

NON-REIMBURSABLE INTERAGENCY AGREEMENT  
BETWEEN THE  
NASA LEWIS RESEARCH CENTER  
CLEVELAND, OHIO  
AND THE  
U.S. ARMY CORPS OF ENGINEERS  
OHIO RIVER DIVISION

**I. AUTHORITY**

This Agreement is entered into by the United States Army Corps of Engineers (USACE), Ohio River Division and the National Aeronautics and Space Administration (NASA), Lewis Research Center, Cleveland, Ohio. The legal authority for this Agreement is found in the Space Act of 1958, Sections 203(c)(5) and (6), 42 U.S.C. §2473(c), as implemented by NASA Management Instruction (NMI) 1050.1E; and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. §9601-9626.

**II. PURPOSE**

The purpose of this agreement is to

- A. Coordinate the cooperative efforts of both Federal agencies for implementation of environmental remedial actions for hazardous waste (HW) sites at the Plum Brook Station
- B. Delineate areas of responsibility in order to avoid duplication of effort while insuring that all areas are addressed
- C. Develop a vehicle for sharing information helpful to both parties

**III. SCOPE**

This agreement shall cover the site known as Plum Brook Station, a satellite facility of the Lewis Research Center, Cleveland, Ohio, formerly known as the Plum Brook Ordnance Works.

**IV. RESPONSIBILITIES**

- A. NASA Lewis Research Center as the current site owner is responsible for
  - 1. Overall planning, coordination, and implementation of remedial investigations and remediations
  - 2. Coordination of site activities with regulatory agencies and local governments
  - 3. Coordination of public affairs for the overall site, to provide a single source for information to the public
  - 4. Development and implementation of plans to provide

investigation and remediation of NASA-lead units as defined in Appendix A and NASA-lead units defined according to procedures established in section IX

- B. U.S. Army Corps of Engineers (USACE), Ohio River Division, is responsible for
  - 1. Support to NASA in their role as lead for the overall cleanup effort
  - 2. Support of the coordination with the regulatory agencies and local governments
  - 3. Support to the NASA Public Affairs Office with information on USACE projects
  - 4. Development and implementation of plans to provide investigation and remediation of USACE-lead units as defined in Appendix B and USACE-lead units defined according to the procedures established in Section IX

#### V. REPORTING

A. The parties agree to provide periodic reports to each other as to the status of progress and current schedules of ongoing and future work. During periods of plan development, the report interval shall be quarterly. During field activities, the report interval shall be monthly. During periods not addressed above, the report interval shall be semi-annually.

B. The parties agree to share preliminary analytical data which has been obtained by one party but not yet validated and is required by the other party. Upon receipt of a request for data describing the intended use of the data, the preliminary data shall be marked "Draft" or "Preliminary" and supplied to the requesting party within 30 days of the request. Such preliminary data is not to be released or utilized for any other purpose without the written consent of the party supplying the data.

The determination of releasability on all Freedom of Information Act (FOIA) requests will be made by NASA, and any requests received by USACE will be forwarded with the documents USACE identifies as responsive to the NASA Lewis Research Center FOIA Officer for such determination of releasability. (In the alternative)--- Any determination of releasability made by USACE on a Freedom of Information Act (FOIA) request will be routed through NASA for concurrence prior to release of any documents.

C. The parties agree to provide each other with an opportunity for review and comment of plan documents and draft final reports.

D. The parties agree to provide a copy of all final reports to the other party within 60 days of completion of the report.

## **VI. PROGRAM FUNDING**

Both parties agree to pursue funding for execution of the projects identified in Appendix A and/or B. It is understood that funding limitations may prevent execution of a given part of the work at any time during the life of this project. If funding becomes a problem for either party, that party must notify the other and arrange for a discussion between both parties to determine how the project may proceed and other options. In any case, each party must notify the other if it appears execution of a given part of work will be prevented for any reason.

There will be no transfer of funds or other financial obligation between NASA and USACE in connection with this Agreement. Each party will fund its own participation under this Agreement. (There should also be a specific period within which notification should be given upon discovery of a funding problem).

- A. NASA funding shall be provided through the Construction of Facilities Program.
- B. USACE funding shall be provided through the Formerly Utilized Defense System Program (FUDS), a part of the Defense Environmental Restoration Program.

## **VII. MANAGEMENT ARRANGEMENTS**

- A. The parties agree to discuss point of contact (POC) arrangements upon mutual consent to and final signature on this Agreement.
- B. Both parties agree to develop methodology for exchange of project management plans and for mutual discussion of other party's plans.

