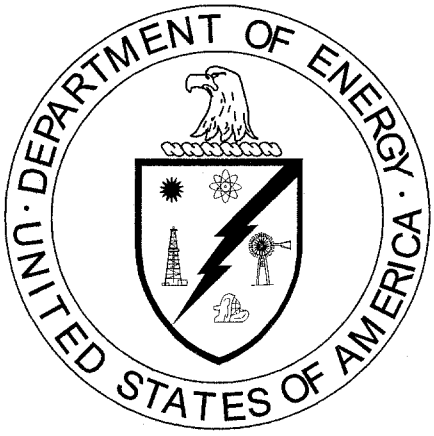
DOE/LX/07-0220&D2/R1
Primary Document

Removal Action Work Plan for Soils Operable Unit Inactive Facilities SWMU 19 and SWMU 181 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky



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Tetra Tech, Inc.,

contributed to the preparation of this document and should not be considered an eligible contractor for its review.

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Removal Action Work Plan for Soils Operable Unit Inactive Facilities SWMU 19 and SWMU 181 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

Date Issued—October 2009

Revised Date—December 2009

Prepared for the
U.S. DEPARTMENT OF ENERGY
Office of Environmental Management

Prepared by
PADUCAH REMEDIATION SERVICES, LLC
managing the

Environmental Management Activities at the
Paducah Gaseous Diffusion Plant
under contract DE-AC30-06EW05001

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PREFACE

This *Removal Action Work Plan for Contaminated Soils Operable Unit Inactive Facilities SWMU 19 and SWMU 181 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* DOE/LX/07-0220&D2/R1, (RAWP) was prepared in accordance with requirements under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980. The objectives of this report are to (1) update the schedule for performing construction activities and to (2) provide a summary level description of the plans and the goals attainment to be utilized for the removal action. The removal action goals of this project are to ensure direct contact risk at the C-218 Outdoor Firing Range [Solid Waste Management Unit (SWMU) 181] and C-410-B Hydrogen Fluoride Neutralization Lagoon (SWMU 19) for the current industrial worker falls within the U. S. Environmental Protection Agency risk range (EPA 1999).

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CONTENTS

FIGURES

TABLES

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ACRONYMS

ALARA	as low as reasonably achievable
ALM	Adult Lead Methodology
ARAR	applicable or relevant and appropriate requirement
BJC	Bechtel Jacobs Company LLC
BMP	best management practice
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
COPC	chemical of potential concern
CWA	Clean Water Act
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EDE	effective dose equivalent
EE/CA	Engineering Evaluation/Cost Analysis
EO	Executive Order
EPA	U. S. Environmental Protection Agency
EM	Environmental Management
ES&H	Environmental, Safety, and Health
FFA	Federal Facility Agreement
FR	*Federal Register*
HF	hydrogen fluoride
HMR	Hazardous Material Regulation
IEUBK	Integrated Exposure Uptake Biokinetic Model
KAR	*Kentucky Administrative Regulations*
KPDES	Kentucky Pollutant Discharge Elimination System
LLW	low-level waste
NEPA	National Environmental Policy Act
NHANES III	National Health and Nutrition Examination Survey
NRC	Nuclear Regulatory Commission
NWP	Nationwide Permit
OU	operable unit
PCB	polychlorinated biphenyl
PGDP	Paducah Gaseous Diffusion Plant
PRS	Paducah Remediation Services, LLC
QA	quality assurance
QC	quality control
RA	removal action
RAO	Removal Action Objective
RAWP	Removal Action Work Plan
RCRA	Resource Conservation and Recovery Act
SE	Site Evaluation
SI	Site Investigation
SWMU	solid waste management unit
TBC	to be considered
TCLP	Toxicity Characteristic Leaching Procedure
TSCA	Toxic Substance Control Act of 1976
USC	*United States Code*
UTS	Universal Treatment Standard

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EXECUTIVE SUMMARY

The Paducah Gaseous Diffusion Plant (PGDP) is an active uranium enrichment facility owned by the U.S. Department of Energy (DOE). DOE is conducting environmental restoration activities at PGDP in compliance with the requirements of the Commonwealth of Kentucky and the U.S. Environmental Protection Agency (EPA) under the Comprehensive Environmental Response, Compensation, and Liability Act. PGDP was placed on the National Priorities List in 1994. DOE, EPA, and Commonwealth of Kentucky entered into a Federal Facility Agreement in 1998.

DOE, EPA, and Commonwealth of Kentucky have entered into an agreement to remediate three areas of the PGDP known as the C-218 Outdoor Firing Range [Solid Waste Management Unit (SWMU) 181], C-403 Neutralization Tank (SWMU 40), and C-410-B Hydrogen Fluoride Neutralization Lagoon (SWMU 19). This agreement, the *Action Memorandum for Soils Operable Unit Inactive Facilities* (DOE 2009a), documents the non-time-critical removal action for these inactive facilities. An Engineering Evaluation/Cost Analysis (EE/CA) was prepared to develop and document the decision process of determining the appropriate removal action (DOE 2008). The EE/CA is incorporated in the Action Memorandum as Attachment 2. For the C-218 Firing Range (SWMU 181), the removal action (RA) is limited to the removal of lead-contaminated soil. For C-403 (SWMU 40) and C-410-B (SWMU 19), the removal action is limited to the removal of contamination within their respective SWMU boundaries (DOE 2009a). This action implements excavation and removal of areas of known contamination (i.e., soil/sediment and accumulated rainwater) associated with the three facilities and includes one or more engineering controls to prevent transport of contaminated soil/sediments and accumulated rainwater, as required. Temporary access controls,[1] such as exclusion zones and fencing, also will be utilized during the action. After completion of the removal action, and upon verification that the removal action objectives (RAOs) are achieved (including site restoration), engineering and temporary access controls will be evaluated and discontinued as appropriate. Completion of this removal action will reduce the risk to current and future workers and excavation workers from direct contact by removing known sources of contamination.

The RAOs for this removal action are consistent with the overall Remedial Action Objectives for the Soils Operable Unit (OU) and include the following:

- Control current industrial worker exposure to soils, sediment, and/or accumulated rainwater containing hazardous substances, pollutants, or contaminants.

- Identify and control, as needed, off-site migration into multimedia exposure pathways such as surface water and groundwater.

Upon completion of this removal action, and in keeping with the phased approach, this interim action will be followed by the Soils Remedial OU and the Comprehensive Site OU for evaluation, with implementation of additional and final actions, as needed, to ensure long-term protectiveness (DOE 2008). This Removal Action Work Plan (RAWP) addresses the removal actions for C-218 Outdoor Firing Range [Solid Waste Management Unit (SWMU) 181] and C-410-B Hydrogen Fluoride Neutralization Lagoon (SWMU 19).

[1] "Temporary access controls" previously were defined as "interim institutional controls" in the Soils Inactive Facilities EE/CA and Soils Inactive Facilities Action Memorandum. In the EE/CA and Action Memorandum, "interim institutional controls" included fencing, signage, and engineering controls.

During development of this RAWP, a change in schedule for the C-403 Neutralization Tank (SWMU 40) was determined to be necessary. The delay in implementation of the removal action is because a 30 inch water line located adjacent to SWMU 40 must be rerouted. The water line is critical to the United States Enrichment Corporation (USEC) facility operations, and rerouting the water line will interfere with ongoing plant operations. As a result, even though the removal action decision presented in the Action Memorandum remains valid, implementation of the RA will occur after plant shutdown with development, review, and approval of an RAWP. A change in schedule for the C-403 Neutralization Tank RA will result in no change to the current threat to public health and the environment. Current access restrictions eliminate uncontrolled human exposure to the C-403 Neutralization Tank, and no releases are known to be occurring from the C-403 Neutralization Tank.

1. INTRODUCTION

The Soils Operable Unit (OU) Inactive Facilities Removal Action is being conducted under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). The Soils OU Inactive Facilities Removal Action will address the potential threat to human health and the environment from direct contact with contaminated soil and sediments located within C-218 Outdoor Firing Range [Solid Waste Management Unit (SWMU) 181], and C-410-B Hydrogen Fluoride (HF) Neutralization Lagoon (SWMU 19) at the Paducah Gaseous Diffusion Plant (PGDP) in Paducah, Kentucky (Figures 1 and 2). This part of the removal action will include excavation and removal of known contaminated soils (i.e., soil/sediment and accumulated rainwater) and management and proper disposition of the remediation waste.

The PGDP was constructed from 1951 to 1954, began operating in 1952, and was fully operational by 1955, supplying enriched uranium for commercial reactors and military defense reactors. PGDP was operated by Union Carbide Corporation until 1984, when Martin Marietta Energy Systems, Inc. (which later became Lockheed Martin Energy Systems, Inc.), was contracted to operate the plant for the U.S. Department of Energy (DOE). On July 1, 1993, DOE leased the plant production/operations facilities to the United States Enrichment Corporations; however, DOE maintains ownership of the plant and is responsible for environmental restoration and waste management activities. On April 1, 1998, Bechtel Jacobs Company LLC, (BJC) replaced Lockheed Martin Energy Systems, Inc. in implementing the Environmental Management (EM) Program at PGDP. On April 23, 2006, Paducah Remediation Services, LLC, (PRS) replaced BJC in implementing the EM Program at PGDP.

PGDP was placed on the National Priorities List, effective June 30, 1994 (59 *Federal Register* 27989, May 31, 1994). A Federal Facility Agreement (FFA) negotiated by DOE, U.S. Environmental Protection Agency (EPA), and the Commonwealth of Kentucky coordinates the requirements of the Resource Conservation and Recovery Act (RCRA) and CERCLA at the facility.

1.1. PURPOSE OF THE REMOVAL ACTION WORK PLAN

Preparation of this Removal Action Work Plan (RAWP) follows development and approval of an Engineering Evaluation/Cost Analysis (EE/CA) (DOE 2008) and Action Memorandum (DOE 2009a). This RAWP provides the project schedule for implementation of the removal action, summarizes the work to be performed, identifies project plans to be used during construction, and provides a crosswalk to identify the applicable or relevant and appropriate requirements (ARARs).

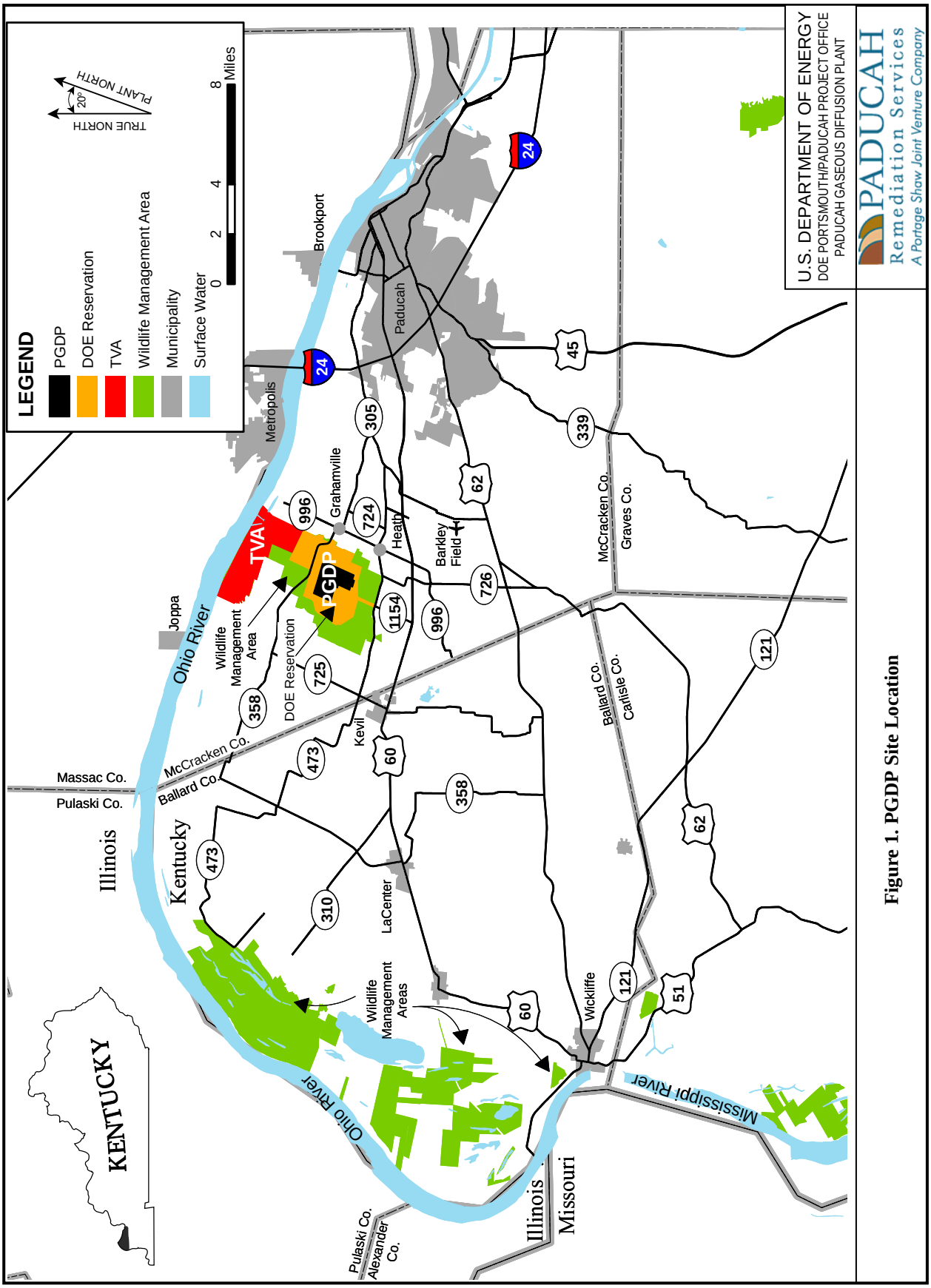


Figure 1. PGDP Site Location

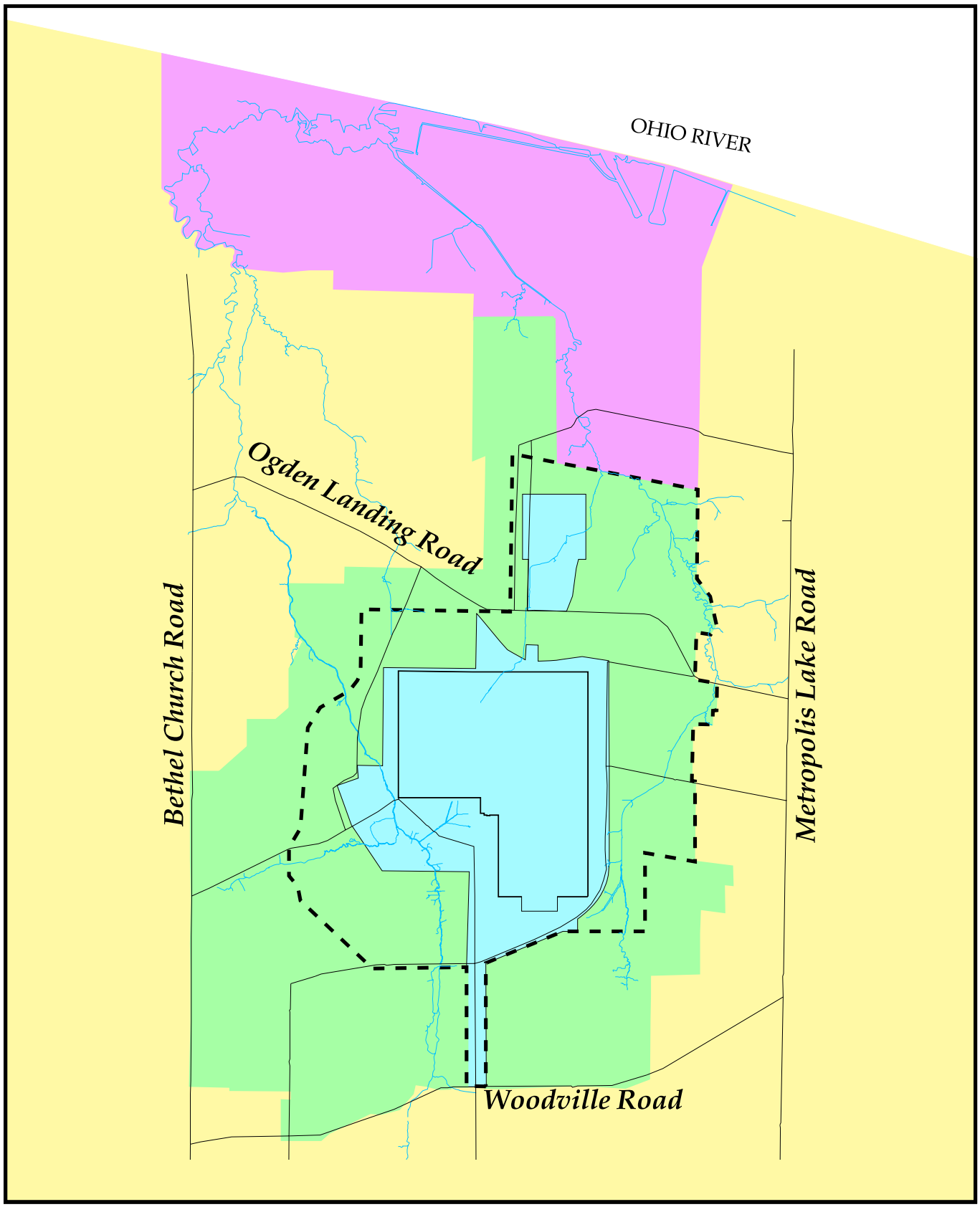


Figure 2. PGDP Land Ownership Map

1.2. SCOPE OF THE REMOVAL ACTION WORK PLAN

This RAWP is prepared in accordance with CERCLA, as amended by Superfund Amendments and Reauthorization Act, and is consistent with the National Contingency Plan and the Paducah FFA. This removal action is consistent with and will not preclude anticipated objectives for future CERCLA actions at PGDP. The following items are included in this RAWP:

- A summary level description of the specific Soils OU Inactive Facilities removal actions;
- An updated schedule for performing construction activities;
- A design package that contains a scope of work, drawings, and any project calculations; and
- Various project plans [e.g., Environmental, Safety, and Health (ES&H), Waste Management, Quality Assurance (QA), Sampling and Analysis, and Data Management].

During development of this RAWP, a change in schedule for the C-403 Neutralization Tank (SWMU 40) was determined to be necessary. The delay in implementation of the removal action is because a 30 inch water line located adjacent to SWMU 40 must be rerouted. The water line is critical to the United States Enrichment Corporation (USEC) facility operations, and rerouting the water line will interfere with ongoing plant operations. As a result, even though the removal action decision presented in the Action Memorandum remains valid, implementation of the RA will occur after plant shutdown with development, review, and approval of an RAWP. A change in schedule for the C-403 Neutralization Tank RA will result in no change to the current threat to public health and the environment. Current access restrictions eliminate uncontrolled human exposure to the C-403 Neutralization Tank, and no releases are known to be occurring from the C-403 Neutralization Tank.

2. PROJECT ORGANIZATION

The project organization chart outlining the relationship of key personnel and organizations is shown in Figure 3. The roles and responsibilities of the project team are described below.

DOE Project Manager—Serves as the point of contact with regulatory agencies, and directs the overall completion of the removal action in accordance with the approved Action Memorandum and RAWP. Establishes baseline scope, schedule, and budget and serves as the primary interface for EM activities implemented by DOE's Prime Contractor.

Prime Contractor Project Manager—Serves as the primary point of contact with DOE to implement the removal action. Performs work in accordance with the baseline scope and schedule and directs the day-to-day activities of Contractor personnel.

Quality Assurance/Quality Control Manager—Verifies all work is completed in accordance with the Quality Assurance Plan. Develops QA/Quality Control (QC) procedures and implementing administrative procedures that govern both technical and non-technical work.

Field Superintendent—Oversees all field activities and verifies field operations follow established and plans and procedures.

Health and Safety Representative—Develops the ES&H plan and oversees implementation of Integrated Safety Management Systems and the overall safety and health of employees, both in the field and the office. Provides direct support to the Prime Contractor Project Manager concerning the safety and health of project personnel, the general public, and impacts to property and the environment. Each task will have the proper ES&H controls in place before work begins, meeting all applicable federal, state, and local regulations.

Field Technical Staff—Provides direct support to the Field Superintendent concerning technical aspects of the project.

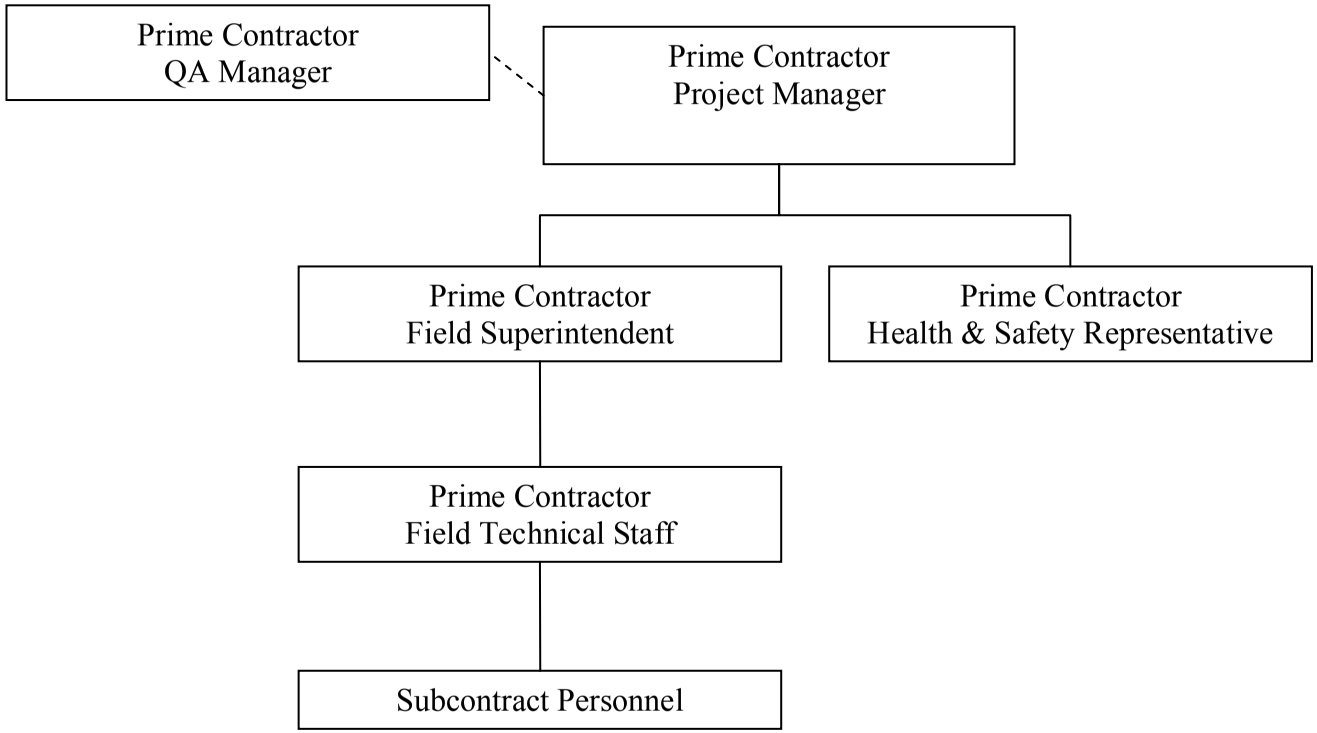


Figure 3. Project Organization

3. PROJECT DESCRIPTION

The Soils OU Inactive Facilities Removal Action addressed in this RAWP will include implementation of one or more engineering controls to prevent movement of contaminated soil/sediments and accumulated rainwater; complete removal of C-410-B HF Neutralization Lagoon (SWMU 19) to its SWMU boundary[2] (DOE 2009a); removal of lead-contaminated soil at the C-218 Firing Range (SWMU 181) (DOE 2009); post-excavation sampling; and managing and properly disposing of remediation waste. Work will include mobilization; installation of Best Management Practice (BMP) controls; excavation; post-excavation sampling; restoration; soil handling, appropriate disposal; and demobilization. Installation of temporary BMP controls will be completed in accordance with *Best Management Practices Plan, Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* PRS/PROG/0017, and is dependent upon the site conditions at the time of excavation. After excavation is complete, and upon verification that the removal action objectives (RAOs) are achieved (including site restoration), localized engineering controls and temporary access controls will be evaluated and discontinued, as appropriate. Design drawings provided in Appendix B show general site layouts for the removal actions.

3.1. HISTORY

The C-218 Outdoor Firing Range (SWMU 181) and C-410-B HF Neutralization Lagoon (SWMU 19) are inactive facilities that supported plant activities associated with various historical plant processes at the PGDP. Each of these inactive facilities has been investigated previously. The contamination associated with each inactive facility originated from plant activities.

C-218 Outdoor Firing Range (SWMU 181)

The C-218 Firing Range (SWMU 181) is an inactive facility formerly used as an outdoor firing range that was operational from 1985 to 1992. The facility is located immediately west of PGDP on DOE property (Figure 4) and is a U-shaped soil berm approximately 4.88 m (16 ft) high. Excess excavation material from the East-West Ditch Oil Structure project (Engineering Service Order-13885) completed in 1983, along with possible additional fill material from C-611, was utilized to construct the berm. The facility was utilized for weapons training, and residual munitions fragments containing lead are found within the soils.

C-410-B Hydrogen Fluoride Neutralization Lagoon (SWMU 19)

The C-410-B HF Neutralization Lagoon (SWMU 19) is located north of the C-410 Feed Plant (Figure 4). It is a rectangular, below grade impoundment with dimensions of 11.59 m x 15.55 m x 2.13 m (38 ft x 51 ft x 7ft) [383.88 m^3 (13,560 ft^3)]; has an earth-clay floor; and has sloped sides reinforced with wire and grout. It received effluent from the C-410-C Neutralization Building, where lime was used for the neutralization of HF cell electrolyte from fluoride cells. In addition, trucks transporting fly ash to the C-746-T Inert Landfill were rinsed in this impoundment. All processes in the C-410 Building ceased in the late 1970s.

[2] Defined boundaries of SWMU 19 extend no further than 3 ft on each side of or 3 ft from the bottom of the lagoon.

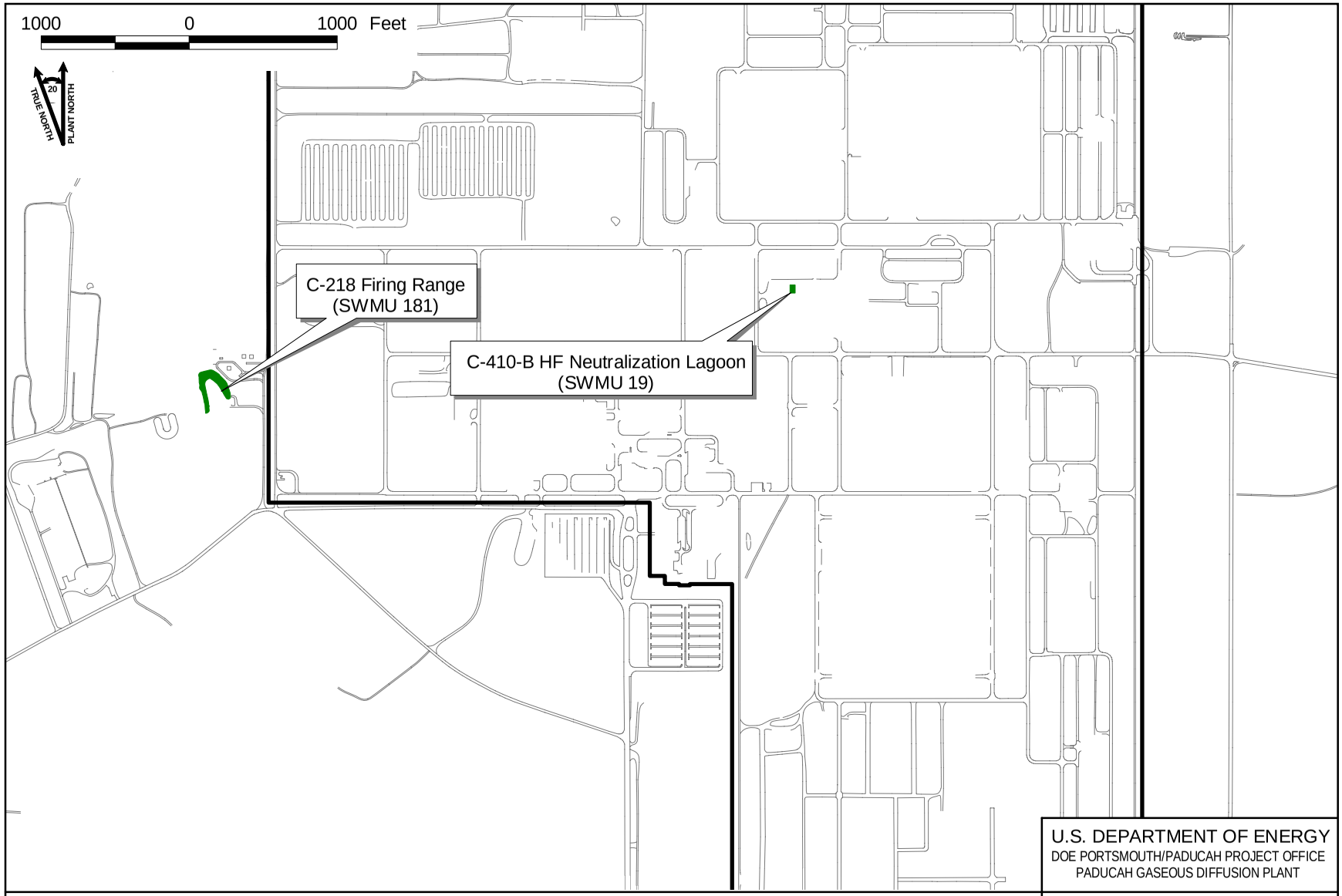


Figure 4. Location of SWMUs 19 and 181

Site Investigation

The C-218 Firing Range and C-410-B HF Neutralization Lagoon have been characterized in previous investigations. These include the Administrative Consent Order Phase II Site Investigation (SI) in 1991 (CH2M HILL 1992); SWMU/Area of Concern Self-Assessment Evaluation for Decision Report #65 in 1993 (MMES 1994); and waste area groups 9 and 11 Site Evaluation (SE) in 1999 (DOE 1999). These investigations involved collecting soil, sediment, sludge, and surface water samples from the C-410-B HF Neutralization Lagoon and individual and composite surface soil samples from the C-218 Firing Range. Further discussion of the previous investigations is provided in Section 1.3 and Section 1.5 of the EE/CA.

The investigations have identified a potential for, or threat of, release into the environment of hazardous substances as defined by CERCLA § 101 (14), pollutants or contaminants as defined by CERCLA § 101 (33), including lead at the C-218 Outdoor Firing Range and radionuclides at the C-410-B HF Neutralization Lagoon. A complete list of detected analytes is provided in Appendix D of the EE/CA. A list of chemicals of potential concern (COPCs) with action levels is presented in Section 3, "Threats to Public Health or Welfare," of the Action Memorandum (DOE 2009a).

Previous and Current Actions

There have been no previous response actions for these inactive facilities. The C-410-B HF Neutralization Lagoon is roped off in accordance with 10 *CFR* Part 835 subpart G due the presence of radionuclides at concentrations up to 10 times background concentrations, based on data collected during the SE and Phase II SI (DOE 1999b).

Current DOE plant controls associated with these units consist of the following:

1. The units are within areas protected from trespassing under the 1954 Atomic Energy Act as amended (referred to as the 229 Line). These areas are posted as "no trespassing" and trespassers are subject to arrest and prosecution.

2. Vehicle access to the units is restricted by passage through Security Post 57 and by the plant vehicle protection barrier.

3. The units are in areas that are subject to routine patrol and visual inspection by plant protective forces, at a minimum once per shift.

4. Section XLII of the FFA requires the sale or transfer of the site to comply with Section 120(h) of CERCLA.

5. Protection of the current PGDP industrial workers is addressed under DOE's Integrated Safety Management System/Environmental Management System program.

On February 27, 2007, DOE submitted a Non-Time-Critical Removal Notification for three inactive facilities indicating that a removal action was warranted (DOE 2007). Subsequent to receiving Removal Notification approval, DOE prepared an EE/CA that described the environmental conditions that supported the need for a removal action, developed and evaluated various alternatives, and recommended the alternative that best met the removal action objectives. The recommended response action cited within

the EE/CA is consistent[3] with the final actions for the PGDP and will contribute to the efficient performance of long-term remediation of PGDP.

3.2. REMOVAL ACTION OBJECTIVES

The C-218 Outdoor Firing Range (SWMU 181) and C-410-B HF Neutralization Lagoon (SWMU 19) have been identified as SWMUs under the FFA due to the potential for actual or threatened releases of hazardous constituents from the facilities. Soil, sediment, and accumulated rainwater are the exposure pathways of concern at the two inactive facilities. The inactive facilities are not suspected sources of surface water or groundwater contamination at the site and, as a result, direct contact with soil, sediment, and accumulated rainwater is the primary focus of the action.

The RAOs for this removal action are consistent with the overall Remedial Action Objectives for the Soils OU referenced in Appendix 3 of the SMP and meet the intent of Section X of the FFA (See Footnote 3). The RAOs include the following:

- Control current industrial worker exposure to soils, sediment, and accumulated rainwater containing hazardous substances, pollutants, or contaminants.

- Identify and control, as needed, off-site migration into multimedia exposure pathways such as surface water and groundwater.

Completion of this removal action will reduce the risk to current and future workers and excavation workers from direct contract by removing known sources of contamination.

Under this action, C-410-B HF Neutralization Lagoon (SWMU 19) will be removed to up to 3 ft beyond its SWMU boundary; therefore, cleanup levels for this inactive facility are not applicable. With regard to C-410-B Hydrogen Fluoride Neutralization Lagoon, the boundary definition was discussed in previous scoping meetings with agreement to remove up to 3 ft beyond the SWMU boundary, which was determined likely to include the majority of any soil contamination. Any contamination left in place would be addressed in a subsequent response action. This approach is included in the approved Engineering Evaluation/Cost Analysis (DOE 2008) and Action Memorandum (DOE 2009a). For the C-218 Firing Range (SWMU 181), only a cleanup level for lead will be achieved since the focus of this removal action is lead-contaminated soil at SWMU 181. The cleanup goals for lead at the C-218 Firing Range (SWMU 181) under this action were approved in the Action Memorandum (DOE 2009a) and are presented in Table 1 for reference.

[3] Page 50 of the FFA, Section X Removal Actions, Applicability states: "Removal activity is not intended to supplant, compromise or foreclose RAs, including Interim RAs, at the Site. If a long-term remedy is planned, removal actions at the Site may be used to mitigate the threat to human health and the environment until the RA can be implemented. Removal actions shall, to the extent practicable, contribute to the efficient performance of any anticipated long-term RA with respect to the release concerned. In selecting an appropriate Removal Action, the parties shall take into consideration the removal actions outlined in section 300.415 (d) of the NCP."

Table 1. Cleanup Levels Based on Carcinogenic Risk and Hazard

	Background (mg/kg or pCi/g)	Risk-Derived Cleanup Goal (mg/kg)	Industrial Hazard-Derived Cleanup Goal (mg/kg)	Recreational Hazard-Derived Cleanup Goal (mg/kg)	Selected Cleanup Level (mg/kg)
Soils and Sediment					
Lead	36	-	800[a]	1,420[b]	800[c]

[a] An updated screening level for soil lead at industrial sites of 800 ppm is based on a recent analysis of the combined phases of the National Health and Nutrition Examination Survey (NHANES III) that chose a cleanup goal protective for all subpopulations (EPA 2007).
[b] Cleanup goal for lead in soil derived using the Integrated Exposure Uptake Biokinetic Model (IEUBK) (EPA 1994).
[c] Cleanup level for lead in soil was evaluated for industrial (current) land use and recreational (future) land use, defaulting to the industrial no action level of 800 mg/kg as the more protective.

3.3. NATIONAL ENVIRONMENTAL POLICY ACT INTEGRATION

Consistent with DOE's *Secretarial Policy Statement on the National Environmental Policy Act* (NEPA), June 13, 1994, DOE has relied on the CERCLA process for evaluating the proposed activities associated with the removal action and incorporated the analysis for NEPA values (DOE 1994). No significant adverse environmental impacts are expected from implementation of this action. The impact to vulnerable or sensitive populations, habitats, or natural resources (i.e., critical or aquatic habitat, migratory birds, wetlands, streams, and floodplains) has been identified. These impacts have been evaluated and any necessary mitigation measures required to meet ARARs have been incorporated into the design phase and will be implemented during the construction and operation phases of the removal action (see Tables 2 through 4).

3.4. REMOVAL ACTION APPROACH

The Soils OU Inactive Facilities removal action will include implementation of one or more engineering controls to prevent movement of contaminated soil/sediments and accumulated rainwater; complete removal of C-410-B HF Neutralization Lagoon (SWMU 19) to its SWMU boundary (DOE 2009a); reduction of lead concentration within C-218 Firing Range (SWMU 181) (DOE 2009a); post-excavation sampling; and management and proper disposal of remediation waste. Work will include mobilization; postings; installation of BMP controls; excavation; post-excavation sampling; restoration; soil handling, transportation, and disposal; and demobilization. Additional details are included in appendices to this RAWP:

- Appendix A provides a Scope of Work with information on the sequencing and types of construction activities that will be performed;
- Appendix B provides Design Drawings of the areas included in these removal actions;
- Appendix C contains the Environmental Safety and Health Plan for work to be performed;
- Appendix D provides the Waste Management Plan;

- Appendix E provides the Quality Assurance Project Pan;

- Appendix F provides the Sampling and Analysis Plan with information on the data quality objectives, sampling plans for the removal action support survey, and confirmation sampling in addition to basics; and

- Appendix G provides the Data Management Plan for these activities.

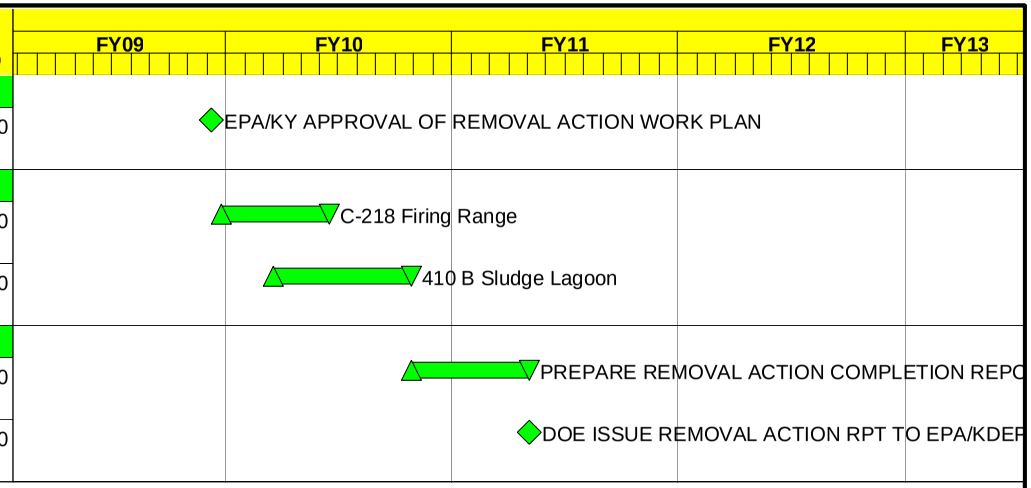
These plans will be supplemented by use of contractor Standard Operating Procedures, contractor and subcontractor work packages and design drawings once implementation issues have been considered.

Upon completion of this response action, and in keeping with the phased approach, this interim action will be followed by the Soils Remedial OU and the Comprehensive Site OU for evaluation, with implementation of additional and final actions, as needed, to ensure long-term protectiveness (DOE 2008).

4. PROJECT SCHEDULE

The schedule for the removal action (RA) is detailed in Figure 5. This schedule represents an estimate for planning purposes and is included here for informational purposes only and is not intended to establish enforceable schedules or milestones. Enforceable milestones are contained in Appendix C of the FFA and Appendix 5 of the Site Management Plan (DOE 2009b). Also note that the schedule includes business days in lieu of calendar days.

Activity ID	Activity Description	Early Start	Early Finish	Orig Dur	Rem Dur	% Comp
04.11.06.01.02.01.03 Removal Action Work Plan						
AR00002250	EPA/KY APPROVAL OF REMOVAL ACTION WORK PLAN		08SEP09	0	0	0
04.11.06.01.02.02 Soils Removal Action of 2 Facilities						
AR00002337	C-218 Firing Range	23SEP09	17MAR10	120	120	0
AR00002316	410 B Sludge Lagoon	18DEC09	27JUL10	150	150	0
04.11.06.01.02.03 Removal Action Completion Report						
AR00002330	PREPARE REMOVAL ACTION COMPLETION REPORT	28JUL10	01FEB11	128	128	0
AR00002460	DOE ISSUE REMOVAL ACTION RPT TO EPA/KDEP (D1)		01FEB11	0	0	0



Start Date	01OCT02
Finish Date	02MAR12
Data Date	24APR06
Run Date	04AUG09 06:59

Early Bar
Progress Bar
Critical Activity

SEWP

Sheet 1 of 1

Paducah Remediation Services

Soils 2 Inactive Facilities

Date	Revision	Checked	Approved

5. PLANS

5.1. ENVIRONMENTAL, SAFETY, AND HEALTH

All work will be performed in a manner that minimizes the risk of bodily harm to employees, other project personnel, and the general public and avoids damage to property or the environment. Requirements will be followed for safe and compliant work associated with metals, radiological contamination, PCB contamination, and other identified or unidentified hazards associated with this removal action. In addition, federal and state ES&H regulations applicable to the removal action will be implemented during the course of this work. Proper ES&H controls and monitoring shall be in place for each activity. An ES&H Program Plan, has been developed to detail ES&H and compliance provisions, and is included as Appendix C.

