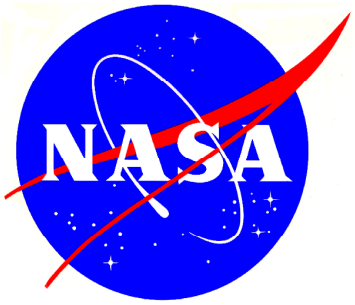

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NASA PLUM BROOK REACTOR FACILITY

ENVIRONMENTAL MANAGEMENT PLAN

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REVISED SEPTEMBER 2001

OFFICE OF SAFETY AND ASSURANCE TECHNOLOGIES

Plum Brook Reactor Facility Environmental Management Plan Revision - September 2001

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18 Sept 2001

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01 Oct 2001

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03 Oct 01

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September 2001 Change to Environmental Management Plan

Change Summary

1. New Appendix D added with description of closure status of Data Gaps

2. Titles added to Appendices A, B and C

3. Table of Contents revised to indicate titles for appendices and new Appendix D

4. Revision to Section 2.0 to correct typos and update closure plans for Data Gaps in Section 2.4.

5. Revision to Section 3.0 to correct typos and update Table 3.1.7-1, Key Environmental Activities. Text was added in the Water section of Table 3.1.7-1 for Stormwater NPDES. The text reference to Section 2.2.2.2 in Sanitary Water Treatment in Table 3.1.7-1 was also changed.

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LIST OF ACRONYMS AND ABBREVIATIONS

ACM	Asbestos containing materials
ALARA	As low as reasonably achievable
ANL	Argonne National Laboratory
CAN	Corrective Action Notice
CESQG	Conditionally Exempt Small Quantity Generator
CFR	Code of Federal Regulations
CIB	Community Information Bank
CIH	Certified Industrial Hygienist
CNS	Chem-Nuclear Systems
CQC	Contractor Quality Control
D&D	Decontamination and Decommissioning
DHEC	Department of Health and Environmental Control
DOT	U.S. Department of Transportation
EA	Environmental Assessment
EBS	Environmental Baseline Survey
EMP	Environmental Management Plan
EPC	Emergency Preparedness Coordinator
EPP	Emergency Preparedness Plan/Program
ERT	Emergency Response Team
ESH	Environmental, Safety and Health
FUDS	Formerly Utilized Defense Sites
GRC	Glenn Research Center
HAZWOPER	Hazardous Waste Operations and Emergency Response
HEPA	high-efficiency particulate air
HP	Health Physicist
LBP	lead-based paint
LQG	large quantity generator
NASA	National Aeronautics and Space Administration
NPDES	National Pollution Discharge Elimination System
NRC	Nuclear Regulatory Commission
OAC	Ohio Administrative Code
OEPA	Ohio Environmental Protection Agency
OSAT	Office of Safety and Assurance Technologies
OSHA	Occupational Safety and Health Administration
OSO	Onsite Safety Officer
RCRA	Resource Conservation and Recovery Act
PAN	Preventive Action Notice
PAT	Plant Access Training
PBRF	Plum Brook Reactor Facility
PBS	Plum Brook Station
POTW	Publicly-Owned Treatment Works
RWT	Radiation Work Training
QA/QC	Quality Assurance/Quality Control
QAR	Quality Assurance Representative

QC	Quality Control
SQG	small quantity generator
TCLP	Toxicity Characteristic Leaching Procedure
TSDF	Treatment, Storage, Disposal Facility
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
WEMS	Water Effluent Monitoring System

1.0 INTRODUCTION

This Environmental Management Plan (EMP) describes the management of the environmental aspects of the Plum Brook Reactor Facility (PBRF) Decommissioning Project. The EMP was prepared to support the *PBRF Decommissioning Project Plan* and to provide a roadmap of the environmental activities required to support the successful decommissioning and license termination. This is a "living document." The Environmental Management Plan will undergo periodic review/revision as the PBRF Decommissioning Project progresses from Planning and Pre-Decommissioning through NRC license termination. These reviews will occur as each project work plan is developed to assure that timely environmental permit revisions, notifications or applications are submitted or acquired. In addition, as information becomes available to close the listed Data Gaps, the EMP will be revised to include the closure status of each gap.

1.1 BACKGROUND

The National Aeronautics and Space Administration's (NASA) PBRF located on the Plum Brook Station (PBS), a satellite facility of NASA's John Glenn Research Center (GRC) in Cleveland, Ohio. The PBS (formerly the Plum Brook Ordnance Works) is located 50 miles west of Cleveland in the city of Sandusky, Ohio and was established in 1941 as an explosives manufacturing plant. Explosives production continued until 1945, at which time the building and production lines were decontaminated and decommissioned (D&D). After decommissioning, the PBS changed ownership several times and eventually was acquired by NASA in 1955.

The PBRF is located within an 11-ha (27-acre) fenced area on the PBS and consists of the following facilities and areas (Figure 1.1-1):

- A Reactor Building (Building 1111) with a 60-megawatt research test reactor and 100-kilowatt swimming-pool type thermal mock-up reactor
- A seven cell Hot Laboratory complex (Building 1112)
- Reactor and laboratory operations support facilities that include the Reactor Office and Laboratory Building (Building 1141), Primary Pump House (Building 1134), Fan House (Building 1132), Waste Handling Building (Building 1133), Hot Retention Area (1155), Cold Retention Area (1154), and Hot Pipe Tunnel
- A Water Effluent Monitoring Station (Building 1192), Emergency Retention Basin, Pentolite Ditch, drainage system, and two known areas of low-level waste spills
- General support facilities which include the Reactor Services Equipment Building (Building 1131)

During its operating life, the PBRF was used to perform nuclear irradiation testing of fueled and unfueled experiments for space program applications. The facilities operated in support of NASA programs for 10 years until 1973 when they were shutdown. In July 1973, the reactor was defueled, selected equipment was decontaminated, and all systems were placed in safe and secure storage. In 1977, NASA decided not to resume operations at the PBRF, but instead to decommission the reactor, decontaminate and dispose of radioactive structures and materials, and terminate the Nuclear Regulatory Commission (NRC) licenses. In March 1980, NASA requested authorization from NRC to conduct D&D activities at the PBRF and to terminate the license. In May 1981, NRC issued a dismantling order and authorized proceeding with dismantlement (NRC 1981) of the PBRF. However, dismantlement of the PBRF was not initiated due to budgetary constraints. NASA was granted a possession-only license that allowed it to "possess-but-not-operate" its two reactors. The PBRF is currently under three "possess-but-do-not operate" NRC licenses: (1) license TR-3 for the main test reactor, (2) license R-93 for the mock-up reactor, and (3) Broad Byproduct Materials License #34-060706-03 for the remaining facilities.

In 1997 and 1998, NASA decided to D&D the PBRF. An Environmental Assessment (EA) was conducted and based on the alternatives evaluated. NASA selected the alternative to decontaminate the PBRF and to terminate the NRC licenses with no restrictions to allow unrestricted future use of the property. The PBRF is currently shutdown. Building entries have been locked and the PBRF buildings have been enclosed within a locked fence.

1.2 SCOPE OF WORK

The major activities that will be performed in the D&D of the PBRF are:

- Pre-Decommissioning activities that include:
    - Refurbishment of necessary facility systems, installation of office and work trailers, removal of loose equipment, and historic preservation activities.
- Decontamination of buildings and structures
- Removal of reactor internals and tanks
- Removal of activated materials in the Hot Dry Storage Area
- Removal of loose equipment, fixed equipment and components, and piping in the buildings and underground areas
- Removal of activated portions of the concrete biological shield and other areas of contaminated concrete inside and outside of the buildings
- Removal of embedded piping (i.e., piping embedded in concrete)
- Removal of contaminated soil and either leveling or backfilling the excavated areas

- Conducting final status surveys of all affected areas after decontamination to verify that radioactive material has been removed below the license termination criteria
- Demolition of the above-grade portions of decontaminated buildings and structures as well as the below-grade portions to a depth of three feet
- Backfilling the below-grade portion of decontaminated buildings and in-ground structures
- Radioactive and industrial waste transportation and disposal/treatment
- Preparation and submittal of required reports to the NRC that demonstrate compliance with the license termination

For additional details see the *Decommissioning Plan for the Plum Brook Reactor Facility.*

1.3 NASA ENVIRONMENTAL POLICY

The NASA's GRC Environmental Policy is:

> *NASA Glenn Research Center (GRC) operates in a manner that protects and preserves the environment through pollution prevention, the continual improvement of our operations, and complying with environmental regulations.*

NASA's management fully intends to continue its commitment to safety and the environment on the PBRF Decommissioning Project. NASA has selected the safest and most thorough approach in order to reduce residual radiation levels so that the PBRF site will be safe enough to be used for any purpose in the future. NASA will ensure decommissioning is conducted in a manner that fully protects workers, the surrounding communities, and the environment.

2.0 DECONTAMINATION AND DECOMMISSIONING PROJECT PLANNING

The overall Decontamination and Decommissioning (D&D) Project will have two stages – Pre-Decommissioning (PD) and final site D&D. Since removal of loose equipment from selected areas and certain historic preservation activities will be performed during PD, certain planning elements that pertain to PD will be included below, as appropriate.

2.1 ENVIRONMENTAL ASPECTS

2.1.1 Air

D&D activities that will generate air emissions include the removal of friable asbestos containing materials and lead-based paint (LBP) from buildings, excavation of contaminated soils and backfilling, and demolition of decontaminated buildings and structures. Air emissions will consist of dust and particulate matter including paint dust and asbestos fibers. These emissions will have to be managed in accordance with the regulatory requirements regarding the release of air emissions and from an occupational health standpoint.

2.1.2 Water

Stormwater and wastewater generated during the PBRF decommissioning and remediation activities could potentially affect the environment if not managed in accordance with regulatory requirements for stormwater and wastewater discharges. Storm events or increased surface water flow over the PBRF during demolition and remediation activities could potentially cause an increased amount of sediment in stormwater runoff. The installation of office and work trailers during PD activities will have an insignificant impact on surface soils or stormwater runoff. In addition, contaminants from disturbed areas where contaminants are known to exist could be included in stormwater runoff. This runoff will have to be tested and managed appropriately to ensure that it does not cause any degradation of surface water quality once it leaves the PBS property.

Wastewater that may be generated from the decontamination of buildings, structures, and equipment, dewatering operations, Water Effluent Monitoring Station, and any other decommissioning or remediation activities must be collected and pretreated before discharged from the facility. Wastewater discharged to the sanitary sewer system will ultimately be treated by the local publicly owned treatment works (POTW), and therefore, must meet the requirements of the local POTW. Sanitary wastewater will begin being discharged during PD. Approval for this sanitary discharge must also be granted by the POTW. No wastewater can be discharged to the ground unless a permit is received from the appropriate regulatory authority.

2.1.3 Soil

Soil excavated during remediation will need to be segregated into two groups: clean and contaminated. Clean soils can be used as backfill onsite. Contaminated soils must be managed as a solid and hazardous waste based on their characterization. Contaminated soils must be stored, tested, and transported to a licensed disposal facility in accordance with the appropriate regulations as discussed in Section 2.2.3. The majority of this activity will occur during D&D.

PD activities will only impact soil during the installation of the office and work trailers. The amount of soil being disturbed will be minimal and will be in "clean" areas of the PBRF. These soils will not require disposal.

2.1.4 Noise

The primary sources of noise related to decommissioning and remediation will be due to building demolition activities such as the use of jackhammers, scabblers, and concrete saws; heavy equipment usage during excavation and backfilling operations, staging and segregation of demolition debris and soils; and increased truck traffic. Noise generated by these activities must be considered from the standpoint of nuisance noise and an occupational health issue.

2.1.5 Biological Resources

Plant and animal life in the PBRF area will be adversely affected during D&D activities as a result of disturbing the land during excavation of soil, staging of excavated soils and demolition debris, and truck loading. According to the EA, there are no threatened or endangered species in the PBRF area, however there are species of concern in the general PBS vicinity (i.e., moths). Wildlife on the PBS includes white-tailed deer, raccoons, woodchucks, moles, starlings, pigeons, coyotes, hawks, Canada geese, and turkey vultures. Table 2.1.5−1 provides a list of the plant and animal species of concern that were found or observed on the PBS or in the surrounding area during a 1994 biological survey. The area may also be frequented by various bird species that use the area during migration. Care should be taken to minimize the size of the disturbed area where possible.

TABLE 2.1.5-1.— *Species of Concern on PBS or in the Surrounding Area*

Status	Species	Common Name
PLANTS		
Endangered	*Hypericum gymnanthum*	Least St. John's-wort
	Carex cephaloidea	Thin-leaf sedge
Threatened	*Arenaria laterifolia*	Grove sandwort
	Carex conoidea	Field sedge
	Helianthus mollis	Ashy sunflower
Potentially threatened	*Baptisia lacteal*	Prairie false indigo
	Carex alata	Broad-winged sedge
	Gratiola virginiana	Round-fruited hedge-hyssop
	Hypericum majus	Tall St. John's-wort
	Rhexia virginiana	Virginia meadow-beauty
	Scleria trigomerata	Tall nut-rush
	Viola lanceolata	Lance-leaved violet
ANIMALS		
Endangered	*Papaipema silphii* *Spartiniphaga inops* *Hypocoena enervata*	Moths
	Accipiter cooperii	Cooper's hawk
	Bartramia longicauda	Upland sandpiper
	Cistothorus platensis	Sedge wren
	Cistothorus palustris	Marsh wren
		Brewster's warbler
	Dendroica virens	Black-throated green warbler
	Ammodramus henslowii	Henslow's sparrow
	Empidonax alnorum	Alder flycatcher
	Empidonax minimus	Least flycatcher
Threatened (Federally listed)	*Haliaeetus leucocephalus*	Bald eagle
Special concern	*Elaphe vulpina gloydi*	Eastern fox snake
	Emydoidea blandingii	Blanding's turtle
	Opheodrys vernalis	Smooth green snake

2.1.6 Waste Generation and Storage

D&D activities at the PBRF will generate radioactive waste, hazardous waste, mixed waste, and nonhazardous and nonradiological solid industrial waste. PD activities will generate, possibly, some lab-pack type waste. This document will only discuss hazardous and solid industrial waste generation. No radiological or mixed wastes will be discussed. For specific waste volumes that will be generated by waste type, please refer to the PBRF EA.

2.1.6.1 *Hazardous Waste*

Hazardous wastes that will be generated during site activities include decontamination fluids, contaminated equipment, and contaminated, excavated debris and soil, and LBP debris and chips removed from buildings. Hazardous waste will have to be managed as discussed in Section 2.2.6.1.

2.1.6.2 *Solid Waste - Nonhazardous and Nonradiological*

Nonhazardous and nonradiological solid industrial waste will be generated during demolition activities. These wastes will consist of decontaminated concrete, masonry, pipes, metal, wire, and other building debris, and pipes. In addition, asbestos-containing materials (ACM) removed from buildings before they are demolished is a special waste and must be handled accordingly. Decontaminated metal that has scrap value will be recycled. Clean, hard demolition debris will be used as backfill material onsite.

2.1.7 Waste Disposal

2.1.7.1 *Hazardous Waste*

Hazardous waste generated by the PBRF must be either treated onsite to remove the hazardous components or disposed of offsite at a hazardous waste treatment, storage, and disposal facility (TSDF) licensed to accept each specific waste stream. Each waste stream must be tested to demonstrate that they meet the waste acceptance criteria for the specific disposal facility. The disposal requirements for two proposed disposal facilities, Envirocare and Barnwell, are outlined in Section 2.2.7.

2.1.7.2 *Nonhazardous Waste and Nonradiological Waste*

Clean demolition debris that has no scrap value and is not acceptable for fill will be disposed of at a licensed construction and demolition debris facility. Asbestos waste must be disposed at a licensed asbestos disposal facility.

2.1.8 Waste Transportation

2.1.8.1 *Hazardous Waste*

Hazardous waste must be transported to the disposal facility by a licensed, registered transporter. All waste shipments must be in accordance with the U.S. Department of Transportation (DOT) requirements for packaging, labeling, marking, placarding, and recordkeeping as discussed in Section 2.2.8. In addition, a shipping manifest completed by the waste generator must accompany each shipment of hazardous waste as discussed in Section 2.2.8.

2.1.8.2 *Nonhazardous Waste*

Nonhazardous waste must be shipped to an industrial landfill by a licensed transporter.

2.1.9 Historic Preservation

Currently, there are no facilities at the PBRF that have been designated as historic resources, and no archaeological or cultural resources have been identified at the facility. The Ohio State Historic Preservation Officer responded with a determination of "no interest" to a letter that initiated the Section 106 Consultation process. However, as NASA's only operating reactor, there is interest within NASA to preserve some of the artifacts and to document the history of the

operation. Some of the visual documentation will be accomplished during PD before the removal of loose equipment. These activities will not require any environmental permitting. There will be a need to assure that personnel involved in documenting the condition of the PBRF are properly trained in the appropriate safety precautions that will be required during their activities. This phase of historic preservation activity will be completed by June 18, 2001.

2.2 REGULATORY ASPECT

There will be requirements for permit modifications, agency notifications and other regulatory activities throughout the life of this project. It will be critical for regulatory arrangements to be planned and ready prior to the initiation of any affected activity. Anticipated regulatory requirements are contained in the text below and extracted in Table 3.1.7-1 – *Key Environmental Activities*. Specific project schedules will be reviewed and adjusted, if necessary, to indicate the appropriate lead-time environmental activity.

2.2.1 Air

Air emissions will be produced during the implementation of several PBRF decommissioning activities. Radioactive airborne contaminants will be generated during building decontamination activities. Air asbestos emissions will be generated during abatement activities and airborne lead emissions will be generated during the removal of lead-based paint from buildings and structures. Particulate emissions will be generated during building and structure demolition, soil excavation and backfill, and truck loading of excavated soils, debris, and construction and demolition debris for offsite disposal. The requirements for the control of airborne radioactive contaminants are discussed in the PBRF Decommissioning Plan. The regulatory requirements for the remaining air emissions are discussed below.

Asbestos Emission Control

In the rules for air emission control during demolition and renovation, the Ohio Administrative Code (OAC) 3745-20-04 stipulate that each owner or operator of a demolition or renovation operation must remove friable ACM from a facility being demolished or renovated before any wrecking or dismantling would break up the materials or preclude access to the materials for subsequent removal. However, friable ACM need not be removed before demolition if the materials are: (1) on a facility component that is encased in concrete or other similar material, or (2) adequately wetted whenever exposed during demolition. When a facility component covered, coated or containing friable asbestos is being removed as units or in sections, each operator or owner must adequately wet friable ACM exposed during cutting or disjointing operations, and carefully lower the units or sections to ground level not dropping, throwing, sliding or otherwise damaging them.

The operator must adequately wet friable ACM when they are being stripped from facility components before the components are removed from the facility. In renovation operations, wetting that would unavoidably damage equipment or cause an unreasonable safety hazard, is not required if the owner or operator submits a written request, no less than 30 days prior to the starting date of such operations, asking the Director of the U.S. Environmental Protection Agency (EPA) to determine whether wetting to comply with this rule would unavoidably damage equipment or present an unreasonable safety hazard, and supplies the director with

adequate information to make this determination. In addition, the director of the Ohio Environmental Protection Agency (OEPA) issues a written determination that equipment damage or an unreasonable safety hazard would be unavoidable. The owner or operator must use alternative emission controls in accordance with the terms of the determination. At a minimum, the owner or operator must use a local exhaust ventilation and collection system designed and operated to capture the particulate ACM produced by the stripping and removal of friable ACM. The system must exhibit no visible emissions. A copy of the director's written determination shall be kept at the worksite.

Once a facility component covered with, coated or containing friable ACM has been removed as units or in sections, the operator must adequately wet friable ACM when they are being stripped from facility components or encase the friable ACM on the component with a suitable leak-tight container, in accordance with Paragraph C of OAC 3745-20-05.

For friable ACM that have been removed or stripped, the operator needs to adequately wet the materials to ensure that the materials remain adequately wet until collected for disposal in accordance with OAC 3745-20-05 and carefully lower the materials to the ground level or a lower floor without dropping, throwing, sliding or otherwise damaging them. The operator must then transport the materials to the ground via leak-tight chutes, high-efficiency particulate air equipped vacuum transport system, or in leak-tight containers if the materials have been removed or stripped more than 50 feet above ground level and were not removed as units or in sections.

When the temperature at the location of wetting is below 0˚C or 32˚F, comply with Paragraphs A4 and A5 of OAC 3745-20-04. The owner or operator need not comply with the other wetting requirements of this rule. Use a local exhaust ventilation and collection system designed and operated to capture the particulate ACM produced by the stripping and removal of friable ACM. The system shall exhibit no visible emissions. Then remove facility components coated or covered with friable ACM as units or sections to the maximum extent possible.

It is the responsibility of each owner or operator of any demolition or renovation operation to ensure all ACM, which have been damaged or made friable by demolition, renovation or adjacent stripping operations, are repaired, encapsulated, or removed for disposal in accordance with OAC 3745-20-05, prior to the removal of emission controls.

A demolition notification form must be filed with OEPA at least 10 working days prior to the commencement of work. A licensed asbestos removal contractor must remove asbestos containing materials.

Lead Emissions

OAC 3745-71 regulates lead emissions. The Ohio regulatory requirements stipulate that the ambient air quality standard for lead must be a maximum arithmetic mean of 1.5 micrograms per cubic meter during any calendar quarter. Lead emissions must be measured using procedures outlined in 40 CFR Part 50, Appendix G or by equivalent composite test methods approved in Appendix C of CFR Part 58. No permit is required as long as the above requirements are met.

Particulate Matter

OAC 3745-17 regulates particulate matter emissions. Particulate emissions must be measured in accordance with OAC 3745-17-03 and controlled, where possible, in accordance with OAC 3745-17-07. No permit is required for airborne particulate matter for the types of decommissioning activities that will be performed at the PBRF (Endlish 2001). However, where possible, the PBRF is expected to employ fugitive dust control measures to minimize particulate matter as described in OAC-3745-17.

2.2.2 Water

2.2.2.1 *Stormwater*

The water generated by the PBRF decommissioning activities must be handled in accordance with regulations set forth by the OEPA. The OEPA has a permitting program to document construction activities and to require practices that keep pollutants out of surface waterbodies. The permitting program is part of the National Pollution Discharge Elimination System (NPDES).

