Department of Energy

Portsmouth/Paducah Project Office
1017 Majestic Drive, Suite 200
Lexington, Kentucky 40513
(859) 219-4000

JUL 19 2016

Mr. Brian Begley
Federal Facility Agreement Manager
Division of Waste Management
Kentucky Department for Environmental Protection
300 Sower Blvd.
Frankfort, Kentucky 40601

PPPO-02-3310806-16

Ms. Julie Corkran
Federal Facility Agreement Manager
U.S. Environmental Protection Agency, Region 4
61 Forsyth Street
Atlanta, Georgia 30303

Dear Mr. Begley and Ms. Corkran:

TRANSMITTAL OF THE D2 SITE MANAGEMENT PLAN, PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY, ANNUAL REVISION—FISCAL YEAR 2016 (DOE/LX/07-2400&D2)

References:

1. Letter from J. Corkran to T. Duncan, "Site Management Plan, Paducah Gaseous Diffusion Plant (DOE/LX/07-2400&D1), Annual Revision—FY 2016, EPA ID KY8890008982, McCracken County, KY," dated March 7, 2016
2. Letter from A. Webb to T. Duncan, "Submittal of Comments to the Site Management Plan, Paducah Gaseous Diffusion Plant, Paducah, Kentucky–Annual Revision—FY 2016 (DOE/LX/07-07-2400&D1), Paducah Site, Paducah, McCracken County, Kentucky, KY8-890-008-982," dated December 15, 2015

Enclosed for your approval is the certified D2 *Site Management Plan, Paducah Gaseous Diffusion Plant, Paducah, Kentucky, Annual Revision—FY 2016*, DOE/LX/07-2400&D2, (SMP). This version of the SMP addresses, to the extent possible, comments received from the Kentucky Department for Environmental Protection (KDEP) on December 15, 2015; the U.S. Environmental Protection Agency (EPA) on March 7, 2016; and additional comments/clarifications received during comment resolution meetings held March 30, 2016, and April 27–28, 2016. In addition to responding to EPA and KDEP comments, the U.S. Department of Energy (DOE) has updated Appendix 1 of the D2 SMP to reflect the status of the removal and remedial actions and Appendix 5 of the D2 SMP to incorporate the latest milestone modifications approved by the regulatory agencies. EPA and KDEP comments have requested that DOE commit to additional enforceable milestones in the fiscal year (FY) 2016 SMP, including incorporation of milestones for the remaining remediation scope and deactivation and decommissioning at the Paducah Gaseous Diffusion Plant (PGDP). DOE stated in the scoping

meetings and comment resolution meetings for the FY 2016 SMP, that the budget for FY 2016 already has passed and the FY 2017 budget request has been submitted to Congress for the work currently identified in the approved SMP and that the enforceable milestones, including the out-year completion dates for the pre-PGDP shutdown scope, are consistent with those agreed to by the Federal Facility Agreement (FFA) parties in August 2012.

As part of DOE's plan for addressing the remaining remediation scope and the decommissioning of PGDP that currently is not milestoned or planned within the approved SMP, DOE is developing a comprehensive Life Cycle Plan that incorporates the pre-PGDP shutdown scope with the remaining remediation scope and decommissioning of PGDP. This is essential to understanding DOE's long-term management needs for the Paducah Site and the appropriate sequence of cleanup activities to be conducted. Until the Life Cycle Plan is approved by the Portsmouth/Paducah Project Office and subsequently DOE Headquarters via an approved baseline, DOE cannot commit to any planning dates or enforceable milestones for the remaining remediation scope and the decommissioning of PGDP; therefore, DOE is not able to include additional planning dates or enforceable milestones in the FY 2016 SMP for this scope.

As the parties are aware, there is no near-term decommissioning activities currently planned for any major facilities at PGDP in the three-year enforceable window (FY 2016–FY 2018). As a result, DOE does not believe is it necessary to reach consensus on the future decommissioning of PGDP facilities with respect to completing the FY 2016 SMP. DOE recommends that the parties begin evaluating cleanup strategies once DOE completes the Life Cycle Plan.

DOE appreciates the FFA parties' efforts to-date in assisting with finalization of the D2 SMP. A redline version of the D2 SMP and comment response summaries are provided to assist with your review.

If you have any questions or require additional information, please contact me at (270) 441-6862.

Sincerely,

Tracey Duncan
Federal Facility Agreement Manager
Portsmouth/Paducah Project Office

Enclosures:
1. Certification Page
2. FY 2016 D2 SMP (Clean)
3. FY 2016 D2 SMP (Redline)
4. Comment Response Summary-EPA
5. Comment Response Summary-KDEP
6. Other Changes-DOE

