

PROPERTY SURVEY SUMMARY SHEET
DERP-FUDS PROPERTY NO. G05OH0018
PLUM BROOK ORDNANCE WORKS
SANDUSKY, OHIO
6 OCTOBER 1999
(REVISED FROM 20 MAY 1999)

FUDS PROPERTY NAME: Plum Brook Ordnance Works (PBOW)

CURRENT PROPERTY NAME: Approximately 6,400 acres of the original 9,100 acres acquired for the site is now owned by the National Aeronautics Space Administration (NASA) and has been renamed *Plum Brook Station*. Remaining portions are owned by the General Services Administration (used by Ohio National Guard), Perkins Township Board of Education (used as a bus transportation center) or privately owned and used for farmland.

LOCATION: Sandusky, Erie County, Ohio. Latitude: 41° – 23' – 06" N,
Longitude: 82° – 40' – 03" W (approximate site entrance) See attached site map.

SITE HISTORY: The Department of Defense (DoD) acquired the 9,100-acre site in 1938 to manufacture 2,4,6-trinitrotoluene (TNT), dinitrotoluene (DNT), and pentolite. Production began on December 16, 1941 and continued through late 1945. In December 1945, custody of PBOW was transferred to the U.S. Army Ordnance Department, and the U.S. Army Corps of Engineers assumed responsibility for maintenance and custodial duties. In 1956, the National Advisory Committee for Aeronautics (now known as the National Aeronautics Space Administration, NASA) began leasing portions of PBOW from the Army. On March 15, 1963, NASA acquired approximately 6,400 acres of PBOW and presently utilizes the site aerospace research activities.

SITE VISIT: Robert P. Johannsen, CEORH-ED-D, conducted the initial site visit, 8 May 1985.

CATEGORY OF HAZARD: HTRW

PROJECT DESCRIPTION: Investigation of the Plum Brook Ordnance Works for Project No. G05OH001803, HTRW, has been separated into various areas of concern, and the following new HTRW projects are recommended or are currently in progress:

- a. Project No. G05OH001811 Additional Burning Grounds. During operation of the PBOW facility from 1942-1945, burning grounds were used for destruction of off-specification TNT, explosives, acids, solvents, asbestos, and waste oil. The Additional Burning Grounds include the G-8, Taylor Road, Snake Road, Fox Road, and the "Additional" burning grounds. Records indicate that the Taylor Road, Fox Road, and Snake Road burning grounds were used by NASA for waste disposal and a fire training area was located at the Snake Road Burning Ground. A Site Investigation (SI) of the G-8 Burning Grounds has been accomplished and the final report was issued 14 March 1997. The SI discovered impacts from polynuclear aromatic hydrocarbons (PAH) and metals, recommended further evaluation of

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constituents that were above Risk-Based Concentrations (RBCs), and the installation of one-bedrock monitoring well.

A SI of the Additional Burning Ground has been accomplished and the final report was issued 23 December 1997. PAH, PCB, nitroaromatics, and metals exceeded RBCs, and risk assessments were recommended. A Remedial Investigation (RI) is recommended for these five sites to obtain additional information to fill identified data gaps from the previous SI's, and complete the risk assessments. Previous investigations at the Fox Road, Taylor Road, and Snake Road burning grounds should be reviewed to identify data gaps and obtain the data necessary to prepare risk assessments for those sites. The need for and type of remedial actions at the five burning grounds will depend on the risk assessments' results.

