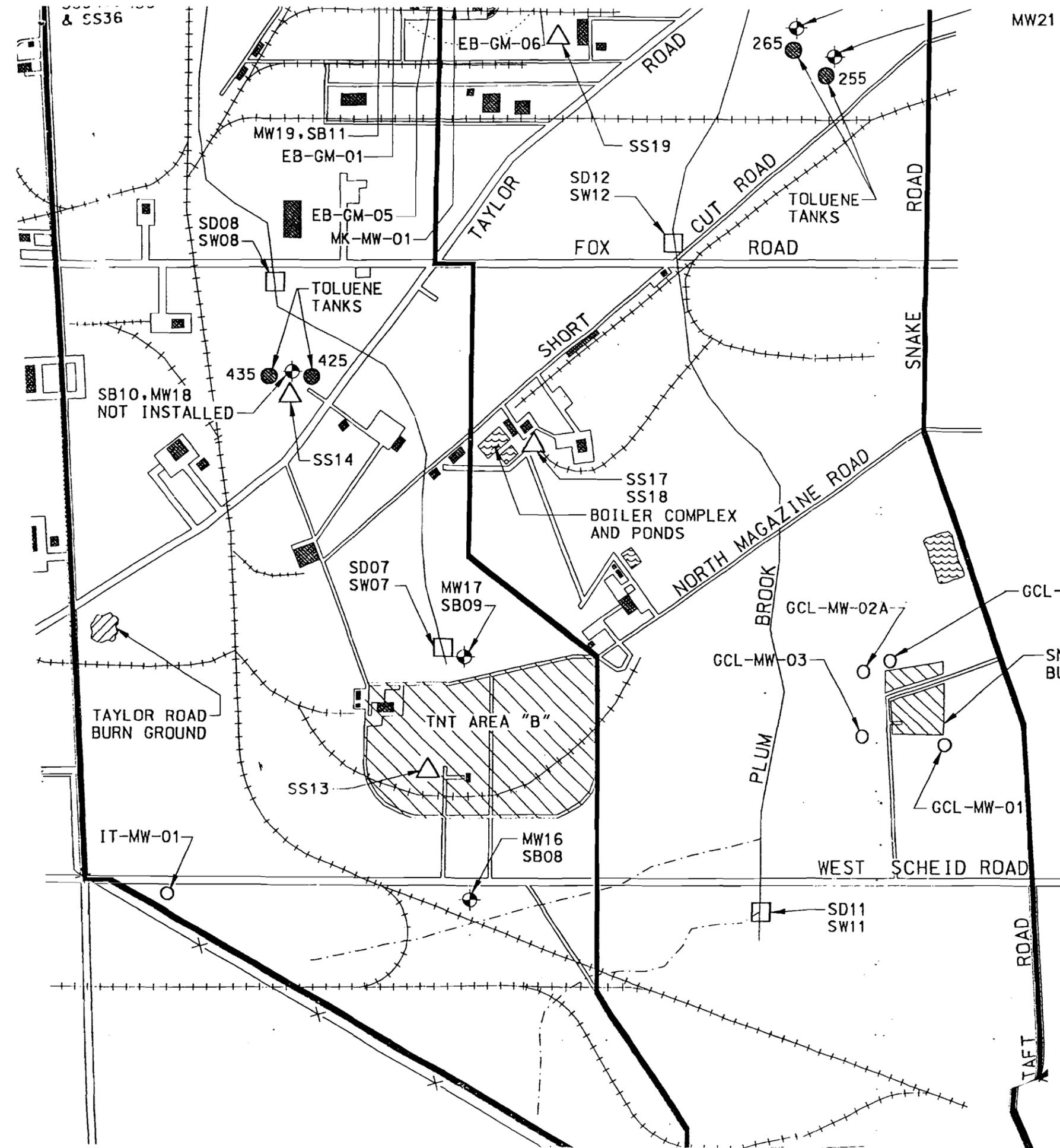
TNT AREA "B"			
MATRIX	SAMPLE POINT	CONTAMINANT	LEVEL (ppb)
GW	MW17	BIS(2-ethylhexyl) PHTHALATE	12
SW	SD07	ACETONE	53
		2,4,6-TRINITROTOLUENE (TNT)	25000
SS	SS13	TOLUENE	33
SS	SB09	2,4,6-TNT	12000
SS	SB09	2,6-DINITROTOLUENE (DNT)	60

PMU 2 AND 3

SAMPLE LOCATION F.L.

SCALE: 1"=1000'

MW21 NOT INSTALLED



& SS36

EB-GM-06

265

255

MW19, SB11

EB-GM-01

SS19

SD12 SW12

SD08 SW08

EB-GM-05
MK-MW-01

FOX

TOLUENE TANKS

ROAD

CUT ROAD

ROAD

ROAD

SB10, MW18
NOT INSTALLED

435

425

SS14

SHORT

SS17

SS18

BOILER COMPLEX
AND PONDS

NORTH MAGAZINE ROAD

SD07 SW07

MW17 SB09

BROOK

GCL-MW-02A

GCL-MW-02B

TAYLOR ROAD
BURN GROUND

TNT AREA "B"

GCL-MW-03

SNAKE ROAD
BURN PIT

SS13

PLUM

GCL-MW-01

IT-MW-01

MW16 SB08

WEST SCHEID ROAD

SD11 SW11

ROAD

Taft

PLUM BROOK STATION PRELIMINARY ASSESSMENT
NASA LEWIS RESEARCH CENTER
JUNE 1991

C-8

PLUM BROOK STATION
PRELIMINARY ASSESSMENT

June 1991

Prepared for:

Office of Environmental Programs
NASA Lewis Research Center
Cleveland, Ohio 44135

Prepared by:

Science Applications International Corporation
25000 Great Northern Corporate Center
Suite 300
North Olmsted, Ohio 44070

Under Subcontract to:

ANALEX Corporation
3005 Aerospace Parkway
Brook Park, Ohio 44142-1003

The site is served by an internal paved road system totaling 62.5 miles and a currently unused 15.7-mile rail system.⁴ The site is bounded on the north by Bogart Road, on the south by Mason Road, on the east by U.S. Highway 250, and on the west by County Road 43.

2.2 Site History

The ownership and regulatory histories of Plum Brook Station are described in this section.

2.2.1 Site Ownership History

Plum Brook Station was established by the U.S. Army in the early 1940s to manufacture ordnance [trinitrotoluene (TNT), dinitrotoluene (DNT), and pentolite] for World War II. The U.S. Army entered into a contract with Trojan Powder Company for the purpose of manufacturing this ordnance. The official title for the site during this time was the Plum Brook Ordnance Works (PBOW). Ground-breaking to construct facilities to support the manufacturing of ordnance began on April 15, 1941.⁶ Production began on December 16, 1941 and continued throughout late 1945. Production ceased two weeks after V-J Day. During the production period more than one billion pounds of ordnance was manufactured.

PBOW was placed in standby condition from 1945 to 1946. Throughout this time, the Army conducted decontamination and decommissioning (D&D) of many of the buildings and structures associated with the manufacturing of ordnance. Decontamination efforts on all TNT and DNT lines began in September 1945.⁷ Decontamination of TNT lines, acid lines, pentolite lines, and DNT lines was halted during the last quarter of 1945. Typical D&D methods for buildings and structures involved removal and relocation of all explosives to a burning ground where they were burned.⁸ Where possible, remaining buildings and structures were burned to the ground. Steam lines, drain lines, etc., were

flushed and dismantled.^{8,9} There is no indication in PBOW historical records of where lines were flushed. Appendix B to this PA report contains procedures followed by the Army to decontaminate the PBOW in 1945.

It is estimated that 65 percent of the necessary decontamination of PBOW was completed by December 1945.⁷ On midnight of December 17, the physical custody of the PBOW was transferred from Trojan Powder Company to the U.S. Army Ordnance Department. The Ordnance Department became the accountable agency and the U.S. Army Corps of Engineers assumed responsibility for maintenance and custodial duties at the PBOW from January 1 through June 30, 1946. After further decontamination efforts were completed, and the extent of contamination certified, PBOW was transferred to the War Assets Administration in August 1946. From 1946 to 1949 the property was protected and maintained by Matthew-Levio and Sons. In 1949 it was transferred to the General Services Administration (GSA), which maintained oversight of the facility until August 1954. Ravenna Arsenal conducted further decontamination efforts from 1954 to 1958. NASA accepted the facility in 1963 after Ravenna Arsenal certified that the PBOW had been completely decontaminated and was suitable for unrestricted future use. After acceptance of the PBOW, NASA identified further areas that required decontamination. In 1964, NASA continued site decontamination and the removal of structures.

The site remained virtually "mothballed" from 1945 until 1956, when the National Advisory Committee for Aeronautics (NACA) determined that the former PBOW was a suitable site to locate a new test reactor. An agreement was made in 1956 for a lease of 500 acres of the north portion of the site to construct and operate the Plum Brook Reactor Facility (PBRF). In October 1958, NACA became the National Aeronautics and Space Administration (NASA). NASA operated the PBRF from 1963-1973 under a license agreement with the Atomic Energy Commission (AEC). NASA currently has a license agreement with the Nuclear Regulatory Commission (NRC) for the safe protective storage of the PBRF.

INPR DOCUMENTATION OBTAINED FROM PIRS

C-9



DEPARTMENT OF THE ARMY

U.S. Army Corps of Engineers
WASHINGTON, D.C. 20314-1000

*PLUM BROOK
INPR*

REPLY TO
ATTENTION OF:

CEMP-RF (200-1a)

13 JAN 1993

MEMORANDUM FOR

COMMANDER, OHIO RIVER DIVISION, ATTN: CEORD-DL
COMMANDER, HUNTSVILLE DIVISION, ATTN: CEHND-PM-OT

SUBJECT: Defense Environmental Restoration Program for Formerly
Used Defense Sites (DERP-FUDS) - Plum Brook Ordnance Works,
Sandusky, Ohio (Site Number G05OH001800)

1. This memorandum authorizes:

a. A hazardous, toxic, and radioactive waste (HTRW) project (project number G05OH001803) as described in the Inventory Project Report (INPR). Subject to availability of funds, the next phase of the HTRW project shall be a remedial investigation and feasibility study (RI/FS). The RI/FS, however, shall be of lesser scope than that required for a National Priority List site.

b. An ordnance and explosive waste (OEW) project (project number G05OH001806) as described in the INPR. Subject to availability of funds, the next phase of the OEW project shall be an engineering evaluation and cost analysis (EE/CA) to determine removal alternatives at the site. Please note that the approved project number is consistent with the number assigned by CEORD, rather than the one used by CEHND-PM-OT.

2. Execution of the HTRW project is assigned to a designated HTRW design district in accordance with the recent USACE reorganization. Execution of the OEW project through the removal design phase is assigned to the Huntsville Division. The subsequent removal action phase of the OEW project is assigned to CEORD.

3. We request:

a. CEORD, within 60 days of the date of this memorandum, ensure the landowners are notified of the decision and provide copies of the notification letters to CEMP-RF. CEORD also ensure that either CEORH or the HTRW design district updates the DERP-FUDS database within 30 days after the database is functional.

b. CEHND must periodically screen the DERP-FUDS database to ensure that geographic divisions/districts have provided the required update.

200.1e

G05OH001806_01.08_0007



CEMP-RF (200-1a)

SUBJECT: Defense Environmental Restoration Program for Formerly
Used Defense Sites (DERP-FUDS) - Plum Brook Ordnance Works,
Sandusky, Ohio (Site Number G05OH001800)

c. Both CEORD and CEHND must ensure that the respective
projects are programed in the appropriate fiscal year workplans.

4. POC: T. Julian Chu, (202) 504-4695.

FOR THE DIRECTOR OF MILITARY PROGRAMS:

for Christopher Bond MS, EN

MICHAEL H. FELLOWS
Colonel, Corps of Engineers
Chief, Environmental Restoration
Division
Directorate of Military Programs

CF:

CEMRD-ED

CEORH-ED

CEORL-ED

CEHND-PM-ED



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DIVISION, OHIO RIVER
CORPS OF ENGINEERS
P. O. BOX 1159
CINCINNATI, OHIO 45201-1159

DEC 24 1992

CEORD-DL-MS (200-1c)

MEMORANDUM FOR CDRUSACE, ATTN: CEMP-RF/Chu, 20 Massachusetts Ave., NW, Washington, DC 20314-1000

SUBJECT: DERP-FUDS Inventory Project Report (INPR) for Site No. G05OH001800, Plum Brook Ordnance Works, Sandusky, Ohio

1. I am forwarding the INPR for Plum Brook Ordnance Works for appropriate action. The site is eligible for DERP-FUDS and the proposed HTRW (G05OH001803) and OEW (G05OH001806) projects are eligible for DERP-FUDS.

