

SITE MANAGEMENT PLAN

**PLUM BROOK ORDNANCE WORKS
SANDUSKY, OHIO**

PART C

PROJECT MANAGEMENT

September 1995

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LIST OF ACRONYMS

AOC	area of concern
AR	administrative record
ARARs	applicable or relevant and appropriate requirements
ATSDR	Agency for Toxic Substances Disease Registry
CADD	computer-aided drafting and design
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CRP	Community Relations Plan
D&D	decontamination and decommissioning
DERP	Defense Environmental Restoration Program
DNT	2,4- or 2,6-dinitrotoluene
DOD	Department of Defense
DQO	data quality objective
DSMOA	Defense and State Memorandum of Agreement
EE/CA	engineering evaluation/cost analysis
EM	USACE Engineering Manual
ER	USACE Engineering Regulation
FFCA	Federal Facilities Compliance Act
FS	feasibility study
FUDS	formerly-used defense sites
GPS	global positioning system
GSA	General Services Administration
HTF	Hypersonic Tunnel Facility
HRS	Hazard Ranking System
IAG	interagency agreement
IDW	investigative-derived waste
MOA	memorandum of agreement
MOU	memorandum of understanding
MSL	mean sea level
MW	monitoring well
NACA	National Advisory Committee for Aeronautics
NASA	National Aeronautics and Space Administration
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NPL	National Priority List
OBS	organizational breakdown structure
OSHA	Occupational Safety and Health Administration
OSWER	Office of solid Waste and Emergency Response
PA	preliminary assessment
PBOW	Plum Brook Ordnance Works
PBRF	Plum Brook Reactor Facility
PBS	Plum Brook Station
PM	Project Manager
PMP	Project Management Plan
PMU	project management unit

**List of Acronyms
(Continued)**

PRP	potentially responsible party
PSAP	project-specific sampling and analysis plan
QA	quality assurance
QAPP	quality assurance program plan
QC	quality control
RA	remedial action
RAB	Restoration Advisory Board
RAM	responsibility assignment matrix
RD	remedial design
RI	remedial investigation
ROD	record of decision
SAP	sampling and analysis plan
SARA	Superfund Amendments and Reauthorization Act
SSHP	site-specific safety and health plan
SI	site inspection
SMP	site management plan
TAG	Technical Assistance Grant
TNT	2,4,6-trinitrotoluene
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
WBS	work breakdown structure

PART C SUMMARY

Plum Brook Ordnance Works (PBOW) is located near Sandusky, Ohio, 50 miles west of Cleveland, Ohio, and four miles south of the Lake Erie Port of Sandusky. The site was acquired by the Department of Defense (DOD) in 1938 to manufacture 2,4,6-trinitrotoluene (TNT), dinitrotoluene (DNT), and pentolite. Production began on December 16, 1941 and continued through late 1945, yielding over 900 million pounds of ordnance during this time. In December 1945, custody of PBOW was transferred to the U.S. Army Ordnance Department, and the U.S. Army Corps of Engineers (USACE) assumed responsibility for maintenance and custodial duties.

In 1956 the National Advisory Committee for Aeronautics (now known as the National Aeronautics and Space Administration, NASA) began leasing sections of PBOW from the Army. By 1963, approximately 6,400 acres of PBOW had been acquired by NASA for various aerospace research activities. Research and test activities were conducted by NASA at Plum Brook Station (PBS) throughout the 1960s and early 1970s.

Environmental remediation of the PBOW site is administered by the Defense Environmental Restoration Program for Formerly-Used Defense Sites (DERP-FUDS) program. This Site Management Plan (SMP) provides a management tool for conducting environmental restoration at PBOW. The SMP is divided into three sections:

- Part A - Site Description and Management Approach
- Part B - Areas of Concern
- Part C - Project Management

This volume, Part C, provides preliminary information necessary for the development of a Project Management Plan (PMP) for environmental remediation activities at PBOW. Part C includes the following sections:

- **Management Responsibilities** - defines the requirements for a PMP; provides a preliminary Work Breakdown Structure (WBS); and defines organizational responsibilities for managing and conducting remedial activities at PBOW.
- **Administrative Record** - establishes the requirement for an Administrative Record (AR) for PBOW activities, and identifies USEPA guidance documents for this purpose; defines the scope of the AR, the role of the local community in the AR, and State involvement in the AR process;

and provides a model administrative record file structure, and guidance on developing and maintaining the AR.

- **Community Relations** - provides guidelines for establishing a community relations program for PBOW activities, along with requirements and guidelines for a community relations plan (CRP); and defines the makeup and responsibilities of the Remediation Advisory Board, and the general steps in conducting community relations activities.
- **AOC Rankings and Prioritization** - summarizes the Hazard Ranking System (HRS) scores applied to the PBOW AOCs in earlier studies. Based on the HRS scores, previous investigations, and the history of activities at the AOCs, each AOC is given a preliminary prioritization of 1, 2, or 3, with 1 being the highest priority. Each AOC at PBOW will also undergo the DOD Relative Risk Site Evaluation process designed to assess relative risk of DERP-FUDS sites. The evaluation process is described in this section.
- **Project Schedule** - establishes the requirements for a project schedule in the PMP, and provides a preliminary summary schedule for conducting remedial activities at each of the AOCs at PBOW, based on the priorities assigned to the AOCs in the previous Section.
- **Funding Requirements** - describes the requirements for including budget and cost estimates in the PMP, and provides a preliminary cost estimate, for planning purposes, for each phase of remedial investigation. These cost estimates are time-phased using the preliminary schedule developed for the previous Section, and rolled up by fiscal year to show maximum yearly costs for PBOW remediation through the assumed life of the project.
- **Updating the SMP** - defines the requirement for updating and revising the SMP, and describes the mechanism for incorporating changes into the document; references the document control process to be established for PBOW documents.
- **Management Resources** - contains resource requirements that must be included in the PMP; provides information on locations and points-of-contact for PBOW resources, including maps, photos, historical documents, and investigation results.
- **Recommendations for Project Management** - provides recommendations for USACE project management to implement early in the site restoration process. Recommendations include: deciding the restoration prioritization; establishing background chemical data; initiating interagency coordination; developing the framework for the administrative record; initiating community relations; conducting site baseline mapping; preparing project plans and procedures; establishing document control procedures; and establishing a data management system.

1.0 INTRODUCTION

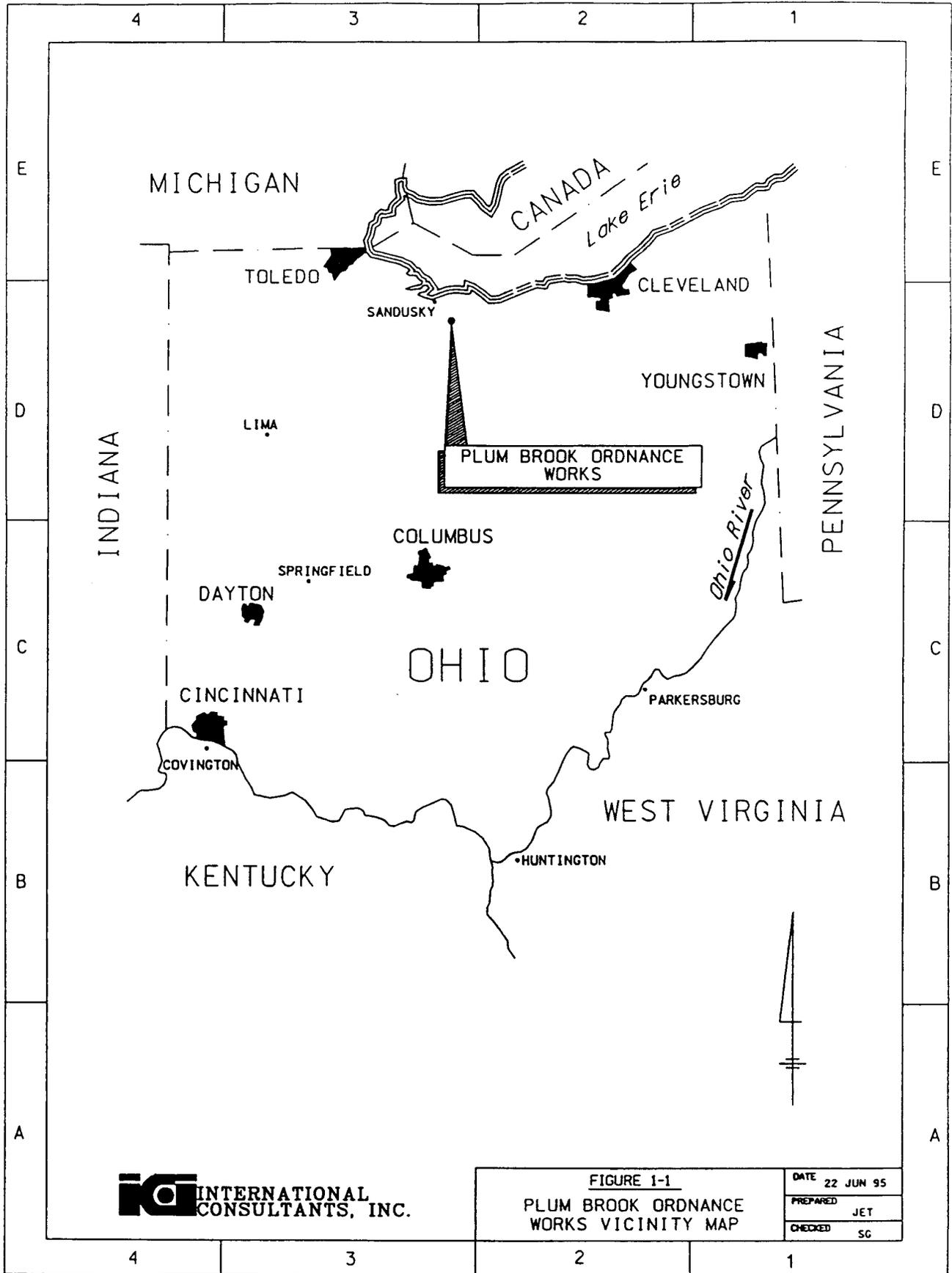
The Site Management Plan (SMP) provides a management tool for environmental restoration at Plum Brook Ordnance Works (PBOW) (Figure 1-1). The SMP is divided into three sections:

- **Part A - Site Description and Management Approach** - contains a description of the regulatory framework, site setting, site investigations and results, management objectives, quality assurance requirements, sampling and analysis plans, site-specific safety and health plan, and document control and data management.
- **Part B - Areas of Concern** - presents detailed descriptions of each area of concern (AOC), including physical characteristics, site investigations and other studies, contaminants of concern, and the nature and extent of contamination, all based on existing information.
- **Part C - Project Management** - includes a roadmap for the management of remediation of PBOW.

This volume, Part C of the SMP, describes management responsibilities, the Administrative Record, community relations, AOC rankings and prioritization, project schedules, funding requirements, management resources, and recommendations for project management.

1.1 LOCATION AND GENERAL DESCRIPTION

Plum Brook Ordnance Works (Plum Brook Station, PBS) is located near Sandusky, Ohio, 50 miles west of Cleveland, Ohio, and four miles south of the Lake Erie Port of Sandusky (Figure 1-1). The site lies principally in Perkins Township, with much of the southeastern portion in Oxford Township. The eastern edge of the site extends into Huron and Milan Townships. The site is bounded by U.S. Route 250 on the east, County Road 43 on the west, Bogart Road on the north, and Mason Road on the south. Most of PBOW is situated on undisturbed forested land, while the area surrounding the site is used for agriculture. The site has a total of 62.5 miles of internal paved roads and 15.7 miles of railroad line, most of which has been abandoned.



IC INTERNATIONAL CONSULTANTS, INC.

FIGURE 1-1
 PLUM BROOK ORDNANCE
 WORKS VICINITY MAP

DATE	22 JUN 95
PREPARED	JET
CHECKED	SG

1.2 HISTORY OF PAST OPERATIONS

The original site was acquired by the Department of Defense (DOD) in 1938 and consisted of approximately 9,010 acres of land. Currently, PBS consists of approximately 6,400 acres, however, PBOW remediation addresses the entire 9,010 acres. In the early 1940s the U.S. Army contracted with the Trojan Powder Company to manufacture 2,4,6-trinitrotoluene (TNT), dinitrotoluene (DNT), and pentolite at PBOW. Production began on December 16, 1941 and continued through late 1945, ceasing two weeks after V-J Day (September 2, 1945). During this production period, over 900 million pounds of these materials were manufactured at PBOW. After the operation ceased, the area was turned over to the Army Ordnance Department and was renamed Plum Brook Depot and used for ammunition storage.

PBOW was placed in standby condition from 1945 to 1946. During this time, the Army conducted decontamination and decommissioning (D&D) of many of the buildings and structures associated with the manufacturing of ordnance (SAIC 1991). D&D included removal and relocation of all explosives to burn grounds for incineration. Where possible, remaining structures and buildings were burned in place. Drain lines and steam lines were flushed and dismantled; however, PBOW historical records do not indicate where they were flushed or where the water used for flushing was disposed.

In December 1945, custody of PBOW was transferred from the Trojan Powder Company to the U.S. Army Ordnance Department, and the U.S. Army Corps of Engineers (USACE) assumed responsibility for maintenance and custodial duties at PBOW from January 1 through June 30, 1946. In August 1946, PBOW was transferred to the War Assets Administration. Additional decontamination efforts were undertaken by Ravenna Arsenal from 1954 to 1958.

1.3 HISTORY OF CURRENT OPERATIONS

In 1956 the National Advisory Committee for Aeronautics (NACA) began leasing sections of PBOW from the Army. An agreement was made in 1956 for a lease of 500 acres of the north portion of the site to construct and operate the Plum Brook Reactor Facility (PBRF). In 1958 NACA became the National Aeronautics and Space Administration (NASA). By 1963, approximately 6,400 acres of PBOW had been acquired by NASA for various aerospace research activities, plus an additional 2,000 acres to serve as a buffer zone. Research and test activities were conducted by NASA at PBS throughout the 1960s and early 1970s.

In 1978, NASA declared approximately 2,150 acres of land as excess. The Perkins Township Board of Education uses 46 of the excess acres as a bus transportation center. Much of the balance of the excessed

property was reclaimed for farmland. NASA also excessed Parcel #59 to The General Services Administration (GSA) in 1978 for subsequent disposal. The efforts of the GSA to dispose of the property have been futile largely due to the presence of the waste water ponds resulting from PBOW activities. NASA controls the land associated with PBS through ownership of title, use of easements, leases, permits, and ownership of development rights.