5.2. WASTE MANAGEMENT

Soil and other waste materials generated as a result of this excavation and removal of contaminated media will be characterized properly and disposed of in accordance with the substantive provisions of ARARs/TBCs for low-level, hazardous, and PCB waste. All on-site management of such materials also will be conducted in accordance with the substantive provisions of ARARs/TBCs. A project-specific Waste Management Plan has been prepared that incorporates requirements for waste handling, transportation, and disposal. This Waste Management Plan is included as Appendix D.

5.3. QUALITY ASSURANCE

An established QA program that defines the administrative procedures for implementing and integrating good quality practices will be provided throughout the work. Verification will be made that all activities affecting quality are performed in a controlled and consistent manner and in accordance with all applicable procedures and requirements. A QA Plan has been developed to detail QA requirements and is included as Appendix E.

5.4. CALCULATIONS

Calculations shall be used to document any type of technically required mathematical computation in which the results are used in a design, study, report, or evaluation. Calculations shall be sufficiently detailed as to purpose, methods, assumptions, design input, references, and units so that a person technically qualified in the subject can review and understand the documentation and verify the adequacy of the results without recourse to the originator. Complete identification of the version of any software used and the method of verification or validation of that software shall be included. Calculations shall be performed in accordance with PRS-WCE-1026, *Project Calculations*. In addition, QA packages shall be provided for any risk assessment calculations.

5.5. SOFTWARE QUALITY ASSURANCE

All calculations generated by software programs shall meet requirements of PRS-WCE-1026, *Software Calculations*, and DOE Order 414.1C.

5.6. SAMPLING

The DOE Prime Contractor is responsible for preparing a sampling plan to address post-excavation sampling activities in excavated areas. The sampling plan will identify contaminants of concern, sampling requirements, a sampling strategy to verify that remaining contamination levels meet cleanup levels established in the Soils OU Action Memorandum (DOE 2009a), and the strategy for the collection of soil characterization samples that will be used in future CERCLA actions. This sampling plan is included as Appendix F.

5.7. DATA MANAGEMENT

The DOE Prime Contractor is responsible for preparing a Data Management Implementation Plan to identify and document data, management requirements and applicable procedures; expected data types and information flow; and roles and responsibilities for all data management activities associated with the removal action for the Soils OU Inactive Facilities. This Data Management Implementation Plan is included as Appendix G.

6. OBJECTIVES ATTAINMENT

The objective of the removal action is to reduce the risk to current industrial workers from direct contact with contaminated soil/sediment and accumulated rainwater associated with the C-218 Outdoor Firing Range (SWMU 181) and C-410-B HF Neutralization Lagoon (SWMU 19). This objective will be attained through the removal of the C-410-B HF Neutralization Lagoon (SWMU 19) to its SWMU boundary and through the removal of lead-contaminated soil to its specified cleanup level at the C-218 Firing Range (SWMU 181). The removal action is considered complete after the RAOs have been verified as achieved; verification or characterization sampling has been performed; engineering and interim institutional controls have been evaluated and discontinued, as appropriate; the site has been restored and determined stable; and treatment, storage, or disposal of contaminated media and waste has been completed.

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7. APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

ARARs were developed and presented in the Action Memorandum (DOE 2009a). The ARARs are provided in Tables 2 through 4. The tables list each chemical-specific, location-specific, and action-specific ARAR identified for the design and implementation of the removal action.

Table 2. Summary of Chemical-Specific ARARs/TBCs for the Soils Operable Unit Inactive Facilities

CHEMICAL-SPECIFIC			
Chemical characteristic	**Requirement(s)**	**Prerequisite**	**Citation(s)**
Screening level for lead	Establishes a screening level for lead in soil at commercial/industrial (i.e., nonresidential) sites of 800 ppm as found in Frequent Questions from Risk Assessors on the Adult Lead Methodology (ALM) accessed at: http://www.epa.gov/superfund/health/contaminants/lead/almfaq.htm	Removal of lead-contaminated soils at the 218 Firing Range—**TBC**.	EPA-540-R-03-001 National Health and Nutrition Examination Survey III

Table 3. Summary of Location-Specific ARARs/TBCs for the Soils Operable Unit Inactive Facilities

LOCATION-SPECIFIC			
Location characteristic(s)	**Requirement(s)**	**Prerequisite**	**Citation(s)**
Wetlands			
Presence of wetlands as defined in 10 *CFR* 1022.4	Avoid, to the extent possible, the long- and short-term adverse effects associated with destruction, occupancy, and modification of wetlands.	DOE actions that involve potential impacts to, or take place within, wetlands—**applicable**.	10 *CFR* 1022.3(a)
	Take action, to extent practicable, to minimize destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.		10 *CFR* 1022.3(a)(7) and (8)
	Undertake a careful evaluation of the potential effects of any new construction in wetlands. Identify, evaluate, and, as appropriate, implement alternative actions that may avoid or mitigate adverse impacts on wetlands.		10 *CFR* 1022.3(b) and (d)
	Measures that mitigate the adverse effects of actions in a wetland including, but not limited to, minimum grading requirements, runoff controls, design and construction constraints, and protection of ecologically-sensitive areas.		10 *CFR* 1022.13(a)(3)
	If no practicable alternative to locating or conducting the action in the wetland is available, then before taking action design or modify the action in order to minimize potential harm to or within the wetland, consistent with the policies set forth in Executive Order 11990.		10 *CFR* 1022.14(a)

Table 3. Summary of Location-Specific ARARs/TBCs for the Soils Operable Unit Inactive Facilities (Continued)

LOCATION-SPECIFIC			
Location characteristic(s)	**Requirement(s)**	**Prerequisite**	**Citation(s)**
Location encompassing aquatic ecosystem as defined in 40 *CFR* 230.3(c)	Except as provided under section 404(b)(2), no discharge of dredged or fill material is permitted if there is a practicable alternative that would have less adverse impact on the aquatic ecosystem or if it will cause or contribute to significant degradation of the waters of the United States.	Action that involves the discharge of dredged or fill material into *waters of the United States*, including jurisdictional wetlands—**relevant and appropriate**.	40 *CFR* 230.10(a) and (c)
	Except as provided under section 404(b)(2), no discharge of dredged or fill material shall be permitted unless appropriate and practicable steps have been taken that will minimize potential adverse impacts of the discharge on the aquatic ecosystem. 40 *CFR* 230.70 *et seq.* identifies such possible steps.		40 *CFR* 230.10(d)
Nationwide Permit Program	Must comply with the substantive requirements of the NWP 38 and General Conditions, as appropriate.	Discharge of dredged or fill material into *waters of the United States*, including jurisdictional wetlands—**relevant and appropriate**.	Nation Wide Permit (38) Cleanup of Hazardous and Toxic Waste 33 *CFR* 323.3(b)
Floodplains			
Presence of floodplain as defined in 10 *CFR* 1022.4	Avoid, to the extent possible, the long- and short-term adverse effects associated with occupancy and modification of floodplains.	DOE actions that involve potential impacts to, or take place within, floodplains—**applicable**.	10 *CFR* 1022.3(a)

Table 3. Summary of Location-Specific ARARs/TBCs for the Soils Operable Unit Inactive Facilities (Continued)

LOCATION-SPECIFIC			
Location characteristic(s)	**Requirement(s)**	**Prerequisite**	**Citation(s)**
	Floodplains		
	Undertake a careful evaluation of the potential effects of any action taken in a floodplain. Identify, evaluate, and, as appropriate, implement alternative actions that may avoid or mitigate adverse impacts on floodplains		10 *CFR* 1022.3(b) and (d)
	Restore and preserve natural and beneficial values served by floodplains to the extent practicable.		10 *CFR* 1022.1(a)(3)
	Measures that mitigate the adverse effects of actions in a floodplain including, but not limited to, minimum grading requirements, runoff controls, design and construction constraints, and protection of ecologically-sensitive areas.		10 *CFR* 1022.13(a)(3)
	If no practicable alternative to locating or conducting the action in the floodplain is available, then before taking action design or modify its action in order to minimize potential harm to or within the floodplain, consistent with the policies set forth in EO 11988 and EO 11990.		10 *CFR* 1022.14(a)

Table 3. Summary of Location-Specific ARARs/TBCs for the Soils Operable Unit Inactive Facilities (Continued)

LOCATION-SPECIFIC			
Location characteristic(s)	**Requirement(s)**	**Prerequisite**	**Citation(s)**
Endangered, threatened, or rare species			
Presence of federally endangered or threatened species, as designated in 50 *CFR* 17.11 and 17.12 or critical habitat of such species	Actions that jeopardize the existence of a listed species or results in the destruction or adverse modification of critical habitat must be avoided or reasonable and prudent mitigation measures taken.	Action that is likely to jeopardize fish, wildlife, or plant species or destroy or adversely modify critical habitat—**applicable**.	16 *USC* 1531 *et. seq*., Sect. 7(a)(2)
Presence of migratory birds and their habitats	Then unlawful killing, taking, possession, and sale of almost all species of native birds in the U.S. is prohibited.	If action is likely to impact migratory birds—**applicable**.	16 *USC* 703-704

CFR = Code of Federal Regulations
DOE = U.S. Department of Energy
EO = Executive Order
NWP = Nationwide Permit
USC = United States Code

Table 4. Summary of Action-Specific ARARs/TBCs for the Soils Operable Unit Inactive Facilities

ACTION-SPECIFIC			
Action	**Requirements**	**Prerequisite**	**Citation(s)**
Site preparation, construction, and excavation activities			
Activities causing fugitive dust emissions	No person shall cause, suffer, or allow any material to be handled, processed, transported, or stored; a building or its appurtenances to be constructed, altered, repaired, or demolished, or a road to be used without taking reasonable precaution to prevent particulate matter from becoming airborne. Such reasonable precautions shall include, when applicable, but not be limited to the following: • Use, where possible, of water or chemicals for control of dust in the demolition of existing buildings or structures, construction operations, the grading of roads or the clearing of land; • Application and maintenance of asphalt, oil, water, or suitable chemicals on roads, materials stockpiles, and other surfaces which can create airborne dusts; • Covering, at all times when in motion, open bodied trucks transporting materials likely to become airborne; • The maintenance of paved roadways in a clean condition; and • The prompt removal of earth or other material from a paved street which earth or other material has been transported thereto by trucking or earth moving equipment or erosion by water.	Fugitive emissions from land-disturbing activities (e.g., handling, processing, transporting or storing of any material, demolition of structures, construction operations, grading of roads, or the clearing of land, etc.)—**applicable**.	401 *KAR* 63:010 § 3(1)

Table 4. Summary of Action-Specific ARARs/TBCs for the Soils Operable Unit Inactive Facilities (Continued)

ACTION-SPECIFIC			
Action	**Requirements**	**Prerequisite**	**Citation(s)**
	No person shall cause or permit the discharge of visible fugitive dust emissions beyond the lot line of the property on which the emissions originate.		401 *KAR* 63:010 § 3(2)
Activities causing radionuclide emissions	Emissions of radionuclides to the ambient air from DOE facilities shall not exceed those amounts that would cause any member of the public to receive in any year an EDE of 10 mrem/yr.	Radionuclide emissions at a DOE facility—**applicable**.	40 *CFR* 61.92 401 *KAR* 57:002
	Radioactive materials released to the atmosphere as a consequence of routine DOE activities shall not cause members of the public to receive, in a year, an EDE greater than 10 mrem per year.	Dose received from all sources of radionuclides via airborne emissions—**TBC**.	DOE O 5400.5(II)(1)(b)
Activities causing toxic substances or potentially hazardous matter emissions	Persons responsible for a source from which hazardous matter or toxic substances may be emitted shall provide the utmost care and consideration in the handling of these materials to the potentially harmful effects of the emissions resulting from such activities. No owner or operator shall allow any affected facility to emit potentially hazardous matter or toxic substances in such quantities or duration as to be harmful to the health and welfare of humans, animals and plants.	Potentially hazardous matter or toxic emissions—**applicable**.	401 *KAR* 63:020 § 3
Radiation protection of the public and the environment	Except as provided in 5400.1(II)(1)(a)(4), the exposure of members of the public to radiation sources as a consequence of all routine DOE activities shall not cause, in a year, an EDE greater than 100 mrem per year. The ALARA process shall be implemented for all DOE activities and facilities that cause public doses.	Dose received from all exposure modes from all DOE activities (including remedial actions) at a DOE facility —**TBC**.	DOE O 5400.5(II)(1)(a) and (2)

Table 4. Summary of Action-Specific ARARs/TBCs for the Soils Operable Unit Inactive Facilities (Continued)

ACTION-SPECIFIC			
Action	**Requirements**	**Prerequisite**	**Citation(s)**
Activities causing storm water runoff	Utilize best management practices (BMPs) to control pollutants in storm water discharges during and after construction which may include, as appropriate, soil stabilization practices (e.g., seeding); perimeter structural practices (e.g., gabions, silt fences, sediment traps); and storm water management devices.	Storm water discharge associated with construction activities, including clearing, grading, and excavating, that result in land disturbance of equal to or greater than one (1) acre and less than five (5) acres, except where otherwise exempt as specified in 401 *KAR* 5:002 § 1 (293)(a)—**applicable**. Storm water discharge associated with construction activity at industrial sites, including clearing, grading, and excavation, that result in the disturbance of five (5) acres or more total land area—**applicable**.	401 *KAR* 5:060 § 12 (2)(a)(2)(c)
General Waste Management			
General PCB management requirements	Any person storing or disposing of PCB waste must do so in accordance with 40 *CFR* 761, Subpart D.	Storage or disposal of waste containing PCBs at concentrations ≥ 50 ppm—**applicable**.	40 *CFR* 761.50(a)
	Any person cleaning up and disposing of PCBs shall do so based on the concentration at which the PCBs are found.	Cleanup and disposal of PCB remediation waste as defined in 40 *CFR* 761.3—**applicable**.	40 *CFR* 761.61

Table 4. Summary of Action-Specific ARARs/TBCs for the Soils Operable Unit Inactive Facilities (Continued)

ACTION-SPECIFIC			
Action	**Requirements**	**Prerequisite**	**Citation(s)**
Management of PCB/Radioactive waste	Any person storing such waste ≥ 50 ppm PCBs must do so taking into account both its PCB concentration and radioactive properties, except as provided in 40 *CFR* 761.65(a)(1), (b)(1)(ii) and (c)(6)(i).	Storage of PCB/Radioactive waste for a disposal—**applicable**.	40 *CFR* 761.50(b)(7)(i)
	Any person disposing of such waste must do so taking into account both its PCB concentration and its radioactive properties. If, taking into account only the properties of the PCBs in the waste, the waste meets the requirements for disposal in a non-hazardous waste landfill then the PCB/radioactive waste may be disposed without regard to the PCB component of the waste.	Disposal of PCB/Radioactive waste for a disposal—**applicable**.	40 *CFR* 761.50(b)(7)(ii)
Waste Characterization			
Characterization of solid waste	Must determine if solid waste is excluded from regulation under 40 *CFR* 261.4.	Generation of solid waste as defined in 40 *CFR* 261.2—**applicable**.	40 *CFR* 262.11(a) 401 *KAR* 32:010 §2
	Must determine if waste is listed as a hazardous waste in subpart D of 40 *CFR* Part 261.	Generation of solid waste which is not excluded under 40 *CFR* 261.4—**applicable**.	40 *CFR* 262.11(b) 401 *KAR* 32:010 §2
	Must determine whether the waste is identified in subpart C of 40 *CFR* Part 261 by using prescribed testing methods or applying generator knowledge based on information regarding material or processes used.	Generation of solid waste that is not listed in subpart D of 40 *CFR* Part 261 and not excluded under 40 *CFR* 261.4—**applicable**.	40 *CFR* 262.11(c) 401 *KAR* 32:010 §2
	Must refer to Parts 261, 262, 264, 265, 266, 268, and 273 of Chapter 40 for possible exclusions or restrictions pertaining to management of the specific waste.	Generation of solid waste which is determined to be hazardous—**applicable**.	40 *CFR* 262.11(d) 401 *KAR* 32:010 §2

Table 4. Summary of Action-Specific ARARs/TBCs for the Soils Operable Unit Inactive Facilities (Continued)

ACTION-SPECIFIC			
Action	**Requirements**	**Prerequisite**	**Citation(s)**
General waste analysis for treatment, storage, and disposal of hazardous waste	Must obtain a detailed chemical and physical analysis on a representative sample of the waste(s), which at a minimum, contains all the information that must be known to treat, store, or dispose of the waste in accordance with pertinent sections of 40 *CFR* 264 and 268.	Treatment, storage, or disposal of RCRA-hazardous waste—**applicable**.	40 *CFR* 264.13(a)(1) 401 *KAR* 34:020 § 4
Characterization of industrial wastewater	Industrial wastewater discharges that are point source discharges subject to regulation under section 402 of the Clean Water Act, as amended, are not solid wastes for the purpose of hazardous waste management.	Generation of industrial wastewater for discharge—**applicable**.	40 *CFR* 261.4(a)(2) 401 *KAR* 31:010 § 4
Determinations for land disposal of hazardous waste	Must determine the underlying hazardous constituents [as defined in 40 *CFR* 268.2(i)] in the waste.	Generation of RCRA characteristic hazardous waste (and is not D001 non-wastewaters treated by CMBST, RORGS, or POLYM of Section 268.42 Table 1) for storage, treatment or disposal—**applicable**.	40 *CFR* 268.9(a) 401 *KAR* 37:010 §8
	Must determine if the hazardous waste meets the treatment standards in 40 *CFR* 268.40, 268.45, or 268.49 by testing in accordance with prescribed methods or use of generator knowledge of waste.	Generation of hazardous waste—**applicable.**	40 *CFR* 268.7(a) 401 *KAR* 37:020 §7

Table 4. Summary of Action-Specific ARARs/TBCs for the Soils Operable Unit Inactive Facilities (Continued)

ACTION-SPECIFIC			
Action	**Requirements**	**Prerequisite**	**Citation(s)**
	Must determine each EPA Hazardous Waste Number (Waste Code) to determine the applicable treatment standards under 40 *CFR* 268.40 *et. seq*.		40 *CFR* 268.9(a) 401 *KAR* 37:010 §8
Characterization of LLW	Shall be characterized using direct or indirect methods and the characterization documented in sufficient detail to ensure safe management and compliance with the WAC of the receiving facility.	Generation of DOE LLW—**TBC**.	DOE M 435.1-1(IV)(I)
	Characterization data shall, at a minimum, include the following information relevant to the management of the waste:		DOE M 435.1-1(IV)(I)(2)
	• physical and chemical characteristics;		DOE M 435.1-1(IV)(I)(2)(a)
	• volume, including the waste and any stabilization or absorbent media;		DOE M 435.1-1(IV)(I)(2)(b)
	• weight of the container and contents;		DOE M 435.1-1(IV)(I)(2)(c)
	• identities, activities, and concentration of major radionuclides;		DOE M 435.1-1(IV)(I)(2)(d)
	• characterization date;		DOE M 435.1-1(IV)(I)(2)(e)
	• generating source; and		DOE M 435.1-1(IV)(I)(2)(f)
	• any other information that may be needed to prepare and maintain the disposal facility performance assessment, or demonstrate compliance with performance objectives.		DOE M 435.1-1(IV)(I)(2)(g)

Table 4. Summary of Action-Specific ARARs/TBCs for the Soils Operable Unit Inactive Facilities (Continued)

ACTION-SPECIFIC			
Action	**Requirements**	**Prerequisite**	**Citation(s)**
Waste Accumulation, Storage and Staging			
Temporary on-site storage of hazardous waste in containers	A generator may accumulate hazardous waste at the facility provided that	Accumulation of RCRA hazardous waste on-site as defined in 40 *CFR* 260.10—**applicable**.	40 *CFR* 262.34(a) 401 *KAR* 32:030 §5
	• waste is placed in containers that comply with 40 *CFR* 265.171-173;		40 *CFR* 262.34(a)(1)(i) 401 *KAR* 32:030 §5
	• the date upon which accumulation begins is clearly marked and visible for inspection on each container;		40 *CFR* 262.34(a)(2) 401 *KAR* 32:030 §5
	• container is marked with the words "hazardous waste."		40 *CFR* 262.34(a)(3) 401 *KAR* 32:030 § 5
Accumulation area	Container may be marked with other words that identify the contents.	Accumulation of 55 gal or less of RCRA hazardous waste or one quart of acutely hazardous waste listed in 261.33(e) at or near any point of generation—**applicable**.	40 *CFR* 262.34(c)(1) 401 *KAR* 32:030 §5
Temporary on-site storage of remediation waste in staging piles (e.g., excavated soils/sediments, sludge)	May be temporarily stored, (including mixing, sizing, blending or other similar physical operations intended to prepare the wastes for subsequent management or treatment) at a facility if used only during remedial operations provided that the staging pile will be designed to	Accumulation of non-flowing hazardous remediation waste in staging pile (or remediation waste otherwise subject to land disposal restrictions)—**applicable**.	40 *CFR* 264.554(a)(1) 401 *KAR* 34:287 § 5
	• facilitate a reliable, effective and protective remedy;		40 *CFR* 264.554(d)(1)(i) 401 *KAR* 34:287 § 5

Table 4. Summary of Action-Specific ARARs/TBCs for the Soils Operable Unit Inactive Facilities (Continued)

ACTION-SPECIFIC			
Action	**Requirements**	**Prerequisite**	**Citation(s)**
	• prevent or minimize releases of hazardous wastes and constituents into the environment, and minimize or adequately control cross-media transfer as necessary to protect human health and the environment (e.g., use of liners, covers, run-off/run-on controls, as appropriate).		40 *CFR* 264.554(d)(1)(ii) 401 *KAR* 34:287 § 5
	Must not place ignitable or reactive remediation waste in a staging pile unless the remediation waste has been treated, rendered, or mixed before placed in the staging pile so that	Storage of ignitable or reactive remediation waste in staging pile in—**applicable**.	40 *CFR* 264.554(e) 401 *KAR* 34:287 § 5
	• The remediation waste no longer meets the definition of ignitable or reactive under 401 *KAR* 31:030 § 2 and § 4; and		40 *CFR* 264.554(e)(1)(i) 401 *KAR* 34:287 § 5
	• (ii) You have complied with 401 *KAR* 34:020 § 8, General Requirements for Ignitable, Reactive, or Incompatible Wastes.		40 *CFR* 264.554(e)(1)(ii) 401 *KAR* 34:287 § 5
	Must not place in the same staging pile unless you have complied with 40 *CFR* 264.17(b).	Storage of incompatible remediation waste in staging pile in—**applicable**.	40 *CFR* 264.554(f)(1) 401 *KAR* 34:287 § 5
	Must separate the incompatible materials or protect them from one another by using a dike, berm, wall or other device.		40 *CFR* 264.554(f)(2) 401 *KAR* 34:287 § 5

Table 4. Summary of Action-Specific ARARs/TBCs for the Soils Operable Unit Inactive Facilities (Continued)

ACTION-SPECIFIC			
Action	**Requirements**	**Prerequisite**	**Citation(s)**
Use and management of containers holding hazardous waste	If container is not in good condition or if it begins to leak, must transfer waste into container in good condition.	Storage of RCRA hazardous waste in containers—**applicable**.	40 *CFR* 265.171 401 *KAR* 35:180 §2
	Use container made or lined with materials compatible with waste to be stored so that the ability of the container is not impaired.		40 *CFR* 265.172 401 *KAR* 35:180 §3
	Keep containers closed during storage, except to add/remove waste.		40 *CFR* 265.173(a) 401 *KAR* 35:180 §4
	Open, handle and store containers in a manner that will not cause containers to rupture or leak.		40 *CFR* 265.173(b) 401 *KAR* 35:180 §4
Storage of PCB waste and/or PCB/radioactive waste in a RCRA-regulated container storage area	Does not have to meet storage unit requirements in 40 *CFR* 761.65(b)(1) provided unit	Storage of PCBs and PCB Items designated for disposal—**applicable**.	40 *CFR* 761.65(b)(2)
	• is permitted by EPA under RCRA §3004, or		40 *CFR* 761.65(b)(2)(i)
	• qualifies for interim status under RCRA §3005; or		40 *CFR* 761.65(b)(2)(ii)
	• is permitted by an authorized state under RCRA §3006; and,		40 *CFR* 761.65(b)(2)(iii)
	• PCB spills cleaned up in accordance with Subpart G of 40 *CFR* 761.		40 *CFR* 761.65(c)(1)(iv)

Table 4. Summary of Action-Specific ARARs/TBCs for the Soils Operable Unit Inactive Facilities (Continued)

ACTION-SPECIFIC			
Action	**Requirements**	**Prerequisite**	**Citation(s)**
Storage of PCB waste and/or PCB/radioactive waste in non-RCRA regulated unit	Except as provided in 40 *CFR* 761.65 (b)(2), (c)(1), (c)(7), (c)(9), and (c)(10), after July 1, 1978, owners or operators of any facilities used for the storage of PCBs and PCB items designated for disposal shall comply with the storage unit requirements in 40 *CFR* 761.65(b)(1).	Storage of PCBs for disposal — **applicable**.	40 *CFR* 761.65(b)
	Storage facility must have or be • Adequate roof and walls to prevent rainwater from reaching stored PCBs and PCB items;		40 *CFR* 761.65(b)(1) 40 *CFR* 761.65(b)(1)(i)
	• Adequate floor that has continuous curbing with a minimum 6-inch high curb. Floor and curb must provide a containment volume equal to at least two times the internal volume of the largest PCB article or container or 25% of the internal volume of all articles or containers stored there, whichever is greater. *Note*: 6 inch minimum curbing not required for area storing PCB/radioactive waste;		40 *CFR* 761.65(b)(1)(ii)
	• No drain valves, floor drains, expansion joints, sewer lines, or other openings that would permit liquids to flow from curbed area;		40 *CFR* 761.65(b)(1)(iii)
	• Floors and curbing constructed of Portland cement, concrete, or a continuous, smooth, non-porous surface that prevents or minimizes penetration of PCBs; and		40 *CFR* 761.65(b)(1)(iv)
	• Not located at a site that is below the 100-year flood water elevation.		40 *CFR* 761.65(b)(1)(v)

Table 4. Summary of Action-Specific ARARs/TBCs for the Soils Operable Unit Inactive Facilities (Continued)

ACTION-SPECIFIC			
Action	**Requirements**	**Prerequisite**	**Citation(s)**
Risk-based storage of PCBs	TSCA provides for risk-based storage of PCBs when the method will not pose an unreasonable risk of injury to health or the environment.	Storage of waste containing PCBs in a manner other than prescribed in 40 *CFR* 761.65(b) (see above) —**applicable**.	40 *CFR* 761.61(c)
Temporary storage of PCB waste (e.g., PPE, rags) in a container(s)	Container(s) shall be marked as illustrated in 40 *CFR* 761.45(a).	Storage of PCBs and PCB items in containers for disposal—**applicable**.	40 *CFR* 761.40(a)(1)
	Storage area must be properly marked as required by 40 *CFR* 761.40(a)(10).		40 *CFR* 761.65(c)(3)
	Any leaking PCB Items and their contents shall be transferred immediately to a properly marked nonleaking container(s).		40 *CFR* 761.65(c)(5)
	Container(s) shall be in accordance with requirements set forth in DOT HMR at 49 *CFR* 171-180.		40 *CFR* 761.65(c)(6)
Temporary storage of bulk PCB remediation waste in a waste pile	Waste must be placed in a pile that • is designed and operated to control dispersal by wind, where necessary, by means other than wetting;	Storage of PCB remediation waste or PCB bulk product waste in waste pile at cleanup site or site of generation—**applicable**.	40 *CFR* 761.65(c)(9)(i)
	• does not generate leachate through decomposition or other reactions;		40 *CFR* 761.65(c)(9)(ii)
	• is at a storage site with a liner designed, constructed, and installed to prevent any migration of wastes off or through liner into adjacent subsurface soil, groundwater or surface water.		40 *CFR* 761.65(c)(9)(iii)(A)

Table 4. Summary of Action-Specific ARARs/TBCs for the Soils Operable Unit Inactive Facilities (Continued)

ACTION-SPECIFIC			
Action	**Requirements**	**Prerequisite**	**Citation(s)**
	Liner must be • constructed of materials that have appropriate chemical properties and sufficient strength and thickness to prevent failure because of pressure gradients, physical contact with waste or leachate to which they are exposed, climatic conditions, the stress of installation, and the stress of daily operation;		40 *CFR* 761.65(c)(9)(iii)(A)(*1*)
	• placed on foundation or base capable of providing support to liner and resistance to pressure gradients above and below the liner to present failure because of settlement compression or uplift;		40 *CFR* 761.65(c)(9)(iii)(A)(*2*)
	• installed to cover all surrounding earth likely to be in contact with waste.		40 *CFR* 761.65(c)(9)(iii)(A)(*3*)
	The storage site must have a cover that meets the above requirements and installed to cover all of the stored waste likely to be contacted by precipitation, and is secured so as not to be functionally disabled by winds expected under normal weather conditions; and		40 *CFR* 761.65(c)(9)(iii)(B)
	Have a run-on control system designed, constructed, operated and maintained such that it		40 *CFR* 761.65(c)(9)(iii)(C)
	• prevents flow on the stored waste during peak discharge from at least a 25-year storm.		40 *CFR* 761.65(c)(9)(iii)(C)(*1*)

Table 4. Summary of Action-Specific ARARs/TBCs for the Soils Operable Unit Inactive Facilities (Continued)

ACTION-SPECIFIC			
Action	**Requirements**	**Prerequisite**	**Citation(s)**
	Collection and holding facilities (e.g., tanks or basins) must be emptied or otherwise managed expeditiously after storms to maintain design capacity of the system.		
	Requirements of 40 *CFR* 761.65(c)(9) may be modified under the risk-based disposal option of 40 *CFR* 761.61(c).		40 *CFR* 761.65(c)(9)(iv)
Staging of LLW	Shall be for the purpose of the accumulation of such quantities of wastes necessary to facilitate transportation, treatment, and disposal.	Management of LLW at a DOE facility—**TBC**.	DOE M 435.1-1 (IV)(N)(7)
Packaging of LLW	Shall be packaged in a manner that provides containment and protection for the duration of the anticipated storage period and until disposal is achieved or until the waste has been removed from the container.	Packaging of DOE LLW in containers —**TBC**.	DOE M 435.1-1(IV)(L)(1)(a)
	Vents or other measures shall be provided if the potential exists for pressurizing or generating flammable or explosive concentrations of gases within the waste container.		DOE M 435.1-1(IV)(L)(1)(b)
	Containers shall be marked such that their contents can be identified.		DOE M 435.1-1(IV)(L)(1)(c)

Table 4. Summary of Action-Specific ARARs/TBCs for the Soils Operable Unit Inactive Facilities (Continued)

ACTION-SPECIFIC			
Action	**Requirements**	**Prerequisite**	**Citation(s)**
Waste Treatment			
Treatment of RCRA hazardous waste soil	Prior to land disposal, all "constituents subject to treatment" as defined in 40 *CFR* 268.49(d) must be treated as follows:	Treatment of restricted hazardous waste soils—**applicable**.	40 *CFR* 268.49(c)(1) 401 *KAR* 37:040 §10
	• **For non-metals** (except carbon disulfide, cyclohexanone, and methanol), treatment must achieve a 90 percent reduction in total constituent concentrations, except as provided in 40 *CFR* 268.49(c)(1)(C).		40 *CFR* 268.49(c)(1)(A) 401 *KAR* 37:040 §10
	• **For metals** and carbon disulfide, cyclohexanone, and methanol,), treatment must achieve a 90 percent reduction in total constituent concentrations as measured in leachate from the treated media (tested according to TCLP) or 90 percent reduction in total constituent concentrations (when a metal removal technology is used), except as provided in 40 *CFR* 268.49(c)(1)(C).		40 *CFR* 268.49(c)(1)(B) 401 *KAR* 37:040 §10
	• When treatment of any constituent subject to treatment to a 90 percent reduction standard would result in a concentration less than 10 times the Universal Treatment Standard for that constituent, treatment to achieve constituent concentrations less than 10 times the universal treatment standard is not required. [Universal Treatment Standards are identified in 40 *CFR* 268.48 Table UTS].		40 *CFR* 268.49(c)(1)(C) 401 *KAR* 37:040 §10
	In addition to the treatment requirement required by paragraph (c)(1) of 40 *CFR* 268.49, soils must be treated to eliminate these characteristics.	Treatment of soils that exhibit the hazardous characteristic of ignitability, corrosivity, or reactivity—**applicable**.	40 *CFR* 268.49(c)(2) 401 *KAR* 37:040 §10

Table 4. Summary of Action-Specific ARARs/TBCs for the Soils Operable Unit Inactive Facilities (Continued)

ACTION-SPECIFIC			
Action	**Requirements**	**Prerequisite**	**Citation(s)**
Treatment of collected wastewater	All tank systems, conveyance systems, and ancillary equipment used to treat, store or convey wastewater to an on-site KPDES-permitted wastewater treatment facility are exempt from the requirements of RCRA Subtitle C standards.	On-site wastewater treatment units subject to regulation under § 402 or § 307(b) of the CWA (KPDES-permitted)—**applicable**.	40 *CFR* 264.1(g)(6) 401 *KAR* 34:010 § 1
Treatment of LLW	Treatment to provide more stable waste forms and to improve the long-term performance of a LLW disposal facility shall be implemented as necessary to meet the performance objectives of the disposal facility.	Treatment of LLW for disposal at a LLW disposal facility—**TBC**.	DOE M 435.1-1(IV)(O)
Waste Disposal or Effluent Discharge			
Disposal of prohibited RCRA hazardous waste in a land-based unit	Are not prohibited if the wastes no longer exhibit a prohibited characteristic at the point of land disposal, unless the wastes are subject to a specified method of treatment other than DEACT in 40 *CFR* 268.40, or are D003 reactive cyanide.	Land disposal of restricted RCRA hazardous wastes that are hazardous only because they exhibit a hazardous characteristic—**applicable**.	40 *CFR* 268.1(c)(4)(iv) 401 *KAR* 37:010 §2
	May be land disposed if it meets the requirements in the table "Treatment Standards for Hazardous Waste" at 40 *CFR* 268.40 before land disposal.	Land disposal, as defined in 40 *CFR* 268.2, of prohibited RCRA waste—**applicable**.	40 *CFR* 268.40(a) 401 *KAR* 37:040 §2
	Must be treated according to the alternative treatment standards of 40 *CFR* 268.49(c) or according to the UTSs specified in 40 *CFR* 268.48 applicable to the listed and/or characteristic waste contaminating the soil prior to land disposal.	Land disposal, as defined in 40 *CFR* 268.2, of restricted hazardous soils—**applicable**.	40 *CFR* 268.49(b) 401 *KAR* 37:040 §10

Table 4. Summary of Action-Specific ARARs/TBCs for the Soils Operable Unit Inactive Facilities (Continued)

ACTION-SPECIFIC			
Action	**Requirements**	**Prerequisite**	**Citation(s)**
Disposal of RCRA hazardous debris in a land-based unit	Must be treated prior to land disposal as provided in 40 *CFR* 268.45(a)(1)-(5) unless EPA determines under 40 *CFR* 261.3(f)(2) that the debris no longer contaminated with hazardous waste or the debris is treated to the waste-specific treatment standard provided in 40 *CFR* 268.40 for the waste contaminating the debris.	Land disposal, as defined in 40 *CFR* 268.2, of RCRA-hazardous debris—**applicable**.	40 *CFR* 268.45(a) 401 *KAR* 37:040 §7
Disposal of RCRA characteristic waste that is managed in an CWA wastewater treatment unit	Are not prohibited, if the wastes are managed in a treatment system which subsequently discharges to waters of the U.S. under the CWA unless the wastes are subject to a specified method of treatment other than DEACT in 40 *CFR* 268.40, or are D003 reactive cyanide.	Restricted RCRA hazardous waste that are hazardous only because they exhibit a hazardous characteristic—**applicable**.	40 *CFR* 268.1(c)(4)(i) 401 *KAR* 37:010 §2
Disposal of bulk PCB remediation waste off-site (self-implementing)	May be sent off-site for decontamination or disposal provided the waste either is dewatered on-site or transported off-site in containers meeting the requirements of DOT HMR at 49 *CFR* parts 171-180.	Off-site disposal of bulk PCB remediation waste (as defined in 40 *CFR* 761.3)—**relevant and appropriate**.	40 *CFR* 761.61(a)(5)(i)(B)
	Must provide written notice including the quantity to be shipped and highest concentration of PCBs [using extraction EPA Method 3500B/3540C or Method 3500B/3550B followed by chemical analysis using Method 8082 in SW-846 or methods validated under 40 *CFR* 761.320-26 (Subpart Q)] before the first shipment of waste to each off-site facility where the waste is destined for an area not subject to a TSCA PCB Disposal Approval.	Off-site disposal of bulk PCB remediation waste (as defined in 40 *CFR* 761.3) to a facility not subject to a TSCA PCB Disposal Approval—**relevant and appropriate**.	40 *CFR* 761.61(a)(5)(i)(B)(2)*(iv)*

Table 4. Summary of Action-Specific ARARs/TBCs for the Soils Operable Unit Inactive Facilities (Continued)

ACTION-SPECIFIC			
Action	**Requirements**	**Prerequisite**	**Citation(s)**
	Shall be disposed of in accordance with the provisions for cleanup wastes at 40 *CFR* 761.61(a)(5)(v)(A).	Off-site disposal of dewatered bulk PCB remediation waste with a PCB concentration < 50 ppm—**relevant and appropriate**.	40 *CFR* 761.61(a)(5)(i)(B)(2)*(ii)*
	Shall be disposed of •in a hazardous waste landfill permitted by EPA under §3004 of RCRA;	Off-site disposal of dewatered bulk PCB remediation waste with a PCB concentration ≥ 50 ppm—**relevant and appropriate**.	40 *CFR* 761.61(a)(5)(i)(B)(2)*(iii)*
	• in a hazardous waste landfill permitted by a state authorized under §3006 of RCRA; or		
	• in a PCB disposal facility approved under 40 *CFR* 761.60.		
Disposal of PCB contaminated porous surfaces (self-implementing)	Shall be disposed off-site as bulk PCB remediation waste according to 40 *CFR* 761.61(a)(5)(i) or must meet the substantive requirements of these regulations for on-site disposal or decontaminated for use according to 40 *CFR* 761.79(b)(4).	PCB remediation waste porous surfaces (as defined in 40 *CFR* 761.3)—**relevant and appropriate**.	40 *CFR* 761.61(a)(5)(iii)
Disposal of liquid PCB remediation waste (self-implementing)	Shall either • decontaminate the waste to the levels specified in 40 *CFR* 761.79(b)(1) or (2); or	Liquid PCB remediation waste (as defined in 40 *CFR* 761.3)—**relevant and appropriate**.	40 *CFR* 761.61(a)(5)(iv) 40 *CFR* 761.61(a)(5)(iv)(A)
	• dispose of the waste in accordance with the substantive requirements of 40 *CFR* 761.61(b) or 40 *CFR* 761.61(c).		40 *CFR* 761.61(a)(5)(iv)(B)

Table 4. Summary of Action-Specific ARARs/TBCs for the Soils Operable Unit Inactive Facilities (Continued)

ACTION-SPECIFIC			
Action	**Requirements**	**Prerequisite**	**Citation(s)**
Performance-based disposal of PCB remediation waste	May dispose by one of the following methods • in a high-temperature incinerator under 40 *CFR* 761.70(b);	Disposal of non-liquid PCB remediation waste (as defined in 40 *CFR* 761.3)—**applicable**.	40 *CFR* 761.61(b)(2) 40 *CFR* 761.61(b)(2)(i)
	• by an alternate disposal method under 40 *CFR* 761.60(e);		
	• in a chemical waste landfill under 40 *CFR* 761.75;		
	• in a facility under 40 *CFR* 761.77; or		
	• through decontamination in accordance with 40 *CFR* 761.79.		40 *CFR* 761.61(b)(2)(ii)
	Shall be disposed according to 40 *CFR* 761.60(a) or (e), or decontaminate in accordance with 40 *CFR* 761.79.	Disposal of liquid PCB remediation waste—**applicable**.	40 *CFR* 761.61(b)(1)
Risk-based disposal of PCB remediation waste	May dispose of in a manner other than prescribed in 40 *CFR* 761.61(a) or (b) if method will not pose an unreasonable risk of injury to [sic] human health or the environment.	Disposal of PCB remediation waste—**applicable**.	40 *CFR* 761.61(c)
Disposal of PCB cleanup wastes (e.g., PPE, rags, non-liquid cleaning materials) (self- implementing option)	Shall be disposed of either • in a municipal solid waste facility under 40 *CFR* 258 or non-municipal, nonhazardous waste subject to 40 *CFR* 257.5 thru 257.30; or	Generation of non-liquid PCBs during and from the cleanup of PCB remediation waste—**relevant and appropriate**.	40 *CFR* 761.61(a)(5)(v)(A)

Table 4. Summary of Action-Specific ARARs/TBCs for the Soils Operable Unit Inactive Facilities (Continued)