## **VIII. PUBLIC INFORMATION COORDINATION**

It is agreed that the NASA Public Affairs Office, as the on-site office, shall take the lead in the area of public information. The intent is to provide a single point of contact with the public and to avoid the release contradictory or inaccurate information to the public by either agency.

## **IX. AMENDMENT AND TERMINATION**

- A. This agreement may be modified or amended by written agreement between NASA and USACE, and may be terminated by mutual agreement of NASA and USACE. Modifications or amendments which substantially impact the responsibilities outlined in this agreement will be executed by signatories of authority equal to that of the signatories of this agreement.

- B. In the event that additional units are discovered as the result of site activities, the units will be assigned to one of the parties upon mutual written agreement and included either in appendix A or B.

**X. DISPUTE RESOLUTION**

The parties agree that in the event of disputes between the parties, both USACE and NASA will use their best efforts to resolve disputes in an informal fashion through consultation and communication. The parties agree that in the event that informal consultation and communication fail to resolve the dispute, the dispute shall be resolved as described in Executive Order 10288.

**XI. OFFICIALS NOT TO BENEFIT**

No member of or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this agreement, or to any benefit arising from it.

**XII. LIABILITY AND RISK OF LOSS**

USACE agrees to assume liability for any damages which arise as a result of its activities under this agreement, and agrees, subject to availability of funds, to pay all costs associated with the repair of said damage. User agrees to make good faith effort to obtain the necessary funds required for repair of any damage.

**XIII. EFFECTIVE DATE**

This agreement is effective on the date of the last signature below.

Larry J. Ross

NON-REIMBURSABLE INTERAGENCY AGREEMENT  
BETWEEN THE  
NASA LEWIS RESEARCH CENTER  
CLEVELAND, OHIO  
AND THE  
U. S. ARMY CORPS OF ENGINEERS  
OHIO RIVER DIVISION  
FOR  
PLUM BROOK ORDNANCE WORKS  
HUNTINGTON DISTRICT COMMENTS

1. Office of Counsel Comments:

a. This draft must be completely rewritten. There are a number of problems in reviewing this draft, not the least of which is there is no Appendix A or B attached. It is not clear whether these are items to be negotiated in the future or are currently existing proposals. In any event, since each party is agreeing to fund or take the lead for a portion of response activities, it is clear that this is a PRP agreement and not work for others under the Economy Act.

b. I. AUTHORITY: No authority is cited for the Corps to execute this agreement. The dollar symbols should be changed to Section symbols.

c. II. PURPOSE: Despite the purpose section contained in this agreement, it is difficult to ascertain the agreement's actual purpose. Regardless of the actual intent of the agreement, the effect is that the Corps is placing NASA in a position to resolve all cleanup responsibilities with the Corps being relegated to a supporting role in the process. This is an untenable position in light of the apparent PRP liability of both NASA and USACE. CERCLA deals with "hazardous substances," which by definition includes "hazardous wastes." Change hazardous wastes to hazardous substances to be consistent with CERCLA terminology. Also, it is unclear from the lack of back-up data whether removal actions are planned in addition to remedial actions. If so, change "remedial actions" to "response actions," which under CERCLA includes both removal and remedial actions. This comment is applicable to other references to "hazardous wastes" and "remedial action" in this agreement.

d. V. REPORTING. B: "Required" in the first sentence should be changed to "requested." The second paragraph relating to FOIA compliance requires USACE to defer to NASA for document releasability, or in the alternative, that NASA must concur with releasability determinations by USACE. The Corps may not relieve itself of its FOIA obligations by separate contract. This paragraph should be stricken.

ENCL 2.

e. V. REPORTING C: Timeframes must be established if opportunity for review and comment are to be meaningful.

f. VI. FUNDING: It is difficult to analyze this paragraph in the absence of the referenced A and B appendices. In any event, this paragraph requires extensive revisions. For example, "problem" must be defined, notification procedures must be established and guidance should be provided for project continuance in the event of funding obstacles.

g. VII. MANAGEMENT ARRANGEMENTS, A: This provision is merely an agreement to agree and would be unenforceable. Also, POC arrangements should be established in this document. From a timing standpoint, it is inappropriate to address this issue now, and if so, perhaps proposal of this MOA is premature.

h. VII. MANAGEMENT ARRANGEMENTS, B: Procedures for development of a methodology should be set out in this paragraph.

i. IX. AMENDMENT AND TERMINATION, B: This paragraph states that operable units will be assigned to the parties "upon mutual written agreement." A section should be added to address the situation in which the parties are unable to mutually agree.

j. X. DISPUTE RESOLUTION: This paragraph should be rewritten to set out a clearly defined Dispute Resolution process. The Executive Order citation contained in this paragraph is incorrect and deals not with interagency disputes, but with competitive service requirements of Government employees.

k. XII. LIABILITY AND RISK OF LOSS: This paragraph is unacceptable. It attempts to place ALL risk of loss on USACE.