- b. Project No. G05OH001812 Reservoir No. 2 Burning Ground. During operation of the PBOW facility from 1942-1945, the Reservoir No. 2 Burning Ground was used for destruction of off-specification TNT, explosives, acids, solvents, asbestos, and waste oil. A SI has been accomplished and the final report was issued 23 December 1997. Semi-volatile organic compounds (SVOCs), PCB, nitroaromatics, and metals were discovered above RBCs. Additional sampling was recommended to determine the extent of contamination. Based upon the SI recommendations, a RI should be conducted, which would involve soil sampling and analysis to define the extent of site contamination, and preparation of human health and ecological risk assessments. The need for and type of remedial action at the Reservoir No. 2 Burning Ground will depend on the RI recommendations and risk assessment results.
- c. Project No. G05OH001813 TNT Area A. The Department of Defense (DoD) utilized the Plum Brook Ordnance Works (PBOW) from 1941 until 1945 for the manufacture of 2,4,6-trinitrotoluene (TNT), dinitrotoluene (DNT), and pentolite. During this period, the PBOW facility housed operations for the manufacture of TNT and DNT in three primary areas, referred to as TNT Area A, TNT Area B, and TNT Area C. The project consists of the preparation of a RI/FS for TNT Area A. Objectives of the RI/FS would be to determine physical site characteristics; the nature and extent of site contamination; if contamination is attributed to former DoD activities; threats to human health and the environment; and potential remedial actions. The four-step RI/FS study for TNT Area B should be reviewed and used as a template for the investigation of TNT Area A. Previous investigations of this site should be reviewed to eliminate duplication of effort and identify any data gaps from those investigations.

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- d. Project No. G05OH001814 TNT Area B. From 1941 until 1945, the DoD utilized TNT Area B at the PBOW for the manufacture of TNT, DNT, and pentolite. A RI of surface and subsurface soil was accomplished in October – November 1998, and the draft report was submitted for regulator review in June 1999. Nitroaromatic contamination was discovered in various locations throughout the site, typically limited to the immediate vicinity of buildings or process areas. VOC, SVOC, and metal contamination were present, but not attributed to DoD activities. PCB contamination was also discovered, however, its use has not been documented at PBOW. Remaining work involves preparation of Human Health and Ecological risk assessments, and a focused Feasibility Study of potential remedial actions.
- e. Project No. G05OH001815 TNT Area C. The DoD constructed and utilized TNT Area C at the Plum Brook Ordnance Works (PBOW) for the manufacture of TNT, DNT, and pentolite from 1941 until 1945. The project consists of the preparation of a RI/FS for TNT Area C. Objectives of the RI/FS would be to determine physical site characteristics; the nature and extent of site contamination; if contamination is attributed to former DoD activities; threats to human health and the environment; and potential remedial actions. The four-step RI/FS study for TNT Area B should be reviewed and used as a template for the investigation of TNT Area C. Previous investigations of this site should be reviewed to eliminate duplication of effort and identify any data gaps from those investigations.
- f. Project No. G05OH001816 TNT Rail Car Loading. It is assumed that when the DoD utilized PBOW, TNT was loaded onto rail cars for shipment from the site and to on-site storage areas. The locations of these areas are unknown; however, remnants of blast-protection walls at TNT Area B suggest the possible location of one area that is referred to as TNT Rail Car Loading Area 1017. A limited SI has been accomplished and the draft report was submitted September 1999 for state regulator review. The investigation determined that there has been no significant environmental damage. Further project work includes SI finalization and coordination with state regulators for the preparation of a No Action Decision Document for this project.
- g. Project No. G05OH001817 Wastewater Treatment Plants No. 1 and 3. When the DoD utilized PBOW, process wastewater (“red water”) from TNT production was transported to WWTP No. 1 – TNT Area A, or WWTP No.3 – TNT Area C. The wastewater was then discharged through wooden flumes and elevated discharge pipes to settling ponds, known as the West Area Red Water Ponds A-1 and A-2, and the Pentolite Road Red Water Pond. A limited SI has been accomplished and the draft report submitted for review in September 1999. Further investigation will depend on the SI results and regulator review comments.