ACTION-SPECIFIC			
Action	**Requirements**	**Prerequisite**	**Citation(s)**
	• in a RCRA Subtitle C landfill; or		
	• in a PCB disposal facility; or		
	• through decontamination under 40 *CFR* 761.79(b) or (c).		
Disposal of PCB cleaning solvents, abrasives, and equipment (self-implementing option)	May be reused after decontamination in accordance with 40 *CFR* 761.79; or For liquids, disposed in accordance with 40 *CFR* 761.60(a).	Generation of PCB wastes from the cleanup of PCB remediation waste—**relevant and appropriate**.	40 *CFR* 761.61(a)(5)(v)(B) 40 *CFR* 761.60(b)(1)(i)(B)
Disposal of PCB decontamination waste and residues	Shall be disposed of at their existing PCB concentration unless otherwise specified in 40 *CFR* 761.79(g).	PCB decontamination waste and residues for disposal—**applicable**.	40 *CFR* 761.79(g)
Disposal of LLW	LLW shall be certified as meeting waste acceptance requirements before it is transferred to the receiving facility.	Disposal of LLW at a DOE facility—**TBC**.	DOE M 435.1-1(IV)(J)(2)
Disposal of waste with residual radioactive material off-site	If residual radioactive material is released to a non-DOE or non-NRC licensed facility, the waste must achieve authorized limits in accordance with DOE Order 5400.5(IV)(4)(a) before that release.	Release of residual radioactive material to a non-DOE or non-NRC licensed facility for disposal—**TBC**.	DOE O 5400.5(II)(5)(c)(6) and 5400.5(IV)(5)(a)
On-site disposal of waste with residual radioactive Material	Disposal of residual radioactive material must achieve the authorized limits in accordance with DOE Order 5400.5 (IV)(4)(a).	Release of residual radioactive material for disposal on-site—**TBC**.	DOE O 5400.5(IV)(5)(a)

Table 4. Summary of Action-Specific ARARs/TBCs for the Soils Operable Unit Inactive Facilities (Continued)

ACTION-SPECIFIC			
Action	**Requirements**	**Prerequisite**	**Citation(s)**
Decontamination/Cleanup			
Decontamination of movable equipment contaminated by PCBs (self-implementing option)	May decontaminate by • swabbing surfaces that have contacted PCBs with a solvent;	Decontaminating movable equipment contaminated by PCB, tools and sampling equipment—**applicable**.	40 *CFR* 761.79(c)(2)
	• a double wash/rinse as defined in 40 *CFR* 761.360-378; or		
	• another applicable decontamination procedure under 40 *CFR* 761.79.		
Decontamination of PCB Containers (self-implementing option)	Must flush the internal surfaces of the container three times with a solvent containing < 50 ppm PCBs. Each rinse shall use a volume of the flushing solvent equal to approximately 10% of the PCB container capacity.	Decontaminating a PCB Container as defined in 40 *CFR* 761.3—**applicable**.	40 *CFR* 761.79(c)(1)
Decontamination of PCB contaminated water	The decontamination standard for water containing PCBs is less than or equal to 0.5 µg/L (i.e., approximately ≤0.5 ppb PCBs) for unrestricted use.	Water containing PCBs regulated for disposal—**applicable**.	40 *CFR* 761.79(b)(1)(iii)
Release of property having residual radioactive material to an off-site commercial facility	Prior to being released, property shall be surveyed to determine whether both removable and total surface contamination (including contamination present on and under any coating) are in compliance with the standards set forth in DOE O 5400.5.	Release of materials and equipment with surface residual radioactive contamination—**TBC**.	DOE O 5400.5(II)(5)(c)(1) and 5400.5(IV)(5)(d)

Table 4. Summary of Action-Specific ARARs/TBCs for the Soils Operable Unit Inactive Facilities (Continued)

ACTION-SPECIFIC			
Action	**Requirements**	**Prerequisite**	**Citation(s)**
Unit Closure			
Closure of RCRA container management unit	Generators must close the container management unit in a manner that • Minimizes the need for further maintenance; • Controls, minimizes or eliminates, to the extent necessary to protect human health and environment, postclosure escape of hazardous waste, hazardous constituents, contaminated runoff or hazardous waste decomposition products to ground or surface waters or to the atmosphere; and • Complies with closure requirements of 40 *CFR* 265.111 and 40 *CFR* 265.114.	Management of RCRA hazardous waste in containers—**applicable**.	40 *CFR* 262.34(a)(1)(iv)(B) 401 *KAR* 32:030 § 5 (1)
Closure of staging piles of remediation waste	Must be closed by removing or decontaminating all remediation waste, contaminated containment system components, and structures and equipment contaminated with waste and leachate.	Storage of remediation waste in staging pile located in previously contaminated area—**relevant and appropriate**.	40 *CFR* 264.554(j)(1) 401 *KAR* 34:287 § 5
	Must decontaminate contaminated sub-soils in a manner that will protect human and the environment.		40 *CFR* 264.554(j)(2) 401 *KAR* 34:287 § 5
	Must be closed according to substantive requirements in 40 *CFR* 264.258(a) and 264.111.	Storage of remediation waste in staging pile located in uncontaminated area—**relevant and appropriate**.	40 *CFR* 264.554(k) 401 *KAR* 34:287 § 5

Table 4. Summary of Action-Specific ARARs/TBCs for the Soils Operable Unit Inactive Facilities (Continued)

ACTION-SPECIFIC			
Action	**Requirements**	**Prerequisite**	**Citation(s)**
Waste Transportation			
Transportation of RCRA hazardous waste on-site	The generator manifesting requirements of 40 *CFR* 262.20–262.32(b) do not apply.	Transportation of hazardous wastes on a public or private right-of-way within or along the border of contiguous property under the control of the same person, even if such contiguous property is divided by a public or private right-of-way—**applicable**.	40 *CFR* 262.20(f) 401 *KAR* 32:020 § 1
Transportation of RCRA hazardous waste off-site	Must comply with the generator requirements of 40 *CFR* 262.20–23 for manifesting, Sect. 262.30 for packaging, Sect. 262.31 for labeling, Sect. 262.32 for marking, Sect. 262.33 for placarding, Sect. 262.40, 262.41(a) for record keeping requirements, and Sect. 262.12 to obtain EPA ID number.	Preparation and offering of hazardous waste for transport off-site—**applicable**.	40 *CFR* 262.10(h) 401 *KAR* 32:010 § 1
Transportation of PCB wastes off-site	Must comply with the manifesting provisions at 40 *CFR* 761.207 through 218.	Relinquishment of control over PCB wastes by transporting, or offering for transport**—applicable**.	40 *CFR* 761.207(a)
Transportation of radioactive waste	Shall be packaged and transported in accordance with DOE Order 460.1B and DOE Order 460.2.	Preparation of shipments of radioactive waste—**TBC**.	DOE M 435.1-(I)(1)(E)(11)
Transportation of LLW	To the extent practical, the volume of the waste and the number of the shipments shall be minimized.	Preparation of shipments of LLW**—TBC**.	DOE M 435.1-1(IV)(L)(2)

Table 4. Summary of Action-Specific ARARs/TBCs for the Soils Operable Unit Inactive Facilities (Continued)

ACTION-SPECIFIC			
Action	**Requirements**	**Prerequisite**	**Citation(s)**
Transportation of hazardous materials	Shall be subject to and must comply with all applicable provisions of the HMR at 49 *CFR* 171–180 related to marking, labeling, placarding, packaging, emergency response, etc.	Any person who, under contract with a department or agency of the federal government, transports "in commerce," or causes to be transported or shipped, a hazardous material—**applicable**.	49 *CFR* 171.1(c)
Transportation of hazardous materials on-site	Shall comply with 49 *CFR* Parts 171-174, 177, and 178 or the site- or facility-specific Operations of Field Office approved Transportation Safety Document that describes the methodology and compliance process to meet equivalent safety for any deviation from the Hazardous material Regulations [i.e., Transportation Safety Document for On-Site Transport within the Paducah Gaseous Diffusion Plant, PRS-WSD-0661, (PRS 2007b)].	Any person who, under contract with the DOE, transports a hazardous material on the DOE facility—**TBC**.	DOE O 460.1B(4)(b)
Transportation of hazardous materials off-site	Off-site hazardous materials packaging and transfers shall comply with 49 *CFR* Parts 171-174, 177, and 178 and applicable tribal, State, and local regulations not otherwise preempted by DOT and special requirements for Radioactive Material Packaging.	Preparation of off-site transfers of LLW—**TBC**.	DOE O 460.1B(4)(a)

ALARA = as low as reasonably achievable; ARAR = applicable or relevant and appropriate requirement; CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act; *CFR* = *Code of Federal Regulations;* CWA = Clean Water Act; DOE = U.S. Department of Energy; DOT = Department of Transportation; EDE = effective dose equivalent; EPA = U.S. Environmental Protection Agency; HMR = Hazardous Material Regulations; *KAR* = *Kentucky Administrative Regulations;* KPDES = Kentucky Pollutant Discharge Elimination System; LLW = low-level waste; mrem = millirem; NRC = Nuclear Regulatory Commission; PCB = polychlorinated biphenyl; PPE = personal protective equipment; RCRA = Resource Conservation and Recovery Act; TBC = to be considered; TCLP = Toxic Characteristic Leaching Procedure; TSCA = Toxic Substances Control Act; UST = underground storage tank; UTS = universal treatment standard; WAC = waste acceptance criteria

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APPENDIX A

SCOPE OF WORK

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CONTENTS

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ACRONYMS

ARAR	applicable or relevant and appropriate requirement
BMP	Best Management Practice
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
ES&H	Environmental, Safety, and Health
HF	hydrogen fluoride
KAR	*Kentucky Administrative Regulation*
KEEC	Kentucky Energy and Environment Cabinet
KPDES	Kentucky Pollutant Discharge Elimination System
OSHA	U.S. Occupational Safety and Health Administration
OU	Operable Unit
PCB	polychlorinated biphenyl
PGDP	Paducah Gaseous Diffusion Plant
RAWP	Removal Action Work Plan
RCRA	Resource Conservation and Recovery Act
SAP	Sampling and Analysis Plan
SOW	statement of work
SWMU	solid waste management unit
TBC	to be considered
TCA	1,1,1-trichloroethane
TCE	trichloroethene
TSCA	Toxic Substances and Control Act
WMP	Waste Management Plan

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A. SCOPE OF WORK

A.1 GENERAL

The objective of this action is to remove contamination at the C-218 Outdoor Firing Range [Solid Waste Management Unit (SWMU) 181] and C-410-B Hydrogen Fluoride (HF) Neutralization Lagoon (SWMU 19) at the Paducah Gaseous Diffusion Plant (PGDP) in Paducah, Kentucky.

The C-218 Outdoor Firing Range (SWMU 181) and C-410-B HF Neutralization Lagoon (SWMU 19) are inactive facilities that supported plant activities associated with various historical plant processes at the PGDP. Both of these inactive facilities have been investigated previously. The contamination associated with each inactive facility originated from plant activities. Figure 4 in the main text of this Removal Action Work Plan (RAWP) shows the locations of the two inactive facilities, and design drawings provided in Appendix B show general site layouts for the removal actions.

This Statement of Work (SOW) is subject to change or modification as a result of the final regulator approval process for the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) activity that this SOW is intended to support.

A.1.1 C-218 OUTDOOR FIRING RANGE (SWMU 181)

The C-218 Firing Range (SWMU 181) is an inactive facility formerly used as an outdoor firing range that was operational from 1985 to 1992. The facility is located immediately west of PGDP on U.S. Department of Energy (DOE) property and is a U-shaped soil berm approximately 4.88 m (16 ft) high. Excess excavation material from the East-West Ditch Oil Structure project (Engineering Service Order-13885) completed in 1983, along with possible additional fill material from C-611, was utilized to construct the berm. The facility was utilized for weapons training, and residual munitions fragments containing lead are found within the soils.

A.1.2 C-410-B HF NEUTRALIZATION LAGOON (SWMU 19)

The C-410-B HF Neutralization Lagoon (SWMU 19) is located north of the C-410 Feed Plant. It is a rectangular, below grade impoundment with dimensions of 11.59 m x 15.55 m x 2.13 m (38 ft x 51 ft x 7 ft) [383.88 m^3 (1,938 ft^3)]; has an earth-clay floor; and has sloped sides reinforced with wire and grout. It received effluent from the C-410-C Neutralization Building, where lime was used for the neutralization of HF cell electrolytes from lead-acid batteries. In addition, trucks transporting fly ash to the C-746-T Inert Landfill were rinsed in this impoundment. All processes in the C-410 Building ceased in the late 1970s.

A.2 SCOPE

The Soils Operable Unit (OU) Inactive Facilities removal action will include implementation of one or more engineered controls to prevent movement of contaminated soil/sediments and accumulated rainwater; temporary access controls, such as exclusion fencing and hazard postings will be used as required; complete removal of C-410-B HF Neutralization Lagoon (SWMU 19) to its SWMU boundary[1] (DOE 2009); removal of lead-contaminated soil at the C-218 Firing Range (SWMU 181) (DOE 2009); post-excavation sampling; and managing and properly disposing of remediation waste. Work will include

[1] Defined boundaries of SWMU 19 extend no further than 3 ft on each side of or 3 ft from the bottom of the lagoon.

mobilization; fence installation with hazard postings; installation of Best Management Practice (BMP) controls; excavation; post-excavation sampling; restoration; soil handling, transportation and disposal; and demobilization. The following outlines activities included in the removal action; however, it should be noted that specifics of certain construction and disposition activities are not supplied so as to provide flexibility when performing the work:

- Establish construction site access control. The use of fencing and hazard posting will be based on anticipated activities, hazard characterization, exposure assessments, and will integrate radiological protection as required with decisions regarding where postings will be placed made by the Certified Industrial Hygienist.

- Excavate approximately 59,500 ft^3 of soil/sediment and remove 25,000 gal of accumulated rainwater from the areas of known contamination to eliminate the risk of human receptors contacting contaminated soil/sediment and accumulated rainwater.

  - Under this action, C-410-B HF Neutralization Lagoon (SWMU 19) will be removed to its SWMU boundary. Any residual contamination from historical releases remaining after excavation is complete for the C-410-B HF Neutralization Lagoon (SWMU 19) will be addressed as part of future remedial investigation activities (e.g., Groundwater OU, Soils OU, Comprehensive Site OU, etc.).

  - For the C-218 Firing Range (SWMU 181), the focus of this removal action is lead-contaminated soil at SWMU 181. Any residual lead-contaminated soil remaining at the C-218 Firing Range (SWMU 181) after excavation is complete that exhibits concentrations greater than those established for unrestricted use/unlimited exposure will be addressed as part of future remedial investigation activities associated with the Soils OU.

- Perform verification soil sampling (equivalent to characterization sampling for potential future use in CERCLA actions) during excavation (limited to lead) at the C-218 Firing Range.

- Collect soil characterization samples at the C-410-B HF Neutralization Lagoon prior to restoration for potential use in future CERCLA actions (e.g., Groundwater OU, Soils OU, Comprehensive Site OU, etc.).

- Install temporary localized sediment control measures such as small stormwater retention areas, silt fencing, or rock check dams during excavation activities, as needed. Installation will control sediment and contaminant migration from the action and will be dependent upon the site conditions at the time of excavation.

- Restore (i.e., backfill with clean soil, reseeding, etc.) disturbed acreage to prevent erosion, migration, and recontamination.

- Characterize (to the extent necessary per waste acceptance criteria of disposition facility), containerize, transport, and dispose of all equipment and contaminated soil/sediment and rainwater excavated/removed from the areas of known contamination at an appropriate on- or off-site disposal/storage facility.

- Assess temporary localized sediment control measures and interim institutional controls (if applied) and discontinue as appropriate.

- Continue inspection and site maintenance during and after excavation/removal and restoration to ensure that no additional erosion occurs and until the excavated/restored area is stable.

The impact to vulnerable or sensitive populations, habitats, or natural resources (i.e., critical or aquatic habitat, migratory birds, wetlands, streams, and floodplains) has been identified. These impacts have been evaluated and the necessary mitigation measures required to meet applicable or relevant and appropriate requirements (ARARs) will be implemented during the construction and operation phases of this removal action.

Mobilization will include, but is not limited to, participation in the Readiness Assessment process, delivery of all necessary construction and environmental, safety, and health (ES&H) equipment, setup of any temporary facilities, establishment of a trained and qualified workforce on the job site, and delivery of construction materials required for starting work. All work shall be performed in strict compliance with U.S. Occupational Safety and Health Administration (OSHA) 29 *CFR* 1910 and 1926. An experienced worker with excavation competent person training in accordance with OSHA 29 *CFR* 1926 subpart P shall supervise excavation and backfill activities. Erosion control measures will be established.

Storm water control will be implemented as described in the BMP Plan, PRS/PROG/0017. The BMP plan will be implemented to minimize and/or eliminate the potential that contaminants associated with the inactive facilities might migrate beyond their current boundaries. These BMPs may include use of dust mitigation/suppression, diversion of run-on/run-off around the project area, and/or installation of small storm water retention areas, silt fencing, or rock check dams as localized engineering controls, as required. Any containers of oil or oil products will be inventoried in accordance with PRS/ENM/0037, *Spill Prevention, Control, and Countermeasure Plan*, for the DOE Paducah Site. If volumes equal or exceed 55 gal, plans for controls will be set in place.

Excavation and removal activities will be conducted in a manner that will limit fugitive dust emissions and will provide sedimentation controls, thereby limiting potential impacts due to airborne particulates and suspended solid loading.

The removal action will generate approximately 59,500 ft^3 of soil/sediment and approximately 25,000 gal of accumulated rainwater requiring on-site or off-site disposal. Soil and other waste materials will be characterized, managed, transported, and disposed of in accordance with the ARARs/to be considered (TBCs) for low-level radioactive, Resource Conservation and Recovery Act (RCRA), Toxic Substances and Control Act (TSCA), or industrial waste. DOE will manage/store polychlorinated biphenyl (PCB) remediation wastes in risk-based storage instead of storage meeting 40 *CFR* 761.61(b)(1) requirements pursuant to 40 *CFR* 761.65(b)(2)(vi) and 761.65(c)(9)(iv). Such wastes may be stored up to 180 days in drums, B-12 boxes, B-25 boxes, intermodal containers, Sealand containers and/or other appropriate DOT performance orientated packaging, provided that the containers are sealed when not adding/removing materials. Storing PCB remediation wastes in this manner provides a level of protectiveness that is similar to storing PCB remediation wastes in piles under 40 *CFR* 761.65(c)(9). DOE will perform disposal [in accordance with 40 *CFR* § 761.61(a)(5)(v)] of soil containing less than or equal to 49 ppm PCBs at the C-746-U Solid Waste Landfill. The Environmental Performance Standard in 401 *KAR* 47:030, Section 8, and Condition Number ACTV0006, "Standard Requirement 1"of Solid Waste Permit No. 073-00014/073-00015/073-00045, currently allow such disposal. PCB remediation waste requiring off-site disposal (i.e., greater than 49 ppm) will be disposed of in accordance with 40 *CFR* § 761.61(a), (b), or (c) in a RCRA permitted landfill, in a landfill with a coordinated approval, in a chemical waste landfill, or in a facility with approval from EPA. The contractor will follow permit conditions and as low as reasonably achievable as required by DOE orders.

Health-based standards of 39.2 ppm TCE and 2,080 ppm 1,1,1-trichloroethane (TCA) in solids will be used as the criteria for making contained-in/contaminated-with determinations for environmental media and debris managed on-site and/or designated for disposal at the C-746-U Landfill. The Commonwealth of Kentucky has agreed to consult with DOE and the state where the off-site facility is located to reach agreement on the appropriate health-based standard for making such determinations for waste that is to be shipped to such a facility. Wastewater collected or generated as part of the Removal Action will be sent to an existing Kentucky Pollutant Discharge Elimination System (KPDES)-permitted Waste Water Treatment Facility located at PGDP for treatment prior to discharge into surface water. Water may be treated and disposed of on- or off-site; however it will meet facility WAC and as low as reasonably achievable as required by DOE orders.

Off-site transfer of any hazardous substance, pollutant, or contaminant generated during this action will be sent to a facility that complies with applicable federal and state laws and has been approved by U.S. Environmental Protection Agency (EPA) for acceptance of CERCLA waste. Accordingly, DOE will verify with the appropriate EPA regional contact that any needed off-site facility is acceptable for receipt of CERCLA wastes prior to transfer in accordance with the requirements of the Off-Site Rule in 40 *CFR* § 300.440(a)(4).

Post-excavation soil sampling activities will be conducted following excavations. At the C-218 Firing Range (SWMU 181), verification soil sampling for lead will be performed. Limited additional excavation of lead 'hot spots' may be required depending upon sampling results. At the C-410-B HF Neutralization Lagoon, soil characterization samples will be collected prior to restoration for use in future CERCLA actions (e.g., Groundwater OU, Soils OU, Comprehensive Site OU, etc.). All post-excavation sampling will be conducted in accordance with the Sampling and Analysis Plan (SAP) found in Appendix F. Sampling locations will be surveyed upon completion of sampling activities and the four corner boundaries of the C-410-B HF Neutralization Lagoon will be surveyed and used to update as-built engineering drawings.

Upon completion of fieldwork, demobilization will occur. Demobilization includes decontamination and removal of all construction and health and safety equipment, dismantlement and removal of temporary structures and storm water controls, removal of excess construction materials, removal of all personnel, and preparation of a post construction completion report.

All work shall be performed in accordance with this RAWP, the SOW (Appendix A); the design drawings (Appendix B); ES&H Plan (Appendix C); Waste Management Plan (WMP) (Appendix D); Quality Assurance Project Plan (Appendix E); SAP (Appendix F); and the Data Management Implementation Plan (Appendix G).

A.2.1 C-218 OUTDOOR FIRING RANGE (SWMU 181)

The following is the specific scope for the C-218 Outdoor firing range.

Soil: The length of the face of SWMU 181 [approximately 130 m (425 ft)] will be excavated to a depth of up to two ft and the ground surface in front of the berm [approximately 1,730 m^2 (18,600 ft^2)] will be excavated to reduce the lead concentration within the facility "hot spot" to below 800 mg/kg. This will result in the "hot spot" excavation of approximately 3,398 m^3 (51,000 ft^3) of contaminated soil. Any residual lead-contaminated soil remaining at the C-218 Firing Range (SWMU 181) after excavation is complete that exhibits concentrations greater than those established for unrestricted use/unlimited exposure will be addressed as part of future remedial investigation activities associated with the Soils OU.

A.2.2 C-410-B HF NEUTRALIZATION LAGOON (SWMU 19)

The following are specific scopes for the C-410-B HF Neutralization lagoon.

Soil/Sediment and Debris: SWMU 19 will be excavated within its defined boundaries. Defined boundaries of SWMU 19 extend no further than 3 ft on each side of or 3 ft from the bottom of the lagoon. This will result in the removal of approximately 241 m^3 (8,512 ft^3) of sediment, concrete, and soil, which includes the lagoon structure and its defined area, as well as approximately 94,635 L (25,000 gal) of water. Any residual contamination from historical releases remaining after excavation is complete will be addressed as part of future remedial investigation activities (e.g., Groundwater OU, Soils OU, Comprehensive Site OU, etc.).

Accumulated Rainwater: Accumulated rainwater, estimated at approximately 94,633 L (25,000 gal), will be pumped from the lagoon and properly stored and disposed of prior to excavation of the lagoon and surrounding soil. The rainwater/sludge mixture will be pumped from the lagoon by a pump designed to pump solids and liquids (i.e., trash pump). The sludge either will be placed in an approved filtering container to allow for solid/liquid separation or the mixture will be passed through a filter press unit at C-752-C or another approved unit at the site. The liquids and solids then will be properly stored and dispositioned. Impermeable containments will be constructed at hose connections to ensure all liquids are contained.

A.3 WORK INCLUDED

A.3.1 MOBILIZATION

A. Mobilization shall include, but is not limited to, participation in the Readiness Review process; delivery of all necessary construction and health & safety equipment; setup of any temporary facilities; maintenance of temporary facilities; establishment of the total required workforce on the job site; completion of site specific training; delivery of all construction materials required to start work; and establishment of construction site access controls. It also includes the submittal of all documentation required prior to the start of fieldwork.

A.3.2 SEDIMENT CONTROL MEASURES

A. Construct and maintain, at a minimum, storm water management controls, including but not limited to diversion ditches, diversion dams, silt fence, straw bale barriers, silt socks, erosion control blankets or mats, and rock check dams. Storm water control will be implemented as described in the BMP Plan, PRS/PROG/0017.

B. Install erosion and sediment control measures. All erosion and sediment control measures shall be maintained throughout the construction period. Erosion and sediment control measures (i.e., hay bales and/or silt fencing) for the C-218 firing range will be placed at the sides and bottom of the excavation since excavation activities will be at the vertical face and floor of the berm. Weekly checks will be made to ensure erosion controls are in place during project downtime. Erosion and sediment controls will be put in place at the end of each days activities.

C. If feasible, disturbed areas shall be securely covered with an impermeable liner during extended periods of time where no excavation/sampling work is required or when inclement weather is forecast. Transfer water collected in the work area into liquid storage containers. A pump (i.e. trash pump) would be used to transfer rainwater. A low point would be created when placing the

liner over the excavation to allow for the water to collect. The water would be pumped into a mobile poly tank and disposed of in an appropriate manner.

D. Best management practices shall be implemented as outlined in the "Best Management Practices Plan," PRS/PROG/0017.

A.3.3 C-410-B HF NEUTRALIZATION LAGOON (SWMU 19)

A. Obtain excavation/penetration permits prior to excavation work.

B. Setup working zones near the excavation area in accordance with the ES&H Plan (Appendix C).

C. Construct or install all erosion control structures per BMP Plan, PRS/PROG/0017.

D. Pump the accumulated storm water and manage per the WMP (Appendix D).

E. Locate utilities by hand excavation methods.

F. Field verify the location of all utilities by hand excavation and determine the proper action (capping, relocating, or plugging) of all utilities prior to continuation of work. Utilities and locations shown in Appendix B are from the PGDP utility maps.

G. Underground utilities shall be emptied and cut at the edge of the excavation and relocated, capped, or plugged.

H. Use the sheet pile, shoring, or other appropriate methods to stabilize excavation during removal. The specific method(s) to be used for stabilization, if needed, will be developed during construction planning. Contractor construction work control documents will include appropriate details such as plans, drawings or schematics showing how the sheet pile, shoring, or other appropriate methods will be used to stabilize excavations during the removal process.

I. Excavate soil, sediment, and debris (concrete) to the lines and grades as shown on Drawing C7DC410B0A001 in Appendix B.

J. Take special care during excavation around pipe supports and building foundations.

K. The excavated soil, sediments, and concrete debris shall be managed in accordance with the WMP (Appendix D).

L. Characterize the waste, as necessary, and dispose of according to WMP (Appendix D).

M. Collect soil characterization samples prior to restoration for use in future CERCLA actions per the SAP (Appendix F).

N. Backfill the excavated area with clean fill (Appendix H) and compact.

O. Cover with 6 inch dense graded aggregate and crown to drain.

A.3.4 C-218 OUTDOOR FIRING RANGE (SWMU 181)

A. Obtain excavation/penetration permits prior to excavation work.

B. Setup working zones near the excavation area in accordance with the ES&H Plan (Appendix C).

C. Locate utilities by hand excavation methods.

D. Coordinate with the RA contractor to determine the status of all utilities.

E. Field verify the location of all utilities by hand excavation and determine the proper action (capping, relocating, or plugging) of all utilities prior to continuation of work. Utilities and locations shown in Appendix B are from the PGDP utility maps.

F. Underground utilities shall be emptied and cut at the edge of the excavation and relocated, capped, or plugged.

G. Excavate soil up to two ft around the inside of the berm and from the existing ground surface if required, as shown in cross sections of Drawing C7DC21800A001 (Appendix B).

H. The excavated soil shall be managed in accordance with the WMP (Appendix D).

I. Characterize the waste, as necessary, and dispose of according to the WMP (Appendix D).

J. Verification samples will be collected in accordance with the SAP (Appendix F). If cleanup goals have not been met, additional excavation will be performed per the SAP and verification sampling will be repeated.

K. The excavated area shall be restored and seeded/revegetated.

L. Apply erosion control blanket to berm slopes.

A.3.5 WASTE MANAGEMENT AND DISPOSAL

A. Manage waste generated under the WMP (Appendix D). Waste will be evaluated for disposal options and will be disposed of in the most appropriate and economical way. Waste includes, but is not limited to, accumulated stormwater, miscellaneous concrete/brick/metal debris, and soil/sediments.

B. Provide weekly inspections and maintenance of the waste staging areas and temporarily staged excavated materials until they are shipped off-site.

A.3.6 DEMOBILIZATION

Demobilization shall include, but not be limited to, backfill and restoration in accordance with design drawings; decontamination of equipment; removal of all construction and health & safety equipment; dismantlement and removal of all temporary structure; and removal of all excess construction materials.

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APPENDIX B

DESIGN DRAWINGS

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B. DESIGN DRAWINGS

No.	Drawing No.	Title
1	C7DC410B0A001 REV 0	C-410-B HF Neutralization Lagoon (SWMU 19) Removal
2	C7DC21800A001 REV 1	C-218 Outdoor Firing Range (SWMU 181) Removal

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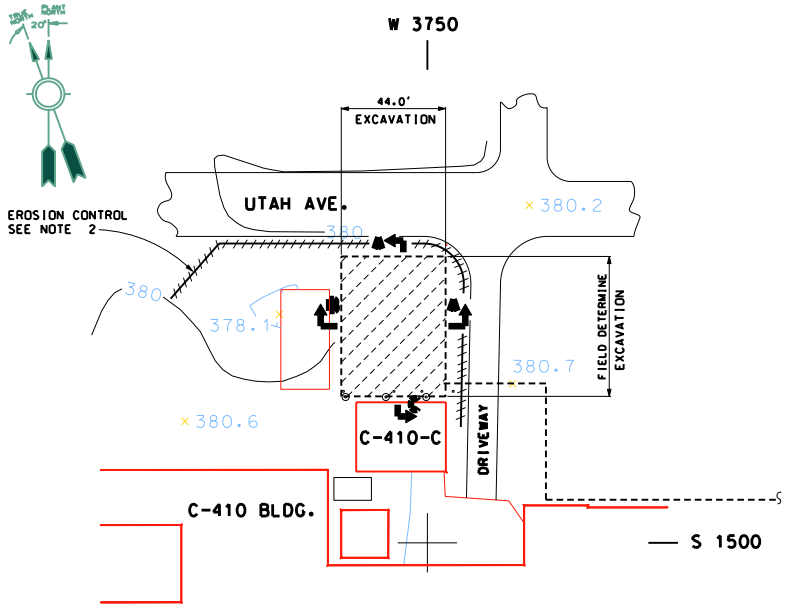
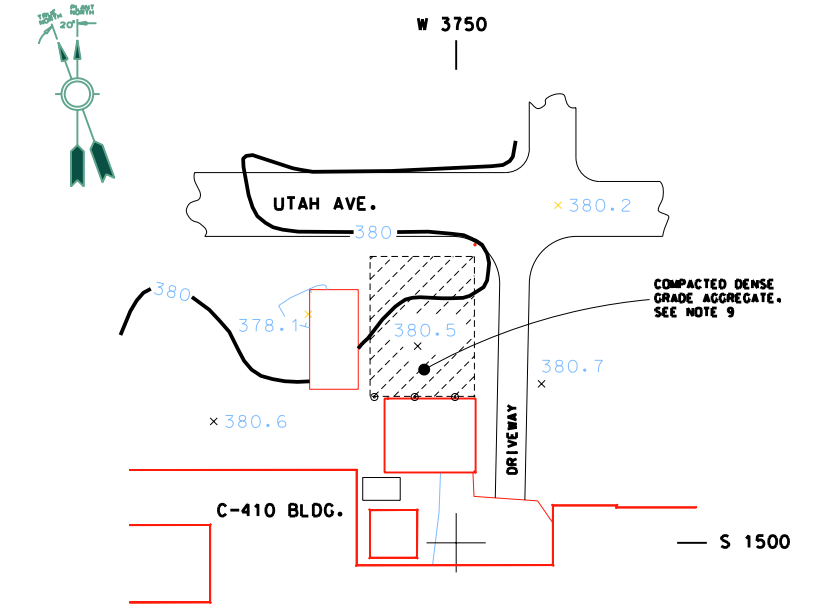


C-410-B SLUDGE LAGOON SITE PLAN

(C-410-B PROPOSED REMOVAL)

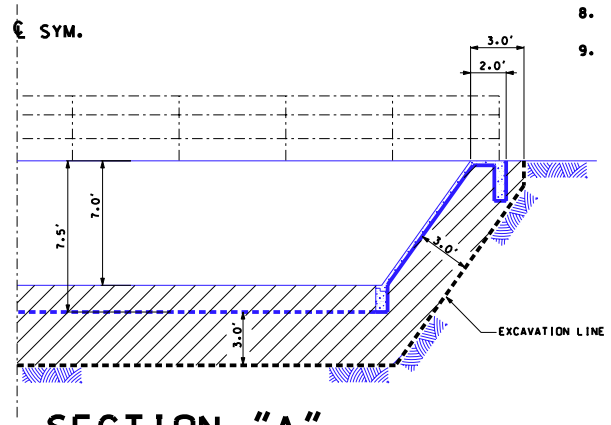


C-410-B SLUDGE LAGOON SITE PLAN

(C-410-B PROPOSED FINISHED GRADING PLAN)

NOTES:

1. OBTAIN AN EXCAVATION/PENETRATION PERMIT PRIOR TO EXCAVATION WORK.
2. INSTALL EROSION AND SEDIMENT CONTROL MEASURES AT LOCATIONS SHOWN AND AS SPECIFIED IN EXHIBIT "E" SPECIFICATION SECTION 02270 EROSION CONTROL. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD.
3. BEST MANAGEMENT PRACTICES SHALL BE IMPLEMENTED AS OUTLINED IN THE "BEST MANAGEMENT PRACTICES PLAN. PADUCAH GASEOUS DIFFUSION PLANT. PADUCAH. KENTUCKY. PRS/PROG/0017. MAY. 2007".
4. ALL WORK SHALL BE PERFORMED IN STRICT COMPLIANCE WITH OSHA 29 CFR 1910 AND 1926. AN EXPERIENCED WORKER WITH EXCAVATION COMPETENT PERSON TRAINING IN ACCORDANCE WITH OSHA 29 CFR 1926 SUBPART P SHALL SUPERVISE EXCAVATION AND BACKFILL ACTIVITIES.
5. DIMENSIONS. COORDINATES. AND ELEVATIONS ARE APPROXIMATE AND SHALL BE FIELD VERIFIED PRIOR TO THE START OF WORK.
6. LOCATION AND STATUS OF ALL UTILITIES AND STRUCTURES ARE APPROXIMATE AND SHALL BE FIELD VERIFIED IN COOPERATION WITH THE CONTRACTOR BY VACUUM OR HAND EXCAVATION. THE CONTRACTOR SHALL APPROVE THE PROPER ACTION (CAPPING. RELOCATING. OR PLUGGING) FOR ALL UTILITIES PRIOR TO CONTINUATION OF WORK. UTILITIES AND LOCATIONS SHOWN ARE FROM THE PGDP UTILITY MAPS.
7. RAIN WATER THAT HAS ACCUMULATED WITHIN THE LAGOON SHALL BE REMOVED. TRANSPORTED. AND DISPOSED IN ACCORDANCE WITH THE REMOVAL ACTION WORK PLAN APPENDIX E WASTE MANAGEMENT PLAN.
8. CONCRETE SHALL BE REMOVED AND DISPOSED IN ACCORDANCE WITH APPENDIX E WASTE MANAGEMENT PLAN
9. UPON COMPLETION OF THE WORK. ALL DISTURBED SOIL AREAS SHALL BE RESTORED IN ACCORDANCE WITH EXHIBIT "E" SPECIFICATION SECTIONS 02200 EARTHWORK AND 02936 SEEDING AND PLANTING.



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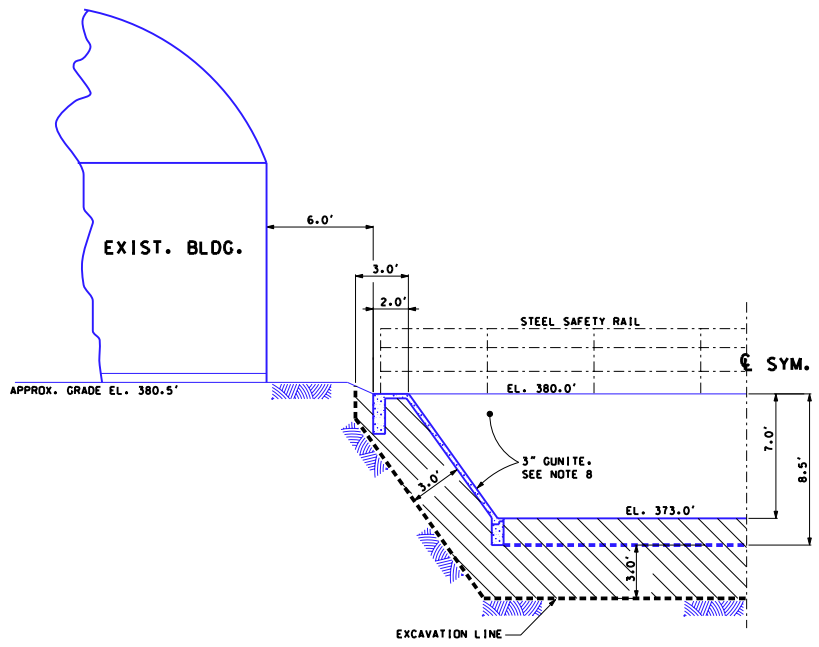

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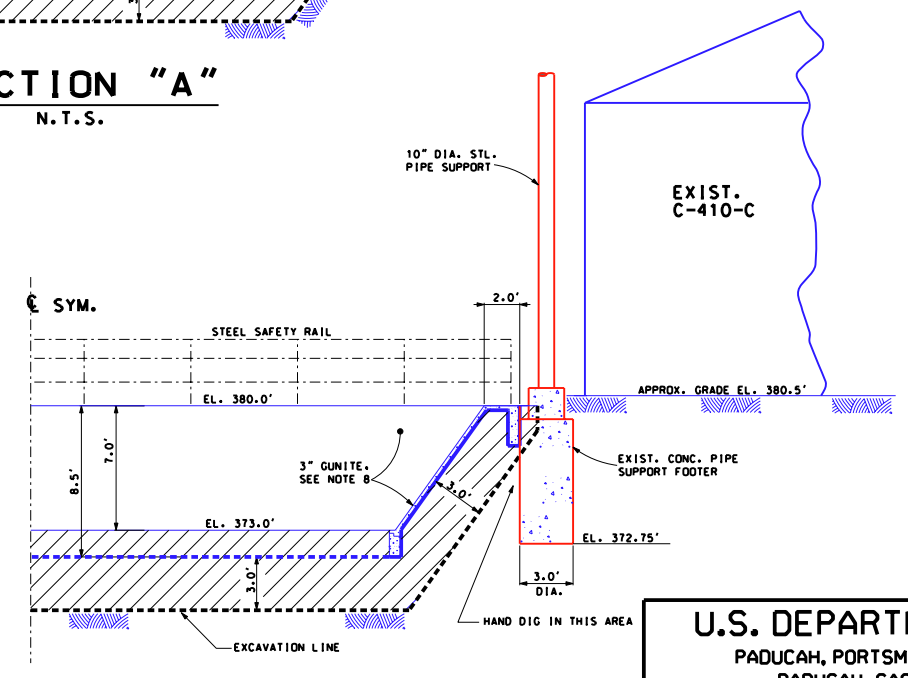

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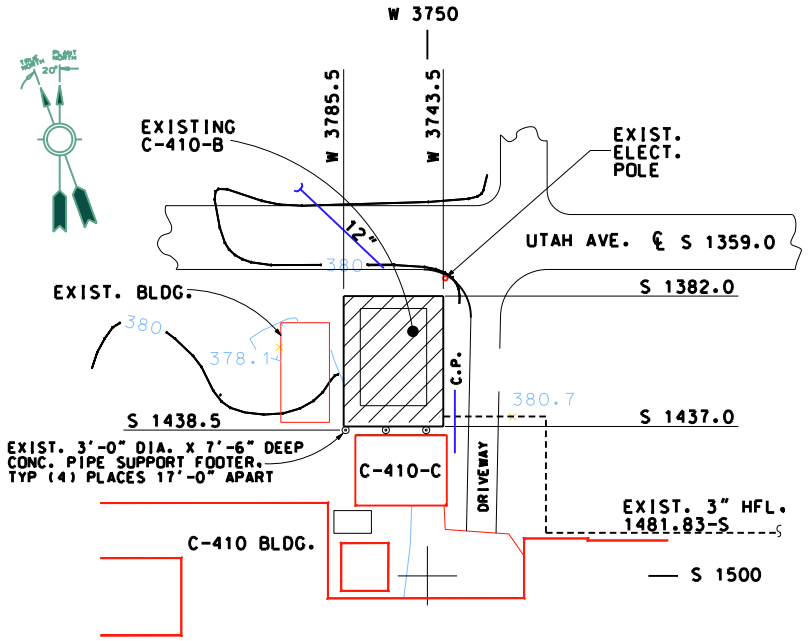

C-410-B SLUDGE LAGOON SITE PLAN

(EXISTING CONDITIIONS)

GRAPHIC SCALE

0 40 80

1" = 40'

NO REPRESENTATION OR WARRANTY, EXPRESSED OR IMPLIED, IS MADE AS TO THE ACCURACY, COMPLETENESS OR USEFULNESS OF THE INFORMATION OR STATEMENTS CONTAINED IN THESE DRAWINGS, OR THAT THE USE OR DISCLOSURE OF ANY INFORMATION, APPARATUS, METHOD, OR PROCESS DISCLOSED IN THESE DRAWINGS MAY NOT INFRINGE PRIVATE RIGHTS OF OTHERS. NO LIABILITY IS ASSUMED WITH RESPECT TO THE USE OF, OR FOR DAMAGES RESULTING FROM THE USE OF ANY INFORMATION, APPARATUS, METHOD, OR PROCESS DISCLOSED IN THESE DRAWINGS. DRAWINGS MADE AVAILABLE FOR INFORMATION TO BIDDER ARE TO BE USED FOR OTHER PURPOSES AND ARE TO BE RETURNED UPON REQUEST OF THE FORWARDING CONTRACTOR.