The OEPA rules regarding construction stormwater states that any project that disturbs more than 5 acres of ground requires an NPDES permit to discharge stormwater from the project site. Any project that disturbs less than 5 acres but is part of a larger plan of development must also obtain a NPDES permit to discharge stormwater from the site. This is effective through March 9, 2003. After March 9, 2003, a permit will be required to discharge stormwater if the project or larger plan of development disturbs one acre or more. Another upcoming change is that the local government will be required to regulate construction activities within their jurisdiction more closely.

According to the OEPA, Division of Surface Water, decommissioning activities at the PBRF are covered under the existing PBS NPDES permit. However, a modification of the existing permit structure will be necessary. OEPA indicated that NASA personnel would have to evaluate the decommissioning activities and determine the potential for site contaminants to come in contact with stormwater runoff. An NPDES permit modification request must be submitted to the OEPA. OEPA stated that the modification request must contain an explanation of decommissioning and remediation activities that will come in contact with stormwater, parameters expected to be in the stormwater that has come in contact with these activities, NASA's plan to contain or control stormwater, and generally how NASA intends to prevent site pollutants from going offsite in stormwater runoff. Construction stormwater runoff must be in compliance with the Ohio water quality standards. OEPA indicated they would like to see a summary report of the site activities, including the remediation activities, to include volumes of soil to be excavated and the number of acres of land that will be disturbed.

Stormwater discharged under the existing PBS permit structure can only contain those parameters specified in the existing permit and only at the levels specified in the existing permit. Any construction stormwater that comes in contact with contamination will have to be contained by some method (e.g., silt fences, etc.) to prevent any pollutants from entering Ohio streams and waterways. Permit modification requests take approximately 30 days for the OEPA to review

and respond. To prevent potential project schedule delays, it is recommended that 60 days be allocated in the schedule to obtain a permit modification from the state.

2.2.2.2 *Sanitary Sewer Wastewater*

Through an agreement with the City of Sandusky, Erie County diverts a portion of the wastewater from the sanitary sewers to the City of Sandusky for treatment. The diversion system is an automatic system that is based on a timer and the volume of water received. The sanitary sewer system at PBS is connected to the Plum Brook Pumping Station which pumps water to either the Erie County wastewater treatment system or the City of Sandusky wastewater treatment system.

Wastewater that will be discharged to the sanitary sewer system from PBRF decommissioning activities could therefore be treated at the Erie County treatment system, the City of Sandusky treatment system, or possibly both. Both Erie County and the City of Sandusky have requirements for accepting pretreated wastewater discharged to the sanitary sewer system. Wastewater from dewatering operations and treated wastewater from decontamination or other activities would be accepted from the sanitary sewer only under certain provisions by Erie County and City of Sandusky. Special pretreatment will not be required for the sanitary wastewater discharges from the office and work trailers that are located outside the fenceline on the PBRF. Should a source of sanitary wastewater from within the fenceline of PBRF become necessary, arrangements with the local POTW will need to be coordinated.

Erie County indicated that before any wastewater from the PBRF decommissioning will be accepted, the county will require a joint meeting that includes representatives from Erie County, NASA, OEPA, and possibly the City of Sandusky. The parties attending this meeting would discuss and come to an agreement on the specific requirements for the PBRF.

The discussion would include, but be limited to:

- Specific activities that will be conducted at the PBRF that generate wastewater
- Description of what environmental impacts are associated with the discharges
- What other regulatory agencies, such as the OEPA, are requiring NASA GRC to do
- What type of testing parameters the county will require of NASA GRC
- The frequency of testing and monitoring
- What the county will and will not be able to accept

Erie County indicated that it would expect NASA to provide drawings that show how the PBRF wastewater will be discharged. As a result of the meeting, a formal agreement would be developed and signed. The PBRF would discharge water based on the terms of the agreement. The agreement would be expected to be good for the duration of the decommissioning project, but would include a clause that stipulates that if there are modifications or changes that would cause the content of the wastewater to change from the criteria set forth in the formal agreement,

then project discharges would stop. Erie County indicated that it couldn't provide a timeframe for permit until all the parties meet to discuss the issues and the county has a better understanding of the specifics of the project.

Erie County indicated that since the OEPA has specific standards for the county regarding pretreatment, the county would be guided by the OEPA's perspective of the wastewater pretreatment requirements for the PBRF. Erie County sent a letter dated October 12, 2000 to NASA that described in general terms the county's expectations and requirements and that they were expecting that this letter would result in the initiation of discussions with NASA.

The City of Sandusky indicated that before any wastewater from PBRF decommissioning, dewatering operations, or any other industrial activities would be accepted in the sanitary sewer. NASA must submit test results from a complete analysis of the wastewater that will be discharged to the City of Sandusky. The test results must include all constituents in the wastewater, not just the parameters that are specified in the current permit. After receipt of analytical results, the city will review the results and determine if the effluent can be put in the sanitary sewer. The city will make a decision only after reviewing the test results. At least 30 days should be allowed for review of test results.

Erie County, City of Sandusky, Ohio EPA, PBRF, and PBS personnel will also discuss requirements, if any, regarding the discharge of sanitary wastewater from the trailers to be positioned at the PBRF.

2.2.3 Soil

The PBRF Decommissioning Project will comply with NASA GRC procedures on the Handling and Disposal of Soil requiring that soils be characterized and segregated into three groups: clean fill, solid waste, and hazardous waste. Excavated soils should be containerized in rolloffs or other container type to keep it from direct contact with the ground.

If contaminated soils are stored directly on the ground, the OEPA may consider that the contaminated soils are an illegal hazardous waste storage area.

Excavated soils that contain hazardous components must be handled as a *Resource Conservation and Recovery Act* (RCRA) hazardous waste. The EPA has granted the State of Ohio authority to implement the RCRA hazardous waste program. RCRA regulates the treatment, storage, and disposal of hazardous wastes. Wastes are defined as RCRA hazardous if they are specifically named on one of the four lists of hazardous wastes (F001 to F039, K001 to K161, P001 to P205, and U001 to U411) or if they exhibit one of four characteristics (ignitability, corrosivity, reactivity, or toxicity).

Generators of stored hazardous wastes, including contaminated soils, are subject to the RCRA 90 storage rule and all rules regarding labeling, covering, tracking, and others. Contaminated soils must be properly characterized. Records of all waste test results, waste analyses, and other determinations made in hazardous waste identification must be maintained by the generator. Based on characterization, hazardous wastes must be properly transported offsite by a registered hazardous waste transporter to a permitted RCRA hazardous waste TSDF. It is the responsibility of the generator (NASA) to ensure that the first shipment of all hazardous waste shipped offsite

to a TSDF is accompanied by appropriate notifications and certifications. A properly completed manifest that is signed by NASA personnel must accompany each shipment of RCRA hazardous waste to the TSDF. NASA personnel must be sure to receive a completed copy of the manifest from the TSDF. A copy must be maintained onsite for 3 years.

Confirmation samples must be collected from excavated areas and analyzed to verify that all contaminated soils have been removed. Excavated soils must be tested to determine pollutant content for waste acceptance criteria for the specific disposal facility.

2.2.4 Noise

Nuisance noise is generally regulated by local ordinances. According to the Erie County Health Department, there is no county or city ordinance regarding noise. Noise related to occupational health is regulated under Occupational Safety and Health Administration (OSHA) regulations for worker health and safety. The *PBRF Health and Safety Site Specific Plan* should be referenced for specific requirements.

2.2.5 Biological

Several natural areas have been identified in the vicinity of PBS including, but not limited to, the Milan State Wildlife Area, Erie Sand Barrens State Nature Preserve, Sheldon Marsh State Nature Preserve, and Resthaven Wildlife Area. The biological survey conducted at PBS in 1994 determined that that are no threatened or endangered species that inhabit the area of the PBRF complex, however, the survey identified several wildlife species at PBS that are either threatened, endangered, or of special concern; and one species, the Bald Eagle, that is Federally listed. Plum Brook Station is also home to many other animal and plant species that do not have special status. The PBRF decommissioning and remediation activities will have to be managed in a manner that does not cause harm to the animal and plant populations on the PBS, the surrounding portions of Erie County, or the natural areas in the vicinity of the PBS.

2.2.6 Waste Generation and Storage

2.2.6.1 *Hazardous Waste*

Generators of hazardous wastes must manage those wastes in compliance with the requirements of OAC 3745-52 and 40 CFR 261.1–262.44. Generators must comply with all applicable hazardous waste regulations regarding waste management, identification, characterization, storage, accumulation, labeling, packaging, marking, placarding, transportation and disposal. OEPA indicated that all hazardous wastes generated during decommissioning and remediation activities must be managed in accordance with all the applicable OACs that cover hazardous waste.

Managing Hazardous Waste

When a waste is produced, it is the generator's responsibility to determine if the waste is hazardous. A waste may be hazardous either because it is specifically listed as hazardous or because of its characteristics. The characteristics considered are corrosivity, ignitability, reactivity, and toxicity. The limits of these characteristics are as follows:

- *Ignitability:* A liquid having a flash point of less than 140˚F flammable solids, ignitable gases and oxidizers are all considered hazardous.
- *Corrosivity:* An aqueous solution having a pH less than or equal to 2 or greater than or equal to 12.5, or at 550˚C corrodes steel at a rate greater than 1/4 inch per year.
- *Reactivity:* Any waste capable of easily generating toxic or explosive gases is considered reactive.
- *Toxicity:* If a Toxicity Characteristic Leaching Procedure (TCLP) indicates levels of a toxic material above a specified concentration, the material will be hazardous.

In order to determine whether or not a waste exhibits toxicity, a TCLP can be conducted.

Generator Status

The generator must comply with regulations that are dependent upon their generator status. Generators are categorized as either Conditionally Exempt Small Quantity Generator (CESQG), Small Quantity Generator (SQG), or Large Quantity Generator (LQG) based on the amount of waste they generate over a specific period of time.

- *CESQG*: Generates more than 100 kg (220 lbs) of hazardous waste per month. In addition to sending the hazardous waste to a permitted facility, the CESQG can never accumulate more than 1,000 kg (2,200 lbs) of hazardous waste on-site at any given time

- *SQG*: Generates between 100 and 1,000 kg (220 and 2,200 lbs) of hazardous waste per month. An EPA identification number must be obtained, waste sent off-site must be manifested, and specific storage and handling requirements must be followed.

- *LQG*: Generates more than 1,000 kg (2,200 lbs) of hazardous waste per month. A LQG must submit an annual report to the Ohio EPA and follow all other regulations applicable to LQG's, such as designing a contingency plan, ensuring all employees are trained on hazardous waste safety issues, and keeping the facility and its equipment in compliance with preparedness and prevention measures.

NASA's PBS is a LQG and as result, does not require a separate hazardous waste permit or a modification to the existing permit for the wastes that will be generated as a result of the PBRF Decommissioning Project. The hazardous wastes that will be generated during decommissioning activities include decontaminated fluids, contaminated equipment, contaminated and excavated debris and soil, and contaminated LBP debris and chips removed from buildings. Since a separate hazardous waste permit or generator ID is not necessary for the PBRF, the volume of waste generated would not be tracked separately for the PBRF Decommissioning Project. However, the volume of waste from the PBRF Decommissioning Project can be tracked based on the hazardous waste manifests.

Waste Storage

All hazardous waste, regardless of the generator status, must be accumulated in containers that are in good condition and compatible with the stored waste. Containers holding hazardous waste must always be closed during storage except when it is necessary to add or remove waste, and they must not be opened, handled, or stored in a manner that may rupture the container or cause it to leak. Containers also must be marked with the words "hazardous waste" and the date on which accumulation of the waste begins.

Waste Accumulation

The amount of time hazardous waste may be accumulated depends on the generator status. LQGs may accumulate hazardous waste no longer than 90 days and SQGs have 180 days until they must remove the waste from the place of generation. All three generator categories must remove hazardous waste before accumulation time expires to a permitted TSDF. If the waste remains at the site, an EPA identification number must be obtained for the site or the waste may be accumulated at a central location for which the generator has obtained an EPA identification number. The central location should be located so control can be maintained over the accumulation by the generator.

Generally, generators may, within a 90 day period, accumulate and/or conduct treatment of hazardous waste that is generated onsite without an Ohio hazardous waste permit, provided that the waste is placed (1) in containers and the generator complies with other applicable rules of the OACs, (2) in tanks and the generator complies with applicable rules of the OACs, and (3) on drip pads and the generator complies with applicable rules of the OACs and maintains the following records at the facility.

It is important to maintain the following specific records at the facility: (1) a description of procedures that will be followed to ensure that all wastes are removed from the drip pad and associated collection system at least once every ninety days; and (2) the documentation of each waste removal, including the quantity of waste removed from the drip pad and the sump or collection system and the date and time of removal.

In addition, a generator who, for 90 days or less, accumulates and/or conducts treatment of hazardous waste that is generated on-site without an Ohio hazardous waste permit is exempt from all requirements in OAC 3745-66-10 to 3745-66-48 except for OAC 3745-66-14 and Paragraphs A and B of OAC 3745-66-11.

The date upon which each period of accumulation or treatment begins is clearly marked and visible for inspection on each container. While being accumulated or treated on-site, each container and tank is labeled or marked clearly with the words “Hazardous Waste”. The generator complies with the requirements for owners or operators in Paragraph A4 of OAC 3745-59-07 and OAC 3745-65-16, 3745-65-30 to 3745-65-37, and 3745-65-50 to 3745-65-56.

Identification and Characterization. Generators can determine whether their waste is hazardous by either applying knowledge of hazardous characteristic of the waste in light of materials and processes used, or by testing the waste using standard methods specified in OAC

3745-51. Each waste stream must be tested using a representative number of samples. Based on characterization, hazardous wastes must be properly transported offsite by a registered hazardous waste transporter to a permitted RCRA hazardous waste TSDF. It is the responsibility of the generator (NASA) to ensure that the first shipment of all hazardous waste shipped offsite to a TSDF is accompanied by appropriate notifications and certifications. A properly completed manifest that is signed by NASA personnel must accompany each shipment of RCRA hazardous waste to the TSDF. NASA personnel must be sure to receive a completed copy of the manifest from the TSDF. A copy must be maintained onsite for 3 years.

Labeling. In accordance with OAC 3745-52-31, before a hazardous waste generator transports hazardous wastes or offers hazardous wastes for transportation off-site, the generator must label each package of hazardous waste in accordance with the applicable DOT regulations on hazardous materials under 49 CFR Part 172.

Packaging. In accordance with OAC 3745-52-30, before a hazardous waste generator transports hazardous wastes or offers hazardous wastes for transportation off-site, the generator must package the waste in accordance with the applicable DOT regulations on packaging, under 49 CFR Parts 173, 178 and 179.

Marking. In accordance with OAC 3745-52-32, before a hazardous waste generator transports hazardous wastes or offers hazardous wastes for transportation off-site, the generator must mark each package of hazardous wastes in accordance with the applicable DOT regulations on hazardous materials under 49 CFR Part 172.

In addition, the generator must mark each container of 110 gallons or less used in such transportation with the following words and information displayed in accordance with the requirements of 49 CFR 172.304: "Hazardous waste - Federal law prohibits improper disposal. If found, contact the nearest police or public safety authority, or the United States Environmental Protection Agency. Generator's name and address. Manifest document number."

Placarding. In accordance with OAC 3745-52-33, before a hazardous waste generator transports hazardous wastes or offers hazardous wastes for transportation off-site, the generator must placard or offer the initial transporter the appropriate placards according to DOT regulations for hazardous materials under 49 CFR Part 172, Subpart F.

Recordkeeping. Recordkeeping for hazardous waste is regulated by OAC 3745-52-40. Hazardous waste generators must keep a copy of each manifest signed in accordance with OAC 3745-52-23 for three years or until a signed copy is received from the designated waste disposal facility. This signed copy shall be retained as a record for at least three years from the date the waste was accepted by the initial transporter. USACE and Montgomery Watson at the PBRF will maintain hazardous waste manifests and permits associated with the PBRF Decommissioning Project and the PBS Environmental Management Office will retain a copy.

Generators must keep a copy of each annual report and exception report for a period of at least three years from the due date of the report. Generators must keep records of any test results, waste analyses, or other determinations made in accordance with rule OAC 3745-52-11 or Chapter 3745-51 of the OAC for at least three years from the date that the waste was last sent to on-site or off-site TSDF.

The periods of retention referred to in this rule are extended automatically during the course of any unresolved action regarding the regulated activity or as requested by the director.

Annual Report. A generator who ships any hazardous waste off-site must prepare and submit to OEPA a *Generator Annual Hazardous Waste Report* by March first of each year in accordance with OAC 3745-52-41. The *Generator Annual Hazardous Waste Report* must be prepared using the forms and instruction supplied by the director of OEPA on the request of the generator. It must also cover generator activities during the previous year, and must include, but not be limited to, the following information:

- The EPA identification number, name, and address of the generator
- The calendar year covered by the report
- The EPA identification number, name, and address for each off-site TSDF to which waste was shipped during the year
- The name and EPA identification number of each transporter used during the reporting year for shipments to a TSDF
- A description, EPA hazardous waste number (from OAC 3745-51-20 to 3745-51-24 or 3745-51-30 to 3745-51-35), DOT hazard class, and quantity of each hazardous waste shipped off-site for shipments to a treatment, storage, or disposal facility

The following information shall be listed by EPA identification number of each such off-site facility to which waste was shipped:

- A description of the efforts undertaken during the year to reduce the quantity and toxicity of hazardous waste generated
- A description of the changes in quantity and toxicity of waste actually achieved during the year in comparison to previous years
- The certification signed by the generator or authorized representative

Lead-Based Paint

LBP waste is considered a hazardous waste and must be managed in accordance with the hazardous waste rules presented above. In order to determine if wastes produced from LBP removal are hazardous, 40 CFR 261 and the OAC Chapter 3745-51 should be referenced.

Listed hazardous wastes are unlikely to be generated in LBP abatements if stripping agents such as toluene (F001), methylene chloride (F002), and methanol (F003) are used. These materials are listed as hazardous wastes and will need to be handled according to the hazardous waste regulations. Of the four characteristics, corrosivity and toxicity usually are of most concern in LBP abatement waste. Chemicals, such as sodium hydroxide, used for paint stripping are generally corrosive. The lead constituent of the wastes often exhibits toxicity.

In order to determine whether or not a LBP waste generated at the PBRF exhibits toxicity, a TCLP can be conducted. If the paint waste contains 5 ppm lead or above, it is considered to be a characteristic hazardous waste; or to save analytical cost, the generator can declare the LBP waste as hazardous.

A LBP and polychorinated biphenyls (PCB) survey, which consisted of visual inspections and sampling, was completed at the Plum Brook complex buildings in September 2000. The samples were analyzed for lead and PCB content. The survey found that all of the paint bulk sample results for PCBs were less than 50 ppm. The survey found that oil in the fluorescent light fixture ballasts contained PCBs at greater than 500 ppm in certain buildings. Lead was found to be high in the structural support of the buildings, precipitator, and water tower. Detailed lead and PCB analytical results and specific sampling locations can be found in *the ACM/LBP/PCB Survey Report, Plum Brook Reactor Area Buildings*, (SAIC-FASS Team 2000).

2.2.6.2 *Solid Waste - Nonhazardous and Nonradiological*

Clean Hard Fill

Decontaminated building debris such as concrete, masonry, pipes, metal, wire, and other building debris, pipes, etc., will be used as backfill in the demolition and excavated areas. Clean hard demolition debris that will be used as hard backfill is governed by OEPA regulation, OAC 3745-400. This rule stipulates that clean hard fill consists of reinforced and non-reinforced concrete, asphalt concrete, brick, block, tile or stone. Clean hard fill does not include any material that is contaminated with hazardous, solid, or infectious wastes. Clean hard fill shall be (1) recycled into usable construction material, (2) disposed in a licensed construction and demolition debris or other waste facilities, (3) used to change the grade on the site of generation or removal, or (4) used to change the grade on a site other than the site of generation.

Clean hard fill may be stored for a period of less than two years. Stored means the debris is held in a manner remaining retrievable and substantially unchanged. Clean hard fill stored for more than two years will be considered illegal disposal of construction and demolition debris. Clean hard fill may not be stored in regulatory wetlands or flood plains without first receiving permission to fill from the OEPA Division of Surface Water and/or the U.S. Army Corps of Engineers (USACE).

If the clean hard fill is used to change the grade on a site other than the PBS property, then NASA must provide a written "Notice of Intent to Fill" to the local Construction and Demolition Debris licensing authority where the clean fill will be placed. "The Notice of Intent to Fill" must state:

- The nature of the fill material
- The site of generation or removal
- The site to be filled
- When filling will begin and end

- The telephone number of the person making the notification
- The notice must be received by the authority at least seven days before filling

Construction Debris

Clean construction debris that is disposed offsite must be disposed at a licensed construction and demolition debris facility in accordance with OEPA OAC 3745-400-05. Exclusions to this rule may be found in OAC 3745-400-03.

Asbestos Containing Materials

The OEPA indicated that if the ACM is friable or Category 2, it must be removed by a licensed contractor before building demolition or renovation. A demolition/renovation notification form must be filed with the state at least 10 working days before work begins. ACM waste must be disposed at an approved landfill. If the ACM is Category 1 (i.e., floor tile), then it can be left in place for demolition. If the ACM is contaminated with radioactive or hazardous waste then the contaminated ACM would have to be handled as radioactive or hazardous waste, as appropriate.

The rules presented in OAC 3745-20 provide detailed requirements for demolition and renovations that involve friable ACM. The rules contain requirements for notification, asbestos emission control, and asbestos waste handling.

Notification. The rules for notification stipulate that the owner or operator must notify the director of OEPA with written notice of intention to demolish or renovate at least 10 business days before any demolition operation begins at the facility if the amount of friable ACM in a facility being demolished is at least 260 linear feet on pipes or at least 160 square feet on other facility components. In addition, the owner or operator must notify the director of OEPA with written notice of intention to demolish or renovate at least 20 business days before any demolition operation begins if the amount of friable asbestos materials in a facility being demolished is less than 260 linear feet on pipes or less than 160 square feet on other facility components, including those facilities which contain no friable asbestos. They need to do this as early as possible before any emergency demolition or renovation operation begins, and at least five days before any planned renovation operation begins. The content of the notification can be found in OAC 3745-20-03.

Asbestos Waste Handling. Standards for asbestos waste handling are provided in OAC 3745-20-05. The owner or operator of the demolition or renovation operation is required to dispose of ACM wastes at an active waste disposal site operated in accordance with OAC 3745-20-06. The rules require that the owner or operator of the demolition or renovation operation must discharge no visible emissions during the collection, processing, packaging, transporting, or disposition of any and must use one of the methods below:

- Adequately wet ACM waste and seal the material into durable leak-tight disposal containers or enclosure system in accordance with Paragraph C of this rule.