e-copy w/enclosures:
april.ladd@lex.doe.gov, PPPO/PAD
april.webb@ky.gov, KDEP/Frankfort
brad.montgomery@ffspaducah.com, FFS/Kevil
brian.begley@ky.gov, KDEP/Frankfort
bruce.ford@ffspaducah.com, FFS/Kevil
bwhatton@tva.gov, TVA/PAD
corkran.julie@epa.gov, EPA/Atlanta
craig.jones@ffspaducah.com, FFS/Kevil
dave.dollins@lex.doe.gov, PPPO/PAD
edward.johnstone@ffspaducah.com, FFS/Kevil
ffscorrespondence@ffspaducah.com, FFS/Kevil
gaye.brewer@ky.gov, KDEP/PAD
hjlawrence@tva.gov, TVA/PAD
jennifer.woodard@lex.doe.gov, PPPO/PAD
leo.williamson@ky.gov, KDEP/Frankfort
myrna.redfield@ffspaducah.com, FFS/Kevil
nathan.garner@ky.gov, KYRHB/Frankfort
pad.rmc@swiftstaley.com, SSI/Kevil
richards.jon@epamail.epa.gov, EPA/Atlanta
rkdehart@tva.gov, TVA/PAD
stefanie.fountain@ffspaducah.com, FFS/Kevil
stephaniec.brock@ky.gov, KYRHB/Frankfort
teresa.overby@ffspaducah.com, FFS/Kevil
todd.powers@ffspaducah.com, FFS/Kevil
tracey.duncan@lex.doe.gov, PPPO/PAD

CERTIFICATION

Document Identification: **D2 *Site Management Plan, Paducah Gaseous Diffusion Plant, Paducah, Kentucky, Annual Revision—FY 2016,* DOE/LX/07-2400&D2**

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Fluor Federal Services, Inc.

Myrna E. Redfield, Acting Director, Environmental Management — Date Signed: 7/19/16

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

U.S. Department of Energy

Jennifer Woodard, Paducah Site Lead
Portsmouth/Paducah Project Office — Date Signed: 7/19/2016

DOE/LX/07-2400&D2
Primary Document

Site Management Plan
Paducah Gaseous Diffusion Plant
Paducah, Kentucky

Annual Revision—FY 2016

CLEARED FOR PUBLIC RELEASE

DOE/LX/07- 2400&D2
Primary Document

Site Management Plan
Paducah Gaseous Diffusion Plant
Paducah, Kentucky

Annual Revision—FY 2016

Date Issued—July 2016

Prepared for
U.S. Department of Energy
PADUCAH GASEOUS DIFFUSION PLANT
Paducah, Kentucky 42002
by
FLUOR FEDERAL SERVICES, INC.,
Paducah Deactivation Project
managing the
Deactivation Project at the
Paducah Gaseous Diffusion Plant
under Task Order DE-DT0007774

CLEARED FOR PUBLIC RELEASE

THIS PAGE INTENTIONALLY LEFT BLANK

CONTENTS

THIS PAGE INTENTIONALLY LEFT BLANK

FIGURES

THIS PAGE INTENTIONALLY LEFT BLANK

ACRONYMS

AOC	area of concern
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CSOU	Comprehensive Site Operable Unit
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
EM	Environmental Management
EPA	U.S. Environmental Protection Agency
ERH	electrical resistance heating
FFA	Federal Facility Agreement
FS	feasibility study
FY	fiscal year
GDP	gaseous diffusion plant
LOI	Letter of Intent
LUC	land use controls
LUCAP	Land Use Controls Assurance Plan
LUCIP	Land Use Control Implementation Plan
NCP	National Contingency Plan
NPL	National Priorities List
OU	operable unit
PGDP	Paducah Gaseous Diffusion Plant
RACR	Remedial Action Completion Report
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RGA	Regional Gravel Aquifer
RI	remedial investigation
SMP	Site Management Plan
SWMU	solid waste management unit

THIS PAGE INTENTIONALLY LEFT BLANK

1. INTRODUCTION

The Paducah Gaseous Diffusion Plant (PGDP) was placed on the National Priorities List (NPL) on May 31, 1994. In accordance with Section 120 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the U.S. Department of Energy (DOE) entered into a Federal Facility Agreement (FFA) with the U.S. Environmental Protection Agency (EPA) and Kentucky on February 13, 1998. The FFA established one set of consistent requirements for achieving comprehensive site remediation in accordance with the Resource Conservation and Recovery Act (RCRA) and CERCLA, including stakeholder involvement.

Section XVIII of the FFA requires that DOE submit an annual Site Management Plan (SMP), which outlines DOE's strategic approach for achieving cleanup under the FFA, to EPA and the Energy and Environment Cabinet (formerly known as the Kentucky Environmental and Public Protection Cabinet) by November 15th of each year. The FFA states that the purpose of the SMP is to coordinate and document the potential and selected operable units (OUs), including removal actions; to define cleanup priorities; to identify work activities that will serve as the basis for enforceable timetables and deadlines under the agreement; and to establish long-term cleanup goals.

During fiscal year (FY) 2012, based on projected near-term flat funding and reasonable funding increases beyond 2017 for the Paducah Site, the FFA Senior Managers commissioned the FFA Managers to review and reprioritize FFA work, as needed, to achieve continuous progress while ensuring a bias for action. A series of meetings was held among the FFA Managers to evaluate options. The FFA Managers agreed to the following prioritization for work implementation:

- Optimize plume containment;
- Address groundwater sources;
- Complete Decontamination and Decommissioning of C-340 and C-410;
- Continue CERCLA Waste Disposal Alternatives activities to support future disposal needs; and
- Implement other work ensuring there is continuous progress/bias for action.

The reprioritization of projects based on projected near-term flat funding and reasonable funding increases for the Paducah Site resulted in the rescheduling of milestones, including out-year completion dates for the pre-GDP shutdown scopes OUs. The FY 2013 SMP officially incorporated the changes agreed to by the FFA parties and moved completion dates for the pre-GDP shutdown scope OUs from 2019 to 2032.