1. As a general statement, it should be noted that this agreement appears to lack a specific focus and does not attempt to realistically divide response action tasks between NASA and USACE. Additionally, this agreement necessarily covers PRP issues relating to ultimate cleanup liability.

2. Engineering Division Comments:

a. IV. RESPONSIBILITIES B.1,B.2,B.3.: These three sections of the agreement state that the USACE is responsible for providing support to NASA and regulatory agencies. The type of support should be better defined. The support responsibilities should be quantified and qualified as much as possible at this stage of the project.

b. IV. RESPONSIBILITIES B.4: It is difficult to comment on the agreement since Appendix A and B were not provided. Appendix B defines the units for which the USACE will be the responsible Lead agency. Also, what is the relationship between the units

defined in A and B or is there any relationship? Do NASA Lead units and USACE Lead units overlap with respect to investigation and remediation? In addition, after investigation, could the same remediation be used for each? If so, does this agreement permit one party completing the work it mutually agreed to? It would be helpful to know more about A and B.

c. V. REPORTING A.: In addition to the periodic reports as discussed in the agreement, should there also be periodic meetings for project coordination, scheduling and information exchange - PARTNERING?

d. XII. LIABILITY AND RISK OF LOSS: The liability and risk of loss is ALL directed at the USACE. This appears to be very one way. Is NASA subject to any liability and risk of loss?

3. Project Management Division Comments:

a. II. PURPOSE, A.: Change "HW" to "HTRW".

b. V. REPORTING, C.: Add "Review periods will normally be thirty calendar days".

c. VI. PROGRAM FUNDING: Add the following sentence to the end of paragraph one. "Project acceleration due to availability of additional funding will be coordinated in a similar manner." Change "specific period" in the second paragraph to "sixty days".

d. VI. PROGRAM FUNDING, B.: Change "Formerly Utilized Defense System Program" to "Formerly Used Defense Sites Program".

e. VII. Management Arrangements: Add the following paragraph. "Both parties agree to coordinate draft schedules for investigation, design and remediation prior to finalization and release to outside agencies or to the public. This is especially critical in areas where one party's work may effect the other party or where on-going NASA operations will effect USACE remediation efforts. Face-to-face meetings will be held annually (at a minimum) to discuss project issues and progress."

f. VIII. Public Information Coordination: Add the following sentence at the end of the paragraph. "Coordination with the USACE Public Affairs Office will be accomplished prior to the release of information by NASA."

g. XII. Liability and Risk of Loss: Change "USACE agrees" to "USACE and NASA agree" in the first line. Define who "User" is in the last sentence.

*UB*

ENCLOSURE

2

NASA Plum Brook Station  
Preliminary Assessment  
June 1991

The site is served by an internal paved road system totaling 62.5 miles and a currently unused 15.7-mile rail system.<sup>4</sup> 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.<sup>6</sup> 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.<sup>7</sup> 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.<sup>8</sup> Where possible, remaining buildings and structures were burned to the ground. Steam lines, drain lines, etc., were

flushed and dismantled.<sup>8,9</sup> 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.<sup>7</sup> 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.

NASA acquired an additional 6,000 acres of the former PBOW on March 15, 1963, for the purpose of conducting various aerospace research activities. NASA continues to use the site today. Throughout the 1960s, various test and research facilities were constructed at Plum Brook Station to support NASA's aerospace program. The major research facilities that evolved in the 1960s are:<sup>10</sup>