2. I recommend that:

a. CEMP-R approve the proposed HTRW project and assign it through this division to Huntington District for inclusion in the FY94 Workplan.

b. CEMP-R approve the proposed OEW project and assign it to CEHND for further investigation.

ALBERT J. GENETTI, Jr.
Brigadier General, US Army
Commanding

Encl

CF:
CEHND-PM-OT
CEHND-PM-EP



DEPARTMENT OF THE ARMY
HUNTINGTON DISTRICT, CORPS OF ENGINEERS
502 EIGHTH STREET
HUNTINGTON, WEST VIRGINIA 25701-2070

REPLY TO
ATTENTION OF:

CEORH-ED-DC (1110)

1 APR 92

MEMORANDUM FOR Commander, Ohio River Division, ATTN: CEORD-DL-MS

SUBJECT: DERP-FUDS Inventory Project Report (INPR) for Site No. G05OH001800, Plum Brook Ordnance Works, Sandusky, Ohio

1. This revised INPR reports on the DERP-FUDS preliminary assessment of the Plum Brook Ordnance Works. A site visit was conducted on 8 May 1985 and a Confirmation Study was conducted in February 1990. The site survey summary sheet, site map and Chemical Contamination Summary are attached as Enclosure 1.
2. We determined that the site was formerly used by the Army. A recommended Findings and Determination of Eligibility is attached as Enclosure 2.
3. We also determined there is hazardous waste at the site eligible for clean-up under DERP-FUDS. The category of hazardous waste at the site is HTW and OEW. The Project Summary Sheets are attached as Enclosures 3 and 4.
4. I recommend that you:
 - a. Approve and sign the Findings and Determination of Eligibility.
 - b. Forward a copy of this INPR to CEMRD for a determination of the need for further study of the HTW project.
 - c. Forward a copy of this INPR to CEHND for the PA file, and for a determination of the need for further study at the site.

Encl
as (6 cys ea)

JR *Wayne R. Reynolds, LTC*
JAMES R. VAN EPPS
Colonel, Corps of Engineers
Commanding

Encl 1

SITE SURVEY SUMMARY SHEET
FOR
DERP-FUDS SITE NO. G05OH001800
PLUM BROOK ORDNANCE WORKS, OHIO
20 March 1992

SITE NAME: Plum Brook Ordnance Works

LOCATION: Sandusky, Ohio

SITE HISTORY: Property was acquired in 1941 by purchase and condemnation for the construction and operations of an ordnance works. The site was excessed to GSA in various phases. The current major owner is NASA.

SITE VISIT: A site visit was conducted on 8 May 1985 by Robert P. Johannsen, CEORH-ED-D.

CATEGORY OF HAZARD: HTW and OEW

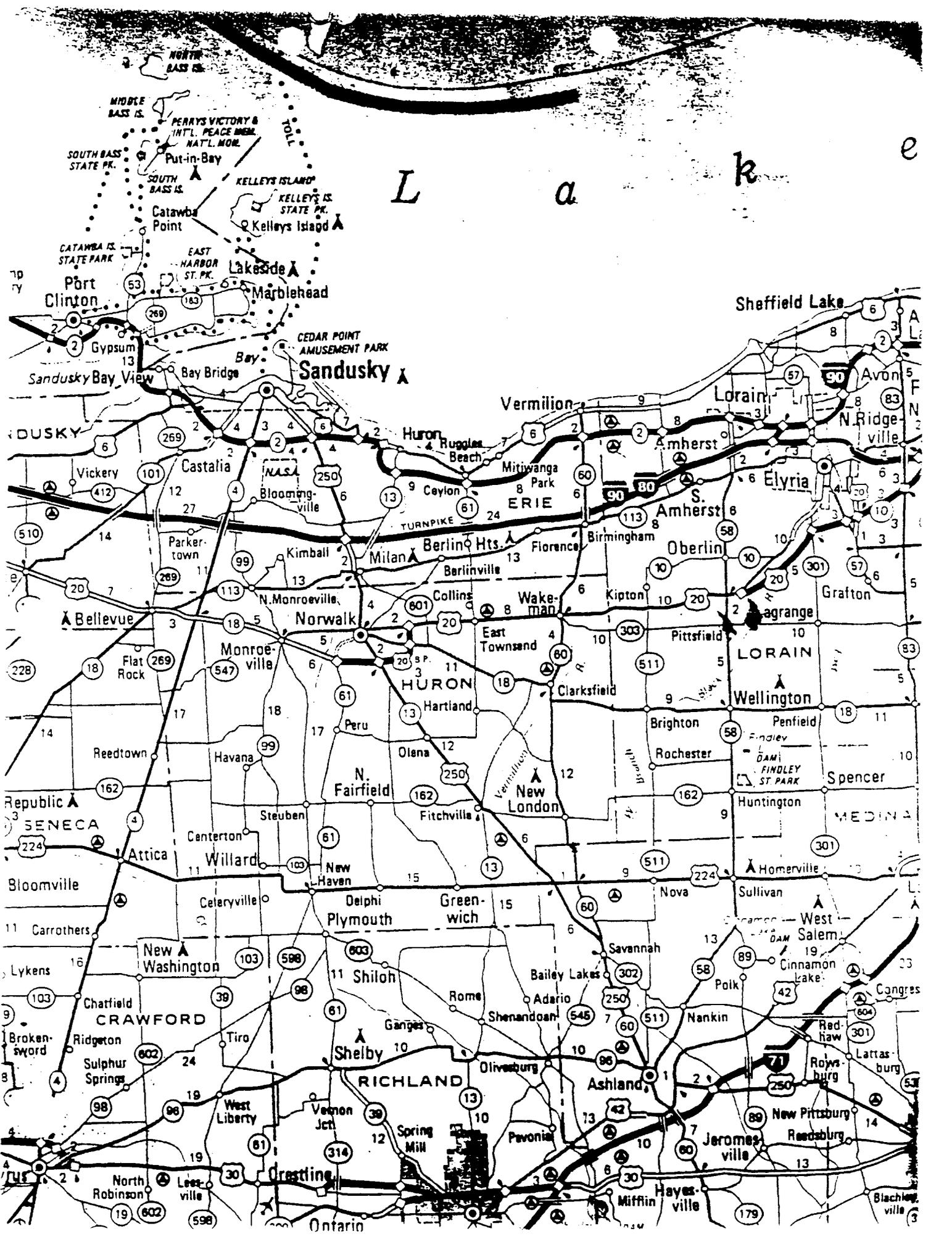
PROJECT DESCRIPTION:

a. HTW. The project consists of the preparation of a Remedial Investigation/Feasibility Study (RI/FS) for contaminated areas such as TNT deposits on the site.

b. OEW. Work involves a site inspection and preparation of a report on potential ordnance and explosive waste hazards that may exist at the site.

AVAILABLE STUDIES AND REPORTS: Confirmation Study by CEORN, February 1990. The Chemical Contamination Summary is attached.

PA POC: Frank R. Albert, Jr., (304) 529-5194, CEORH-ED-DC.



CHEMICAL CONTAMINATION SUMMARY
FOR
THE FORMER PLUM BROOK ORDNANCE WORKS
SANDUSKY, OHIO

1. A confirmation study was conducted at the former Plum Brook Ordnance Works, Sandusky, Ohio, to determine if chemical contamination from previous DOD-related activities was present and if groundwater degradation was resulting. The scope of the contamination evaluation included a records review and evaluation; visual site inspection; development of a site specific safety plan, sampling/analysis plan, monitoring well installation plan, and QA/QC plan; soils sampling during the monitoring well installation for geotechnical characterization; installation of four monitoring wells for ground-water sampling, chemical characterization, and in-situ permeability testing; collection of 20 composite soil samples from soil borings for chemical characterization; collection of four surface water samples from the streams at the site for chemical characterization; a site survey; and completion of hazardous ranking forms.
2. A summary of significant chemical concentrations found during this study is provided in Table 1. The overall hazard ranking score for chemical contamination is 0 since no users of this aquifer were found in the area. This score may not be accurate, as it was done using the Navy's HRS scoring method instead of the EPA's HRS scoring method. This study was begun before the EPA's HRS scoring method was required for confirmation studies.
3. Analytical results of the nitroaromatic analyses indicates extensive soil contamination at both waste disposal areas and minor soil contamination at the Scheid Road Burning Ground. Nitroaromatic contamination was also found in the groundwater at Waste Disposal Area 2. This contamination is directly attributable to past DOD actions at this facility.
4. Results of the volatile organics analyses indicated acetone in the soil and groundwater samples. This can be attributed to the decontamination procedures used during the contamination survey.
5. Analytical results of the metals analyses indicate significant concentrations of manganese in the soil at Waste Disposal Area 2. Elevated sodium levels were also found in the soil at both waste disposal areas. One soil sample from the Scheid Road burning ground also exhibited elevated levels of lead. Substantial concentrations of chromium were found in the groundwater samples. Elevated concentrations of Barium were also found in one groundwater sample. One soil sample from Waste Disposal Area 2 contained a elevated concentration of chromium. All of this contamination is a result of past DOD activities at the site.
6. Elevated sulfate concentrations were found in the groundwater and the soil at the waste disposal areas. Surface water and soil samples from the waste disposal areas exhibited elevated nitrate concentrations. All of this contamination probably resulted from DOD activities at the site.

A discrepancy between the contract laboratory results and the Quality Assurance laboratory results for explosives arose during this study. Analytical results were in question from a previous study conducted by the same laboratory. The contract laboratory did not detect TNT while the QA laboratory did. As a result of this conflict, all nitroaromatic analyses for all studies performed by this contractor were examined in detail. Based on this examination, it was determined that the nitroaromatic results for Plum Brook were low. Therefore, the nitroaromatic contamination found during this phase is probably more extensive than the results of this study show. This decision was based on discussions with CEMRD-ED-GL, CERL, and the contract laboratory.

RECOMMENDATION

It is recommended that an Remedial Investigation/Feasibility Study (RI/FS) be conducted at this site. This study should include:

- Installation and sampling of additional monitoring wells to determine the extent of explosives, metals, sulfate, and nitrate contamination.
- Collection of additional soil samples to determine the extent of the explosives and metals contamination at the waste disposal areas and metals contamination at the Scheid Road burning ground.
- Collection of sediment samples from the pond at Waste Disposal Area 2.
- Evaluation of preliminary hazards and a survey of sensitive receptors to determine if immediate action is required at the site.

TABLE 1

SUMMARY OF SIGNIFICANT CONCENTRATIONS FOUND
IN SAMPLES COLLECTED AT THE FORMER PLUM BROOK ORDNANCE WORKS

<u>Constituent</u>	<u>Location</u>	<u>Standard</u>	<u>Concentration (ppb)</u>
Barium	MW02B	1,000 ppb	214,000
Chromium	MW02B		20,000
	SB-07		17,000
	MW-02 (dup)	50 ppb	120
	MW-06		120
1,3 - DNB	SB-12		590
	SB-13		620
	SB-14		3,700
	SB-16		550
	SB-16 (4-6')		6,400
	SB-18		5,000
2,6 - DNT	SB-14		1,700
	SB-16		1,500
	SB-18		1,000
	MW-02		27
	MW-02 (dup)		25
2,4 - DNT	SB-07		230
	SB-12		910
	SB-13		2,200
	SB-14		20,000
	SB-16		3,200
	SB-16 (4-6')		16,300
	SB-17		1,100
	SB-18		19,000
	MW-02		160
	ME-02 (dup)		140
Lead	SB-03		50,000
Manganese	SB-01		300,000
	SB-02		180,000
	SB-03		71,300
	SB-05		35,000
	SB-06		129,000
	MW02B		2,600,000
	SB-07		530,000
	SB-09		104,000
	SB-10		271,000
	SB-11		211,000

TABLE 1 (con't)