This annual update of the SMP sets forth enforceable milestones for FY 2016, FY 2017, and FY 2018, and enforceable completion dates for media-specific OUs associated with the strategic cleanup initiatives. These initiatives include a series of prioritized response actions, ongoing site characterization activities to support future response action decisions, and D&D of the gaseous diffusion plant (GDP). After completion of these activities, the Comprehensive Site OU (CSOU) evaluation will be conducted, with implementation of additional actions, as needed, to ensure long-term protectiveness of human health and the environment. CERCLA 5-Year Review evaluations are and will continue to be conducted to determine if any modifications to actions are required prior to the CSOU evaluation.

Strategic Cleanup Initiatives

- Groundwater OU Strategic Initiative
- Burial Grounds OU Strategic Initiative
- Surface Water OU Strategic Initiative
- Soils OU Strategic Initiative
- Decontamination and Decommissioning (D&D) OU Strategic Initiative

Appendix 1 of this SMP contains a summary of the status of all actions taken to date relative to the signed Records of Decision or Action Memoranda (including both interim and final response actions). This appendix also serves to meet the requirements of Section X.A of the FFA to submit an annual removal action report describing a summary of removal actions performed during the previous FY. More detailed information on the

status of each OU is available in the FFA Semiannual Progress Report.

2. LAND USE

The planning assumptions for current land use are depicted in Figure 1 and the reasonably foreseeable future use is depicted in Figure 2. Several factors were considered in establishing the land-use assumptions under this strategy, including current and past land use, future industrial missions planned at the site, and stakeholder input. Interest has been expressed by outside entities for the industrial use of areas adjacent to the PGDP.

2.1 LAND USE CONTROLS

The site cleanup strategy recognizes that the long-term protectiveness of some response actions might rely upon, or be supplemented by, engineering barriers, institutional controls, and/or other land use controls (LUCs). To ensure that these controls remain protective, CERCLA five-year reviews, in conjunction with monitoring of requirements contained in the Land Use Control Assurance Plan (LUCAP), are implemented.

A Land Use Control Implementation Plan (LUCIP) is developed for each remedy that includes LUCs. The LUCIPs include a detailed explanation of the implementation and long-term maintenance of the LUCs. The LUCAP requires annual certification in the SMP that the LUCIPs are being implemented. This certification also will identify any noncompliance with a LUCIP and the steps taken to correct any such noncompliance, any nonmajor changes in land use, and any changes in designated officials. Appendix 2 contains the annual certification of LUCIPs implemented at PGDP.

3. OPERABLE UNITS

Site cleanup activities have been divided as follows: (1) pre-GDP shutdown scope, (2) post-GDP shutdown scope, and (3) CSOU scope. The pre-GDP shutdown scope is associated with media-specific OUs initiated prior to shutdown of the operating Gaseous Diffusion Plant (i.e., Pre-GDP shutdown Activities). These media-specific OUs were established by developing a site conceptual risk model for each source area [solid waste management units (SWMUs)/areas of concern (AOCs)]. This process included a qualitative evaluation of contaminant types and concentration, release mechanisms, likely exposure pathways, estimated points of exposure, and potential receptors based on current and reasonably foreseeable future land groundwater uses. The source areas for the Pre-GDP shutdown scope have been grouped into these media-specific OUs:

- Groundwater OU
- Surface Water OU
- Soils OU
- Burial Grounds OU
- D&D OU

The following OUs have been identified for site cleanup activities that will occur during the post-GDP phase of the cleanup:

- GDP Groundwater Sources OU
- Additional Burial Grounds Sources OU
- GDP D&D OU
- Soils and Slabs OU
- GDP Lagoons & Ditches OU

The Paducah GDP ceased uranium enrichment operations in May 2013 and DOE property leased to USEC was returned to the Department of Energy in October 2014. In order to reflect better that the GDP no longer is operating, all activities previously identified as post-GDP shutdown scope now are identified as Remaining Remediation Scope. A well-defined approach for the Remaining Remediation Scope has not been developed, and the work has not been prioritized or integrated with the pre-GDP shutdown scope and schedule. The current scope and assumptions details for the pre-GDP scope and general scope for the Remaining Remediation Scope OUs can be found in Appendix 3.

DOE currently is implementing deactivation and utility optimization activities outside of the FFA scope to prepare the site for effective implementation of all future mission activities. DOE continues to implement the pre-GDP shutdown scope, while developing plans and strategies for future decommissioning of the GDP. When decommissioning work is identified for