1.4 PREVIOUS AND CURRENT INVESTIGATIONS

To date, a number of environmental studies and investigations have taken place at PBOW. These are described in detail in Section 4.0 of Part A; they are also summarized in Section 9.0, Table 9-1, of this Part of the SMP.

2.0 MANAGEMENT RESPONSIBILITIES

All environmental restoration projects executed under the DERP-FUDS program by USACE are subject to the basic principles of project management as described in USACE document ER 5-7-1(FR). The USACE Project Manager (PM) is the primary point of contact for the project, including contact with the client installation, Major command, regulators, and the public. The PM is also responsible for project scope, budget, cost, schedule, and quality of the environmental restoration products. This section summarizes project management responsibilities for conducting environmental restoration work at PBOW, and provides preliminary guidance on the Project Management Plan, organizational responsibilities, and the work breakdown structure for PBOW.

2.1 PROJECT MANAGEMENT PLAN (PMP)

A PMP is required for work conducted at PBOW. The PMP provides a common understanding between USACE Huntington District, the customer, Major Subordinate Commands, and USACE headquarters. The PMP is a contract to develop and deliver products in accordance with commitments made between USACE entities. The PMP will establish scope, schedule, budgets, client interaction, and technical performance requirements for the management and control of the project. It is a working document that evolves over the life of the project. The PMP is prepared by the PM in accordance with the guidance of USACE document ER 5-7-1(FR).

2.2 ORGANIZATIONAL RESPONSIBILITIES

Investigations at PBOW under the DERP-FUDS program fall under the jurisdiction of two USACE Districts: Huntington and Nashville. Each District has distinct responsibilities for site remediation, and in some instances, the Districts have joint responsibility, such as supervision of individual tasks within the same project. The responsibilities generally fall under five categories: initiation, execution, consultation, supervision, and review. Table 2-1 provides a preliminary representation of the responsibility assignments for the PBOW program. The table assigns preliminary generic responsibilities; as the program matures, a detailed organizational responsibility assignment matrix will be provided in the PMP.

Table 2-1. PBOW General Responsibility Assignment Matrix

Work Element	Huntington District	Nashville District
Program Management	I, E	C, R
Safety and Health	S, R	I, E, S
Quality Assurance	S, R	I, E, S
Community Relations	I, E, S	C
Site Investigations/Remediation		
Project Scoping Plan	C, R	I, E, S
Project-Specific Sampling & Analysis Plan	C, R	I, E, S
Quality Assurance Project Plan	C, R	I, E, S
Safety & Health Plan	C, R	I, E, S
Data Gathering, Sampling	C, R	I, E, S
Sample Analysis	C, R	I, E, S
Risk Assessment	C, R	I, E, S
Investigation Derived Waste (IDW)	C, R	I, E, S
Site Investigation Reports	C, R	I, E, S
Project Management ^a	I, E, C, S	E, C, S
Remediation	E, S, R	I, C, R

I = Initiation; E = Execution; C = Consultation; S = Supervision; R = Review

^aJoint responsibility for execution, consultation, and supervision of individual tasks under the same project.

2.3 WORK BREAKDOWN STRUCTURE

The scope of work for the PBOW program is broken down into its component parts, or work breakdown structure (WBS), by the PM in cooperation with USACE technical managers. The WBS is product-oriented, and arrayed in a hierarchy of levels, either graphically or by a listing. A product at any level is made up of those products listed in the hierarchical lower level. The WBS elements containing the products and sub-products should be:

- Product-oriented
- Independent at each level
- Integrated
- Manageable within the organization's capability
- Measurable
- Complete, covering all the items in the work scope.

The breakdown of the work scope continues to a level (the cost account level) at which the PM can assign work to a specific organization (usually a district branch or section). The assignment of the cost account level to a technical manager is a key point of management control and cost accountability. The size and level of the cost account in the WBS can vary, and should be based on the scope of the task rather than on an arbitrary predetermined level of the WBS. The WBS provides a common, ordered framework for summarizing information, assigning work elements, and establishing cost and schedule controls. A preliminary upper-level WBS for PBOW is provided in Figure 2-1.

2.4 RESPONSIBILITY ASSIGNMENT MATRIX

An organizational breakdown structure (OBS) is also developed by the PM, and organizational assignments are made from the WBS. The intersection of the OBS and WBS results in a responsibility assignment matrix (RAM), which is incorporated into the PMP. The RAM is a representation of the organizational responsibilities for the performance of the WBS elements. It defines the organization authorized to do the work, and defines the summarization path for cost performance reporting. The RAM is part of the project configuration, and must reflect all changes for assigned responsibility. When the cost account levels are developed for the PBOW WBS, the RAM will be prepared for inclusion in the PMP.