SUMMARY OF SIGNIFICANT CONCENTRATIONS FOUND
IN SAMPLES COLLECTED AT THE FORMER PLUM BROOK ORDNANCE WORKS

<u>Constituent</u>	<u>Location</u>	<u>Standard</u>	<u>Concentration (ppb)</u>
Manganese	SB-12		262,000
	SB-13		263,000
	SB-14		146,000
	SB-15		181,000
	SB-15 (4-6')		244,000
	SB-16		78,200
	SB-16 (4-6')		435,000
	SB-17		141,000
	SB-18		97,600
	MW-01	50 ppb	310
	MW-02		2,800
	MW-02 (dup)		3,000
	MW-06		93
Nitrate	SB-01		2,000
	SB-05		2,000
	SB-09		12,000
	SB-11		5,000
	SB-12		7,000
	SB-16 (4-6')		1,800,000
	SB-18		2,500,000
	SW-01		15,000
Nitrobenzene	SB-16		480
Nitrotoluene	SB-16		480
Sodium	SB-02		110,000
	MW02B		578,000
	SB-07		1,360,000
	SB-09		205,000
	SB-10		174,000
	SB-11		539,000
	SB-12		1,660,000
	SB-13		2,590,000
	SB-14		3,420,000
	SB-15		96,900
	SB-15 (4-6')		125,000
	SB-16		1,040,000
	SB-16 (4-6')		2,820,000
	SB-17		1,240,000
SB-18		1,980,000	

TABLE 1 (con't)

SUMMARY OF SIGNIFICANT CONCENTRATIONS FOUND
 IN SAMPLES COLLECTED AT THE FORMER PLUM BROOK ORDNANCE WORKS

<u>Constituent</u>	<u>Location</u>	<u>Standard</u>	<u>Concentration (ppb)</u>
Sulfate	SB-12		2,000,000
	SB-13		16,000
	SB-14		15,000
	SB-16		9,000
	SB-16 (4-6')		120,000
	SB-17		10,000
	SB-18		190,000
	MW-01		130,000
	MW-02		950,000
	MW-02 (dup)		950,000
	MW-06		60,000
	SW-01		100,000
	SW-02		110,000
	SW-03		110,000
	SW-04		180,000
SW-04 (dup)		180,000	
3,5 - TNS	SB-03		93
	SB-07		410
	SB-12		3,400
	SB-13		730
	SB-14		14,000
	SB-16		1,200
	SB-16 (4-6')		15,000
	SB-17		670
SB-18		10,000	
2,4,6 - TNT	SB-12		680
	SB-16		740

**DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
FOR
FORMERLY USED DEFENSE SITES
FINDINGS AND DETERMINATION OF ELIGIBILITY**

PLUM BROOK ORD WORKS

Sandusky, Erie County, Ohio

Site No. G050H001800

FINDINGS OF FACT

1. The Plum Brook Ordnance Works consisted originally of 9,071.06 acres of land [9020.66 acres fee, 50.40 acres easement] acquired by purchase and condemnation from various owners in 1941. The site, located 4.7 miles south of Sandusky, Ohio, and 59 miles west of Cleveland, lies in the townships of Huron, Milan, Perkins, and Oxford, in Erie County, Ohio.
2. The Plum Brook Ordnance Works was used by the Trojan Powder Company for the manufacture of explosives during World War II. The works was constructed by the U. S. Army in 1940 and operated by the Army until 1945. The works included production lines for TNT, DNT, and pentolites.
3. The Plum Brook Ordnance works ceased operations in 1945, and the area was renamed the Plum Brook Depot. Portions of the depot were operated as an ammunition storage facility for Erie Ordnance Depot. The Plum Brook Depot was placed in inactive status in 1961.

The land disposal occurred in several, fairly complicated, stages. At the end of World War II, continued use of the works by the Department of War was not contemplated, so the entire facility, except for 52.74 acres which was previously quitclaimed to the Baltimore and Ohio Railroad Company on 27 March 1943, was declared excess. Later, the Department of the Army decided that it was best to withdraw the magazine area [2800.46 acres fee] from excess, and on 11 March 1946 this withdrawal was approved. The War Assets Administration accepted custody of the remainder on 6 September 1946.

In 1947, the magazine area, 2800.46 acres fee, was redesignated The Plum Brook Depot Activity [hereinafter PBDA]. It was to become known also as the "retained area" and was not a part of the surplus to WAA. This acreage was also referred to as the Erie Ordnance Depot, and was utilized for powder storage.

On 15 March 1949, the retained magazine area was 2800.46 acres, and the surplus in the custody of WAA/GSA was 6167.86 acres, fee; and 50.40 acres, easement.

By letter of transfer dated 16 June 1954, effective 30 June 1954, the Department of the Army reacquired from GSA the 3180.33 acres ordnance works and 50.40 acres easements, which thereafter was known as Plum Brook Ordnance Works [hereinafter PBOW]. The rest of the original site, previously declared excess to WAA, was disposed of to either NASA or third party grantees. This area, referred to as the WAA net disposal area, contained 2987.13 acres. No work is proposed in the net disposal area, which is now largely a subdivision of residential properties, so it is unknown if any conditions, etc., are present in those disposal transactions.

By letter dated 24 January 1958, the Department of the Army transmitted a copy of a permit entered into by NACA [predecessor of NASA] and Army, by which NACA accepted Plum Brook Ordnance Works [PBOW] "subject to existing contamination without fencing of such areas by the Department of the Army."

By SF 118 dated 3 October 1958, as amended 3 August 1959, the Department of the Army declared excess 3180.33 acres fee and 50.60 acres easements [PBOW]. The SF 118 states that "detailed information regarding contamination is not being furnished as it is understood that NACA is agreeable to the transfer of the installation subject to contamination." At the time of this excess, PBOW was permitted to NACA, as noted in the preceding paragraph.

By SF 118 dated 22 September 1961, the Department of the Army declared excess the magazine area, [PBDA], 2800.46 acres fee. The SF 118 states that "neutralization of any contamination has been completed." At the time of excessing, this area was subject to 8 revocable at will agricultural leases.

On 23 October 1961, NASA-Lewis Research Center requested transfer of all lands covered by SF118 dated 3 October 1958 as amended [PBOW], and of the PBDA, SF 118 as listed in the preceding paragraph, for a total of 6031.39 acres of land, of which 5980.79 acres were fee, 50.40 acres easement, and 0.2 acres license. [Figures do not add up to acquisition figures exactly due to differences in survey and to rounding] A Statement of Justification attached thereto reads:

A Use Agreement was obtained from the Department of the Army on July 5, 1956, for approximately 500 acres (Pentolite Area, Plum Brook Ordnance Works). The reactor facility was constructed on this site with NACA, C&E appropriation of Fiscal Years 1956, 1958, and 1960. Subsequently, the balance of the land and structures of the Plum Brook Ordnance Works (excluding the Igloo Area) was turned over to NASA under a Use Agreement from the Department of the Army on January 22, 1958. This latter area (approximately 2700 acres) was and is used by the NASA for the construction of many rocket research facilities with NASA C&E and R&D appropriations of Fiscal Years 1958 and 1959.

...The current major research programs being conducted at Plum Brook include the following:

1. Effect of radiation on materials.
2. Research on components for nuclear propulsion systems.
3. High energy chemical propulsion systems.
4. Nuclear rocket component research.

On 22 July 1962, NACA requested transfer of the entire 5980.79 acre fee and 50.40 acres easements [PBDA and PDOW]. The property was transferred to NACA on 15 March 1963 without reimbursement. NACA assumed accountability for and custody of the property on that date.

By corrected SF 118 dated 18 April 1978, NASA-Lewis Research Center declared excess 2152.15 acres of land and the structures thereon. Within this area lies two sites, both part of the old PBOW, which NASA accepted subject to contamination. The first of these was the Perkins School site. By indenture dated 2 June 1978, the Secretary of HEW quitclaimed unto the Perkins Board of Education, Sandusky, Ohio, 46.023 acres of land, subject to all legal highways. Exceptions included a right for the Government to maintain utilities; the exclusive use of the grantor and its assigns, together with rights of access, to a water reservoir and pumping station. Further, the grantee assumed maintenance of the roadways until they are dedicated. The Government also reserved for ten years the ownership of certain telephone equipment, the exclusive use thereof, and access to repair it. The restricted use of the property to educational purposes for thirty years. There was no recapture clause, nor did the Government promise to clean up the property, nor was any other type of restoration clause included in the deed. Also within the PBOW which NASA accepted subject to contamination was NASA designated Tract No. 59, consisting of 603.98 acres, which at the time of excess was under permit by NASA to EPA. This tract is currently under GSA control, but the SF118 indicates that EPA has a continuing need for all real property and improvements thereon, including buildings, roadways, utilities, and fencing. The Ohio National Guard has made it known to GSA that it has an interest in acquiring this property. Finally, GSA has indicated that should DoD restore or decontaminate this property, it contemplates sale to private parties. GSA has indicated that it is now their policy to not dispose of property which is or may be contaminated, so they are awaiting corrective action on the red water basins in order to process and dispose of this tract.

By SF 118 dated 10 October 1980, NASA-Lewis Research Center declared excess 142.663 acres of land and roadways, identified by NASA as parcels numbers 61 and 62. No work is contemplated by this report for either of these two parcels. Parcel Number 62, acreage unknown, was disposed of by GSA to the

Department of the Army for use as an U. S. Army Reserve Center. GSA also has made two other disposals in recent years, to Wensink Seed Farms on 19 December 1989, quitclaiming 5.63 acres, and to Edward Scott Schenk, on 25 October 1989, quitclaiming 10.3 acres. Both of these disposals were subject to certain covenants intended to maintain the archeological integrity of the sites, but to no other significant covenants or restrictions. There were no recapture clauses or reversions in these two disposals, and GSA required the clean-up of these sites prior to its disposal of them. GSA apparently has approximately 2090.2 acres plus parcel number 61 still in its current inventory, as no further disposal information was found.

NASA-Lewis Research Center remains a 3685.977 acre installation owned by the United States, and as such, is not eligible for DERP-FUDS under existing program guidelines.

DETERMINATION

Based on the foregoing findings of fact, the site has been determined to be formerly used by DoD. It is therefore eligible [with the exception of the active installation] for the Defense Environmental Restoration Program - Formerly Used Defense Sites established under 10 USC 2701 et seq.

24 Dec 92
Date


ALBERT J. GENETTI, Jr.
Brigadier General, U.S. Army
Commanding

PROJECT SUMMARY SHEET
FOR
DERP-FUDS HTW PROJECT NO. G05OH001803
PLUM BROOK ORDNANCE WORKS
SANDUSKY, OHIO
SITE NO. G05OH001800
20 March 1992

PROJECT DESCRIPTION: Plum Brook Ordnance Works was utilized by the Department of Defense for the production of ordnance. DOD use of the site left red water basins as part of the contamination.

PROJECT ELIGIBILITY: Records indicate that the site was acquired and utilized by DOD for an ordnance works. Residual deposits of TNT and red water basins remain from DOD use of the site. A contamination evaluation found TNT compounds in the soil and groundwater.

POLICY CONSIDERATIONS: Current DOD policy dictates eligibility for remediation of DOD generated hazardous and toxic waste even though there was no evidence of a hazard when the property was transferred from DOD. The contamination present is from direct DOD use of the site.

PROPOSED PROJECT: An HTW project is proposed. The project consists of the preparation of a Remedial Investigation/Feasibility Study of the red water basins, soil and groundwater.

EPA Form 2070-12: Attached.

DD Form 1391: Attached.

District POC: Frank R. Albert, Jr., (304) 529-5194, CEORH-ED-DC.



POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 1 - SITE INFORMATION AND ASSESSMENT

I. IDENTIFICATION
01 STATE 02 SITE NUMBER

II. SITE NAME AND LOCATION

01 SITE NAME (EPA Form 3500-1 or descriptive name of site): PLUM BROOK CRDNANCE WORKS

02 STREET, ROUTE NO. OR SPECIFIC LOCATION IDENTIFIER: _____

03 CITY: SANDUSKY 04 STATE: OH 05 ZIP CODE: _____ 06 COUNTY: ERIE 07 COUNTY OR CONG. DIST. CODE: _____ 08 COUNTY OR CONG. DIST. CODE: 5

09 COORDINATES: LATITUDE _____ LONGITUDE _____

10 DIRECTIONS TO SITE (Starting from nearest public road):
I 80, NORTH 0.1 MILE ON RT 4, EAST .2 MILE ON RT 13. SITE NORTH NEAR BURNINGVILLE

III. RESPONSIBLE PARTIES (FORMER USE)

01 OWNER (if known): US Army Corps of Engs 02 STREET (if known) (agency name): 502 2nd ST

03 CITY: HUNTINGTON 04 STATE: WV 05 ZIP CODE: 25701 06 TELEPHONE NUMBER: 304 529-5194

07 OPERATOR (if known and different from owner): NONE 08 STREET (if known) (agency name): _____

09 CITY: _____ 10 STATE: _____ 11 ZIP CODE: _____ 12 TELEPHONE NUMBER: _____

13 TYPE OF OWNERSHIP (check one):
 A PRIVATE B FEDERAL NASA C STATE D COUNTY E MUNICIPAL
 F OTHER Former Road Use G UNKNOWN

4 OWNER OPERATOR NOTIFICATION ON FILE (check all that apply):
 A RCRA 3001 DATE RECEIVED _____ B UNCONTROLLED WASTE SITE (RCRA 103(c)) DATE RECEIVED _____ C NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION: YES DATE 2 90 NO MONTH DAY YEAR

BY (check all that apply):
 A EPA B EPA CONTRACTOR C STATE D OTHER CONTRACTOR
 E LOCAL HEALTH OFFICIAL F OTHER US Army Corps of Engs
CONTRACTOR NAME(S): NASHVILLE DIST

02 SITE STATUS (check one): A ACTIVE B INACTIVE C UNKNOWN

03 YEARS OF OPERATION: _____ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT KNOWN OR ALLEGED:
Barium; Chromium; Acetone; Manganese; Sulfate; Nitrate; 1,3-DNB; 2,6-DNT; 2,4-DNT; 1,3,5-TNB; 2,4,6-TNT

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION:
SOIL AND GROUNDWATER CONTAMINATION

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (check one): A HIGH B MEDIUM C LOW D NONE

VI. INFORMATION AVAILABLE FROM

01 CONTACT: FRANK ALBERT 02 OF (agency, organization): US ARMY COE HUNTINGTON DISTRICT 03 TELEPHONE NUMBER: 304 529-5194

04 PERSON RESPONSIBLE FOR ASSESSMENT: SAME 05 AGENCY: _____ 06 ORGANIZATION: _____ 07 TELEPHONE NUMBER: _____ 08 DATE: 3 20 92



POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER

II. HAZARDOUS CONDITIONS AND INCIDENTS <small>CONTINUE</small>			
01 <input type="checkbox"/> J DAMAGE TO FLORA 04 NARRATIVE DESCRIPTION	02 <input type="checkbox"/> OBSERVED (DATE _____)	<input type="checkbox"/> POTENTIAL	<input type="checkbox"/> ALLEGED
01 <input type="checkbox"/> K DAMAGE TO FAUNA 04 NARRATIVE DESCRIPTION <small>(INCLUDE NUMBER(S) OF SPECIES)</small>	02 <input type="checkbox"/> OBSERVED (DATE _____)	<input type="checkbox"/> POTENTIAL	<input type="checkbox"/> ALLEGED
01 <input type="checkbox"/> L CONTAMINATION OF FOOD CHAIN 04 NARRATIVE DESCRIPTION	02 <input type="checkbox"/> OBSERVED (DATE _____)	<input type="checkbox"/> POTENTIAL	<input type="checkbox"/> ALLEGED
01 <input checked="" type="checkbox"/> M UNSTABLE CONTAINMENT OF WASTES <small>(SOLID, LIQUID, OR GASEOUS WASTES)</small> 03 POPULATION POTENTIALLY AFFECTED _____	02 <input checked="" type="checkbox"/> OBSERVED (DATE <u>2/90</u>)	<input type="checkbox"/> POTENTIAL	<input checked="" type="checkbox"/> ALLEGED
04 NARRATIVE DESCRIPTION <u>SOIL CONTAMINATION FOUND</u>			
01 <input type="checkbox"/> N DAMAGE TO OFFSITE PROPERTY 04 NARRATIVE DESCRIPTION	02 <input type="checkbox"/> OBSERVED (DATE _____)	<input type="checkbox"/> POTENTIAL	<input type="checkbox"/> ALLEGED
01 <input type="checkbox"/> O CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs 04 NARRATIVE DESCRIPTION	02 <input type="checkbox"/> OBSERVED (DATE _____)	<input type="checkbox"/> POTENTIAL	<input type="checkbox"/> ALLEGED
01 <input type="checkbox"/> P ILLEGAL/UNAUTHORIZED DUMPING 04 NARRATIVE DESCRIPTION	02 <input type="checkbox"/> OBSERVED (DATE _____)	<input type="checkbox"/> POTENTIAL	<input type="checkbox"/> ALLEGED
05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS			
III. TOTAL POPULATION POTENTIALLY AFFECTED: <u>5100</u>			
IV. COMMENTS			
V. SOURCES OF INFORMATION <small>SEE ADDITIONAL INFORMATION ON C-11010-1001-100100-100001</small>			
<u>CONFIRMATION STUDY BY NASHVILLE DISTRICT COE FEB 1990</u>			



POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT

IDENTIFICATION
STATE/ COUNTY SITE NUMBER

PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 A GROUNDWATER CONTAMINATION
02 OBSERVED DATE 2/90 POTENTIAL ALLEGED
03 POPULATION POTENTIALLY AFFECTED 700 04 NARRATIVE DESCRIPTION

NASHVILLE DISTRICT CONFIRMATION STUDY
FEB 1990

01 E SURFACE WATER CONTAMINATION
02 OBSERVED DATE _____ POTENTIAL ALLEGED
03 POPULATION POTENTIALLY AFFECTED 700 04 NARRATIVE DESCRIPTION

01 C CONTAMINATION OF AIR
02 OBSERVED DATE _____ POTENTIAL _____ ALLEGED
03 POPULATION POTENTIALLY AFFECTED _____ 04 NARRATIVE DESCRIPTION

01 F FIRE EXPLOSIVE CONDITIONS
02 OBSERVED DATE _____ POTENTIAL ALLEGED
03 POPULATION POTENTIALLY AFFECTED _____ 04 NARRATIVE DESCRIPTION

01 E DIRECT CONTACT
02 OBSERVED DATE _____ POTENTIAL _____ ALLEGED
03 POPULATION POTENTIALLY AFFECTED _____ 04 NARRATIVE DESCRIPTION

01 S CONTAMINATION OF SOIL
02 OBSERVED DATE 2/90 POTENTIAL ALLEGED
03 AREA POTENTIALLY AFFECTED 1/4 MILE 04 NARRATIVE DESCRIPTION

01 D DRINKING WATER CONTAMINATION
02 OBSERVED DATE 2/90 POTENTIAL ALLEGED
03 POPULATION POTENTIALLY AFFECTED 700 04 NARRATIVE DESCRIPTION

AQUIFER IN AREA BUT NO USERS FOUND

01 W WORKER EXPOSURE/INJURY
02 OBSERVED DATE _____ POTENTIAL _____ ALLEGED
03 WORKERS POTENTIALLY AFFECTED _____ 04 NARRATIVE DESCRIPTION

01 P POPULATION EXPOSURE/INJURY
02 OBSERVED DATE _____ POTENTIAL _____ ALLEGED
03 POPULATION POTENTIALLY AFFECTED _____ 04 NARRATIVE DESCRIPTION



POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

1. IDENTIFICATION
01 STATE 02 SITE NUMBER

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 WASTE STATES <input checked="" type="checkbox"/> SOLID <input checked="" type="checkbox"/> POWDER/FINES <input checked="" type="checkbox"/> SLUDGE <input type="checkbox"/> OTHER _____ <input checked="" type="checkbox"/> SLURRY <input type="checkbox"/> LIQUID <input type="checkbox"/> GAS	02 WASTE QUANTITY AT SITE <small>MEASURE OF WASTE QUANTITIES TYPICAL OF WASTE</small> TONS _____ CUBIC YARDS _____ NO. OF DRUMS _____	03 WASTE CHARACTERISTICS <small>CHARACTERISTICS OF WASTE</small> <input type="checkbox"/> A TOXIC <input type="checkbox"/> B CORROSIVE <input type="checkbox"/> C RADIOACTIVE <input type="checkbox"/> D PERSISTENT <input type="checkbox"/> E SOLUBLE <input type="checkbox"/> F INFECTIOUS <input type="checkbox"/> G FLAMMABLE <input checked="" type="checkbox"/> H IGNITABLE <input type="checkbox"/> I HIGHLY VOLATILE <input checked="" type="checkbox"/> J EXPLOSIVE <input type="checkbox"/> K REACTIVE <input type="checkbox"/> L INCOMPATIBLE <input type="checkbox"/> M NOT APPLICABLE
---	---	--

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
01	SLUDGE			
02	DILY WASTE			
03	SOLVENTS			
04	PESTICIDES			
05	OTHER ORGANIC CHEMICALS			
06	INORGANIC CHEMICALS			
07	ACIDS			
08	BASES			
09	HEAVY METALS			

IV. HAZARDOUS SUBSTANCES (See Appendix 101 for most frequently listed CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/ DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
	BARIUM		LAND	214,000	PPB
	CHROMIUM		LAND	20,000	PPB
	1,3-DNB		LAND	6,400	PPB
	2,6-DNT		LAND	1,700	PPB
	2,4-DNT		LAND	20,000	PPB
	LEAD		LAND	50,000	PPB
	MANGANESE		LAND	2,600,000	PPB
	NITRATE		LAND	2,500,000	PPB
	NITROBENZENE		LAND	400	PPB
	NITROTOLUENE		LAND	400	PPB
	SODIUM		LAND	3,400,000	PPB
	SULFATE		LAND	2,000,000	PPB
	1,3,5-TNB		LAND	15,000	PPB
	2,4,6-TNT		LAND	700	PPB

V. FEEDSTOCKS (See Appendix 101 for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (See Appendix 101 for sources of information)

CONFIRMATION STUDY FEB 1990 BY
NASHVILLE DISTRICT, CORPS OF ENGRS
(NOTE: MAX. CONCENTRATIONS SHOWN)

PROJECT SUMMARY SHEET
FOR
DERP-FUDS OEW PROJECT NO. G05OH001806
PLUM BROOK ORDNANCE WORKS
SANDUSKY, OHIO
SITE NO. G05OH001800
20 March 1992

PROJECT DESCRIPTION: The site is a 9,071 acre ordnance works that was used by the Army for the manufacture of explosives.

PROJECT ELIGIBILITY: Records indicate that the site was acquired and utilized by DOD for an ordnance works. Any ordnance contamination that may exist would be the direct result of DoD activity. This project has been evaluated in accordance with the risk assessment procedures for explosive ordnance.

POLICY CONSIDERATIONS: There is no policy applicable to this project.

PROPOSED PROJECT: An OEW project is proposed that consists of a site inspection to evaluate potential hazards.

DD Form 1391: Attached.

RAC: A Risk Assessment Code (RAC) of 4 was derived for the site; categorized as "Critical" (Category II) for hazard severity and "Remote" (Level D) for hazard probability. A RAC of 4 indicates a site inspection is required to evaluate potential threats to personnel. The RAC evaluation is attached.

Division POC: Robert Nore, CEHND-PM-OT, (205) 955-1512.

APPENDIX A
RISK ASSESSMENT PROCEDURES FOR
EXPLOSIVE ORDNANCE (EXO)

Site Name Plum Brook Ordnance Work Rater's Name FRANK ALBERT
 Site Location SANDUSKY OH Organization GEORGE EOD DC
 DERP Project # 6054001306 RAC _____

EXO RISK ASSESSMENT:

This risk assessment procedure was developed in accordance with MIL-STD 882B and AR 385-10.

The EXO risk assessment is based upon documented evidence consisting of records searches, reports of Explosive Ordnance Disposal (EOD) detachment actions, and field observations, interviews, and measurements. These data are used to assess the risk involved based upon the hazards identified at the site. The risk assessment is composed of two factors, hazard severity and hazard probability.

Any field activities should be made with the assistance of qualified EOD personnel.

Part I. Hazard Severity. Hazard severity categories are defined to provide a qualitative measure of the worst credible mishap resulting from personnel exposure to various types and quantities of unexploded ordnance items.