- *Liquid Hydrogen Pump Site (A Site Complex)* - This facility was utilized to test liquid hydrogen research pumps of various designs up to pump speeds of 60,000 revolutions per minute.
- *High Energy Rocket Engine Research Facility (B1 Site Complex)* - This facility was designed to test propellant systems at altitude conditions.
- *Space Propulsion Research Facility (B2 Site Complex)* - This facility was utilized to test space vehicles and upper stage rocket engines in a simulated space environment.
- *Rocket Dynamics and Control Facility (B3 Site Complex)* - This facility was utilized for altitude tests on various components for large rocket engines as well as for other research and development projects.
- *Turbo Pump Site (C Site Complex)* - This facility was utilized for research on liquid hydrogen turbo pumps and pump inducers.
- *Controls and Turbine Test Site (D Site Complex)* - This facility was utilized to test research turbines in order to design drive turbines for rocket propellant pumps for chemical and nuclear engines.
- *Dynamics Stand (E Site Complex) Space Power Facility* - This facility is a 144 feet test stand equipped with electromagnetic shake devices. It was used to simulate forces spacecraft are expected to encounter during launch and in flight.
- *Hydraulics Lab (F Site Complex)* - At this test site, cryogenic liquid such as liquid hydrogen was passed through test set-ups to obtain data on various fluid flow conditions.
- *G Site Complex* - This test site was utilized to test turbo pumps. During a 1964 test, hydrogen leaking from a pump caused an explosion and the complete destruction of the G Site Complex. The research being conducted

at the site was near completion at that time. The site was demolished and has not been used since.

- **Fluorine Pump Site (I Site Complex)** - At this site, liquid fluorine pumps with speeds up to 20,000 revolutions per minute and flow rates of 50 pounds per second were tested.
- **Oxidizer Hydraulics Lab (J Site Complex)** - Rocket engine oxidizer system components were tested at this facility to determine how they reacted with other materials.
- **Cryogenic Propellant Tank Site (K Site Complex)** - This facility was used to test propellant tank insulation systems and to determine pressurizing gas requirements during propellant outflow. The tank served as a research test chamber where liquid hydrogen rocket fuel tanks were tested.
- **Hypersonic Tunnel Facility (HTF)** - In this facility, air velocities and temperatures were created to simulate rocket flight speeds up to seven times the speed of sound and altitude conditions up to 120,000 feet.
- **Space Power Facility (SPF)** - This facility is a very large vacuum tank used for the testing of spacecraft and/or their subsystems and components in a simulated space environment. The vacuum chamber is the largest ever built. It was also designed to accommodate tests involving reactor operations but was never utilized for that purpose. In 1979, the facility was modified for use by Garrett Corporation to produce uranium hexafluoride gas centrifuges for the Department of Energy (DOE). The facility was utilized for this purpose from August 1979 through November 1986. The facility has since been restored to support additional NASA vacuum tests and is currently in use today.

On June 30, 1974, Plum Brook Station was placed in a standby condition. A skeleton crew of NASA personnel provided maintenance and oversight of Plum Brook Station during its standby period. NASA declared approximately 2,152 acres of the original 9,009 acres as excess in April 1978. The Perkins Board of Education received 46 of the excess acres, which included buildings 7142, 7144, 7191, 7192, 7193, 7231, 7232, 8191, 8232, and 8431. The Perkins Board of Education uses the land as a bus transportation center.

## 5. POTENTIAL SOURCES OF ENVIRONMENTAL CONTAMINATION

This section of the PA report describes the identities, locations, and characteristics of potential contamination sources at Plum Brook Station.

### 5.1 Identification of Potential Contamination Sources

This section discusses the potential sources of environmental contamination and the preliminary operable units into which they have been grouped. These sources and units were identified through document reviews, site surveillance, and interviews with Plum Brook Station employees. To determine potential sources of environmental contamination all current management and handling practices for hazardous substances (waste and product) were evaluated including receipt, storage, use, and disposal of all CERCLA listed substances at Plum Brook Station. Practices were evaluated to determine whether they resulted in planned or unplanned releases of hazardous constituents to the environment. The historical management of products and wastes at Plum Brook Station was also evaluated. Through these evaluations, 14 operable units were identified at Plum Brook Station. Several of these operable units consist of multiple potential sources of environmental contamination which have been grouped to streamline further CERCLA investigations and remedial actions. Table 5-1 lists the operable units at Plum Brook Station, identifies the hazardous constituents suspected of being present at the units, and describes the possible receptors of the hazardous constituents. Sections 5.2.1 through 5.2.14 discuss in detail the known or suspected hazards associated with each operable unit. Table 5-2 lists the coordinates (longitude and latitude) for the 14 identified operable units. For units of large areal extent, the coordinates listed in Table 5-2 correlate to the centers of the units.