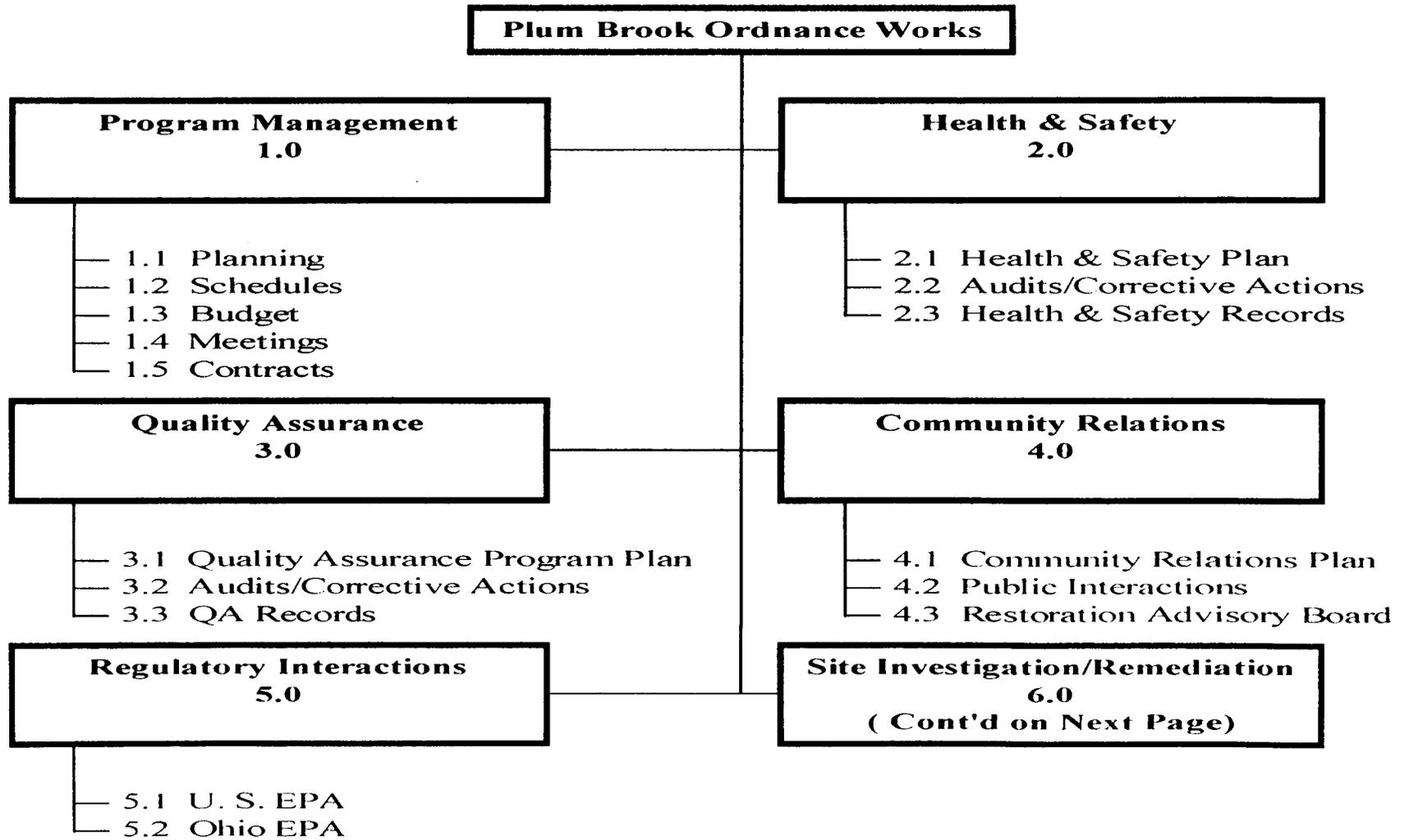


Figure 2-1. Preliminary Work Breakdown Structure (WBS) for PBOW

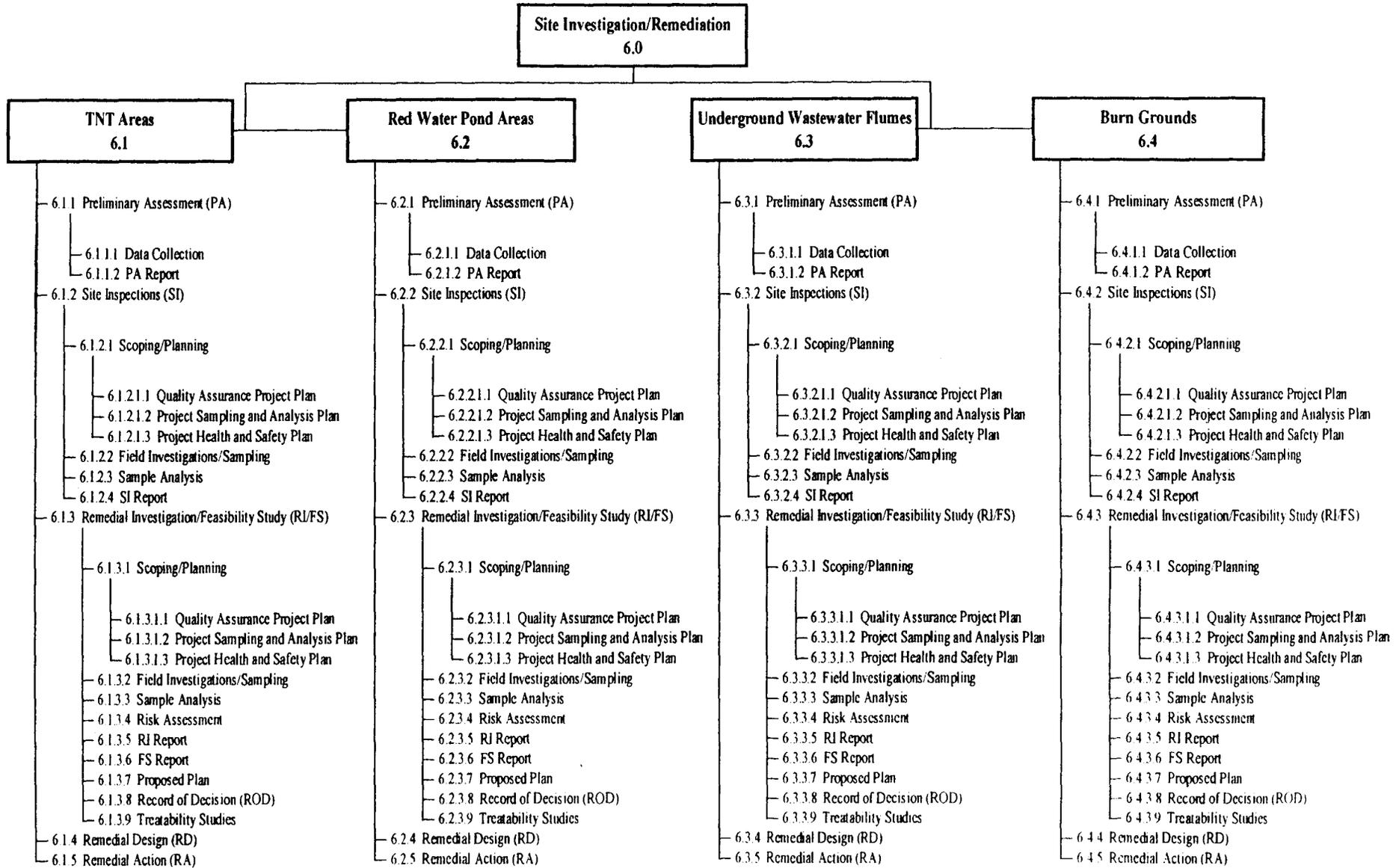


Figure 2-1. Continued

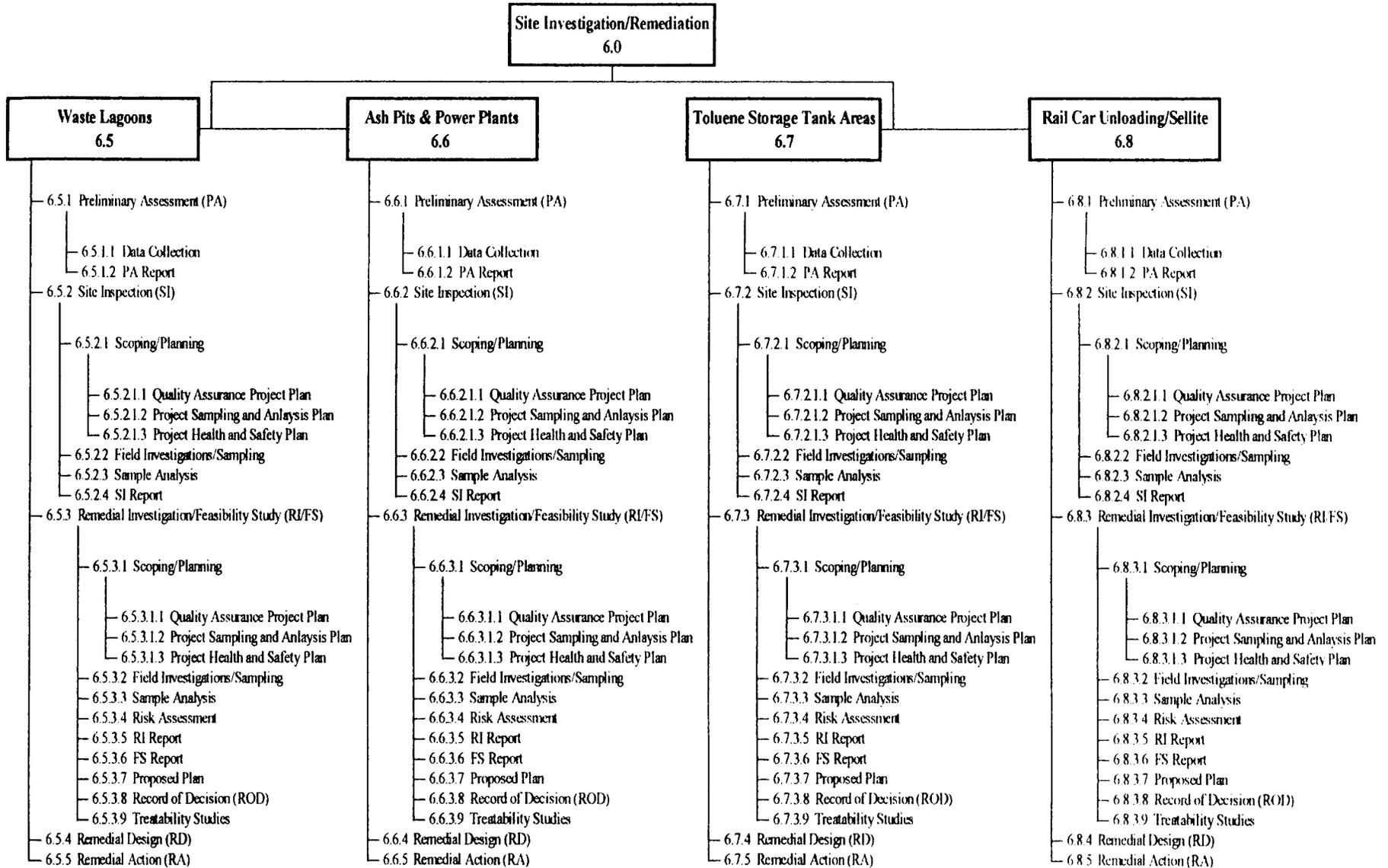


Figure 2-1. Continued

**Site Investigation/Remediation
6.0**

**Pentolite Area
6.9**

- 6.9.1 Preliminary Assessment (PA)
 - 6.9.1.1 Data Collection
 - 6.9.1.2 PA Report
- 6.9.2 Site Inspection (SI)
 - 6.9.2.1 Scoping/Planning
 - 6.9.2.1.1 Quality Assurance Project Plan
 - 6.9.2.1.2 Project Sampling and Analysis Plan
 - 6.9.2.1.3 Project Health and Safety Plan
 - 6.9.2.2 Field Investigations/Sampling
 - 6.9.2.3 Sample Analysis
 - 6.9.2.4 SI Report
- 6.9.3 Remedial Investigation/Feasibility Study (RI/FS)
 - 6.9.3.1 Scoping/Planning
 - 6.9.3.1.1 Quality Assurance Project Plan
 - 6.9.3.1.2 Project Sampling and Analysis Plan
 - 6.9.3.1.3 Project Health and Safety Plan
 - 6.9.3.2 Field Investigations/Sampling
 - 6.9.3.3 Sample Analysis
 - 6.9.3.4 Risk Assessment
 - 6.9.3.5 RI Report
 - 6.9.3.6 FS Report
 - 6.9.3.7 Proposed Plan
 - 6.9.3.8 Record of Decision (ROD)
 - 6.9.3.9 Treatability Studies
- 6.9.4 Remedial Design (RD)
- 6.9.5 Remedial Action (RA)

**Acid Areas
6.10**

- 6.10.1 Preliminary Assessment (PA)
 - 6.10.1.1 Data Collection
 - 6.10.1.2 PA Report
- 6.10.2 Site Inspection (SI)
 - 6.10.2.1 Scoping/Planning
 - 6.10.2.1.1 Quality Assurance Project Plan
 - 6.10.2.1.2 Project Sampling and Analysis Plan
 - 6.10.2.1.3 Project Health and Safety Plan
 - 6.10.2.2 Field Investigations/Sampling
 - 6.10.2.3 Sample Analysis
 - 6.10.2.4 SI Report
- 6.10.3 Remedial Investigation/Feasibility Study (RI/FS)
 - 6.10.3.1 Scoping/Planning
 - 6.10.3.1.1 Quality Assurance Project Plan
 - 6.10.3.1.2 Project Sampling and Analysis Plan
 - 6.10.3.1.3 Project Health and Safety Plan
 - 6.10.3.2 Field Investigations/Sampling
 - 6.10.3.3 Sample Analysis
 - 6.10.3.4 Risk Assessment
 - 6.10.3.5 RI Report
 - 6.10.3.6 FS Report
 - 6.10.3.7 Proposed Plan
 - 6.10.3.8 Record of Decision (ROD)
 - 6.10.3.9 Treatability Studies
- 6.10.4 Remedial Design (RD)
- 6.10.5 Remedial Action (RA)

**Garage & Maintenance Area
6.11**

- 6.11.1 Preliminary Assessment (PA)
 - 6.11.1.1 Data Collection
 - 6.11.1.2 PA Report
- 6.11.2 Site Inspection (SI)
 - 6.11.2.1 Scoping/Planning
 - 6.11.2.1.1 Quality Assurance Project Plan
 - 6.11.2.1.2 Project Sampling and Analysis Plan
 - 6.11.2.1.3 Project Health and Safety Plan
 - 6.11.2.2 Field Investigations/Sampling
 - 6.11.2.3 Sample Analysis
 - 6.11.2.4 SI Report
- 6.11.3 Remedial Investigation/Feasibility Study (RI/FS)
 - 6.11.3.1 Scoping/Planning
 - 6.11.3.1.1 Quality Assurance Project Plan
 - 6.11.3.1.2 Project Sampling and Analysis Plan
 - 6.11.3.1.3 Project Health and Safety Plan
 - 6.11.3.2 Field Investigations/Sampling
 - 6.11.3.3 Sample Analysis
 - 6.11.3.4 Risk Assessment
 - 6.11.3.5 RI Report
 - 6.11.3.6 FS Report
 - 6.11.3.7 Proposed Plan
 - 6.11.3.8 Record of Decision (ROD)
 - 6.11.3.9 Treatability Studies
- 6.11.4 Remedial Design (RD)
- 6.11.5 Remedial Action (RA)

**TNT Rail Car Loading Areas
6.12**

- 6.12.1 Preliminary Assessment (PA)
 - 6.12.1.1 Data Collection
 - 6.12.1.2 PA Report
- 6.12.2 Site Inspection (SI)
 - 6.12.2.1 Scoping/Planning
 - 6.12.2.1.1 Quality Assurance Project Plan
 - 6.12.2.1.2 Project Sampling and Analysis Plan
 - 6.12.2.1.3 Project Health and Safety Plan
 - 6.12.2.2 Field Investigations/Sampling
 - 6.12.2.3 Sample Analysis
 - 6.12.2.4 SI Report
- 6.12.3 Remedial Investigation/Feasibility Study (RI/FS)
 - 6.12.3.1 Scoping/Planning
 - 6.12.3.1.1 Quality Assurance Project Plan
 - 6.12.3.1.2 Project Sampling and Analysis Plan
 - 6.12.3.1.3 Project Health and Safety Plan
 - 6.12.3.2 Field Investigations/Sampling
 - 6.12.3.3 Sample Analysis
 - 6.12.3.4 Risk Assessment
 - 6.12.3.5 RI Report
 - 6.12.3.6 FS Report
 - 6.12.3.7 Proposed Plan
 - 6.12.3.8 Record of Decision (ROD)
 - 6.12.3.9 Treatability Studies
- 6.12.4 Remedial Design (RD)
- 6.12.5 Remedial Action (RA)

Figure 2-1. Continued

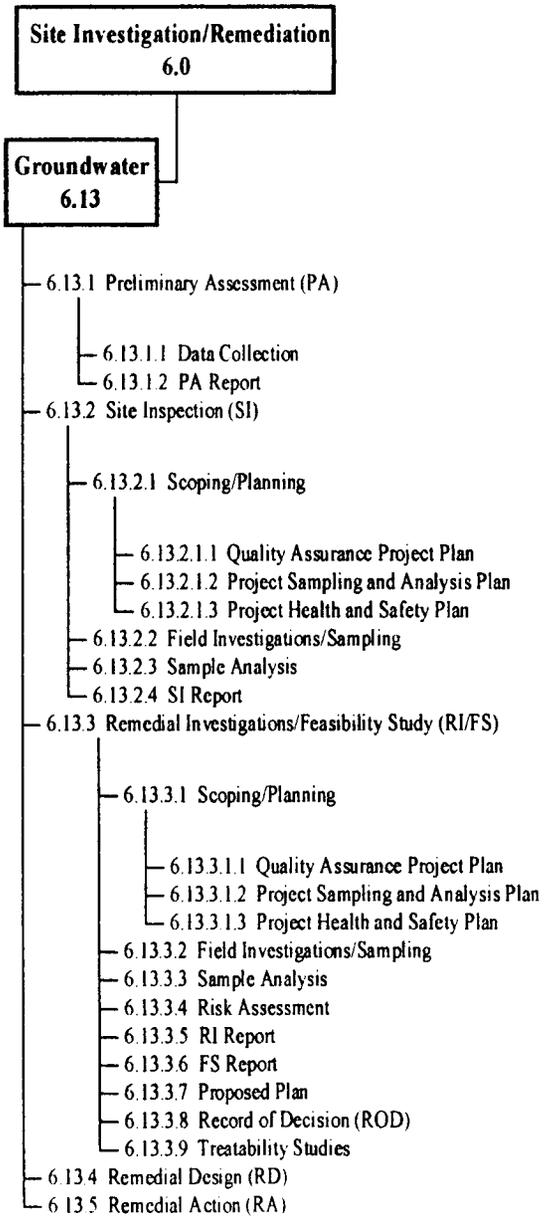


Figure 2-1. Continued

3.0 ADMINISTRATIVE RECORD

Under CERCLA §113, administrative records (AR) are to be established upon which the lead agency (USACE) bases the selection of a response action (a remediation activity requiring a decision document, e.g., ROD or Action Memorandum). This AR serves two purposes: (1) it contains the full body of documentation which provided the basis for the selection of a response action; and (2) it provides a vehicle for public participation. The USEPA's Office of Solid Waste and Emergency Response (OSWER) Directive 9833.3A-1 provides guidelines for AR establishment and administration. All PBOW documents that may become part of the AR will be kept in an "information repository" near the site, and will be available for public review.

3.1 PURPOSE AND SCOPE

Documents generally included in the AR include all final documents generated by the lead and support agencies, information and comments provided by the public and potentially responsible parties (PRPs), and technical and site-specific information. Draft documents and internal memoranda are not usually included.

The following principles should be applied in the establishment of the AR. The AR should:

- be compiled as relevant documents are generated or received by the lead agency.
- include all documents that form the basis for the decision, whether they support the final selection or not.
- be a *contemporaneous explanation of the basis for the selection of the response action.*

3.1.1 Judicial Review

Judicial review of any issues concerning the adequacy of a CERCLA response action is limited to the AR. For this reason, facts and arguments related to the response action that challenging parties present for the first time, that are not included in the administrative record, are not considered. Courts generally do not permit persons challenging the decision to depose, examine, or cross-examine USEPA, state or other federal agency decision-makers, staff, or contractors concerning the selection. This saves time in locating personnel who may have changed positions during or after the selection.

The court generally applies the highly deferential *arbitrary and capricious* standard of review set forth in §113(j)(2) of CERCLA. Under this standard, the court does not substitute its judgement for that of the decision-maker or act as an independent decision-maker, but acts as a reviewing body whose limited task is to check for arbitrary and capricious action. Thus, the decision will only be overturned if the AR indicates that the decision was arbitrary or capricious or was otherwise not in accordance with regulations. If the AR is found to be incomplete or otherwise inadequate, the judicial review can be expanded to include depositions, examinations, or cross-examinations of USEPA, state or other federal agency decision-makers, staff, or contractors concerning the selection.

3.1.2 Public Participation

Under §113(k)(2) of CERCLA, the public must have the opportunity to participate in the development of the AR and §117 provides for public participation in the remedial action selection process. If the lead agency does not provide adequate public participation, persons challenging a response action may argue that judicial review should not be limited to AR review. The lead agency must, therefore, make the information considered or relied upon in the selection process available to the public, provide an appropriate opportunity for public comment on the information, place comments and information received from the public in the AR, and reflect in the AR the lead agency's consideration of the information.

3.1.3 PBOW Scope

The AR established for PBOW shall be in accordance with USEPA's OSWER Directive 9833.3A-1 and relevant USACE regulations and guidance. Establishment of the AR is currently in progress to ensure that all relevant documentation that will serve as the basis for the selection of remediation at PBOW is included. It will include all public comments and information provided, as well as documentation of USACE community relations programs. Initiation of the AR at this early stage will guard against potential omissions from the AR that should render it incomplete or inadequate for judicial review under a challenge.

3.1.4 State Involvement at Federal Lead Sites

For CERCLA sites in which a federal agency is the lead agency, that agency is required to notify appropriate state agencies (Ohio EPA and Ohio Department of Natural Resources, for example) of the establishment of the AR. The agency must forward a copy of the AR file draft index to interested state agencies as soon as it is available, and forward all revisions as they are published. In addition, interested

state agencies are to be included on the site community relations mailing list and be afforded the opportunity for comment on major remediation documents (workplans, RIs, FSs, EE/CAs).

3.2 ESTABLISHMENT OF THE ADMINISTRATIVE RECORD

Each AR is considered an AR file until the response action for the site is selected, under consultation with all appropriate agencies. Therefore, to avoid misrepresentation, the compilation of documentation for PBOW will be referred to as the "AR file" until the set of records is considered complete. The AR file will be housed in an information repository near the site to allow public access.

Each decision document (ROD or Action Memorandum) must be supported by an AR. Under CERCLA, remediation is often broken into separate response actions, including multiple operable units or removal actions. Each requires a separate AR. Information relevant to more than one response decision (site investigation or preliminary assessment) may be placed in the AR files for the initial response action and incorporated by reference in the indices of subsequent AR files for the overall site.

The AR file is to be compiled as relevant documents are generated or received and remain on a current status. All documents which are clearly relevant and non-privileged are placed in the AR file, indexed, and made available to the public as soon as practicable. Comment on relevant documents by the public are also to be included in the AR files.

Table 3-1 contains a model AR file structure. Justification is unnecessary for file categories without any documents. These categories should be omitted from the index. For example, if study of a particular AOC is not required to proceed further than the preliminary assessment, all categories usually included after that point are omitted from that AOC's AR file. Each document should be filed in only one category, but can be referenced in other categories.

When there are questions on inclusion of particular documents into the AR file, the documents should be segregated and reviewed at regular intervals for relevance. For example, draft documents or documents subject to claims of privilege should be set aside for quarterly review. Prior to a public comment period, the issues regarding these documents should be completely resolved and the amended documents placed in the AR files, if appropriate.