- Keep asbestos-containing demolition debris adequately wet or encapsulated until collected for disposal for facilities demolished where asbestos was not removed prior to demolition.

- Process friable ACM waste into nonfriable forms, such as nonfriable pellets or other shapes.

The owner or operator of a demolition or renovation operation must seal all friable ACM wastes into durable leak-tight disposal containers or use an approved alternative disposal system in accordance with the following provisions.

- All containers of ACM wastes must be labeled with the following information: DANGER, CONTAINS ASBESTOS FIBERS, AVOID CREATING DUST, CANCER AND LUNG DISEASE HAZARD, R.Q. Hazardous Substance, N.O.S. asbestos, ORM-E 9188.

- ACM waste must be sealed in plastic bags having a thickness of at least 0.006 inch (six-mils). A second clean, leak-tight plastic bag having a thickness of at least 0.006 inch (six-mils) must fully contain the first bag.
- Whenever necessary, to prevent any ACM waste from penetrating a container, the materials must be sealed into a combination of a 0.006 inch (six-mils) plastic bag and a leak-tight steel, plastic, or fiber drum, or reinforced disposal box, leak-tight polypropylene woven fabric bag, or similar suitable and durable container. Drums must be banded and sealed with reinforced tape or in accordance with manufacturers recommendations.

- Facility components coated with, covered or containing friable ACM and removed in units or sections shall be sealed with at least 0.012 inch (twelve mils) of leak-tight plastic or at least 0.010 inch (ten mils) of leak-tight polypropylene woven fabric.

- ACM waste facility components, and contaminated debris may be disposed of using an alternative disposal system which has received the prior written approval of the director.

When removing or transporting ACM waste to a disposal site, each owner or operator of any demolition or renovation operation to whom this rule applies shall prepare and secure any load of ACM waste material in a manner that prevents any visible emissions, load loss, and spillage or leakage of liquids.

2.2.7 Pollution Prevention/Waste Minimization

For this PBRF Decommissioning Project, the primary pollution prevention activity would be recycling (e.g., demolition debris as clean fill). Other opportunities for pollution prevention such as changes to production or raw material use are more applicable to a manufacturing process than to decontamination or decommissioning. The Pollution Prevention Act of 1990 outlines an environmental management hierarchy that includes:

- Preventing or reducing pollution at the source whenever feasible.

- Recycling in an environmentally safe manner whenever feasible pollution that cannot be prevented.

- Treating in an environmentally safe manner whenever feasible pollution that cannot be prevented or recycled.

- Disposing or releasing pollution in an environmentally safe manner only as a last resort.

Since waste treatment and disposal costs are directly related to the volume of waste generated, strategies for source reduction/pollution prevention and waste minimization approaches will be utilized during decontamination and decommissioning. For example, during demolition, accidental spilling of fuel, lubricants, and other fluids could create a potential contamination hazard and contaminate surface water or soils. Spills and leaks of hazardous fluids would be minimized or avoided by restricting the location of activities such as refueling. Requiring immediate cleanup of spills and leaks will minimize the potential effects of accidental spills. Decommissioning equipment would be maintained regularly and the source of leaks will be identified and repaired. Lubricating oils, acids for equipment cleaning, and other potentially hazardous wastes that may be associated with decontamination and decommissioning activities will be stored in containers within secondary containment structures onsite to reduce the impact of possible leaks. The use of chemicals and cleaning solutions also will be minimized as much as practical. Different waste streams will be segregated to reduce the potential for cross contamination. Utilizing compaction, consolidation, and efficient packaging will reduce waste volumes. Other waste pollution prevention measures such as control of fugitive dust emissions to minimize particulate matter will also be employed.

2.2.8 Waste Disposal

When source reduction or waste minimization is not feasible, hazardous and other wastes generated from decontamination and decommissioning activities will be disposal in accordance with applicable state and Federal regulations. This section identifies the specific waste disposal facilities that are currently known and describes the waste acceptance criteria for those disposal facilities.

Three primary disposal alternatives have been proposed for the *PBRF Decommissioning Project Waste:*

- Disposal at Envirocare of Utah, Inc. (Envirocare). Disposal would include approximately 1,221,000 ft^3 of low-level radioactive waste, less than 1,000 ft^3 of mixed wastes and various RCRA hazardous wastes.

- Disposal at Chem-Nuclear Systems (CNS) Barnwell Facility in South Carolina. Disposal would include about 11,000 ft^3 of Highly Activated Components.

- Disposal at an Industrial Landfill. Disposal would include approximately 230,000 ft^3 of non-radioactive, non-hazardous materials such as asbestos and demolition debris.

Additional TSD facilities may be involved for other hazardous wastes that may be encountered. Prior to shipping any waste to a facility that is not specifically listed in this plan or the *Radioactive and Hazardous Waste Management Plan*, complete waste characterizations will be performed to assure that the waste generated is acceptable with regards to the permit at the

designated TSDF. Prior approval will be required from a TSDF before the first wastes may be shipped to it.

USACE will make recommendations for disposal facilities for NASA's GRC approval. The following tables will provide information on the waste disposal process for Envirocare and CNS Barnwell Facility in South Carolina.

ENVIROCARE

Envirocare is licensed to receive mixed waste, as defined by the *Low-Level Radioactive Waste Policy Act* (Public Law 96-573), and radioactive-PCB waste for disposal. Envirocare can accept radioactive waste in the form of soil or debris. Envirocare's Radioactive Material License (Condition 56) defines compacted soil as (1) having a graded material that will pass through a 4-inch grizzly, and (2) having a bulk density greater than 70 pounds per cubic foot dry weight in accordance with American Society for Testing and Materials (ASTM) D-698 (Standard Proctor Test). Debris includes both decommissioning and routinely generated operational waste including, but not limited to, radiologically contaminated paper, piping, rocks, glass, metal, concrete, wood, bricks, resins, sludges, tialings, slag, residue, and personal protective equipment that conforms to the debris size requirements. Oversized debris (greater than 10 inches in at least one dimension and longer than 8 feet in any dimension) can be disposed of at Envirocare's facility (Envirocare 1999). However, generators should identify these materials as part of the waste profiling process as outlined below in Table 2.2.7–1.

Envirocare is prohibited from accepting the following wastes (Envirocare 1999):

- Radioactive waste classified as Class B or C waste
- Sealed sources or radioactive material that is permanently bonded or fixed in a capsule or matrix
- Liquid radioactive waste, solid waste containing observable free liquids, or waste which fails the Paint Filter Liquids Test
- Waste capable of detonation, explosive decomposition, reactive at normal temperature and pressure, or reactive with water
- Waste capable of generating quantities of toxic gases, vapors or fumes harmful to persons transporting, handling, or disposing of waste
- Pyrophoric materials contained in wastes must be treated, prepared, and packaged to be nonflammable
- Hazardous waste that is not also a radioactive waste
- Shock sensitive wastes and materials
- Mixed waste where the radioactive portion at the time of disposal would exceed the limits set forth in Envirocare's Radioactive Waste License

- EPA waste codes F020, F021, F022, F023, F026, and F027; and Utah waste codes F999 and P999

Additional information on the waste acceptance criteria for Envirocare can be found in Envirocare's Waste Acceptance Guideline on Envirocare's website (http://www.envirocareutah.com/main.html).

CNS accepts low-level radioactive waste material for disposal at the Barnwell Waste Management Facility (Barnwell). All Class C waste generated as a result of decommissioning activities at the PBRF will be sent to Barnwell if it's selected as a disposal facility. Radioactive waste shipments to Barnwell must comply with CNS Radioactive Materials License (No. 097); applicable DOT and NRC regulations; South Carolina Department Health and Environmental Control (DHEC) Regulation 61-83, Transportation of Radioactive Waste Into or Within South Carolina; NCR IE Information Bulletin No. 83-10; and NCR Branch Technical Position on Concentration Averaging and Encapsulation (dated January17, 1995) (CNS 1999). Information regarding shipment and documentation criteria from Barnwell's Waste Acceptance Criteria (CNS 1999) is outlined in Table 2.2.7-2.

TABLE 2.2.7–1.—*Waste Acceptance Criteria for Envirocare*

Responsibility	Process	Form/Activity	Time Required
NASA	Conduct waste characterization	– Contact Envirocare – Evaluate waste streams based on radiological characterization, chemical and land disposal permits and regulations, physical characteristics	– Should be completed prior to preparing the Waste Profile Form (EC-0230)
NASA	Prepare waste profile and obtain analytical results for parameters specified in waste profile form	– Radioactive Waste Profile Record (Waste Profile, Form EC-0230) is available on www.envirocareutah.com	
NASA	Submit Waste Profile		
EC	Conduct preliminary review of Waste Profile Form to ensure necessary information is provided	– Request additional information if Waste Profile Form is incomplete – Submit waste profile package to EC compliance staff for final approval	– Comments provided within 2 weeks of receipt of Waste Profile Form – As soon as the review and approval process is completed
NASA	Provide pre-shipment samples		
EC	Pretreatment Sample Test. Develop "fingerprint" of specific waste	– Send samples to the following address: Envirocare of Utah, Inc. South Clive Facility US I-80, Exit 49 Tooele County Clive, Utah 84029 (For FedEx Shipments only, used zip code 84083).	– Pre-shipment sample testing is normally performed within 2 weeks of receipt
NASA	Prepare shipping documents. Shipping documents will depend on type of waste being shipped.	– Uniform Low-Level Radioactive Waste Manifest must accompany every shipment. – Other forms include: Uniform Hazardous Waste Manifest (EPA Form 8700-22 or state equivalent) and Land Disposal Restriction Notification and/or Certification – Provide any applicable special handling or receiving instructions	
EC	Notice of Transport	– Request any additional documentation for approved waste stream – Review and approve draft copy of shipping documents – Issue Notice of Transport Form	
NASA	Scheduling and Transport: 5 working days written request must be provided prior to each shipment	– Contact Scheduling Department to confirm schedule of first shipment – Provide 5-day Advance Shipment Notification Form – Provide advance copies of Uniform Low-level Radioactive Waste Manifest (NRC Forms 540 and 541) and other shipping documents prior to waste shipment	– Minimum of 5 working days prior to shipment arrival – At least 3 days prior to scheduled shipment arrival (can be faxed to the Scheduling Department (435/884-

TABLE 2.2.7–1.—*Waste Acceptance Criteria for Envirocare*			
		shipment – Hazardous material shipment must include Emergency Response Information meeting the requirements of 349 CFR 172 Subpart G – Each mixed waste shipment must include Hazardous Waste Manifest, Land Disposal Restrictions Notice and/or Certification and Weigh Bill	1721) or emailed to manifest@envirocareutah.com
EC	Waste Receiving and Processing	– Inspect for compliance with DOT and State of Utah regulations and other applicable documentation. – Inspect and sample waste – Process waste – Provide copy of Uniform Low-Level Radioactive Waste Manifest to generator	

TABLE 2.2.7–2.—*Waste Acceptance Criteria for Chem-Nuclear Systems Barnwell Waste Management Facility*

Responsibility	Process	Form/Activity	Time Required
NASA	Pre-shipment Requirements	– Contract with CNS certifying compliance with Site Criteria – Prior approval from Barnwell Licensing Department for shipments with activities totaling 40,000 curies – Advance copies of all shipping documents for pre-paid shipments – Valid state of South Carolina Radioactive Waste Transport Permit, unless exempt – Obtain Shipment Identification Number from CNS Barnwell Prior Notification Plan (PNP) Department – Approval from DHEC for Class C waste disposal	– Applications must be completed signed and received by DHEC at least 30 days before shipping date
NASA	Shipment Documentation	These documents must accompany waste shipments: – Barnwell's Uniform Low-level Waste Manifest (Forms 540/540A, 541/541A, and 542/542A), as appropriate. Forms are available from the PNP Department. The manifest should be faxed (803/259-7230) or mailed to CNS at shipment departure. – DHEC Radioactive Waste Shipment Prior Notification and Manifest Form (DHEC Form 802). This form is required for shipments greater than 75 ft^3 and/or greater than 1 curie. Copies of this form should be sent to KHEC in Columbia, SC and CNS PNP Department at Barnwell. One copy should accompany shipment. – DHEC Form 803, Radioactive Waste Shipment Certification – Complete isotopic analysis printout or equivalent for aqueous filter media, filters, and resins – Documentation required for Class C waste (specify waste description, container weight/volume and type, radiation levels, total curie content, radionuclide concentration, waste classification method) – Written statement of any unusual hazards and/or necessary precautions	– Form 803 should be sent to DHEC and CNS 72 hours prior to shipment into or within the state of South Carolina

TABLE 2.2.7–2.—*Waste Acceptance Criteria for Chem-Nuclear Systems Barnwell Waste Management Facility*			
		– High Integrity Container Certification	
Barnwell	Shipment Docmentation	– Provide NASA with signed copy of Waste Manifest Forms – Provide letter indicating shipment has been received	– Within 7 days after shipment is received and accepted for disposal – Within 7 days should acceptance be delayed
NASA	Waste Shipment Scheduling	– Contact CNS PNP Department to schedule shipments – Inform CNS PNP Department of all data changes with regard to DHEC Form 802 – Inform CNS PNP Department of shipment cancellations – Notify CNS PNP Department when shipment leaves NASA GRC and provide shipment updates	– Schedule monthly shipments under Shipment ID number on the 10th day of the month that the waste will be shipped.
Barnwell		– Assign CNS Shipment ID Number – Notify DHEC of changes to Shipment ID Number – Notify DHEC if shipment is delayed until the following month	
NASA	Waste Classification and Packaging	– Properly classify (A-U, A-, B or C) and mark waste shipments on top of disposal containers – Ensure package identification and other required markings and labelling are clearly visible on the shipping package – Label disposal packages containing two or more inner packages with the most restrictive classification on the outer disposal container – Ship waste in wooden or steel containers or in SC DHEC-approved high integrity containers. Wooden boxes should be banded with metal bands and of waterproof construction or properly covered during transport. All boxes must be equipped with skids or non-returnable lifting devices. – Ensure that drums or other containers filled with non-radioactive materials is not used for shielding	
Barnwell		Approve supplemental shielding	

TABLE 2.2.7–2.—*Waste Acceptance Criteria for Chem-Nuclear Systems Barnwell Waste Management Facility*			
NASA	Waste Shipment	**Van Shipments:** – Segregate Class A, B, and C wastes in the same shipment – Obtain approval to ship drums weighing 1,000 lbs or less on pallets – Obtain approval for accompanying lifting devices for drums exceeding 1,000 lbs – Separate drums greater than 1,000 lbs from those less than 1000 lbs See Barnwell's Waste Acceptance Criteria (S20-AD-010) for additional requirements	
		Cask Shipments: – Ensure CNS is a "Registered User" of NRC-licensed cask, not owned by CNS, prior to shipment – Provide third party cask documentation (C of C, SAR, handling and maintenance procedures, and drawings) to CNS – Ensure compliance with Certificate of Compliance for cask in use See Barnwell's Waste Acceptance Criteria (S20-AD-010) for additional requirements	
		Class C Waste: – Waste shipments must have state of South Carolina DHEC approval prior to disposal – Documentation for each shipment must be provided to Barnwell Licensing Department prior to shipment departure	
Barnwell		– Review Class C waste documentation for consistency with disposal license, Branch Technical Position on Concentration Averaging and Encapsulation, as applicable, and site disposal requirements – Fax and mail Class C documentation to KHEC for review	
		Irradiated Hardware: – Submit Class C Waste Classification Recorded for each shipment of waste containing irradiated hardware to Barnwell Licensing Department – Classify hardware based on volume and weight only. No credit for waste container volume or weight can be used	

TABLE 2.2.7–2.—*Waste Acceptance Criteria for Chem-Nuclear Systems Barnwell Waste Management Facility*			
		– Classify waste based on activity concentration of highest individual component or radionuclide concentration averaging using Barnwell Rule of 10 – Waste classification, using the highest individual component, may be determined using radionuclide concentrations averaged over the entire volume and weight – Final waste classification for irradiated hardware should not exceed Class C	

Shortly after the transport and disposal methods for a large component of the reactor have been confirmed, NASA should contact CNS so that a meeting with DHEC to discuss the project and the preliminary plans made to date can be discussed. The following documents and information must be provided to DHEC for review and approval (CNS 1999).

- Transportation plan including the transport method and conveyance, notifications to be made, the transportation routes and estimated schedules
- DOT and/or NRC authorization for transportation of the component(s)
- Waste characterization/classification methods and documentation, regardless of the resultant waste class
- Engineering evaluation demonstrating that the component(s) meet the structural stability requirements for the site
- Dose assessment, which provides estimates of the personnel and fenceline doses from the point of component acceptance through backfill
- Trench modification plan outlining any changes from the existing trench design, access ramps, or site roadways
- Disposal plan describing how the component(s) will be accepted, handled, and disposed within the trench

Additional specific information on Barnwell's Waste Acceptance is available at http://www.chemnuclear.com/20AD1017.htm.

2.2.9 Waste Transportation

Hazardous Waste Shipping

Before shipping hazardous waste offsite to a TSDF, the generator must ensure that hazardous waste containers are packaged, labeled, and marked in accordance with all applicable DOT packaging standards before offering the waste to a transporter. Hazardous waste must be shipped using a licensed hazardous material transporter. The transporter must be registered with the public utilities commission of Ohio and must have an EPA identification number from OEPA. The generator must make sure that all hazardous waste shipments are accompanied by a hazardous waste manifest and is in compliance with the manifest rules.

The transporter requirements for manifests are provided in OAC 3745-53-21. The requirements stipulate the transporter shall deliver the entire quantity of hazardous waste which he has accepted from a generator or transporter to the designated facility listed on the manifest; the alternate designated facility, if the hazardous waste cannot be delivered to the designated facility because an emergency prevents delivery; the next designated transporter; or the place outside the United States designated by the generator. If the hazardous waste cannot be delivered in accordance with Paragraph #1, the transporter must contact the generator for further directions and shall revise the manifest according to the generator's instructions.

The general manifest requirements are provided in OAC 3745-52-20. The requirements are as follows. A generator who transports hazardous waste for off-site treatment, storage, or disposal shall prepare a uniform hazardous waste manifest, EPA form 8700-22, and if necessary, EPA form 8700-22A (the continuation sheet) before transporting the hazardous wastes off-site. The completion of these forms (Items I and R) relating to the EPA waste number is required in addition to the completion of items 1-20 and items 21-35 respectively, on these forms.

The generator shall designate on the manifest one facility that is permitted to handle the waste described on the manifest. The generator may also designate on the manifest one alternate facility that is permitted to handle waste in the event an emergency prevents delivery of the waste to the primary designated facility. If the transporter is unable to deliver the hazardous waste to the designated facility or the alternate facility, the generator shall either designate another facility or instruct the transporter to return the waste.

The requirements of these OAC rules 3745-52-22 and 3745-52-23 do not apply to hazardous waste produced by generators of greater than 100 kg (220 lbs) but less than 1,000 kg (2,200 lbs) in a calendar month where the waste is reclaimed under a contractual agreement pursuant to which the type of waste and frequency of shipments are specified in the agreement, and the vehicle used to transport the waste to the recycling facility and to deliver regenerated material back to the generator is owned and operated by the reclaimer of the waste. The generator maintains a copy of the reclamation agreement in his files for a period of at least three years after termination or expiration of the agreement.

The manifest must consist of at least the number of copies which will provide the generator, each transporter, and the owner or operator of the designated facility with one copy each for their records and another copy to be returned to the generator.

The generator shall sign the manifest certification by hand, and obtain the handwritten signature of the initial transporter and date of acceptance on the manifest. He should also retain one copy in accordance with Paragraph A of OAC Rule 3745-52-40. The generator shall then give the transporter the remaining copies of the manifest.

For shipment of hazardous wastes in the United States solely by water (bulk shipments only), the State of Ohio generator shall send accompanying the waste, three copies of the manifest dated and signed in accordance with this rule to the owner or operator of the designated facility or the last water (bulk shipment) transporter to handle the waste in the United States, if transported by water. For rail shipments of hazardous waste in the United States which originate at the site of generation, the state of Ohio generator must send at least three copies of the manifest dated and signed in accordance with this rule to the next non-rail transporter, if any; the designated facility if transported solely by rail; or the last rail transporter to handle the waste in the state of Ohio if transported by rail. For shipments of hazardous waste to a designated facility in another state that is authorized pursuant to 40 CFR Part 271 but has not yet obtained authorization to regulate that particular waste as hazardous, the generator in Ohio must assure that the designated facility agrees to sign and return the manifest to the generator in Ohio, and that any out-of-state transporter signs and forwards the manifest to the designated facility.

When removing or transporting ACM waste to a disposal site, the owner or operator of the demolition or renovation operation must prepare and secure any load of ACM waste in a manner that prevents any visible emissions, load loss, and spillage or leakage of liquids.

2.2.10 Historic Preservation

Since there are no federal or state historical, archaeological or cultural resources located within the PBRF, there will be no environmental regulatory requirements associated with these activities. Personnel involved with documenting the condition of the PBRF prior to and during PD and D&D activities will be required to have the proper safety training before they commence work.

2.3 COORDINATION WITH OTHER PBS/PBRF ENVIRONMENTAL ACTIVITIES

The activities associated with decommissioning and remediation will need to be done so in coordination with other work being performed at the PBS under the Formerly Utilized Defense Sites (FUDS) program to avoid schedule delays and potential conflicts. FUDS activities currently include activities associated with the Emergency Retention Basin, Water Effluent Monitoring Station, Pentolite Ditch and spill area, RCRA underground storage tank closures at three locations on PBS including the reactor area, space power facility area, and garage and maintenance area; and the groundwater pump and treat system.

2.4 DATA GAPS

Various data gaps were identified during conduct of the Environmental Baseline Survey (EBS) that was conducted in conjunction with this EMP. Several of these gaps concern lack of data on certain types of potential contaminants (based on site activities and history), others are lack of sampling in certain areas, and one was identified during the review of historic aerial photographs. The specific data gaps identified are discussed below along with plans to bring closure to the gaps in information.