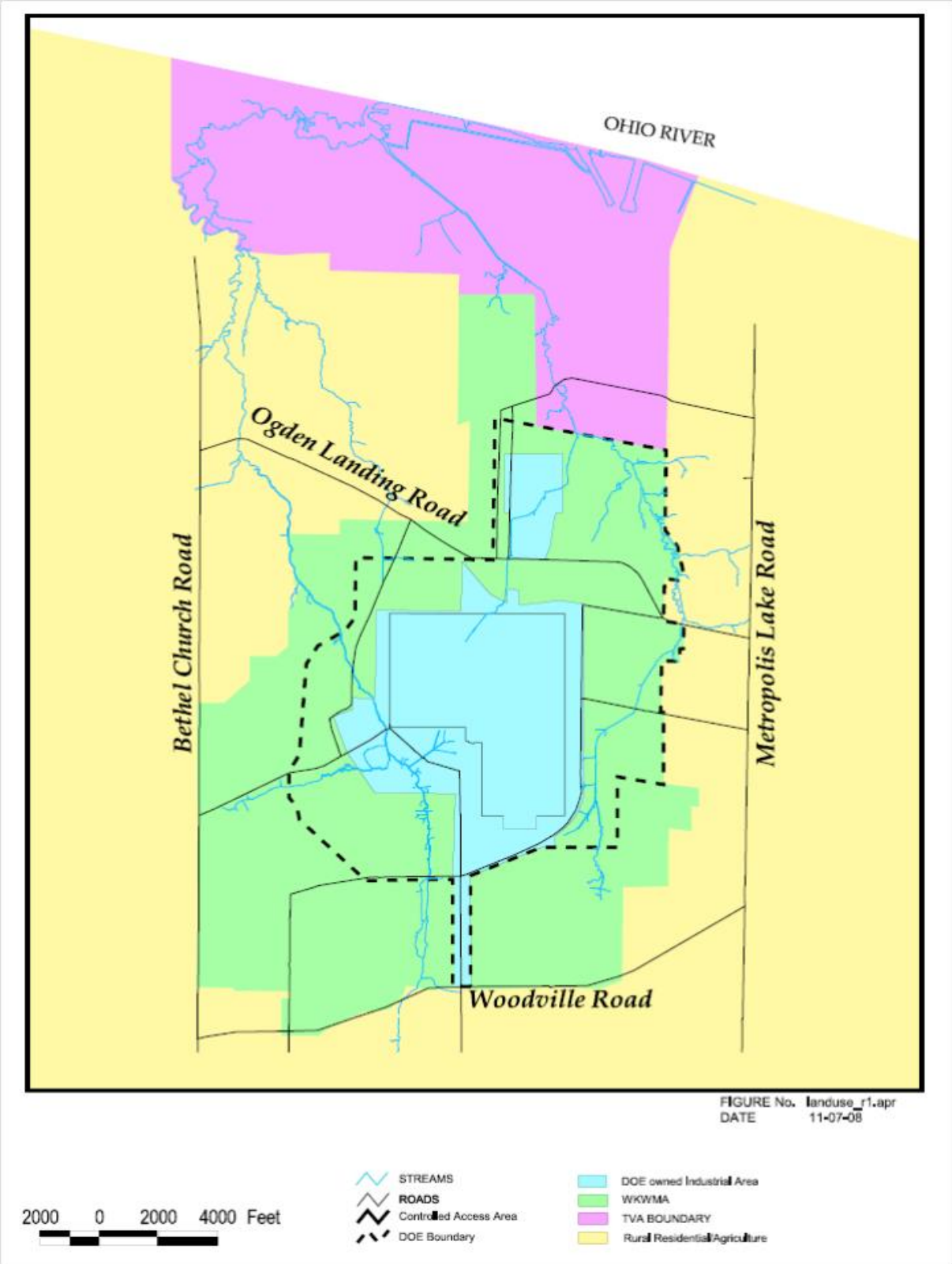

Figure 1. Current Land Use at PGDP

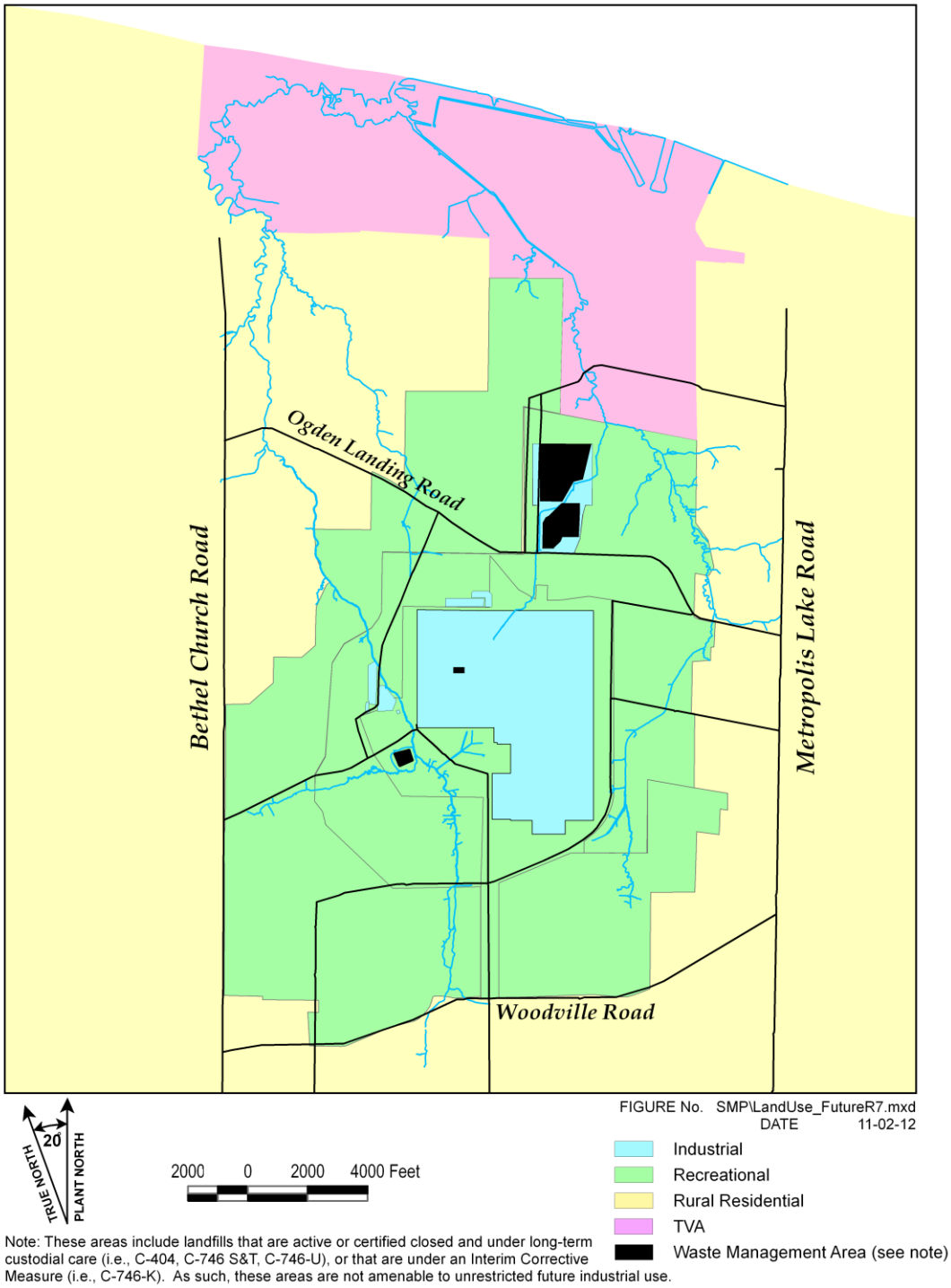

Figure 2. Reasonably Anticipated Future Land Use at PGDP

inclusion under the FFA, it will be integrated into the SMP and prioritized by the FFA Parties.

The final CSOU evaluation will occur following completion of Remaining Remediation D&D, D&D of the Depleted Uranium Hexafluoride (DUF_6) Conversion Plant, and completion of cleanup of each of the specific OUs (e.g., GDP Groundwater Sources OU, Soils and Slabs OU). Any required environmental monitoring of remedy performance and/or progress toward achieving the RAOs will be conducted and reported in accordance with the selected remedies. Once no further response is appropriate, and all RAOs have been achieved, the site would be eligible for deletion from the NPL. Appendix 3 includes additional information regarding scope and planning assumptions for the OUs. Appendix 4 contains lists of SWMUs and AOCs sorted by OUs.

Risk Prioritization Criteria

- Mitigate immediate threats, both on- and off-site.
- Reduce further migration of off-site contamination.
- Address sources contributing to off-site contamination.
- Address remaining sources contributing to on-site contamination.
- Perform D&D of the GDP/Address Remaining Remediation Scope OUs.
- Perform D&D of the DUF_6 Plant once it ceases operations.
- Evaluate the final CSOU.

4. SITE PRIORITIZATION

DOE uses a combination of factors to prioritize work being implemented under the Environmental Management (EM) program at PGDP. These include considerations such as regulator expectations, risk-based decision making, compliance with other programs, technical considerations associated with GDP transition/turnover, mortgage reduction, and demonstrated progress toward completing the EM mission.

The risk prioritization criteria incorporate the general program-management principles of the NCP, which emphasize the use of accelerated actions to address imminent threats and reduce migration of off-site contamination.

Consistent with those principles, the risk prioritization criteria described above are used as guidelines, in conjunction with the other previously mentioned factors, to prioritize response actions. The prioritization criteria have been applied to each of the OUs at PGDP. Enforceable milestones for FY 2016, FY 2017, FY 2018, and out-year enforceable completion dates consistent with these prioritization criteria are included in Appendix 5. Appendix 5 includes enforceable completion dates for