TYPE OF ORDNANCE

A. Conventional Ordnance and Ammunition

	YES VALUE	NO VALUE	VALUE
Small Arms (.22 cal - .50 cal)	2	0	—
Medium/Large Caliber (20 mm and larger)	10	0	—
Bombs, Explosive	10	0	<u>10</u>
Bombs, Practice (w/spotting charges)	6	0	—
Grenades, Hand and Rifle, Explosive	10	0	—
Grenades, Practice (w/spotting charges)	6	0	—

	<u>YES</u> VALUE	<u>NO</u> VALUE	VALUE
Landmines, Explosive	10	0	—
Landmines, Practice (w/spotting charges)	6	0	—
Rockets, Guided Missiles, Explosive	10	0	—
Detonators, Blasting Caps	10	0	—
Demolition Charges	10	0	—
Conventional Ordnance and Ammunition Value (Maximum of 10). <u>10</u>			

B. Pyrotechnics

	<u>YES</u> VALUE	<u>NO</u> VALUE	VALUE
Any Munition Containing White Phosphorus or other Pyrophoric Material (i.e., Spontaneously Flammable)	10	0	—
Any Munition Containing a Flame or Incendiary Material (i.e., Napalm, Triethylaluminum Metal Incendiaries)	6	0	—
Military Flares	4	0	—
Pyrotechnics Value (Maximum of 10). —			

C. Bulk High Explosives (Bulk explosives not an integral part of conventional ordnance).

	<u>YES</u> VALUE	<u>NO</u> VALUE	VALUE
Primary or Initiating Explosives (Lead Styphnate, Lead Azide, Nitroglycerin, Mercury Azide, Mercury Fulminate, etc.)	10	0	—
Booster, Bursting or Fuse Explosives (PETN, Compositions A, B, C, Tetryl, TNT, RDX, HMX, HBX, Black Powder, etc.)	10	0	<u>10</u>

	<u>YES</u> VALUE	<u>NO</u> VALUE	VALUE
Military Dynamite	10	0	—
Less Sensitive Explosives (Ammonium Nitrate, Favier Explosives, etc.)	3	0	—
High Explosives Value (Maximum value of 10).			<u>10</u>

D. Propellants

	<u>YES</u> VALUE	<u>NO</u> VALUE	VALUE
Solid or Liquid Propellants	6	0	— <u>0</u>

E. Chemical Agents/Radiological Materials/Munitions

	<u>YES</u> VALUE	<u>NO</u> VALUE	VALUE
Radiological	25	0	—
Toxic Chemical Agents (Choking, Nerve, Blood, Blister)	25	0	—
Incapacitating Agent (BZ)	10	0	—
Riot Control and Miscellaneous (Vomiting, Tear, Chlorine, Mustard Simulant)	5	0	—
Any Munition Containing Smoke, Illumination, Signal Charge	4	0	—

Chemical Agents/Radiological Materials/Munitions Value (Maximum 25). 0

Total Ordnance and Explosive Waste Characteristics Value (Total =
A + B + C + D + E with a Maximum value of 61). 20

TABLE 1

HAZARD SEVERITY

Description	Category	Value
CATASTROPHIC	I	≥ 21
CRITICAL	II	$\geq 13 < 21$
MARGINAL	III	$\geq 5 < 13$
NEGLIGIBLE	IV	< 5

* Apply Hazard Severity to Table 3.

Part II. Hazard Probability. The probability that a hazard has been or will be created due to the presence and other rated factors of explosive ordnance (EXO) on a formerly used DOD site.

AREA, EXTENT, ACCESSIBILITY OF CONTAMINATION

A. Locations of Contamination

	<u>YES</u> VALUE	<u>NO</u> VALUE	VALUE
Within Tanks, Pipes, Vessels or Other confined locations.	5	0	—
On the surface or within 3 feet.	5	0	—
Inside walls, ceilings, or other parts of Buildings or Structures.	4	0	—
Subsurface, greater than 3 feet in depth.	3	0	<u>3</u>

Value for location of EXO (Maximum Value of 5).

3

B. Distance to nearest inhabited locations or structures likely to be at risk from EXO site (roads, parks, playgrounds, and buildings).

<u>Distance to Nearest Target</u>	VALUE
Less than 1250 feet	5
1250 feet to 0.5 miles	4
0.5 miles to 1.0 mile	3
1.0 mile to 2.0 miles	2
2.0 miles to 5.0 miles	1
Over 5.0 miles	0

Distance to Persons Value (Maximum Value of 5).

4

C. Numbers and types of Buildings within a 2 mile radius measured from the hazardous area, not the installation boundary.

Number of Buildings	VALUE
0	0
1 to 10	1
11 to 50	2
51 to 100	3
101 to 250	4
251 or Over	5

Number of Buildings Value (Maximum Value of 5). 1

D. Types of Buildings

	VALUE
Educational, Child Care, etc.	5
Residential, Hospitals, Hotels, etc.	5
Commercial, Shopping Centers, etc.	5
Industrial Warehouse, etc.	4
Agricultural, Forestry, etc.	3
Detention, Correctional	2
Military	1
No Buildings	0

Types of Buildings Value (Maximum Value of 5). 4

E. Accessibility to site refers to the measures taken to limit access by humans or animals to ordnance and explosive wastes. Use the following guidance:

Barrier	Assigned Value
A 24-hour surveillance system (e.g., television monitoring or surveillance by guards or facility personnel) which continuously monitors and controls entry onto the facility;	0

OR
Barrier

Assigned Value

An artificial or natural barrier (e.g., a fence combined with a cliff), which completely surrounds the facility; and a means to control entry, at all times, through the gates or other entrances to the facility (e.g., an attendant, television monitors, locked entrances, or controlled roadway access to the facility).	0
Security guard, but no barrier	1
A barrier, (any kind of fence) but no separate means to control entry	2
Barriers do not completely surround the facility	3
No barrier or security system	5

Accessibility Value (Maximum Value of 5).

2

F. Site Dynamics - This deals with site conditions that are subject to change in the future, but may be stable at the present. Examples would be excessive soil erosion by beaches or streams, increasing land development that could reduce distances from the site to inhabited areas or otherwise increase accessibility.

VALUE

None Anticipated	0
Expected	5

(Maximum Value of 5)

0

Total value for hazard probability.
Sum of Values A through F.
(Not to exceed 30). Apply this value
to Hazard Probability Table 2 to determine
Hazard Level.

14

TABLE 2

HAZARD PROBABILITY

Description	Level	Value
FREQUENT	A	≥27
PROBABLE	B	≥21 <27
OCCASIONAL	C	≥15 <21
REMOTE	D	≥ 8 <15
IMPROBABLE	E	<8

* Apply Hazard Probability to Table 3.

Part III. Risk Assessment. The risk assessment value for this site is determined using the following Table 3. Enter with the results of the hazard probability and hazard severity values.

TABLES 1 AND 2

HAZARD SEVERITY - II
(from Table 1)

HAZARD PROBABILITY - D
(from Table 2)

TABLE 3

Probability Level		FREQUENT A	PROBABLE B	OCCASIONAL C	REMOTE D	IMPROBABLE E
Severity Category:						
CATASTROPHIC	I	1	1	2	3	4
CRITICAL	II	1	2	3	4	5
MARGINAL	III	2	3	4	4	5
NEGLIGIBLE	IV	3	4	4	5	5

Note: The risk assessment code for EXO is not equivalent to the risk assessment code prescribed in AR 385-10:

RISK ASSESSMENT CODE (RAC)

- RAC 1 Imminent Hazard - Emergency action required to mitigate the hazard or protect personnel (i.e., Fencing, physical barrier, guards, etc.).
- RAC 2 Action required to mitigate hazard or protect personnel. Feasibility study is appropriate.
- RAC 3 Action required to evaluate potential threat to personnel. High priority Site Inspection is appropriate.
- RAC 4 Action required to evaluate potential threat to personnel. Site Inspection is appropriate.
- RAC 5 No action required.

Justification. In narrative form, summarize the documented evidence that supports this risk assessment.



DEPARTMENT OF THE ARMY
MISSOURI RIVER DIVISION, CORPS OF ENGINEERS
P.O. BOX 103, DOWNTOWN STATION
OMAHA, NEBRASKA 68101-0103



REPLY TO
ATTENTION OF

28 OCT 1992

CEMRD-ED-HP (200-1c)

MEMORANDUM FOR Commander, U.S. Army Engineer Division, Ohio
River, ATTN: CEORD-DL-MS, P.O. Box 1159,
Cincinnati, Ohio 45201-1159

SUBJECT: Defense Environmental Restoration Program for
Formerly Used Defense Sites (DERP-FUDS) Inventory Project
Report (INPR) for Site No. G05OH001800, Plum Brook Ordnance
Works, Sandusky, Ohio

1. Reference memorandum, CEORD-DL-MS, 10 June 1992, subject:
DERP-FUDS Inventory Project Report (INPR) for Site No.
G05OH001800, Plum Brook Ordnance Works, Sandusky, Ohio.
2. Comments on this INPR are:
 - a. Concur that additional work (RI/FS) should be
performed.
 - b. Recommend this work be phased into two operable units
(enclosure 1).
 - c. Clarify the differences in the contamination summary
references, Waste Disposal Areas and the Shield Road Burning
Grounds (enclosure 2).
3. I recommend that if this INPR is approved, it should be
sent to Ohio River Division for assignment to Nashville
District for execution.
4. If there are any questions, contact Mark Mimick at (402)
221-7560.

FOR THE COMMANDER:

2 Encls
as

J J Grasso
for JOSEPH J. GRASSO, P.E.
Acting Director
HTRW and Engineering

CF:
CEMP-R
CEHND
CEORN-ER-M

Encl 2

10 September 1992

MEMORANDUM FOR CEMRD-ED-HP (Mimick)

SUBJECT: Technical Evaluation (Chemistry) on INPR Proposal for Site No. G05OH001800, Plum Brook Ordnance Works, Sandusky, Ohio

1. Reference memorandum, CEMRD-ED-HP, 03 Sep 92, SAB.
2. A review of the subject INPR has been performed by CEMRD-ED-EC. Based on the chemical data given in the report, it appears that the soil and groundwater of this site are contaminated by metals, explosives, and possibly volatile organic compounds. This contamination is most likely the result of past DoD activities at the Plum Brook Ordnance Works. CEMRD-ED-EC agrees that additional work (in the form of a RI/FS) should be performed. However, the work should be phased into two operable units: OU1 (soil) and OU2 (ground water), since contamination adsorbed on the soil is a contributor to the ground water contamination. Operable Unit 2's RI/FS should be delayed until remediation of all Operable Unit 1 sites is completed, including areas not covered by DERP-FUDS monies. Delaying OU2 would not be considered significant since receptors to possible ground water contamination have not been identified.
3. The costs proposed in this report should also be phased to match the two operable units.
4. Point of contact is Larry D. Becker at (402) 221-7416.



MARCIA C. DAVIES
Chief, Environmental, HTRW Division
HTRW and Engineering Directorate

CF:
CEMRD-ED-TG



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DIVISION, OHIO RIVER
CORPS OF ENGINEERS
P. O. BOX 1159
CINCINNATI, OHIO 45201-1159

CEORD-DL-MS (200-1c)

DEC 24 1992

MEMORANDUM FOR CDRUSACE, ATTN: CEMP-RF/Chu, 20 Massachusetts Ave., NW, Washington, DC 20314-1000

SUBJECT: DERP-FUDS Inventory Project Report (INPR) for Site No. G05OH001800, Plum Brook Ordnance Works, Sandusky, Ohio

1. I am forwarding the INPR for Plum Brook Ordnance Works for appropriate action. The site is eligible for DERP-FUDS and the proposed HTRW (G05OH001803) and OEW (G05OH001806) projects are eligible for DERP-FUDS.

2. I recommend that:

a. CEMP-R approve the proposed HTRW project and assign it through this division to Huntington District for inclusion in the FY94 Workplan.

b. CEMP-R approve the proposed OEW project and assign it to CEHND for further investigation.

Encl

13/
ALBERT J. GENETTI, Jr.
Brigadier General, US Army
Commanding

CF:
CEHND-PM-OT
CEHND-PM-EP

11 September 1992

MEMORANDUM FOR CEMRD-ED-HP

SUBJECT: DERP-FUDS Inventory Project Report (INPR) for Site No. G050H001800, Plum Brook Ordnance Plant, Marion, OH

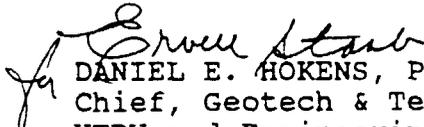
1. Reference memorandum, SAB, CEMRD-ED-HP, 3 September 1992.

2. As requested, a review of the INPR has been performed by CEMRD-ED-TG. Based on available information, ED-TG conditionally concurs with the recommendation for additional site characterization. Without the referenced confirmation study, it is difficult to evaluate the significance of the contamination described in the INPR. It is assumed that the sampling results for compounds other than explosives have been compared to appropriate background data and that the potential effects of filtered vs. unfiltered water samples have been considered. Without a map, it is difficult to evaluate the significance of the explosive concentrations since it is not clear how close the sampling locations were to the potential sources or how widespread the contamination is. This should be clarified before the INPR is accepted.

3. In addition, it is not clear that the areas investigated in the confirmation study are the same as the areas proposed for the HTW project. The contamination summary references Waste Disposal Areas 1 and 2 and the Sheid Road Burning Grounds, but the proposed project is to address red water lagoons. This must be clarified.