During interviews with personnel who worked at the PBRF when it was active, it was noted that the analytical laboratories at the PBRF used typical solvents associated with laboratories, such as carbon tetrachloride, acetone, and methylene chloride. Waste solvents were disposed of by pouring them down the drains at the laboratories. Because the laboratories handled radioactive materials, these drains are part of the hot drain system that discharged to the tanks in the Hot Retention Area (#1155). Liquids stored in this area were allowed to "cool" and were then diluted with non-radioactive water and discharged through the Water Effluent Monitoring Station (WEMS) (#1192). Although the solvents disposed of were certainly diluted greatly in this process, in addition to the dilution that occurred in the Hot Retention Area, it is possible that the sediments at the WEMS may have been contaminated by volatile organic compounds. Sediment and subsurface (to a depth of 5-feet) sampling/volatile organic analyses should be conducted at the WEMS to verify that no VOC contamination exists. Three sediment samples collected from random locations should be sufficient to determine if this area has been impacted by solvent contamination.

> *Samples for VOC analysis will be collected along with the regularly scheduled sampling events at the WEMS and Pentolite Ditch areas. Closure is expected by September 2001.*

There is another potential source of VOC contamination being introduced into the WEMS. This source is the current discharge of water from the sumps in the basements of the major buildings at the PBRF. Due to the depths of the wells at the sumps, it is safe to assume that this water is from the bedrock aquifer. The RCRA investigation conducted at the former waste solvent tank site found that the sump at Building 1131 has caused a radial depression of the groundwater table towards the sump. Although the former waste solvent tank site could be contributing to the VOC contamination, the sump effluent is monitored quarterly for radioactive constituents only; VOCs are not an analyte.

> *During one of the next rounds of quarterly samples, additional samples will be collected to analyze for VOCs. Closure is expected by September 2001.*

During the sitewide groundwater monitoring study, benzene was detected in Reactor Well #1 (a bedrock well) at a concentration of up to 8.8 ug/l (the RBC is 0.36 ug/l). Although benzene is known to be naturally occurring in the area and has been found in most bedrock monitoring wells across Plum Brook Station, it is not known to naturally occur in surface water. The sump effluent is discharged through the WEMS, into Pentolite Ditch and then into Plum Brook. Since the sump effluent is from the bedrock aquifer, there is potential for it to be contaminated with VOCs, particularly benzene. A grab sample of the sump effluent at the WEMS should be collected when it is not raining (to avoid dilution by storm water) and analyzed for VOCs.

> *A grab sample for VOC analysis will be collected along with the regularly scheduled sampling events at the WEMS and Pentolite Ditch areas. This sample will be collected in a manner to assure there is no dilution due to rainwater. Closure is expected by September 2001.*

Although not specifically identified during either the records search or interviews conducted during the EBS, there is another potential source of contamination associated with the laboratory drainage system. Because of the nature of the laboratory operations, potential exists for substances such as mercury from broken thermometers to have been disposed of in sink or floor drains. Therefore, during demolition of the laboratory areas, sludge present in the laboratory floor drains and sink traps, and any material present between floor sub-surfaces should be sampled and analyzed for a complete set of analytical parameters (i.e., VOCs, SVOCs, Target Analyte List metals, and pesticides/PCBs).

> *Rather than conduct extensive sampling of these areas and fixtures, these materials will be properly characterized during demolition in accordance with the RADIOACTIVE AND HAZARDOUS WASTE MANAGEMENT PLAN. Closure is expected during demolition activities scheduled during 2005.*

The Sludge Basins (#1153) in the northeast corner of the PBRF and the associated Drying Basins in the northern area outside the PBRF fence have never been sampled. This is because these basins were part of the raw water treatment system and thus are not suspected to have radiological contamination. However, the potential use of algaecides or similar substances to control microorganism growth in the process water leads to the possibility that the sludge/sediment in the Sludge Basins and what is now soil in the Drying Basins may be contaminated with these substances. Several sediment and soil samples should be collected in

each of these areas at random locations and analyzed for pesticides/herbicides and metals. If any contaminants are detected, a sampling grid system should be established over each basin and an appropriate number of random samples should be collected in accordance with EPA guidance.

> *A sampling and analysis plan will be developed to address this issue. Closure is expected December 2001 unless results indicate the need for a gridded sampling and analysis plan.*

As discussed in Section 4.2.13 of the EBS Report, the diesel fuel above ground storage tank just north of the Services Equipment Building (#1131) was overfilled in about 1975. Soil sampling of the impacted area was never conducted. In addition, stained soil was observed below the tank during the site visit. This area and the soils between the tank and the catch basin located approximately 60 feet north of the tank should be sampled and analyzed for diesel range organics and total petroleum hydrocarbons. Composite samples should be collected from a depth of 0 – 2 feet from beneath the tank and then at 10-foot intervals to the catch basin.

> *A sampling and analysis plan will be developed to address this issue. Closure is expected by December 2001.*

Based on the data reviewed for the EBS, it appears that the overburden groundwater in the central portion of the PBRF has not been analyzed for nitroaromatics. Reactor Well 2, a bedrock well, was sampled in 1995 during the Focused RI at the Pentolite Road Red Water Ponds, and 3-NT and 3,4-DNT were found at levels of 23 ug/l and 13 ug/l, respectively. The Limited Site Investigation of the former Pentolite Area Waste Lagoons did not identify nitroaromatic contamination in soils, and concluded that the potential for groundwater contamination was therefore low. Groundwater, however, was not sampled as part of this investigation. Overburden groundwater at the PBRF should be analyzed for nitroaromatics in order to verify that the former Pentolite Area Waste Lagoons did not impact groundwater at the facility.

> *There have been numerous groundwater studies conducted across the entire Plum Brook Station. These studies appear to indicate that the issue of contamination in overburden groundwater has been adequately addressed. Additional document research through former site investigations will complete this investigation. Closure is expected by September 2001.*

During the review of data conducted for the EBS, no information was found on the extent of the area of contamination from the 2 areas of low-level waste spills (just south of Building #1134 and south of Building #1133). Soils were sampled to a depth of 10 feet in the area south of the Waste Handling Building (#1133) in the 1985 characterization study, and contamination was reported to a depth of 6 feet. No direct indication of the areal extent of the contamination was given (It was stated that soil should be removed to a depth of 8 feet and that a total of 185 cubic yards of soil should be removed. Assuming a square excavation, this would imply an area of 25 feet on each side). No radiological concentration was reported in the 1985 study for the second spill area near the Primary Pump House (#1134). The 1998 survey confirmed the presence of contamination near the Waste Handling Building, but no contamination was detected at the previously identified spill area. The lateral extent of the spill near Building #1133 should be determined, and the presence or absence of contamination associated with the second spill should be verified.

According to on-site personnel, neither of these two spill areas is very large. The location of both areas are known and marked. During the decommissioning phase of this project, the two spill areas will be excavated until the remaining soils test as clean. Closure will be coordinated during the remediation of the Spill Areas in April 2005.

During the review of historic aerial photographs taken during construction of the PBRF, piles of unknown material were observed in what is now the parking lot (see photo in Appendix B of the EBS Report). This material appears to be fill, but its origin is unknown. It is possible that this material was obtained onsite. Given the history of the Plum Brook Ordnance Works, the area beneath and immediately south of the parking lot may have been filled with soil contaminated by nitroaromatics. Although this area is outside the fenced portion of the PBRF, it is recommended that ten soil samples (composites from 0 – 2 feet) be collected in these areas and analyzed for nitroaromatics.

The contamination identified in this data gap is more closely associated with the former operations as Plum Brook Ordinance Works (PBOW). As such, data gathering for this gap will be coordinated with the FUDS project at PBS that is designated to address this issue. Since the PBRF staff office trailers have been installed in this area, closure is expected by 2006.

Finally, since the PBRF is downgradient of several former PBOW sites located in the adjacent areas south of the PBRF, there is potential for groundwater contamination from these sites to migrate towards the PBRF. With the installation of monitoring wells just south of Pentolite Road and upgradient from the PBRF, it will be possible to determine if contaminants are migrating from all of the areas of concern in the adjacent area to the PBRF. The approximate recommended locations of these wells are presented in Figure 4.8.6-1 of the EBS Report.

As in the data gap discussed above, this issue is associated with the PBOW operations. Since the source of contamination is identified as the Pentolite Road Red Water Ponds, the installation of monitoring wells will be coordinated with the FUDS project currently designated to address this issue. Closure is expected by 2003.

2.5 DECOMMISSIONING PROJECT OBJECTIVES AND TARGETS

2.5.1 PBRF Decommissioning Project

The objective of the PBRF Decommissioning Project is to safely remove and dispose of contaminated equipment, components, and systems; to safely remove and dispose of contaminated concrete, piping, debris and soil; safely decontaminate buildings and structures; and safely demolish all buildings and existing structures within the PBRF fence to an elevation of 1 m below grade.

2.5.2 Safety

2.5.2.1 *Worker Safety*

The objective of the PBRF Decommissioning Project regarding worker safety is to perform site decommissioning activities, and transport and dispose of hazardous and radioactive waste in a manner that will maintain the worker safety in compliance with all applicable laws and regulations.

2.5.2.2 *Public Safety*

The objective of the PBRF Decommissioning Project regarding public safety is to perform site decommissioning activities in a manner that will maintain the safety of the public in compliance with all applicable laws and regulations.

2.5.2.3 *Transportation Safety*

The objective of the PBRF Decommissioning Project regarding transportation safety is to transport and dispose of hazardous and radioactive waste in a manner that will maintain the safety of the public in compliance with all applicable laws and regulations.

2.5.3 Training

The objective of the PBRF Decommissioning Project regarding training is to ensure that each staff person performing work on the PBRF Decommissioning Project receives adequate training on the environmental management policy, health and safety issues, and their specific job responsibilities.

3.0 DECOMMISSIONING PROJECT IMPLEMENTATION

The project implementation involves executing the approved project requirements and plans. The D&D activities shall be conducted as detailed in the *Decommissioning for the Plum Brook Reactor Facility and Operations Plan* and in accordance with the project-specific plans and procedures.

3.1 ENVIRONMENTAL MANAGEMENT PLANNING

Proper environmental management planning is essential to minimize the impact to the environment and to ensure environmental compliance. Planning ensures that the necessary resources are identified, requirements are identified and assigned to appropriate processes and procedures, and roles and responsibilities are clearly identified. NASA's environmental planning has been conducted with input from its Federal Sector partners and its subcontractors involved in this decommissioning project. The decommissioning project environmental planning activities have included pre-design investigations to determine the extent of contamination of the PBRF; an evaluation of the project risks (e.g., cost risks); and the development of mitigative measures to ensure successful decommissioning of the PBRF.

3.1.1 Development of Plans and Procedures

Several project-specific plans and procedures have been prepared to ensure that the effort is in compliance with NASA's GRC Environmental Policy and fulfills the stated goals and objectives of the project. In addition, the PBRF Decommissioning Project will comply with all NASA's GRC environmental safety, health (ES&H) and security programs and manuals. The plans and procedures that have been developed for this project include the following:

- *Decommissioning Plan*
- *Decommissioning Project Plan*
- *Decommissioning Operations Plan*
- *Environmental Management Plan*
- *Community Relations Plan*
- *Radiation Protection Plan*
- *Radiation Protection Manual*
- *Site-Specific Safety and Health Plan*
- *Risk Management Plan*
- *Quality Control and Contractor Quality Control Plans*

- *Training and Certification Plan*
- *Radioactive and Hazardous Waste Management Plan*
- *Work Plans and Procedures, Including Part 61 Sampling and Analysis and the Removal of Loose Equipment*
- *Lead and Asbestos Plan*

With the exception of the *Decommissioning Plan for the Plum Brook Reactor Facility* and the *Lead and Asbestos Plan*, these project-specific plans and procedures are included as appendices to the *Decommissioning Operations Plan for the Plum Brook Reactor Facility*.

3.1.2 Project Roles and Responsibilities

The D&D of the PBRF is a significant effort and involves several organizations working together to ensure the success of the project. The PBRF Decommissioning Team is comprised of two subteams, the Federal sector and the private sector. The Federal Sector Team consists of NASA's GRC, the USACE and Argonne National Laboratory (ANL). The private sector team consists of a decommissioning community relations contractor, the Focus Group, and decommissioning support of Montgomery Watson, Duke Engineering & Services (DE&S), and MOTA Corporation (MOTA) (Figure 3.1.2-1). Additional information on project roles and responsibilities is available in the *Decommissioning Plan for the Plum Brook Reactor Facility* and the *Operations Plan for the Plum Brook Reactor Facility*.

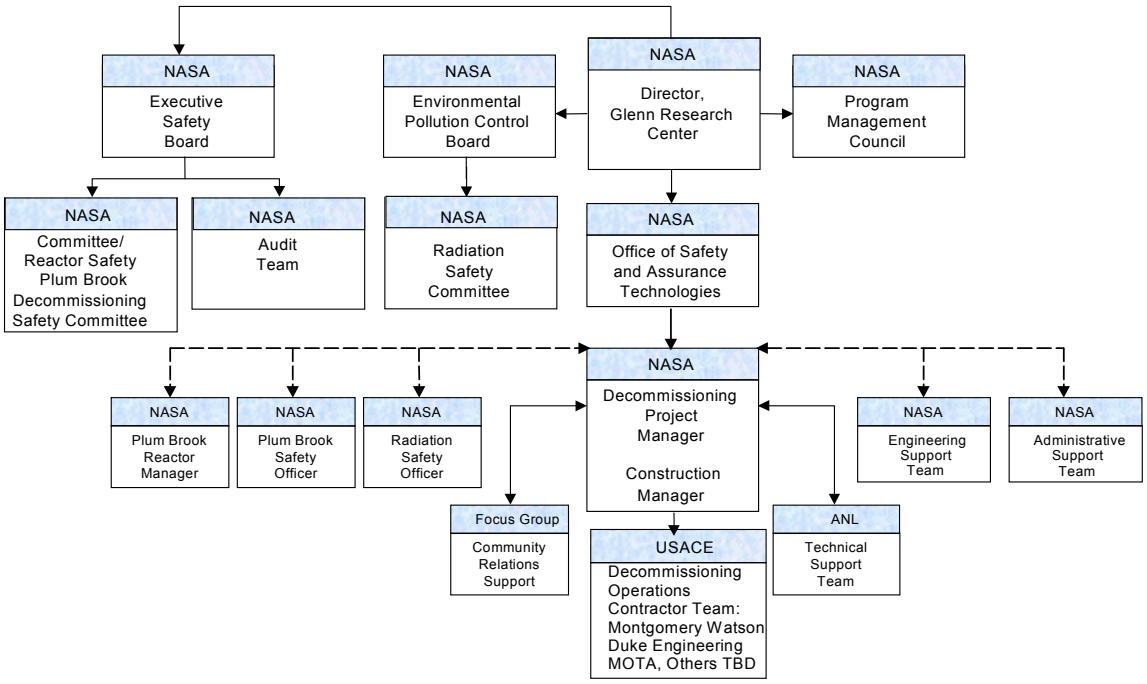

FIGURE 3.1.2–1.—*NASA's Organizational Structure for the PBRF Decommissioning Project.*

3.1.3 Communication

Effective environmental management requires constructive internal and external communication. Internal communication requires input from all personnel, at all levels, working on the decommissioning and dismantlement activities and methods for communicating information to employees (e.g., weekly staff meeting, bulletin boards). External communication would involve communication between NASA and the regulatory and stakeholder community and effective methods of providing information, especially to the stakeholders and the public.

3.1.3.1 *Internal Communication*

Internal communication will involve interaction between NASA's GRC, its Federal Sector Partners (ANL and USACE), and its private support contractors. Information transfer will occur in the variety of ways and will involve all members of the Decommissioning Team as well as NASA's GRC management. Since the management of this project is the responsibility of the GRC Office of Safety and Assurance Technologies (OSAT), the Director of OSAT will provide periodic updates and receive direction from the GRC Director. The GRC Director also will receive input from the Executive Safety Board, the Environmental Pollution Control Board and the Program Management Council on which NASA Headquarters is represented. The Director of OSAT will provide project technical direction to the NASA Decommissioning Project Manager.

The NASA Project Manager will provide technical direction and project-related information to ANL, USACE and the Community Relations Contractor, the Focus Group. Communication between NASA's GRC and the Montgomery Watson team will be through the USACE Project Manager and Resident Manager. The USACE Project Manager will serve as the primary USACE point-of-contact with NASA and will be responsible for overall management and execution of the construction activities. In addition, the Project Manager and the Resident Manager will coordinate and facilitate all meetings and discussions between USACE and NASA. The USACE Resident Manager will communicate on a daily basis with the NASA Project Manager and Construction Manager and with the prime contractor's (Montgomery Watson) Project Manager. Daily communications will include a "plan of the day" meeting, contractor quality control (CQC) reports, and quality assurance (QA) reports. Decommissioning team members will meet, as needed, for preparatory, initial, follow-up and resolution meetings; and senior management will meet with project managers from the respective partners at least monthly and more frequently when required. The USACE Resident Manager will be responsible for making sure that the NASA Construction Manager is informed on all USACE contracting actions with Montgomery Watson. The NASA, USACE, and Montgomery Watson communication interface is shown in Figure 3.1.3-1.

To reduce the risk of miscommunication among the teams that could result in notice of violations or fines from regulating agencies, the Environmental Team will constantly communicate with the other project teams to ensure that the project remains in environmental compliance. The Environmental Team for the PBRF Decommissioning Project will consist of onsite and offsite project members as well as Safety and Radiation Team members from NASA, USACE, and the private contractors. This Team will be responsible for all issues pertaining to air, water,

hazardous wastes, solid waste, historic preservation, stormwater, decontamination activities, pollution prevention and recycling, site restoration, training and regulatory concerns. This Environmental Team will not only communicate with the various teams, but they also will be aware of and view the day-to-day activities as they occur. All project teams will need to understand the project's environmental requirements and the phasing of the environmental programs with all other work. This Environmental Team is not meant to be viewed as a "watch-dog" for the other teams but rather to ensure that their activities are being done in an environmentally compliant manner to ensure this project is not halted or fined due to noncompliance issues.

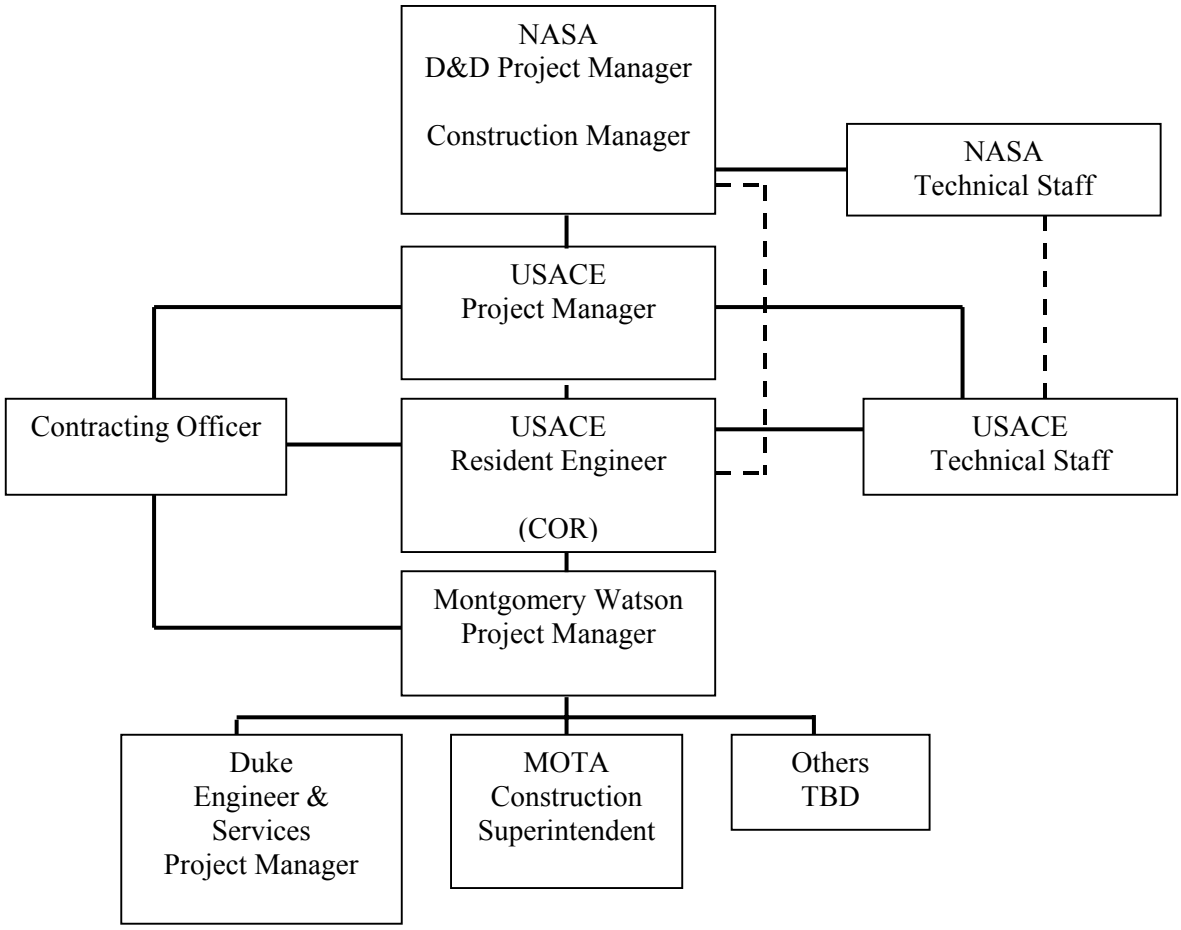

FIGURE 3.1.3–1.*—Interface with Contractor and NASA.*

To ensure a "day-to-day" continuous flow of information through all Decommissioning Team Members, a project-specific *Communications Management Plan* will be developed. The *Communications Management Plan* will document the formal and informal communications that will occur throughout the project and address how information will be communicated and filed for proper project documentation. Project-specific information will be conveyed primarily via meetings and conference calls, weekly reports, progress reports, and general correspondence.

- *Meetings and Conference Calls:* Prior to the start of any major construction or investigation activity, a Kickoff Meeting will be held on-site to review pertinent documents, establish lines of communication, and address any outstanding issues. Meetings and conference calls also will be conducted as needed to ensure that all team members are focusing on the appropriate scope and scheduled activities and are being controlled within the established estimates. Meetings and conference calls will be scheduled to assure maximum attendance by essential project team members, and will have an agenda, issued in advance of the meeting or call, to allow participants sufficient time to prepare for the meeting or call. Minutes or notes for each meeting will be recorded and filed.

- *Weekly Reports*: Daily logs will be prepared and rolled into a weekly report by the onsite Environmental Team. These reports will outline the activities, issues, permitting activities/requirements and possible future actions, and will serve as the initial actions that will be performed for the task at hand. The reports will be submitted to the PBS Environmental Manager (for information only) and the PBRF Project Manager. This information can then be compiled by the Project Manager into a site-wide status report and submitted to NASA Headquarters when necessary.