pre-GDP shutdown scope. These enforceable completion dates for remedial actions shall be considered satisfied upon issuance of a D1 Remedial Action Completion Report (RACR) (i.e., Final Remedial Action Report as specified in FFA) for those areas where RAOs have been achieved. In cases where a period of operations and maintenance (O&M) may be required to achieve RAOs, such as groundwater, a D1 Interim RACR will be issued upon completion of remedial construction and a determination by DOE that the remedy is operating as intended. The out-year enforceable milestone for completion of the pre-GDP shutdown Groundwater OU, as specified in Section XVIII.C, "Timetables and Deadlines" of the FFA, will be satisfied upon issuance of a D1 Interim RACR. The D1 Final RACR for groundwater then will be issued once the RAOs have been achieved. The pre-GDP shutdown D&D OU consists of multiple removal actions for specific facilities and will be considered complete upon issuance of a Removal Action Completion Notification letter for the OU. All data collected in support of any removal or remedial action shall be managed in accordance with an approved Data Management Plan (DMP). In accordance with Section XXVII.C of the FFA, the final DMP shall be appended to the SMP. Appendix 6 contains the final DMP for the Paducah Site.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX 1

ACTIONS TAKEN TO DATE

THIS PAGE INTENTIONALLY LEFT BLANK

Operable Unit Summary

WAGs/Media	Response Type	ROD/Action Memorandum	Response Description	Status[1]
GROUNDWATER OPERABLE UNIT (OPERABLE UNIT DESIGNATION 01)				
WAG 26/Groundwater	Emergency removal action	N/A	Provided temporary water to local residences where private wells are contaminated by TCE and Tc-99.	Complete
WAG 26/Groundwater	Removal action	August 30, 1994	Extended municipal water line to residences affected by off-site groundwater contamination.	Construction Complete/Operational
WAG 26/Groundwater (Northwest Plume)	Interim Remedial Action (IRA)	July 23, 1993	Hydraulic containment and treatment of high concentrations of off-site TCE contamination in the Northwest Plume.	Construction Complete/Operational
	Explanation of Significant Differences (ESD)	January 27, 2011	Optimization of the Northwest Plume system through placing existing southern extraction wells (EWs) on standby and installing two new EWs east of original southern extraction field.	Construction Complete/Operational

[1] Detailed information on the status of each project or operable unit is available in the FFA Semiannual Report.