All documents considered to be of relevance to the selection of the response action must be placed in the AR file at the time the decision document is signed. All documents or comments relevant to the response selection generated or received after the decision document is signed are to be placed in a post-decision

Table 3-1. Model Administrative Record File Structure

- | | |
|---|--|
| <ul style="list-style-type: none"> 1.0 SITE IDENTIFICATION <ul style="list-style-type: none"> 1.1 Background 1.2 Previous Reports <ul style="list-style-type: none"> 1.2.1 RCRA 1.2.2 UST 1.2.3 Other 1.3 Site Inspections/Notification 1.4 Preliminary Assessment 1.5 Site Investigation 2.0 REMOVAL ACTION <ul style="list-style-type: none"> 2.1 Sampling and analysis Plans 2.2 Sampling Data and Chain of Custody Forms 2.3 EE/CA Approval Memorandum 2.4 EE/CA 2.5 Action Memorandum and Amendments 2.6 Public Comment and Correspondence 3.0 REMEDIAL INVESTIGATION <ul style="list-style-type: none"> 3.1 Sampling and Analysis Plan 3.2 Sampling Data and Chain of Custody Forms 3.3 Work Plan 3.4 RI Report 3.5 Public Comment and Correspondence 4.0 FEASIBILITY STUDY <ul style="list-style-type: none"> 4.1 ARAR Determination 4.2 FS Report 4.3 Proposed Plan 4.4 Supplements and Revisions 4.5 Public Comment and Correspondence 5.0 RECORD OF DECISION <ul style="list-style-type: none"> 5.1 Record of Decision 5.2 Amendments 5.3 Explanations of Significant Differences 5.4 Public comment and Correspondence 6.0 COORDINATION WITH STATE OF OHIO <ul style="list-style-type: none"> 6.1 Cooperative Agreements 6.2 Correspondence | <ul style="list-style-type: none"> 7.0 ENFORCEMENT <ul style="list-style-type: none"> 7.1 Enforcement History 7.2 Endangerment Assessments 7.3 Administrative Orders 7.4 Consent Decrees 7.5 Affidavits 7.6 Documentation of Technical Discussions with PRPs on Response Actions 7.7 Notice Letters and Responses 7.8 Correspondence 8.0 HEALTH ASSESSMENTS <ul style="list-style-type: none"> 8.1 ATSDR Health Assessments 8.2 Toxicological Profiles 8.3 OSHA Health Records 8.4 Correspondence 9.0 NATURAL RESOURCE TRUSTEES <ul style="list-style-type: none"> 9.1 Notices Issued 9.2 Findings of Fact 9.3 Reports 9.4 Correspondence 10.0 PUBLIC PARTICIPATION <ul style="list-style-type: none"> 10.1 Community Relations Plan 10.2 Comments and Responses 10.3 Public Notices 10.4 Public Meeting Transcripts 10.5 Documentation of Other Public Meetings 10.6 Fact Sheets and Press Releases 10.7 Newspaper Articles 10.8 Responsiveness Summary 10.9 Late Comments 10.10 General Correspondence 11.0 TECHNICAL SOURCES AND GUIDANCE DOCUMENTS <ul style="list-style-type: none"> 11.1 USEPA Headquarters Guidance 11.2 USEPA Regional Guidance 11.3 State of Ohio Guidance 11.4 Technical Sources |
|---|--|

document file maintained at the same location as the AR. There are five instances in which post-decision documents may be placed in the AR:

- If the decision document does not address a portion of the action or delays a portion of decision to a later date.
- Where there is significant change in a basic feature of the selected response action with respect to scope, performance, or cost.
- To address changes that are so significant that they fundamentally alter the very nature of the overall response action and require an amended decision document.
- In the case of comments received after the close of the public comment period which contain significant information.
- To include public comments received from public comment periods held or extended by the lead agency after selection of the response action.

3.2.1 AR Index

Each AR file must be indexed to allow staff and the public easy access to information. The AR file allows the lead agency a degree of control over documents located at or near the site, preventing persons from altering the AR file by simply physically adding or removing documents from the file. In addition, the AR file index can be used as an overview of site history. The AR file index is to be labelled as the AR file draft index until the decision document is signed, at which time it becomes the AR index.

The PBOW AR file draft index should include the following information on each document:

- Document number
- Date of document preparation
- Document title - by title of document rather than transmittal memo name. It should contain adequate information to easily discern it from similar documents
- Author - name and affiliation
- Recipient - name and affiliation
- Location of document.

The index can be organized by subject or arranged in chronological order. The PBOW AR file will be organized by subject. Documents that are customarily grouped together (sampling data, chain-of-custody forms) may be listed as a group in the index.

The index is to be updated as new documents are added to the file, or quarterly, at a minimum. The quarterly reviews will coincide with the reviews of material on which there is a question of relevance. The index is to be updated prior to any public comment period.

3.2.2 AR File Location

Section 113(k)(1) of CERCLA stipulates that the AR is to be available to the public *at or near the facility at issue*. Duplicates may be kept at any other location. One copy of the AR file must be located at a regional office or other central location. The regional location for the PBOW AR file is the Huntington USACE office. Both copies should be available for public inspection at reasonable time (business hours). Unless requested, the AR file is always to be available at the central location, therefore, AR file documents required for emergency use are to be taken from the site AR file.

The AR file located at or near the site is to be situated in an information repository normally used for community relations purposes. These typically include a public or university library, town hall, or other publicly accessible place. Location of the AR files is to be coordinated with the project community relations director.

When transmitting the AR file to the repository, initial contact is the responsibility of the community relations director. Transmittal of the initial AR file, as well as subsequent additions, will include a cover letter and a transmittal acknowledgement form. An AR fact sheet that addresses any anticipated questions about the document should also accompany the transmittal.

A master copy of all documents is to be kept at the Huntington and Nashville USACE offices.

3.2.3 Special Documents

Certain documents which are included in the AR file do not have to be maintained at multiple locations due to the nature of the documents and the burden associated with maintaining these documents at multiple locations. These documents must be included in the index and incorporated by reference. The index must include the location of the documents for public review. USACE must, upon request, provide these documents at the site AR file location for review. This does not include documents in the confidential files.

These documents do not have to be available in multiple locations:

- **Verified sampling data** - sampling data may be left in its original storage location. Data summary sheets must be in the AR file. The index must list the data summary sheets, reference the sampling data, and indicate its location.
- **Chain of custody forms** - may be left in original storage location, with reference to the forms and their location in the index.
- **Confidential and privileged documents** - are to be located in a separate, locked cabinet in the Huntington and Nashville USACE offices. The AR file index contains the title, location, reasons for confidentiality of the document(s), and a summary of the document's information, to the extent possible.
- **Guidance and policy documents** - a compendium of general guidance documents such as *Compendium of CERCLA Response Selection Guidance Documents*, Office of Waste Programs Enforcement, May 1989, are to be kept at the site and regional AR file locations. This eliminates the need for keeping copies of each guidance document at each location. Each guidance or policy document used to select the response action must be included in the index with its location.
- **Technical literature** - publicly available technical literature not generated for the response action process must be clearly referenced in the AR file index. Reports that are not readily available must be physically included in the AR file at any location, with its location referenced in the index.
- **Computer models and technical databases** - must be available upon request from any given location. Printouts are physically included in the file only if they were used in the response action selection.

3.3 PUBLIC AVAILABILITY

The availability of the AR file varies with the nature of the response action. In all cases, the lead agency should publish a notice of availability of the AR file when it first becomes available, describing the purpose, location, availability, and method for public participation. The notice should be published in a major local newspaper, distributed to all persons on the community relations mailing list, and sent to all PRPs or potential PRPs. A copy of the announcement should be included in the AR file.

3.3.1 Remedial Actions

The AR file must be available when the remedial investigation (RI) begins, usually when the work plan is approved. Relevant documents would include the preliminary assessment, site investigation, work plans, sampling data, and the community relations plan. Documents are added as they are generated or received.

3.3.2 Removal Actions

Time-critical removal actions include those actions which must take place within six months after identification of the hazard. The AR file must be available to the public as soon as possible, and within a maximum of 60 days from initiation of the removal action.

Emergency removal actions are usually initiated within hours of the verification of a release or a threat of release and are usually completed within 30 days. The AR file must be available to the public as soon as possible and must be available at the regional office, unless a copy is requested.

Non-time-critical removal actions are those that will require a planning period in excess of six months. The AR file for these actions must be made available at the regional and local sites when the engineering evaluation/cost analysis (EE/CA) is made available for public comment.

3.4 MAINTAINING THE RECORD

Security and integrity of the AR files must be maintained at all times. Procedures for document storage room access should be established to ensure orderly access to the files. Each AR file location should have a reading area for record review. The reading area should be available during reasonable hours (business hours) and contain: AR files, USEPA Guidance Compendium, copier access, and a visitor sign-in book. The use of a visitor sign-in book assists control of document loss and damage as well as documenting efforts to provide public access to the files. The book should include: the visitor's name, affiliation, address, phone number, date of visit, documents reviewed, cost of copied materials. Section 117(d) of CERCLA requires lead agencies to provide access to copiers, but does not require the lead agency to bear the financial burden of the copies.

Storage and viewing areas should be supervised to maintain proper security. Documents should not be allowed to leave the document reading room or be left unattended. Wherever feasible, documents should be checked after each review to ensure that they have been returned intact. Files should be kept locked. The AR Coordinator should perform regular reviews of the documents in the AR file.

The AR file is to be maintained until a decision document is signed. The time period required for maintaining the AR after the decision document is signed is not clearly defined. When there is ongoing or possible litigation, the central AR file should be available until the litigation is completed. Also, if there is considerable public interest, the AR may be kept available as an historical record of activities at the site.

3.5 CERTIFICATION

A certification as to the completeness of the AR must be performed when it is filed in court. Any certification is to be signed by the lead agency. Under OSWER guidance (1990), USACE may choose to have the AR Coordinator certify that the record was compiled and maintained in accordance with applicable U.S. Army and USEPA regulations and guidance. *This attests that the record was compiled in accordance with regulations, but does not address the completeness of the file.*

4.0 COMMUNITY RELATIONS

An effective community relations program is based on establishing a two-way dialog designed to not only keep local citizens informed about site progress, but to also allow them the opportunity to provide input to site decisions. Initiation of these programs should be accomplished early in the remediation program. To date, USACE personnel have maintained an open dialog with community leaders and the media. As remedial activities proceed, a focused community relations plan will be developed to facilitate community involvement with site activities and to formalize USACE methods to inform the public on site activities as well as methods for conflict resolution. Guidelines for establishing a community relations program are included in this section.

This guidance was prepared in accordance with USEPA *Community Relations in Superfund: A Handbook*, 1992 and the DOD/USEPA *Restoration Advisory Board Implementation Guidelines*, 1994.

4.1 COMMUNITY RELATIONS REQUIREMENTS AND POLICIES

This section presents community relations activities that are required under the 1990 National Oil and Hazardous Substance Pollution Contingency Plan (NCP), in the Superfund Amendments and Reauthorization Act of 1986 (SARA), and USEPA policy documents such as OSWER Directive 9295.2-03, *Interagency Agreement Between the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency in Executing P.L. 96-510 (CERCLA)* (December 1994). SARA states that USEPA guidelines, rules, regulations, and criteria are applicable to federal agencies.

Merely fulfilling these required activities may not result in adequate community relations efforts, however they do provide a foundation for an effective program. The activities required for community relations under CERCLA are described in Table 4-1. Some of these activities may not be required at PBOW since the site is not yet listed on the National Priority List (NPL).

4.2 COMMUNITY RELATIONS INTERVIEWS

Information generated about community concerns and information requirements during the community relations interviews provides the basis for preparation of the Community Relations Plan (CRP). Included in the interviews are State of Ohio and local officials, past employees, community leaders, media representatives, citizen's groups, interested citizens, area residents, local business representatives

Table 4-1. CERCLA Community Relations Requirements

ACTIVITY	REQUIREMENT	REQUIREMENT SOURCE(S)
REMOVAL ACTIONS		
Agency Spokesperson	The agency shall designate a spokesperson to inform the public about the release and actions taken, to respond to questions, and to notify immediately affected citizens and state and local officials	NCP §300.415(m)(1)
Administrative Record (AR)	The agency must establish an AR and make it available to the public at a central location at or near the site, if applicable	SARA §113(k) NCP §300.820
FOR REMOVAL ACTIONS WITH PLANNING PERIODS OF LESS THAN SIX MONTHS		
Notice and Availability of AR	Within 60 days of on-site removal activity, the lead agency must make the AR available and issue a Notice of Availability in a major local newspaper of general circulation	NCP §300.415(m)(2)(ii)
Public Comment Period	The agency must provide a public comment period, if appropriate, of no less than 30 days from the date the AR is made available	NCP §300.415(m)(2)(ii)
Response to Significant Comments	The agency must prepare a written response to significant comments	NCP §300.415(m)(2)(ii)
FOR REMOVAL ACTIONS EXPECTED TO EXTEND BEYOND 120 DAYS		
Community Interviews	By the end of the 120-day period, the agency must conduct interviews with local officials, public interest groups, or other interested parties to determine their concerns and information needs, and to learn how citizens would like to be involved in the remediation process	NCP §300.415(m)(3)(i)
Community Relations Plan	The agency must prepare a formal CRP, based on community interviews and other relevant information, that specifies the community relations activities the agency plans to undertake. The CRP must be completed within 120 days of the start of on-site removal activity	NCP §300.415(m)(3)(ii)

Table 4-1. Continued

ACTIVITY	REQUIREMENT	REQUIREMENT SOURCE(S)
Information Repository Establishment and Notification and Notice of Availability of AR	Within 120 days of the start of on-site removal activity, the agency must establish an information repository at or near the site that contains AR materials and must publish a Notice of Availability of the AR	NCP §300.415(m)(3)(iii)
FOR REMOVAL ACTIONS WITH A PLANNING PERIOD OF AT LEAST SIX MONTHS		
Community Interviews and CRP	In addition to the above, the agency must conduct interviews and prepare a CRP prior to the completion of the engineering evaluation/cost analysis (EE/CA)	NCP §300.415(m)(4)(i)
Information Repository/AR Establishment and Notification	In addition to the above, the agency must establish the repository and publish the notice no later than the signing of the EE/CA approval memorandum	NCP §300.415(m)(4)(i)
Notice of Availability/Description of the EE/CA	The agency must publish a Notice of Availability and a brief description of the EE/CA in a major local newspaper of general circulation	NCP §300.415(m)(4)(ii)
Public Comment Period	Upon completion of the EE/CA, the agency must provide a minimum of 30 days for the submission of written and oral comments. Upon timely request, the agency must allow a comment period extension of 15 days	NCP §300.415(m)(4)(iii)
Responsiveness Summary	The agency must prepare a written response to significant comments and make the summary available to the public in a repository	NCP §300.415(m)(2)(iv)