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- h. Project No. G05OH001818 Wastewater Treatment Plant No. 2. When the DoD utilized PBOW, process waste water (“red water”) from TNT production was transported to Wastewater Treatment Plant No. 2 - TNT Area B, and then discharged through wooden flumes and elevated discharge pipes to settling ponds, known as the West Area and Pentolite Road Red Water Ponds. A Site Investigation of WWTP No. 2 has been accomplished, and the final report was issued 23 December 1997. It was determined that surface and subsurface soil contained PAH, PCB, and metals at concentrations that exceeded RBCs. The SI recommended additional soil sampling to establish the extent of site contaminants. A RI of WWTP No. 2 is recommended. Presently, a SI of WWTP Nos. 1 and 3, Project No. G05OH001817 is in progress. Any lessons learned from that SI should be incorporated into this project, as well as the recommendations from the December 1997 SI for WWTP No. 2, to prepare human health and ecological risk assessments. The need for and type of remedial action will depend on the RI recommendations and risk assessment results.
- i. Project No. G05OH001819 Pentolite Area Waste lagoons. The DoD utilized PBOW to manufacture pentolite from March 1943 through August 1945. During this period, wastewater was generated and disposed of into two (2) wastewater lagoons, or settling basins. The lagoons have since been removed and the pentolite area re-graded by NASA for the construction of the Plum Brook Reactor Facility. A limited SI has been accomplished and the report submitted for regulator review in September 1999. At this time, there is no indication of DoD contamination. Further investigation of the Pentolite Area waste lagoons may depend on regulator review comments.
- j. Project No. G05OH001820 Red Water Ponds. The DoD discharged TNT process wastewater, referred to as “red water”, into two (2) settling ponds, the West Area and the Pentolite Road, Red Water Ponds. In 1997, a focused RI determined that explosives were present in soils, and that explosives, metals, and nitrates were present in overburden groundwater, at both red water pond areas. The RI also noted that explosives might be present in the bedrock groundwater. A Direct Push Investigation and Risk Assessment has been conducted and the draft report was submitted March 1999. The human health risk assessment (HHRA) determined that cancer risks or hazard indices did not exceed Ohio EPA limits; however, data was insufficient on metals in surface water. The report noted that the HHRA would be completed when the bedrock groundwater RI is completed. The Ecological RA predicted relatively high hazard quotients for some receptors; however, there were noted data gaps. Further investigation is recommended to eliminate these data gaps.

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- k. Project No. G05OH001821 Ash Pits No. 1 and 3. The DoD constructed and utilized three (3) coal-burning power plants in support of the PBOW activities. Ash pits served as disposal areas for ash that was generated from the power plants. Based on past site activities, heavy metals are the likely contaminants of concern at the ash pits. A limited SI has been accomplished for these ash pits the draft report submitted for regulator review in September 1999. There is indication that these areas may have been negatively impacted by DoD activities. Metals' contamination may be consistent with background metal concentrations; however, the concentrations are high enough to warrant further investigation. The focus of any additional work will also depend on regulator comments to the draft SI.
- l. Project No. G05OH001822 Powerhouse No. 2 Ash Pits. The DoD constructed and utilized coal-burning Powerhouse No. 2 in support of the TNT production activities at PBOW. Ash that was generated from the plant was disposed in an adjacent pit. Heavy metals are the likely contaminants of concern at the ash pit. A SI of this ash pit has been accomplished and the final report issued 23 December 1997. It was determined that surface soil contained SVOCs and metals, and that subsurface soil contained metals, all at concentrations exceeding RBCs. The SI stated that soil sampling was adequate, and that risk assessments should be prepared. It is therefore recommended that human health and ecological risk assessments be prepared to determine the need for and any type of remedial action.
- m. Project No. G05OH001823 Acid Areas No. 1, 2 and 3. The DoD constructed and utilized three (3) acid areas to manufacture nitric and sulfuric acids, for use in TNT and pentolite manufacture. Based on past site activities, the acid areas were likely to be contaminated from nitric and sulfuric acids. A SI has been completed and the final report was submitted 18 December 1998. The SI determined that surface soils at all areas have SVOC and PCB contamination. All areas had metals' contamination that was comparable to background concentrations, and an isolated occurrence of 2,4-DNT was found in Acid Area 3. The SI recommended that human health and ecological risk assessments be prepared. Additional investigation may be required if unacceptable risks are found.
- n. Project No. G05OH001824 Lower Toluene Tanks. The DoD constructed and utilized the Lower Toluene Tanks to store toluene for use in the production of TNT and DNT. The DoD decommissioned the tanks in 1945. NASA removed one tank and uses it for fuel oil storage. A limited SI has been accomplished, with no indication of release from the USTs. The draft report was submitted for regulator review in September 1999. Additional project work involves seeking regulator concurrence on no further action and preparation of a No Further Action Decision Document.