4. The potential for subsequent use of the site to have affected ground water needs to be considered. Suggest that subsequent site owners, including NASA, be contacted for information concerning other environmental problems known to exist in the vicinity.

5. Point-of-contact is Dave Becker, CEMRD-ED-TG, ext. 3399.


DANIEL E. HOKENS, P.E.
Chief, Geotech & Tech Engrg Division
HTRW and Engineering Directorate

CF: CEMRD-ED-EC
CEMRD-OC

EXECUTIVE OFFICE SUMMARY PAGE

CEORD-DL-MS

15 December 1992
Bertsch/6248

OFFICE	ACTION	INITIALS	DATE
CEORD-DL-M	COORDINATION	<u>RS</u>	<u>16 Dec 92</u>
CEORD-DL	COORDINATION	<u>RS</u>	<u>16 Dec 92</u>
CEORD-OC	COORDINATION	<u>just</u>	<u>23 Dec 92</u>
CEORD-EL	COORDINATION	<u>just</u>	<u>23 Dec 92</u>
CEORD-DD	COORDINATION	<u> </u>	<u> </u>
CEORD-DE	APPROVAL/SIGNATURE	<u> </u>	<u>24 Dec</u>
CEORD-DL-MS	DISTRIBUTION	<u> </u>	<u> </u>

SUBJECT: DERP-FUDS Inventory Project Report for Site No. G050H001800, Plum Brook Ordnance Works, Sandusky, Ohio

1. PURPOSE: Subject report requires Division Commander's approval before forwarding to HQs. The result of this report is:

 The site has been determined to be ineligible under the DERP Program and no further action is required.

X The site has been determined to be eligible and there are potential project/projects at the site which should be added to the FUDS work plan.

2. RECOMMENDATION: Commander approve the report by signing the cover letter and the Findings of Determination of Eligibility at Tab A.

3. DISCUSSION: None.

4. RESOURCE IMPACTS: None.

5. COMMAND ACTION: REVISE SEE ME FOR YOUR INFO

APPENDIX D
HISTORICAL PHOTOGRAPHS

PHOTO 1
TNT Chunks Found in Barricades at TNT B Area
Approximately 12 - 15 pounds (PC in hand)

NASA
P63-123.



PHOTO 1

APPENDIX E

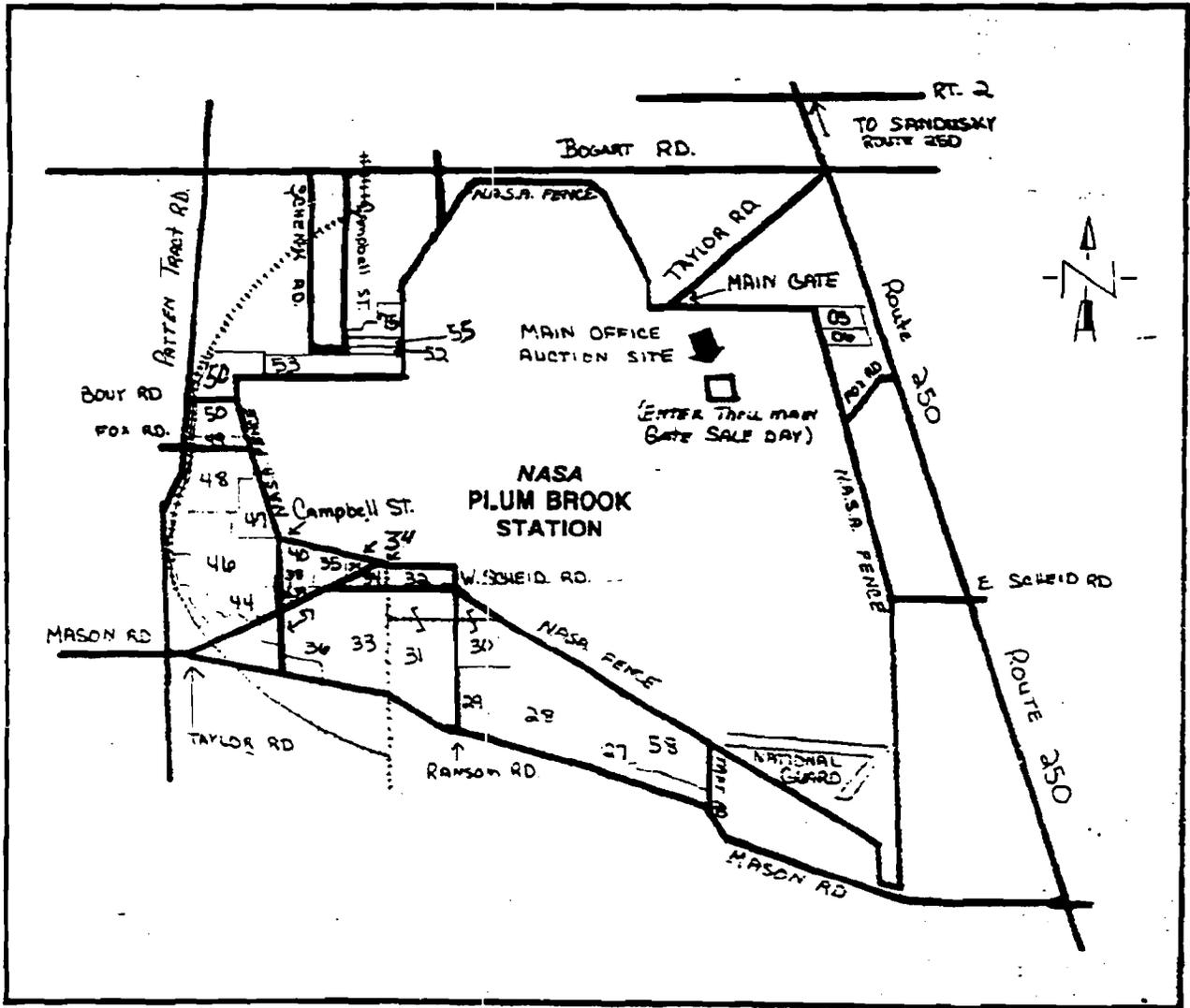
NOT USED

APPENDIX F
NEWSPAPER/JOURNALS

1 story, A-1.

4-28-83

'wice...' NASA sale nets \$2,371,000



F. James Ostheimer

Buffer-zone land outside the fence at NASA's Plum Brook Station has again changed hands. Map shows the land auctioned Wednesday.

SANDUSKY LIBRARY

APPENDIX G
PRESENT SITE PHOTOGRAPHS



PHOTO 1
Magazine #9155
Typical



PHOTO 2
Interior Magazine #9155



PHOTO 3
Contaminated Area C



PHOTO 4
Contaminated Area B



PHOTO 5
Contaminate/Disposal Area 2



PHOTO 6
Contaminated Area TNT A



PHOTO 7
Contaminated Area TNT A

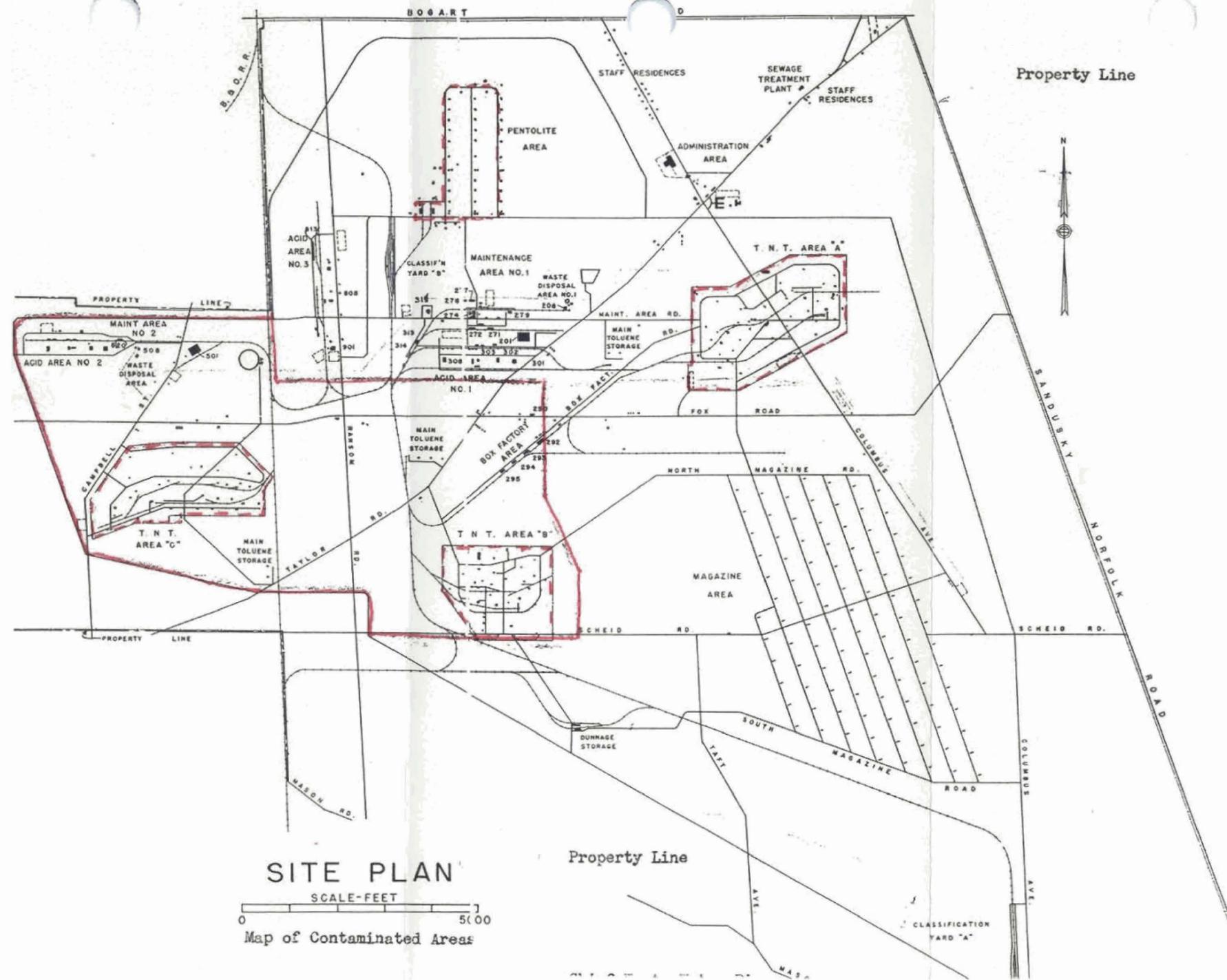
APPENDIX H
HISTORICAL MAPS/DRAWINGS



AERIAL VIEW STAFF RESIDENCES



AERIAL VIEW PENTOLITE AREA



SITE PLAN

SCALE- FEET
0 500

Map of Contaminated Areas

APPENDIX I
FINALIZATION DOCUMENTS



DEPARTMENT OF THE ARMY
HUNTSVILLE CENTER, CORPS OF ENGINEERS
P.O. BOX 1600
HUNTSVILLE, ALABAMA 35807-4301

REPLY TO
ATTENTION OF:

CEHNC-OE-CX

09 March 2007

MEMORANDUM FOR Commander, US Army Engineering District, Louisville
(CELRL-PM-M/Walt Perro), PO Box 59, Louisville, KY 40201-0059

SUBJECT: Defense Environmental Restoration Program, Formerly Used Defense Sites,
Ordnance and Explosives, Chemical Warfare Materials, Archives Search Report (ASR),
Plum Brook Ordnance Works, Sandusky, OH, **Project No. G05OH001806**

1. Enclosed is the final ASR Technical Advisory Group (TAG) package for the above subject site. In accordance with the TAG review, a RAC 5 has been assigned.
2. Remove the existing "draft" cover from ASR. Replace with enclosed cover and package.
3. A RAC 5 will be entered into FUDSMIS by CEHNC.
4. The District needs to ensure ASR is entered into PIRS.
5. If you disagree or have any questions concerning the action, please call me at 256-895-1797 or DSN 760-1767.