SECTION AND DETAIL KEY

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PROFESSIONAL SEAL

REV.	DATE	DESCRIPTION	DRAWN BY	DRAFT CHK	ENGR CHK	ORG/ ENGR	LEAD ENGR	QA	CONF CTRL/ NUCL SFTY	FAC MGR	PROJ ENGR
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U.S. DEPARTMENT OF ENERGY
PADUCAH, PORTSMOUTH PROJECT OPERATIONS,
PADUCAH GASEOUS DIFFUSION PLANT

PADUCAH Remediation Services
A Portage Shaw Joint Venture Company
managed for the DEPARTMENT OF ENERGY under U.S. GOVERNMENT contract DE-AC30-06EW05001
Paducah, Kentucky

TETRA TECH, INC
KEVIL, KENTUCKY
(270) 462-4600
FAX (270) 462-4601

DOE CONTRACT NO. DE-AC30-06EW05001

PROJECT NAME:
SOILS INACTIVE FACILITIES REMOVAL ACTION PLAN

TITLE:
C-410-B HF NEUTRALIZATION LAGOON
SOLID WASTE MANAGEMENT UNIT
(SWMU 19) REMOVAL

CAD FILE NAME	BUILDING	PLANT	CLASS
C7DC410B0A001 REV B.DGN	C-410-B	PGDP	U

SCALE:	DRAWING NUMBER	REV
NOTED	C7DC410B0A001	A

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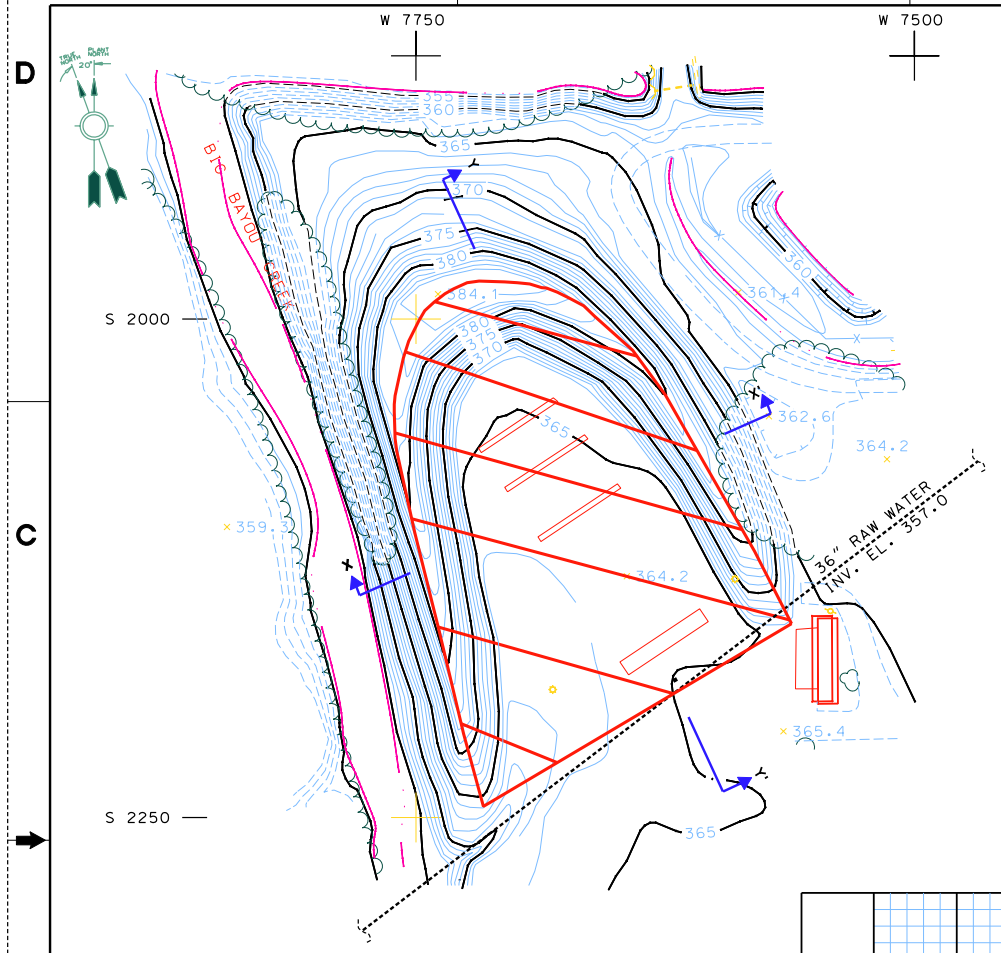
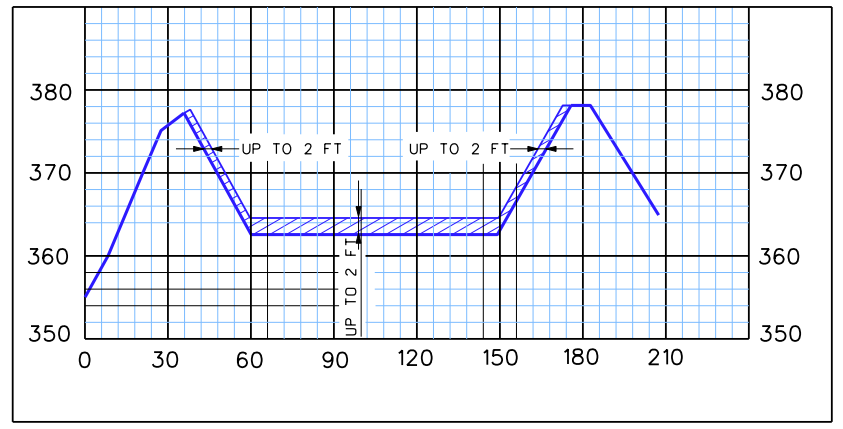


C-218 OUTDOOR FIRING RANGE SITE PLAN

GRAPHIC SCALE
40 0 40 80
1" = 40'

NOTES:

1. OBTAIN AN EXCAVATION/PENETRATION PERMIT PRIOR TO EXCAVATION WORK.
2. BEST MANAGEMENT PRACTICES SHALL BE IMPLEMENTED AS OUTLINED IN THE "BEST MANAGEMENT PRACTICES PLAN, PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY, PRS/PROG/0017, MAY, 2007".
3. ALL WORK SHALL BE PERFORMED IN STRICT COMPLIANCE WITH OSHA 29 CFR 1910 AND 1926. AN EXPERIENCED WORKER WITH EXCAVATION COMPETENT PERSON TRAINING IN ACCORDANCE WITH OSHA 29 CFR 1926 SUBPART P SHALL SUPERVISE EXCAVATION AND BACKFILL ACTIVITIES.
4. DIMENSIONS, COORDINATES, AND ELEVATIONS ARE APPROXIMATE AND SHALL BE FIELD VERIFIED PRIOR TO THE START OF WORK.
5. LOCATION AND STATUS OF ALL UTILITIES AND STRUCTURES ARE APPROXIMATE AND SHALL BE FIELD VERIFIED IN COOPERATION WITH THE CONTRACTOR STR BY VACUUM OR HAND EXCAVATION. THE CONTRACTOR STR SHALL APPROVE THE PROPER ACTION (CAPPING, RELOCATING, OR PLUGGING) FOR ALL UTILITIES PRIOR TO CONTINUATION OF WORK. THE 36 INCH RAW WATER PIPE LINE LOCATION SHOWN WAS TAKEN FROM PGDP UTILITY MAPS.
6. UPON COMPLETION OF THE WORK, ALL DISTURBED SOIL AREAS SHALL BE RESTORED IN ACCORDANCE WITH EXHIBIT "E" SPECIFICATION SECTIONS 02200 EARTHWORK AND 02936 SEEDING AND PLANTING.
7. A TWO FT. THICK EXCAVATION IS SHOWN IN THE CROSS-SECTIONS FOR DEFINITION. FINISH GRADE FOLLOWING REMOVAL ACTIVITIES WILL BEDEFINED BY CONFIRMATION SOIL ANALYSES, THEREFORE, A POST REMOVAL CROSS-SECTION IS NOT PROVIDED.



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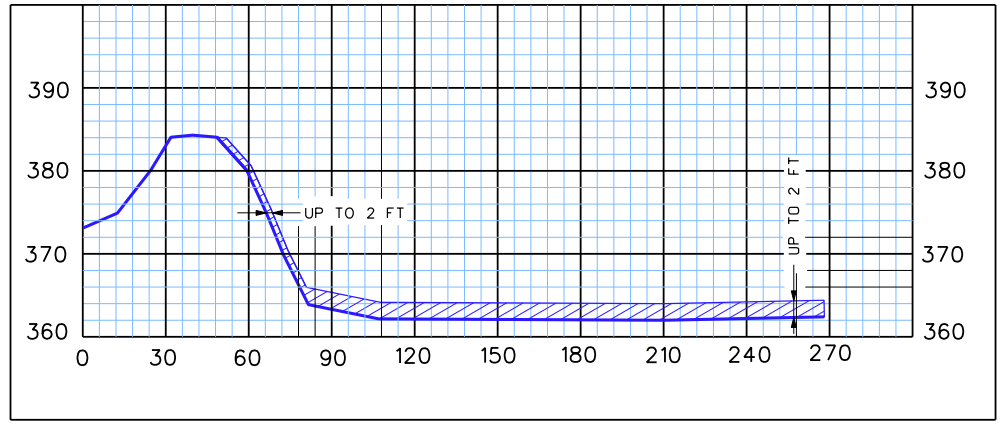
HORIZ: 1" = 30'



Y-Y'

SCALE:
VERT: 1" = 10'
HORIZ: 1" = 30'

SECTION NUMBER OR DETAIL LETTER
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SECTION AND DETAIL KEY

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PROFESSIONAL SEAL

REV.	DATE	DESCRIPTION	DRAWN BY	DRAFT CHK	ENGR CHK	ORG/ ENGR	LEAD ENGR	QA	CONF CTRL/ NUCL SFTY	FAC MGR	PROJ ENGR
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DRAWING REVISIONS

U.S. DEPARTMENT OF ENERGY
PADUCAH, PORTSMOUTH PROJECT OPERATIONS,
PADUCAH GASEOUS DIFFUSION PLANT

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DOE CONTRACT NO. DE-AC30-06EW05001

PROJECT NAME:
SOILS INACTIVE FACILITIES REMOVAL ACTION PLAN

TITLE:
C-218 OUTDOOR FIRING RANGE
SOLID WASTE MANAGEMENT UNIT
(SWMU 181) REMOVAL

CAD FILE NAME	BUILDING	PLANT	CLASS
C7DC21800A001 REV 0.DGN	C-218	PGDP	U

SCALE:	DRAWING NUMBER	REV
NOTED	C7DC21800A001	A

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APPENDIX C

ENVIRONMENTAL, SAFETY, AND HEALTH PLAN

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CONTENTS

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ACRONYMS

ACGIH	American Conference of Gevernment Industrial Hygienists
AHAs	Activity Hazard Assessments
AIHA	American Industrial Hygiene Association
ALARA	as-low-as-reasonably-achievable
ANSI	American National Standards Institute
CAAS	Critically Accident Alarm System
CRZ	contamination reduction zone
DOE	U.S. Department of Energy
EMS	Environmental Management System
EPA	U.S. Environmental Protection Agency
ES&H	Environmental, Safety, and Health
EZ	exclusion zone
FS	Field Superintendent
H&S	health and safety
HASPs	Health and Safety Plans
HSR	Health and Safety Representative
ISMS	Integrated Safety Management System
NIOSH	National Institute for Occupational Safety and Health
OSHA	U.S. Occupational Safety and Health Administration
OU	Operable Unit
PEL	permissible exposure limit
PGDP	Paducah Gaseous Diffusion Plant
PPE	personal protective equipment
PSS	Plant Shift Superintendent
RCT	Radiological Control Technician
RWP	Radiological work permits
SZ	support zone
TLV	threshold limit value

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C.1 PURPOSE

This Environmental, Safety, and Health (ES&H) Plan has been developed to discuss the general ES&H requirements associated with the Soils Operable Unit (OU) Inactive Facilities Removal Action Work Plan (RAWP) and identify some potential hazards. Site specific hazards and controls will be established for each task and location prior to performing work. These hazards and controls will be documented in the form of Site Specific Health and Safety Plan (HASPs), Activity Hazard Assessments (AHAs), work packages, and procedures. Personnel will be familiar with these work control documents prior to performing work in the affected areas.

C.2 INTEGRATED SAFETY MANAGEMENT/ENVIRONMENTAL MANAGEMENT

The Soils OU Inactive Facilities Project will utilize an Integrated Safety Management System (ISMS), which integrates the Safety Management System, the Environmental Management System (EMS), and Quality Management System, to ensure personnel and environmental safety and quality are integrated into management and work practices at all levels so that missions are accomplished while protecting the public, the workers, and the environment. The concepts of the ISMS/EMS will be utilized to provide a formal, organized process to ensure the safe performance of work. The ISMS/EMS Plan identifies the methodologies that will be used to address previously recognized hazards and how the hazards are mitigated using contractor-accepted ES&H practices.

The core functions and guiding principles of ISMS/EMS will be implemented by incorporating applicable programs, policies, technical specifications, and procedures from the U.S. Department of Energy (DOE), U.S. Occupational Safety and Health Administration (OSHA), U.S. Environmental Protection Agency (EPA), and other applicable regulatory guidance. Brief descriptions of the five ISMS/EMS core functions are provided below.

C.2.1 DEFINE SCOPE OF WORK

Defining and understanding the scope of work is the first critical step in successfully performing any specific activity in a safe and compliant manner. Each member of the project team will participate in discussions conducted to understand the scope and contribute to the planning of the work. The Soils OU Inactive Facilities project team will meet with personnel to ensure that everyone understands the scope of work and the technical and safety issues involved. These meetings are conducted to ensure that all parties are in agreement on the scope and approach to complete the work.

C.2.2 ANALYZE HAZARDS

In the course of planning the work, the project team will identify hazards including personnel safety and environmental risks associated with the performance of the work. Hazards may be identified and assessed by performing a site visit, reviewing lessons learned, and reviewing project plans or historical data. The hazard assessment process will be prescribed by the DOE Prime Contractor procedures and policies.

Once the hazards have been identified and assessed, measures will be identified to minimize risks to workers, the public, and the environment. These measures are described in the project-specific AHAs, which serve to provide a control mechanism for all work activities. AHAs are detailed, activity-specific evaluations that address each step of the task and/or activity that will be performed. The AHA

development process entails a detailed evaluation of each task to identify specific activities or operations required to successfully complete the scope of work and define the potential chemical, environmental, physical, radiological, and/or biological hazards that may be encountered; the media and manner in which they may occur; and how they are to be recognized, mitigated, and controlled. Appropriate hazard controls may include engineering controls, administrative controls, and the use of personal protective equipment (PPE). The Soils OU Inactive Facilities project team is responsible for the preparation, revision, and implementation of AHAs.

Applicable AHAs will be reviewed with the personnel who will perform the work. Participants in this review will sign and date the AHA to signify that they understand all hazards, controls, and requirements in the AHAs. Copies of the AHAs with appropriate signatures shall be maintained at the work location.

C.2.3 DEVELOP/IMPLEMENT CONTROLS

The primary mechanisms used to flow down ISMS/EMS controls to the project team are project-specific plans and technical procedures. Other mechanisms include program/project management systems, employee training, communication, work site inspections, independent assessments, and audits. These mechanisms are communicated in the following:

- Pre-Job meetings
- Orientations
- Training
- Plan-of-the-day/pre-job briefings
- AHAs
- Radiological work permits (RWP)

The plan-of-the-day/pre-job briefing incorporates the principles of ISMS/EMS. The specific steps within ISMS/EMS are emphasized to each employee. It is emphasized that no employee will be directed or forced to perform any task that he/she believes is unsafe, puts health at risk, or that could endanger the public or the environment. One of the key elements of ISMS/EMS is that all personnel are permitted to stop work or decline to perform an assigned task because of a reasonable belief that the task poses an imminent risk of death, serious physical harm, or other serious hazard to workers or the environment.

Employee involvement is emphasized in all training sessions, beginning with initial orientation training, and is then periodically reinforced in refresher training, as applicable, and in ES&H briefings/meetings. Employees are encouraged to participate in the selection, development, and presentation of training/meeting topics and their full and constructive input is encouraged in all communication sessions.

C.2.4 PERFORM WORK

After the project team has been given approval to proceed, the project-specific plans will be implemented. The Soils OU Inactive Facilities project team will verify that all applicable plans, forms, and records are contained in the project files and accessible by approved personnel. Actions that will be taken during the performance of the work to incorporate ISMS/EMS principles include the following:

- Plan-of-the-day/pre-job briefings
- Monthly project safety meetings
- ES&H oversight/inspections
- Safety inspections

- Equipment inspection
- Stop work authority

C.2.5 FEEDBACK/IMPROVEMENT

Feedback and improvement is accomplished through several channels, including ISMS/EMS audits, self-assessments, employee suggestions, lessons learned and post-job briefings.

Soils OU Inactive Facilities project management will encourage employees to submit freely any suggestions that offer opportunities for improvement and constructive criticism on the program. Project management will conduct periodic inspections and meetings with project personnel at the work site to discuss safety issues, environmental issues, and/or concerns, as well as other relevant topics.

During field activities, meetings and briefings will provide opportunities for project personnel to communicate the following:

- Lessons learned and any other topics relevant to the work performed
- How work steps/procedures could be modified to promote a safer working environment
- How communications could be improved within the project team
- Overall issues or concerns they may have regarding how the work was performed

C.3 FLOWDOWN TO SUBCONTRACTORS

The ISMS/EMS approach to ES&H ensures that personnel, including subcontractors, are aware of their roles, responsibilities, and authorities for worker/public safety and protection of the environment. All organizations will be responsible for compliance with the Prime Contractor's Worker Safety and Health Program, ISMS/EMS Program, Radiation Protection Program, and Quality Assurance Program. In addition, subcontract requirements will flow down to lower-tier subcontractors, as applicable. Personnel will have the appropriate health and safety training required in accordance with OSHA 29 *CFR* § 1910 and § 1926, but also will undergo site-specific pre-job training including safety and environmental to ensure that ES&H issues related to the activities to be performed or specific to the work site are clearly understood. Documentation of training will be available for review prior to starting work.

C.4 SUSPENDING/STOPPING WORK

In accordance with 10 *CFR* 851.20 and the DOE Prime Contractor's Worker Safety and Health Program and procedures, employees and subcontractors have suspend/stop-work authority. Individuals involved in any aspect of the project have the authority and responsibility to suspend or stop work for any perceived threat to the health and safety (H&S) of the workers, the public, or to the environment. Concerns shall be brought to the attention of the Field Superintendent (FS) and Health and Safety Representative (HSR), they will be evaluated by Project Management personnel, and actions will be taken to rectify or control the situation. In the case of imminent danger or emergency situations, personnel should halt activities immediately and instruct other affected workers to pull back from the hazardous area. The FS and/or HSR should be notified immediately; at that time Management and/or emergency responders will be notified.

C.5 ISMS/EMS BRIEFINGS AND ORIENTATIONS

Plan-of-the-day/pre-job briefings detailing the specific hazards of the work to be performed and safety precautions and procedures specific for the job shall be conducted by the FS and/or HSR at the beginning of each shift. During these briefings, work tasks and the associated hazards (personnel safety and environmental risks) and mitigating controls will be discussed using task-specific AHAs, project documents, and/or Lessons Learned as guidance.

Prior to performing work on the site, personnel shall be required to read, or be briefed, on the DOE Prime Contractor's Worker Safety and Health Program, applicable AHAs, the work package and other applicable documents. This shall be documented as required reading, acknowledgement forms, or briefing sheets. Visitors also will be oriented to the applicable plans and potential hazards that they may encounter.

C.6 KEY PROJECT PERSONNEL AND RESPONSIBILITIES

One of the primary underlying principles of a successful project organization is the establishment of clearly defined roles and responsibilities and effective lines of communication among employees and the Prime Contractor, subcontractors and other organizations involved in the project. Ensuring that personnel fully understand their roles and responsibilities and that they have a thorough understanding of the scope of work and other project requirements will provide the foundation for successful and safe completion of the project.

The roles and responsibilities of key field team members are briefly described as follows:

- The Environmental Restoration Project Manager oversees the implementation of the project plans and provides the resources for the project.

- The Soils OU Project Manager oversees the project plans and work activities while ensuring that operations are conducted in accordance with the DOE Prime Contractor procedures, regulatory requirements, and Worker Safety and Health Program and is responsible for coordinating and assigning resources needed for the project. The Project Manager also performs management audits and inspections.

- The Quality Assurance Specialist provides support and oversight to the project to ensure that work is performed in accordance with the work package and other applicable plans and procedures.

- The FS coordinates field activities and logistics and provides the communications between the project team and the field team as well as other support groups. The FS also ensures that on-site personnel comply with the Worker Safety and Health Program, work packages, and applicable procedures.

- The HSR provides H&S support and oversight to the project to ensure that work is being performed safely and in accordance with the Worker Safety and Health Program, applicable regulations, 10 *CFR* § 851, DOE directives, and applicable plans and procedures.

- The Radiological Control Group provides support and guidance to the project and assists the FS and HSR with implementation of radiological controls and as-low-as-reasonably-achievable (ALARA) principles. The Radiological Control Technician (RCT) observes the work area before/during activities for radiological hazard and authorizes entry into and exit from the radiological work area.

- Environmental Compliance organization provides environmental support and oversight to the project to ensure that the planning and field work is being performed properly and in accordance with all applicable regulations, DOE directives, and relevant plans and procedures.

- The Waste Management Coordinator provides waste management support to the project to coordinate waste containers and removal of waste from the worksite, while complying with the Worker Safety and Health Program, as well as ES&H and work control requirements.

- Field Technical Staff/Subcontractors–Samplers, drillers, operators, maintenance mechanics, and electricians perform work as specified in work packages, adhering to the Worker Safety and Health Program, HASP, RWPs, project procedures, and AHAs. Field Team personnel also participate in the identification of the hazards and development of the work controls to be utilized during the work.

C.7 SITE CONTROL

C.7.1 WORK SITE CONTROL ZONES

Work zones will be utilized to control access. These areas will be controlled by the FS, HSR, and/or RCT to minimize the number of individuals potentially exposed to site hazards and to ensure that individuals who enter follow the required procedures. The following is a description of the different types of zones that may be established at the site.

C.7.2 EXCLUSION ZONE

The exclusion zone (EZ) is the immediate area around an excavation or remedial action activity where there is potential for personal exposure to hazardous materials. The exclusion zone will be marked and entry and exit points will be established to regulate movement of personnel and equipment to reduce the potential of the spread of contamination.

C.7.3 CONTAMINATION REDUCTION ZONE

The contamination reduction zone (CRZ) is the transition area between the EZ and construction zone or support zone. This area will provide a buffer area to reduce the probability that contamination will leave the EZ. The CRZ is designed for the following activities:

- Decontamination of equipment, workers, and sample containers;
- Staging of emergency response equipment and supplies (e.g., first-aid, fire equipment);
- Scanning of personnel, materials, and equipment;
- Sample packing and preparation; and
- Worker rest area.

The CRZ is designed to reduce the possibility of the clean area becoming contaminated by site hazards. The degree of contamination in the CRZ decreases as the distance from the contaminants increases.

C.7.4 CONSTRUCTION ZONE

The construction zone is the area outside of potential contamination, but still encompassing work activities and possible hazards associated with fieldwork activities. Entry into this area is controlled and the area clearly marked with barrier tape, rope, or flagging**.**

C.7.5 SUPPORT ZONE

The support zone (SZ) is the outermost area of the site. This area is uncontaminated where workers provide operational and administrative support. The support zone is clean and will not be entered by contaminated equipment or personnel, unless properly controlled or except under emergency or evacuation conditions. Normal work clothes are appropriate within this zone.

C.7.6 SITE COMMUNICATIONS

PGDP plant radios, plant phones, and cell phones will be used for on-site and off-site communications. Project personnel will be orientated to the use of plant radios and emergency numbers. Hand signals may also be utilized; these will be covered with project personnel if necessary.

C.7.7 AUTHORIZATION TO ENTER

Personnel shall adhere to site entry and control procedures identified in the RWP, AHAs, and this site-specific HASP; personnel must wear the appropriate PPE and enter the work area only after receiving permission of the FS, HSR, and/or RCT. The FS (or designee) will verify that the appropriate training and briefing requirements are met prior to entry.

As a requirement for work on this project, workers entering the EZ or CRZ will be required to take the appropriate level of HAZWOPER training. This training must cover the requirements in 29 *CFR* § 1910.120, HAZWOPER. As applicable, workers must receive annual 8-hour refresher training and 1- or 3-day on-site supervision under a trained, experienced supervisor. The FS shall receive additional 8-hour training in hazardous waste operations supervision. Workers and visitors entering the EZ or CRZ will be briefed in the provisions of this HASP and be required to sign the HASP Acknowledgment Form. Workers entering radiological posted work areas also will be required to complete Radworker II training.

C.7.8 VISITORS

Visitors to the site shall abide by the following:

- "Visitor" means persons not involved in routine site work activities.

- Visitors shall be instructed to stay outside of the EZ and CRZ and remain within the SZ during the extent of their stay.

Visitors requesting to observe work conducted in the EZ must wear appropriate PPE prior to entry into that zone. Visitors who with to enter the EZ must produce evidence that they have medical clearance, and appropriate HAZWOPER training that is up-to-date. Visitors also must have received the required training for the tasks being performed and entry must be approved by the FS, HSR and/or RCT.

C.8 PERSONAL PROTECTIVE EQUIPMENT

When engineering controls are not feasible, when the administrative controls in place are not adequate or when otherwise indicated (such as for ALARA), PPE will be specified by the AHA and/or RWP. At a minimum, personnel performing work in work zones may be required to wear the following standard safety apparel:

- Hard hats meeting the requirements of American National Standards Institute (ANSI) Z89.1 as prescribed in 29 *CFR* § 1910.135, *Head Protection*. Hard hats will be worn with the suspension properly installed. Hard hats will not be damaged, painted, or deformed.

- Safety glasses with firm side shields will meet the requirements of ANSI Z87.1 as prescribed in 29 *CFR* §1910.133, *Eye and Face Protection*. Prescription glasses also will meet the ANSI standard and be provided with fixed or firm clip-on side shields. Cover glasses used over prescription glasses will be permitted. Safety glasses will be worn in any area where construction activities are taking place. Face shields will not be worn in lieu of safety glasses.

- Sturdy safety toed work shoes or boots meeting the requirements of ANSI Z41, as prescribed in 29 *CFR* §1910.136, *Foot Protection*, shall be worn.

The required level of protection is specific to the activity being conducted. The levels of PPE apply only to activities conducted inside an established EZ. Work conducted within CRZs will vary, but generally are one level of protection lower than the EZ. Activities conducted within SZ should require normal work clothes and PPE unless specified by the FS or HSR.

C.8.1 TASK-SPECIFIC LEVELS OF PROTECTION

The levels of protection will be determined by the task and/or proximity of the task being performed and will be identified in the task specific AHAs and RWPs.

C.8.2 RESPIRATORY PROTECTION

Respiratory protection requirements will be determined by air monitoring and survey results. Personnel required to wear respiratory protection will be trained and quantitatively fit-tested prior to use of the respirator, as prescribed in accordance with DOE Prime Contractor procedure. Personnel required to wear respirators will inspect their respirators before and after each use and any deficiencies will be reported to the FS or HSR immediately. Respirators will be properly stored in a bag in a clean, dry environment and routinely cleaned. Damaged respirators shall not be used.

C.9 MEDICAL SURVEILLANCE

The medical surveillance program provides for baseline, annual, and termination medical examinations for the following employees in accordance with 29 *CFR* § 1910.120, HAZWOPER. Each employee who is or may be exposed to hazardous substances or health hazards at or above the permissible exposure limit (PEL) for 30 days or more per year and each employee who wears a respirator for 30 days or more per year will receive a medical examination before assignment, approximately 12 months later, and at termination of employment or at reassignment. Employees who develop signs or symptoms indicating overexposure or are injured or exposed above the PEL in an emergency situation will be examined medically as soon as possible following the incident

Personnel performing HAWOPER activities on this project must complete an annual HAZWOPER physical. The examining physician will document the worker's fitness for work. In addition, the physician will ensure personnel are capable of wearing a respirator through medical examination and conducting a pulmonary function test.

Radiation workers, working under an RWP, may be required to submit a baseline bioassay, periodic bioassay during the project, and exit bioassay at the end of the project.

C.9.1 EXPOSURE MONITORING

Air monitoring shall be used to identify and quantify airborne levels of hazardous substances and health hazards in order to determine the appropriate level of employee protection needed on-site.

C.9.2 ROUTINE AIR MONITORING REQUIREMENTS

Air monitoring will be performed during the following activities:

- Intrusive activities such as soil excavation;
- Activities where there is a potential for exposure to heavy metals (lead, arsenic, beryllium, etc.) and silica dust; and
- Personnel are opening waste containers that contain potentially contaminated material.

C.9.3 INDUSTRIAL HYGIENE MONITORING

Industrial Hygiene monitoring and sampling will be performed by assigned project H&S support personnel. Monitoring will use direct-reading instruments, air-sampling equipment, environmental-monitoring equipment, and assessment techniques as determined appropriate by the H&S Group based on professional judgment and in accordance with OSHA, National Institute for Occupational Safety and Health (NIOSH) and American Conference of Government Industrial Hygienists (ACGIH).

Personnel sampling will be conducted to assess the potential exposure to individual employees and to ensure that the proper level of PPE has been selected for the assigned task(s). Samples will be collected in the employee’s breathing zone using personnel sampling pumps and the appropriate collection media. For tasks with the potential for exposure to significantly elevated chemical concentration, it is expected that the sampling frequency will increase.

If direct reading instruments indicate levels of vapors or particulates that exceed the action level for over 15 minutes in the work area, then personnel sampling will be initiated immediately. Sampling will be conducted, at a minimum, on the worker with the highest expected exposure. Monitoring will continue until levels recorded by direct reading instruments return below the action level.

Once initiated, sampling will always continue for a period long enough to collect a volume of air sufficient to allow the laboratory to achieve an analytical detection limit no greater than one-half the OSHA permissible exposure limit (PEL) or ACGIH threshold limit value (TLV), whichever is the more stringent of the two. The samples will be collected in accordance with the approved NIOSH or OSHA methodology and analyzed for the appropriate contaminant(s) of concern. All personnel exposure samples shall be analyzed by a laboratory accredited by American Industrial Hygiene Association (AIHA) in accordance with the appropriate NIOSH or OSHA methodology.

C.9.4 RADIOLOGICAL MONITORING

Radiological Control will perform personnel air monitoring during work in contamination areas and potentially at the boundary. Scanning of equipment and personnel will also be performed to minimize the possibility of the spread of contamination. Personnel working on the Soils OU Inactive Facilities project will also be monitored through Dosimetry and required to wear a dosimeter when working in radiological zones and submit bioassays as required.

C.10 EMERGENCY RESPONSE

C.10.1 RESPONSIBILITIES

The PM, FS, and HSR are responsible for the Soils OU Inactive Facilities project emergency management program and ensuring that the appropriate emergency response equipment is readily available at the work site and in proper working order.

In the event of an emergency, all site personnel shall follow the requirements and provisions of the PGDP Emergency Management Plan. Emergency response shall be provided by the PGDP emergency response organization. The HSR will be in charge of personnel accountability during emergency activities. All personnel working on-site will be trained to recognize and report emergencies to the HSR or the FS. The HSR or FS will be responsible for notifying the PGDP emergency response organization.

The PGDP emergency response organization will be contacted for emergency response to all medical emergencies, fires, spills, or other emergencies. The Plant Shift Superintendent (PSS) will coordinate 24-hour emergency response coverage. The requirements of this section will be communicated to site workers. Any new hazards or changes in the plan also will be communicated to site workers.

The DOE on-scene coordinator will provide oversight on an ongoing basis for emergency management/recovery activities.

C.10.2 REPORTING AN EMERGENCY

C.10.2.1 Discovery

The person who discovers an emergency should immediately report it, then attempt to establish control ONLY if the incident is minor in magnitude. Where such measures are obviously inadequate or not successful in controlling the incident or for emergency conditions, personal injuries, or other unusual events with potential for causing personal injury, environmental releases, or property damage, the employee will initiate notification of appropriate emergency response personnel.

Soils OU Inactive Facilities project personnel will maintain a radio, telephone, or other reliable means of notifying emergency response personnel and the PSS.

C.10.2.2 Emergency Contacts

- ***Fire:*** Fire alarm pull box, plant telephone Bell System 333, or plant radio channel 16
- ***Medical:*** Plant telephone Bell System 333 or plant radio channel 16
- ***Security:*** Plant telephone Bell System 6246 or plant radio channel 16
- ***PSS:*** Plant telephone Bell System 6211 or plant radio channel 16.

If using a cell phone: 270-441-6333 for emergency, for NON-emergency use 270-441-6211.

C.10.3 INITIAL EMERGENCY RESPONSE

When an emergency occurs, the HSR or FS will assume responsibility for the management of the scene and the protection of the personnel. Personnel are to be evacuated from the immediate danger area, as appropriate. Depending on the degree of emergency, RADCON controls may need to be adhered to during the emergency. For personnel injury or illness, there will be at least one person with current training in first aid and cardiopulmonary resuscitation present on site during all field activities. This individual will provide minor first aid until other emergency personnel arrive and assume emergency response duties or it is determined to transport the injured to the hospital or medical provider.

C.10.4 PADUCAH GASEOUS DIFFUSION PLANT ALARMS

The alarms can be heard by calling 6161 on a Bell phone.

These include the following:

Radiation Emergency/Criticality Accident Alarm System (CAAS):	Continuous blast on a high-pitched air whistle or electronic horn **ACTION**: Evacuate area immediately and stay away from effected building, Report to an assigned plant assembly point.
Attack Warning/Tornado Warning:	Intermittent 2-second blast on plant horns **ACTION:** Take cover.
Evacuate Signal:	Continuous blast on plant horns **ACTION:** Evacuate building
Plant Emergency:	Hi-Lo Tones **ACTION:** Listen to plant public address system/radio for instructions
Cascade Buildings:	Three blasts on building horns or howlers **ACTION:** Call area control room.
Other Buildings:	One 10-second blast on building horns or sirens **ACTION:** Follow local emergency procedures.

During field activities all personnel must participate in all PGDP accountability/assembly drills by sending all on-site project personnel to the appropriate assembly station for accountability. The FS, HSR, or designee will be responsible for accounting for all field personnel (including sub-tier subcontractor personnel) and reporting any unaccounted-for personnel to the emergency coordinator.

C.10.5 REPORTING A SPILL

When a spill is discovered, the FS or HSR will immediately contact PSS, Environmental Compliance, and the PM and convey as much information as possible (e.g., material involved, estimated quantity spilled/affected, location, affected personnel, other hazardous conditions).

C.10.6 PROTECTIVE ACTIONS FOR SPILL

An effort will be made to stop the release and contain the spill using materials in the on-site spill response kit, only if it is safe to do so and if no unprotected exposures occur. A telephone contact list will be available for emergency notification.

In the event that personnel are exposed to hazardous chemicals or radioactive materials, appropriate emergency response action will be taken to remove the contaminated clothing. An emergency shower and eyewash station will be used to flush exposed skin and eyes, respectively. This emergency equipment will be maintained in a readily accessible location adjacent to the active work area.

If an acute exposure to airborne chemicals occurs or is suspected and the affected personnel are unable to escape the work zone, the FS or HSR will immediately contact PSS for assistance. Rescue operations will not be performed unless the rescuers are dressed in the appropriate protective equipment.

Soils OU Inactive Facilities Project Management will be responsible for ensuring all spills of hazardous materials are properly cleaned up and disposed of, including any material generated from the spill, unless otherwise directed.

The FS or HSR has the following responsibilities:

- Ensure that spill containment is performed safely;
- Provide all known information to PSS to ensure proper response;
- Ensure that decontamination measures for exposed personnel are conducted safely and promptly;
- Ensure that, if personnel are exposed to airborne chemicals and are unable to escape the work zone, rescue is not attempted unless rescue personnel are dressed in the appropriate protective equipment; and
- Notify Environmental Compliance for spill reporting and cleanup requirements.

During field activities all personnel must participate in all PGDP accountability/assembly drills by sending all on-site project personnel to the appropriate assembly station for accountability. The FS, HSR, or designee will be responsible for accounting for all field personnel (including sub-tier subcontractor personnel) and reporting any unaccounted-for personnel to the emergency coordinator directing the drill.

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APPENDIX D

WASTE MANAGEMENT PLAN

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D.1. OVERVIEW

This Waste Management Plan (WMP) is the primary document for management and final disposition of waste material that will be generated as a result of the removal of contaminated soil under the execution of the Removal Action Work Plan (RAWP).

The Soils Operable Unit (OU) Inactive Facilities Removal Action (RA) will include implementation of one or more engineering controls to prevent movement of contaminated soil/sediments and accumulated rainwater. The RA will also include complete removal of the C-410-B Hydrogen Fluoride (HF) Neutralization Lagoon [Solid Waste Management Unit (SWMU) 19] to up to 3 ft beyond its SWMU boundary (including removal and disposition of wastewater), reduction of lead concentration within the C-218 Firing Range (SWMU 181), excavating the contaminated areas, post-excavation sampling, and managing and properly disposing of remediation waste. Work will include mobilization, fence installation with hazard postings, installation of best management practice controls, excavation, post-excavation sampling, restoration, soil handling, transportation and disposal, and demobilization.

This WMP addresses the management of remediation waste from the point of generation through final disposition. The Soils OU Inactive Facilities RA is part of U.S. Department of Energy (DOE) Prime Contractor and Paducah Remediation Services, LLC, (PRS) shall be responsible for all waste management activities. Standard practices and procedures outlined in this WMP pertaining to the generation, handling, transportation, and storage of waste will comply with all DOE, Resource Conservation and Recovery Act (RCRA), and Toxic Substances Control Act (TSCA) requirements.

Copies of this WMP will be available during fieldwork. The DOE Prime Contractor waste management coordinator (WMC) will be responsible for implementing all procedures and requirements of this WMP.

The WMP for the Soils OU Inactive Facilities RA underscores the following objectives:

- Management of project waste in a manner that is protective of human health and the environment
- Minimization of waste generation
- Compliance with federal, state and DOE requirements
- Selection of storage and disposal alternatives

All waste management activities must comply with this WMP, applicable procedures, the C-746-U Landfill waste acceptance criteria (WAC) found in *Waste Acceptance Criteria for the Treatment, Storage and Disposal Facilities at the Paducah U. S. Department of Energy Site*, PRS-WSD-0011/R0, and WACs for off-site treatment, storage, and disposal facilities designated to receive waste.

During the course of the project, additional Paducah Gaseous Diffusion Plant (PGDP) and DOE waste management requirements may be identified. If necessary, a revised WMP will be issued to ensure compliance with all requirements. It should be noted that specifics of construction and disposition activities are not yet available; therefore, in some cases, specific details are not provided herein so as to allow flexibility when performing the work.

D.2. WASTE PLANNING AND GENERATION

D.2.1 WASTE PLANNING

The Waste Generation Plan no longer is required in PRS-WSD-0011.

D.2.2 WASTE GENERATION

Several waste streams will be generated by the Soils OU Inactive Facilities RA. The major portion of the waste generated will be excavated soil/sediment, sludge, concrete, rubble, and accumulated rainwater. Work packages will be developed to present appropriate details such as waste storage areas, the route the waste will follow upon arriving at these locations, the route the waste will take exiting the facility, and information regarding traffic control and traffic control implementation.

Limited quantities of investigation-derived waste (IDW) from the verification sampling also will be generated. The IDW could include personal protective equipment (PPE), sampling returns, sampling equipment, or decontamination water. Wastes generated from field activities have the potential to contain contaminants related to known or suspected past operational or disposal practices and must be stored and disposed of in accordance with applicable state and federal guidelines. Waste generated will be stored in Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) on-site waste storage areas (i.e., C-745-C, C-760, C-761, or other CERCLA storage facility) or within the RCRA area of contamination during the characterization period prior to disposal, when practical. CERCLA on-site waste storage areas will be operated in compliance with applicable or relevant and appropriate waste storage requirements. Wastewater will be transferred to storage pending characterization and treatment. A landfill package will be required for soil, rubble, etc., generated as a result of excavation activities. Treatment of excavated materials or accumulated rainwater would depend on the WAC for whatever facility is used for disposal. Table D.1 shows estimated quantities of waste that is expected to be generated during the implementation of the Soils OU Inactive Facilities RAWP.