Table 4-1. Continued

ACTIVITY	REQUIREMENT	REQUIREMENT SOURCE(S)
REMEDIAL RESPONSES		
PRIOR TO REMEDIAL INVESTIGATION (RI)		
Community Interviews	The agency must hold on-site discussions with local officials and community members to assess their concerns and determine appropriate community relations activities	NCP §300.430(c)(2)(i)
Community Relations Plan	The agency must develop and approve a complete CRP, based on community interviews, prior to the commencement of field activities	NCP §300.430(c)(2)(ii)(A-C)
Information Repository	The repository must be established and be made available, with adequate notice, to the public for reading and/or copying	SARA §117(d) NCP §300.430(c)(2)(iii)
Technical Assistance Grant (TAG) Notification	The agency must inform the public of the availability of TAGs and place material relevant to TAGS in the repository	NCP §300.430(c)(2)(iv)
UPON COMMENCEMENT OF REMEDIAL INVESTIGATION		
Administrative Record	The agency must establish an AR and consider participation of interested persons in its development	SARA §113(k) NCP §300.815
AR Notification	The agency must publish a Notice of Availability of the AR in a major local newspaper with general circulation	NCP §300.815

Table 4-1. Continued

ACTIVITY	REQUIREMENT	REQUIREMENT SOURCE(S)
UPON COMPLETION OF THE FEASIBILITY STUDY (FS) AND PROPOSED PLAN		
RI/FS and Proposed Plan Notification and Analysis	The agency must publish a Notice of Availability of the RI/FS and proposed plan, including a brief summary of the proposed plan and the announcement of a comment period, in a major local newspaper of general circulation	SARA §117(a) and (d) NCP §300.430(f)(3)(i)(A)
Public Comment Period	The agency must provide a minimum of 30 days for the submission of written and oral comments. Upon timely request the agency must allow a comment period extension of 30 days	SARA §117(a)(2) NCP §300.430(f)(3)(c)
Public Meeting	The agency must provide an opportunity for a public meeting to be held at or near the site during the comment period	SARA §113 and §117(a)(2) NCP §300.430(f)(3)(i)(D)
Meeting Transcript	The agency must prepare and make available to the public a meeting transcript	SARA §117(a)(2) NCP §300.430(f)(3)(i)(E)
Notice and Comment Period on the Administrative Order on Consent or Consent Decree	A notice of the proposed settlement must be published in the <i>Federal Register</i> at least 30 days before the agreement becomes final. The notice must state the name of the facility and the parties to the proposed agreement. Those persons who are not parties to the agreement must be provided an opportunity to file written comments for a period of 30 days.	SARA §122(i) NCP §300.430(c)(5)(i)
Responsiveness Summary	The agency must prepare a response to significant comments, criticisms, and new data submitted and ensure that this response document accompanies the ROD	SARA §113 and §117(b) NCP §300.430(f)(3)(i)(F)

Table 4-1. Continued

ACTIVITY	REQUIREMENT	REQUIREMENT SOURCE(S)
PRE-ROD SIGNIFICANT CHANGES		
Discussion of Significant Changes	Upon determination that such changes could be reasonably anticipated by the public, the agency must include in the ROD a discussion of the changes and the reasons for their inclusion	NCP §300.430(f)(3)(ii)(A)
Revised Proposed Plan and Public Comment	Upon determination that such changes could not have been reasonably anticipated by the public, the agency must issue a revised Proposed Plan that includes a discussion of the changes and the reasons for their inclusion. The agency must seek additional public comment.	NCP §300.430(f)(3)(ii)(B)
AFTER THE ROD IS SIGNED		
ROD Availability and Notification	The agency must make the ROD available for public inspection and copying at or near the site prior to the commencement of remedial activity. The agency must publish a Notice of Availability of the ROD in a major local newspaper with general circulation and include the basis and purpose of the selected action.	NCP §300.430(f)(6)
Revision of the CRP	Prior to remedial design, the agency should review the CRP and revise it, if necessary, to reflect community concern pertaining to the remedial design and construction phase	NCP §300.435(c)(1)
POST-ROD SIGNIFICANT CHANGES: When the remedial action, settlement, or consent decree differs significantly from the remedy selected in the ROD with respect to scope, performance, or cost		
Notice of Availability of Explanation of Significant Differences	The agency must publish a notice that briefly summarizes the significant differences and the reasons for the differences in a major local newspaper with general circulation, and make the supporting information available to the public in the AR	NCP §300.435(c)(2)(ii)(A)

Table 4-1. Continued

ACTIVITY	REQUIREMENT	REQUIREMENT SOURCE(S)
<p>POST-ROD SIGNIFICANT CHANGES: When the remedial action, settlement, or consent decree fundamentally alters the basic features of the selected remedy with respect to scope, performance, or cost</p>		
Notice of Availability of Proposed ROD Amendment	The agency must proposed an amendment to the ROD and issue a Notice of Availability with a brief description in a major local newspaper with general circulation	NCP §300.435(c)(2)(ii)(A)
Public comment, Public Meeting, Meeting Transcript, and Responsiveness Summary	The agency must follow the same procedures as required for the completion of the FS and Proposed Plan	NCP §300.435(c)(2)(ii)(B)-(F)
Notice of Availability of Amended ROD	The agency must publish a Notice of Availability of the amended ROD in a major local newspaper with general circulation and make the amended ROD and supporting information available in the AR prior to initiation of the remedial action affected by the amendment	NCP §300.435(c)(2)(ii)(G) and (H)
<p>REMEDIAL DESIGN</p>		
Fact Sheet and Public Briefing	Upon completion of the final engineering design, the agency must issue a fact sheet and provide a public briefing, as appropriate, prior to initiation of remedial action	NCP §300.435(c)(3)
<p>NPL ADDITIONS</p>		
Publication of Proposed Rule and Public comment Period	USEPA must publish the proposed rule in the <i>Federal Register</i> and seek comments	NCP §300.425(d)(5)(i)
Publication of Final Rule and Response to Comments	USEPA must publish the final rule in the <i>Federal Register</i> and respond to significant comments and significant new data submitted	NCP §300.425(d)(5)(ii)

Table 4-1. Continued

ACTIVITY	REQUIREMENT	REQUIREMENT SOURCE(S)
NPL DELETIONS		
Public Notice and Comment	USEPA must publish a Notice of Intent to Delete in the <i>Federal Register</i> and provide Notice of Availability in a major local newspaper. USEPA must allow a comment period of at least 30 days	NCP §300.425(e)(4)(i) and (ii)
Public Access to Information	Copies of information supporting the proposed deletion must be placed in a repository	NCP §300.425(e)(4)(iii)
Response to Significant Comments	USEPA must respond to significant comments and significant new data submitted and include the written responses in the final deletion package	NCP §300.425(e)(4)(iv)
Availability of Final Deletion Package	The final deletion package must be placed in the local repository once the notice has been placed in the <i>Federal Register</i>	NCP §300.425(e)(5)

Source: USEPA, Community Relations in Superfund: A Handbook, 1992.

(Chambers of Commerce), local civic groups, local chapters of public interest groups (Sierra Club, League of Women Voters), school officials, and any potentially interested parties. The interviews should be conducted in an informal setting and on either a one-on-one basis or in small groups composed of persons with similar concerns, such as school board representatives. The list should not be limited to only the most vocal groups, but should be representative of the community. Usually, a successful interview schedule includes between 15 and 25 interviews, the number depends on the size of the potential remediation project and the evident level of local concern and should be sufficient for PBOW. The target number of interviews should be sufficiently flexible to add interviews as persons or groups with significant concerns or information are identified.

Personnel conducting the interviews should be thoroughly familiar with the site and potential remediation activities, as well as the concerns of the local community. Local issues can include: proximity of residences and schools, site visibility, presence of livestock or crops near the site, location of water supplies and recreational water bodies, site access controls, other Superfund sites, and past experiences with federal officials (USACE, NASA).

4.3 THE COMMUNITY RELATIONS PLAN (CRP)

A CRP is required under the NCP for all remedial or removal actions requiring more than 120 days for completion. The design of the CRP generally involves identifying citizen's concerns, their requirements for information, and developing a plan to address these concerns and requirements. Specific techniques and approaches for fulfilling community relations requirements vary with site location, the technical complexity of the potential remediation, and the level of community-desired involvement identified during the interviews. Public input should be solicited throughout the remediation process and community activities should be scheduled to coincide with site milestones.

As indicated in Table 4-1, the CRP must be completed prior to the start of an RI/FS and outline all planned community relations activities and notifications. The PBOW CRP should identify specific methods for informing the public when an AOC has been identified as not requiring further action. Revisions of the CRP are not required until after a ROD has been signed, however, review and updating the PBOW CRP as changes occur, particularly when AOCs are identified as requiring no further action, or on a quarterly basis, is good policy.

Recommended CRP format (USEPA 1992) consists of the following:

- **Section 1, Overview of the CRP** - outlines the purpose and features of the community relations effort at the site and identifies site-specific goals.
- **Section 2, Site Description** - presents site location, history, contaminants of concern, nature of hazard, previous investigations, lead agency responsible.
- **Section 3, Community Background** - contains community profile, history of community involvement, and key community concerns and perceptions as identified in the interviews.
- **Section 4, Community Relations Program** - site-specific community relations program for the site listing planned activities, methods of communication, resources available, key community individuals or organizations, and areas of special sensitivity.
- **Section 5, Community Relations Activities and Timing** - the required and recommended activities and when they should be conducted with additional activities that may become required with new findings or a change in site status (if PBOW becomes listed on the NPL).
- **Appendix A, Contact List** - contains a listing of persons contacted during the interviews and persons to receive information about the site. The CRP that is made public contains no addresses or telephone numbers. A suggested list includes: federal, state, and local elected officials; citizen's and environmental groups; USEPA regional officials; Ohio environmental officials; local protective services officials; and the media.
- **Appendix B, Suggested Locations for Meetings and Information Repositories** - suggested locations for public meetings include: schools, town halls, library meeting rooms, meeting rooms of local service groups, The AR could be installed in libraries, town halls, or county offices. Hours of availability, contacts, and room capacities should be included.

4.4 RESTORATION ADVISORY BOARD

To increase the involvement of communities at military facility remediation sites, DOD and USEPA have developed joint guidelines for establishing Restoration Advisory Boards (RABs) (*Restoration Advisory Board Implementation Guidelines*, DOD and USEPA, 1994). RABs have been created to provide a forum for expression of differing points of view from diverse community groups and stakeholders (parties

actually or potentially affected by restoration activities) and to provide advice to decision-makers on restoration issues. The RAB does not replace community relations activities, but complements other community involvement efforts.

USEPA's involvement on a RAB will vary dependent upon the site's NPL status. USEPA's involvement is at the discretion of the regional office for non-NPL sites and installations where USEPA has not been funded by DOD. Ohio EPA should be invited to participate. Ohio EPA and USEPA Region V offices should be kept informed of RAB activities, regardless of their decision to participate.

4.4.1 The Initial Meeting

Prior to forming the RAB, a fact sheet should be distributed which describes the purpose of the RAB and opportunities for membership and participation, membership selection process, and responsibilities of membership. This is to be followed by a public notice of the RAB informational meeting in a major local newspaper of general circulation. The notice should include the date, time, and location of the meeting; the purpose of the RAB; membership opportunities; name and phone number of a contact for additional information; proposed topics for discussion; and that the meeting is open to all interested persons. A separate press release would also be appropriate. Suggested timing would be to place the notice one to two weeks prior to the meeting and the press release just a few days prior to the meeting.

The initial RAB meeting should be run by a professional facilitator. This provides the public with a sense of being on the same footing as the USACE and may provide for a more relaxed atmosphere. At the RAB information meeting, a brief description of the site and potential remediation is presented. Community concerns previously identified by site personnel (and Ohio and U.S. EPAs, at their discretion) should be discussed and an opportunity for identification of additional concerns allowed. The RAB, membership, membership selection, and responsibilities are also discussed. A list of potential interest groups can be made with attendee participation to ensure that there is a full representation of the diversity of the community. A question and answer period is also included.

4.4.2 Formulating the RAB

RAB members should be chosen by a selection panel which has in turn been selected by the USACE Project Manager in consultation with the NASA Institutional Operations Manager. The members of the selection board should reflect the significant interests of the community and live within the potentially affected community. Some potential interest groups include, but are not limited to:

- Local residents and community members (including minorities and lower income groups)
- Local government officials
- Local agencies
- Business leaders
- School districts
- Installation employees
- Local/regional environmental groups/activists
- Civic and public interest groups
- Religious community
- Physicians/health care providers
- Other regulatory agencies
- Local homeowners organizations
- Native American nations.

USACE Huntington and Nashville Districts, NASA, Ohio EPA, and USEPA should each have one representative dedicated to serving on the RAB. The size of the RAB is to be determined by the selection committee, but should not exceed approximately 20.

Once the selection panel has identified potential RAB members, a list of the RAB nominees is presented to the Project Manager, who approves final selection. The only grounds for refusing a nomination list is lack of diversity. A recruiting letter with a community interest form to be filled out and returned is sent to each individual nominated. If there is insufficient positive response, local interest groups may be solicited for nominations. A letter should also be sent to each individual who expressed interest but was not selected, thanking them for their interest and indicating any potential activities in which they could participate.

The selection panel is also to establish procedures for additions to and removals from the RAB. Conflict of interest issues should also be established. DOD contractors should not be RAB members. However, RAB members who have business interests should not be limited in their ability to compete for contracts.

4.4.3 RAB Operations

Once the RAB is officially formed, it should develop its own operating procedures. Some issues to be decided include:

- **Co-Chairpersons** - method of selection and term. One chairperson is a USACE project staff member and the other is usually elected by the community members of the RAB. Terms range from one to three years.

- **Initial Fact Sheet** - published to announce the RAB's formation, members, and meeting schedule. It also encourages participation and thanks persons who expressed an interest.
- **Mission Statement** - articulates the overall purpose of the RAB.
- **Operating Procedures** - establish policies on schedules of regular meetings, attendance, membership (removal and additions/replacements), membership and office terms, dispute resolution, reviewing and responding to comments, and public participation.
- **Training** - some initial training for community members may be required to familiarize them with the site, the remediation process, and other technical issues. This may occur as workshops, briefings, tours, briefing packets, or formal training sessions.
- **Administrative Support** - USACE is responsible for providing adequate administrative support to the RAB such as meeting facilities, preparation of minutes, copying of documents and/or fact sheets, mailings, newspaper notices, mailing list management, distribution of outreach materials, and meeting facilitation. This support is to be provided from DERP funds.
- **Conducting the Meetings** - regular attendance should be required and meetings should take place in a central location. Each meeting should have an agenda and be open to the public. Consensus is not a prerequisite for RAB recommendations. Consenting opinions are allowed. The format will vary dependent on subjects to be discussed and the composition of the RAB. Summary meeting minutes should be prepared, reviewed by the co-chairs, and made available to members and the public within two weeks of the meeting. A public notice announcing the availability of the minutes and the time, date, and location of the next meeting should be published. The USACE is responsible for copying and distribution of meeting minutes.