- *Progress Reports:* Monthly progress reports indicating the status of project deliverables, actual costs versus planned costs, critical path activities, scope changes, and other issues will be distributed to all decommissioning team members. These reports will be issued monthly but can be issued more frequently, if required by NASA. Montgomery Watson will prepare an Earned Value Report that will provide information on the progress of its tasks. The USACE Project Manager will forward the Earned Value Report to the NASA Construction Manager and the USACE Project Manager will incorporate it into the "Monthly Status Report" that is prepared for the NASA Project Manager.

- *General Correspondence:* All official or formal communications between NASA, USACE, and Montgomery Watson will be sent and signed mainly by the Project Managers or a Senior-level Manager. Informal communications will occur at the work-level between technical support team members and will occur primarily by email.

A listing of key internal contacts that are involved in the management and implementation of the *PBRF Decommissioning Project* are maintained by PBRF administrative staff on a personal drive (U:\Rolodex Information\PBRF Listing General.xls). Additional information on the key contacts is available in the *Decommissioning Plan for the Plum Brook Reactor Facility*.

3.1.3.2 *External Communication*

External communication will consist of verbal and written communications between the Decommissioning Team and the stakeholder, public, and regulatory communities. NASA's external communications to the public and stakeholder groups are being supported by the Focus Group. The Focus Group prepared the *Community Relations Plan for the Plum Brook Reactor Facility* based on extensive research of the communities within Erie County and interviews with current and retired NASA employees, public officials, and leaders in educational, environmental, business, and minority communities. Information dissemination also has been facilitated via fact sheets, media training, library resources, the Internet, and a Community Workgroup.

The development of a Community Workgroup is an important part of NASA's Community Relations Plan for the PBRF Decommissioning Project. The Community Workgroup consists of a diverse group of citizens who reside and work in Erie and Huron counties. The Workgroup currently consists of 14 members who meet quarterly. The Workgroup will serve as a two-way communication vehicle through the life of the project. NASA's GRC is working with the Workgroup to communicate updated information on the decommissioning to the public, and listens to questions and concerns expressed by Workgroup members as well as members of the public who attend the Workgroup meetings. Community Workgroup meetings as well as other NASA's GRC events are advertised in area newspapers or via local radio stations. A list of the Workgroup members and their contact information is available on the PRBF Decommissioning website (www.lerc.nasa.gov/WWW/pbrf/workgroup.htm).

NASA's GRC has established a Community Information Bank (CIB) at the Firelands College Library. The CIB is a repository of information on the *PBRF Decommissioning Project*. Currently, the CIB consists of the *Decommissioning Plan, Community Relations Plan,* press releases and public service announcements on decommissioning related activities, and the meeting minutes of the Community Workgroup. The information in the CIB is updated continuously and is available to the public for review upon request.

NASA's GRC has prepared several fact sheets to provide information about decommissioning activities at the PBRF. The fact sheets are available on the PBRF Decommissioning website (http://www.lerc.nasa.gov/WWW/pbrf/). In addition to fact sheets, NASA has prepared an environmental assessment (EA) to evaluate the impacts of decommissioning the PRBF on human health and the environment. Once the draft EA is completed, the document will be published in the Federal Register for public comment and also will be available in the CIB at the Firelands College Library.

Regulatory advocacy will be in the form of notifications and requests for permits and/or authorizations to conduct decommissioning activities. The NASA PBRF Environmental Manager will be the point-of-contact for communication with representatives of regulatory agencies. The NASA PBRF Environmental Manager will maintain records of all communications (incoming and outgoing) with regulatory contacts. The NASA Environmental Manager supports the PBRF Decommissioning Project in ensuring that the project complies with all applicable regulations regarding the transportation of waste, health and safety of workers, D&D, and discharges to environmental media by contacting appropriate regulatory contacts,

when necessary, and seeking all necessary permits. In addition, regulators will have unfettered access to inspect documentation, the PBRF site, waste containers, and waste transportation vehicles to ensure that the appropriate rules and regulations and jurisdiction are being followed. Key external regulatory contacts are provided in Appendix A, Table A-1. Since the names of the individuals may change, it is important to verify the name of the regulatory contact.

3.1.4 Worker Training

The Decommissioning Project Team is firmly committed to the protection of safety and health of its employees and the public, and as such, will provide appropriate training for all PBRF Decommissioning Project personnel. The PBRF Decommissioning Project will comply with NASA's GRC ES&H, and security programs and manuals as well as the decommissioning project-specific plans and procedures. Decommissioning activities also will comply with NRC, USACE, OSHA, DOT, and other state and local safety regulations. All employees will receive training on the *Decommissioning Plan* for the PBRF (NASA 2000d). The level of training will be based on job requirements and the extent of the PBRF site access required. Based on job requirements and the extent of access required, personnel will be categorized as follows:

- *Site Access:* An individual granted access to the Protected Area only. Limited access to the Radiation Control Area may be granted with written approval of the Radiation Protection Manager.

- *Radiation Worker:* An individual granted access to the Protected Area, Radiation Control Area, and any Radiation Control Zone.

A project-specific training plan, *NASA Plum Brook Reactor Facility Decommissioning and Decontamination Training and Certification Plan* has been prepared which defines the content and administration of Plant Access Training (PAT) and Radiation Work Training (RWT). The PAT/RWT program includes Radiation Protection, Emergency Planning, Industrial Safety, Fire Protection, Security, Fitness for Duty, Quality Assurance/Quality Control, and Administrative Controls Training for unescorted access to the protected areas of the PBRF. The Montgomery Watson Team Training Group is responsible for delivery and coordination and revision of the technical content of NASA GRC PAT/RWT. The Montgomery Watson Team may contract vendors to conduct training. More detailed information on site access and RWT is available in the *NASA Plum Brook Reactor Facility Decommissioning and Decontamination Training and Certification Plan*.

The minimum training provided to any worker will include, but will not be limited to the following subjects:

- Principles of radiation protection

- Radiation monitoring techniques

- Radiation monitoring instrumentation

- Emergency procedures
- Radiation hazards and controls
- Concepts of radiation and contamination
- Provisions of 10 CFR Parts 19 and 20
- NRC license conditions and limitations
- Responsibilities of workers and supervisors
- Reporting requirements for workers
- Exposure control procedures
- Biological effects of radiation
- Radiation control zone procedures
- Safe work permits
- Environmental requirements and procedures including air, water, and soil
- Environmental management procedures
- Solid and hazardous waste management
- Confined space entry awareness
- Lead, asbestos, and hazardous materials awareness

The objectives of training are to:

(1) Provide workers with information about radiologically and chemically hazardous substances, sources and types, exposure routes, and effects.

(2) Provide information on the radiation protection program for the decommissioning activities to enable each worker to comply with safety and health rules and to properly respond to all conditions.

(3) Provide instruction in the fundamentals of radiation and chemical protection to enable workers to meet as low as reasonably achievable (ALARA) objectives.

(4) Provide information and training on personal protection equipment, monitoring instruments, and equipment available and how to use them.

(5) Instruct workers about applicable Federal, state, NASA and decommissioning project-specific on protection rules concerning health and safety.

All training will be administered by qualified instructors and all training instructors will be certified using the requirements in the *Employee Training Qualification Standard 204.0, Documentation of Training and Qualification of Personnel Who Perform Work*. Instructor qualifications are outlined in the *NASA Plum Brook Reactor Facility Decommissioning and Decontamination Training and Certification Plan*.

3.1.4.1 *Occupational Safety and Health Administration/Hazardous Waste Training*

OSHA Regulations for Construction, Hazardous Waste Operation and Emergency Response (29 CFR 1926.65) requires that employees that work at a clean-up site to be qualified in accordance with the OSHA standards or Hazardous Waste Operator and Emergency Responder (HAZWOPER). HAZWOPER training will be required for all personnel performing hands-on work, that is, decommissioning personnel directly involved with the implementation of D&D activities within the PBRF site. HAZWOPER training will be provided to appropriate site personnel through outside vendors.

3.1.4.2 *Lead and Asbestos Removal Training*

Contractor personnel performing asbestos abatement and disposal services will be trained in accordance with 29 CFR 1926.1101, 29 CFR 1910.1001, 40 CFR 61.140-61.157, and Chapter 3701-34 of the OAC, as applicable. Contractor personnel performing lead paint abatement services will be trained in accordance with 29 CFR 1926.62(e).

3.1.4.3 *Radiation Protection Training*

A Radiological Protection Program and a Radiological Protection Manual have been prepared to ensure that personnel responsible for performing radiological work are appropriately trained. Training programs will be developed for members of the public, general NASA GRC employees, and radiological workers. To the extent appropriate to each employee's prior training, radiation safety training will include the following work assignments and degree of exposure to potential radiological hazards.

- Risks of exposure to radiation and radioactive materials, including prenatal radiation exposure
- Basic radiological fundamentals and radiation protection concepts
- Controls, limits, policies, procedures, alarms and other measures implemented at the facility to control exposures, including both routine and emergency situations
- Individual rights and responsibilities associated with the implementation of the facility radiation protection program

- Individual responsibilities for implementing ALARA measures

- Individual exposure reports that may be requested

All radiological work activities, including those performed by subcontractors, will meet the requirements set forth in the *NASA Plum Brook Reactor Facility Decommissioning and Decontamination Radiation Protection Program*. The radiological training requirements for site personnel, visitors, and radiological workers are outlined in Chapter 6 of the *NASA Plum Brook Reactor Facility Decommissioning and Decontamination Radiation Protection Manual*.

3.1.4.4 *Emergency Preparedness Training*

NASA's Emergency Preparedness Plan (EPP) is based on the concept that the best way to effectively manage emergencies is to pre-plan the response effort and develop specific procedures for prevention, preparedness, response, and recovery. An important component of the Emergency Preparedness process is training of all personnel to adequately deal with possible emergencies. Training is required for all personnel working at NASA's GRC and for members of the Emergency Response Team (ERT). All Decommissioning Project personnel will be trained in the evacuation procedures for the area(s) where they work. It is the responsibility of project managers to ensure that their employees are trained in evacuation procedures. All new NASA GRC employees are required to take two safety training courses during their orientation: Glenn New Employee Safety Orientation and Federal Hazard Communication Training. All service and construction contractor personnel are required to view a safety orientation video. Service contractors are not required to view the safety video after the initial viewing but are required to implement their own safety and health programs. However, contractor personnel are required to view the safety video every two years. Additional information on training and the Emergency Preparedness Plan is available in the *NASA/Glenn Research Center Emergency Preparedness Plan.*

3.1.5 Recordkeeping

All documentation associated with the PBRF Decommissioning Project will be maintained by USACE and Montgomery Watson at the PBS in accordance with NASA and USACE requirements. NASA will retain original documentation on the PBRF Decommissioning Project.

3.1.5.1 *Documentation Procedures*

General procedures for records and reports documenting site work activities are described in the following sections.

Daily Reports. Documentation reporting that will be completed on a daily basis during the construction activities includes:

- *Daily Construction Reports:* The Project Superintendent will complete daily construction reports. The Project Superintendent will provide the Daily Construction Reports to the Project Manager, Construction Manager and Task Order Manager at the completion of the

work week. A copy of the report will be provided to NASA and the USACE. Copies of the Daily Construction Reports will be maintained on site for reference. The original Daily Construction Report will be retained for filing in the project records.

- *Manager/Project Superintendent:* The Daily Quality Control (QC) Report will include inspections, test results, and laboratory results when received, and will indicate compliance or non-compliance with specifications. The Montgomery Watson CQC Manager will provide the Daily QC Reports to the Project Manager and the Construction Manager at the completion of a workday. A copy of the report will be provided to the NASA and USACE Quality Assurance Representative (QAR) within 24 hours. Copies of the Daily QC Reports will be maintained on site for reference. The original Daily QC Report will be retained for filing in the project records.

Inspection and Observation. Documentation reporting that will be completed for inspection and observation activities during the project generally includes, but will not be limited to:

- *Preparatory Phase Checklist*: This form will be completed to document completion of the Preparatory Phase for each definable feature of work. The CQC Manager will complete the Preparatory Phase Checklist. The checklist will be reviewed by NASA and the USACE and attached to the Daily QC Report.

- *Initial Phase Checklist*: This form will be completed to document completion of the Initial Phase for each definable feature of work. The CQC Manager will complete the Initial Phase Checklist. The checklist will be reviewed by NASA and the USACE and attached to the Daily QC Report.

- *Notice of Completion:* This form will be completed to document completion of each definable feature of work. The CQC Manager will complete the Notice of Completion. The certificate will be submitted to NASA and the USACE.

- *In-Progress Inspection:* In-progress inspections will be completed as the work progresses. Results from the inspections will be summarized on the Daily QC Report.

- *Field Modification Form*: This form will be used to document field modifications as requested by NASA and approved by the USACE. The form will be completed by the Project Superintendent and reviewed by NASA and the USACE COR. The form will be attached to the Daily Construction Report.

- *Deficiency Tracking Log:* This log will be used to document the occurrence of deficiencies, resolution of deficiencies, and identification of corrective action measures.

- *Construction Photograph Log:* This log will be completed to record construction photo documentation and also will be used to document video recordings and other digital documentation collected to record the work performed. The log will be completed and maintained by the Project Superintendent and will be submitted with the photographs to the Montgomery Watson Project Manager, NASA and the USACE.

Health and Safety. Documentation reporting that will be completed for Health and Safety considerations during the construction activities includes:

- *Tailgate Safety Meeting:* A daily tailgate safety meeting will be held prior to beginning work each day. The Onsite Safety Officer (OSO) will coordinate the meeting. The OSO will complete the Tailgate Safety Meeting Form and attach a copy to the Daily QC Report.

- *Compliance Inspection:* A Certified Industrial Hygienist (CIH) and Health Physicist (HP) will conduct Compliance inspections at least once a year during site activities. The CIH and HP will summarize the results on a memorandum, and will send the memorandum to the Montgomery Watson Project Manager.

- *Safety Audit:* A safety audit will be completed at the site at least once a year during the performance of the remediation activity and will be documented in a memorandum.

As part of NASA Health and Safety and Radiation Protection Programs, NASA also will maintain the following records:

- Personnel exposure records, including results of bioassays and incidents of skin contamination.

- Incidents of overexposure or injuries involving radioactive materials.

- Work area, facility, station, and environmental monitoring survey records indicating sampling information and analysis results.

- Survey instrument calibration records and inventory.

- Personnel training in radiation safety and control.

Routine reports of conditions relating to safety and health will be prepared for NASA management. In addition, reports required under 10 CFR Parts 19 and 10 CFR 20, Subpart M, Reports, with regard to personnel exposures or the release of radioactive materials will be submitted to the NRC.

Weekly Construction Meetings. Weekly construction meetings will be held on-site during site activities. These meetings will be coordinated by the Montgomery Watson Project Superintendent and will be attended by NASA, USACE and other subcontractors as appropriate. Minutes from the Weekly Meeting will be completed by the Montgomery Watson Project Superintendent and distributed to the appropriate parties within three working days.

Submittal Register. The Montgomery Watson CQC Manager as part of the CQC system will maintain a Contractor Submittal Register. The log will provide a listing of all submittals, the current status of each submittal, and any pending or planned action required by Montgomery Watson, NASA or the USACE.

Completion Report. Montgomery Watson Team will prepare completion Reports upon completion of the Final Inspection for a particular location or activity. The report will summarize construction activities and modifications, and will include record photographs, chain of custodies, manifests, and sampling results. Montgomery Watson Team or the Construction Manager will prepare the Completion Report. The reports will be reviewed and approved by the Task Order Manager and submitted to NASA and the USACE for final approval.

In addition to the site work activities records and reports discussed above, records will be kept for all decommissioning related to training, waste management activities and regulatory (e.g., permits) and NASA Headquarters reporting.

Montgomery Watson will be responsible for maintaining records of decommissioning personnel training and qualifications. These records will include the trainee's name, training date, subjects covered during training, equipment for which training was received, written test results, and the instructor's name. In addition, the NASA's GRC Organization Development and Training Office will keep a record of all individuals trained.

All radioactive and hazardous wastes generated as a result of PBRF decommissioning activities and shipped offsite for disposal will be accompanied by a shipment manifest. A NASA representative will be required to sign all waste manifests generated from the PBRF Decommissioning Project. NASA will retain all waste manifests and permits.

Reporting requirements requested by NASA Headquarters include:

- Monthly financial status reports documenting commitment, obligation, and costs.
- Monthly report of significant technical highlights.
- Quarterly integrated technical, cost and schedule variance reports in the event that cost and/or schedule variances exceed $500K or the Estimate to Complete increases by more than $500K from the existing baseline.
- Notification of major problems, issues, and concerns (e.g., disposal issues, safety, security, major design modifications, and changes in NRC requirements) and the potential impact on the project.

USACE will comply with these reporting requirements by providing NASA's GRC with the necessary information in a specified timeframe or in a timely manner. Recordkeeping requirements can also be found in the project-specific quality control, waste management, and training plans.

3.1.5.2 *Records Management*

All records will be stored in a manner that ensures their integrity, retrievability, and security. Methods for protecting documents include storage in vaults, file rooms with fixed fire

suppression, fire-rated cabinets, and duplicate storage. In storing records, consideration should be given to possible physical damage that could result from extreme temperatures, moisture, infestation, electromagnetic fields, excessive light, stacking, theft and vandalism. At a minimum, records should be protected from (1) exposure to fire, equivalent to an Underwriters Laboratories 1.5-hour or greater fire resistance rating; (2) water damage caused by a 100-year flood; and (3) extreme wind velocities.

3.1.6 Document Control

Document control builds on the recordkeeping process to ensure that project-specific documentation (e.g., plans, procedures) is revised/updated by the appropriate project personnel. The document control procedure will designate responsibility and authority for preparing, revising, updating, managing and dispositioning of the PBRF Decommissioning Project documentation. The document control process will ensure that all decommissioning personnel have access to the most up-to-date procedures necessary to perform their jobs.

All documentation associated with the PBRF Decommissioning Project will be maintained by USACE and Montgomery Watson at NASA's PBS. The USACE Resident Manager will maintain the official files for construction activities and will provide copies to the NASA Construction Manager. Project-specific procedures and work execution documents, including QC reviews and approvals, will be developed and controlled directly by the Montgomery Watson project team. The USACE and Montgomery Watson QA/QC Representative or Project Managers will coordinate and control reviews, modifications and updates to documentation prepared by Montgomery Watson. Original and revisions will have the following (1) issue/revision date; (2) effective date; (3) revision numbers; (4) document number; and (5) approval signatures. The Montgomery Watson QA/QC Representative will maintain a document control index, a complete list of all project-specific documents and the history of the revision. Once documents have been created, reviewed and signed, they are considered complete and shall not be modified. Any necessary changes will be highlighted and prepared as a separate revision or addendum to the original document.

3.1.7 Schedule and Budget

The proposed project schedule for completion of the decommissioning activities outlined in the *Decommissioning Plan* is provided in Figure 3.1.7-1. The project schedule is based on current pre-decommissioning activities and correlates to the project's Work Breakdown Structure shown in Section 8 of the *Plum Brook Reactor Facility Decommissioning Operations Plan*. The proposed project schedule is based on unconstrained funding and shows license termination in FY04. Table 3.1.7-1 provides a list of the key environmental activities (e.g., application for permits) that are required in order for the project to proceed. Lead Time dates will be incorporated into each specific work plan to assure that permit revisions/modifications are in place before work is scheduled to commence.

NASA and the USACE have adequate staff and budget to successfully complete the PBRF Decommissioning Project. Any additional activities and data gaps that are identified in the EMP and the EBS can be addressed within the current budget projection. The estimated cost in

current year dollars (represented as a percent of total cost) for D&D of the PBRF is shown in Figure 3.1.7-2.

TABLE 3.1.7-1–*Key Environmental Activities*

Media	Permit Lead Time
WATER:	
Modify Existing PBS NPDES Stormwater Permit	Need to allow at least 60 days to modify current NPDES permit to allow for demolition activities (see Section 2.2.2.1). Demolition represents a change to the permitted discharge from the site. Requires Stormwater Notice of Intent (NOI).
Sanitary Water Treatment (Erie County)	Meeting with Erie County, OEPA, NASA and City of Sandusky to discuss treatment of sanitary waste (see Section 2.2.2.2). Permit granted after meeting with stakeholders.
Sanitary Water Treatment (City of Sandusky)	Submit test results from wastewater analysis. Allow 30 days for review by the City of Sandusky.
HAZARDOUS WASTE	No modification to existing generator ID required. Pollution prevention and waste minimization measures should be employed to avoid or reduce the volume of wastes generated (see Section 2.2.7).
AIR:	
Asbestos	No permit required. However, a demolition notification form must be provided to OEPA at least 10 working days prior to the start of demolition.
Lead	No permit required providing that the ambient air quality standard of 1.5 μg/m3 is not exceeded during any calendar quarter.
Particulate Matter	No permit required. However, where possible, fugitive dust control measure should be employed as described in OAC-3745-17.