Table D.1. Estimation of RA/IDW Waste

Waste Stream	Volume	Container Type and Quantity	TSDF	Treatment Required
Excavated Soil– C-218 Firing Range	1,444 m^3	TBD	TBD	Yes
Excavated Soil/Concrete/Sludge–C-410B	241 m^3	TBD	C-746-U	None
Accumulated Rainwater–C-410B	94,633 L	Large Mobile Storage Containers[c]	TBD	Yes
Personal Protective Equipment, Plastic	0.57 m^3	3 1A2X 55-gallon drums	C-746-U	None
Sample Residuals, Returns	0.14 m^3	1 1A2X 55-gallon drum	TBD	Yes
Sampling Equipment	0.71 m^3	4 1A2X 55-gallon drums[a, b]	C-746-U	None
Decontamination Water	1136 L	6 1A1X 55-gallon drums	TBD	TBD

[a] It is yet to be determined whether sampling equipment will be decontaminated and reused or disposed of as waste.
[b] This does not allow for decontamination of excavation equipment.
[c] Waste to be placed in storage pending characterization.

Contractor waste management procedures and protocols will be followed, and work packages will be developed to present appropriate details such as how the excavated soil and waste materials will be stored and managed, with decision criteria to be applied if more than one alternative is proposed.

D.3. WASTE MANAGEMENT ROLES AND RESPONSIBILITIES

D.3.1 WASTE MANAGEMENT TRACKING RESPONSIBILITIES

Waste generated during Soils OU Inactive Facilities RA activities will require a comprehensive waste-tracking system capable of maintaining an accurate inventory of waste. To prevent inappropriate disposal of waste, all generation, storage and characterization information must be included in the tracking system. Specifically, the waste inventory must include the following information:

- Generation date
- Request for Disposal (RFD) number
- Waste origination location
- Waste matrix (solid, liquid)
- Waste description (soil, PPE, etc.)
- Quantity
- Storage location
- Sampling status
- Sampling results status
- Date of disposal

D.3.2 WASTE MANAGEMENT COORDINATOR

The WMC will manage all waste according to PGDP facility requirements and this WMP. WMC responsibilities include coordinating daily activities with field personnel, overseeing daily waste management operations, and maintaining a waste management logbook. The waste management log contains a complete history of waste generated and current status of SWOU RA waste containers. A designated waste operator also may make entries in the waste management logbook.

The WMC will ensure that procurement and inspection of equipment, material or services critical to the shipment of waste to off-site treatment, storage and disposal facilities complies with procedure PRS-WSD-3012 R3, *Procurement, Inspection and Management of Items Critical for Paducah Off-site Waste Shipments.* Additionally, the WMC will ensure that wastes to be disposed of in the C-746-U Landfill are packaged and managed according to the on-site landfill's WAC.

Additional responsibilities of the WMC include the following:

- Maintaining an adequate supply of container labels;
- Maintaining drum inventories;
- Interfacing with all necessary personnel;
- Preparing RFDs;
- Tracking SWOU RA waste;
- Ensuring waste containers are labeled according to procedure and WAC;
- Coordinating waste disposal or transfers;

- Coordinating container sampling for characterization; and

- Ensuring that temporary container storage areas are properly established, maintained, and inspected and inspection records are properly managed.

D.3.3 COORDINATION WITH FIELD CREWS

The WMC is responsible for advising field crew personnel who generate and containerize waste meet the requirements of PRS-WSD-3015, *Waste Packaging*, for ensuring compliance with this WMP. The WMC will interface with DOE Prime Contractor Materials Disposition personnel to coordinate waste handling activity and waste container characterization sampling, if required.

D.3.4 COORDINATION WITH ON-SITE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

The WMC will document all waste streams generated on RFD forms and individual containers on Waste Item Container Logs. RFD documentation of all waste must be included as part of a landfill package for RA waste that is designated for disposal at the C-746-U Landfill. Landfill packages must be compiled and approved per procedure PRS-WSD-3025/R0, *Preparation and Processing of Paducah Landfill Packages.* For waste that is designated for off-site disposal or treatment prior to disposal (i.e., wastewater), the RFD must be submitted to the materials disposition group to facilitate the placement of the container in the designated storage facility. The container will remain in storage during characterization and until a viable disposal alternative is identified.

D.3.5 CHARACTERIZATION OF WASTE FOR DISPOSAL

As discussed in Section 3, the SOU Inactive Facilities have been characterized in previous investigations. Sampling and analysis data from these investigations will be examined to determine if it is sufficient to characterize waste generated during excavation and remediation for disposal at the C-746-U Landfill, off-site disposal, or treatment prior to disposal (i.e., wastewater). For those wastes identified as having sufficient characterization, no additional sampling and analysis will be required. For those materials with insufficient data to allow disposal, additional characterization will be performed through sampling and analysis. Samples may be obtained *in situ* taking into account expected excavation limits during excavation (e.g., from backhoe buckets) or on the containerized material after excavation. The number of samples and sampling strategies necessary will be dependent upon the volume of waste to be characterized, potential on-site or off-site disposal or treatment facilities, and contaminants of concern. Procedures and strategies for additional characterization will be consistent with those identified in Appendix F, with waste stream specific DQOs and sampling and analysis plans developed as needed for each waste stream.

D.4. TRANSPORTATION OF WASTE

Transportation of Soils OU Inactive Facilities RA waste will comply with PRS-WSD-0661/R0, *Transportation Safety Document for On-site Transport within the Paducah Gaseous Diffusion Plant, Paducah, Kentucky.* It is anticipated that the majority of the RA waste will be disposed of in the C-746-U Landfill; transportation of this waste will be by bulk package. The WMC will arrange for movement of

contained waste. Waste material designated for off-site disposal will be shipped per PRS-WSD-3028 R3, *Off-site Shipping.*

D.5. INVESTIGATION-DERIVED WASTE CHARACTERIZATION AND DISPOSAL

The removal action will generate approximately 59,500 ft^3 of soil/sediment and approximately 25,000 gal of accumulated rainwater requiring on-site or off-site disposal. Soil and other waste materials will be characterized, managed, transported, and treated/disposed of in accordance with the ARARs/to be considered (TBCs) for low-level radioactive, RCRA, Toxic Substances and Control Act (TSCA), or industrial waste. DOE will manage/store polychlorinated biphenyl (PCB) remediation wastes in risk-based storage instead of storage meeting 40 *CFR* 761.61(b)(1) requirements pursuant to 40 *CFR* 761.65(b)(2)(vi) and 761.65(c)(9)(iv). Such wastes may be stored up to 180 days in drums, B-12 boxes, B-25 boxes, intermodal containers, and/or Sealand containers, provided that the containers are sealed when not adding/removing materials. Storing PCB remediation wastes in this manner provides a level of protectiveness that is similar to storing PCB remediation wastes in piles under 40 *CFR* 761.65(c)(9). DOE will perform disposal [in accordance with 40 *CFR* § 761.61(a)(5)(v)] of soil containing less than or equal to 49 parts per million (ppm) PCBs at the C-746-U Solid Waste Landfill. The Environmental Performance Standard in 401 *KAR* 47:030, Section 8, and Condition Number ACTV0006, "Standard Requirement 1"of Solid Waste Permit No. 073-00014/073-00015/073-00045, currently allow such disposal. PCB remediation waste requiring off-site disposal (i.e., greater than 49 ppm) will be disposed of in accordance with 40 *CFR* § 761.61(a), (b), or (c) in a RCRA permitted landfill, in a landfill with a coordinated approval, in a chemical waste landfill, or in a facility with approval from EPA.

Health-based standards of 39.2 ppm TCE and 2,080 ppm 1,1,1-trichloroethane (TCA) in solids will be used as the criteria for making contained-in/contaminated-with determinations for environmental media and debris managed on-site and/or designated for disposal at the C-746-U Landfill The Kentucky Energy and Environment Cabinet (KEEC) has agreed to consult with DOE and the state where the off-site facility is located to reach agreement on the appropriate health-based standard for making such determinations for waste that is to be shipped to such a facility. Wastewater collected or generated as part of the RA will be sent to an existing Kentucky Pollutant Discharge Elimination System (KPDES)-permitted Waste Water Treatment Facility located at PGDP for treatment prior to discharge into surface water

Off-site transfer of any hazardous substance, pollutant, or contaminant generated during this action will be sent to a facility that complies with applicable federal and state laws and has been approved by EPA for acceptance of CERCLA waste. Accordingly, DOE will verify with the appropriate EPA regional contact that any needed off-site facility is acceptable for receipt of CERCLA wastes prior to transfer in accordance with the requirements of the Off-Site Rule in 40 *CFR* § 300.440(a)(4).

D.6. WASTE MINIMIZATION

Waste minimization requirements that will be implemented, as appropriate, include those established by the 1984 Hazardous and Solid Waste Amendments of RCRA; DOE Orders 5400.1, 5400.3 and 435.1; and the DOE Prime Contractor. Requirements specified in the DOE Prime Contractor WMP, PRS-CDL-0029, *Waste Management Plan for the Paducah Environmental Remediation Project*, concerning waste generation, tracking, and reduction techniques will be followed.

To support the DOE Prime Contractor commitment to waste reduction, an effort will be made during all field activities to minimize waste generation, largely through ensuring that potentially contaminated waste material is localized and is not allowed to come into contact with clean material. Such an event could create more contaminated waste. Waste minimization also will be facilitated through waste segregation, selection of PPE, and waste handling practices.

Solid wastes such as Tyvek™ coveralls and packaging materials will be segregated. An attempt will be made to separate visibly soiled coveralls from clean coveralls. In some instances, partially soiled coveralls can be cut up and segregated. Other solid waste will not be allowed to contact potentially contaminated soil waste. Efforts will be made to keep Tyvek™ coveralls clean, reuse clean coveralls, and use coveralls only when necessary. Proper waste handling and spill control techniques will help minimize waste, particularly around decontamination areas where water must be containerized. The contractor will follow the WAC for whatever facility is used for disposal.

D.7. HEALTH AND SAFETY ISSUES RELATED TO IDW ACTIVITIES

Waste management activities will be conducted in compliance with health and safety procedures documented in the Environmental, Safety, and Health Plan, included as Appendix C of this RAWP.

APPENDIX E

QUALITY ASSURANCE PROJECT PLAN

Based on the Intergovernmental Data Quality Task Force Uniform Federal Policy for Quality Assurance Project Plans (Final Version 1, March 2005)

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CONTENTS

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QAPP WORKSHEETS

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ACRONYMS

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
COC	contaminant of concern
COPC	chemical of potential concern
DOE	U.S. Department of Energy
DOECAP	DOE Consolidated Audit Program
EE/CA	Engineering Evaluation/Cost Analysis
EPA	U. S. Environmental Protection Agency
FFA	Federal Facility Agreement
HF	hydrogen fluoride
OU	operable unit
PCB	polychlorinated biphenyl
PGDP	Paducah Gaseous Diffusion Plant
QA	quality assurance
QAPP	Quality Assurance Project Plan
RAO	Removal Action Objective
RAWP	Removal Action Work Plan
SAP	Sampling and Analysis Plan
SI	Site Investigation
SWMU	solid waste management unit
TCE	trichloroethene
UFP	Uniform Federal Policy for Quality Assurance Project Plans

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QAPP Worksheet #1
Title Page

UFP-QAPP Manual Section 2.1:

Document Title: *Quality Assurance Project Plan (QAPP) for the Removal Action Work Plan (RAWP) for Soils Operable Unit Inactive Facilities at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*

Lead Organization: Contractor

Preparer's Name and Organizational Affiliation: Contractor

Preparer's Address, Telephone Number, and E-mail Address: 761 Veterans Avenue Kevil, KY, 42053; (270) 441-5000

Preparation Date (Month/Year)08/2009

Document Control Number: N/A

QAPP Worksheet #2
QAPP Identifying Information

UFP-QAPP Manual Section 2.2.4:
Site Name/Project Name: Paducah Soils Operable Unit Inactive Facilities Removal Project
Site Location: Paducah Gaseous Diffusion Plant
Site Number/Code: N/A
Operable Unit: Soils Operable Unit
Contractor Name: Paducah Remediation Services, LLC
Contractor Number: DE-AC30-06EW05001 (DOE-PRS contract)
Contract Title: Paducah Gaseous Diffusion Plant Remediation Subcontract
Work Assignment Number: N/A

1. Identify guidance used to prepare QAPP: Uniform Federal Policy for Quality Assurance Project Plans, DOE Order 414.1C, 10 *CFR* 830, NQA-1

2. Identify regulatory program: CERCLA and Federal Facilities Compliance Agreement for the Paducah Gaseous Diffusion Plant (DOE/OR/07-1707)

3. Identify approval entity: U. S. EPA, Commonwealth of Kentucky, DOE

4. Indicate whether the QAPP is a generic or a project-specific QAPP. (circle one)

5. List dates of scoping sessions that were held: 10/5/08, 11/24/08

6. List dates and titles of QAPP documents written for previous site work, if applicable:	Approval Date:
Title: Work Plan for the Burial Grounds Operable Unit Remedial Investigation/Feasibility Study at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky (Quality Assurance Plan is Section 11) (DOE/OR/07-2179&D2/R1)	11/13/2006 (Latest date of regulatory approval)
Title: Remedial Design Report, Certified for Construction Design Drawings and Technical Specifications Package, for the Groundwater Operable Unit for Volatile Organic Compound Contamination at the C-400 Cleaning Building at The Paducah Gaseous Diffusion Plant, Paducah, Kentucky (Quality Assurance/Quality Control and Data Management is Section 8) (DOE/LX/07-0005&D2/R1)	7/16/2008 (Latest date of regulatory approval)
Construction Quality Control Plan for the Interim Remedial Action for the Volatile Organic Compound Contamination at the C-400 Cleaning Building at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky (DOE/LX/07-0031&D2/R1)	11/7/2008 (Latest date of regulatory approval)
Remedial Action Work Plan for the Interim Remedial Action for the Volatile Organic Compound Contamination at the C-400 Cleaning at the Paducah Gaseous Diffusion Plant, at Paducah, Kentucky (Quality Assurance Plan is Section 9) (DOE/LX/07-0004&D2R1	10/23/2008 (Latest date of regulatory approval)

QAPP Worksheet #2
QAPP Identifying Information
(Continued)

7. List organizational partners (stakeholders) and connection with lead organization:
   DOE Prime Contractor at the Paducah Gaseous Diffusion Plant (PRS)

8. List data users: DOE, Contractor, U.S. EPA, Commonwealth of Kentucky

9. If any required QAPP elements and required information are not applicable to the project, then circle the omitted QAPP elements and required information on the attached table. Provide an explanation for their exclusion below:
   N/A

QAPP elements and required information that are not applicable to the project are circled and an explanation is provided in the QAPP.

Note: Information is only entered in the "Crosswalk to Related Documents" if the information is not contained in the QAPP worksheets as indicated in first two columns. Also, if the required QAPP element fulfills other quality requirements, that requirement is noted in the "Crosswalk to Related Documents" column

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Related Documents
Project Management and Objectives		
2.1 Title and Approval Page	- Title and Approval Page	
2.2 Document Format and Table of Contents 2.2.1 Document Control Format 2.2.2 Document Control Numbering System 2.2.3 Table of Contents 2.2.4 QAPP Identifying Information	- Table of Contents - QAPP Identifying Information	
2.3 Distribution List and Project Personnel Sign-Off Sheet 2.3.1 Distribution List 2.3.2 Project Personnel Sign-Off Sheet	- Distribution List - Project Personnel Sign-Off Sheet	
2.4 Project Organization 2.4.1 Project Organizational Chart 2.4.2 Communication Pathways 2.4.3 Personnel Responsibilities and Qualifications 2.4.4 Special Training Requirements and Certification	- Project Organizational Chart - Communication Pathways - Personnel Responsibilities and Qualifications Table - Special Personnel Training Requirements Table	DOE O 414.1C/10 *CFR* § 830.120 Criterion 1– Management Program; Criterion 2 Training and Qualification;

QAPP Worksheet #2 QAPP Identifying Information (Continued)

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Related Documents
2.5 Project Planning/Problem Definition 2.5.1 Project Planning (Scoping) 2.5.2 Problem Definition, Site History, and Background	- Project Planning Session Documentation (including Data Needs tables) - Project Scoping Session Participants Sheet - Problem Definition, Site History, and Background - Site Maps (historical and present)	DOE O 414.1C/10 *CFR* § 830.120 Criterion 6– Design
2.6 Project Quality Objectives and Measurement Performance Criteria 2.6.1 Development of Project Quality Objectives Using the Systematic Planning Process 2.6.2 Measurement Performance Criteria	- Site-Specific PQOs - Measurement Performance Criteria Table	
2.7 Secondary Data Evaluation	- Sources of Secondary Data and Information - Secondary Data Criteria and Limitations Table	
2.8 Project Overview and Schedule 2.8.1 Project Overview 2.8.2 Project Schedule	- Summary of Project Tasks - Reference Limits and Evaluation Table - Project Schedule/Timeline Table	
Measurement/Data Acquisition		
3.1 Sampling Tasks 3.1.1 Sampling Process Design and Rationale 3.1.2 Sampling Procedures and Requirements 3.1.2.1 Sampling Collection Procedures 3.1.2.2 Sample Containers, Volume, and Preservation 3.1.2.3 Equipment/Sample Containers Cleaning and Decontamination Procedures 3.1.2.4 Field Equipment Calibration, Maintenance, Testing, and Inspection Procedures 3.1.2.5 Supply Inspection and Acceptance Procedures 3.1.2.6 Field Documentation Procedures	- Sampling Design and Rationale - Sample Location Map - Sampling Locations and Methods/SOP Requirements Table - Analytical Methods/SOP Requirements Table - Field Quality Control Sample Summary Table - Sampling SOPs - Project Sampling SOP References Table - Field Equipment Calibration, Maintenance, Testing, and Inspection Table	DOE O 414.1C/10 *CFR* § 830.120 Criterion 5– Work Processes; Criterion 6– Design

QAPP Worksheet #2 QAPP Identifying Information (Continued)

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Related Documents
3.2 Analytical Tasks 3.2.1 Analytical SOPs 3.2.2 Analytical Instrument Calibration Procedures 3.2.3 Analytical Instrument and Equipment Maintenance, Testing, and Inspection Procedures 3.2.4 Analytical Supply Inspection and Acceptance Procedures	- Analytical SOPs - Analytical SOP References Table - Analytical Instrument Calibration Table - Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table	DOE O 414.1C/10 *CFR* § 830.120 Criterion 8–Inspection and Acceptance Testing
3.3 Sample Collection Documentation, Handling, Tracking, and Custody Procedures 3.3.1 Sample Collection Documentation 3.3.2 Sample Handling and Tracking System 3.3.3 Sample Custody	- Sample Collection Documentation Handling, Tracking, and Custody SOPs - Sample Container Identification - Sample Handling Flow Diagram - Example Chain-of-Custody Form and Seal	DOE O 414.1C/10 *CFR* § 830.120 Criterion 4–Documents and Records
3.4 Quality Control Samples 3.4.1 Sampling Quality Control Samples 3.4.2 Analytical Quality Control Samples	- QC Samples Table - Screening/Confirmatory Analysis Decision Tree	
3.5 Data Management Tasks 3.5.1 Project Documentation and Records 3.5.2 Data Package Deliverables 3.5.3 Data Reporting Formats 3.5.4 Data Handling and Management 3.5.5 Data Tracking and Control	- Project Documents and Records Table - Analytical Services Table - Data Management SOPs	DOE O 414.1C/10 *CFR* § 830.120 Criterion 4–Documents and Records
Assessment/Oversight		
4.1 Assessments and Response Actions 4.1.1 Planned Assessments 4.1.2 Assessment Findings and Corrective Action Responses	- Assessments and Response Actions - Planned Project Assessments Table - Audit Checklists - Assessment Findings and Corrective Action Responses Table	DOE O 414.1C/10 *CFR* § 830.120 Criterion 3–Quality Improvement; Criterion 9–Management Assessment; Criterion 10 –Independent Assessment
4.2 QA Management Reports	- QA Management Reports Table	.
4.3 Final Project Report		
Data Review		
5.1 Overview		

QAPP Worksheet #2 QAPP Identifying Information (Continued)

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Related Documents
5.2 Data Review Steps 5.2.1 Step I: Verification 5.2.2 Step II: Validation 5.2.2.1 Step IIa Validation Activities 5.2.2.2 Step IIb Validation Activities 5.2.3 Step III: Usability Assessment 5.2.3.1 Data Limitations and Actions from Usability Assessment 5.2.3.2 Activities	- Verification (Step I) Process Table - Validation (Steps IIa and IIb) Process Table - Validation (Steps IIa and IIb) Summary Table - Usability Assessment	
5.3 Streamlining Data Review 5.3.1 Data Review Steps To Be Streamlined 5.3.2 Criteria for Streamlining Data Review 5.3.3 Amounts and Types of Data Appropriate for Streamlining		

QAPP Worksheet #3
Distribution List

UFP-QAPP Manual Section 2.3.1:

QAPP Recipients	Title	Organization	Telephone Number	Fax Number	E-mail Address	Document Control Number
The QAPP is submitted as a section of the Inactive Facilities RAWP; thus it will be included on the RAWP distribution list.	N/A	N/A	N/A	N/A	N/A	N/A

QAPP Worksheet #4-1
Project Personnel Sign-Off Sheet

UFP-QAPP Manual Section 2.3.2
Organization: Paducah Remediation Services, LLC

Project Personnel	Title	Telephone Number	Signature	Date QAPP Read
Contractor	ER/EM Director		Personnel will read the QAPP prior to mobilization.	N/A
Contractor	Project Manager		Personnel will read the QAPP prior to mobilization.	N/A
Contractor	Quality Assurance Manager		Personnel will read the QAPP prior to mobilization.	N/A
Contractor	Environmental Engineer		Personnel will read the QAPP prior to mobilization.	N/A
Contractor	Environmental Compliance and Protection Lead		Personnel will read the QAPP prior to mobilization.	N/A
Contractor	Environmental Sampling Lead		Personnel will read the QAPP prior to mobilization.	N/A
Contractor	QA Specialist		Personnel will read the QAPP prior to mobilization.	N/A
Contractor	Health and Safety Representative		Personnel will read the QAPP prior to mobilization.	N/A
Contractor	Waste Coordinator		Personnel will read the QAPP prior to mobilization.	N/A

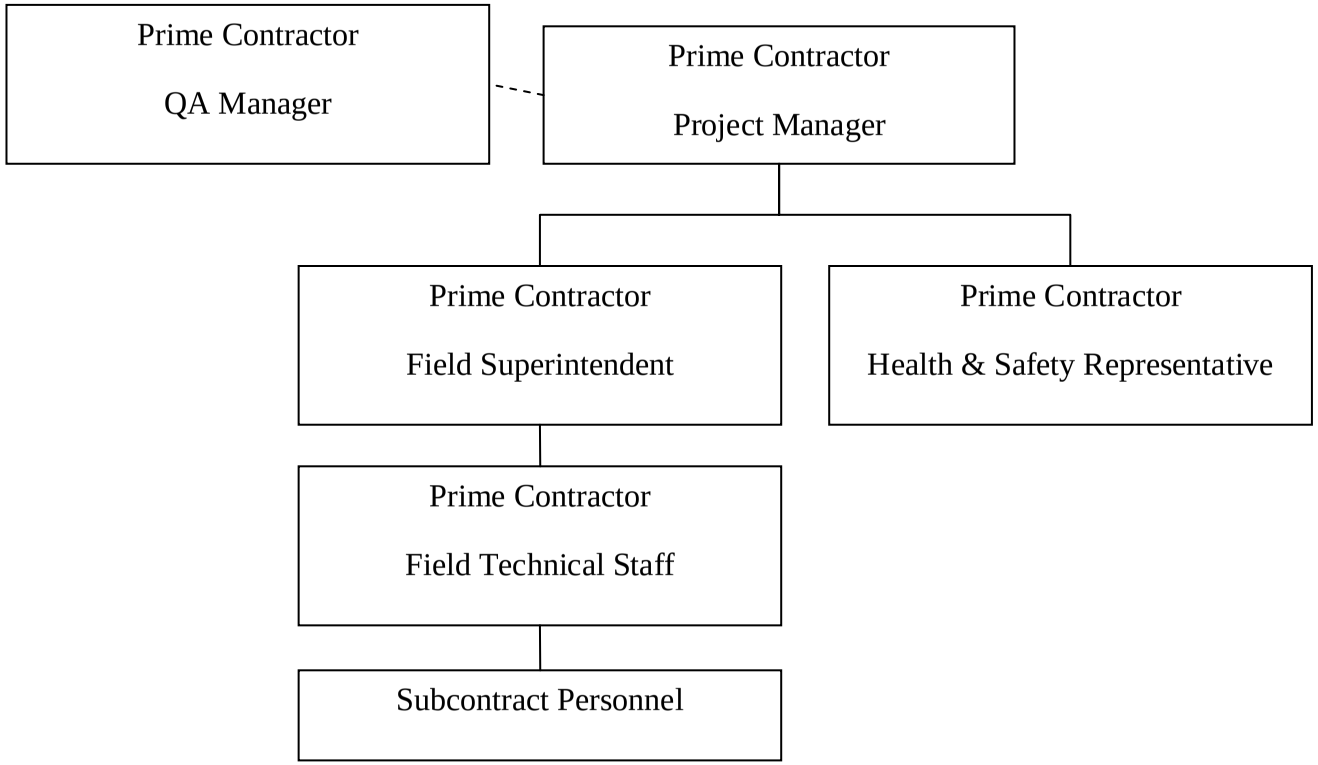
QAPP Worksheet #4-2
Project Personnel Sign-Off Sheet

Organization: U.S. Department of Energy

Project Personnel	Title	Telephone Number	Signature	Date QAPP Read
Field project personnel will read and sign that they have read the QAPP at mobilization or during pre-job kickoffs.	N/A	N/A	N/A	N/A

QAPP Worksheet #5
Project Contractor Organizational Chart

UFP-QAPP Manual Section 2.4.1



QAPP Worksheet #6
Communication Pathways

UFP-QAPP Manual Section 2.4.2:
Note: Formal communications across company or regulatory boundaries occur via letter. Other forms of communication such as e-mail, verbal, meetings, etc. will occur throughout the project.

Communication Drivers	Responsible Entity	Name	Phone Number	Procedure (Timing, Pathways, etc.)
Federal Facility Agreement DOE/OR/07-1707 (PRS-035)	DOE Paducah Site Lead			All formal communication between DOE, EPA, and the Kentucky Department for Environmental Protection
Federal Facility Agreement DOE/OR/07-1707 (PRS-035)	DOE Paducah Environmental Restoration Project Manager			All formal communications between DOE and Contractor for Environmental Restoration Projects
All Project Requirements	Contractor Site Manager			All formal communication between Contractor and DOE
All Project Requirements	Contractor ER/EM Director			All communications between the project and the Site Manager
All Project Requirements	Contractor ER/EM Deputy Director			All communications between the project and the Site Manager
All Project Requirements	Contractor Project Manager			All communication between the project and the ER/EM Director (Interim)
Project Quality Assurance Requirements	Contractor QA Manager			All quality related communications
Project Quality Assurance Requirements	Contractor QA Specialist			All project quality related communications
FFA Compliance	Contractor FFA Project Manager			All internal communication regarding FFA compliance
Sampling Requirements	Contractor Environmental Sampling Lead			All internal communication regarding field sampling
Analytical Laboratory Interface	Contractor Lab Coordinator			All communication between Contractor and analytical laboratory
Waste Management Requirements	Contractor Waste Coordinator			All internal communication regarding waste project waste management
Environmental Compliance Requirements	Contractor Environmental Compliance Lead			All internal correspondence regarding environmental requirements and compliance
Subcontractor Requirements (if applicable)	Contractor Senior Subcontract Administrator			All correspondence between the project and subcontractors, if applicable
Health and Safety requirements	Contractor Health and Safety Representative			All internal communication regarding safety and health requirements

QAPP Worksheet #7
Personnel Responsibilities and Qualifications Table

UFP-QAPP Manual Section 2.4.3:

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
	Paducah Site Lead	DOE	Overall site responsibility– liaison with EPA and Commonwealth of Kentucky	
	Paducah Environmental Restoration Project Manager	DOE	Environmental Restoration project responsibility	
	Paducah Site Manager	Contractor	Contractor lead responsible for site	
	ER/EM Director	Contractor	Overall ER/EM project responsibility	
	Project Manager	Contractor	Overall soils/surface water responsibility	
	Quality Assurance Manager	Contractor	Overall project QA responsibility	
	Environmental Engineer	Contractor	Project responsibility	
	Federal Facility Agreement Project Manager	Contractor	Project responsibility	
	Environmental Engineer	Contractor	Project SAP	
	Environmental Compliance and Protection Lead	Contractor	Project Environmental Compliance Protection responsibility	
	Environmental Sampling Lead	Contractor	Project Sampling responsibility	
	QA Specialist	Contractor	Project QA responsibility	
	Health and Safety Representative	Contractor	Project Safety and Health Responsibility	
	Waste Coordinator	Contractor	Overall Project waste management responsibility	

QAPP Worksheet #8
Special Personnel Training Requirements Table

UFP-QAPP Manual Section 2.4.4:

Project Function	Specialized Training – Title or Description of Course	Training Provider	Training Date	Personnel/Groups Receiving Training	Personnel Titles/ Organizational Affiliation	Location of Training Records/Certificates[1]
There will be no Specialized Training required for this project	N/A	N/A	N/A	N/A	N/A	N/A

[1]If training records and/or certificates are on file elsewhere, document their location in this column. If training records and/or certificates do not exist or are not available, then this should be noted.

QAPP Worksheet #9-1
Project Scoping Session Participants Sheet

UFP-QAPP Manual Section 2.5.1:

Project Name Paducah Soils Operable Unit Inactive Facilities Removal **Projected Date(s) of Sampling** TBD **Project Manager** Craig Jones	**Site Name** Paducah Gaseous Diffusion Plant **Site Location** Paducah, KY

Date of Session: 10/5/08
Scoping Session Purpose: QAPP kickoff, assign UFP worksheets to project team

Name	Title	Affiliation	Phone #	E-mail Address	Project Role
Doug Jones	QA Specialist	PRS	270-441-5089	Dj1@prs-llc.net	QA
Craig Jones	Project Manager	PRS	270-4415114	N8e@prs-llc.net	PM
Tracey Duncan	ER/EM Director	PRS	N/A	N/A	Manager
Lisa Crabtree	Sample/Data Management	PRS	270-441-5135	tvg@prs-llc.net	Sample/Data
Jana White	Task Lead	PRS	270-441-5185	fmt@prs-llc.net	Project
LeAnne Garner	Engineer	Tetra Tech	270-441-5436	yln@prs-llc.net	Project
Myrna Redfield	ER/EM Deputy Director	PRS	270-441-5113	mxn@prs-llc.net	Manager
John Morgan	Environmental Compliance Manager	PRS	270-441-5069	J31@prs-llc.net	Support

Comments/Decisions: Discussion of potential schedule and team members

Action Items: Tracey Duncan, Myrna Redfield to call Turpin Ballard; project team to complete, as applicable, relevant UFP QAPP worksheets as information becomes available

Consensus Decisions: Use UFP format for QAPP

QAPP Worksheet #9-2
Project Scoping Session Participants Sheet (Continued)

UFP-QAPP Manual Section 2.5.1:

Project Name Paducah Soils Operable Unit Inactive Facilities Removal **Projected Date(s) of Sampling** TBD **Project Manager** Craig Jones	**Site Name** Paducah Gaseous Diffusion Plant **Site Location** Paducah, KY

Date of Session: 11/24/08
Scoping Session Purpose: Status update on QAPP worksheets

Name	Title	Affiliation	Phone #	E-mail Address	Project Role
Doug Jones	QA Specialist	PRS	270-441-5089	Dj1@prs-llc.net	QA
Craig Jones	Project Manager	PRS	270-4415114	N8e@prs-llc.net	PM
Tracey Duncan	ER/EM Director	PRS	N/A	N/A	Manager
Lisa Crabtree	Sample/Data Management	PRS	270-441-5135	tvg@prs-llc.net	Sample/Data
Jana White	Task Lead	PRS	270-441-5185	fmt@prs-llc.net	Task Lead
LeAnne Garner	Engineer	Tetra Tech	270-441-5436	yln@prs-llc.net	Project
Myrna Redfield	ER/EM Deputy Director	PRS	270-441-5113	mxn@prs-llc.net	Manager
Elizabeth Wyatt	Project Engineer	PRS	270-441-5034	Ew2@prs-llc.net	Project
Clint Dietsch	Engineer	PRS	270-441-5254	idf@prs-llc.net	Project
Jennifer Watson	Sample/Data Management	PRS	270-441-5293	oxn@prs-llc.net	Sample/Data

Comments/Decisions:	Surface Water Operable Unit (SWOU) (On-Site) project also discussed at this scoping session–use this as first scoping session for SWOU (On-Site); locate DOE QAPP requirements on UFP crosswalk worksheet (#2)
Action Items:	Target dates: Soils QAPP complete: 12/2/08; SWOU QAPP incomplete–due 12/1/08 (will be essentially blank)
Consensus Decisions:	N/A

QAPP Worksheet #10
Problem Definition

UFP-QAPP Manual Section 2.5.2:

The problem to be addressed by the project: The DOE, EPA and Commonwealth of Kentucky have entered into an agreement to remediate three areas of the Paducah Gaseous Diffusion Plant. They are the C-218 Outdoor Firing Range (SWMU 181) and the C-410-B Hydrogen Fluoride Neutralization Lagoon (SWMU 19). The agreement document is *Action Memorandum for Soils Operable Unit Inactive Facilities* (DOE 2009). The action includes excavation and removal of areas of known contamination (soil, sediment, and accumulated rainwater). This problem was described in detail in *Engineering Evaluation/Cost Analysis(EE/CA) for Soils Operable Unit Inactive Facilities at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-0016&D2. The soil, sediment, and accumulated rainwater have been contaminated with various plant pollutants through normal plant operations. This RAWP addresses the removal actions for C-218 Outdoor Firing Range [Solid Waste Management Unit (SWMU) 181] and C-410-B Hydrogen Fluoride Neutralization Lagoon (SWMU 19).

The environmental questions being asked: N/A

Observations from any site reconnaissance reports: N/A

A synopsis of secondary data or information from site reports: Two documents previously submitted to EPA describe all available secondary information: *Action Memorandum for Soils Operable Unit Inactive Facilities* (DOE 2009), and *Engineering Evaluation/Cost Analysis for Soils Operable Unit Inactive Facilities at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-0016&D2.

The possible classes of contaminants and the affected matrices:

1. C-218 Outdoor Firing Range (SWMU 181)

Soil/sludge–Lead [Characterization for chemicals of potential concern (COPC) associated with berm material is being planned in conjunction with the Soil Pile Project sampling event, and the characterization data will be used as part of a follow-up evaluation of the C-218 Firing Range currently scheduled under Soils OU.]

QAPP Worksheet #10 Problem Definition (Continued)

2. C-410-B Hydrogen Fluoride Neutralization Lagoon (SWMU 19)

Soil/sludge–Silver, uranium (234, 235 and 238), fluoranthene, total PAHs

Accumulated Rainwater–Antimony, lead

(Also–see Section 1.6.1 of the EE/CA)

The rationale for inclusion of chemical and nonchemical analyses: N/A

Information concerning various environmental indicators: N/A

Project decision conditions ("IF..., then..." statements): See Section F.3.1 for C-218 Outdoor Firing Range (SWMU 181).

QAPP Worksheet #11
Project Quality Objectives/Systematic Planning Process Statements

UFP-QAPP Manual Section 2.6.1:

Who will use the data? DOE, EPA, and the Commonwealth of Kentucky will use the environmental sampling data obtained subsequent to the Removal Action.

What will the data be used for? To determine if the Removal Action Objectives (RAOs) have been met.

What type of data are needed? (target analytes, analytical groups, field screening, on-site analytical or off-site laboratory techniques, sampling techniques) Target analytes for each removal action location are listed on worksheet #10. Subsequent to the removal action, representative soil/sediment samples will be obtained from each location and analyzed in a Department of Energy Consolidated Audit Program (DOECAP) certified laboratory.

Note that the soil results will be reported on an "as received" or wet weight basis.

How "good" do the data need to be in order to support the environmental decision? The data need to be able to confirm that the RAOs have been met. The C-410-B HF Neutralization Lagoon will be removed to its SWMU boundary; therefore, cleanup levels for this inactive facility are not applicable per the *Action Memorandum for Soils Operable Unit Inactive Facilities*, DOE/LX/07-0121&D2/R1. The RAO for lead the C-218 Firing Range is 800 mg/kg. The sampling and analysis data need to be able to identify this concentration. Lead-contaminated soil is the focus of this removal action at C-218. Soil verification samples from C-218 also may be used as characterization samples in any future CERCLA actions.

How much data are needed? (number of samples for each analytical group, matrix, and concentration) This information is detailed in Appendix F, Sampling and Analysis Plan (SAP), of the Removal Action Work Plan (RAWP).

Where, when, and how should the data be collected/generated? For SWMU 19 post-excavation sampling will be performed in order to document the level of clean-up achieved by the excavation. Since the Action Memorandum limits the excavation at SWMU 19 to its SWMU boundary (defined as no further than 3 ft beyond the current sides and floor of the unit), only post- excavation sampling will be performed. For SWMU 181, two sampling activities will be performed: a removal action support survey[1] that will be completed using screening-level analysis [i.e., the use of x-ray fluoroscopy (XRF) field screening], including field detectors and analytical kits, if applicable, and post-excavation sampling to confirm that the cleanup levels for lead have been achieved. Coordinates for removal action support survey sample locations (Activity I) and post-excavation sample locations from SWMU 19 will be obtained using a global positioning system. Each sample point from the post-excavation sampling (Activity II) of SWMU 181 will be surveyed for its horizontal and vertical location using the PGDP coordinate system for horizontal control using GPS or standard survey techniques.

Who will collect and generate the data? A sampling team will collect the soil samples following guidelines for underground storage tanks (USTs) and PRS sampling procedures. A DOE certified laboratory will generate the data results.

How will the data be reported? Field data will be recorded on chain-of-custody forms, in field logbooks, and field data sheets. The field laboratory and the fixed-base laboratory will provide data in an Electronic Data Deliverable (EDD). Project data will be reported from the Paducah Oak Ridge Environmental Information System (OREIS).

How will the data be archived? Data will be archived in OREIS. Data will be archived for 30 years.

[1] Per the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) (EPA 2000), support surveys are conducted to (1) support excavation activities, (2) determine when a site or survey unit is ready for the final status survey, and (3) provide updated estimates of site-specific parameters to use for planning the final status survey. A support survey serves to monitor the effectiveness of excavation efforts that are intended to reduce contamination to acceptable levels. This type of survey guides the cleanup in a real-time mode. The support survey typically relies on a simple radiological parameter, such as direct radiation near the surface, as an indicator of effectiveness. For this application, the survey relies on field screening of the only contaminant of concern (COC) lead. The action level (the level below which there is an acceptable level of assurance that the cleanup levels for all COCs have been attained) is determined and used for immediate, in-field decisions. Such a survey is intended for expediency and cost effectiveness and might not provide thorough or accurate data describing the overall characterization of the site. Depending on the instrumentation used during the support survey, the information provided might not be adequate to demonstrate compliance with the cleanup levels.

QAPP Worksheet #12-1
Measurement Performance Criteria Table

Matrix	Soil/sediment
Analytical Group[1]	Semivolatile Organic Compounds
Concentration Level	Low

Sampling Procedure[2]	**Analytical Method/SOP**[3]	**Data Quality Indicators (DQIs)**	**Measurement Performance Criteria**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)**
See Worksheet #21, Ref. # 2	SW846-8270	Precision–Lab	RPD–38%	Laboratory Duplicates	A
		Accuracy/Bias	+/- 20% recovery	Laboratory Sample Spikes	A
		Accuracy/Bias-Contamination	No target compounds > quantitation limit	Method Blanks/Instrument Blanks	A
		Completeness[4]	90%	Data completeness check	S&A

[1]If information varies within an analytical group, separate by individual analyte.
[2]Reference number from QAPP Worksheet #21 (see Section 3.1.2).
[3]Reference number from QAPP Worksheet #23 (see Section 3.2).
[4]Completeness is calculated as the number of samples planned to be collected divided by the number of sample results that are not rejected.

QAPP Worksheet #12-2
Measurement Performance Criteria Table

Matrix	Soil/sediment
Analytical Group[1]	Metals (aluminum, antimony, barium, beryllium, calcium, chromium, iron, magnesium, manganese, molybdenum, nickel, sodium, vanadium, and zinc)
Concentration Level	Low

Sampling Procedure[2]	**Analytical Method/SOP**[3]	**Data Quality Indicators (DQIs)**	**Measurement Performance Criteria**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)**
See Worksheet #21, Ref. # 1	SW846-6010	Precision–Lab	RPD–35%	Laboratory Duplicates	A
		Accuracy/Bias	+/- 20% recovery	Laboratory Sample Spikes	A
		Accuracy/Bias-Contamination	No target compounds > quantitation limit	Method Blanks/Instrument Blanks	A
		Completeness[4]	90%	Data completeness check	S&A

[1]If information varies within an analytical group, separate by individual analyte.
[2]Reference number from QAPP Worksheet #21 (see Section 3.1.2).
[3]Reference number from QAPP Worksheet #23 (see Section 3.2).
[4]Completeness is calculated as the number of samples planned to be collected divided by the number of sample results that are not rejected.

QAPP Worksheet #12-3
Measurement Performance Criteria Table

Matrix	Soil/sediment
Analytical Group[1]	Metals (arsenic, cadmium, cobalt, copper, lead, selenium, silver thallium, uranium)
Concentration Level	Low

Sampling Procedure[2]	**Analytical Method/SOP**[3]	**Data Quality Indicators (DQIs)**	**Measurement Performance Criteria**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)**
See Worksheet #21, Ref. # 1	SW846-6020	Precision–Lab	RPD–35%	Laboratory Duplicates	A
		Accuracy/Bias	+/- 20% recovery	Laboratory Sample Spikes	A
		Accuracy/Bias-Contamination	No target compounds > quantitation limit	Method Blanks/Instrument Blanks	A
		Completeness[4]	90%	Data completeness check	S&A

[1]If information varies within an analytical group, separate by individual analyte.
[2]Reference number from QAPP Worksheet #21 (see Section 3.1.2).
[3]Reference number from QAPP Worksheet #23 (see Section 3.2).
[4]Completeness is calculated as the number of samples planned to be collected divided by the number of sample results that are not rejected.