The RAB should receive copies of all major site reports and documents for review and comment. However, as the RAB does not constitute the public in its entirety, these reports and documents must also be available in the AR files to ensure for review and comment.

4.4.4 Roles and Responsibilities

The principle roles in the RAB are the co-chairs, community members, Ohio EPA representative, and the USEPA representative. Their specific responsibilities include:

- **USACE Co-Chairperson** - coordinates with community chair to prepare agenda prior to each meeting; ensures that USACE participates in an open and constructive manner; attends all meetings and ensures RAB has the opportunity to participate in the restoration decision process; ensures that community concerns are addressed; distributes site documents to the RAB and the public; assists in development and maintenance of a mailing list of interested persons; provides relevant guidance and policy documents; provides adequate administrative support; addresses non-restoration issues to the proper agency; and reports progress to other USACE staff.

- **Community Co-Chairperson** - coordinates with USACE chair to prepare agenda prior to each meeting; ensures that community members participate in an open and constructive manner; ensures that all community issues and concerns related to the restoration are raised; assists in dissemination of information to the community; serves without compensation.
- **RAB Community Members** - attend all meetings; provide advice and comment on restoration issues; represent and communicate community interests and concerns; act as conduits for an exchange of information among USACE, the community, and oversight agencies; review, evaluate, and comment on site-related reports and documents; serve without compensation.
- **Ohio EPA Representative** - attends meetings; serves as an information, referral, and resource service for the community and the USACE concerning restoration issues; reviews, evaluates, and comments on restoration-related reports and documents; ensures that Ohio environmental standards and regulations are identified and addressed; facilitates flexible and innovative solutions; assists in training of RAB community members.
- **USEPA Representative** - attends meetings; serves as an information, referral, and resource service for the community and the USACE concerning restoration issues; reviews, evaluates, and comments on restoration-related reports and documents, as appropriate; ensures that federal environmental standards and regulations are identified and addressed; facilitates flexible and innovative solutions; assists in training of RAB community members.

4.5 CONDUCTING COMMUNITY RELATIONS PROGRAMS

The following is a brief description of community relations activities that are required or recommended for each stage of a site remediation (some of the stages of remediation identified may not be required for PBOW):

- **Preliminary Assessment** - initial consultation with state agencies, USEPA, other agencies and local officials; inform interested officials of results.
- **Site Inspections** - provide notice to local community concerning field sampling program, stressing fact-finding nature and the potential outcomes (remediation or no further remediation required); lay groundwork for a potential RI/FS by identifying community leaders and organizations, create a mailing list, set up a hotline for information, designate an agency contact person; present interested person and groups with results of inspection.
- **NPL Listing Process** - notify community about pending listing, providing information on implications, methods for providing comment; identify locations for public meetings and hold a public meeting; initiate TAG awareness program.
- **Remedial Investigations** - prepare site mailing list; designate agency contact, if not already identified; conduct interviews; prepare CRP; identify locations for repository and establish AR

with public notice; hold public meeting/briefing or distribute fact sheet to discuss completed CRP and RI workplan; seek public input with workshops or small focused meetings.

- **Feasibility Studies** - informal meetings, workshops, and/or briefings during the FS development; issue fact sheets and news releases discussing progress; maintaining AR.
- **Proposed Plan** - review proposed plan for clarity; publish Notice of Availability, brief summary, and comment period; make proposed plan and supporting information available; hold public meeting; prepare responsiveness summary; publish a newspaper notice of the ROD.
- **Remedial Design** - review CRP and revise as required; review and evaluate community relations activities to date; issue fact sheet and/or publish newspaper notice on engineering design; hold public briefing prior to initiation of design.
- **Remedial Action** - issue fact sheets, briefings, workshops, and/or newspaper notices on progress.
- **Operations and Maintenance** - monitor community concerns; keep public informed, as appropriate. For planned shutdowns, provide advance notification of the shutdown, its duration, and reasons. The Public should be immediately informed of any unplanned shutdowns, anticipated duration, and reasons. Identify any potential changes in site appearance due to weather conditions and prepare the public for the potential changes (water vapor above an air stripping tower may become visible during periods of cold temperatures.). Inform the public of long-term site potential.
- **NPL Deletion Process** - coordinate with USEPA regional staff in providing assistance with activities involved with a Notice of Intent to Delete.

4.6 COMMUNITY RELATIONS RESPONSIBILITIES OF OTHER AGENCIES

Coordination among agencies is essential to ensure effective community involvement and minimal potential conflict. Formal participation is required of States in the CERCLA process. Prior to initiation of a remedial action, the State of Ohio must provide assurance that it will assume responsibility of operations and maintenance of a site, if necessary, and must provide an acceptable off-site disposal facility, if required. The State of Ohio is also involved in the settlement process between USEPA and USACE and may legally challenge USEPA's remediation selection. Appropriate State officials are to be allowed opportunity to review and comment on PBOW reports. Effort must be made to ensure State officials are included in all community relations activities and are kept well informed of site activities.

No mandatory community relations require involvement of other agencies except USEPA, which has oversight authority and responsibility in CERCLA remediation. However, it is advisable to include other agencies on PBOW community relations mailing lists and provide invitations to public meetings and briefings.

4.7 THE TECHNICAL ASSISTANCE GRANT (TAG) PROGRAM

Congress authorized the Technical Assistance Grants (TAGs) program to provide communities near CERCLA sites an opportunity to become well-informed and involved with the remediation process. Local groups affected by CERCLA sites (a facility on the NPL or eligible for listing where work has begun) are provided grants of up to \$50,000. Groups may use the funds to hire a technical advisor to help them interpret available information on the site, but not to develop new information or to underwrite legal actions. Technical services included as eligible for payment under the TAGs program include: reviewing site-related documents, meetings with the group to explain technical information, assistance with communicating concerns, site visits, and attending site meetings and hearings.

The TAGs monies are intended to cover a three-year period, additional funding may be available with application. Groups must supplement some of the funding with in-kind contributions. Assistance in application completion is provided by USEPA regional offices.

4.8 RISK COMMUNICATION

An understanding of the principles of risk communication is an essential part of an effective community relations program. The basic objectives of an effective risk communication program are designed to increase:

- Agency awareness of community perceptions at the site.
- Public understanding of the chemicals of concern and their potential effects on human health and the environment.
- Public understanding of the risks of remediation.
- Public understanding of the use of risk assessment in decision-making.

USEPA has developed *Seven Cardinal Rules of Risk Communication*:

- Accept and involve the public as a legitimate partner.
- Plan carefully and evaluate your efforts.
- Listen to the public's specific concerns.
- Be honest, frank, and open.
- Coordinate and collaborate with other credible sources.
- Meet the needs of the media.
- Speak clearly and with compassion.

The first task of risk communication is to explain that the requirements for a risk to exist must include all of the following:

- site contamination
- pathways for the contamination to reach surrounding populations
- populations at or near the site that may be exposed.

If any one of these factors is missing, there is no risk.

4.8.1 Technical Versus Non-Technical Issues

One of the most difficult aspects of risk communication is merging the technical issues of the site with the public's concerns. Technical staff that are expected to present technical information to the public should be advised that the public's perception of risk is most often driven by non-technical concerns. These must be addressed in addition to technical issues, otherwise there will likely be a perception that the technical representative is not communicating and, therefore, may be hiding something. These concerns will have been identified in the interviews.

There is a definite linkage between perceptions of risk and the amount of control held over the risk factor. Once community involvement is established, and there is a perception of having some control over remediation, there will be increased willingness to listen to technical discussions of risk.

4.8.2 Risk Comparisons

Risk comparisons can put a situation in perspective, but inappropriate comparisons can have extremely negative results. The following are guidelines for risk comparisons:

- Avoid addressing an acceptability of risk, merely compare risks.
- Do not compare voluntary risks (e.g., accidents resulting from speeding) with involuntary risks (e.g., deaths resulting from ground-water contamination).
- Do not trivialize risk (e.g., "there are greater chances of dying from carcinogens in peanut butter than in drinking this ground water").
- Quantity comparisons are more useful than probability comparisons.
- Use risk comparisons with standards used at other sites.

- Compare different estimates of the same risk.
- Present comparative risks for all alternatives.

4.9 INTERAGENCY COORDINATION

An important function of community relations personnel at any remediation site is coordination of all agencies involved in the cleanup. Public input must be channelled to the appropriate organizations and information must be disseminated to the community from a variety of sources.

For sites not listed on the NPL, community relations activities must be conducted according to state law. USACE community relations guidelines may be used at PBOW if they are not inconsistent with CERCLA and USEPA guidelines.

The majority of interagency community relations requirements only become applicable to a site once the site is listed on the NPL. For federally-owned sites, site-specific Interagency Agreements (IAG) are entered into by the site owner or PRP and USEPA. These often detail community relations responsibilities. There is at this time no IAG between USACE and USEPA concerning PBOW. Another agency that may become involved with a federally-owned NPL site is the Agency for Toxic Substances Disease Registry (ATSDR). ATSDR is required under SARA to perform a health assessment at each NPL site and may perform them at non-NPL sites upon request. These health assessments combine site-specific risk assessment information with health data on local residents and/or site workers. ATSDR may be requested to perform community relations activities such as issuing notices and fact sheets or conducting public meetings or workshops.

Each state is required, under CERCLA and SARA, to identify the state agencies to be involved with each response action, describe the agencies' roles in the remediation, and oversee the participants. State and local officials can also provide information on the site and possibly serve as liaison between the lead agency and community groups. Under the DSMOA program, the State of Ohio is eligible for DOD funding to assist with the costs of DERP-FUDS oversight (Section 2.0 of Part A). Some of this funding can be used for community relations activities.

Federal and state agencies have an additional role in CERCLA, that of trustees of natural resources. Examples of these agencies are Department of Interior, U.S. Department of Agriculture, Department of Commerce, Ohio Department of Natural Resources, and Native American nations. These agencies must be notified by USEPA of any potential for natural resource damages arising from releases. USEPA must also provide coordination among the agencies in the assessments, investigations, and planning in the

determination of the magnitude of the damages. PRPs can be assessed a fine to repay the amount of damage determined to have been effected on natural resources by the release.

5.0 RANKINGS OF AREAS OF CONCERN

The Hazard Ranking System (HRS) is used by the EPA's superfund program to assess the relative threat associated with actual or potential releases of hazardous substances. The HRS is the primary screening tool to determine if a site is to be included on the National Priorities List (NPL). The NPL identifies sites that are priorities for further investigation and that are a potential risk to public health or to the environment. A site scoring 28.5 or greater on the HRS is eligible for the NPL. The 28.5 HRS score does not represent a specified level of risk, but is merely a cutoff point that serves as a screening-level indicator for the highest priority releases or threatened releases. Sites that score below 28.5 are normally addressed by State authorities and any federal agencies directly involved with the site.

5.1 HAZARD RANKING SYSTEM INVESTIGATIONS AT PBOW

Two HRS assessments have been performed for AOCs at PBOW: in the 1991 Preliminary Assessment by SAIC and in the 1994 Site Inspection by Morrison Knudsen. Detailed descriptions of these rankings are included in Section 15.0 of Part B.

5.1.1 SAIC Preliminary Assessment, 1991

The HRS evaluation of PBOW by SAIC in 1991 included the ground water migration pathway, surface water migration pathway, soil exposure pathway, air migration pathway, and the overall site score. Individual AOCs were scored separately for each exposure pathway. Only one AOC, the Red Water Ponds, scored near the eligibility score of 28.5, with an overall score of 26.66. The other AOCs received low scores primarily because low values were assigned to the Target and Waste Characteristics Factor Values. Although Target Demographic Values were reasonably accurate, the Waste Characteristic Factor Values were not as representative because limited information was available on waste quantities. Because the division of PBOW into 14 AOCs may have diluted the effect of HRS scoring, an overall score for PBOW was generated incorporating all identified sources and overall site conditions. This scoring produced a site score of 34.8, developed from a ground-water pathway score of 33.3, a surface water pathway score of 28.7, a soil exposure pathway score of 28.7, and an air pathway score of 45.5. Based on this approach, the PBOW cumulative score exceeded the eligibility value of 28.5.

5.1.2 Morrison Knudsen Site Inspection, 1994

The HRS evaluation of PBOW by Morrison Knudsen (1994) included the ground-water migration pathway, the surface water pathway, the soil exposure pathway, and the air migration pathway, resulting in an overall score of 7.99. The individual pathway score for ground water was 2.09; for surface water, 0.18; for soil exposure, 15.88; and for air migration, 9.22. Individual Project Management Units (PMUs) were also scored separately. All individual scores were below the overall site score, except PMU 3 with Plum Brook as its major surface water body. The high scores at PMU 3 are due to the presence of several coal tar derivatives that were detected in sediment samples collected near the intersection of the streams with asphalt roads.

5.2 PRIORITIZATION

Of the 41 potential sources of environmental contamination in 13 AOCs discussed in Part B of this SMP (Sections 2.0 through 14.0), 25 have documented contamination in surface and subsurface soils, three have shown no contamination in either surface or subsurface soils, and 13 have not been sampled in these media. Sediment and ground-water contamination has been detected at numerous locations, and in some cases this contamination may be correlated with specific sites which may affect their HRS scores and priority rankings. Elevated levels of COCs have not been detected in any of the surface water samples analyzed from the site. Sampling at many of the sites and AOCs has not been sufficient to determine their significance as potential source areas of contamination, or their priority ranking for site remediation.

Due to a lack of information on some of the AOCs at PBOW, it is recommended that a Site Inspection be conducted to evaluate the presence of contamination in these areas. These AOCs include the Acid Areas, the Pentolite Area, the Garage and Maintenance Area, and the TNT Rail Car Loading Areas. In addition, the historical evaluation conducted by Dames & Moore (1995) suggested alternate locations for some sites, including Ash Pit #1, Ash Pit #2, and Reservoir #2 Burn Ground. A Site Inspection of these sites is also recommended.

Based on previous investigations and historical activities at PBOW, the following preliminary prioritization for remedial action is recommended for the AOCs described in this SMP:

Priority 1: Ground Water, Red Water Ponds, and TNT Areas.

Priority 2: Underground Wastewater Flumes, Burn Grounds, Toluene Tank Areas, Acid Areas, and Pentolite Area.

Priority 3: Ash Pits and Power Plants, Waste Lagoons, Garage and Maintenance Area, and Rail Car Loading Areas.