FOR THE DIRECTOR:

DANNY R. MARDIS
Archives Search Report Manager

Encl

CF:
Commander, US Army Engineer District, St Louis (CEMVS-EC-P/Thomas Freeman),
1212 Spruce Street, St Louis, MO 63103-2822 (w/encls)

ED-SY-O

ED

OE-CX

OE-S

OE



DEPARTMENT OF THE ARMY
HUNTSVILLE CENTER, CORPS OF ENGINEERS
P.O. BOX 1600
HUNTSVILLE, ALABAMA 35807-4301

REPLY TO
ATTENTION OF:

CEHNC-OE-CX (200-1c)

07 February 2007

MEMORANDUM FOR US Army Engineer District, St. Louis
(CEMVS-PM-M/Mike Dace), 1222 Spruce Street, St. Louis, MO 63103-2833

SUBJECT: Result of the Technical Advisory Group (TAG) Review of Archives Search Reports (ASR) and Fact Sheets for Defense Environmental Restoration Program Formerly Used Defense Sites (DERP-FUDS)

1. The following enclosed ASRs and Fact Sheets are finalized.

<u>Project Number</u>	<u>Site Name</u>
B08MT030201	Fort Peck Aerial Gunnery Range
B08MT028301	Fort William Henry Harrison Army
B08MT031201	Glasgow Pattern Gunnery Range
B08MT031901	Great Falls Pattern Gunnery Range
B08MT032403	Lewistown Army Air Field
B08MT032601	Lewistown Pattern Gunnery Range
B07NE005802	Kearney Rifle Range
B07NE003705	Nebraska Ordnance Plant (Supplemental ASR)
B07NE006401	Plattsmouth Rifle Range
D01NH000102	Camp Langdon
C02NJ000100	Fort Dix
K06NM033301	Guadalupe Bombing and Gunnery Range
B07MO028402	Vichy Army Airfield
B07MO017800	Weldon Spring Ordnance Works (Weldon Spring Chemical Plant)
B07MO017100	St. Louis Ordnance Sub-Depot
B07MO001000	St. Louis Ordnance Plant
B07MO017000	St. Louis Ordnance Core Plant
A04MS001202	Gulf Ordnance Plant
A04MS001000	Camp Shelby
E05MI011103	Romulus Army Airfield
D01MAT90900	Lawrence Depot (CWS Warehouse)
D01ME052301	Fort George
D01ME043301	U.S. Naval Auxiliary Air Station, Rockland
B07KS028600	Walker Army Air Field
B07KS098200	Kansas Army Ammunition Plant
G05IN008200	Terre Haute Ordnance Depot
G05IN007300	Newport Army Ammunition Plant

CEHNC-OE-CX (200-1c)

SUBJECT: Result of the Technical Advisory Group (TAG) Review of Archives Search Reports (ASR) and Fact Sheets for Defense Environmental Restoration Program Formerly Used Defense Sites (DERP-FUDS)

<u>Project Number</u>	<u>Site Name</u>
H09HI033301	Waiakea Forest Reserve
I04GA000300	Atlanta General Depot
I04FL016700	Boca Raton Army Air Field
I04FL106500	Mosquito Lagoon Target Sites
I04FL069800	U.S. Naval Amphibious Training Base, Ft. Pierce
I04FL007800	Withlacoochee Air Field
I04FL010300	Zephyrhills Army Air Field
J09CA082300	Hammer Army Airfield
J09AZ101501	Yuma Proving Grounds (Yuma Test Branch)
F10AK005004	Attu Island Chichagof Harbor
F10AK098404	Gerstle River Expansion Area
J08UT109800	Yellow Jacket Ranges
J08UT109500	Southern Triangle Dugway Proving Ground
J08UT002601	Hurricane Mesa Test Site
B07KS000100	Marysville
B08MT000203	Glasgow Army Air Field
K06TX000900	Camp Bowie
K06TX000600	Camp Bullis
NOT FUDS ELGIBLE	Camp Bullis Training Site
K06TX015700	Former Pantex Ordnance Plant Texas Tech Research Farm Property
K06TX07800	Laguna Madre Gunnery Range (Laguna Atascosa National Refuge)
K06TX063401	Harlingen Air Force Base
K06TX110001	Sabine Pass
K06TX106701	Sabine Pass Temporary Harbor Defense
K06TX003601	San Jacinto Ordnance Depot
B08SD000800	Black Hills Army Depot
I04SC000800	The Charleston Army Depot
G05OH015401	Rossford Army Depot
G05OH001806	Plum Brook Ordnance Works
G05OH001001	Columbus Army Forces Service Depot
I04NCT91200	Carolina Maneuver Area

2. Recommended strategy for future actions to be taken by the Project Manager is included in the enclosed fact sheets. Supporting data for TAG decisions are also included with the fact sheets.

CEHNC-OE-CX (200-1c)

SUBJECT: Result of the Technical Advisory Group (TAG) Review of Archives Search Reports (ASR) and Fact Sheets for Defense Environmental Restoration Program Formerly Used Defense Sites (DERP-FUDS)

3. Fact sheets, supporting data and corrected pages, due to prior reviews, are to be distributed with the subject ASRs.

4. Subject ASRs are recommended to be final when enclosed fact sheets, supporting data and corrected pages are included as a part of the project package.

5. The POC is Mr. Danny Mardis, commercial 256-895-1797, DSN 760-1767, and fax 256-895-1798.

FOR THE DIRECTOR:



DANNY R. MARDIS
Archives Search Report Manager
For Ordnance and Explosives Team

Encl

**RESTORATION INFORMATION MANAGEMENT SYSTEM
FORMERLY USED DEFENSE SITES (FUDS)
PROJECT FACT SHEET
DECEMBER 1993
TAG REVIEW DATE: 14 November 2006**

1. **SITE NAME:** Plum Brook Ordnance Works

SITE NUMBER: G050H001800

LOCATION: City: Sandusky
County: Erie
State: Ohio

PROJECT NUMBER: G050H001806

CATEGORY: MMRP

INPR RAC: NA

ASR RAC: 5

TAG RAC: 5

2. **POC'S:**

GEOGRAPHIC DISTRICT:
Name: Walt Perro
Office: CELRL-PM-M
Phone: 502-315-6825

GEOGRAPHIC DIVISION:
Name: Patty Bersch
Office: CELRD-PDM
Phone: 513-684-6248

HEADQUARTERS:
Name: Dale Moeller
Office: CEMP-RF
Phone: 202-761-4649

ASR/INPR TEAM:
Name: Bradford McCowan
Office: CEHNC-OE-CX
Phone: 256-895-1174

ASR SUPPORT DISTRICT:
Name: Dennis Gilmore
Office: CELMS-PM-M
Phone: 314-331-8108

ASR TECHNICAL REVIEWER:
Name: Jose A. Garcia
Office: SJMAC-ESM
Phone: 918-420-8805

3. **SITE DESCRIPTION:**

a. Plum Brook Ordnance Works, is located in Erie County, within Huron, Milan, Perkins and Oxford Townships, 4.7 miles south of Sandusky, Ohio. The site served as a TNT and DNT manufacturing facility and consisted of 9,071.06 acres of land.

b. The site was used for the manufacturing of trinitrotoluene (TNT) and Dinitrotoluene (DNT). The facility was operated under contract by the Trojan Powder Company.

c. During the site visit, the team did not find MEC or MPPEH Debris.

4. **SITE HISTORY:**

a. The Government acquired the land by purchase and condemnation from various owners in 1941. In 1958 the Department of the Army transferred the majority of the manufacturing facilities to NASA which constructed rocket research facilities on site.

b. There is no evidence of MEC or MPPEH debris on FUDS released properties. Properties owned by NASA are undergoing various HTRW projects with the assistance of the U.S. Army.

c. A Certificate of Clearance was not found for this property. There were no EOD Reports discovered for this property.

d. There is no evidence of CWM training, storage or disposal activities associated with the FUDS property.

e. Production of TNT/DNT ceased in August 1945, two weeks after V-J Day. Portions of the PBOW which had storage magazines were used as an ammunition storage facility under the name, Erie Ordnance Depot until 1961. Presently, various parties own 3,250 acres of the original lands that were part of the acreage of this facility. The Perkins Board of Education was granted 46.023 acres by quitclaim deed. NASA owns the majority of the property (3,685 acres), and the GSA still controls certain tracts, which allows the Army to have an Army Reserve Center on this site.

5. **PROJECT DESCRIPTION:**

Size:	3,296 acres (FUDS)
	5,724 acres (NASA/Army owned)
Former Use:	Extended Boundary Lands
Present Use:	Private Ownership/School
Possible End Use:	Same
MEC Presence:	

Confirmed: None
 Potential: Same
 ASR Recommends: RAC 5
 HNC Safety: RAC NA

6. CURRENT STATUS:

The U.S. Army Corps of Engineers, St. Louis District, completed the Archives Search Report for Plum Brook Ordnance Works in December 1993.

7. STRATEGY:

NDAI

8. ISSUES AND CONCERNS: The Huntsville Center Technical Advisory Group met and evaluated this ASR on 14 November 2006. The consensus was a RAC score of 5. The following issues were addressed:

a. There are various HTRW projects related to this project due to heavy TNT/DNT contamination.

b. The initial INPR RAC score evaluation was not part of the ASR. There is a large amount of information about various projects related to this site in Project Information Retrieval System (PIRS)

c. The HNC RAC safety review was not available for this process.

9. SCHEDULE SUMMARY:

<u>Phase</u>	<u>Orig. Start</u>	<u>Sch. Start</u>	<u>Actual Start</u>	<u>Orig. Comp.</u>	<u>Sch. Comp.</u>	<u>Actual Comp.</u>
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10. FUNDING/BUDGET SUMMARY:

<u>Year</u>	<u>Phase</u>	<u>EXEC FOA</u>	<u>IN House Required</u>	<u>Contract Required</u>	<u>Funds Obligated</u>
-------------	--------------	-----------------	--------------------------	--------------------------	------------------------

RISK ASSESSMENT PROCEDURES FOR
MILITARY MUNITIONS RESPONSE PROJECTS

Property Name:	Plum Brooks Ordnance Works	Rater's Name:	Jose Garcia
Property Location:	Erie County, OH	Phone Number:	(918)420-8805
FUDS Property/Project #:	G05OH001806	District:	DAC
Property Type:	TNT/DNT Manufacturing Plant	Office Symbol:	SJMAC-ESM
Score:	5	Date Completed:	3 November 2006

RISK ASSESSMENT:

This risk assessment (RAC) procedure was developed to address explosives safety hazards related to munitions. This procedure does not address environmental hazards associated with munitions constituents. The U.S. Army Engineering and Support Center, Huntsville (USAESCH), Ordnance and Explosives Directorate (CEHNC-OE) developed this procedure in accordance with MIL-STD 882C and AR 385-10. The Risk Assessment Code (RAC) score will be used by the U.S. Army Corps of Engineers to prioritize the response action(s) at Formerly Used Defense Sites (FUDS). The risk assessment should be based on the best available information resulting from record searches, reports of Explosive Ordnance Disposal (EOD) actions, field observations (site visits), and interviews. This information is used to assess the risk involved based on the potential MMRP hazards identified for the project. The risk assessment evaluates two factors, hazard severity and hazard probability.

Part I - Hazard Severity. Hazard severity categories are defined to provide a qualitative measure of the worst credible event resulting from personnel exposure to various types and quantities of unexploded ordnance.

TYPE OF ORDNANCE: (Check all that apply)

A. Conventional ordnance and ammunition:

- | | VALUE |
|---|-----------------------------|
| Projectiles, explosive (20 millimeter and larger) | 10 <input type="checkbox"/> |
| Bombs, explosive | 10 <input type="checkbox"/> |
| Grenades, hand or rifle, explosive | 10 <input type="checkbox"/> |
| Landmine, explosive | 10 <input type="checkbox"/> |
| Rockets, guided missile, explosive | 10 <input type="checkbox"/> |
| Other Explosive item not previously stated | 10 <input type="checkbox"/> |
| Bomb, practice (w/spotting charge) | 6 <input type="checkbox"/> |
| Detonators, blasting caps, fuses, boosters, bursters | 6 <input type="checkbox"/> |
| Practice ordnance (w/ spotting charges, other than bombs) | 4 <input type="checkbox"/> |
| Small arms, complete round (.50 cal or less) | 1 <input type="checkbox"/> |
| Small arms, expended (.50 cal or less) | 0 <input type="checkbox"/> |
| Practice ordnance (w/o spotting charges) | 0 <input type="checkbox"/> |

Conventional ordnance and ammunition (enter largest single value checked) 0

What evidence do you have regarding conventional unexploded ordnance? During the property visit, the team did not find MEC or MPPEH Debris.

Property Name:
Project Number:
Property Type:

B. Pyrotechnics (for munitions not described above):

	VALUE
Munitions containing White Phosphorus (WP) or other pyrophoric material (i.e., spontaneously flammable)	10 <input type="checkbox"/>
Munitions containing a flame or incendiary material (i.e., Napalm, Triethylaluminum metal incendiaries)	10 <input type="checkbox"/>
Containers containing WP or other pyrophoric material or flame or incendiary material	6 <input type="checkbox"/>
Flares, signals, simulators, screening/burning smokes (other than WP)	4 <input type="checkbox"/>
Pyrotechnics (enter the single largest value checked)	<u>0</u>

What evidence do you have regarding pyrotechnics? None.