QAPP Worksheet #12-4
Measurement Performance Criteria Table

Matrix	Soil/sediment
Analytical Group[1]	PCBs
Concentration Level	Low

Sampling Procedure[2]	**Analytical Method/SOP**[3]	**Data Quality Indicators (DQIs)**	**Measurement Performance Criteria**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)**
See Worksheet #21, Ref. # 1	SW846-8082	Precision–Lab	RPD–43%	Laboratory Duplicates	A
		Accuracy/Bias	+/- 20% recovery	Laboratory Sample Spikes	A
		Accuracy/Bias-Contamination	No target compounds > quantitation limit	Method Blanks/Instrument Blanks	A
		Completeness[4]	90%	Data completeness check	S&A

[1]If information varies within an analytical group, separate by individual analyte.
[2]Reference number from QAPP Worksheet #21 (see Section 3.1.2).
[3]Reference number from QAPP Worksheet #23 (see Section 3.2).
[4]Completeness is calculated as the number of samples planned to be collected divided by the number of sample results that are not rejected.

QAPP Worksheet #12-5
Measurement Performance Criteria Table

Matrix	Soil/sediment
Analytical Group[1]	Radionuclides (Gross alpha and Gross beta)
Concentration Level	Low

Sampling Procedure[2]	**Analytical Method/SOP**[3]	**Data Quality Indicators (DQIs)**	**Measurement Performance Criteria**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)**
See Worksheet #21, Ref. # 1	EPA 900	Precision–Lab	RPD–30%	Laboratory Duplicates	A
		Accuracy/Bias	+/- 20% recovery	Laboratory Sample Spikes	A
		Accuracy/Bias-Contamination	No target compounds > quantitation limit	Method Blanks/Instrument Blanks	A
		Completeness[4]	90%	Data completeness check	S&A

[1]If information varies within an analytical group, separate by individual analyte.
[2]Reference number from QAPP Worksheet #21 (see Section 3.1.2).
[3]Reference number from QAPP Worksheet #23 (see Section 3.2).
[4]Completeness is calculated as the number of samples planned to be collected divided by the number of sample results that are not rejected.

QAPP Worksheet #12-6
Measurement Performance Criteria Table

Matrix	Soil/sediment
Analytical Group[1]	Radionuclides (uranium-234, uranium-235, uranium-238)
Concentration Level	Low

Sampling Procedure[2]	**Analytical Method/SOP**[3]	**Data Quality Indicators (DQIs)**	**Measurement Performance Criteria**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)**
See Worksheet #21, Ref. # 1	Alpha spectroscopy	Precision–Lab	RPD–20%	Laboratory Duplicates	A
		Accuracy/Bias	+/- 20% recovery	Laboratory Sample Spikes	A
		Accuracy/Bias-Contamination	No target compounds > quantitation limit	Method Blanks/Instrument Blanks	A
		Completeness[4]	90%	Data completeness check	S&A

[1]If information varies within an analytical group, separate by individual analyte.
[2]Reference number from QAPP Worksheet #21 (see Section 3.1.2).
[3]Reference number from QAPP Worksheet #23 (see Section 3.2).
[4]Completeness is calculated as the number of samples planned to be collected divided by the number of sample results that are not rejected.

QAPP Worksheet #12-7
Measurement Performance Criteria Table

Matrix	Soil/sediment
Analytical Group[1]	Radionuclides (americium-241, neptunium-237, plutonium-238, plutonium-239/240, thorium-228, thorium-230, thorium-232)
Concentration Level	Low

Sampling Procedure[2]	**Analytical Method/SOP**[3]	**Data Quality Indicators (DQIs)**	**Measurement Performance Criteria**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)**
See Worksheet #21, Ref. # 1	Alpha spectroscopy	Precision–Lab	RPD–50%	Laboratory Duplicates	A
		Accuracy/Bias	+/- 20% recovery	Laboratory Sample Spikes	A
		Accuracy/Bias-Contamination	No target compounds > quantitation limit	Method Blanks/Instrument Blanks	A
		Completeness[4]	90%	Data completeness check	S&A

[1]If information varies within an analytical group, separate by individual analyte.
[2]Reference number from QAPP Worksheet #21 (see Section 3.1.2).
[3]Reference number from QAPP Worksheet #23 (see Section 3.2).
[4]Completeness is calculated as the number of samples planned to be collected divided by the number of sample results that are not rejected.

QAPP Worksheet #12-8
Measurement Performance Criteria Table

Matrix	Soil/sediment
Analytical Group[1]	Radionuclides (cesium-137)
Concentration Level	Low

Sampling Procedure[2]	**Analytical Method/SOP**[3]	**Data Quality Indicators (DQIs)**	**Measurement Performance Criteria**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)**
See Worksheet #21, Ref. # 1	Gamma spectroscopy	Precision–Lab	RPD–50%	Laboratory Duplicates	A
		Accuracy/Bias	+/- 20% recovery	Laboratory Sample Spikes	A
		Accuracy/Bias-Contamination	No target compounds > quantitation limit	Method Blanks/Instrument Blanks	A
		Completeness[4]	90%	Data completeness check	S&A

[1]If information varies within an analytical group, separate by individual analyte.
[2]Reference number from QAPP Worksheet #21 (see Section 3.1.2).
[3]Reference number from QAPP Worksheet #23 (see Section 3.2).
[4]Completeness is calculated as the number of samples planned to be collected divided by the number of sample results that are not rejected.

QAPP Worksheet #12-9
Measurement Performance Criteria Table

Matrix	Soil/sediment
Analytical Group[1]	Radionuclides (technetium-99)
Concentration Level	Low

Sampling Procedure[2]	**Analytical Method/SOP**[3]	**Data Quality Indicators (DQIs)**	**Measurement Performance Criteria**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)**
See Worksheet #21, Ref. # 1	Liquid scintillation	Precision–Lab	RPD–50%	Laboratory Duplicates	A
		Accuracy/Bias	+/- 20% recovery	Laboratory Sample Spikes	A
		Accuracy/Bias-Contamination	No target compounds > quantitation limit	Method Blanks/Instrument Blanks	A
		Completeness[4]	90%	Data completeness check	S&A

[1]If information varies within an analytical group, separate by individual analyte.
[2]Reference number from QAPP Worksheet #21 (see Section 3.1.2).
[3]Reference number from QAPP Worksheet #23 (see Section 3.2).
[4]Completeness is calculated as the number of samples planned to be collected divided by the number of sample results that are not rejected.

QAPP Worksheet #12-10
Measurement Performance Criteria Table

Matrix	Soil/sediment
Analytical Group[1]	Lead
Concentration Level	Moderate

Sampling Procedure[2]	**Analytical Method/SOP**[3]	**Data Quality Indicators (DQIs)**	**Measurement Performance Criteria**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)**
	SW846-6200	Precision–Lab	RPD–20%	Laboratory Duplicates	A
		Accuracy/Bias	+/- 20% recovery	Laboratory Sample Spikes	A
		Accuracy/Bias-Contamination	No target compounds > quantitation limit	Method Blanks/Instrument Blanks	A
		Completeness[4]	90%	Data completeness check	S&A

[1]If information varies within an analytical group, separate by individual analyte.
[2]Reference number from QAPP Worksheet #21 (see Section 3.1.2).
[3]Reference number from QAPP Worksheet #23 (see Section 3.2).
[4]Completeness is calculated as the number of samples planned to be collected divided by the number of sample results that are not rejected.

QAPP Worksheet #13
Secondary Data Criteria and Limitations Table

UFP-QAPP Manual Section 2.7:

Secondary Data	Data Source (Originating Organization, Report Title, and Date)	Data Generator(s) (Originating Org., Data Types, Data Generation/Collection Dates)	How Data Will Be Used	Limitations on Data Use
Appendix C "Analytical Data"; process knowledge and historical use	DOE, EE/CA, July 2008	DOE; previous analytical sampling/analysis results; contaminant conclusions based historical use and process knowledge	To determine risk to human health and provide input to the removal action alternatives	N/A

QAPP Worksheet #14
Summary of Project Tasks

UFP-QAPP Manual Section 2.8.1:

Sampling Tasks: From SAP

Analysis Tasks: From SAP

Quality Control Tasks: From SAP

Secondary Data: From SAP

Data Management Tasks: From SAP

Documentation and Records: Documentation and Records will be per DOE Prime Contractor procedure PRS-DOC-1009, *Documents and Records.*

Assessment/Audit Tasks: Assessments and audits will be per DOE Prime Contractor procedure PRS-ENM-5003, *Quality Assured Data*.

Data Review Tasks: Data review tasks will be per DOE Prime Contractor procedure PRS-ENM-5003, *Quality Assured Data*.

QAPP Worksheet #15-1
Reference Limits and Evaluation Table

Matrix: Soil/Sediment
Analytical Group: semivolatile organic compounds
Concentration Level: low

Analyte	CAS Number	Project Action Limit (µg/kg)	Project Quantitation Limit (µg/kg)	Analytical Method[1]		Achievable Laboratory Limits[2]	
				MDLs	Method QLs	MDLs	QLs
1,2,4-Trichlorobenzene	120821	N/A	660	660		660	N/A
1,2-Dichlorobenzene	95-50-1	N/A	660	660		660	N/A
1,3-Dichlorobenzene	541731	N/A	660	660		660	N/A
1,4-Dichlorobenzene	106467	N/A	660	660		660	N/A
2,4,5-Trichlorophenol	95-95-4	N/A	660	660		660	N/A
2,4,6-Trichlorophenol	88-06-2	N/A	660	660		660	N/A
2,4-Dichlorophenol	120832	N/A	660	660		660	N/A
2,4-Dimethylphenol	105679	N/A	660	660		660	N/A
2,4-Dinitrotoluene	121142	N/A	660	660		660	N/A
2,6-Dinitrotoluene	606202	N/A	660	660		660	N/A
2-Chloronaphthalene	91-58-7	N/A	660	660		660	N/A
2-Chlorophenol	95-57-8	N/A	660	660		660	N/A
2-Methylnaphthalene	91-57-6	N/A	660	660		660	N/A
2-Nitrophenol	88-75-5	N/A	660	660		660	N/A
4-Bromophenyl phenyl ether	101553	N/A	660	660		660	N/A

QAPP Worksheet #15-1 Reference Limits and Evaluation Table (Continued)

Matrix: Soil/Sediment
Analytical Group: semivolatile organic compounds
Concentration Level: low

Analyte	CAS Number	Project Action Limit (µg/kg)	Project Quantitation Limit (µg/kg)	Analytical Method[1]		Achievable Laboratory Limits[2]	
				MDLs	Method QLs	MDLs	QLs
4-Chlorophenylphenyl ether	7005723	N/A	660	660		660	N/A
Acenaphthene	83-32-9	N/A	660	660		660	N/A
Acenaphthylene	208968	N/A	660	660		660	N/A
Anthracene	120127	N/A	660	660		660	N/A
Benz(a)anthracene	56-55-3	N/A	660	660		660	N/A
Benzo(a)pyrene	50-32-8	N/A	660	660		660	N/A
Benzo(b)fluoranthene	205992	N/A	660	660		660	N/A
Benzo(ghi)perylene	191242	N/A	660	660		660	N/A
Benzo(k)fluoranthene	207089	N/A	660	660		660	N/A
bis(2-chloroethoxy)methane	111911	N/A	660	660		660	N/A
bis(2-chloroethyl) ether	111444	N/A	660	660		660	N/A
bis(2-chloroisopropyl) ether	108601	N/A	660	660		660	N/A
bis(2-ethylhexyl)phthalate	117817	N/A	660	660		660	N/A
Butyl benzyl phthalate	85-68-7	N/A	660	660		660	N/A
Chrysene	218019	N/A	660	660		660	N/A
Dibenz(a,h)anthracene	53-70-3	N/A	660	660		660	N/A
Dibenzofuran	132649	N/A	660	660		660	N/A

QAPP Worksheet #15-1 Reference Limits and Evaluation Table (Continued)

Matrix: Soil/Sediment
Analytical Group: semivolatile organic compounds
Concentration Level: low

Analyte	CAS Number	Project Action Limit (µg/kg)	Project Quantitation Limit (µg/kg)	Analytical Method[1]		Achievable Laboratory Limits[2]	
				MDLs	Method QLs	MDLs	QLs
Diethylphthalate	84-66-2	N/A	660	660		660	N/A
Dimethylphthalate	131113	N/A	660	660		660	N/A
Di-n-butylphthalate	84-74-2	N/A	660	660		660	N/A
Di-n-octylphthalate	117840	N/A	660	660		660	N/A
Fluoranthene	206440	N/A	660	660		660	N/A
Fluorene	86-73-7	N/A	660	660		660	N/A
Hexachlorobenzene	118741	N/A	660	660		660	N/A
Hexachlorobutadiene	87-68-3	N/A	660	660		660	N/A
Hexachlorocyclopentadiene	77-47-4	N/A	660	660		660	N/A
Hexachloroethane	67-72-1	N/A	660	660		660	N/A
Indeno(1,2,3-cd)pyrene	193395	N/A	660	660		660	N/A
Isophorone	78-59-1	N/A	660	660		660	N/A
m,p-cresol		N/A	660	660		660	N/A
Naphthalene	91-20-3	N/A	660	660		660	N/A
Nitrobenzene	98-95-3	N/A	660	660		660	N/A
N-Nitroso-di-n-propylamine	621647	N/A	660	660		660	N/A
N-Nitrosodiphenylamine	86-30-6	N/A	660	660		660	N/A
o-cresol	95-48-7	N/A	660	660		660	N/A
Phenanthrene	85-01-8	N/A	660	660		660	N/A

QAPP Worksheet #15-1 Reference Limits and Evaluation Table (Continued)

Matrix: Soil/Sediment
Analytical Group: semivolatile organic compounds
Concentration Level: low

Analyte	CAS Number	Project Action Limit (µg/kg)	Project Quantitation Limit (µg/kg)	Analytical Method[1]		Achievable Laboratory Limits[2]	
				MDLs	Method QLs	MDLs	QLs
Phenol	108952	N/A	660	660		660	N/A
Pyrene	129000	N/A	660	660		660	N/A
Pyridine	110861	N/A	660	660		660	N/A
3,3'-Dichlorobenzidine	91-94-1	N/A	1,300	1,300		1,300	N/A
4-Chloro-3-methylphenol	59-50-7	N/A	1,300	1,300		1,300	N/A
4-Chloroaniline	106478	N/A	1,300	1,300		1,300	N/A
Benzyl Alcohol	100516	N/A	1,300	1,300		1,300	N/A
2,4-Dinitrophenol	51-28-5	N/A	3,300	3,300		3,300	N/A
2-Methyl-4,6-dinitrophenol	534521	N/A	3,300	3,300		3,300	N/A
2-Nitroaniline	88-74-4	N/A	3,300	3,300		3,300	N/A
3-Nitroaniline	99-09-2	N/A	3,300	3,300		3,300	N/A
4-Nitroaniline	100016	N/A	3,300	3,300		3,300	N/A
4-Nitrophenol	100027	N/A	3,300	3,300		3,300	N/A
Benzoic Acid	65-85-0	N/A	3,300	3,300		3,300	N/A
Pentachlorophenol	87-86-5	N/A	3,300	3,300		3,300	N/A

[1]Analytical MDLs and QLs are those documented in validated methods.
[2]Achievable MDLs and QLs are limits that an individual laboratory can achieve when performing a specific analytical method.

QAPP Worksheet #15-2
Reference Limits and Evaluation Table

Matrix: Soil/Sediment
Analytical Group: metals
Concentration Level: low

Analyte	CAS Number	Project Action Limit (mg/kg)	Project Quantitation Limit (mg/kg)	Analytical Method[1]		Achievable Laboratory Limits[2]	
				MDLs	Method QLs	MDLs	QLs
Aluminum	7429-90-5	N/A	20	20		20	N/A
Antimony	7440-36-0	N/A	10	10		10	N/A
Arsenic	7440-38-2	N/A	1	1		1	N/A
Barium	7440-39-3	N/A	2.5	2.5		2.5	N/A
Beryllium	7440-41-7	N/A	0.5	0.5		0.5	N/A
Cadmium	7440-43-9	N/A	0.5	0.5		0.5	N/A
Calcium	7440-70-2	N/A	100	100		100	N/A
Chromium	7440-47-3	N/A	2.5	2.5		2.5	N/A
Cobalt	7440-48-4	N/A	1	1		1	N/A
Copper	7440-50-8	N/A	2.5	2.5		2.5	N/A
Iron	7439-89-6	N/A	20	20		20	N/A
Lead	7439-92-1	800	1	1		1	N/A
Magnesium	7439-95-4	N/A	5	5		5	N/A
Manganese	7439-96-5	N/A	2.5	2.5		2.5	N/A
Mercury	7439-97-6	N/A	0.02	0.02		0.02	N/A
Molybdenum	7439-98-7	N/A	5	5		5	N/A
Nickel	7440-02-0	N/A	5	5		5	N/A
Selenium	7782-49-2	N/A	1	1		1	N/A
Silver	7440-22-4	N/A	2.5	2.5		2.5	N/A
Sodium	7440-23-5	N/A	200	200		200	N/A

QAPP Worksheet #15-2 Reference Limits and Evaluation Table (Continued)

Matrix: Soil/Sediment
Analytical Group: metals
Concentration Level: low

Analyte	CAS Number	Project Action Limit (mg/kg)	Project Quantitation Limit (mg/kg)	Analytical Method[1]		Achievable Laboratory Limits[2]	
				MDLs	Method QLs	MDLs	QLs
Thallium	7440-28-0	N/A	2	2		2	N/A
Uranium	7440-61-1	N/A	1	1		1	N/A
Vanadium	7440-62-2	N/A	2.5	2.5		2.5	N/A
Zinc	7440-66-6	N/A	20	20		20	N/A

[1]Analytical MDLs and QLs are those documented in validated methods.
[2]Achievable MDLs and QLs are limits that an individual laboratory can achieve when performing a specific analytical method.

QAPP Worksheet #15-3
Reference Limits and Evaluation Table

Matrix: Soil/Sediment
Analytical Group: PCBs
Concentration Level: low

Analyte	CAS Number	Project Action Limit (mg/kg)	Project Quantitation Limit (mg/kg)	Analytical Method[1]		Achievable Laboratory Limits[2]	
				MDLs	Method QLs	MDLs	QLs
Aroclor-1016		n/a	0.1	0.1	n/a	0.1	n/a
Aroclor-1221		n/a	0.1	0.1	n/a	0.1	n/a
Aroclor-1232		n/a	0.1	0.1	n/a	0.1	n/a
Aroclor-1242		n/a	0.1	0.1	n/a	0.1	n/a
Aroclor-1248		n/a	0.1	0.1	n/a	0.1	n/a
Aroclor-1254		n/a	0.1	0.1	n/a	0.1	n/a
Aroclor-1260		n/a	0.1	0.1	n/a	0.1	n/a
Total PCBs		n/a	0.1	0.1	n/a	0.1	n/a

[1]Analytical MDLs and QLs are those documented in validated methods.
[2]Achievable MDLs and QLs are limits that an individual laboratory can achieve when performing a specific analytical method.

QAPP Worksheet #15-4
Reference Limits and Evaluation Table

Matrix: Soil/Sediment
Analytical Group: radionuclides
Concentration Level: low

Analyte	CAS Number	Project Action Limit (pCi/g)	Project Quantitation Limit (pCi/g)	Analytical Method[1]		Achievable Laboratory Limits[2]	
				MDLs	Method QLs	MDLs	QLs
Alpha Activity	12587-46-1	N/A	5	5		5	N/A
Beta Activity	12587-47-2	N/A	5	5		5	N/A
Americium-241	14596-10-2	N/A	0.05	3		0.05	N/A
Cesium-137	10045-97-3	N/A	0.1	0.5		0.1	N/A
Neptunium-237	13994-20-2	N/A	0.05	3		0.05	N/A
Plutonium-238	13981-16-3	N/A	0.05	6		0.05	N/A
Plutonium-239/240	N/A	N/A	0.05	4		0.05	N/A
Technetium-99	14133-76-7	N/A	1	8		1	N/A
Thorium-228	14274-82-9	N/A	0.05	3		0.05	N/A
Thorium-230	14269-63-7	N/A	0.05	4		0.05	N/A
Thorium-232	N/A	N/A	0.05	3		0.05	N/A
Uranium-234	13966-29-5	N/A	0.15	3		0.15	N/A
Uranium-235	15117-96-1	N/A	0.05	2		0.05	N/A
Uranium-238	24678-82-8	N/A	0.15	2		0.15	N/A

[1]Analytical MDLs and QLs are those documented in validated methods.
[2]Achievable MDLs and QLs are limits that an individual laboratory can achieve when performing a specific analytical method.

QAPP Worksheet #15-5
Reference Limits and Evaluation Table

Matrix: Soil/Sediment
Analytical Group: lead by XRF
Concentration Level: low

Analyte	CAS Number	Project Action Limit (mg/kg)	Project Quantitation Limit (mg/kg)	Analytical Method[1]		Achievable Laboratory Limits[2]	
				MDLs	Method QLs	MDLs	QLs
Lead	7439-92-1	800	N/A	20		20	N/A

[1]Analytical MDLs and QLs are those documented in validated methods.
[2]Achievable MDLs and QLs are limits that an individual laboratory can achieve when performing a specific analytical method.

QAPP Worksheet #16
Project Schedule/Timeline Table

UFP-QAPP Manual Section 2.8.2:

Activities	Organization	Dates (MM/DD/YY)		Deliverable	Deliverable Due Date
		Anticipated Date(s) of Initiation	Anticipated Date of Completion		
RAWP (including QAPP, SAP and WMP)preparation	DOE Prime Contractor	October 2008	January 2009	RAWP (including QAPP, SAP and WMP)	June 2009
RAWP (including QAPP, SAP and WMP) review, comment, revision, and approval.	DOE Prime Contractor, DOE, EPA, Commonwealth of Kentucky	June 2009	August 2009	D2 RAWP	TBD
Readiness Assessment	DOE Prime Contractor	TBD	TBD	Readiness Assessment Report (Internal)	NA
Mobilization	DOE Prime Contractor	TBD	TBD	NA	NA
Removal Actions	DOE Prime Contractor	TBD	TBD	NA	NA
Field Sampling	DOE Prime Contractor	TBD	TBD	NA	NA
Laboratory Analysis	DOECAP certified analytical laboratory	TBD	TBD	NA	NA
Data Review	DOE Prime Contractor	TBD	TBD	NA	NA
Assessments/ surveillances	DOE Prime Contractor	Within 1 month of mobilization and periodically thereafter	TBD	Assessment Reports (Internal)	N/A
De-mobilization	DOE Prime Contractor	TBD	TBD	N/A	N/A
Final Project Report Preparation	DOE Prime Contractor	TBD	TBD	Final Project Report	TBD

QAPP Worksheet #17
Sampling Design and Rationale

UFP-QAPP Manual Section 3.1.1:

Describe and provide a rationale for choosing the sampling approach (e.g., grid system, biased statistical approach):

SWMU 19 will composite samples on a grid system as illustrated in Appendix F, "Sampling and Analysis Plan."

SWMU 181 will be sampled in random locations within an established grid system.

Describe the sampling design and rationale in terms of what matrices will be sampled, what analytical groups will be analyzed and at what concentration levels, the sampling locations (including QC, critical, and background samples), the number of samples to be taken, and the sampling frequency (including seasonal considerations) [May refer to map or Worksheet #18 for details]:

Soil will be sampled from both SWMUs following excavation. At SWMU 19, samples for a wide range of analyses will be collected. Samples from SWMU 181 will be collected and analyzed for lead, the unit's contaminant of concern. After excavation, lead results are expected to be less than the 800 mg/kg action limit for SWMU 181. Additional information is available in Worksheet 18 and in Appendix F "Sampling and Analysis Plan."

QAPP Worksheet #18
Sampling Locations and Methods/SOP Requirements Table

UFP-QAPP Manual Section 3.1.1:

Sampling Location/ID Number	Matrix	Depth (units)	Analytical Group	Concentration Level	Number of Samples (Identify Field Duplicates)	Sampling SOP Reference[1]	Rationale for Sampling Location
SWMU 19	Soil	surface	Semivolatile organic compounds	low	8 composite samples, plus 1 field duplicate	See Worksheet #21, Ref. # 2	See Worksheet #17 and Appendix F
SWMU 19	Soil	surface	PCBs	low	8 composite samples, plus 1 field duplicate	See Worksheet #21, Ref. # 2	See Worksheet #17 and Appendix F
SWMU 19	Soil	surface	Metals	low	8 composite samples, plus 1 field duplicate	See Worksheet #21, Ref. # 2	See Worksheet #17 and Appendix F
SWMU 19	Soil	surface	Radionuclides	low	8 composite samples, plus 1 field duplicate	See Worksheet #21, Ref. # 2	See Worksheet #17 and Appendix F
SWMU 181	Soil	surface	Lead	low	100 composite samples for field screening analysis, plus 5 field duplicates	See Worksheet #21, Ref. # 1	See Worksheet #17 and Appendix F
SWMU 181	Soil	surface	Lead	low	10 split composite samples plus one field duplicate for fixed-base laboratory confirmation	See Worksheet #21, Ref. # 1	See Worksheet #17 and Appendix F
SWMU 181	Soil	surface	Lead	low	7 random grab samples plus 1 field duplicate	See Worksheet #21, Ref. # 1	See Worksheet #17 and Appendix F

QAPP Worksheet #19
Analytical SOP Requirements Table

UFP-QAPP Manual Section 3.1.1:

Matrix	Analytical Group	Concentration Level	Analytical and Preparation Method/SOP Reference[1]	Sample Volume	Containers (number, size, and type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/ analysis)
soil	Semivolatile organic compounds	low	8270	[2]	[2]	cool 4° C	14 days until extraction/40 days
soil	PCBs	low	8082			cool 4° C	14 days until extraction/40 days
soil	Metals (including lead)	low	6010/6020			cool 4° C	180 days
soil	Radionuclides	low	see Worksheet #12			cool 4° C	180 days

[1]Specify the appropriate reference letter or number from the Analytical SOP References table (Worksheet #23).
[2] Sample volume and container requirements will be specified by the laboratory.

QAPP Worksheet #20
Field Quality Control Sample Summary Table

UFP-QAPP Manual Section 3.1.1:

Matrix	Analytical Group	Concentration Level	Analytical and Preparation SOP Reference[1]	No. of Sampling Locations[2]	No. of Field Duplicates	Inorganic No. of MS	No. of Field Blanks	No. of Equip. Blanks	No. of PT Samples	Total No. of Samples to Lab
Soil	Semivolatile organic compounds	low	SW846-8270	8	1		1	1	N/A	11
Soil	PCBs	low	SW846-8082	8	1		1	1	N/A	11
Soil	Metals	low	SW846-6010/6020	8	1		1	1	N/A	11
Soil	Radionuclides	low	see Worksheet #12	8	1		1	1	N/A	11
Soil	Lead	low	XRF	100	5				N/A	0
Soil	Lead	low	SW846-6010/6020	10	1		1	1	N/A	13
Soil	Lead	low	SW846-6010/6020	7	1		1	1	N/A	10

[1]Specify the appropriate reference letter or number from the Analytical SOP References table (Worksheet #23).
[2]If samples will be collected at different depths at the same location, count each discrete sampling depth as a separate sampling location or station.

QAPP Worksheet #21
Project Sampling SOP References Table

UFP-QAPP Manual Section 3.1.2:

Reference Number	Title, Revision Date, and/or Number	Originating Organization	Equipment Type	Modified for Project Work? (Y/N)	Comments
1	PRS-ENM-0023 Rev. 0, Composite Sampling	PRS	Sampling	N	NA
2	PRS-ENM-2300 Rev. 0, Collection of Soil Samples	PRS	Sampling	N	NA
3	PRS-ENM-2700 Rev. 0, Logbooks and Data Forms	PRS	Sampling	N	NA
4	PRS-ENM-2702 Rev. 0, Decontamination of Sampling Equipment	PRS	Sampling	N	NA
5	PRS-ENM-2704 Rev. 0, Trip, Equipment and Field Blank	PRS	Sampling	N	NA
6	PRS-ENM-2708 Rev. 0, Chain-of-Custody Forms, Field Sample Logs, Sample Labels, and Custody Seals	PRS	Sampling	N	NA
7	PRS-ENM-5004 Rev. 0, Sample Tracking, Lab Coordination, and Sample Handling Guidance	PRS	Sampling	N	NA
8	Method 6200, Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment.	Manufacturer	Analytical	N	NA

QAPP Worksheet #22
Field Equipment Calibration, Maintenance, Testing, and Inspection Table

UFP-QAPP Manual Section 3.1.2.4:

Field Equipment	Calibration Activity	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference[1]
TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

[1]Specify the appropriate reference letter or number from the Project Sampling SOP References table (Worksheet #21).

QAPP Worksheet #23
Analytical SOP References Table

UFP-QAPP Manual Section 3.2.1:

Reference Number	Title, Revision Date, and/or Number	Definitive or Screening Data	Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work? (Y/N)
8270	Semivolatile Organic Compounds by Gas Chromatography/ Mass Spectrometry (GC/MS)	Definitive	SVOAs	GC/MS	TBD	TBD
8082	Polychlorinated Biphenyls (PCBs) by Gas Chromatography	Definitive	PCBs	GC	TBD	TBD
6010	Inductively Coupled Plasma-Atomic Emission Spectrometry	Definitive	Metals	ICP	TBD	TBD
6020	Inductively Coupled Plasma-Mass Spectrometry	Definitive	Metals	ICP-MS	TBD	TBD
Alpha Spec*	Alpha Spectrometry	Definitive	Rads	Alpha Spectrometry	TBD	TBD
Gamma Spec*	Gamma Spectrometry	Definitive	Rads	Gamma Spectrometry	TBD	TBD
Liquid Scintillation*	Tc-99 by Liquid Scintillation	Definitive	Rads	Liquid Scintillation	TBD	TBD

* Analytical methods for radiochemistry parameters are laboratory-specific. Laboratory contracting will be subsequent to the completion of the RAWP.

QAPP Worksheet #24
Analytical Instrument Calibration Table

UFP-QAPP Manual Section 3.2.2:

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference[1]
*						

[1]Specify the appropriate reference letter or number from the Analytical SOP References table (Worksheet #23).
* The laboratory is responsible for maintaining instrument calibration information per their QA Plan. This information is audited annually by the DOECAP. Laboratory(s) contracted will be DOECAP certified. Laboratory contracting will be subsequent to the completion of the RAWP. Field survey/sampling instrumentation will be calibrated according to manufacturer's instructions.

QAPP Worksheet #25
Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

UFP-QAPP Manual Section 3.2.3:

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference[1]
*								

[1]Specify the appropriate reference letter or number from the Analytical SOP References table (Worksheet #23).
* The laboratory is responsible for maintaining instrument and equipment maintenance, testing, and inspection information per their QA Plan. This information is audited annually by the DOECAP. Laboratory(s) contracted will be DOECAP certified. Laboratory contracting will be subsequent to the completion of the RAWP. Field survey/sampling instrumentation will be maintained, tested, and inspected according to manufacturer's instructions.

QAPP Worksheet #26
Sample Handling System

UFP-QAPP Manual Appendix A:

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT	
Sample Collection (Personnel/Organization):	Sampling Teams/DOE Prime Contractor and Subcontractors
Sample Packaging (Personnel/Organization):	Sampling Teams/DOE Prime Contractor and Subcontractors
Coordination of Shipment (Personnel/Organization):	Lab Coordinator/DOE Prime Contractor
Type of Shipment/Carrier:	Direct Delivery or Overnight/Fed Ex
SAMPLE RECEIPT AND ANALYSIS	
Sample Receipt (Personnel/Organization):	Sample Management/Contracted Laboratory
Sample Custody and Storage (Personnel/Organization):	Sample Management/Contracted Laboratory
Sample Preparation (Personnel/Organization):	Analysts/Contracted Laboratory
Sample Determinative Analysis (Personnel/Organization):	Analysts/Contracted Laboratory
SAMPLE ARCHIVING	
Field Sample Storage (No. of days from sample collection):	See Worksheet #17
Sample Extract/Digestate Storage (No. of days from extraction/digestion):	See Worksheet #17
Biological Sample Storage (No. of days from sample collection):	N/A
SAMPLE DISPOSAL	
Personnel/Organization:	Waste Disposition/DOE Prime Contractor and Subcontractors
Number of Days from Analysis	N/A

QAPP Worksheet #27
Sample Custody Requirements

UFP-QAPP Manual Section 3.3.3:

Field Sample Custody Procedures (sample collection, packaging, shipment, and delivery to laboratory):
Field sample custody requirements will be per DOE Prime Contractor procedure PRS-ENM-5004, *Sample Tracking, Lab Coordination, and Sample Handling Guidance.*

Laboratory Sample Custody Procedures (receipt of samples, archiving, disposal).

Laboratory sample custody procedures are per the DOECAP certified laboratory sample custody procedures.

Sample Identification Procedures:

Sample identification requirements will be per the Soils Operable Unit Removal Action Work Plan

Chain-of-custody Procedures:

Chain-of-custody requirements will be per DOE Prime Contractor procedure PRS-ENM-5004, *Sample Tracking, Lab Coordination, and Sample Handling Guidance*.

QAPP Worksheet #28 QC Samples Table

UFP-QAPP Manual Section 3.4:

Matrix	Soil
Analytical Group	SMO
Concentration Level	TBD
Sampling SOP	See #21
Analytical Method/ SOP Reference	EPA methods
Sampler's Name	TBD
Field Sampling Organization	DOE/PRS
Analytical Organization	SMO
No. of Sample Locations	See RAWP SAP

QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Duplicates	Minimum 5%	NA	NA	NA	Precision	See PRS-ENM-5003 Rev. 0, Quality Assured Data Procedure
Field Blanks	Minimum 5%	NA	NA	NA	Accuracy/Bias (Contamination)	See PRS-ENM-5003 Rev. 0, Quality Assured Data Procedure
Trip Blanks	Minimum 5%	NA	NA	NA	Accuracy/Bias (Contamination)	See PRS-ENM-5003 Rev. 0, Quality Assured Data Procedure
Equipment Rinseates	Minimum 5%	NA	NA	NA	Accuracy/Bias (Contamination)	See PRS-ENM-5003 Rev. 0, Quality Assured Data Procedure

QAPP Worksheet #28
QC Samples Table (Continued)

QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Initial Calibration	Twice each day the XRF is used	Method 6200 or per manufactures instructions	Recalibrate per Method 6200 or per manufactures instructions	Environmental Sampling Lead	Accuracy/Bias (Contamination)	See PRS-ENM-5003 Rev. 0, Quality Assured Data Procedure
Instrument Blank	Beginning of each day the XRF is used, every 20 samples thereafter	Method 6200 or per manufactures instructions	Recalibrate per Method 6200 or per manufactures instructions	Environmental Sampling Lead	Accuracy/Bias (Contamination)	See PRS-ENM-5003 Rev. 0, Quality Assured Data Procedure
Method Blank	Once each day the XRF is used	Method 6200 or per manufactures instructions	Identify and reanalyze per Method 6200	Environmental Sampling Lead	Accuracy/Bias (Contamination)	See PRS-ENM-5003 Rev. 0, Quality Assured Data Procedure
Internal Standards	Twice each day the XRF is used	Method 6200 or per manufactures instructions	Recalibrate per Method 6200 or per manufactures instructions	Environmental Sampling Lead	Precision	See PRS-ENM-5003 Rev. 0, Quality Assured Data Procedure

QAPP Worksheet #29
Project Documents and Records Table

UFP-QAPP Manual Section 3.5.1:

Sample Collection Documents and Records	On-site Analysis Documents and Records	Off-site Analysis Documents and Records	Data Assessment Documents and Records	Other
Data Logbooks and associated completed sampling forms Sample Chains-of- Custody	Laboratory Data Packages OREIS database & associated data packages	OREIS database & associated data packages	PRS-ENM-5003, Att. G Data Assessment Review Checklist and Comment Form	Form QAP-E-004, *Management/ Independent Assessment Report*

QAPP Worksheet #30
Analytical Services Table

UFP-QAPP Manual Section 3.5.2.3:

Matrix	Analytical Group	Concentration Level	Sample Locations/ID Numbers	Analytical SOP	Data Package Turnaround Time	Laboratory/Organization (Name and Address, Contact Person and Telephone Number)	Backup Laboratory/Organization (Name and Address, Contact Person and Telephone Number)
Soil	SVOAs	low	SWMU 19	8270	28-day	TBD	TBD
Soil	PCBs	low	SWMU 19	8082	28-day	TBD	TBD
Soil	Metals	low	SWMU 19	6010	28-day	TBD	TBD
Soil	Metals	low	SWMU 19 and 181	6020	28-day	TBD	TBD
Soil	Rads	low	SWMU 19	Alpha Spec*	28-day	TBD	TBD
Soil	Rads	low	SWMU 19	Gamma Spec*	28-day	TBD	TBD
Soil	Rads	low	SWMU 19	Liquid Scintillation*	28-day	TBD	TBD

* Analytical methods for radiochemistry parameters are laboratory-specific. Laboratory contracting will be subsequent to the completion of the RAWP.

QAPP Worksheet #31
Planned Project Assessments Table

UFP-QAPP Manual Section 4.1.1:

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment (Title and Organizational Affiliation)	Person(s) Responsible for Responding to Assessment Findings (Title and Organizational Affiliation)	Person(s) Responsible for Identifying and Implementing Corrective Actions (CA) (Title and Organizational Affiliation)	Person(s) Responsible for Monitoring Effectiveness of CA (Title and Organizational Affiliation)
Independent Assessment/ Surveillance	TBD	Internal	Prime Contractor QA	QA Specialists, Contractor	Project Manager, Contractor	Project Management/QA Specialist, Contractor	QA Specialist, Contractor
Laboratory Audit	Annual	External	DOE Consolidated Audit Program (DOECAP)	Laboratory Assessor	Laboratory	Laboratory	DOECAP
Management Assessments	TBD	Internal	Prime Contractor Project Management	Project Management, Contractor	Project Management, Contractor	Project Management/QA Specialist, Contractor	QA Specialist, Contractor
Management By Walking Around (MBWA)	TBD	Internal	Prime Contractor Project Management	Project Management, Contractor	Project Management, Contractor	Project Management/QA Specialist, Contractor	QA Specialist, Contractor
MBWA Follow-up surveillances	Quarterly	Internal	Prime Contractor Project Management	ER/EM Director, Project Management or designee, Contractor	Project Management/Designee, Contractor	Project Management/QA Specialist, Contractor	QA Specialist, Contractor

QAPP Worksheet #32
Assessment Findings and Corrective Action Responses

UFP-QAPP Manual Section 4.1.2:

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (Name, Title, Organization)	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (Name, Title, Org.)	Timeframe for Response
Management, Independent, and Surveillances	Form QAP-E-004, *Management/ Independent Assessment Report*, and QAP-E-0710, *Issue Identification Form*	Project Management, Issue Owner, Contractor	Upon issuance of Form QAP-E-004, *Management/ Independent Assessment Report*, form E-QAP-0710, *Issue Identification Form* will be completed and attached to the assessment report.	E-QAP-0710, *Issue Identification Form* documents the issue response and/or corrective actions.	Action owner as designated by issue owner, Contractor	Fifteen days for initial issue response, corrective action schedule determined by issue owner, as per PRS-QAP-1210

QAPP Worksheet #33
QA Management Reports Table

UFP-QAPP Manual Section 4.2:

Type of Report	Frequency (daily, weekly monthly, quarterly, annually, etc.)	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation (Title and Organizational Affiliation)	Report Recipient(s) (Title and Organizational Affiliation)
TBD	TBD	TBD	TBD	TBD

QAPP Worksheet #34
Verification (Step I) Process Table

UFP-QAPP Manual Section 5.2.1:

Verification Input	Description	Internal/ External	Responsible for Verification (Name, Organization)
Field Logbooks	Field logbooks are verified per DOE Prime Contractor procedure PRS-ENM-2700, *Logbooks and Data Forms*, and PRS-ENM-5003, *Quality Assured Data*.	Internal	Project Management or designee, Contractor
Chains of custody	Chains of custody are controlled by DOE Prime Contractor procedure PRS-ENM-5004, *Sample Tracking, Lab Coordination and Sample Handling Guidance*. Chains-of-custody will be included in data assessment packages for review as part of data verification and data assessment.	Internal	Sample and Data Management, Project Management, and QA Personnel, Contractor
Field and Laboratory Data	Field and analytical data are verified and assessed per DOE Prime Contractor procedure PRS-ENM-5003, *Quality Assured Data*. Data assessment packages will be created per this procedure. The data assessment packages will include field and analytical data, chains-of-custody, data verification and assessment queries, and other project specific information needed for personnel to adequately review the package. Data assessment packages will be reviewed to document any issues pertaining to the data and to indicate if data met the data quality objectives of the project.	Internal	Sample and Data Management, Project Management, and QA Personnel, Contractor

QAPP Worksheet #35
Validation (Steps IIa and IIb) Process Table

UFP-QAPP Manual Section 5.2.2:

Step IIa/IIb	Validation Input	Description	Responsible for Validation (Name, Organization)
IIa	Data Deliverables, Analytes, and Holding Times	The documentation from the contractual screening will be included in the data assessment packages, per DOE Prime Contractor procedure PRS-ENM-5003, *Quality Assured Data*.	Sample and Data Management Personnel, Contractor
IIa	Chain-of-Custody, Sample Handling, Sampling Methods and Procedures, and Field Transcription	These items will be validated during the data assessment process as required by DOE Prime Contractor procedure PRS-ENM-5003, *Quality Assured Data*. The documentation of this validation will be included in the data assessment packages.	Project and QA Personnel, Contractor
IIa	Analytical Methods and Procedures, Laboratory Data Qualifiers, and Standards	These items will be reviewed during the data validation process as required by DOE Prime Contractor data validation procedures. Data validation will be performed in parallel with data assessment. The data validation report and data validation qualifiers will be considered when the data assessment process is being finalized.	Data Validation Subcontractor, Sample and Data Management, Project and QA Personnel, Contractor
IIa	Audits	The audit reports and accreditation and certification records for the laboratory supporting the projects will be considered in the bidding process.	Sample and Data Management Personnel, Contractor
IIb	Deviations and qualifiers from Step IIa	Any deviations and qualifiers resulting from Step IIa process will be documented in the data assessment packages.	Sample and Data Management, Project, and QA Personnel, Contractor
IIb	Sampling Plan, Sampling Procedures, Co-located Field Duplicates, Project Quantitation Limits, Confirmatory Analyses, Performance Criteria	These items will be evaluated as part of the data verification and data assessment process per DOE Prime Contractor procedure PRS-ENM-5003, *Quality Assured Data*. These items will be considered when evaluating whether the project met their Data Quality Objectives.	Sample and Data Management, Project, and QA Personnel, Contractor

QAPP Worksheet #36
Validation (Steps IIa and IIb) Summary Table

UFP-QAPP Manual Section 5.2.2:

Step IIa/IIb	Matrix	Analytical Group	Concentration Level	Validation Criteria	Data Validator (title and organizational affiliation)
IIa/IIb	Soil/Sediment	Semivolatile organic compounds	Low	DOE Prime Contractor procedure PRS-ENM-5105, *Volatile and Semivolatile Data Verification and Validation*	TBD
IIa/IIb	Soil/Sediment	Metals	Low	DOE Prime Contractor procedure PRS-ENM-5107, *Inorganic Data Verification and Validation*	TBD
IIa/IIb	Soil/Sediment	Radionuclides	Low	DOE Prime Contractor procedure PRS-ENM-5102, *Radiochemical Data Verification and Validation*	TBD
IIa/IIb	Soil/Sediment	Lead	Low	DOE Prime Contractor procedure PRS-ENM-5107, *Inorganic Data Verification and Validation*	TBD

QAPP Worksheet #37
Usability Assessment

UFP-QAPP Manual Section 5.2.3:

Summarize the usability assessment process and all procedures, including interim steps and any statistics, equations, and computer algorithms that will be used: Field and analytical data are verified and assessed per DOE Prime Contractor procedure PRS-ENM-5003, *Quality Assured Data.* Data assessment packages will be created per this procedure. Data assessment packages will include field and analytical data, chains of custody, data verification and assessment queries, and other project specific information needed for personnel to adequately review the package. Data assessment packages will be reviewed to document any issues pertaining to the data and to indicate if data quality objectives of the project were met.