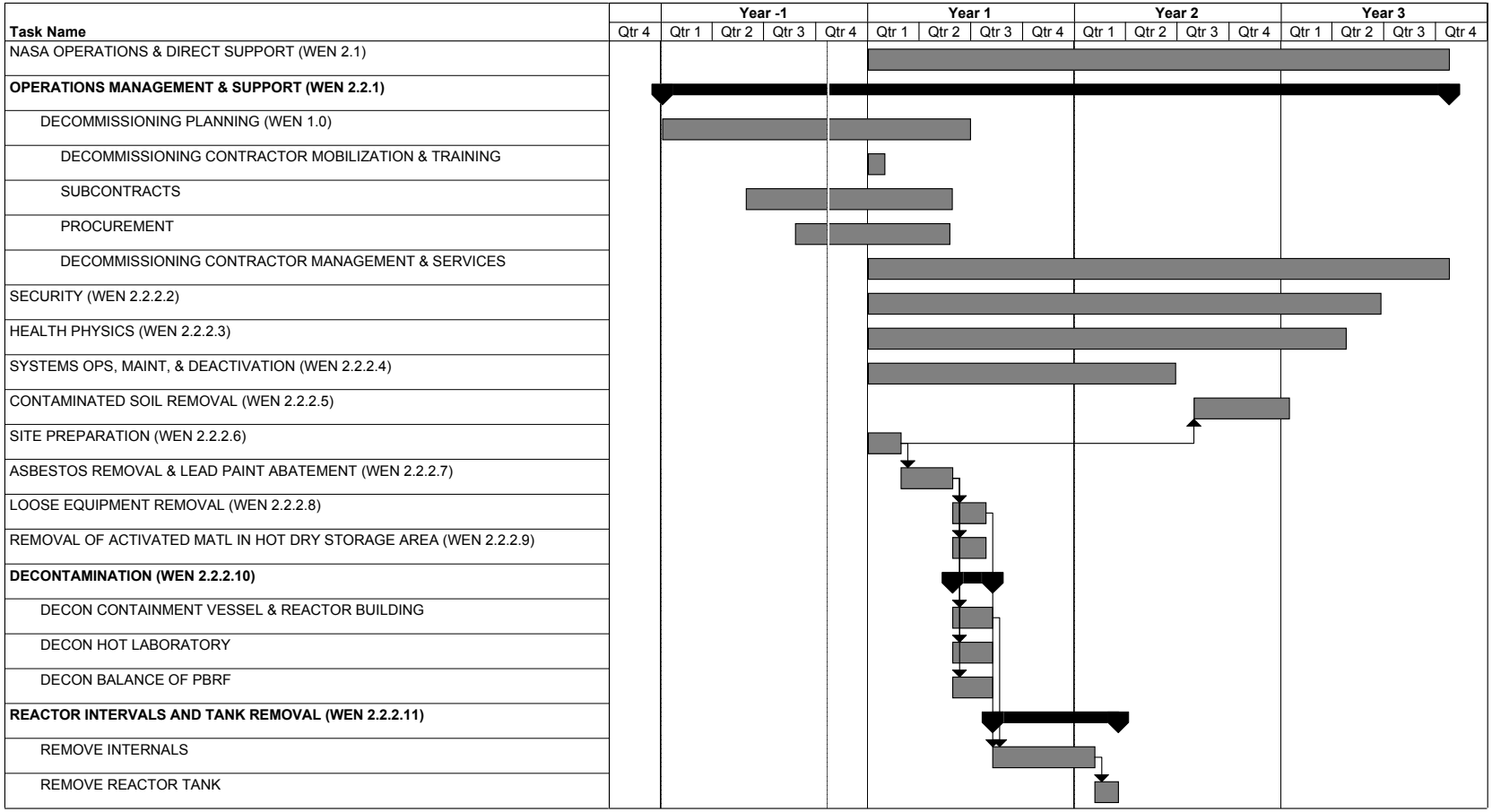

FIGURE 3.1.7-1.—*Proposed Decontamination and Decommissioning Schedule for the PBRF.*

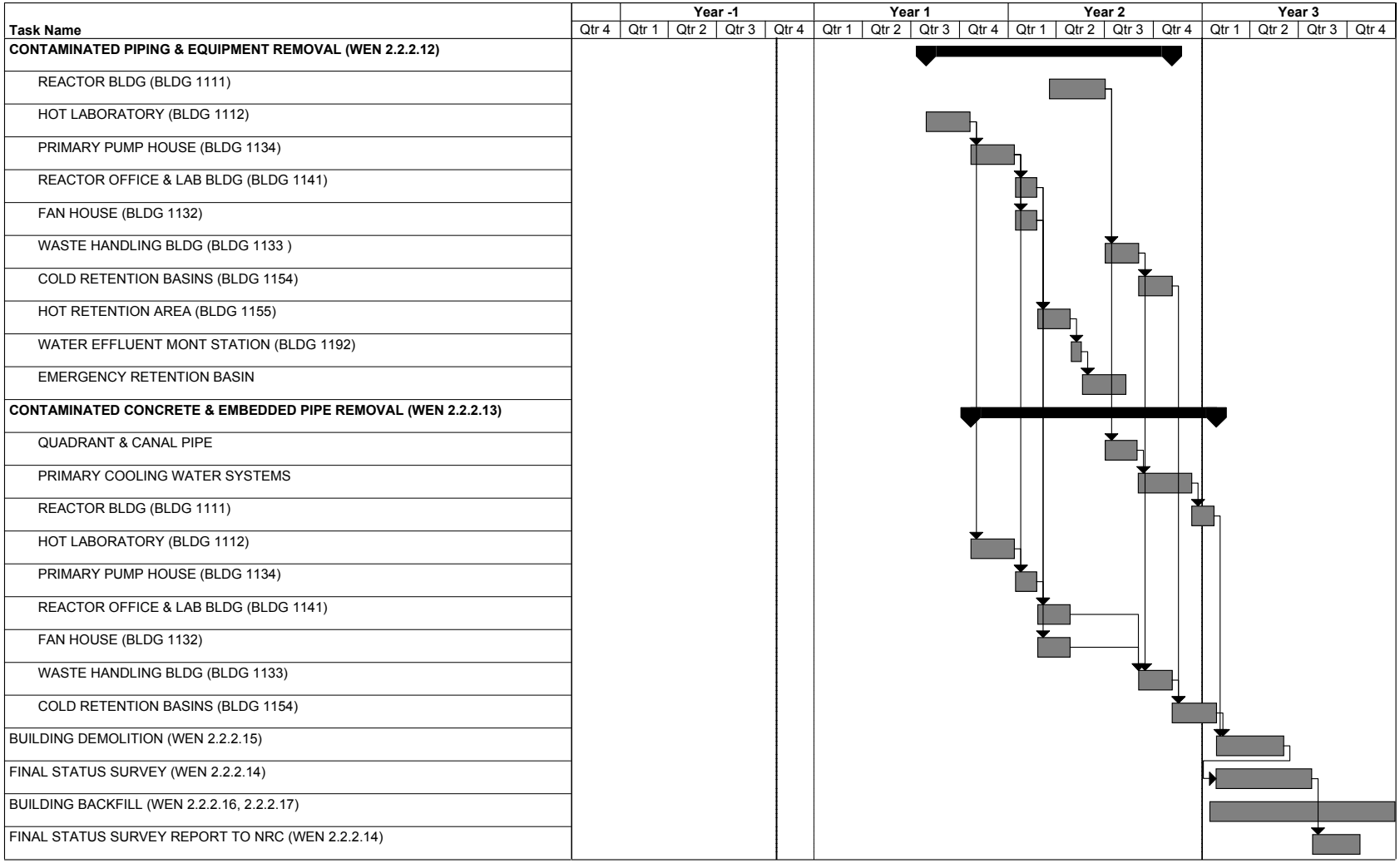

FIGURE 3.7.1-1.—*Proposed Decontamination and Decommissioning Schedule for the PBRF (continued).*

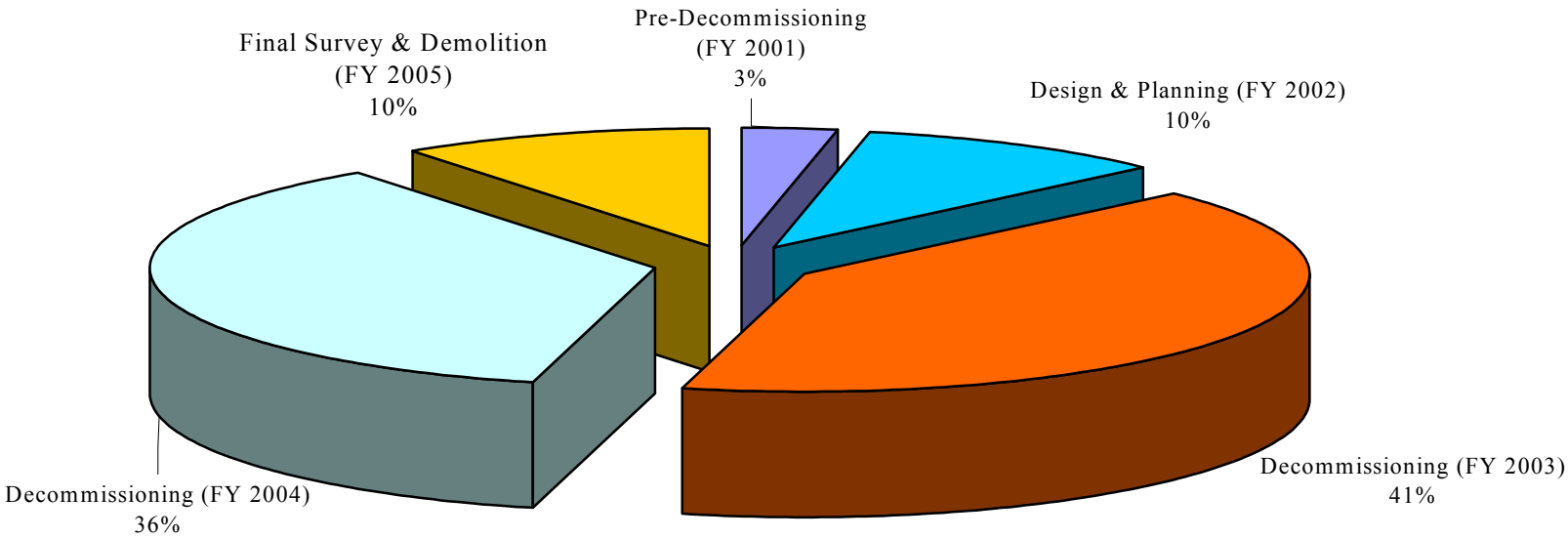

FIGURE 3.1.7-2.—*Estimated Cost (in %) for Decontamination and Decommissioning of the PBRF.*

3.2 EMERGENCY PREPAREDNESS

NASA's GRC has taken a proactive approach to emergency preparedness in that likely threats and emergencies have been identified; response efforts have been pre-planned; and specific procedures for prevention, preparedness, response, and recovery have been developed in order to minimize the impact of a disaster or emergency.

3.2.1 Emergency Preparedness Plan

NASA's GRC Emergency Preparedness Plan (EPP) was developed based on OSHA's Safety and EPA's guidance. The EPP was developed to effectively manage emergencies such as tornadoes, earthquakes, fires, explosions, bomb threats, aircraft crash, arson, riot, labor strife, and hostage incident. The Plan also was prepared to provide Emergency Response personnel with standardized procedures for dealing with emergencies. The EPP is a detailed program dependent on support from several NASA Offices and all PBS personnel. Because of completeness of the GRC EPP, addressing the emergencies that are likely to occur at the PBRF site, and the fact that the PRBF has been shutdown since 1973, a separate EPP was not prepared for the PBRF Decommissioning Project. Furthermore, a conservative accident analysis of likely radionuclide release has been found to be low, less than 1 rem whole body dose. The low dose estimate is due to (1) low radionuclide inventory at the PBRF because the fuel has been removed and much of the facility has been decontaminated; and (2) decontamination operations are not likely to result in large releases into the atmosphere. PBRF emergency procedures will be revised, as necessary, to accommodate emergencies that could occur during decommissioning operations and the EPP can be revised accordingly.

The EPP is reviewed by the ERT after every emergency and updated when necessary. The Emergency Preparedness Coordinator (EPC) also audits the Program annually. Additional detailed information on the EPP and structure of the ERT can be found on NASA's GRC website (www.osat.grc.nasa.gov).

During emergencies, the on-site protocols and procedures described in the GRC EPP should be employed. It is required that all contractors follow the NASA's GRC ES&H procedures and guidance and project-specific plans and procedures.

In the event of an emergency, always give the exact location to the 911 operator. On PBS, dialing 911 from an on-site phone connects to the PBS Communications Center. The Communications Center will then contact and coordinate emergency response. Since phones are not available in many remote areas, radios can be used to contact the Communications Center. Cell phones also can be used, but requires the user to dial (419) 621-3222 to contact the Communications Center.

NASA Glenn Research Center
Plum Brook Station
Plum Brook Reactor Facility
6100 Columbus Avenue
Sandusky, OH 44870

The Emergency Medical Center is Firelands Hospital, 1101 Decatur Street, Sandusky, OH and can be contacted at (419) 626-7400.

3.2.2 Reporting Requirements

In the event that an emergency situation results in the release of hazardous materials of the type and quantity to justify notification under Section 302 of the Federal *Superfund Amendment and Reauthorization Act* (40 CFR 265) or the Ohio Revised Code, Section 3750, the Environmental Management Office will provide written notification to the appropriate state, Federal, and local agencies. In addition, OSHA Reporting Regulations (29 CFR 1904.8) require that notification be provided when three or more are hospitalized and/or one or more fatalities result from an emergency situation. The EPC or the Glenn Safety Office Chief will provide notification to OSHA within 24 hours of an emergency that results in hospitalizations or fatalities. The EPC ensures that any required documentation and written reports are submitted to the necessary Federal, state, local and NASA agencies after an emergency situation. The GRC ERT, EPC, and other NASA EPP personnel and offices will handle all PBRF Decommissioning Emergency activities.

4.0 PROJECT EVALUATION

4.1 INTERNAL MONITORING

NASA has established a process and procedures to perform internal monitoring of the environmental activities related to the decommissioning the PBRF. Internal monitoring will be done on a regular basis to ensure that all activities are performed according to approved environmental plans and procedures for the proper management of hazardous waste, industrial and construction debris waste, storm water discharges, wastewater discharges, air emissions control, worker safety, and worker training. Records will be reviewed for proper completion and maintenance. Internal monitoring activities will be documented and records maintained at the PBS.

4.2 EMS AUDITING

NASA will ensure that environmental audits are conducted during the various decommissioning and remediation activities on a regular schedule. The audits will be conducted by personnel who are familiar with established environmental procedures, but are not directly involved in the implementation of the activity being audited. The audits will include an assessment of compliance with established procedures and plans and the required record keeping. The audit will also identify any findings of noncompliance. A formal report will be prepared by the auditor and provided to the Project Managers for all the Federal agencies responsible for the decommissioning for record keeping and corrective action.

4.3 PREVENTIVE AND CORRECTIVE ACTION

Preventive action is used to address problems before they arise or increase in severity. Corrective action is used to address problems after they have occurred and may result from internal audits, management reviews, monitoring, and complaints. For the *PBRF Decommissioning Project*, preventive actions will be initiated using a Preventive Action Notice (PAN). Corrective actions will be initiated using the Corrective Action Notice (CAN) as the primary means of communication. The identification of a problem requiring preventive or corrective action will be the responsibility of all PBRF Decommissioning personnel. The responsibility for ensuring that the problem is tracked and the PAN or CAN is appropriate and implemented is the responsibility of the QA/QC Manager for Montgomery Watson, the USACE Project Manager with oversight by NASA International Organization Standardization (ISO) Management Representative. The QA/QC Manager will assign responsibility and schedules for implementing a preventive or corrective action. If an action is not implemented in the expected timeframe, the QA/QC will notify the USACE Project Manager and ISO Management Representative and will specify the expected date of completion. The QA/QC Manager will track PANs and CANs until completion. Records of PANs and CANs will be maintained for at least two years after implementation of the preventive or corrective action. A sample CAN form and tracking log is provided in Appendix B.

4.4 QA/QC RECORDS

NASA has developed a systematic approach to ensure that QA/QC in all phases and tasks of the *PBRF Decommissioning Project*. QA/QC measures will be implemented in day-to-day activities and preventive and corrective actions will be tracked and these records will be maintained for at least two years. QA/QC records will be kept by Montgomery Watson with copies provided to USACE and NASA. QA/QC measures implemented in the preparation of procedures, plans, and other documentation will be kept, as specified by NASA or USACE, by the appropriate contractor with a copy provided to the USACE Project Manager and NASA. Since Montgomery Watson will prepare most of the project-specific procedures and work execution packages for this project, Montgomery Watson will keep complete versions of the QC Plans, Document Review Forms, Independent Technical Review Certification Forms, review dates, Daily Construction and QC Reports, and copies of all annotated review comments in project permanent files at the designated Montgomery Watson home office upon completion of the deliverables. Deliverable items indicated in the project schedule would also be included in the permanent file. Copies of all permanent files and records will be provided to NASA and USACE.

5.0 MANAGEMENT REVIEW

There are several levels of NASA management oversight and review of the *PBRF Decommissioning Project*. These reviews range from GRC Project Management Council reviews to Decommissioning Project Meetings that the Director of OSAT attends to monitor project progress. Management oversight of the GRC consists of quarterly reviews by the Center Director, Program Management Council, Environmental Pollution Control Board, and Environmental Safety Board. GRC intends to use the Project Development Readiness Index, as appropriate, to assess the probable success of the project. The PBRF Decommissioning Management Review Cycle is provided in Table 5.1.

TABLE 5.1.—*PBRF Decommissioning Management Review Cycle*

Review Body	Frequency	Time
NASA Non-Advocate Review	Once	April 2001
GRC Program Management Council	Semi-annual	October and May
Glenn Research Center Director Briefing	Quarterly	January, April, July, October
Radiation Safety Committee	Quarterly	January, April, July, October
Environmental Pollution Control Board	Monthly	Last Friday of the month
Decommissioning Safety Committee	As required	Currently Semi-annual
Decommissioning Team Meetings	Twice a month	Every other Tuesday
GRC Annual Independent Assessment	Annual	To be determined

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Appendix A
Regulatory Contacts and Relevant Regulations

TABLE A-1. Relevant Regulatory Contacts

ITEM		*CATEGORY*	*NAME*	*PHONE #*	*E-MAIL*	*ADDRESS*
Water	State	Div of Drinking and Ground Water	Doug Sharp	419-352-8461	doug.sharp@epa.state.oh.us	347 North Dunbridge Road, P.O. Box 466, Bowling Green, OH. 43402
	State	Div of Drinking and Ground Water	Tim Fishbaugh	419-352-8461	tim.fishbaugh@epa.state.oh.us	347 North Dunbridge Road, P.O. Box 466, Bowling Green, OH. 43402
	State	Surface Water	Rick Zuzik	419-373-3020	rick.zuzik@epa.state.oh.us	347 North Dunbridge Road, P.O. Box 466, Bowling Green, OH. 43402
	State	Div of Surface Water	Allen Rupp	419-373-3000	al.rupp@epa.state.oh.us	347 North Dunbridge Road, P.O. Box 466, Bowling Green, OH. 43402
Haz Waste	State	NWDO-Hazardous Waste Management	Don North	800-686-6930x3074		NWDO, 347 North Dunbridge Rd., Bowling Green, OH 43402
	State	Authorization-RCRA Program	Kit Arthur	614-644-3174	kit.arthur@epa.state.oh.us	122 South Front Street, P.O.Box 1049, Columbus, OH 43216-1049
	State	NWDO RCRA/UST/Hazardous Waste	Tim Killeen	419-373-3064	timothy.killen@epa.state.oh.us	NWDO, 347 North Dunbridge Road, P.O. Box 466, Bowling Green, OH. 43402
	State	CERCLA	Cindy Hafner	614-644-2924		122 South Front Street, P.O.Box 1049, Columbus, OH 43216-1049
	State	Closure Plans, Status of Hazardous Waste	Lonnie Terry	614-644-2977	Lonnie.Terry@epa.state.oh.us	122 South Front Street, P.O.Box 1049, Columbus, OH 43216-1049
	State	Closure Plans, Status of Hazardous Waste	Tom Crepeau	614-644-2977	Tom.Crepeau@epa.state.oh.us	122 South Front Street, P.O.Box 1049, Columbus, OH 43216-1049
	State	Fees-Hazardous Waste	Josh Ellis	614-644-2922		122 South Front Street, P.O.Box 1049, Columbus, OH 43216-1049
	State	Hazardous Waste Disposal	Jeremy Carroll	614-644-2934	jeremy.carroll@epa.state.oh.us	122 South Front Street, P.O.Box 1049, Columbus, OH 43216-1049
	State	Notification of Hazardous Waste Activity	Tom Crepeau	614-644-2977	Tom.Crepeau@epa.state.oh.us	122 South Front Street, P.O.Box 1049, Columbus, OH 43216-1049
	State	Hazardous Waste Permit Modification	Lonnie Terry	614-644-2977	Lonnie.Terry@epa.state.oh.us	122 South Front Street, P.O.Box 1049, Columbus, OH 43216-1049
Air Pollution	State	Air Pollution Group	Ohio EPA, NWDO	419-352-8461	N/A	347 North Dunbridge Road, P.O. Box 466, Bowling Green, OH. 43402
	State	Air Pollution	Tammy Endlish/Joe Grobe	419-352-8461/419-373-3120	tammy.endlish@epa.state.oh.us	347 North Dunbridge Road, P.O. Box 466, Bowling Green, OH. 43402
	State	Toxic Release Inventory	Margaret Boddeker	614-644-4830	N/A	N/A
	State	Toxic Release Inventory	Mark Besel	614-644-4834	mark.besel@epa.state.oh.us	N/A
	State	Air Quality Modeling and Planning	Mike Hopkins	614-644-3611	mike.hopkins@epa.state.oh.us	N/A
	State	Field Operations	Tom Rigo	614-644-3626	tom.rogo@epa.state.oh.us	N/A
	State	Engineering Section	Jim Orlemann	614-644-3592	jim.orlemann@epa.state.oh.us	N/A
	State	Air Monitoring Section	Randy Hock	614-644-3619	randy.hock@epa.state.oh.us	N/A
Asbestos	State	Asbestos Section ODH	Mark Needham	614-466-0061	N/A	246 North High, P.O. Box 118, Columbus, OH. 43266
	State	NWDO	Robert Herbenick	419-373-3111	N/A	347 N Dunbridge Rd, P.O.Box 466, Bowling Green, OH. 43402
Lead	State	Remediation	Ron Nabors	419-373-3147	ron.nabors@eppa.state.oh.us	N/A
	State	Remediation	Archie Lunsy	419-373-3035	archie.lunsy@epa.state.oh.us	N/A
PCBs	State	Lead Paint	Daniel Chaffield	614-466-1450	N/A	246 North High, P.O. Box 118, Columbus, OH. 43266
	State	ACM	Tom Buchan	614-644-3068	N/A	122 South Front Street, P.O.Box 1049, Columbus, OH 43216-1049
	State	ACM	Craig Smith	614-644-3144	N/A	122 South Front Street, P.O.Box 1049, Columbus, OH 43216-1049
	State	ACM	Ike Wilder	614-644-3067	N/A	122 South Front Street, P.O.Box 1049, Columbus, OH 43216-1049
AST	Federal	Above Ground Storage Tanks	Richard Karl	312-353-9295	richard.Karl@epa.state.oh.us	N/A
Transportation	State	DOT	Alfred Agler	614-466-3191	N/A	180 East Broad, Street, Columbus, OH 43215-3793
	State	Haulers/Transporters of Hazardous Waste	Public Utilities Commission of OH	614-466-0409	N/A	122 South Front Street, P.O.Box 1049, Columbus, OH 43216-1049
	State	Manifest- Hazardous Waste	Tom Crepeau	614-644-2977	Tom.Crepeau@epa.state.oh.us	122 South Front Street, P.O.Box 1049, Columbus, OH 43216-1049
	State	Office of Traffic Engineering	David Holstein, P.E.	614-466-3601		1980 W. Broad Street, Columbus, OH 43223
	State	Traffic Control	Homer A. Suter, P.E.	614-752-9995		1980 W. Broad Street, Columbus, OH 43223
	State	Rules Hazardous Material Haulers	Public Utilities Commission of OH	416-466-0351		122 South Front Street, P.O.Box 1049, Columbus, OH 43216-1049
	State	Transporters-General Questions	John Schierberl	416-466-2934	John.Schierberl@epa.state.oh.us	122 South Front Street, P.O.Box 1049, Columbus, OH 43216-1049
	State	Office of Pollution Prevention			p2mail@epa.state.oh.us	P.O. Box 1049, Columbus OH., 43216-1049
	State	Land Ban/Disposal Restriction	Jeff Mayhugh	614-644-2934	jeff.mayhugh@epa.state.oh.us	122 South Front Street, P.O.Box 1049, Columbus, OH 43216-1049
	State	Real Estate (Commercial) Transfer	Legal Office	416-644-2115		122 South Front Street, P.O.Box 1049, Columbus, OH 43216-1049
	State	Division of Solid and Waste Management	Ohio EPA-NWDO-Chuck Hull	419-373-3076	chuck.hull@epa.state.oh.us	347 N. Dunbridge Rd., Bowling Green, OH 43402
	State	Radioactive Waste	OH Dept. of Health	614-644-2727		246 North High, P.O. Box 118, Columbus, OH. 43266
Pollution Prevention	State	Bureau of Radiation Protection- Oh. Dept of Health	Eric Dension	619-995-0761	edenision@gw.odh.state.oh.us	N/A
Land Use	State	Recycling Hazardous Waste	Jeff Mayhugh	614-644-2934	jeff.mayhugh@epa.state.oh.us	122 South Front Street, P.O.Box 1049, Columbus, OH 43216-1049