5.2.1 Interactions of AOCs

Based on preliminary investigations, contaminants originating from some AOCs may travel via air or surface or ground water to have an affect on other AOCs. These potential impacts should be considered prior to initiation of remediation. For example, if an upstream AOC undergoes remediation after a downstream AOC is considered "clean", any contaminants dislodged during remediation could possibly reach the downstream locations, contaminating the "clean" location. Two of the AOCs listed in Priority 1, Red Water Ponds and TNT Areas, may be affected by surface water runoff from other AOCs. Detailed descriptions of AOC interactions is included in Section 16.0 of Part B. Also, some AOCs overlap, and remediation efforts in these areas should be combined to avoid mutual interference. Specifically, the underground wastewater flumes and TNT rail car loading areas are located within the TNT Areas, and should be investigated at the same time as the TNT Areas.

5.2.2 Background Chemical Data

Background chemical information is a necessary part of environmental investigations. To determine the nature and extent of contamination, background conditions must be established. To provide background information that will be used consistently with each site investigation, it is recommended that USACE conduct a separate background study for the PBOW site. This study should involve sampling and analysis of ground water, soils, surface water, and sediment at locations selected to represent conditions near the site that are unaffected by past or current site activities. The number of samples in each medium should be sufficient to provide statistical confidence in the background values.

5.3 DOD RELATIVE RISK EVALUATION

Each AOC at PBOW will also undergo a risk evaluation using the DOD Relative Risk Evaluation process which is designed to assess the relative risks of DERP sites. The goal of the evaluation is to ensure that sites with a higher risk (relative to other sites) are generally considered first in the prioritization process, and that available funds in DERP are directed to those sites. The evaluation of relative risk is used in conjunction with other management concerns, such as regulatory agreements, to assist in the sequencing of restoration activities. The evaluation results in a ranking of sites or AOCs into high, medium, or low categories, based on relative risk. This ranking is not a substitute for a baseline risk assessment, nor does it serve to place a site or AOC into a "no further risk" category. It is, rather, a relative evaluation of site

information at one point in time, based on a quantitative analysis of three factors: contaminant hazards, migration pathways, and receptors.

This evaluation framework will be used at PBOW to assess both the relative risk of each AOC within the site, and to assess the relative risk present at PBOW compared to other sites within the DERP program.

6.0 PROJECT SCHEDULES

All work identified in the PBOW WBS will be scheduled in accordance with the guidance of USACE document ER 5-7-1(FR). A project management summary schedule will be developed to encompass major partner and management requirements. The summary schedule should correspond to the WBS and should identify milestones. Additional levels of schedules should be developed as needed. Lower level schedules must be compatible with each other, the project management summary schedule, and the WBS. Schedules should not be made final until resource requirements have been identified and resource allocation plans have been prepared. Detailed schedules may be provided in the PMP Appendix, and maintained to reflect current work plans.

6.1 SCHEDULE ASSUMPTIONS

A preliminary summary schedule has been prepared for conducting environmental investigations at PBOW. The schedule presents only the upper-level WBS elements for each of the areas of concern (AOCs). It is based on the current level of understanding of the site, the status of past and current investigations of the AOCs, and the priority rankings of the AOCs discussed in Section 15.0 of Part B and summarized in Section 5.0 of Part C of this SMP. Several scheduling assumptions were used to develop this schedule. These assumptions include:

- Work on Priority 1 AOCs will begin 1 October 1995 (start of the federal fiscal year).
- Work on Priority 2 AOCs will begin 1 October 1996.
- Work on Priority 3 AOCs will begin 1 October 1997.
- The initial activity at each AOC depends on the status of investigations conducted to date (e.g., the TNT Areas begin with an RI/FS because their SIs have been completed; the Acid Areas begin with a PA because they have not yet been studied). The starting dates and stages of investigation for each AOC are shown in Table 6-1.
- PAs, SIs, RI/FS, and RDs are each assumed to have a duration of one year.
- An RA has been assigned a duration of two years.

Changes in AOC rankings could alter the schedule shown in Table 6-1. Rankings of AOCs (priority levels) are subject to change as more information becomes available through site investigations.

Table 6-1. PBOW Site Restoration Schedule

Priority Ranking	AOC	Start Date ^a / Duration (months)				
		Preliminary Assessment	Site Inspection	Remedial Investigation	Remedial Design	Remedial Action
1	Ground Water	Completed ¹	Completed ²	1995 / 12	1996 / 12	1997 / 24
	West Area RW Ponds	Completed ¹	Completed ²	Completed ²	1995 / 12	1996 / 24
	Pentolite Rd. RW Ponds	Completed ¹	Completed ²	Completed ²	1995 / 12	1996 / 24
	TNT Area A	Completed ¹	Completed ²	1995 / 12	1996 / 12	1997 / 24
	TNT Area B	Completed ¹	Completed ²	1995 / 12	1996 / 12	1997 / 24
	TNT Area C	Completed ¹	Completed ²	1995 / 12	1996 / 12	1997 / 24
2	Wastewater Flumes	Completed ¹	1996 / 12	1997 / 12	1998 / 12	1999 / 24
	Reservoir #2 Burn Ground	1996 / 12	1997 / 12	1998 / 12	1999 / 12	2000 / 24
	G-8 Burn Ground	Completed ¹	1996 / 12	1997 / 12	1998 / 12	1999 / 24
	Taylor Rd. Burn Ground	Completed ¹	Completed ³	1996 / 12	1997 / 12	1998 / 24
	Snake Rd. Burn Ground	Completed ¹	Completed ⁴	1996 / 12	1997 / 12	1998 / 24
	Fox Rd. Burn Ground	Completed ¹	1996 / 12	1997 / 12	1998 / 12	1999 / 24
	Upper Toluene Tanks	Completed ¹	1996 / 12	1997 / 12	1998 / 12	1999 / 24
	Middle Toluene Tanks	Completed ¹	1996 / 12	1997 / 12	1998 / 12	1999 / 24
	Lower Toluene Tanks	Completed ¹	1996 / 12	1997 / 12	1998 / 12	1999 / 24
	Acid Area 1	1996 / 12	1997 / 12	1998 / 12	1999 / 12	2000 / 24
	Acid Area 2	1996 / 12	1997 / 12	1998 / 12	1999 / 12	2000 / 24
	Acid Area 3	1996 / 12	1997 / 12	1998 / 12	1999 / 12	2000 / 24
	Pentolite Area	1996 / 12	1997 / 12	1998 / 12	1999 / 12	2000 / 24
3	Ash Pit #1	1997 / 12	1998 / 12	1999 / 12	2000 / 12	2001 / 24
	Ash Pit #2	1997 / 12	1998 / 12	1999 / 12	2000 / 12	2001 / 24
	Ash Pit #3	Completed ¹	1997 / 12	1998 / 12	1999 / 12	2000 / 24
	Waste Lagoons	Completed ¹	1997 / 12	1998 / 12	1999 / 12	2000 / 24
	Garage and Maint. Area	1997 / 12	1998 / 12	1999 / 12	2000 / 12	2001 / 24
	TNT Loading Areas	1997 / 12	1998 / 12	1999 / 12	2000 / 12	2001 / 24

^a All work begins 01 October.

¹ SAIC 1991, ² Dames & Moore ongoing work (assumed completed by October 1995), ³ IT 1991, ⁴ H+GCL 1992.

6.2 PRELIMINARY SUMMARY SCHEDULE

The preliminary schedule presented in Figure 6-1 is intended only to serve as a starting point for developing the project management summary schedule. Although each AOC is scheduled through site remediation, it is not known at this time how far through the remediation process each AOC will be required to proceed. Some AOCs may not require detailed investigations or remediation, depending on the results of earlier studies. Also, the availability of funds, public concerns, and political pressures could all have an influence on the schedule. In addition, further investigations could reveal information that may alter the existing priority ranking of the AOCs, eliminate AOCs from consideration, or reveal new AOCs.

Activity ID	Target Start	Target Finish	Duration Months	Year																			
				1996			1997			1998			1999			2000			2001			2002	
1st Priority AOC's																							
Ground Water																							
GW01	01OCT95	30SEP96	12	Remedial Investigations																			
GW02	01OCT96	30SEP97	12	Remedial Design																			
GW03	01OCT97	30SEP99	24	Remedial Actions																			
West Area Red Water Ponds																							
WA01	01OCT95	30SEP96	12	Remedial Design																			
WA02	01OCT96	30SEP98	24	Remedial Actions																			
Pentolite Road Red Water Ponds																							
PR01	01OCT95	30SEP96	12	Remedial Design																			
PR02	01OCT96	30SEP98	24	Remedial Actions																			
TNT Area A																							
TA01	01OCT95	30SEP96	12	Remedial Investigations																			
TA02	01OCT96	30SEP97	12	Remedial Design																			
TA03	01OCT97	30SEP99	24	Remedial Actions																			
TNT Area B																							
TB01	01OCT95	30SEP96	12	Remedial Investigations																			
TB02	01OCT96	30SEP97	12	Remedial Design																			
TB03	01OCT97	30SEP99	24	Remedial Actions																			
TNT Area C																							
TC01	01OCT95	30SEP96	12	Remedial Investigations																			
TC02	01OCT96	30SEP97	12	Remedial Design																			
TC03	01OCT97	30SEP99	24	Remedial Actions																			
2nd Priority AOC's																							
Wastewater Flumes																							
WF01	01OCT96*	30SEP97	12	Site Inspections																			

Project Start: 01OCT95
 Project Finish: 30SEP93
 Data Date: 01OCT95
 Plot Date: 27JUL95

Legend:
 ■ Early Bar
 ■ Progress Bar
 ■ Critical Activity

TSMF

Sheet 1 of 5

Figure 6-1
 Plum Brook Ordnance Works
 Preliminary Summary Schedule



Activity ID	Target Start	Target Finish	Duration Months												
				1996	1997	1998	1999	2000	2001	2002	2003				
WF02	01OCT97	30SEP98	12	Remedial Investigations											
WF03	01OCT98	30SEP99	12	Remedial Design											
WF04	01OCT99	30SEP01	24	Remedial Actions											
Reservoir #2 Burn Ground															
RB01	01OCT96*	30SEP97	12	Preliminary Assessments											
RB02	01OCT97	30SEP98	12	Site Inspections											
RB03	01OCT98	30SEP99	12	Remedial Investigations											
RB04	01OCT99	30SEP00	12	Remedial Design											
RB05	01OCT00	30SEP02	24	Remedial Actions											
G-8 Burn Ground															
GB01	01OCT96*	30SEP97	12	Site Inspections											
GB02	01OCT97	30SEP98	12	Remedial Investigations											
GB03	01OCT98	30SEP99	12	Remedial Design											
GB04	01OCT99	30SEP01	24	Remedial Actions											
Taylor Road Burn Ground															
TR01	01OCT96*	30SEP97	12	Remedial Investigations											
TR02	01OCT97	30SEP98	12	Remedial Design											
TR03	01OCT98	30SEP00	24	Remedial Actions											
Snake Road Burn Ground															
SR01	01OCT96*	30SEP97	12	Remedial Investigations											
SR02	01OCT97	30SEP98	12	Remedial Design											
SR03	01OCT98	30SEP00	24	Remedial Actions											
Fox Road Burn Ground															
FR01	01OCT96*	30SEP97	12	Site Inspections											
FR02	01OCT97	30SEP98	12	Remedial Investigations											
FR03	01OCT98	30SEP99	12	Remedial Design											
FR04	01OCT99	30SEP01	24	Remedial Actions											

Activity ID	Target Start	Target Finish	Duration Months	Year														
				1996	1997	1998	1999	2000	2001	2002	2003							
Upper Toluene Tanks																		
UT01	01OCT96*	30SEP97	12			Site Inspections												
UT02	01OCT97	30SEP98	12				Remedial Investigations											
UT03	01OCT98	30SEP99	12					Remedial Design										
UT04	01OCT99	30SEP01	24						Remedial Actions									
Middle Toluene Tanks																		
MT01	01OCT96*	30SEP97	12			Site Inspections												
MT02	01OCT97	30SEP98	12				Remedial Investigations											
MT03	01OCT98	30SEP99	12					Remedial Design										
MT04	01OCT99	30SEP01	24						Remedial Actions									
Lower Toluene Tanks																		
LT01	01OCT96*	30SEP97	12			Site Inspections												
LT02	01OCT97	30SEP98	12				Remedial Investigations											
LT03	01OCT98	30SEP99	12					Remedial Design										
LT04	01OCT99	30SEP01	24						Remedial Actions									
Acid Area 1																		
A101	01OCT96*	30SEP97	12			Preliminary Assessments												
A102	01OCT97	30SEP98	12				Site Inspections											
A103	01OCT98	30SEP99	12					Remedial Investigations										
A104	01OCT99	30SEP00	12						Remedial Design									
A105	01OCT00	30SEP02	24							Remedial Actions								
Acid Area 2																		
A201	01OCT96*	30SEP97	12			Preliminary Assessments												
A202	01OCT97	30SEP98	12				Site Inspections											
A203	01OCT98	30SEP99	12					Remedial Investigations										
A204	01OCT99	30SEP00	12						Remedial Design									
A205	01OCT00	30SEP02	24							Remedial Actions								

Activity ID	Get Start	Target Finish	Duration Months												
				1996	1997	1998	1999	2000	2001	2002	2003				
Acid Area 3															
A301	01OCT96*	30SEP97	12	Preliminary Assessments											
A302	01OCT97	30SEP98	12	Site Inspections											
A303	01OCT98	30SEP99	12	Remedial Investigations											
A304	01OCT99	30SEP00	12	Remedial Design											
A305	01OCT00	30SEP02	24	Remedial Actions											
Pentolite Area															
PA01	01OCT96*	30SEP97	12	Preliminary Assessments											
PA02	01OCT97	30SEP98	12	Site Inspections											
PA03	01OCT98	30SEP99	12	Remedial Investigations											
PA04	01OCT99	30SEP00	12	Remedial Design											
PA05	01OCT00	30SEP02	24	Remedial Actions											
3rd Priority AOC's															
Ash Pit #1															
AP101	01OCT97*	30SEP98	12	Preliminary Assessments											
AP102	01OCT98	30SEP99	12	Site Inspections											
AP103	01OCT99	30SEP00	12	Remedial Investigations											
AP104	01OCT00	30SEP01	12	Remedial Design											
AP105	01OCT01	30SEP03	24	Remedial Actions											
Ash Pit #2															
AP201	01OCT97*	30SEP98	12	Preliminary Assessments											
AP202	01OCT98	30SEP99	12	Site Inspections											
AP203	01OCT99	30SEP00	12	Remedial Investigations											
AP204	01OCT00	30SEP01	12	Remedial Design											
AP205	01OCT01	30SEP03	24	Remedial Actions											

Activity ID	Target Start	Target Finish	Duration Months	Year																			
				1996			1997			1998			1999			2000			2001			2002	
Ash Pit #3																							
AP301	01OCT97*	30SEP98	12	Site Inspections																			
AP302	01OCT98	30SEP99	12	Remedial Investigations																			
AP303	01OCT99	30SEP00	12	Remedial Design																			
AP304	01OCT00	30SEP02	24	Remedial Actions																			
Waste Lagoons																							
WL01	01OCT97*	30SEP98	12	Site Inspections																			
WL02	01OCT98	30SEP99	12	Remedial Investigations																			
WL03	01OCT99	30SEP00	12	Remedial Design																			
WL04	01OCT00	30SEP02	24	Remedial Actions																			
Garage & Maintenance Area																							
GM01	01OCT97*	30SEP98	12	Preliminary Assessments																			
GM02	01OCT98	30SEP99	12	Site Inspections																			
GM03	01OCT99	30SEP00	12	Remedial Investigations																			
GM04	01OCT00	30SEP01	12	Remedial Design																			
GM05	01OCT01	30SEP03	24	Remedial Actions																			
TNT Loading Area																							
TL01	01OCT97*	30SEP98	12	Preliminary Assessments																			
TL02	01OCT98	30SEP99	12	Site Inspections																			
TL03	01OCT99	30SEP00	12	Remedial Investigations																			
TL04	01OCT00	30SEP01	12	Remedial Design																			
TL05	01OCT01	30SEP03	24	Remedial Actions																			

7.0 FUNDING REQUIREMENTS

The Project Management Plan (PMP) will include cost estimates for PBOW based on the guidance provided in USACE document ER 5-7-1(FR). A summary of this guidance is provided in this section.