Describe the evaluative procedures used to assess overall measurement error associated with the project: PARCCS parameters (precision, accuracy, representativeness, comparability, completeness, and sensitivity) will be evaluated per DOE Prime Contractor procedure PRS-ENM-5003, *Quality Assured Data*. This information will be included in the data assessment packages for review by project personnel. Data assessment also will include documentation of QC exceedances, trends, and/or bias in the data set. Data assessment will document any statistics used.

Identify the personnel responsible for performing the usability assessment: Project and QA Personnel.

Describe the documentation that will be generated during usability assessment and how usability assessment results will be presented so that they identify trends, relationships (correlations), and anomalies: Data assessment packages will be created, which will include data assessment comments/questions and laboratory comments. Data verification and assessment queries indicating any historical outliers and background soil exceedances also will be included in the data assessment packages.

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APPENDIX F

SAMPLING AND ANALYSIS PLAN

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CONTENTS

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FIGURES

TABLES

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ACRONYMS

COPC	chemicals of potential concern
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DQO	data quality objective
EE/CA	Engineering Evaluation and Cost Analysis
EPA	U.S. Environmental Protection Agency
EU	exposure unit
FSP	field sampling plan
HF	hydrogen fluoride
KEPPC	Kentucky Environmental and Public Protection Cabinet
OREIS	Oak Ridge Environmental Information System
OU	Operable Unit
PCB	polychlorinated biphenyl
PEMS	Project Environmental Measurements System
PGDP	Paducah Gaseous Diffusion Plant
QA	quality assurance
QC	quality control
RAWP	Removal Action Work Plan
RU	remediation unit
SU	survey unit
SVOA	semivolatile organic analytes
SWMU	Solid Waste Management Units
VSP	Visual Sample Plan
XRF	x-ray fluoroscopy
WAG	Waste Area Group

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F.1. INTRODUCTION

This Removal Action Work Plan (RAWP) for Soils Operable Unit (OU) Inactive Facilities addresses the potential threat to human health and the environment from direct contact with contaminated soil and sediments located within C-410-B Hydrogen Fluoride Neutralization Lagoon [Solid Waste Management Unit (SWMU) 19], and C-218 Outdoor Firing Range (SWMU 181) at the Paducah Gaseous Diffusion Plant (PGDP). The purpose of this appendix is to present the sampling plan for the collection of soil characterization samples at SWMU 19 and the support survey and post-excavation sampling to verify cleanup of lead-contaminated soil from SMWU 181.

The remainder of this section discusses the scope and objectives of the sampling plan. The other sections that comprise the sampling plan address the following topics:

Section F.2: Characterization Summary. This section presents the characterization summary of the two inactive facilities, including a site description and discussion of the nature and extent of contamination.

Section F.3: Data Quality Objectives. This section provides the data quality objectives (DQOs) for the sampling and decision rules for the excavation.

Section F.4: Field Sampling Plan. This section details the field sampling strategy and design for the collection of soil characterization samples at SWMU 19 and the support survey and post-excavation sampling to verify cleanup of lead-contaminated soil from SMWU 181.

Section F.5: Sampling Procedures. This section presents a summary of some of the field procedures for the sampling activities for both screening and definitive sampling. Additional details concerning these procedures and procedures for decontamination, waste management, data management, and health and safety are presented in the RAWP (see Section 5).

Section F.6: Documentation. This section presents a summary of some of the documentation required for the sampling activities.

Section F.7: Sample Location Survey. This section presents the requirements for the sample location survey.

F.1.1 PROJECT SCOPE AND APPROACH

This sampling plan will detail the sampling approach for documenting the attainment of cleanup levels for the inactive facilities. As discussed in the Action Memorandum (DOE 2009) incorporating the Engineering Evaluation/Cost Analysis (EE/CA) (DOE 2008a), the cleanup of the inactive facilities consists of excavation of SWMUs 19 within its SWMU boundary and the removal of lead-contaminated soil within SWMU 181. As a part of any excavation of potentially contaminated soil, decisions will be made to support the excavation activities, and document the achieved cleanup.

For SWMU 19, post-excavation (characterization) sampling will be performed in order to document the level of clean-up achieved by the excavation. Since the Action Memorandum limits the excavation at SWMU 19 to its SWMU boundary (defined as no further than 3 ft beyond the current sides and floor of the unit), only post-excavation sampling will be performed (DOE 2009). This sampling will be performed prior to restoration.

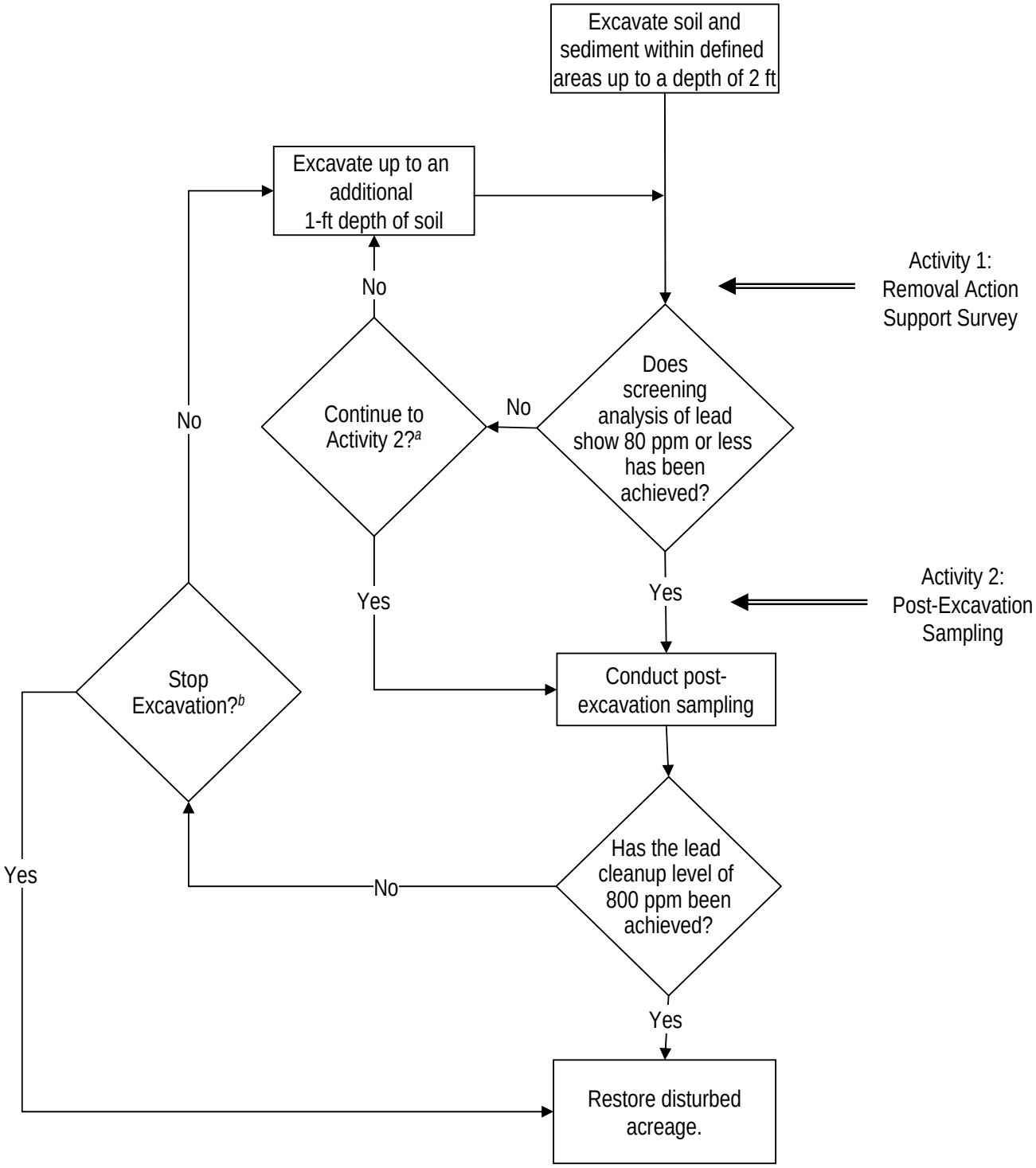
The information required to support these decisions will be collected by the sampling activities that are described below. For SWMU 181, two sampling activities will be performed: 1) a removal action support survey (Activity 1) that will be completed using screening-level analysis [i.e., the use of X-ray fluoroscopy (XRF) field screening], including field detectors and analytical kits; and 2) post-excavation (verification) sampling (Activity 2) to confirm that the cleanup levels for lead have been achieved. Figure F.1 illustrates flow of sampling activities and decisions.

F.2. CHARACTERIZATION SUMMARY

The C-410-B Hydrogen Fluoride (HF) Neutralization Lagoon (SWMU 19) and C-218 Outdoor Firing Range (SWMU 181) are inactive facilities that supported plant activities associated with various historical plant processes at the PGDP. Both of these inactive facilities have been investigated previously. The contamination associated with each inactive facility originated from plant activities. A listing of the previous investigations is provided in the RAWP. Detailed descriptions of the investigations are discussed in the EE/CA for Soils Operable Unit Inactive Facilities (DOE 2008a).

The C-410-B HF Neutralization Lagoon (SWMU 19) is a below grade impoundment with an earth-clay floor, and has sloped sides reinforced with wire and grout. It received effluent from the C-410-B Neutralization Building, where lime was used for the neutralization of hydrogen fluoride cell electrolyte from lead-acid batteries. Based upon historical use, analytical data, and process knowledge of SWMU 19, radionuclides are the primary chemicals of potential concern (COPCs) that will be considered in this removal action. Additionally, according to the risk evaluation presented in the Waste Area Groups (WAGs) 9 and 11 Site Evaluation Report (DOE 1999), metals and semivolatile organic analytes (SVOAs) should be considered when sampling the SWMU.

The C-218 Outdoor Firing Range (SWMU 181) is a 16-ft high soil berm constructed of excess excavation material from within the plant. Based upon historical use, analytical data, and process knowledge, lead is the only contaminant of concern that will be targeted in this removal action for SWMU 181. Additional characterization of the berm was completed as part of the soil pile project sampling event (DOE 2008b). Lead results from this sampling event are used in the development of the post-excavation sampling plan.



[a]During Activity 1, the decision to continue to Activity 2 will be made by the Prime Contractor Task Lead in consultation with the DOE Project Manager.
[b]During Activity 2, the decision to stop excavation will be made by the Prime Contractor Task Lead after the DOE Project Manager consults with the regulatory agencies.

Figure F.1. Removal Action Support Survey and Post-Excavation Sampling SWMU 181

F.3. DATA QUALITY OBJECTIVES

The U.S. Environmental Protection Agency (EPA) DQOs (EPA 2000) are qualitative and quantitative statements, which are established prior to data collection and specify the quality of the data required to support decisions during response activities. The DQOs for a particular site might vary according to the end use of the data (i.e., whether the data are collected to support preliminary assessments/site inspections, remedial investigations/feasibility studies, remedial designs, or removal/remedial actions).

The data requirements for this sampling plan include the collection of both support-survey field measurements and post-excavation characterization and verification sampling fixed-laboratory results to support the removal action of soil and sediment excavation. The data will be collected in such a manner to support the following decision rules.

F.3.1 DECISION RULES (SWMU 181)

F.3.1.1 Removal Action Support Survey—Activity I

- If bullet fragments are present within a 25 m^2 (269 ft^2) survey unit (SU) within a 100 m^2 (1,076 ft^2) remediation unit (RU), then excavate up to one ft of soil from the SU.

- If the lead concentration of any composite sample collected from an SU is greater than one-fifth of 400 mg/kg (i.e., 80 mg/kg), then excavate up to an additional 1 ft of soil from the SU until 400 mg/kg is achieved over an RU.

- If the lead concentration in the composite sample collected from an SU is less than or equal to one-fifth of 400 mg/kg (i.e., 80 mg/kg), then proceed to post-excavation verification sampling (i.e., Activity II).

- Excavation may cease at the discretion of the contractor and U. S. Department of Energy (DOE), even though the screening level has not been met, because of changed conditions such as site safety or other technical or non-technical factors.

It should be noted that, as a result of obtaining sample lead concentrations less than one-fifth of 400 mg/kg, the overall cleanup level of 800 mg/kg will likely be attained.

F.3.1.2 Post-Excavation Sampling—Activity II

- If the average concentration[1] of lead analyzed in an exposure unit (EU) is less than its cleanup level (800 mg/kg), then declare that the cleanup level has been attained.

- If the average concentration[1] of lead analyzed in an EU is greater than the cleanup level, then evaluate results to determine if additional soil should be excavated from the appropriate RU. (Additional

[1] The use of concentrations averaged over all samples collected to ascertain attainment of cleanup levels is consistent with agreements reached for implementation of the North-South Diversion Ditch Sections 1 and 2 Remedial Action (BJC 2003). Additionally, the use of averages is consistent with guidance in Methods for Evaluating Attainment of Cleanup Standards, Volume 1: Soil and Solid Media (EPA 1989).

excavation, if required, will be performed at the direction of the DOE Prime Contractor Task Lead after consultation with the DOE Project Manager and regulatory agencies, as necessary.) Excavation might not continue if site factors indicate a changed condition (i.e., that it is unsafe to continue) or due to other technical or nontechnical factors. Under circumstances such as these, DOE will consult with regulators on a path forward.

F.4. FIELD SAMPLING PLAN

The field sampling plan (FSP) details the sampling strategy and design that will be employed for the sampling plan investigation performed after excavation of SWMUs 19 and 181. This FSP includes a general discussion of the project-specific sampling strategy and a description of the various sampling and analysis activities that will comprise the sampling plan. The FSP does not include discussion of surveys done for Health and Safety purposes prior to excavation. This information is included in the RAWP. When developing the sampling scheme, general underground storage tank guidance was followed, specifically with respect to compositing samples from the walls and floor of the excavation.

F.4.1 C-410-B HYDROGEN FLUORIDE NEUTRALIZATION LAGOON (SWMU 19)

According to the Action Memorandum, SWMU 19 will be excavated to its SWMU boundary (defined as no further than 3 ft beyond the current sides and floor of the unit) (DOE 2009). Each 25-ft section of tank pit wall and tank pit bottom will be sampled by gridding the wall or bottom into quadrants. One grab sample will be collected from each of the four quadrants, and the samples will be composited into one soil sample for laboratory analysis, which represents the entire composite area. The dimensions prior to excavation of SWMU 19 are listed in Table F.1.

Table F.1. Dimensions of SWMU 19

Facility	Length	Width	Depth	Number of Sampling Sections
SWMU 19 (C-410-B Neutralization Lagoon)	51 ft	38 ft	7 ft	2

SWMU 19 will be divided into two sections for sampling. The area represented by the designated sampling sections is sufficient to characterize SWMU 19 soils. From each wall, a composite sample will be collected for analysis consisting of a grab sample from each of the four quadrants shown in Figure F.2. Similarly, a

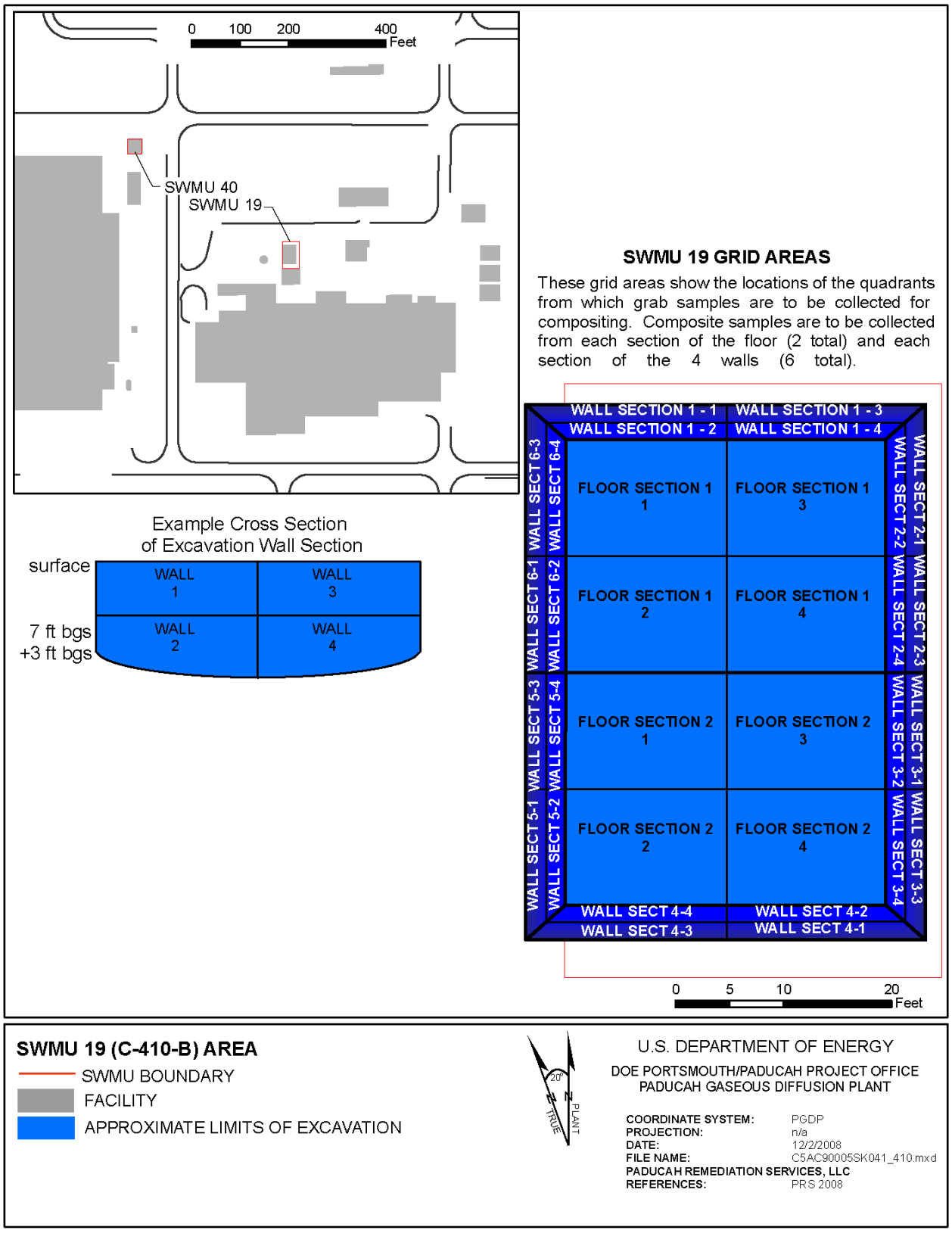


Figure F.2. SWMU 19 (C-410-B) Planned Sampling

composite sample will be collected for analysis for the excavation floor consisting of grab samples from each of the four quadrants (i.e., a four-point composite sample). In each case, the grab sample will be collected as soon as possible following excavation of the quadrant, but at a maximum within four hours of excavation (KEPPC 2006). Each grab sample will be collected from the approximate center of the quadrant, unless evidence of contamination is present; in that case, the grab sample will be collected where contamination is most likely to be present. In order to determine evidence of contamination, the areas will be visually inspected for staining or discoloration. Additionally, radiological surveys and organic vapor monitoring will be performed over all the walls and floor. Further, soil pH may be measured along the floor of the excavation.

Table F.2 lists the analyses and reporting limits for post-excavation sampling at SWMU 19. These reporting limits are consistent with the Remedial Investigation/Feasibility Study Work Plan for the Soils OU being developed currently.

F.4.2 C-218 OUTDOOR FIRING RANGE (SWMU 181)

For SWMU 181, a removal action support survey (Activity I) will be performed to delineate any additional excavation from the soil berm. After the initial excavation of soil is performed for each RU, additional support survey measurements will be performed to determine if action levels have been achieved or if further excavation of soil is necessary. Once excavation is complete, post excavation sampling (Activity II) will be performed to verify cleanup of the soil berm.

F.4.2.1 Removal Action Support Survey—Activity I

The length of the face of SWMU 181 [approximately 130 m (425 ft)] and the ground surface in front of the berm [approximately 1,730 m^2 (18,600 ft^2)] will be gridded into 100 m^2 (1,076 ft^2) RUs as shown in Figures F.3 and F.4. Within each RU, a 25 m^2 (269 ft^2) SU will be established.

First, each SU will be visually inspected to identify evidence of potential remaining lead bullets. A scan of each SU will be performed with a hand-held metal detector capable of detecting lead fragments up to two inches beneath the surface. Once an SU is clear of obvious metal, then a five-point composite sample from each SU will be collected and field-screened using XRF for lead.

Table F.2. Analyses and Reporting Limits for SWMU 19 Post-Excavation Soil Sampling

Reporting Limit (mg/kg)	Metals SW-846, 6010/6020		
0.02	Mercury		
0.5	Beryllium	Cadmium	
1	Arsenic	Cobalt	Lead
	Selenium	Uranium	
2	Thallium		
2.5	Barium	Chromium	Copper
	Manganese	Silver	Vanadium
5	Magnesium	Molybdenum	Nickel
10	Antimony		
20	Aluminum	Iron	Zinc
100	Calcium		
200	Sodium		
(µg/kg)	**SVOAs SW-846, 8270**		
660	Acenaphthene	Dibenzo(a,h)anthracene	Isophorone
	Acenaphthylene	Dibenzofuran	2-Methylnaphthalene
	Anthracene	1,2-Dichlorobenzene	2-Methylphenol (o-cresol)
	Benzo(a)anthracene	1,3-Dichlorobenzene	4-Methylphenol (p-cresol)
	Benzo(b)fluoranthene	1,4-Dichlorobenzene	Naphthalene
	Benzo(k)fluoroanthene	2,4-Dichlorophenol	Nitrobenzene
	Benzo(a)pyrene	Diethylphthalate	2-Nitrophenol
	Benzo(g,h,i)perylene	2,4-Dimethylphenol	N-Nitroso-di-n-dipropylamine
	bis(2-Chloroisopropyl)ether	Dimethylphthalate	N-Nitrosodiphenylamine
	bis(2-Chloroethoxy)methane	2,4-Dinitrotoluene	Phenanthrene
	bis(2-Chloroethyl)ether	2,6-Dinitrotoluene	Phenol
	bis(2-Ethylhexyl)phthalate	Fluoranthene	Pyrene
	4-Bromophenyl-phenylether	Fluorene	1,2,4-Trichlorobenzene
	Butylbenzylphthalate	Hexachlorobenzene	2,4,5-Trichlorophenol
	2-Chloronaphthalene	Hexachlorobutadiene	2,4,6-Trichlorophenol
	2-Chlorophenol	Hexachlorocyclopentadiene	4-Chlorophenyl-phenylether
	di-N-butylphthalate	Hexachloroethane	Chrysene
	di-N-octylphthalate	Indeno(1,2,3-cd)pyrene	
1,300	Benzyl alcohol	4-Chloroanaline	3,3-Dichlorobenzidine
	4-Chloro-3-methylphenol		
3,300	Benzoic acid	2-Nitroanaline	4-Nitrophenol
	4,6-Dinitro-2-methylphenol	3-Nitroanaline	Pentachlorophenol
	2,4-Dinitrophenol	4-Nitroanaline	
(mg/kg)	**PCBs SW-846, 8082**		
0.1	Aroclor-1016	Aroclor-1242	Aroclor-1254
	Aroclor-1221	Aroclor-1248	Aroclor-1260
	Aroclor-1232		Total PCBs
(pCi/g)	**Radionuclides, Alpha Spectroscopy**		
0.05	Americium-241	Neptunium-237	Thorium-228
	Thorium-230	Thorium-232	Plutonium 238
	Plutonium-239/240	Uranium-235	
0.15	Uranium-234	Uranium-238	
(pCi/g)	**Radionuclides, Gamma Spectroscopy**		
0.1	Cesium-137		
(pCi/g)	**Radionuclides, Liquid Scintillation**		
1	Technetium-99		

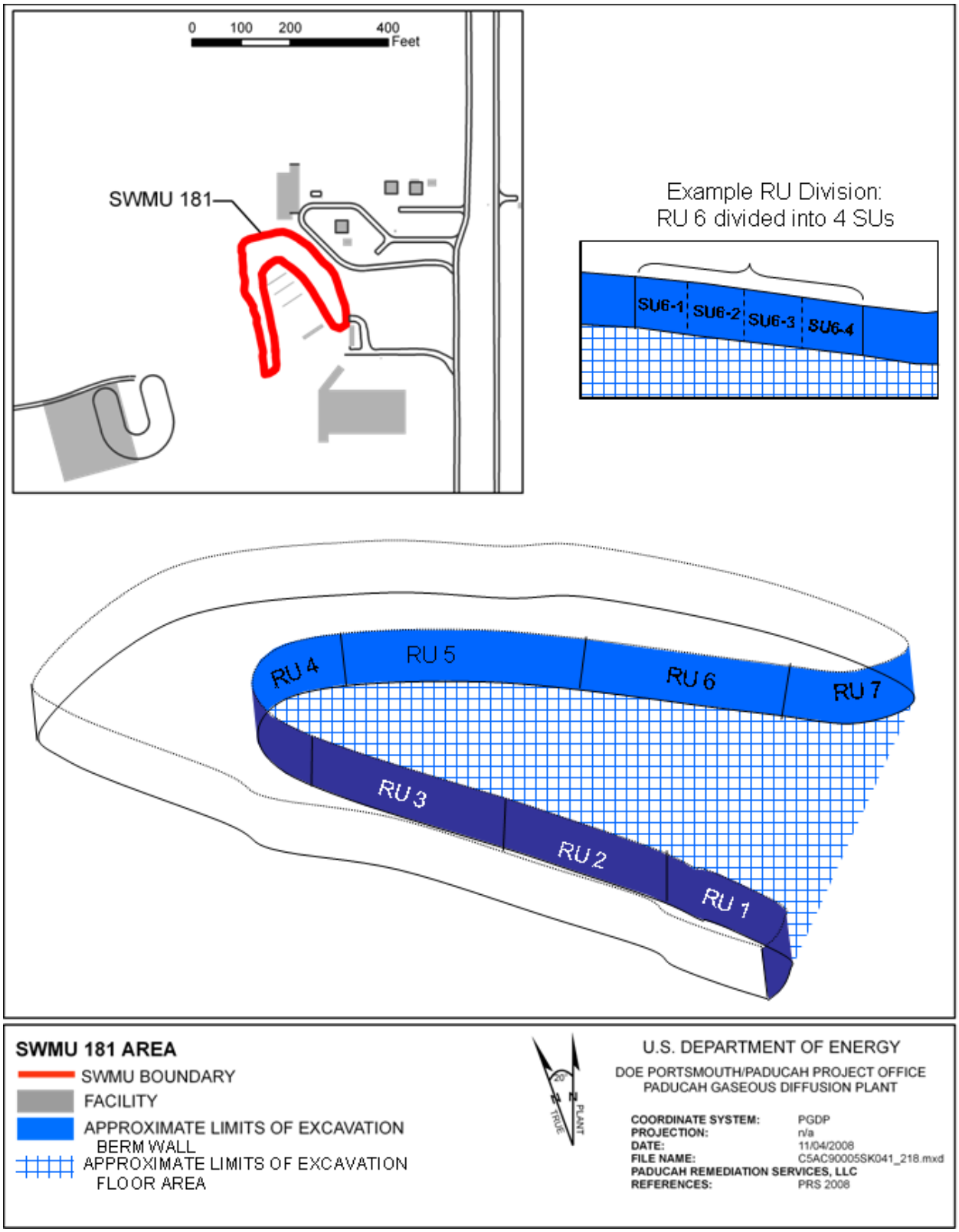


Figure F.3. SWMU 181 (C-218) Planned Sampling of Berm Area

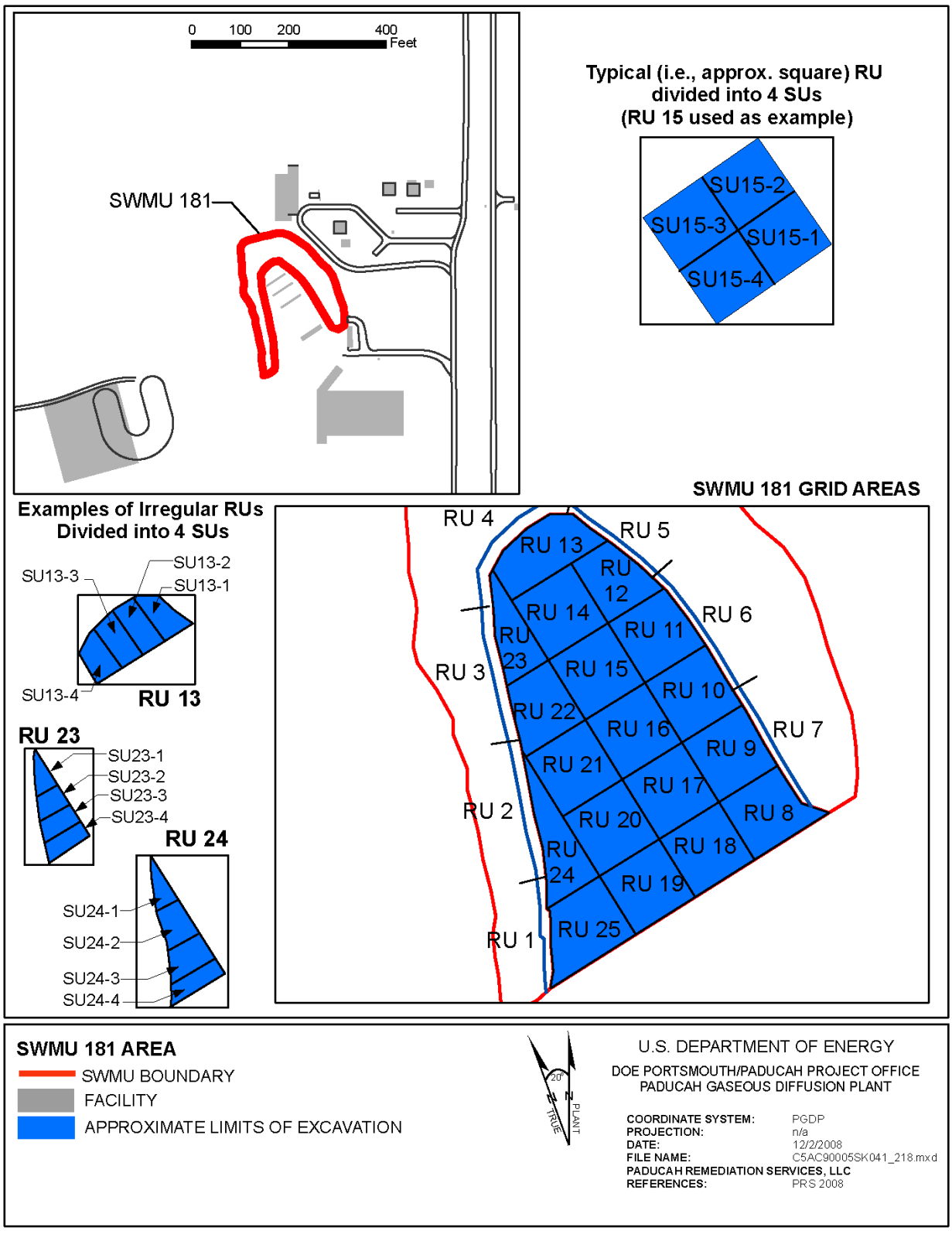


Figure F.4. SWMU 181 (C-218) Planned Sampling of Floor Area

F.4.2.2 Post-Excavation Sampling—Activity II

Following excavation according to the decision rules presented in Section F.3.1.1, the RUs will be aggregated into one EU covering less than 0.5 acre. This area represents the average area that is covered by an industrial worker in one day per agreements made with the regulatory agencies in other projects at PGDP (DOE 2001).

[Seven] soil samples will be collected for post-excavation samples from the EU delineated at SWMU 181. The number of samples was statistically derived using the software Visual Sample Plan (VSP) and existing data from SWMU 181. (See Appendix F, Attachment 1.) These grab samples will be collected from the top 3 inches of the exposed bottom (or face) of an excavated area at locations within selected RUs. Sampling locations within RUs will be determined in the field, but will be near the center of the RU. Selected RUs are listed in Table F.3. The samples will be sent to an approved laboratory and analyzed according to Table F.4. The reporting limit listed in the table is consistent with that planned for the Remedial Investigation/Feasibility Study Work Plan for the Soils OU being developed currently.

Post excavation sample results will be compared to cleanup criteria and are subject to the decision rules in Section F.3.1.2.

Table F.3. RUs[a] to Be Sampled in SWMU 181

RU 2	RU 10	RU 17	RU 22
RU 5	RU 14		RU 23

[a] RUs to be sampled were randomly selected. Locations within RUs will be field selected, near the center of the RU.

Table F.4. Analyses and Reporting Limits for SWMU 181 Removal Action Support Sampling and Post-Excavation Soil Sampling

Reporting Limit (mg/kg)		
Metals SW-846, 6010/6020		
1	Lead	
Metals SW-846, 6200 (XRF)		
20	Lead	

F.5. SAMPLING PROCEDURES

Fieldwork and sampling at PGDP will be conducted in accordance with DOE Prime Contractor-approved medium-specific work instructions or procedures consistent with *Environmental Investigation Standard Operating Procedure and Quality Assurance Manual* (EPA 2001). DOE or its Prime Contractor will approve any deviations from these work instructions and procedures. The DOE Prime Contractor will document changes on Field Change Request forms per contractor procedures. Table F.5 provides an example list of investigation activities that may require work instructions or procedures.

Table F.5. Example Fieldwork and Sampling Activities Requiring Work Instructions or Procedures

Investigation Activity
Use of Field Logbooks
Labeling, Packaging, and Shipping of Environmental Field Samples
Sampling of Containerized Wastes
Opening Containerized Waste
On-Site Handling and Disposal of Waste Materials
Identification and Management of Waste not from a Radioactive Material Management Area
Paducah Contractor Records Management Program
Quality Assured Data
Chain-of-Custody
Field Quality Control
Data Management Coordination Equipment Decontamination
Off-Site Decontamination Pad Operating Procedures
Cleaning and Decontaminating Sample Containers and Sampling Equipment
Environmental Radiological Screening
Archival of Environmental Data within the ER Program
Data Entry
Data Validation
Analysis of Soil by XRF
Use of Metal Detector
Analysis of Soil pH

F.6. DOCUMENTATION

Field documentation will be maintained throughout the Soils OU Inactive Facilities Removal Action in various types of documents and formats, including the field logbooks, sample labels, sample tags, chain-of-custody forms, and field data sheets. The following general guidelines for maintaining field documentation will be implemented. Additional information is contained in the "Data Management Implementation Plan," Appendix H. Documentation requirements are listed below. Entries will be written clearly and legibly using indelible ink.

- Corrections will be made by striking through the error with a single line that does not obliterate the original entry. Corrections will be dated and initialed.

- Dates and times will be recorded using the format "mm/dd/yy" for the date and the military (i.e., 24-hour) clock for the time.

- Zeroes will be recorded with a slash (/) to distinguish them from letter Os.

- Blank lines are prohibited. Information should be recorded on each line or a blank line should be lined out, initialed, and dated.

- No documents will be altered, destroyed, or discarded, even if they are illegible or contain inaccuracies that require correction.

- Information blocks on field data forms will be completed or a line will be drawn through the unused section, and the area will be dated and initialed.

- Unused logbook pages will be marked with a diagonal line drawn from corner to corner and a signature and date must be placed on the line.

- Security of logbooks will be maintained by storing them in a secured (e.g., locked) area when not in use.

- Photocopies of logbooks, field data sheets, and chain-of-custody forms will be made weekly and stored in the project file.

F.6.1 FIELD LOGBOOKS

Field team personnel will use bound field logbooks with sequentially numbered pages for the maintenance of field records and for documenting any information pertinent to field activities. Field forms will be numbered sequentially or otherwise controlled. A designated field team member will record in the field logbooks sampling activities and information from site exploration and observation. Field documentation will conform to approved procedures for use of field logbooks. An integral component of quality assurance/quality control (QA/QC) for the field activities will be the maintenance of accurate and complete field records and the collection of appropriate field data forms. The primary purpose of the logbook is to document each day's field activities; the personnel on each sampling team; and any administrative occurrences, conditions, or activities that may have affected the fieldwork or data quality of any environmental samples for any given day. The level of detail of the information recorded in the field logbook should be such that an accurate reconstruction of the field events can be created from the logbook. The project name, logbook number, client, contract number, task number, document control number, activity or site name, and the start and completion dates will be listed on each logbook's front cover. Important phone numbers, radio call numbers, emergency contacts, and a return address should be recorded on the inside of the front cover.

F.6.2 SAMPLE LOG SHEETS

A sample log sheet will contain sample-specific information for each field sample collected, including field QC samples. Generally, sample log sheets will be preprinted from the data management system with the following information:

- Name of sampler
- Project name and number
- Sample identification number
- Sampling location, station code, and description
- Sample medium or media
- Sample collection date
- Sample collection device
- Sample visual description
- Collection procedure
- Sample type
- Analysis and
- Preservative

In addition, specific analytical requests will be preprinted from the data management system and will include the following for each analytical request:

- Analysis/method
- Container type
- Number of containers
- Container volume

- Preservative (type/volume) and
- Destination laboratory

During sample collection, a field team member will record the remaining required information and will sign and date each sample log sheet. The following information will be recorded for each sample, whether or not the sample was collected:

- The date and time of collection;
- The name of the collector;
- Collection methods and/or procedures;
- Required field measurements and measurement units;
- Instrumentation documentation, including the date of last calibration;
- Adherence to, or deviation from, the procedure and the RAWP;
- Weather conditions at the time of sample collection;
- Activities in the area that could impact subsequent data evaluation;
- General field observations that could assist in subsequent data evaluation;
- Lot number of the sample containers used during sample collection;
- Sample documentation and transportation information, including unique chain-of-custody form number, airbill number, and container lot number; and
- Relevant and associated field QC samples (for each sample).

If preprinted sample log sheets are not used, information will be recorded manually. A member of the field sampling team (other than the recorder) will perform a QA review of each sample log sheet and document the review by signing and dating the log sheet. Notations of deviations will be initialed by the Field Task Manager as part of his/her review of the logbook.

F.6.3 FIELD DATA SHEETS

Field data sheets will be maintained, as appropriate, for the following types of data:

- Sample log sheets
- Chain-of-custody forms
- Instrument calibration logs
- Temperature monitoring sheets and
- Volatile organic compound concentrations and radiological values recorded for each sample collected

Data to be recorded will include such information as the location, sampling depth, sampling station, and applicable sample analysis to be conducted. Field-generated data forms will be prepared, if necessary, based on the appropriate requirements. The same information may be included in the field logbook or, if not, the field

logbook should reference the field data sheet. If preprinted field data sheets are not used, information will be recorded manually in the field logbook.