Operable Unit Summary (Continued)

WAGs/Media	Response Type	ROD/Action Memorandum	Response Description	Status[3]
GROUNDWATER OPERABLE UNIT (OPERABLE UNIT DESIGNATION 01) (Continued)				
WAG 26/Groundwater (Northeast Plume)	IRA	June 15, 1995	Hydraulic containment and treatment of high concentrations of off-site TCE contamination in the Northeast Plume. An ESD has been submitted for optimization of the Northeast Plume system through placing existing EWs on standby, installing two new EWs in the upgradient high concentration area of the Northeast Plume near the eastern edge of the PGDP facility, and installing new treatment units for air stripping as an alternative to the cooling towers.	Construction Complete/Operational Construction of an alternate treatment unit was completed on May 30, 2013. The unit became operational on September 4, 2013. The ESD and RAWP were in dispute until July 2015 at which time the Memorandum of Agreement for resolution was signed. Optimization field start activities are scheduled to begin in September 2016.
SWMU 91/Soil	IRA	August 10, 1998	*In situ* treatment of TCE-contaminated soils using the LASAGNA™ technology.	Complete

Operable Unit Summary (Continued)

WAGs/Media	Response Type	ROD/Action Memorandum	Response Description	Status[3]
GROUNDWATER OPERABLE UNIT (OPERABLE UNIT DESIGNATION 01) (Continued)				
SWMU 11 and SWMU 533/Groundwater (C-400 Source Action)	IRA	August 9, 2005	*In situ* treatment of TCE source areas in the UCRS and RGA located in the southeast and southwest corners of the C-400 Building using electrical resistance heating technology.	Field operations for Phase I completed in FY 2011. Parties agreed to divide Phase II into Phase IIa and Phase IIb. Phase IIa operations began on July 22, 2013, and ceased on November 5, 2014. A treatability study for steam-enhanced extraction was conducted and completed on June 30, 2015. The Treatability Study Report was approved in June 2016. Results will be evaluated prior to selection of a remedy for the lower RGA (Phase IIb).

Operable Unit Summary (Continued)

WAGs/Media	Response Type	ROD/Action Memorandum	Response Description	Status[3]
GROUNDWATER OPERABLE UNIT (OPERABLE UNIT DESIGNATION 01) (Continued)				
SWMU 1: SWMU 211-A; and SWMU 211-B (Southwest Plume Sources)	Remedial Action	March 20, 2012	SWMU 1—*In situ* source treatment using deep soil mixing with interim LUCs. SWMU 211-A—*In situ* source treatment using enhanced *in situ* bioremediation with interim LUCs or long-term monitoring with interim LUCs based upon RDSI results. SWMU 211-B—*In situ* source treatment using enhanced *in situ* bioremediation with interim LUCs or long-term monitoring with interim LUCs based upon RDSI results.	ROD signed; RDSI field activities initiated on July 18, 2012. Completed RDSI field activities on April 26, 2013. Additional sampling was requested by EPA and completed by DOE. The Final Characterization Report Addendum and Letter Notification proposing remedy for 211-A and 211-B are under evaluation by the FFA parties. Mobilization activities for SWMU 1 deep soil mixing were initiated on February 9, 2015, and soil mixing was completed on October 8, 2015. Soil sampling, monitoring wells installation, and Remedial Action Completion Report for SWMU 1 are planned for FY 2016.

Operable Unit Summary (Continued)

WAGs/Media	Response Type	ROD/Action Memorandum	Response Description	Status[3]
SURFACE WATER OPERABLE UNIT (OPERABLE UNIT DESIGNATION 03)				
WAG 25/Surface water (NSDD)	IRA	March 28, 1994	Instituted action to treat certain plant effluent and control the migration of contaminated sediment associated with the NSDD.	Construction Complete/Operational
WAGs 18 & 25/Surface water and sediment (Surface Water/Ditches)	IRA	N/A	Institutional controls (fencing/posting) for off-site contamination in surface water, outfalls, and lagoons.	Construction Complete/Operational
WAG 24/Scrap (Scrapyards)	IRA	N/A	Installation of sediment controls to mitigate surface water/sediment runoff from scrap yards.	Construction Complete/Operational
WAGs 1 &7 WAG 1: SWMU 100 (Fire Training Area) and SWMU 136 (C-740 TCE Spill Site) WAG 7: SWMU 8 (C-746-K Landfill), SWMU 130 (C-611 550-gal Gasoline UST), SWMU 131 (C-611 50-gal Gasoline UST), SWMU 132 (C-611 2,000-gal. Oil UST), SWMU 133 (C-611 Grouted UST), and SWMU 134 (C-611 1,000-gal Diesel/Gasoline Tank)	IRA	August 10, 1998	Interim remedial action installed riprap along creek bank to prevent direct contact, implemented institutional controls, and long-term monitoring for SWMU 8. All other SWMUs were determined to require "no further action" under the IRA. It should be noted that at SWMU 100, institutional controls were selected as part of the remedy.	Construction Complete/Operational
Drum Mountain (Scrap)	Non-time-critical removal action	March 27, 2000	Removed and disposed of Drum Mountain.	Complete
WAG 24, WAG 14, and SWMU 99/Scrap	Non-time-critical removal action	September 26, 2001	Removed and disposed of scrap metal with enhanced sediment control measures.	Complete
SWMU 59/Sediment	IRA	September 25, 2002	Remedial action for Sections 1 and 2 of the NSDD.	Complete