C. Bulk Explosives (HE) (not an integral part of conventional ordnance; un-containerized):

	VALUE
Primary or initiating explosives (Lead Styphnate, Lead Azide, Nitroglycerin, Mercury Azide, Mercury Fulminate, Tetracene, etc.)	10 <input type="checkbox"/>
Secondary explosives (Demolition charges, PETN, Compositions A, B, C, Teteryl, TNT, RDX, HMX, HBX, Black Powder, etc.)	8 <input type="checkbox"/>
Insensitive explosive substances (explosive contaminated soils, ammonium nitrate)	3 <input type="checkbox"/>
Bulk Explosives (HE) (enter the single largest value checked)	<u>0</u>

What evidence do you have regarding bulk explosives? None. It should be noted that TNT/DNT contamination was found on manufacturing facility under the control of NASA. Army and NASA are addressing these issues through a HTRW Program. Areas released are not assessed to have problems associated with TNT/DNT manufacturing.

Property Name:
Project Number:
Property Type:

D. Bulk propellants (not an integral part of rockets, guided missiles, or other conventional ordnance; uncontainerized)

	VALUE
Solid or liquid propellants	6 <input type="checkbox"/>
Bulk Propellants (select 6 or 0)	<u>0</u>

What evidence do you have regarding bulk propellants? None

E. Recovered Chemical Warfare Materiel (RCWM), Weaponized Industrial Chemicals and Radiological Materiel:

	VALUE
Toxic chemical agents (H-Mustard, G-Nerve, V-Nerve and L-Lewisite)	25 <input type="checkbox"/>
Chemical Agent Identification Sets	20 <input type="checkbox"/>
Radiological Materiel (If rad waste is identified please call the HTRW-CX at 402-697-2555)	15 <input type="checkbox"/>
Weaponized Industrial Chemicals (Hydrogen Cyanide AC; Cyanogen Chloride, CK; Phosgene, CG)	10 <input type="checkbox"/>
Riot Control Agents (vomiting, tear)	5 <input type="checkbox"/>
Chemical and Radiological (enter the single largest value checked)	<u>0</u>

What evidence do you have regarding chemical or radiological? None.

TOTAL HAZARD SEVERITY VALUE (Sum of value A through E, maximum of 61) 0
Apply this value to Table 1 to determine Hazard Severity Category

Property Name:
Project Number:
Property Type:

TABLE 1
HAZARD SEVERITY*

<u>DESCRIPTION</u>	<u>CATEGORY</u>	<u>HAZARD SEVERITY VALUE</u>
CATASTROPHIC	I <input type="checkbox"/>	21 and/or greater
CRITICAL	II <input type="checkbox"/>	10 to 20
MARGINAL	III <input type="checkbox"/>	5 to 9
NEGLIGIBLE	IV <input type="checkbox"/>	1 to 4
**NONE	V <input checked="" type="checkbox"/>	0

*Apply Hazard Severity Category to Table 3 and complete Part II of this form.

**If hazard severity value is 0, complete Part II of this form. Then proceed to Part III and use a RAC score of 5 to determine your appropriate action.

PART II - Hazard Probability. The probability that a hazard has been, or will be, created due to the presence and other rated factors of unexploded ordnance, explosives, incendiary, pyrotechnic, radiological, or RCWM materials on a formerly used Department of Defense (DOD) site.

AREA, EXTENT, ACCESSIBILITY OF MMRP HAZARD (Check all that apply)

A. Locations of MMRP hazards:

	VALUE
On the surface	5 <input type="checkbox"/>
Within tanks, pipes, vessels, or other confined areas	4 <input type="checkbox"/>
Inside walls, ceilings, or other building/structure	3 <input type="checkbox"/>
Subsurface	2 <input type="checkbox"/>

Location (enter the single largest value checked) 0

What evidence do you have regarding the location of MMRP? None. It should be noted that TNT/DNT contamination was found on manufacturing facility under the control of NASA. Army and NASA are addressing these issues through a HTRW Program. Areas released are not assessed to have problems associated with TNT/DNT manufacturing.

Property Name:
Project Number:
Property Type:

B. Distance to nearest inhabited location/structure likely to be at risk from MMRP hazard (road, park, playground, building, etc.).

	VALUE
Less than 1,250 feet	5 <input checked="" type="checkbox"/>
1,250 feet to 0.5 mile	4 <input type="checkbox"/>
0.5 mile to 1.0 mile	3 <input type="checkbox"/>
1.0 mile to 2.0 Miles	2 <input type="checkbox"/>
Over 2 miles	1 <input type="checkbox"/>

Distance (enter the single largest value checked) 5

What are the nearest inhabited structures/buildings? The property is surrounded by commercial activity and townships.

C. Number(s) of building(s) within a 2-mile radius measured from the MMRP hazard area, not the installation boundary.

	VALUE
26 and over	5 <input checked="" type="checkbox"/>
16 to 25	4 <input type="checkbox"/>
11 to 16	3 <input type="checkbox"/>
6 to 10	2 <input type="checkbox"/>
1 to 5	1 <input type="checkbox"/>
0	0 <input type="checkbox"/>

Number of buildings (enter the single largest value checked) 5

Narrative: The property is surrounded by commercial activity and townships.

Property Name:
Project Number:
Property Type:

D. Types of Buildings (within 2-mile radius)

	VALUE
Educational, childcare, residential, hospitals, hotels, commercial, shopping centers	5 <input checked="" type="checkbox"/>
Industrial, warehouse, etc.	4 <input checked="" type="checkbox"/>
Agricultural, forestry, etc.	3 <input type="checkbox"/>
Detention, correctional	2 <input type="checkbox"/>
No buildings	0 <input type="checkbox"/>

Types of buildings (enter the single largest value checked) 5

Describe the types of buildings: The property is surrounded by commercial activity and townships.

E. Accessibility to site refers to access by humans to military munitions. Use the following guidance:

	VALUE
No barrier nor security system	5 <input checked="" type="checkbox"/>
Barrier is incomplete (e.g., in disrepair or does not completely surround the site). Barrier is intended to deny egress from the site, as for a barbed wire fence for grazing	4 <input type="checkbox"/>
A barrier (any kind of fence in good repair) but no separate means to control entry. Barrier is intended to deny access to the site.	3 <input type="checkbox"/>
Security Guard, but no barrier	2 <input type="checkbox"/>
A 24-hour surveillance system (e.g., television monitoring or surveillance by guards or facility personnel continuously monitors and controls entry; or, an artificial or natural barrier (e.g., fence combined with a cliff) which completely surrounds the area; and, a means to control entry at all times through the gates or other entrances (e.g., an attendant, television monitors, locked entrances, or controlled roadway access to the area).	0 <input type="checkbox"/>

Accessibility (enter the single largest value checked) 5

Describe the site accessibility: The property is surrounded by commercial activity and townships. Areas affected by TNT/DNT manufacturing are under NASA control, fenced and posted.

Property Name:
Project Number:
Property Type:

F. Site Dynamics. This deals with site conditions that are subject to change in the future, but may be stable at the present. Examples would be excessive soil erosion on beaches or streams, increasing land development that could reduce distances from the site to inhabited areas or otherwise increase accessibility.

	VALUE
Expected	5 <input type="checkbox"/>
Not anticipated	0 <input checked="" type="checkbox"/>
Site Dynamics (enter the single largest value checked)	0

Describe the site dynamics: Site dynamics not expected to change.

TOTAL HAZARD PROBABILITY VALUE 20
 (Sum of largest values for A through F (maximum of 30). Apply this value to Hazard Probability Table 2 to determine the Hazard Probability Level.

**TABLE 2
HAZARD PROBABILITY***

<u>DESCRIPTION VALUE</u>	<u>LEVEL</u>	<u>HAZARD PROBABILITY</u>
FREQUENT	A <input type="checkbox"/>	27 or greater
PROBABLE	B <input type="checkbox"/>	21 to 26
OCCASIONAL	C <input checked="" type="checkbox"/>	15 to 20
REMOTE	D <input type="checkbox"/>	8 to 14
IMPROBABLE	E <input type="checkbox"/>	less than 8

*Apply Hazard Probability Level to Table 3.

Property Name:
 Project Number:
 Property Type:

Part III - Risk Assessment. The risk assessment value for this site is determined using the following Table. Enter the results of the Hazard Probability and Hazard Severity values.

TABLE 3

PROBABILITY LEVEL	FREQUENT A	PROBABLE B	OCCASIONAL C	REMOTE D	IMPROBABLE E
SEVERITY CATEGORY:					
CATASTROPHIC I	1 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
CRITICAL II	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	4 <input type="checkbox"/>
MARGINAL III	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	4 <input type="checkbox"/>	4 <input type="checkbox"/>
NEGLIGIBLE IV	3 <input type="checkbox"/>	4 <input type="checkbox"/>	4 <input type="checkbox"/>	4 <input type="checkbox"/>	4 <input type="checkbox"/>

None (V) = RAC 5

RISK ASSESSMENT CODE (RAC)

- RAC 1-4 Recommend and approve further action as appropriate. Refer to EP 1110-1-18 for discussion of MMRP projects and the process to be followed for execution of project response actions.
- RAC 5 Usually indicates that No DOD Action Indicated (NDAI) is necessary. Recommend and approve NDAI and follow instructions for project closeout in accordance with current program guidance.

PART IV - Narrative. Summarize the documented evidence that supports this risk assessment. If no documented evidence was available, explain all the assumptions that you made.
During the property visit, the team did not find MEC or MPPEH Debris. There was no evidence of CWM training, storage or disposal activities associated with this FUDS property. The FUDS property released is not affected by TNT/DNT manufacturing process. Areas affected are under NASA control and being addressed by HTRW projects between the Army and NASA. Recommend a RAC score of 5.

Property Name:
 Project Number:
 Property Type:

ASR/INPR TEAM

REVIEW PA TAG MMRP
 DATE 3 November 2006
 NAME Jose A. Garcia (918)420-8805

ITEM	DRAWING NO. OR REFERENCE	COMMENT	ACTION
1.	General	Draft ASR for Plum Brook Ordnance Works, Erie County, OH was reviewed for accuracy and completeness. Based on this review the following comments are provided:	1. No comment needed
2.	General	The initial INPR RAC score evaluation was not part of the ASR. There is a large amount of information about various projects related to this site in Project Information Retrieval System (PIRS)	2. As of the date of re-finalization, the INPR documents have been obtained from PIRS and are located in Appendix C-9.
3.	General	The HNC RAC safety review was not available for this process.	3. Accept
4.	General	The reviewer agrees with the ASR RAC score of 5. An updated RAC sheet is included.	4. No comment needed Dennis Gilmore/CEMVS-EC-P/331-8108



US Army Corps
of Engineers
HUNTSVILLE DIVISION

FINAL

Defense Environmental Restoration Program
for
Formerly Used Defense Sites

Ordnance and Explosive Waste
Chemical Warfare Materials

ARCHIVES SEARCH REPORT

PLUM BROOK ORDNANCE WORKS

Sandusky, Ohio

Site No. G050H001806

~~XXXXXXXXXX~~
NOVEMBER 2006

Prepared by
US ARMY CORPS OF ENGINEERS
ST. LOUIS DISTRICT

APPENDIX J
REPORT DISTRIBUTION LIST

REPORT DISTRIBUTION LIST

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CELMS-PD-A	1
CELMS-PM-M	1

APPENDIX K
ARCHIVE ADDRESSES

Ordnance and Explosive Waste
Chemical Warfare Materials
Archives Search Report
for
Plum Brook Ordnance Works
Sandusky, Ohio
Site Number GO50H0019806

APPENDIX K

ARCHIVE ADDRESSES

National Archives
Suitland Reference Branch/Washington National Record Center
4205 Suitland Road
Suitland, MD

National Archives-Great Lakes Region
7358 Pulaski Road
Chicago, IL 60629

Dayton Federal Records Center
3150 Springboro Road
Dayton, OH 45439

National Personnel Records Center
9700 Page Boulevard
St. Louis, MO 63132

Historical Division, Chemical and Biological Defense Agency AMSCB-CHH
Building E5183
Aberdeen Proving Ground, MD 21010

The Ohio Historical Society
Archives-Manuscripts Division
I-71 and 17th Avenue
Columbus, OH 43211

Sandusky Library
114 W. Adams Street
Sandusky, OH 43210