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- o. Project No. G05OH001825. The project is the Garage Maintenance Area (GMA). During the period that DoD occupied PBOW, it constructed and utilized the GMA for the general maintenance and washing of equipment, vehicles, and railcars. Areas of concern at the GMA include the Locomotive Shop and Rail Car Washing Area. NASA presently occupies the Locomotive Shop, and the Rail Car Washing Area is an open field. A limited SI has been accomplished and the draft report submitted for regulator review in September 1999. Elevated levels of PCB and arsenic were discovered in the Locomotive Shop building's maintenance pit, and high levels of 2,4 DNT and arsenic were observed at the Rail Car Washing Area. Further investigation may be required to determine contamination extent and the need for remediation.
- p. Project NO. G05OH001826. The project is site-wide groundwater. DoD utilization of the former PBOW for the manufacture of TNT, DNT, and pentolite may have led to groundwater contamination from leaks and spills, and decommissioning of the PBOW site. A SI is underway, which consists of a site-wide groundwater investigation. Sampling has been conducted, and additional monitoring wells have been installed. Further investigation, RI/FS, is recommended which involves sampling and analysis of existing wells throughout the site to determine the nature and extent of contamination. Additional wells may need to be installed, and supplementary groundwater background data may be required for risk assessment preparation. A hydrologic model should be developed to predict contaminant fate and transport.

AVAILABLE STUDIES AND REPORTS:

An Administrative Record has been established for the Plum Brook Ordnance Works FUDS property. The documents are located at the Huntington District Corps of Engineers and the following library near the PBOW site:

Firelands College Library
901 Rye Beach Road
Huron, Ohio 44839

Some of the available reports include:

- a) War Department Industrial Facilities Inventory, 3/44, US Army Corps of Engineers
- b) Site Management Plan, Plum Brook Ordnance Works, 9/95, ICI, Inc.
- c) TNT Areas Site Investigation-Recommendations, 5/96, Author-Dames & Moore, Inc.
- d) Report for the Site Investigation at the G-8 Burning Ground, 3/97, IT Corporation
- e) Sitewide Groundwater Investigation - Final Report, 4/97, Dames & Moore, Inc.
- f) Red Water Focused Remedial Investigation-Final Report, 4/97, Dames & Moore, Inc.

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- g) TNT Areas Site Investigation-Final Report, 4/97, Dames & Moore, Inc.
- h) Site-Wide Groundwater Investigation, 9/97, IT Corp.
- i) Site Investigations of the Reservoir No. 2 Burning Ground, Additional Burning Ground, Wastewater Disposal Plant No.2, and Powerhouse No.2 Ash Pit, 12/97, IT Corp.
- j) Baseline Human Health Risk Assessment and Ecological Risk Assessment Work Plans – Red Water Ponds, 9/98, IT Corporation
- k) Site Investigation of Acid Areas, 12/98, IT Corporation
- l) Baseline Human Health Risk Assessment and Ecological Risk Assessment Work Plans – TNT Area B, 5/99, IT Corporation
- m) Summary Report Site-Wide Groundwater Monitoring (1997-1998), 6/99, IT Corporation

USEPA REMEDIAL PROJECT MANAGER: A RPM from Region V EPA has not been assigned to the Plum Brook Ordnance Works FUDS property. The Ohio EPA is the lead regulatory agency at this time.

OHIO EPA PROJECT MANAGER:

Ron Nabors, OEPA NW District, (419) 373-3147
Archie Lunsey, OEPA NW District, (419) 373-3035

INSTALLATION POC: Keith M. Peacock, Environmental Coordinator, NASA Plum Brook Station, (419) 621-3234.

DISTRICT POC: Richard L. Meadows, CELRH-DL-M, (304) 529-5388, is the Geographic District Project Manager for the PBOW FUDS property. Linda S. Ingram, CELRN-EP-R-M, (615) 736-7122, and Doug A. Meadors, CELRL-DL-B, (502) 625-7015, are Design District Technical Coordinators for the various Plum Brook projects.