Operable Unit Summary (Continued)

WAGs/Media	Response Type	ROD/Action Memorandum	Response Description	Status[3]
SURFACE WATER OPERABLE UNIT (OPERABLE UNIT DESIGNATION 03) (Continued)				
SWMU 58 (Sections 3, 4, and 5 of the NSDD); SWMU 69 (Outfall 001); SWMU 63 (Outfall 008); SWMU 66 (Outfall 010); SWMU 67 (Outfall 011); and SWMU 68 (Outfall 015) and their associated internal ditches and areas (including SWMUs 92 and 97)	Non-time-critical removal action	April 23, 2009	Removal action for contaminants associated with sediment in Sections 3, 4, and 5 of the NSDD and KPDES Outfalls 001, 008, 010, 011, and 015, and associated internal ditches and areas of PGDP.	Complete
BURIAL GROUNDS OPERABLE UNIT (OPERABLE UNIT DESIGNATION 05)				
WAG 22/Waste and soil (SWMU 2- Burial Ground)	IRA	September 11, 1995	The interim ROD selected an impermeable cap to reduce leachate migration from surface infiltration, groundwater monitoring, and institutional controls. Through agreement of the parties, an impermeable cap was not constructed (*Waste Area Grouping (WAG) 22 Post-Record of Decision (ROD) Change*, October 23, 1996). This change also will be documented in the Final Remedial Decision for SWMU 2.	Additional remedial alternatives for a CERCLA final remedial action are being evaluated in the SWMUs 2, 3, 7, and 30 feasibility study. Institutional controls and groundwater monitoring are ongoing pending final remedy selection.

Operable Unit Summary (Continued)

WAGs/Media	Response Type	ROD/Action Memorandum	Response Description	Status[3]
SOILS OPERABLE UNIT (OPERABLE UNIT DESIGNATION 04)				
C-750-A, -B, and -C USTs	N/A	N/A	Tank removal.	Complete
WAG 7 SWMU 8 (C-746-K Landfill)	IRA	N/A	Enhanced existing cap to reduce leachate migration from surface infiltration.	Complete
AOC 124 WAG 17/Soil (Concrete Rubble Piles)	Removal action	N/A	Excavated soil associated with AOC 124.	Complete
WAG 23/Soil	Removal action	September 11, 1997	Excavated PCB and dioxin-contaminated surface soils to reduce risks to plant industrial workers.	Complete
SWMU 193/Soil	Time-critical removal action	February 19, 2002	Removed petroleum-contaminated soils.	Complete
SWMUs 76 and 519/Soil	Time-critical removal action	July 1, 2002	Removed empty sulfuric acid tanks, size reduced for containerization and dispositioned.	Complete
SWMU 19 [C-410-B Hydrogen Fluoride (HF) Neutralization Lagoon], SWMU 40 (C-403) and SWMU 181 (C-218 Firing Range)	Non-time-critical removal action	May 11, 2009	Removal of lead-contaminated soil at the C-218 Firing Range (SWMU 181). Removal of contamination within the respective SWMU boundaries of C-410-B (SWMU 19). Removal of contamination within the respective SWMU boundaries of C-403 (SWMU 40).	SWMU 19 and SWMU 181 are complete. SWMU 40 removal will be implemented as part of the Remaining Remediation Scope phase. This schedule change has been documented in the Administrative Record.

Operable Unit Summary (Continued)

WAGs/Media	Response Type	ROD/Action Memorandum	Response Description	Status[3]
D&D OPERABLE UNIT (OPERABLE UNIT DESIGNATION 02)				
SWMU 478/Infrastructure (C-410)	Non-time-critical removal action	August 3, 2002	Remove process equipment and piping.	Completed December 2013.
SWMU 478/Infrastructure (C-410)	Non-time-critical removal action	November 23, 2009	Addendum to document a change in scope of the removal action to 1) expand the scope of the existing NTCRA to include facility structure demolition to the slabs and disposition of demolition debris and 2) allow the non-process systems to remain in place and to remove these systems at the same time the building is demolished using heavy equipment such as excavators with shears.	Fieldwork for C-410/C-420 completed in December 2015. Removal Action Report approved in June 2016.
SWMU 477/Infrastructure (C-340 Metals Plant) and SWMU 137 (C-746-A East End Smelter)	Non-time-critical removal action	May 18, 2010	Decommissioning of the C-340 Metals Plant and C-746-A East End Smelter, which entails the demolition of C-340-A, -B, and -C structures as well as the C-746-A East End Smelter. The slabs and soils underlying these structures will be addressed in future CERCLA response actions.	Fieldwork for C-746-A East End Smelter completed in FY 2010; Removal Action Report approved in November 2011. Fieldwork for C-340 completed in September 2013. Removal Action Report approved in May 2014.
SWMU 480 (C-402 Lime House); SWMU 55 (C-405 Incinerator); and SWMU 464 (C-746A West End Smelter)	Non-time-critical removal action	December 5, 2005	Removed, characterized, and disposed of building structure and contents.	Complete