Table A-2. Relevant Regulations

		Agency	Code #	Description	Permits	Internet Address
Water Quality & Management	Federal	USEPA Region 5	**40 CFR 136** **40 CFR 131** **40 CFR 131 Subpart D** **40 CFR 122**	**-Guidelines Establishing Test Procedures for Analysis of Pollutants** **-Water Quality Standards** **-Federally Promulgated Water Quality Standards.** **-EPA Administered Permit Programs: The National Pollutant Discharge Elimination System**		http://www.access.gpo.gov/nara/cfr/waisidx_00/40cfrv15_00.html http://www.access.gpo.gov/nara/cfr/waisidx_00/40cfrv14_00.html Refer to Address Above Refer to Address Above Refer to Address Above
	State	Ohio EPA	**OAC 3745** **-01** **-02** **-03** **-33** **-34** **-38** **Ohio Rev. Code 6111**	 -Water Quality Standards -Attainment and Protection of Surface -Pretreatment Rules Water Quality Standards -NPDES Permit Requirements -Groundwater Rules and Regulations -Ohio NPDES General Permits -Water Pollution Control	Yes	http://onlinedocs.andersonpublishing.com/oac/home3.cfm?GRStructure1=3745&GRStructure2=3745%2D1&GRStructure3=&TextField=%3CJD%3A%223745%2D1%22%3EChapter%203745%2D1%20Water%20Quality%20Standards http://onlinedocs.andersonpublishing.com/revisedcode/home3.cfm?GRDescription1=revised%20code&GRDescription2=title%2061&GRDescription3=%20&TextField=%3CJD%3A%226111%22%3ECHAPTER%206111%3A%20WATER%20POLLUTION%20CONTROL&GRStructure1=6111&GRStructure2=%20
Air Quality & Management	Federal	USEPA Region 5	**Title 42** **Chapter 85**	**Public Health and Welfare** -Air Pollution and Prevention Program		http://www4.law.cornell.edu/uscode/42/ch85.html http://uscode.house.gov/title_42.htm
	State	Ohio EPA	**OAC 3745** **-15** **-17** **-20** **-25** **-71** **-100** **-104** **ORC 3704**	 -Gen. Provisions on Air Pollution Control -Particulate Matter Standards -Asbestos Emissions Control -Emergency Episode Standards -Lead Emissions Control -Toxic Release Inventory -Accidental Release Prevention Program **Air Pollution Control**		http://onlinedocs.andersonpublishing.com/oac/home3.cfm?GRStructure1=3745&GRStructure2=3745%2D1&GRStructure3=&TextField=%3CJD%3A%223745%2D1%22%3EChapter%203745%2D1%20Water%20Quality%20Standards http://onlinedocs.andersonpublishing.com/revisedcode/home3.cfm?GRDescription1=revised%20code&GRDescription2=title%2037&GRDescription3=%20&TextField=%3CJD%3A%223704%22%3ECHAPTER%203704%3A%20AIR%20POLLUTION%20CONTROL&GRStructure1=3704&GRStructure2=%20
Noise	Federal	USEPA Region 5 US Code	**40 CFR 204** **40 CFR 205** **40 CFR 209** **42 USC 4901-4918**	**Noise Emission Standard For Construction Equipment** **Transportation Equipment Noise Emission Controls** **Rules of Practice Governing Proceedings Under the Noise Control Act 1972** **Noise Control Act of 1972**		http://www.epa.gov.cfr
	State	Ohio Dept. of Health	N/A	N/A	NO	No state or local noise ordinance
Energy	Federal	Nuclear Regulatory Commission	**10 CFR 20** **Subpart E** **Sec. 20.1403** **Sec. 20.1404**	**Standards for Protection Against Radiation** -Standards for Protection Against Radiation - Radiological Criteria for License Termination -Criteria for license termination under restricted conditions -Alternate criteria for license termination		http://www.access.gpo.gov/nara/cfr/waisidx_00/10cfr20_00.html

Table A-2. Relevant Regulations

		Agency	Code #	Description	Permits	Internet Address
		Nuclear Regulatory Commission	**10 CFR 40** **Sec. 40.82**	**Domestic Licensing of Source Material** -Criminal penalties		http://www.access.gpo.gov/nara/cfr/waisidx_00/10cfr40_00.html
		Nuclear Regulatory Commission	**10 CFR 50** **Sec. 50.33** **Sec. 50.54** **Sec. 50.75**	**Domestic Licensing of Production and Utilization Facilities** -Contents of Applications; general information -Conditions of licenses -Reporting and record keeping for decommissioning planning		http://www.access.gpo.gov/nara/cfr/waisidx_00/10cfr50_00.html
		Nuclear Regulatory Commission	**10 CFR 72** **.30** **.218**	**Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-level Radioactive Wastes** -Financial assurance and record keeping for decommissioning Termination of licenses -General Provisions		http://www.access.gpo.gov/nara/cfr/waisidx_00/10cfr71_00.html
	State	N/A	N/A	N/A	N/A	N/A
Hazardous Materials Mgmt.	Federal	USEPA Region 5	**40 CFR 260** **.40** **.41** **40 CFR 261** **.1~.3** **.5** **40 CFR 262 .10~108** **40 CFR 268**	**Hazardous Waste Mgmt Sys.: General** -Additional Regulation of Certain Hazardous Waste Recycling Activities on Case-by-Case Basis -Procedures for Case-by Case Regulation of Hazardous Waste Recycling Activities **Identification & Listing of Hazardous Waste** -Purpose, Scope, Definitions of Solid and Hazardous Waste -Special Requirements For Hazardous Waste Generated by Conditionally Exempt Small Quantity Generator Std. Applicable to Generators of Hazardous Waste -Land Disposal Restrictions		http://www.access.gpo.gov/nara/cfr/waisidx_00/40cfr260_00.html http://www.access.gpo.gov/nara/cfr/waisidx_00/40cfr261_00.html http://www.access.gpo.gov/nara/cfr/waisidx_00/40cfr262_00.html
	State	Ohio EPA	**OAC 3745** **-51** **-52** **-53** **-270**	-Identification and History of Hazardous Waste -Generator Standards -Transporter Standards -Land Disposal Restrictions	Must have EPA ID number Must be registered and licensed	http://onlinedocs.andersonpublishing.com/oac/home3.cfm?GRStructure1=3745&GRStructure2=3745%2D1&GRStructure3=&TextField=%3CJD%3A%223745%2D1%22%3EChapter%203745%2D1%20Water%20Quality%20Standards
Asbestos Containing Materials, Lead-Based Paint, PCB's	Federal	USEPA Region 5	**40 CFR 61 .01~.358** **40 CFR 261 .8** **40 CFR 761** **40 CFR 763 .80~.179** **42 USC 4821-4846**	**NESHAPS** **Identification & Listing of Haz. Waste** **PCB Waste Regulated Under TSCA** **Asbestos** **Lead Based Paint Poisoning Prevention Act**		http://www.access.gpo.gov/nara/cfr/waisidx_00/40cfr61_00.html http://www.access.gpo.gov/nara/cfr/waisidx_00/40cfr261_00.html http://www.access.gpo.gov/nara/cfr/waisidx_00/40cfr763_00.html

Table A-2. Relevant Regulations

		Agency	Code #	Description	Permits	Internet Address
	State		**OAC 3701** **-32** **-34-01~34-11** **OAC 3745** **-20** **-71-01~-71-06** ORC 3710	 -Licensure -Asbestos Hazard Abatement Rules -Asbestos Emissions Control -Lead Emissions Control **-Asbestos Abatement**		http://onlinedocs.andersonpublishing.com/oac/home2.cfm?GRStructure1=3701&TextField=%3CJD%3A%223701%22%3E3701%20Department%20of%20Health%20%2D%20Administration%20and%20Director Refer to Above OAC 3745 Address http://onlinedocs.andersonpublishing.com/revisedcode/home3.cfm?GRDescription1=revised%20code&GRDescription2=title%2037&GRDescription3=%20&TextField=%3CJD%3A%223710%22%3ECHAPTER%203710%3A%20ASBESTOS%20ABATEMENT&GRStructure1=3710&GRStructure2=%20
Waste Management	Federal		**40 CFR 273 .1~.81** **42 USC 82** **.6921~.6923** **.6934** **.6961~.6965** **42 USC 103**	**Std. For Universal Waste Mgmt.** **Solid Waste Disposal** -Identification of Hazardous Waste, Standards Applicable to Generator and Transportation of Hazardous Waste. -Monitoring, Analysis, and Testing -Federal Responsibilities **Comprehensive Environmental, Response, Compensation, and Liability**		http://www.access.gpo.gov/nara/cfr/waisidx_00/40cfr273_00.html
	State		**OAC 3701:1** **OAC 3745-400**	**Low Level Radioactive Waste** Construction and Demolition Debris		http://onlinedocs.andersonpublishing.com/oac/home2.cfm?GRStructure1=3701%3A1&TextField=%3CJD%3A%223701%3A1%22%3E3701%3A1%20Radiation%20Control
Wetlands and Floodplains	Federal State	According to the EA the area of concern is not in a wetland or a floodplain, therefore no Federal, State or Local regulations will apply.				
Environmental Justice	Federal					http://es.epa.gov/oeca/oej/oej.html http://es.epa.gov/oeca/main/ej/permitproc.html
	State					
Radioactive Materials Management	Federal	Nuclear Regulatory Commission	**10 CFR 61** **10 CFR 62** **10 CFR 71** **40 CFR 190** **42 CFR 23** **.2021c** **.2021d** **.2023**	**Licensing Requirements for Land Disposal of Radioactive Waste** **Criteria and Proc. for Emergency Access to No-Federal and Regional low-level Waste Disposal Facilities** **Packaging & Trans of Radioactive Materials** **Env. Radiation Protection Std. For Nuclear Power Operations** **Dev. & Cont. Of Atomic Energy** -Responsibilities for Disposal of low level Radioactive Waste -Regional Compacts for Disposal of low level Radioactive Waste -State Authority to Regulate Rad. Below Level of Regulatory Concern of NRC		http://www.access.gpo.gov/nara/cfr/waisidx_00/10cfr61_00.html http://www.access.gpo.gov/nara/cfr/waisidx_00/10cfr62_00.html http://www.access.gpo.gov/nara/cfr/waisidx_00/10cfr71_00.html http://www.access.gpo.gov/nara/cfr/waisidx_00/40cfr190_00.html http://www.access.gpo.gov/nara/cfr/waisidx_99/42cfr23_99.html
	State	Bureau of Radiation	**OAC 3701:1**	**Low Level Radioactive Waste**		http://onlinedocs.andersonpublishing.com/oac/home2.cfm?GRStructure1=3701%3A1&TextField=%3CJD%3A%223701%3A1%22%3E3701%3A1%20Radiation%20Control

Table A-2. Relevant Regulations

		Agency	Code #	Description	Permits	Internet Address
				According to Mike Snee of the Ohio Bureau of Radiation Protection, as of 11-17-00 they have no requirements on radioactive waste. Ohio is currently an "agreement state" adopting the Federal Regulations. Statewide regulations have been drafted and are expected to be implemented within the next two years.		
Hazardous Waste Management (CERCLA, RCRA)	Federal State	USEPA Region 5	**40 CFR 270 (RCRA)** **40 CFR 260 (RCRA)** **40 CFR 261 (RCRA)** **40 CFR 262 (RCRA)** **40 CFR 263 (RCRA)** **40 CFR 268 (RCRA)** **40 CFR 302 (CERCLA)** **40 CFR 311 (CERCLA)** **40 CFR 355 (CERCLA)** **40 CFR 370 (CERCLA)** **40 CFR 372 (CERCLA)**	**-EPA Administered Permit Programs: The Hazardous Waste Permit Program** **-Hazardous Waste Management System** **-Identification and Listing of Haz Waste** **-Standards Applicable to Generators of Haz Waste** **-Standards Applicable to Transporters of Haz Waste** **-Land Disposal Restructins** **-National Oil and Hazardous Substances Pollution Contingency Plan** **-Worker Protection** **-Emergency Planning and Notification** **-Haz Chemical Reporting: Community Right to Know** Toxic Chemical Release Reporting: Community Right to Know	Yes	http://www.access.gpo.gov/nara/cfr/waisidx_00/40cfr270_00.html http://www.access.gpo.gov/nara/cfr/waisidx_00/40cfrv18_00.html Refer to Address Above Refer to Address Above Refer to Address Above http://www.access.gpo.gov/nara/cfr/waisidx_00/40cfrv19_00.html http://www.access.gpo.gov/nara/cfr/waisidx_00/40cfrv20_00.html Refer to Address Above Refer to Address Above Refer to Address Above Refer to Address Above Refer to Address Above
	Federal	USEPA Region 5	**40 CFR 260 .40** **.41** **40 CFR 261 .6**	**Hazardous Waste Mgmt Sys.: General** -Additional Regulation of Certain Hazardous Waste Recycling Activities on Case-by-Case Basis -Procedures for Case-by Case Regulation of Haz. Waste Recycling Activities **Identification & Listing of Haz. Waste** -Requirements for Recyclable Materials		http://www.access.gpo.gov/nara/cfr/waisidx_00/40cfr260_00.html http://www.access.gpo.gov/nara/cfr/waisidx_00/40cfr261_00.html
Pollution Prevention and Recycling	State	OH EPA	**OAC 3745 -50-315~50-316**	-Hazardous Waste Recycling		http://www.epa.state.oh.us/dhwm/dhwmrules/50315.htm
Biological Resources						

Table A-2. Relevant Regulations

		Agency	Code #	Description	Permits	Internet Address
Endangered/ Threatened Species **Community Relations**	According to the EA there were no endangered or threatened species identified in the area of concern, therefore no Federal, State or Local regulations will apply.					
	State		**42 USC 116**	EPCRA		
Historic, Archaeological and Cultural Resources **Onsite and Offsite Trans. for Solid, Haz., and Radioactive Wastes**	Federal State State	US Code	**16 USC 461-467** **16 USC 469** **16 USC 470** **10 CFR 71** **40 CFR 263 .10~.31** **40 CFR 273 .18** **.38** **42 CFR 103 . 9659**	**-Historic Sires Act 1935** **-Archeological & Historical Act 1974** **-Archeological Resources Protection Act 1979** **-Packaging & Trans of Radioactive Materials** **-Std. Applicable to Transporters of Haz Waste** **Std. For Universal Waste Mgmt.** -Off-Site Shipments -Off-Site Shipments **-Transportation of Haz. Substances; Listing as Haz. Mat.; Liability for Release**		http://www.epa.gov.cfr
	Federal	DOT USEPA Region 5	**OAC 3745 -53**	Transporter Standards		http://www.access.gpo.gov/nara/cfr/waisidx_00/10cfr72_00.html http://www.access.gpo.gov/nara/cfr/waisidx_00/40cfr263_00.html http://www.access.gpo.gov/nara/cfr/waisidx_00/40cfr273_00.html
Worker Safety and Protection	State	Ohio EPA				Refer to Above OAC 3745 Address
	Federal	OSHA	**29 CFR 1910** **29 CFR 1913** **29 CFR 1926** **29 CFR 2201**	**-Occupational Safety and Health Standards** **-Rules Concerning OSHA Access to Employee Medical Records** **-Safety and Health Regulations for Construction** **-Regulations Implementing the Freedom of Information Act**		http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1910.html http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1913.html http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1926.html http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_2201.html

Special Note Regarding Local Ordinances: According to a telephone conversation with Ms. Angie Tigges, Planner for the City of Sandusky, Ohio, she informed Tetra Tech, Inc. that the Plum Brook site does not fall within the city's boundaries. Ms. Tigges further explained that the City of Sandusky has no local ordinances affecting the Plum Brook facility. In an effort to obtain information regarding local ordinances, she recommended contacting Jim Lamb with the Perkins Township. After a telephone conversation with Mr. Lamb, he explained that he was not aware of any local ordinances affecting the Plum Brook facility. He further explained that potential public relations problems, such as noise and transportation concerns, would probably be addressed through township meetings but are not currently regulated by the Perkins Township.

Appendix B
Sample Corrective Action Forms

SAMPLE CORRECTIVE ACTION NOTICE

CAN Number:
Issue Date:
Solution Completion Date:

	Name	**Location**	**Phone**
Requested by:			
Issued To:			

Problem Statement (Provide brief description of the problem)**:**

Most Likely Causes:

Implemented Actions/Solutions:

Results (confirming effectiveness):

Closed by:

Closing Date:

SAMPLE CORRECTIVE ACTION TRACKING LOG

CAN Number	Requested By	Issued To	Solution Due Date	Solution Identified	Solution Completed	Solution Effectiveness Verification	CAN Closure Date

Appendix C
February 2001 QA Reviews

QA Review Checklist

Project: Environmental Management Plan for the Plum Brook Reactor Facility

Contract and Delivery Order: DACW69-97-D-0014; 0014

QA Reviewer: Erica Ruhl for Farrah Lowe

Date: 2/27/2001

The following checklist is provided for QA review of the EBSR and EMP. Response "Y", "N", or "NA" should be marked in the space provided as applicable.

1.0	Introduction	Y
2.0	Decontamination and Decommissioning Project Planning	Y
3.0	Decommissioning Project Implementation	Y
4.0	Project Evaluation	Y
5.0	Management Review	Y
6.0	References	Y

QC Certification

* This person reviews the document to ensure that the document preparer and reviewers have included all the required information.

QC Review Checklist

Project: Environmental Management Plan for the Plum Brook Reactor Facility

Contract and Delivery Order: DACW69-97-D-00 14: 00 14

QC Reviewer: Maher Itani

Date: 2/27/01

The following checklist is provided for QC review. Response "Y", "N", or "NA" should be marked in the space provided as applicable.

1.0	Introduction	Y
2.0	Decontamination and Decommissioning Project Planning	Y
3.0	Decommissioning Project Implementation	Y
4.0	Project Evaluation	Y
5.0	Management Review	Y
6.0	References	I -

* This person reviews the document to make sure that the author has provided sufficient and appropriate data, the scope of the assignment has been addressed and communicated properly, and that the technical evaluations are sound.

Quality Certification Document

Project: EMP for the Plum Brook Reactor Facility

Date: 2/27/01

Contract and Delivery Order: DACW69-97-D-00 14; 00 14

This is to certify that this document has undergone QA review by members of the review team in accordance with the Quality Control Plan. All comments resulting from the various reviews have been resolved and incorporated. The following review members certify completion of the review and resolution of comments.

Internal Quality Control Team

NAME		DISCIPLINE	SIGNATURE
for Thomas E. Magette	(QC)	Nuclear Engineer	
Maher Itani	(QC)	Civil Engineer	
John Nash	(QC)	Env. Protection Specialist	
Farrah Lowe	(QA)	Environmental Scientist	Erica Rohl for FL

COMMENTS ON THE ENVIRONMENTAL MANAGEMENT PLAN

19. Page iv: change "Responder" to "Response" in HAZWOPER definition.

The change will be made in the EMP.

20. Page l-4, Section 1.3: GRC recently revised it's environmental policy to conform to IS0 14001 requirements. The new policy is NASA Glenn Research Center (GRC) operates in a manner that protects and preserves the environment through pollution prevention, the continual improvement of our operations, and complying with environmental regulations.

The change in Policy will be reflected in the EMP.

21. Page 2-1, Section 2.1.3: change "Contaminated soils must be managed as a hazardous waste" to "Contaminated soils must be managed as a solid or hazardous waste based upon their characterization.

The change will be made in the EMP.

22. Section 2.1.4: "such as the use of jackhammers."

The change will be made in the EMP.

23. Page 2-2, Section 2.15: Please provide a table of the species of concern in the vicinity of PBRF.

A table with the species of concern will be added to Section 2.1.5 of the EMP.

24. Page 2-3, 2-4; Section 2.2.1: Please describe the activities that are expected to result in air emissions and briefly describe permitting requirements.

The activities will be described and permit requirements will be discussed under each type of emission.

25. Page 2-7, Section 2.2.3: The PBRF decommissioning project must follow NASA GRC procedures (GRC Environmental Programs Manual, Chapter 34 HANDLING AND DISPOSAL OF SOIL) requiring that soils be characterized and segregated into three groups: clean fill, solid waste, and hazardous waste.

The change will be made in the EMP.

26. Section 2.2.6: Hazardous waste: Manifest, notifications and certifications are mentioned in Section 2.2.3 and need to be mentioned again in Section 2.2.6.1 on Hazardous Waste.

The change will be made in the EMP.

27. Section 2.2.6: Where are the manifests kept at PBS or PBRF?

Section 2.2.6 will indicate where manifests will be kept.