7.1 FUNDING

Future funding at PBOW depends on the prioritization of the site based on an assessment of relative risk, as described in Section 5.0. The assessments of relative risk are determined among the AOCs at PBOW as well as among other sites within the Huntington and Nashville USACE Districts and among all USACE sites nationally.

Budgets for restoration projects at PBOW are also dependent on annual appropriations of Congress and subsequent Army allocations for individual programs. There is no way to anticipate the amount of funding that will be available in any given year.

7.2 BUDGET AND COST ESTIMATES

The PMP will include cost estimates delineating the following remedial activities for each of the PBOW AOCs, as applicable:

- PA and SI report preparation
- PA and SI report review (by agency)
- PA and SI project management
- Development of the RI/FS work plan
- Sampling and analysis
- RI and FS report preparation
- RI and FS report review (by agency)
- RI and FS project management.

The PMP should also include estimates of costs associated with the RD and RA for each of the AOCs, if applicable. All cost estimates should relate directly to the WBS. Cost estimates are required to be prepared in the "M-CACES" format using the code of accounts structure prescribed by regulation, as explained in ER 5-7-1(FR).

of resources has a direct bearing on schedules and project cost estimates as well as project budgets. A baseline resource-constrained schedule and baseline cost estimate must be established and used as a basis for measuring schedule performance and physical accomplishment of the work. Budgets which reflect time-phased expectations and requirements for funding can be readily prepared once cost estimates and schedules are developed. A budget should be developed for each element of the WBS at least through level three. Budgets will be coordinated and agreed to by the performing organizations as part of the PMP approval process.

8.0 UPDATING THE SITE MANAGEMENT PLAN

After its acceptance by USACE as a final document, changes will be made to this Site Management Plan (SMP), as appropriate, to include updates on project plans and scopes, study results, interagency agreements, and any other relevant information. This section addresses how changes to the SMP will be made to reflect changes resulting from the acquisition of new site information and program changes that may alter the management strategy for remedial activities at PBOW.

8.1 SMP REVISIONS

Revisions will be made to the SMP as new information relevant to PBOW becomes available. This information may include results of recent investigations, newly discovered historical information, changes in site status, changes in management policy, or any information that has a direct bearing on the site and has a potential impact on site investigations or management strategies. Document revisions will be made at the direction of the USACE project manager (PM) for PBOW.

Revisions to the SMP will be made as page changes to be inserted directly into the document. Each of Parts A, B, and C of the SMP will be kept in separate three-ring binders to facilitate page changes. The revised pages will be identified in the page footers, with revision number and date corresponding to each change. A "revisions sheet" will be added to the front of the document which summarizes changes that have occurred. The table of contents will also be revised, as needed, with revision number and date in the page footers. Each revision will also include changes to the list of references, with corresponding footer changes.

8.2 DOCUMENT CONTROL

The PM will be responsible for controlling changes to the SMP, as well as for distributing revised pages to persons on the SMP distribution list. Controlling changes to the SMP and other documents will help assure that all participants in the remedial activities at PBOW have standardized, updated documentation from which to work. A document control coordinator will be assigned to administer the control system for all documents generated for PBOW. The document control coordinator will prepare page changes for the SMP and issue the approved changes to persons on the distribution list for the SMP.

Included in the front of Part A of the SMP is a master distribution list which includes the name, position, address, telephone number, and number of copies for each person receiving a controlled copy of the SMP. The appropriate number of copies of any and all additions and replacement table of contents pages will be sent to the persons on the list, or their replacements, by the document control coordinator. Controlled document recipients will be responsible for acknowledging document receipt, assuring that the latest authorized documents are in use, and marking, destroying, or returning obsolete or superseded documents.

9.0 MANAGEMENT RESOURCES

The USACE district resources needed to accomplish the remediation work at PBOW must be clearly identified in the PBOW Project Management Plan. Detailed resource requirements and availability of those resources must be identified and scheduled. Examples of resources include:

- Labor (by division, discipline, skill, or organization)
- Technical support (e.g., Architect/Engineer, consulting services, Corps laboratory)
- Equipment
- Computers
- Materials and supplies
- Physical facilities
- Support services (recruiting, training, administrative, trades, photography, publications).

Additional resources specific to PBOW are required for conducting environmental investigations at the site. These resources include reports of previous investigations, historical records, site plans, maps, charts, tables, computer-aided drawings, photographs, and ground-water models. A brief description and location of these additional resources is provided below.

- **Reports** - a description of previous reports prepared for PBOW are included in Table 9-1 and in Section 4.0 of Part A. Copies of these reports are on file at the USACE Huntington and Nashville District offices. Historical records and reports (generated during PBOW operational and post-operational periods) are archived at PBS.
- **Site Plans** - historical site plans are also archived at PBS.
- **Maps, charts, and tables** - historical maps are archived at PBS. New mapping of PBOW is scheduled to take place in 1996 -1997. New maps will be kept on file at the USACE Huntington District. Tables from PBOW investigative reports prepared after 1994 are kept at the Huntington and Nashville District offices.
- **Computer-aided drawings** - computer-aided drafting design (CADD) drawings prepared for the Records Review (D&M 1995) are on file at the Nashville District office. CADD-generated maps prepared for this Site Management Plan (SMP) are on file at the Huntington District office. The SMP drawings are in Micro Station.DGN (Intergraph) format.
- **Historic photographs** - historical photographs (taken during PBOW operational and post-operational periods) are archived at PBS. Copies of these photographs are also kept at the Huntington and Nashville District offices.

Table 9-1. Previous Investigations at PBOW

Report	Preparer	Date	Prepared for	Remarks
Preliminary Assessment	Ohio EPA	1983	Ohio EPA	Investigation of red water ponds and 1981 PCB spill. Hazard Ranking Scoring of entire site.
Environmental Assessment	Ohio Air National Guard	1980s	Ohio Air National Guard	Conducted to allow property transfer. Sampling of West Area Red Water Ponds.
Environmental Resources Document	Warner, Osborn, Pardee	1990	NASA	Description of land use, air, water, noise, biota, floodplains, wetlands, solid and hazardous waste management, historic resources, socioeconomics, utilities, transportation.
Contamination Evaluation	IT Corporation	1991	USACE	Investigations of Red Water Ponds Areas, and Snake and Taylor Road Burn Grounds. Sampling conducted.
Preliminary Assessment	SAIC	1991	NASA	Description and evaluation of 14 AOCs.
Environmental Investigation	H*GCL	1992	NASA	Snake Road burn Ground sampling and analysis.
Site Inspection (SI)	Morrison Knudsen	1994	NASA	Review, sampling, and analysis of 5 project management units (PMUs).
Records Review	Dames & Moore	1995	USACE	Review and summary of historical records. Identified new AOCs and revised locations of others.
Biological Report	Ohio Department of Natural Resources	1995	NASA	Threatened & endangered species study.
SI and Focused Remedial Investigation	Dames & Moore	1996	USACE	TNT Areas, Red Water Ponds, sitewide ground water.

- **Current photographs** - current photographs of PBOW taken by NASA personnel are maintained by the NASA Institutional Operations Manager. Photographs taken for investigations of PBOW are located at Nashville and Huntington District offices.
- **Ground-water models** - ground-water models developed for PBOW are kept at the USACE Nashville District office.

10.0 RECOMMENDATIONS

The following recommendations are made for the consideration of the USACE Project Manager for PBOW. They are management recommendations to be considered for early implementation at PBOW prior to beginning new site investigation or restoration activities.

10.1 RESTORATION PRIORITIZATION

Based on preliminary investigations, contaminants originating from some AOCs may travel via air or surface or ground water to have an effect on other AOCs. These potential impacts should be considered prior to initiation of remediation. For example, if an upstream AOC undergoes remediation after a downstream AOC is considered "clean", any contaminants dislodged during remediation could possibly reach the downstream locations, contaminating the "clean" location. Two of the AOCs listed in Priority 1, Red Water Ponds and TNT Areas, may be affected by surface water runoff from other AOCs. Other potential AOC interactions are provided in Section 16.0 of Part B. Also, because some AOCs overlap, remediation efforts in these areas should be combined to avoid mutual interference. Specifically, because the underground wastewater flumes and TNT rail car loading areas are located within the TNT Areas, they should be investigated at the same time as the TNT Areas.

10.2 BACKGROUND CHEMICAL DATA

Background chemical information is a necessary part of environmental investigations. To determine the nature and extent of contamination, background conditions must be established. To provide background information that will be used consistently with each site investigation, it is recommended that USACE conduct a separate background study for the PBOW site. This study should involve sampling and analysis of ground water, soils, surface water, and sediments at locations near the site that are unaffected by past or current site activities. The number of samples in each medium should be sufficient to provide statistical confidence in the background values.

10.3 INTERAGENCY COORDINATION

To date, USACE personnel have established a good working relationship with NASA with regard to restoration activities. Efforts have also been made to establish communication with Ohio EPA and the

USEPA Region V office. There should be a specific effort undertaken to establish the level of participation each agency will expect to offer in this restoration effort.

It is recommended that USACE also establish communication with the Ohio Historic Preservation Office to notify them of the potential remediation at PBOW, ask for their concerns and recommendations, and determine what level of participation they would desire in restoration activities.

10.4 ADMINISTRATIVE RECORD

An administrative record file and draft file index should be initiated that includes copies of all site reports, records, maps, charts, and photographs, particularly those used to prepare the records review document. An information repository location at or near the site should be identified that will hold the administrative record file.

10.5 COMMUNITY RELATIONS

Community relations efforts should begin soon. Specific recommended activities include: community interviews, determining goals of the PBOW community relations program, preparing the community relations plan, establishing the administrative record and repository, identifying meeting rooms, developing the community mailing list, and assembling the Restoration Advisory Board.

10.6 BASELINE MAPPING

Mapping of AOC boundaries, PBOW structural remnants such as rail lines and building foundations, and locations of existing wells and other features should be done at the site to provide a geographic baseline for future remedial activities. Aerial photography of the site should be used to establish the baseline map. The use of global positioning system (GPS) equipment and procedures should also be considered for this effort to locate features not seen in the aerial photographs. The mapping should be done on a computer-aided drafting and design (CADD) system that can be updated as new information becomes available, and will be compatible with other graphics software.

10.7 PROJECT PLANS AND PROCEDURES

It is recommended that site-wide plans and procedures be developed for PBOW to serve as consistent guidance for contractors and others during site restoration activities. These plans are in addition to site-

specific plans needed for each environmental investigation or remediation. The site-specific plans would incorporate the site-wide plans by reference. Site-wide plans include:

- PBOW Quality Assurance Plan
- Health and Safety Plan
- Sampling and Analysis Plan
- Investigation-Derived Waste (IDW) Management Plan.

Standard field procedures should also be developed for the site as a whole, if not already available, including the following procedures:

- borehole drilling and sampling
- borehole logging
- monitoring well installation and development
- monitoring well construction diagrams
- borehole and monitoring well abandonment
- ground-water sampling
- surface soil sampling
- surface water and sediment sampling
- packaging and shipment of field samples
- decontamination of drilling and sampling equipment
- conducting geophysical surveys
- ground-water level measurement
- aquifer slug tests
- aquifer pumping tests
- field measurements of pH, Eh, and conductivity.

10.8 DOCUMENT CONTROL

Controlling changes to guidance and decision documents will help assure that all participants in the remedial activities at PBOW have standardized, updated documentation from which to work. A document control system should be implemented by USACE for all appropriate documents related to the site, and document control procedures should be developed for preparing, recording, and distributing changes to site documents. Controlled documents should include, for example, the site Quality Assurance Plan, the Health and Safety Plan, field and laboratory procedures, the Site Management Plan, and site-specific sampling and analysis plans.

10.9 DATA MANAGEMENT

As data from remedial activities at PBOW become more voluminous, the need for an effective and usable data management system becomes increasingly crucial. A data management system should be implemented by USACE for all remedial data collected at PBOW. This system should be compatible with other data management systems used by USACE, and should also be compatible with available graphic software employed by USACE. All contractors used for remedial activities at PBOW should be required to provide data in a format that is compatible with the USACE data management system. This system includes Intergraph-based MGE-PC/2[®] with Oracle Relational Database Management System, in a modular GIS environment. The database is maintained at the USACE Nashville District offices.

LIST OF REFERENCES

- Dames & Moore, 1995. *Records Review Report, Plum Brook Ordnance Works, Sandusky, Ohio.* (Draft) April 27, 1995.
- DOD/USEPA , 1994. Restoration Advisory Board Implementation Guidelines.
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- Science Applications International Corporation (SAIC), 1991. *Plum Brook Station Preliminary Assessment.*
- USACE, 1990. Chemical Data Quality Management for Hazardous Waste Remedial Activities. ER 1110-1-263.
- USACE, 1992. Project Management Plans. ER 5-7-1 (FR).
- USACE, 1994a. Requirements for the Preparation of Sampling and Analysis Plans. EM 200-1-3.
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- U.S. Army DERP-FUDS Manual. December 8, 1993.
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