F.6.4 SAMPLE IDENTIFICATION, NUMBERING, AND LABELING

In addition to field logbooks and field data sheets, the sampling team will use labels to track sample holding times, to provide sample traceability, and to initiate the chain-of-custody record for the environmental samples. A pressure-sensitive gummed label (or equivalent) will be secured to each sample container at the time of collection, including duplicates and trip or field blanks, at or before the completion of sample collection.

Sample labels will be waterproof or will be sealed to the sample container with clear acetate tape after all information has been recorded on the label. Generally, sample labels will be preprinted with information from the data management system and will contain the following information:

- Station name
- Sample identification number
- Sample matrix
- Sample type (grab or composite)
- Type or types of analysis required
- Sample preservation (if required) and
- Destination laboratory

A field sampling team member will complete the remaining information during sample collection, including these items:

- Date and time of collection and
- Initials of sampler

The sample numbers will be recorded in the field logbook along with the time of collection and descriptive information previously discussed.

F.6.5 SAMPLE CHAIN-OF-CUSTODY

Chain-of-custody procedures will document sample possession from the time of collection, through transfers of custody, to receipt at the laboratory and subsequent analysis. Chain-of-custody records will accompany each packaged lot of samples; the laboratory will not analyze samples that are not accompanied by a correctly prepared chain-of-custody record. A sample will be considered under custody if it is (1) in the possession of the sampling team; (2) in view of the sampling team; or (3) transferred to a secured (i.e., locked) location. Chain-of-custody records will follow the requirements as specified in a DOE Prime Contractor-approved procedure for keeping records. This form will be used to collect and track samples from collection until transfer to the laboratory. Copies of the signed chain-of-custody records will be faxed or delivered to the DOE Prime Contractor Sample Management Organization within three days of sample delivery.

The Sampling Team Leader is responsible for reviewing and confirming the accuracy and completeness of the chain-of-custody form and for the custody of samples in the field until they have been properly transferred to the Sample Coordinator. The Sample Coordinator is responsible for sample custody until the samples are properly packaged, documented, and released to a courier or directly to the analytical laboratory. If samples are not immediately transported to the analytical laboratory, they will remain in the custody of the Sample

Coordinator, where they will be refrigerated and secured either by locking the refrigerator or by placing custody seals on the individual containers.

Each chain-of-custody form will be identified by a unique number located in the upper-right corner, and recorded on the sample log sheet at the time of sample collection. The laboratory chain-of-custody will be the "official" custody record for the samples. Each chain-of-custody form will contain the following information:

- The sample identification for each sample;
- Collection data for each sample;
- Number of containers of each sample;
- Description of each sample (i.e., environmental matrix/field QC type);
- Analyses required for each sample; and
- Blocks to be signed as custody is transferred from one individual to another.

The airbill number will be recorded on the chain-of-custody form, if applicable. The laboratory chain-of-custody form will be sealed in a resealable plastic bag and taped to the inside of the cooler lid if the samples are to be shipped off-site. A copy will be retained in the laboratory, and the original will be returned to the Sample Manager with the completed data packages.

At each point of transfer, the individuals relinquishing and receiving custody of the samples will sign in the appropriate blocks and record the date and time of transfer. When the laboratory sample custodian receives the samples, he or she will document receipt of the samples, record the time and date of receipt, and note the condition of the samples (e.g., cooler temperature, whether the seals are intact) in the comments section. The laboratory then will forward appropriate information to the Sample Manager. This information may include the following:

- A cover memo stating sample receipt date and any problems noted at the time of receipt; and

- A report showing the field sample identification number, the laboratory identification number, and the analyses scheduled by the laboratory for each sample.

F.6.6 SAMPLE SHIPMENT

Aliquots of investigative samples will be screened by an on-site laboratory before shipment to an off-site laboratory. Results from the screening process will be recorded in Paducah's Project Environmental Measurements System (PEMS) and will be reviewed prior to preparation for sample shipment off-site. Sample containers will be placed in the shipping container and packed with ice and absorbent packing for liquids. The completed chain-of-custody form will be placed inside the shipping container, unless otherwise noted. The container then will be sealed. In general, sample containers will be packed according to the following procedures:

- Glass sample containers will be wrapped in plastic insulating material to prevent contact with other sample containers or the inner walls of the container.

- Logbook entries, sample tags and labels, and chain-of-custody forms will be completed with sample data collection information and names of persons handling the sample in the field before packaging.

- Samples, temperature blanks, and trip blanks will be placed in a thermal-insulated cooler along with ice that is packed in resealable plastic bags. After the cooler is filled, the appropriate chain-of-custody form will be placed in the cooler in a resealable plastic bag attached to the inside of the cooler lid.

- Samples will be classified according to U.S. Department of Transportation (DOT) regulations pursuant to 49 *CFR* § 173. All samples will be screened for radioactivity to determine that DOT limits of 2.0 nCi/mL for liquid waste and 2.0 nCi/g for solid waste are not exceeded.

F.6.7 FIELD PLANNING MEETING

A field planning meeting will occur before work begins at the site, so that all involved personnel will be informed of the requirements of the fieldwork associated with the project. Additional planning meetings will be held whenever new personnel join the field team or if the scope of work changes significantly. Each meeting will have a written agenda and attendees must sign an attendance sheet, which will be maintained on-site and in the project files. The following example topics will be discussed at these meetings:

- Project- and site-specific health and safety
- Objectives and scope of the fieldwork
- Equipment and training requirements
- Procedures
- Required QC measures and
- Documents covering on-site fieldwork

F.6.8 READINESS CHECKLIST

Before implementation of the field program, project personnel will review the work control documents to identify field activities and materials required to complete the activities, including the following items:

- Task deliverables
- Required approvals and permits
- Personnel availability
- Training
- Field equipment
- Sampling equipment
- Site facilities and equipment and
- Health and safety equipment

Before fieldwork begins, appropriate DOE Prime Contractor personnel will concur that readiness has been achieved.

F.7. SAMPLE LOCATION SURVEY

Surveying of sampling locations will be conducted upon completion of sampling activities. Where possible, temporary markers consisting of flagging or of wooden or metal stakes will be used to mark sample locations. A member of the field sampling crew will accompany the survey crew to provide information regarding the location of sampling points.

Coordinates for removal action support survey sample locations (Activity I) and post-excavation sample locations from SWMU 19 grab samples will be obtained using a global positioning system or standard survey techniques. Each sample point from the post-excavation sampling (Activity II) of SWMU 181 will be surveyed for its horizontal and vertical location using the PGDP coordinate system for horizontal control.

Additionally, State Plane Coordinates will be provided using the U.S. Coast and Geodetic Survey North American Datum of 1983. The datum for vertical control will be the U.S. Coast and Geodetic Survey North American Vertical Datum of 1988. Accuracy for this work will be that of a Class 1 First Order survey. Work will be performed by or under responsible charge of a Professional Land Surveyor registered in the Commonwealth of Kentucky. Coordinates will be entered into Paducah PEMS and will be transferred with the station's ready-to-load file to the Paducah Oak Ridge Environmental Information System (Paducah OREIS).

F.8. REFERENCES

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ATTACHMENT 1

CALCULATION OF N—THE NUMBER OF STATISTICALLY BASED SAMPLES REQUIRED FOR SWMU 181

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F1. CALCULATION OF N—THE NUMBER OF STATISTICALLY BASED SAMPLES REQUIRED FOR SWMU 181

Appendix F, Attachment 1, contains the information used to calculate the statistically-based number of samples required for verification of cleanup of the C-218 Outdoor Firing Range (SWMU 181) at the Paducah Gaseous Diffusion Plant (PGDP) for lead.

Historical data available for SWMU 181 show only two locations sampled for lead. These results are not indicative of conditions expected to be encountered for the berm after excavation of the face has taken place. Therefore, the historical data for SWMU 181 will not be used to calculate a standard deviation of data for this exercise.

Data from the November 2008 sampling event provides the results used to calculate the statistical inputs for the sample design. Using Visual Sample Plan (VSP) to perform the statistical evaluation, the variables listed in Table F1.1 were input to the VSP sample design for "Compare Average to Fixed Threshold." Although the lead results from the sampling event indicate data are normally distributed, the sample design not requiring data to have a distributional assumption was chosen to provide a more conservative estimate.

Table F1.1. Visual Sample Plan Inputs

Parameter	Input	Reasoning
Sample Design	Compare Average to Fixed Threshold	Calculate the number of samples needed to compare a sample mean or median against a predetermined threshold.
	Data Not Required to be Normally Distributed	Though data indicate lead values are distributed normally, not requiring the normal distribution provides a more conservative estimate.
	Ordinary Sampling No Distribution Assumption	
True Mean or Median >= Action Level (assume site is dirty)	Null Hypothesis	Assume our baseline condition is that the site is dirty.
False rejection rate (Alpha):	5%	Project is will to assume 5% false rejection rate (i.e., willingness to accept missing contamination).
False acceptance rate (Beta):	20%	Project is will to assume 20% false acceptance rate (i.e., willingness to accept labelling area contaminated when it is actually clean).
Width of Gray Region (Delta):	200	Selected as 25% the cleanup level. The gray region is similar to a decision error.
Action Level (DCGLw)	800	Cleanup level for lead.
Estimated Standard Deviation	2.4	Calculated for lead from November 2008 sampling data.

Use of these parameters yields a minimum number of samples of seven for determining SWMU 181 to be clean.

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APPENDIX G

DATA MANAGEMENT IMPLEMENTATION PLAN

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CONTENTS

ACRONYMS

COC	chain-of-custody
DCC	Document Control Center
DMIP	Data Management Implementation Plan
DOE	U.S. Department of Energy
EDD	electronic data deliverables
EE/CA	Engineering Evaluation and Cost Analysis
GIS	geographic information system
OREIS	Oak Ridge Environmental Information System
OU	Operable Unit
PEMS	Project Environmental Measurements System
PGDP	Paducah Gaseous Diffusion Plant
QA	quality assurance
QC	quality control
RA	removal action
RTL	ready-to-load
SMO	sample management office
SOW	statement of work
SWMU	Solid Waste Management Units
XRF	x-ray fluoroscopy

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G.1. INTRODUCTION

The purpose of this Data Management Implementation Plan (DMIP) is to identify and document data management requirements and applicable procedures, expected data types and information flow, and roles and responsibilities for all data management activities associated with the removal action (RA) for the Soils Operable Unit (OU) Inactive Facilities at the Paducah Gaseous Diffusion Plant (PGDP). Data management provides a system for efficiently generating and maintaining technically and legally defensible data that provide the basis for making sound decisions regarding the environmental and waste characterization at PGDP.

Data management for this project is implemented throughout the life cycle for environmental measurements data. This life cycle occurs from the planning of data for environmental and waste characterization, through the collection, review, and actual usage of the data for decision-making purposes, to the long-term storage of data.

Data types to be managed for the project include field data and analytical data. Historical data has been downloaded from Paducah Oak Ridge Environmental Information System (OREIS) and is available with the Soils OU Inactive Facilities Engineering Evaluation and Cost Analysis (EE/CA) (DOE 2008). Field data are collected in field logbooks or field data forms and are entered into Paducah Project Environmental Measurements System (PEMS), as appropriate, for storage. Analytical data are planned and managed through Paducah PEMS and transferred to Paducah OREIS for long-term storage and reporting.

To meet current regulatory requirements for U.S. Department of Energy (DOE) environmental management projects, complete documentation of the information flow is established. Each phase of the data management process (planning, collecting, analyzing, managing, verifying, assessing, reporting, consolidating, and archiving) must be appropriately planned and documented. The Soils OU Inactive Facilities RA team is responsible for data collection and data management for this project.

The scope of this DMIP is limited to environmental information generated under the Soils OU Inactive Facilities RA. This information includes electronic and/or hard copy records obtained by the project that describe environmental conditions. Information generated by the project (e.g., laboratory analytical results from samples collected) and obtained from sources outside the project (e.g., historical data) falls within the scope of this DMIP. Certain types of information, such as personnel or financial records, are outside the scope of this DMIP.

G.2. PROJECT MISSION

Requirements and responsibilities described in this plan apply to activities conducted by the project team in support of the Soils OU Inactive Facilities RA. Specific activities involving data include, but are not limited to, sampling of sediment and soil; storing, analyzing, and shipping samples, when applicable; and evaluation, verification, validation, assessment, and reporting of analytical results.

G.3. DATA MANAGEMENT ACTIVITIES

Data management will be implemented throughout the life cycle of the Soils OU Inactive Facilities RA. This life cycle occurs from the planning of data for environmental and waste characterization, through the collection, review, and actual usage of the data for decision-making purposes, to the long-term storage of data. Data management activities include the following:

- Acquire existing data
- Plan data collection
- Prepare for sampling activities
- Collect field data
- Collect field samples
- Submit samples for analysis
- Process field measurement and laboratory analytical data
- Laboratory Contractual Screening
- Verify data
- Validate data
- Assess data
- Consolidate, analyze, and use data and records
- Submit data to the Paducah OREIS

Section G.8 contains a detailed discussion of the activities listed above.

G.4. DATA MANAGEMENT INTERACTIONS

The Data Manager interfaces with the Data Coordinator to oversee the use of Paducah PEMS and to ensure that data deliverables meet DOE's standards. The Data Coordinator enters information into Paducah PEMS related to the fixed-base laboratory data once the samples have been delivered and the Lab Coordinator has verified receipt of the samples. The fixed-base laboratory hard-copy data and the electronic data deliverables (EDDs) are loaded into Paducah PEMS by the Data Coordinator. The Soils OU Inactive Facilities RA project team is responsible for data verification and assessment. The Data Coordinator is responsible for preparing the data for transfer from Paducah PEMS to Paducah OREIS. The Data Manager is responsible for transferring the data from the ready-to-load (RTL) files to the Paducah OREIS database.

The Lab Coordinator develops the statement of work (SOW) to be performed by an analytical laboratory in the form of a project-specific laboratory SOW. Analytical methods, laboratory quality control (QC) requirements, and deliverable requirements are specified in this SOW.

The Lab Coordinator receives EDDs, performs contractual screenings, and distributes data packages. The Lab Coordinator interacts with the Data Manager to ensure that hard copy and electronic-deliverable formats are properly specified and interfaces with the contract laboratory to ensure that the requirements are understood and met.

G.4.1 DATA NEEDS AND SOURCES

Multiple data types will be generated and/or assessed during this project. These data types include field data, analytical data (including environmental data), and geographic information system (GIS) data.

G.4.2 HISTORICAL DATA

Historical data that are available electronically will be downloaded from Paducah OREIS as needed. Historical data available in electronic format has been made available in the *Engineering Evaluation/Cost Analysis for the Soils OU Inactive Facilities* at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky DOE/LX/07-0016&D2, July 2008.

G.4.3 FIELD DATA

Field data for the project includes sample collection information and field screen measurement results, such as field x-ray fluoroscopy (XRF).

G.4.4 ANALYTICAL DATA

Analytical data for the project consist of laboratory analyses for environmental and waste characterization.

G.4.5 SURVEY DATA COVERAGE

Global Positioning System or standard survey techniques will be used to obtain civil survey data for this project. The Paducah GIS network is used for preparing maps used in data analysis and reporting of both historical and newly generated data. Coverage for use during the project is as follows:

- Stations (station coordinates are downloaded from Paducah OREIS)
- Facilities
- Plant roads
- Plant fences
- Streams
- Topographic contours

G.5. DATA FORMS AND LOGBOOKS

Field logbooks, site logbooks, chain-of-custody (COC) forms, data packages with associated quality assurance/quality control (QA/QC) information, and field forms are maintained according to the requirements defined in procedure PRS-DOC-1009, *Records Management, Administrative Records, and Document Control*.

Duplicates of field records are maintained until the completion of the project. Logbooks and field documentation are copied periodically. The originals are forwarded to the Document Control Center (DCC) and copies are maintained in the field office.

G.5.1 FIELD FORMS

Sample information is environmental data describing the sampling event and consists of the following: station (or location), date collected, time collected, and other sampling conditions. This information is recorded in logbooks, COC forms, or sample labels. This information is entered directly into Paducah PEMS by the Data Coordinator.

Sample COC forms contain sample-specific information recorded during collection of the sample. Any deviations from the sampling plan are noted on the sample COC form or logbook. The Sampling Team Leader reviews each sample COC form for accuracy and completeness as soon as practical following sample collection.

Sample COC forms are generated from Paducah PEMS with the following information:

Information that is preprinted:	**Information that is entered manually:**
- Lab COC number	- Sample date and time
- Project name or number	- Sample comments (optional)
- Sample ID number	
- Sampling location	
- Sample type (e.g., REG = regular sample)	
- Sample matrix (e.g., SO = soil)	
- Analysis (e.g., PCB)	
- Sample container (volume, type)	

Sample identification numbers are identified in Paducah PEMS and are assigned by the Data Coordinator. An example of the sample numbering schemes used for the Soils OU Inactive Facilities RA project is provided below.

For Solid Waste Management Unit (SWMU) 19:

SSSps-ma000

where

SSS	Identifies the SWMU being sampled (i.e., 181)
p	Identifies the plane (i.e., W for wall or F for floor)
s	Identifies the section
m	Identifies the media type (W identifies the sample as water, S identifies the sample as soil)
a	Identifies the sequential sample (usually “A” for a primary sample and “B” for a secondary sample)
000	Identifies the planned depth of the sample in ft bgs

For SWMU 181:

SSSee-ssA00

where

SSS	Identifies the SWMU being sampled (i.e., 181)
ee	Identifies the exposure unit
ss	Identifies the survey unit
A	Identifies the activity (A for Activity 1 and B for Activity 2)
00	Identifies the depth of the sample in ft bgs (the first samples will be taken at 02 ft bgs, after initial excavation)

G.5.2 LITHOLOGIC DESCRIPTION FORMS

Lithologic description forms will be used as necessary for this project.

G.5.3 WELL CONSTRUCTION DETAIL FORMS

These forms are not necessary for use during this project.

G.5.4 LOGBOOK SAMPLE COLLECTION SHEETS

Sample collection sheets are utilized as an aid for recording sampling information in the field. Logbooks are kept in accordance with PRS-ENM-2700, *Logbooks and Data Forms*.

G.6. DATA AND DATA RECORDS TRANSMITTALS

G.6.1 PADUCAH OREIS DATA TRANSMITTALS

Data to be stored in Paducah OREIS is submitted to the Data Manager prior to reporting. Official data reporting will be generated from data stored in Paducah OREIS.

G.6.2 DATA RECORDS TRANSMITTALS

The Soils OU Inactive Facilities RA project personnel will make records transfers to the DCC.

G.7. DATA MANAGEMENT SYSTEMS

G.7.1 PADUCAH PEMS

Paducah PEMS is the data management system that supports the project's sampling and measurement collection activities and generates Paducah OREIS RTL files. The data management staff accesses Paducah PEMS throughout the life cycle of the project. The project uses Paducah PEMS to support the following functions:

- Initiate the project
- Plan for sampling
- Record sample collection and field measurements
- Record the dates of sample shipments to the laboratory (if applicable)
- Receive and process analytical results
- Verify data
- Access and analyze data
- Transfer project data (in RTL format) to Paducah OREIS

Paducah PEMS is used to generate sample COC forms; import laboratory-generated data; update field and laboratory data based on data verification; data validation. if applicable; data assessment; and transfer data to Paducah OREIS. Requirements for addressing the day-to-day operations of Paducah PEMS include backups, security, and interfacing with the sample management office (SMO).

The Information Technology group performs system backups daily. The security precautions and procedures implemented by the data management team are designed to minimize the vulnerability of the data to unauthorized access or corruption. Only members of the data management team have access to the project's Paducah PEMS and the hard-copy data files. Members of the data management team have installed password-protected screen savers.

G.7.2 PADUCAH OREIS

Paducah OREIS is the centralized, standardized, quality assured, and configuration-controlled data management system that is the long-term repository of environmental data (measurements and geographic) for Paducah environmental management projects. Paducah OREIS is comprised of hardware, commercial software, customized integration software, an environmental measurements database, a geographic database, and associated documentation. The Soils OU Inactive Facilities RA project will use Paducah OREIS for the following functions:

- Access to existing data
- Spatial analysis
- Report generation
- Long-term storage of project data (as applicable)

G.7.3 PADUCAH ANALYTICAL PROJECT TRACKING SYSTEM

The Paducah Analytical Project Tracking System is the business management information system that manages analytical sample analyses for Paducah environmental projects. The Paducah Analytical Project Tracking System provides cradle-to-grave tracking of sampling and analysis activities. The Paducah Analytical Project Tracking System generates the SOW, tracks collection and receipt of samples by the laboratory, flags availability of the analytical results, and allows invoice reconciliation. The Paducah Analytical Project Tracking System interfaces with Paducah PEMS (output from the Paducah Analytical Project Tracking System is automatically transferred to Paducah PEMS).

G.8. DATA MANAGEMENT TASKS AND ROLES AND RESPONSIBILITIES

G.8.1 DATA MANAGEMENT TASKS

The following data management tasks are numbered and grouped according to the activities summarized in Section G.1.2. An explanation of the data review process is provided in the following sections.

G.8.1.1 Acquire Existing Data

The primary background data for this project consists of historical analytical data from previous sampling events near SWMUs 19 and 181. This data is available in the Soils OU Inactive Facilities EE/CA (DOE 2008).

G.8.1.2 Plan Data Collection

Other documents for this project provide additional information for the tasks of project environmental data collection, including sampling and analysis planning, quality assurance, waste management, and health and safety. Also, a laboratory SOW will be developed for this project.

G.8.1.3 Prepare for Sampling Activities

The data management tasks involved in sample preparation include identifying all sampling locations, preparing descriptions of these stations, identifying sample containers and preservation, developing field logbooks, preparation of sample kits and COCs, and coordinating sample delivery to the laboratory. The Lab Coordinator conducts activities associated with the analytical laboratories. Coordinates for support survey sample locations (see Appendix G) will be obtained using a global positioning system. Coordinates for post-excavation final verification sampling will be obtained from a Class 1 First Order survey (see Appendix G).

G.8.1.4 Collect Field Data and Samples

Paducah PEMS is used to identify, track, and monitor each sample and associated data from the point of collection through final data reporting. Project documentation includes field logbooks, COC records, and hard-copy analytical results.

Data management requirements for field logbooks and field forms specify that (1) sampling documentation must be controlled from initial preparation to completion, (2) sampling documentation generated must be maintained in a project file, and (3) modifications to planned activities and deviations from procedures shall be recorded.

Before the start of sampling, the Lab Coordinator specifies the contents of sample kits, which includes sample containers provided by the laboratories, labels, preservatives, and COC records. Sample labels and COCs are completed according to PRS-ENM-2708, *Chain-of-Custody Forms, Field Sample Logs, Sample Labels, and Custody Seals*.

The Soils OU Inactive Facilities RA project field team will collect samples for the project. The field team will record pertinent sampling information on the COC and in the field logbook. The Data Coordinator enters the information from the COC forms into Paducah PEMS.

G.8.1.5 Submit Samples for Analysis

Before the start of field sampling, the Field Superintendent or designee coordinates the delivery of samples with the Lab Coordinator who, in turn, coordinates with the analytical laboratories. The Lab Coordinator presents a general sampling schedule to the analytical laboratories. The Lab Coordinator also coordinates the receipt of samples and containers with the laboratories. The Lab Coordinator ensures that hard-copy deliverables and EDDs from the laboratories contain the appropriate information and are in the correct format.

G.8.1.6 Process Field Measurement and Laboratory Analytical Data

Data packages and EDDs received from the laboratory are tracked, reviewed, and maintained in a secure environment. Paducah PEMS is used for tracking project-generated data. The following information is tracked, as applicable: sample delivery group number, date received, number of samples, sample analyses, receipt of EDD, and comments. The laboratory EDDs are checked as specified in PRS-ENM-5007, *Data Management Coordination*.

The field screen measurement data will be provided by the Soils OU Inactive Facilities RA project team to the Data Manager for loading into Paducah PEMS. This data will be provided in a format specified by the Data Manager. Once this data has been loaded to Paducah PEMS, it will be compared to the original files submitted by the project to ensure that it was loaded correctly.

G.8.1.7 Laboratory Contractual Screening

Laboratory contractual screening is the process of evaluating a set of data against the requirements specified in the analytical SOW to ensure that all requested information is received. The contractual screening includes, but is not limited to, the analytes requested, total number of analyses, method used, EDDs, units, holding times, and reporting limits achieved. Contractual screening is performed for 100 percent of the data. The Lab Coordinator is primarily responsible for the contractual screening upon receipt of data from the analytical laboratory. During contractual screening, the analytical method requested on the laboratory statement of work is compared to the analytical method received from the laboratory to ensure that contract requirements were met.

G.8.1.8 Data Verification

Data verification is the process for comparing a data set against a set standard or contractual requirement. Verification is performed by the Data Coordinator electronically, manually, or by a combination of both.

Verification is performed for 100 percent of data. Data verification includes contractual screening and criteria specific to the Soils OU Inactive Facilities RA. Data is flagged as necessary. Verification qualifiers are stored in Paducah PEMS and transferred with the data to Paducah OREIS.

G.8.1.9 Data Validation

Data validation is the process performed by a third-party, qualified individual. Third-party validation is defined as validation performed by persons independent from sampling, laboratory, and decision making for the program/project (i.e., not the program/project manager). Data validation evaluates the laboratory adherence to analytical-method requirements. Data validation is managed and coordinated with the data management team. The Data Validator performs data validation according to approved procedures. Data validation is documented in a formal deliverable from the data validator. Validation qualifiers are input and stored in Paducah PEMS and transferred to Paducah OREIS.

A minimum of 10 percent of the total number of samples will be validated for this project. Data validation will apply only to the definitive data. Data packages chosen for data validation will be validated at 100 percent.

G.8.1.10 Data Assessment

Data assessment is the process for assuring that the type, quality, and quantity of data are appropriate for their intended use. It allows for the determination that a decision (or estimate) can be made with the desired level of confidence, given the quality of the data set. Data assessment follows data verification and data validation (if applicable) and must be performed at a rate of 100 percent to ensure data is useable. Per contractor procedure, data validation can be performed concurrently with data verification and data assessment. Data assessment is not finalized until data validation is complete, if applicable, and the data validation qualifiers have been evaluated. Data assessment is performed on 100% of the data set, even when data validation is not required.

The data assessment is conducted by the Soils OU Inactive Facilities RA project according to DOE Prime Contractor procedure, PRS-ENM-5003, *Quality Assured Data*. Assessment qualifiers are stored in Paducah PEMS and transferred with the data to Paducah OREIS. Any problems found during the review process are resolved and documented in the data assessment package.

G.8.1.11 Data Consolidation and Usage

The data consolidation process consists of the activities necessary to prepare the evaluated data for the users. The Data Coordinator prepares files of the assessed data from Paducah PEMS to Paducah OREIS for future use. The Data Manager is responsible for transferring the data to Paducah OREIS. Data used in reports distributed to external agencies is obtained from data in Paducah OREIS and has been through the data review process. All data reported has the approval of the Data Manager.

G.8.2 DATA MANAGEMENT ROLES AND RESPONSIBILITIES

The following project roles are defined, and the responsibilities are summarized for each data management task described in the previous subsection.

G.8.2.1 Project Manager

The Project Manager is responsible for the day-to-day operation of the Soils OU Inactive Facilities RA project. The Project Manager ensures the requirements of policies and procedures are met. The project manager or designee assesses data in accordance with DOE Prime Contractor procedure, PRS-ENM-5003, *Quality Assured Data*. The Project Manager is responsible to flow down data management requirements to subcontractors as required.

G.8.2.2 Project Team

The project team consists of the technical staff and support staff (including the data management team) that conducts the various tasks required to successfully complete the project.

G.8.2.3 Data User

Data users are members of the project team who require access to project information to perform reviews, analyses, or ad hoc queries of the data. The data user determines project data usability by comparing the data against predefined acceptance criteria and assessing that the data are sufficient for the intended use.

G.8.2.4 Data Coordinator

The Data Coordinator enters the data into Paducah PEMS, including COC information, field data, data assessment and data validation qualifiers, and any pertinent sampling information. After receiving a notification that a fixed-base laboratory EDD is available to download, the Data Coordinator loads the EDD to Paducah PEMS, performs electronic verification of the data, and then compiles the data assessment package. The Data Coordinator also prepares data for transfer from Paducah PEMS to Paducah OREIS.

G.8.2.5 Document Control Center Manager

The DCC Manager is responsible for the long-term storage of project records. The Soils OU Inactive Facilities RA project team will interface with the DCC Manager and will transfer documents and records in accordance with DOE requirements.

G.8.2.6 QA Specialist

The QA Specialist is part of the project team and is responsible for reviewing project documentation to determine if the project team followed applicable procedures.

G.8.2.7 Data Manager

The Data Manager is responsible for long-term storage of project data and for transmitting data to external agencies according to the *Data and Documents Management and Quality Assurance Plan for Paducah Environmental Management and Enrichment Facilities,* DOE/OR/07-1595&D2, and the Paducah Data Management Policy. The Data Manager ensures compliance to procedures relating to data management with respect to the project and that the requirements of DOE Prime Contractor procedure, PRS-ENM-5003, *Quality Assured Data,* are followed.

G.8.2.8 Lab Coordinator

The Lab Coordinator is responsible for contracting any fixed-base laboratory utilized during the sampling activities. The Lab Coordinator also provides coordination for sample shipment to the laboratory, contractual screening of data packages, and transmittal of data packages to the Paducah DCC.

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APPENDIX H
FILL AND COVER MATERIAL VERIFICATION PROTOCOL

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Paducah Gaseous Diffusion Plant
Fill and Cover Material Verification Protocol

Objective

The protocol will serve as a standard method for determining if fill and cover material is acceptable for response actions at the Paducah Gaseous Diffusion Plant (PGDP). While this protocol presents a standard method for sampling fill and cover material and evaluating the sampling results, deviations from this protocol are likely, and these deviations will be discussed on a case-by-case basis. Examples of likely deviations are the use of historical sampling results instead of results from new sampling in the evaluation and, in the case of historical data, some deviations from the analyte list and analyte sample quantitation limits (SQLs) presented below.

Basis

This protocol is based upon a similar protocol used at the U.S. Department of Energy's (DOE) Savannah River Site (SRS) (Westinghouse Savannah River Company 2003). This protocol was modeled after the SRS protocol in order to respond to preference expressed by U. S. Environmental Protection Agency (EPA) personnel. This protocol was discussed at Federal Facility Manager Meetings held in September 2009, as well as during teleconferences held in September and October 2009.

Verification Protocol

This protocol applies to fill taken from areas owned by DOE at the PGDP. Commercial suppliers of soil for fill or cover will be asked for assurances that soil is uncontaminated as part of contracting.

Protocol requirements are:

- Samples will be collected from soil designated for use in response actions either prior to excavation or from loads at a rate of approximately one five-part composite for every 1,000 yds^3 of soil. If *in situ* historical data from an area is available, then results from that sampling may be evaluated instead of results from new sampling; however, DOE will provide information showing that the historical sampling was performed in a manner consistent with this protocol. Once an area is approved through this protocol for a project, then the area sampled will remain as an approved source of fill or cover for that project or similar projects, and additional sampling from that area will not be required.

- Newly collected soil samples will be analyzed for the sitewide list of chemicals of potential concern in Table 2.1 of *Methods for Conducting Risk Assessments and Risk Evaluations at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, Volume 1,. Human Health,* DOE/LX/07-0107&D1/V1, (Risk Methods Document) (RMD), with some deviations. This list of analytes and deviations are in Table H.1. Historical results will be evaluated, and the absence of any analytes in the historical results will be discussed.

- Sampling and laboratory analytical methods will be consistent with EPA methods, DOE requirements, and contractor-approved procedures.

- SQLs and their radionuclide equivalents for analytes are shown in Table H.1. Historical data with SQLs or their radionuclide equivalents that exceed the values shown in Table H.1 will be evaluated to determine the impact of SQLs on the acceptability of soil proposed as fill or cover. Results with SQLs exceeding the values shown in Table H.1 may be acceptable, once the impacts on the evaluation are understood.

- Results of laboratory analysis will be screened as follows:

  — For those analytes with site-specific background concentrations (i.e., most metals and radionuclides), results will be compared to the full range of background expected or likely at PGDP. This evaluation will begin with a simple comparison against background concentrations presented in Table H.2, but additional analyses will be used to determine if exceedances of these background concentrations represent potential contamination or natural variation.

  — For analytes without site-specific background concentrations (i.e., some metals, some radionuclides, and organic compounds), results will be compared to the appropriate risk-based value derived from no action levels (NAL) presented in Appendix A of the Risk Methods Document (DOE 2009). Justification for the risk-based values used in the comparison will be provided. The risk-based values used will be the lesser of values based upon a cancer risk target of 1E-05 and a hazard index target of 1.

  — If exceedances of either the full range of background or appropriate risk-based value are identified, then an uncertainty analysis will be performed to determine the possible reasons and importance of exceedances. The identification of analyte concentrations exceeding the background and risk-based value benchmarks will not be the sole basis for discounting use of soil from a particular area as fill or cover.

References

DOE 2001. *Methods for Conducting Risk Assessments and Risk Evaluations at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, Volume 1, Human Health*, DOE/OR/07-1506&D2, December.

DOE 2009. Draft *Methods for Conducting Risk Assessments and Risk Evaluations at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, Volume 1, Human Health*, DOE/LX/07-0107&D1/V1, August.

Westinghouse Savannah River Company 2003. *SRS Fill and Cover Material Verification Protocol*, ERTEC-2003-00012, December.

Table H.1. Sitewide Chemicals of Potential Concern at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky[1]

Analyte	CAS Number	Sample Quantitation Limit or Radionuclide Equivalent[2]	
Inorganic Chemicals			
Aluminum	7429905	8,022.5	mg/kg
Antimony	7440360	0.105	mg/kg
Arsenic	7440382	5.5	mg/kg
Barium	7440393	91	mg/kg
Beryllium	7440417	0.45	mg/kg
Boron	7440428	9,180	mg/kg
Cadmium	7440439	0.105	mg/kg
Chromium[3]	7440473	12.5	mg/kg
Cobalt	7440484	6.5	mg/kg
Copper	7440508	12	mg/kg
Iron	7439896	14,328.5	mg/kg
Lead	7439921	17.5	mg/kg
Manganese	7439965	350.5	mg/kg
Mercury	7439976	0.1	mg/kg
Molybdenum	7439987	230	mg/kg
Nickel	7440020	14	mg/kg
Selenium	7782492	0.3	mg/kg
Silver	7440224	1.5	mg/kg
Thallium	7440280	0.105	mg/kg
Uranium	7440611	3.8	mg/kg
Vanadium	7440622	22	mg/kg
Zinc	7440666	41	mg/kg
Organic Compounds			
Acenaphthene	83329	1,230	mg/kg
Acenaphthylene	208968	NA	mg/kg
Acrylonitrile	107131	0.729	mg/kg
Anthracene	120127	7,610	mg/kg
Benzene	71432	3.46	mg/kg
Carbazole	86748	87.2	mg/kg
Carbon tetrachloride	56235	0.574	mg/kg
Chloroform	67663	0.123	mg/kg
1,1-Dichloroethene	75354	0.235	mg/kg
1,2-Dichloroethene (mixed)	540590	156	mg/kg
trans-1,2-Dichloroethene	156605	20	mg/kg
cis-1,2-Dichloroethene	156592	15.4	mg/kg
Dieldrin	60571	0.105	mg/kg
Ethylbenzene	100414	46.4	mg/kg
Fluoranthene	206440	1,090	mg/kg
Fluorene	86737	945	mg/kg
Hexachlorobenzene	118741	0.414	mg/kg
Naphthalene	91203	19.4	mg/kg
2-Nitroaniline	88744	4.56	mg/kg
N-Nitroso-di-n-propylamine	621647	0.2	mg/kg
Phenanthrene	85018	NA	mg/kg
Pyrene	129000	814	mg/kg
Tetrachloroethene	127184	1.08	mg/kg
Trichloroethene	79016	0.22	mg/kg
Total Dioxins/Furans[4]	1746016	1.14E-05	mg/kg

Table H.1. Site-wide Chemicals of Potential Concern at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky[1] (Continued)

Analyte	CAS Number	Sample Quantitation Limit or Radionuclide Equivalent[2]	
Total PAHs	50328	0.197	mg/kg
Benz(a)anthracene	56553	1.96	mg/kg
Benzo(a)pyrene	50328	0.197	mg/kg
Benzo(b)fluoranthene	205992	1.97	mg/kg
Benzo(k)fluoranthene	207089	19.7	mg/kg
Chrysene	218019	197	mg/kg
Dibenz(a,h)anthracene	53703	0.197	mg/kg
Indeno(1,2,3-cd)pyrene	193395	1.97	mg/kg
Total PCBs[5]	1336363	0.624	mg/kg
Aroclor 1016	12674112	0.618	mg/kg
Aroclor 1221	11104282	0.682	mg/kg
Aroclor 1232	11141165	0.682	mg/kg
Aroclor 1242	53469219	0.619	mg/kg
Aroclor 1248	12672296	0.682	mg/kg
Aroclor 1254	11097691	0.493	mg/kg
Aroclor 1260	11096825	0.657	mg/kg
Vinyl chloride	75014	0.402	mg/kg
Xylenes (Mixture)	1330207	82.1	mg/kg
p-Xylene	106423	NA	mg/kg
m-Xylene	108383	3,940	mg/kg
o-Xylene	95476	4,140	mg/kg
Radionuclides			
Americium-241	14596102	15	pCi/g
Cesium-137+D	10045973	0.25	pCi/g
Cobalt-60	10198400	0.0547	pCi/g
Neptunium-237+D	13994202	0.014	pCi/g
Plutonium-238	13981163	0.002	pCi/g
Plutonium-239	15117483	0.009	pCi/g
Plutonium-240	14119336	31.6	pCi/g
Technetium-99	14133767	0.15	pCi/g
Thorium-230	14269637	1.1	pCi/g
Uranium-234	13966295	0.95	pCi/g
Uranium-235+D	15117961	0.055	pCi/g
Uranium-238+D	7440611	0.95	pCi/g

[1] Taken from Table 2.1 in *Methods for Conducting Risk Assessments and Risk Evaluations at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, Volume, 1, Human Health*, DOE/LX/07-0107&D1/V1.

[2] Sample Quantitation Limit refers to the lowest reliably detected value for an inorganic or an organic analyte. For purposes of this table, the radionuclide equivalent or the minimum detectable activity (MDA) is presented. Values presented for most metals and radionuclides are the "average" site-specific background concentrations at the PGDP. Values presented for boron, molybdenum, americium-241, cobalt-60, and organic compounds are derived from no action levels for the child resident taken from the RMD by revising the target cancer risk and hazard index to 1 x 10^{-5} and 1, respectively.

[3] Table 2.1 in the RMD includes Cr III, Cr Total, and Cr VI. Only Cr Total is included here because it is type of chromium expected in soil samples at the PGDP. The cancer-based screening value presented in the RMD for Cr Total was derived using the cancer slope factor for Cr VI. Background values for Cr III are used here.

[4] Table 2.1 in the RMD presents several dioxins and furans. Analyses for these organic compounds will not be required for samples from fill and cover material because they are unlikely to be present in soil from DOE-owned areas at the PGDP the absence of polychlorinated biphenyls (PCBs) based upon PGDP process information.

[5] The list of PCBs may be smaller than that shown here. The list will include Aroclor 1248, 1254, and 1260, which are the most commonly detected PCBs at the PGDP.

NA = not applicable

Table H.2. Site Specific Background Values Used for Soil Evaluation at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

Analysis	CAS Number	Site-Specific Background Values 2001[1]	2009[2]
Metals (mg/kg)			
Aluminum	7429905	13,000	16,045
Antimony	7440360	0.21	0.21
Arsenic	7440382	12	11
Barium	7440393	200	182
Beryllium	7440417	0.67	0.9
Cadmium	7440439	0.21	0.21
Calcium	7440702	200,000	8,376
Chromium[3]	7440473	16	25
Cobalt	7440484	14	13
Copper	7440508	19	24
Iron	7439896	28,000	28,657
Lead	7439921	36	35
Magnesium	7439954	7,700	2,652
Manganese	7439965	1,500	701
Mercury	7439976	0.2	0.2
Nickel	7440020	21	28
Potassium	7440097	1,300	1,005
Selenium	7782492	0.8	0.6
Silver	7440224	2.3	3
Sodium	7440235	320	142
Thallium	7440280	0.21	0.21
Uranium	7440611	4.9	7.6
Vanadium	7440622	38	44
Zinc	7440666	65	82
Radionuclides (pCi/g)			
Cesium-137	10045973	0.49	0.5
Neptunium-237	13994202	0.1	0.028
Plutonium-238	13981163	0.073	0.004
Plutonium-239	15117483	0.025	0.018
Potassium-40	13966002	16	27
Radium-226	13982633	1.5	2.2
Strontium-90	10098972	4.7	0
Technetium-99	14133767	2.5	0.3
Thorium-228	14274829	1.6	2.3
Thorium-230	14269637	1.5	2.2
Thorium-232	NA	1.5	2.2
Uranium-234	13966295	2.5	1.9
Uranium-235	15117961	0.14	0.11
Uranium-238	7440611	1.2	1.9

[1] Background taken from surface soil values found in Table A.12 of DOE 2001.
[2] Background taken from surface soil values found in Table A.12 of DOE 2009.
[3] Background values for Chromium III are presented.
NA = not available

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