28. General comments on waste management: the plan should consider application for a separate generator ID number for the project in order to track project wastes separate from other PBS waste. In addition, there is no discussion of the requirements for waste minimization and pollution prevention programs. Will the project require a hazardous waste permit or do any existing permits have to be modified to reflect the generation of additional hazardous waste for PBRF?

As discussed with Keith Peecook on February 20, 2001, wastes generated by the Decommissioning Project can be tracked simply by keeping copies of the manifests at the project office. In light of this, there is no justification for the additional administrative burden associated with obtaining a new generator ID number. The waste management section will be revised to reflect this.

For this project, the primary pollution prevention activity would be recycling (e.g., clean demolition debris as clean fill). Other opportunities for pollution prevention such as changes to production or raw material use are more applicable to a manufacturing process than to a decontamination or decommissioning project. The Pollution Prevention Act of 1990 outlines an environmental management hierarchy that includes:

- Preventing or reducing pollution at the source whenever feasible.
- Recycling in an environmentally safe manner whenever feasible pollution that cannot be prevented.
- Treating in an environmentally safe manner whenever feasible pollution that cannot be prevented or recycled.
- Disposing or releasing pollution in an environmentally safe manner only as a last resort.

Since Pollution Prevention is more desirable than waste minimization, whenever feasible pollution prevention activities will be conducted during the PBRF Decommissioning Project. A brief discussion of likely pollution prevention activities will be added to the waste management section.

Plum Brook Station is classified as a large quantity generator of hazardous wastes under RCRA and because these wastes are not treated or stored on-site for more than 90 days, no hazardous waste permit is required. The additional hazardous wastes generated by the Decommissioning Project will be identified on manifests and PBS's existing EPA generator identification number will be used; no

modifications to the existing identification number will be required. The waste management section will be revised to reflect this.

29. Page 3-1, Section 3.1.1: The Environmental Management Plan should be included in the list of plans and procedures.

The change will be made in the EMP.

30. Page 3-2, Section 3.1.2: Since the EMP is a part of the overall project plan the information in this section does not need to be repeated and can instead be referenced. Otherwise the Project Roles and Responsibilities will have to be rewritten based on the Partnering Session at Cleveland in December and the Environmental Team's statement as to its roles and responsibility.

The information in Section 3.1.2 will be deleted and a reference to the Project Plan will be included with regard to Roles and Responsibilities of the Project Team.

31. Section 3.1.4: What about hazardous waste training?

Section 3.1.4.1 addresses hazardous waste training.

32. Page 3-8, final paragraph, third sentence: The PBRF Decommissioning Project Manager is responsible for ensuring that the project complies with all applicable regulations. Sentence should be reworded to "The Decommissioning Project Environmental Manager supports the Decommissioning Project Manager in ensuring that the project complies with all.. ."

This change will be made in the EMP.

33. Page 3-18, Section 3.1.7: This section still needs to overlay key environmental activities – the application and receipt of permits, solid waste, hazardous waste, storm water management, dust control, etc on the overall project schedule.

This information will be added to section 3.1.7 in a table summarizing the applicable permits.

34. Page 3-22, Section 3.2: An EPP developed to address potential emergencies associated with maintaining the PBRF in safe, dry storage is not adequate for the decommissioning project. The project needs an EPP that is based upon an analysis of the emergencies that may occur during decommissioning activities. The existing EPP can then be updated as required to meet the needs of the project or a project-specific EPP prepared that supplements or replaces the current EPP. What about emergency preparedness drills and exercises? What good is a plan unless it is used?

Information on the GRC EPP discussed in the EMP was not meant to serve as the EPP for the Decommissioning Project. Rather, it was to highlight that NASA already has an EPP for the site. According to the Decommissioning Plan, Revision 0 (December 1999), page 7-1, "an emergency plan to support the decommissioning activities is not required because a conservative accident analysis has shown that offsite impacts would be less than 1 rem whole body dose or the 5 rem thyroid dose identified in the U.S. EPA Protective Action Guide." Reference to emergency preparedness drills and other preparedness activities were not discussed in the EMP because they are discussed in the existing EPP. A reference to the document and the web location is provided in Section 3.2.1. Information will be added to this section about updating the EPP, if necessary, to accommodate emergencies that could occur during decommissioning operations.

35. Appendix A: There should also be a list of Plum Brook Station environmental permits (with contact persons at the Station) because the permit conditions are environmental requirements that may impact the Project.

As discussed with Keith Peecook on February 20, 2001, the only existing PBS environmental permit that will apply to the Decommissioning Project is the NPDES permit; the outfall affected is the Plum Brook outfall. The stormwater discharges to this outfall will require a modification of this permit (this is discussed in section 2.2.2.1)

Wastewater discharged to the sanitary wastewater system will require coordination with both the Erie County and City of Sandusky water authorities, and a permit will be issued after the required public outreach is completed. This is discussed in section 2.2.2.2. Because obtaining these permits is a schedule issue (see comment # 33), we will add a new table to section 3.1.7, Schedule and Budget, that lists these permits.

Appendix D
Data Gap Closure

APPENDIX D
DATA GAP CLOSURE
Table of Contents

DATA GAP CLOSURE PLAN
1.0 Solvent Disposal Sediment Samples for VOC

Data Gap (from Environmental Baseline Survey Report, Section 5.2, page 5-2):

"During interviews with personnel who worked at the PBRF when it was active, it was noted that the analytical laboratories at the PBRF used typical solvents associated with laboratories, such as carbon tetrachloride, acetone, and methylene chloride. Waste solvents were disposed of by pouring them down the drains at the laboratories. Because the laboratories handled radioactive materials, these drains are part of the hot drain system that discharged to the tanks in the Hot Retention Area (#1155). Liquids stored in this area were allowed to "cool" and were then diluted with non-radioactive water and discharged through the Water Effluent Monitoring Station (WEMS) (#1192). Although the solvents disposed of were certainly diluted greatly in this process, in addition to the dilution that occurred in the Hot Retention Area, it is possible that the sediments at the WEMS may have been contaminated by volatile organic compounds. Sediment and subsurface (to a depth of 5-feet) sampling/volatile organic analyses should be conducted at the WEMS to verify that no VOC contamination exists. Three sediment samples collected from random locations should be sufficient to determine if this area has been impacted by solvent contamination."

Closure Plan (from Environmental Management Plan, Section 2.4, page 2-29):

Samples for VOC analysis will be collected along with the regularly scheduled sampling events at the WEMS and Pentolite Ditch areas. Closure is expected by September 2001.

Findings:

The intent of this investigation was to address the concerns initially raised in the *Environmental Baseline Survey Report* (as stated above). The recommendation of the report was to sample in the vicinity of the WEMS for residual VOC contamination. Sampling and analysis conducted in July 2001 at three random locations revealed no VOC contamination in sediment. Results are documented in a *Final Summary Report, Revised September 10, 2001*.

Closure Status:

There is no evidence of VOC contamination associated with the former PBRF operations. Based on the analytical results, there are no indications that former PBRF lab practices (or any other PBRF activities) resulted in any residual VOC contamination in the sediment near the WEMS. Therefore, further analysis is not indicated.

Data Gap #1 is closed.

DATA GAP CLOSURE PLAN
2.0 Former Waste Solvent Tank VOC in Groundwater

Data Gap (from Environmental Baseline Survey Report, Section 5.2, page 5-2):

"There is another potential source of VOC contamination being introduced into the WEMS. This source is the current discharge of water from the sumps in the basements of the major buildings at the PBRF. Due to the depths of the wells at the sumps, it is safe to assume that this water is from the bedrock aquifer. The RCRA investigation conducted at the former waste solvent tank site found that the sump at Building 1131 has caused a radial depression of the groundwater table towards the sump. Although the former waste solvent tank site could be contributing to the VOC contamination, the sump effluent is monitored quarterly for radioactive constituents only; VOCs are not an analyte."

Closure Plan (from Environmental Management Plan, Section 2.4, page 2-30):

During one of the next rounds of regularly scheduled sampling, an additional sample will be collected to analyze for VOCs. Closure is expected by August 2001.

Findings:

The intent of this investigation was to address the concerns initially raised in the *Environmental Baseline Survey Report* (as stated above). This investigation was to confirm that the RCRA UST leakage had not adversely impacted groundwater around the sumps of the major buildings at the PBRF. Sampling and analysis conducted in July 2001 from the WEMS revealed that there is no VOC contamination in the discharge water. The investigation conducted for Data Gap 1.0 also confirmed that there was no VOC contamination in the sediment around the WEMS. Results are documented in a *Final Summary Report, Revised September 10, 2001*.

Closure Status:

There is no evidence of VOC contamination in the sump discharge water at the WEMS from the former waste solvent tank site. Based on these results, there are no indications that the former RCRA UST leakage (or any other PBRF activities) resulted in any building sump VOC contamination. Therefore, further analysis is not indicated.

Data Gap #2 is closed.

DATA GAP CLOSURE PLAN
3.0 Benzene in Groundwater

Data Gap (from Environmental Baseline Survey Report, Section 5.2, page 5-2):

"During the sitewide groundwater monitoring study (Ref. #35 of the EBS), benzene was detected in Reactor Well #1 (a bedrock well) at a concentration of up to 8.8 ug/l (the RBC is 0.36 ug/l). Although benzene is known to be naturally occurring in the area and has been found in most bedrock monitoring wells across Plum Brook Station, it is not know to naturally occur in surface water. The sump effluent is discharged through the WEMS, into Pentolite Ditch and then into Plum Brook. Since the sump effluent is from the bedrock aquifer, there is potential for it to be contaminated with VOCs, particularly benzene. A grab sample of the sump effluent at the WEMS should be collected when it is not raining (to avoid dilution by storm water) and analyzed for VOCs."

Closure Plan (from Environmental Management Plan, Section 2.4, page 2-30):

A grab sample for BTEX analysis will be collected along with the regularly scheduled sampling events at the WEMS discharge to the Pentolite Ditch. This sample will be collected in a manner to assure there is no dilution due to rainwater. Closure is expected by September 2001.

Findings:

The intent of this investigation was to address the concerns initially raised in the *Environmental Baseline Survey Report* (as stated above). This investigation was to assess groundwater around the PBRF buildings, via sump discharges, for VOCs and benzene. Sampling and analysis conducted in July 2001 from the WEMS confirmed that there is no VOC contamination or benzene in the discharge water. Results are documented in a *Final Summary Report, Revised September 10, 2001*.

Closure Status:

There is no evidence of either benzene or VOC contamination in the groundwater. Based on these results, there are no indications that PBRF operations contributed to any benzene or VOC contamination in building sump groundwater. Therefore, further analysis is not indicated.

Data Gap #3 is closed.

DATA GAP CLOSURE PLAN
4.0 Characterization of Sludge Residue in Sink and Floor Drain Traps

Data Gap (from Environmental Baseline Survey Report, Section 5.2, page 5-2):

"Although not specifically identified during either the records search or interviews, there is another potential source of contamination associated with the laboratory drainage system. Because of the nature of the laboratory operations, potential exists for substances such as mercury from broken thermometers to have been disposed of in sink or floor drains. Therefore, during demolition of the laboratory areas, sludge present in the laboratory floor drains and sink traps, and any material present between floor sub-surfaces should be sampled and analyzed for a complete set of analytical parameters (i.e., VOCs, SVOCs, Target Analyte List metals, and pestcides/PCBs)."

Closure Plan (from Environmental Management Plan, Section 2.4, page 2-30):

Rather than conduct extensive sampling of these areas and fixtures, these materials will be properly characterized during demolition in accordance with the RADIOACTIVE AND HAZARDOUS WASTE MANAGEMENT PLAN. Closure is expected during demolition activities scheduled during 2005.

Findings:

Since there will be no sampling of sanitary traps prior to demolition, findings will be determined during waste characterization efforts during demolition.

Closure Status:

As stated in the Data Gap description above, sludge present in floor and sink traps and any material present between floor sub-surfaces will be sampled during demolition. No further action will be taken on this gap until the actual demolition begins. Waste characterizations will be made when these materials are encountered and disposition will be made in accordance with the *Radioactive and Hazardous Waste Management Plan.* This data gap will be closed when demolition is complete (2005).

DATA GAP CLOSURE PLAN
5.0 Sampling of Sludge Basins and Drying Basins

Data Gap (from Environmental Baseline Survey Report, Section 5.2, page 5-3):

"The Sludge Basins (#1153) in the northeast corner of the PBRF and the associated Drying Basins in the northern area outside the PBRF fence have never been sampled. This is because these basins were part of the raw water treatment system and thus are not suspected to have radiological contamination. However, the potential use of algaecides or similar substances to control microorganism growth in the process water leads to the possibility that the sludge/sediment in the Sludge Basins and what is now soil in the Drying Basins may be contaminated with these substances. Several sediment and soil samples should be collected in each of these areas at random locations and analyzed for pesticides/herbicides and metals. If any contaminants are detected, a sampling grid system should be established over each basin and an appropriate number of random samples should be collected in accordance with EPA guidance."

Closure Plan (from Environmental Management Plan, Section 2.4, page 2-31):

A sampling and analysis plan will be developed to address this issue. Closure is expected by December 2001.

Findings:

Closure Status:

DATA GAP CLOSURE PLAN
6.0 Soil Sampling of Fuel Oil Spill by Building 1131

Data Gap (from Environmental Baseline Survey Report, Section 5.2, page 5-3):

"As discussed in Section 4.2.13 (of the EBS), the diesel fuel above ground storage tank just north of the Services Equipment Building (#1131) was overfilled in about 1975. Soil sampling of the impacted area was never conducted. In addition, stained soil was observed below the tank during the site visit. This area and the soils between the tank and the catch basin located approximately 60 feet north of the tank should be sampled and analyzed for diesel range organics and total petroleum hydrocarbons. Composite samples should be collected from a depth of 0 – 2 feet from beneath the tank and then at 10-foot intervals to the catch basin."

Closure Plan (from Environmental Management Plan, Section 2.4, page 2-31):

A sampling and analysis plan will be developed to address this issue. Closure is expected by December 2001.

Findings:

Closure Status:

DATA GAP CLOSURE PLAN
7.0 Overburden Groundwater Impact from PAWL

Data Gap (from Environmental Baseline Survey Report, Section 5.2, page 5-3):

"Based on the data reviewed for the EBS, it appears that the overburden groundwater in the central portion of the PBRF has not been analyzed for nitroaromatics. Reactor Well 2, a bedrock well, was sampled in 1995 during the Focused RI at the Pentolite Road Red Water Ponds, and 3-NT and 3,4-DNT were found at levels of 23 ug/l and 13 ug/l, respectively. The Limited Site Investigation of the former Pentolite Area Waste Lagoons did not identify nitroaromatic contamination in soils, and concluded that the potential for groundwater contamination was therefore low. Groundwater, however, was not sampled as part of this investigation. Overburden groundwater at the PBRF should be analyzed for nitroaromatics in order to verify that the former Pentolite Area Waste Lagoons did not impact groundwater at the facility."

Closure Plan (from Environmental Management Plan, Section 2.4, page 2-31):

There have been numerous groundwater studies conducted across the entire Plum Brook Station. These studies appear to indicate that the issue of contamination in overburden groundwater has been adequately addressed. Additional document research through former site investigations will complete this investigation. Closure is expected by June 2001.

Findings:

Summary Report, Site-Wide Groundwater Monitoring (1997-1998), IT Corporation, June 1999

> "Section 8.1, Overburden Water-Bearing Zone (p. 8.3) – Three areas, AA1, AA3 and the Reactor Building Area, have not been impacted by past site activities."
>
> "Section 9.0, Recommendations (p. 9.1) – Further investigations of the overburden water-bearing zone is not recommended under current and anticipated future land use scenarios for the following reasons:
>
> - "There are no identified receptors for groundwater from the overburden water-bearing zone
> - "The State of Ohio (DERR) has indicated that the overburden water-bearing zone is not considered a potable water source
> - The overburden water-bearing zone is not likely to be used as a drinking water source now or in the future due to low permeability."

Final (Draft) Report for the former Plum Brook Ordnance Works, Pentolite Area Waste Lagoons, U.S. Army Corps of Engineers, Louisville District, August 1999

> "Section 2.5, Hydrogeology (2.5.2, PAWL (Site Specific) p. 4) – "No groundwater was encountered in the soil borings at the time of our fieldwork for this SI investigation. We anticipate groundwater in the overburden soils of the PAWL site to be perched or trapped water…. Based on the soil types encountered, overburden groundwater quantities should be minimal."

> "Section 3.4, Conclusions (Soil/Waste Source Sampling, p. 11) – Contamination was not revealed by the soil sampling, field screening and chemical laboratory analyses performed within the potential source area of the PAWL site."
>
> Section 4.3, Conclusions (Ground Water Pathways, p. 12) – Groundwater was not encountered in any of the borings at the time of the field activities; therefore, no overburden groundwater samples were obtained. Based on the hydrogeologic information reviewed and obtained, both overburden and bedrock quantities and potability appear limited. Because soil sampling and analyses did not reveal a source of contamination, it is unlikely that groundwater has been impacted by the operation or decommissioning of the PAWL site."
>
> "Section 7.0, Summary, Conclusions and Recommendations (p. 13) – Based on the results of the SI (Site Investigation), we believe the operation and decommissioning of the PAWL (Pentolite Area Waste Lagoons) has not negatively impacted the environment. Therefore, we recommend coordination with federal and/or state regulatory authorities to proceed toward a No Further Action (NFA) decision document."

Communications with Ms. Lisa Humphries (USACE, Huntington District) during 2001 indicate that the Ohio EPA is prepared to issue a "No Further Action" (NFA) letter for the former Pentolite Area Waste Lagoons. Additional testing conducted by Montgomery Watson in August 2000 (no final report as of September 2001) provided additional groundwater data to the Ohio EPA to support the NFA determination.

Closure Status:

The overburden groundwater is seasonal in supply and assessed to be non-potable in the area of the PBRF. Prior sampling data and studies confirm a lack of source material for potential contamination to overburden groundwater from the PAWL. The Ohio EPA is prepared to make a "No Further Action" determination on the former Pentolite Area Waste Lagoons.

There is no data to indicate a need for further investigation of the overburden groundwater. None of the studies previous to the EBS recommended any further investigation of the overburden groundwater. Based on all current information, NASA considers this data gap to be closed.

Data Gap #7 is closed.

DATA GAP CLOSURE PLAN
8.0 Characterization of Low-Level Radiation Spills by Buildings 1133 and 1134

Data Gap (from Environmental Baseline Survey Report, Section 5.2, page 5-3):

"During the review of data conducted for this EBS, no information was found on the extent of the area of contamination from the 2 areas of low-level waste spills (just south of Building #1134 and south of Building #1133). Soils were sampled to a depth of 10 feet in the area south of the Waste Handling Building (#1133) in the 1985 characterization study, and contamination was reported to a depth of 6 feet. No direct indication of the areal extent of the contamination was given (It was stated that soil should be removed to a depth of 8 feet and that a total of 185 cubic yards of soil should be removed. Assuming a square excavation, this would imply an area of 25 feet on each side). No radiological concentration was reported in the 1985 study for the second spill area near the Primary Pump House (#1134). The 1998 survey confirmed the presence of contamination near the Waste Handling Building, but no contamination was detected at the previously identified spill area. The lateral extent of the spill near Building #1133 should be determined, and the presence or absence of contamination associated with the second spill should be verified."

Closure Plan (from Environmental Management Plan, Section 2.4, page 2-32):

According to on-site personnel, neither of these two spill areas is very large. The location of both areas are known and marked. During the decommissioning phase of this project, the two spill areas will be excavated until the remaining soils test as clean. Closure will be coordinated during the remediation of the Spill Areas in April 2005.

Findings:

Standard procedures during decontamination activities direct that low-level radiation in soil be excavated until clean levels are achieved. This is accomplished through numerous sampling events during soil removal. When no more radiation is detected, the contamination is effectively removed.

Closure Status:

The locations of these two spots are well known and marked. During site decontamination activities, excavation of both spots will remove the residual radiation. Closure of this data gap will be accomplished when excavation activities are complete (2005).

DATA GAP CLOSURE PLAN
9.0 Soil Sampling in PBRF Parking Lot

Data Gap (from Environmental Baseline Survey Report, Section 5.2, page 5-4):

"During the review of historic aerial photographs taken during construction of the PBRF, piles of unknown material were observed in what is now the parking lot (see photo in Appendix B of the EBS). This material appears to be fill, but its origin is unknown. It is possible that this material was obtained onsite. Given the history of the Plum Brook Ordnance Works, the area beneath and immediately south of the parking lot may have been filled with soil contaminated by nitroaromatics. Although this area is outside the fenced portion of the PBRF, it is recommended that ten soil samples (composites from 0 – 2 feet) be collected in these areas and analyzed for nitroaromatics."

Closure Plan (from Environmental Management Plan, Section 2.4, page 2-32):

The contamination identified in this data gap is more closely associated with the former operations as Plum Brook Ordinance Works (PBOW). As such, data gathering for this gap will be coordinated with the FUDS project at PBS that is designated to address this issue. Since the PBRF staff office trailers have been installed in this area, closure is expected by 2006.

Findings:

Due to the positioning of PBRF staff trailers on the parking lot, the investigation of possible nitroaromatics may not occur until the PBRF Decommissioning Project is complete and the trailers are removed.

Closure Status:

This data gap will remain open until investigation and sampling activities can be conducted and analyzed.

DATA GAP CLOSURE PLAN
10.0 Groundwater Monitoring Associated with Pentolite Road Red Water Ponds

Data Gap (from Environmental Baseline Survey Report, Section 5.2, page 5-4):

"Finally, as discussed in Section 4.8.6 (of the EBS), since the PBRF is downgradient of several former PBOW sites located in the adjacent areas south of the PBRF, there is potential for groundwater contamination from these sites to migrate towards the PBRF. With the installation of monitoring wells just south of Pentolite Road and upgradient from the PBRF, it will be possible to determine if contaminants are migrating from all of the areas of concern in the adjacent area to the PBRF. The approximate recommended locations of these wells were presented in Figure 4.8.6-1 (of the EBS)."

Closure Plan (from Environmental Management Plan, Section 2.4, page 2-32):

As in the data gap discussed above (Appendix D-9), this issue is associated with the PBOW operations. Since the source of contamination is identified as the Pentolite Road Red Water Ponds, the installation of monitoring wells will be coordinated with the FUDS project currently designated to address this issue. Closure is expected by 2003.

Findings:

The installation of groundwater monitoring wells as proposed in the EBS is a significant project. Coordination with USACE and the FUDS project will be required before installation can begin.

Closure Status:

This data gap will remain open until monitoring well installation and sampling activities can be conducted and analyzed.