**TABLE 5-1. PLUM BROOK STATION OPERABLE UNITS**

Operable Units	Suspected Hazardous Constituents	Potentially Impacted Media
Unit 1 TNT Areas - A,B,C (Spills associated with ordnance production and D&D efforts)	Nitroexplosives, toluene, acetone, acids, asbestos	Soil
Unit 2, Red Water Ponds West Area Red Water Ponds (2 each) Pentolite Road Red Water Pond (includes spoils area)	Nitroexplosives, heavy metals	Soil, surface waters, groundwater
Unit 3 Underground Wastewater Flumes (unidentified bypass lines installed during ordnance production)	Nitroexplosives	Soil
Unit 4 Burning Grounds (2 on Snake Road, 1 off Taylor Road, 1 west of raw water pond, 1 east of Guard House G-8, 1 on Fox Road)	Solvents, unknown chemicals	Soil
Unit 5 Waste Lagoons in Pentolite Area	Acetone, TNT, and pentaerythritol	Soil
Unit 6 Fly Ash Spoil Piles	Heavy metals, organics	Soil
Unit 7 Toluene Storage Tanks - 6 each	Toluene	Soil

TABLE 5-1. PLUM BROOK STATION OPERABLE UNITS (Continued)

Operable Units	Suspected Hazardous Constituents	Potentially Impacted Media
Unit 8 UST Removal Areas - Maint. Area (7121, 7131, 7132) - Pump Station (8133) - PBRF Service Equip. Bldg. (1131) - SPF Bldg. (1411)	Solvents (TCA, TCE, acetone), hydrocarbons, heavy metals	Soil, groundwater
Unit 9 Asbestos Contamination	Asbestos	Soil, surface waters, air
Unit 10 SPF Rubble Pile	Heavy Metals	Soil
Unit 11 Disposal Area 1B	Solvents and Paint Related Compounds	Soil
Unit 12 Disposal Area 2	Unknown Chemicals	Soil
Unit 13 Rail Car Unloading Area	Toluene	Soil
Unit 14 Lime Sludge Disposal Area	Heavy Metals, pH	Soil

TABLE 5-2. COORDINATES OF OPERABLE UNITS

Unit	Name	Latitude	Longitude	Also Known As
1	TNT Areas TNT Area A TNT Area B TNT Area C	41°22'44" 41°21'44" 41°22'04"	82°39'36" 82°40'59" 82°42'37"	
2	Red Water Ponds Pentolite Road Red Water Pond  West Area Red Water Pond A-1  West Area Red Water Pond A-2	41°22'55"  41°22'28"  41°22'28"	82°40'43"  82°42'42"  82°42'48"	Red Water Disposal Area One Red Water Disposal Area Two Red Water Disposal Area Two
3	Underground Wastewater Flumes	Exact locations of flume lines are unknown.	Exact locations of flume lines are unknown.	
4	Burning Grounds Fox Rd. Burn Ground Res. #2 Burn Ground G-8 Burn Ground Taylor Rd. Burn Ground Snake Rd. Burn Pit	41°22'23" 41°22'37" 41°21'54" 41°21'55" 41°21'43"	82°40'09" 82°42'21" 82°42'52" 82°41'38" 82°40'25"	
5	Waste Lagoons In Pentolite Area	41°23'05"	83°41'05"	
6	Fly Ash Spoil Piles Ash Pit#1 Ash Pit#3	41°22'51" 41°22'35"	82°40'41" 82°41'51"	Ash Settling Pit Ash Pit
7	Toluene Storage Tanks Toluene Tank 645 & 655 Toluene Tank 425 & 435 Toluene Tank 255 & 265	41°21'49" 41°22'12" 41°22'34"	82°41'06" 82°41'22" 82°40'28"	Tanks 8951, 8952
8	UST Removal Areas UST Area 1 UST Area 2 UST Area 3 UST Area 4	41°23'11" 41°22'43" 41°22'49" 41°20'58"	82°41'00" 82°41'07" 82°40'36" 82°39'00"	

TABLE 5-2. COORDINATES OF OPERABLE UNITS (Continued)

Unit	Name	Latitude	Longitude	Also Known As
9	Asbestos Contamination	Extent and locations of contamination are unknown	Extent and locations of contamination are unknown	
10	SPF Rubble Pile	41°20'57"	82°39'09"	
11	Disposal Area 1B	41°22'23"	82°40'09"	Fox Rd. Burn Ground
12	Disposal Area 2 Disposal Area 2A Disposal Area 2B	41°22'35" 41°22'41"	82°42'39" 82°43'05"	Lime Sludge Disposal
13	Rail Car Unloading Area	41°22'41"	82°41'15"	
14	Lime Sludge Disposal Area	41°22'35"	82°42'39"	Disposal Area 2A