AOC = area of concern; BGOU = Burial Grounds Operable Unit; ESD = explanation of significant differences; FY = fiscal year; IRA = interim remedial action; KPDES = Kentucky Pollutant Discharge Elimination System; LUCs = land use controls; N/A = not applicable; NSDD = North-South Diversion Ditch; NTCRA = non-time-critical removal action; PGDP = Paducah Gaseous Diffusion Plant; PCB = polychlorinated biphenyl; RDSI = remedial design/support investigation; RGA = Regional Gravel Aquifer; ROD = Record of Decision; SWMU = solid waste management unit; Tc-99 = technetium-99; TCE = trichloroethene; UCRS = Upper Continental Recharge System; UST = underground storage tank; WAG = waste area group

Paducah Operable Unit Designations: Groundwater OU—OU Designation 01; Decontamination and Decommissioning OU—OU Designation 02; Surface Water OU—OU Designation 03; Burial Grounds OU—OU Designation 05; Waste Disposal OU—OU Designation 06; Remaining Remediation Groundwater Sources OU—OU Designation 07; Remaining Remediation Lagoons and Ditches OU—OU Designation 08; Remaining Remediation Burial Grounds OU—OU Designation 09; Remaining Remediation Soils and Slabs OU—OU Designation 10; Remaining Remediation Decontamination and Decommissioning OU—OU Designation 11; Comprehensive Site Operable Unit—OU Designation 12
Note: Operable Unit Designation 00 will be used for the Site Management Plan; Five-Year Review; FFA Semiannual Report; Community Relations Plan; and Data Management Plan

APPENDIX 2

CERTIFICATION OF LUCIPS

THIS PAGE INTENTIONALLY LEFT BLANK

CERTIFICATION OF LUCIPS

In accordance with Section 2.9 of the *Land Use Control Assurance Plan for the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-1799&D2, the U.S. Department of Energy (DOE) certifies that requirements of the *Land Use Control Implementation Plan for the North-South Diversion Ditch at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-1949&D2, and the *Land Use Control Implementation Plan for Interim Remedial Action for the Groundwater Operable Unit for the Volatile Organic Compound Contamination at the C-400 Cleaning Building at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-2151&D2/R2, are being implemented by DOE at Paducah Gaseous Diffusion Plant.

There have been no changes in the designated officials identified under the Land Use Control Implementation Plan/Land Use Control Assurance Plan. There have been no major or "nonmajor" changes of land use.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX 3

OPERABLE UNIT SCOPE DESCRIPTIONS AND KEY PROJECT ASSUMPTIONS

THIS PAGE INTENTIONALLY LEFT BLANK

OPERABLE UNIT SCOPE DESCRIPTIONS AND KEY DOE PLANNING ASSUMPTIONS FROM LIFE CYCLE BASELINE

INTRODUCTION

Pursuant to Section XVIII of the Federal Facility Agreement (FFA), the following operable unit-specific descriptions document the FFA Managers' common understanding of the expected scope of work for each of the operable units (OUs) as well as U.S. Department of Energy's (DOE) key planning assumptions. The FFA Managers acknowledge that both the scope and associated assumptions may change as each project progresses; however, this appendix represents the best understanding given existing information. The milestone dates associated with executing the scope of work are defined in Appendix 5 (Enforceable Timetables and Deadlines; Planning Dates with Long-Term Targets). The milestone dates are based on the scope and associated assumptions described in the following sections. Schedules are based on standard Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) documentation and review/comment time frames established in the FFA.

The Paducah Gaseous Diffusion Plant (PGDP) ceased operations in May 2013 and leased property was returned to DOE in October 2014. Prior to delease, site cleanup activities had been divided as (1) pre-GDP shutdown scope, and (2) post-GDP shutdown scope, and (3) Comprehensive Site Operable Unit (CSOU) scope. The pre-shutdown scope was associated with media-specific OUs initiated prior to shutdown of the operating GDP.

For the purposes of this plan, all activities previously identified as post-GDP shutdown scope now are identified as Remaining Remediation Scope. The Remaining Remediation Scope has not been scheduled or sequenced to be completed before the 2032 end date established for the pre-GDP shutdown scope. This appendix includes general information about the Remaining Remediation Scope OUs. The FFA parties will work during fiscal year (FY) 2016 to evaluate this scope and determine what resequencing is needed, if any.

Scope and Key DOE Planning Assumptions from Life Cycle Baseline have been established for the pre-GDP shutdown scope based on the current understanding of site conditions and to achieve compliance with CERCLA, the National Contingency Plan (NCP), and the FFA. The actual scope of any given remedy will be developed with the U.S. Environmental Protection Agency (EPA) and the Commonwealth of Kentucky (KY) in compliance with the CERCLA process and documented in the appropriate decision document, each of which is subject to public participation in accordance with the FFA, CERCLA, and the NCP. Goals have been established for each OU to guide the development of project-specific remedial action objectives (RAOs).

Assumptions included herein are for DOE's planning purposes. While EPA and KY find the assumptions to be reasonable for bounding cost and schedule forecasts based on existing information, regulatory approval of the SMP does not constitute approval of assumptions. In the event there is a conflict between an assumption in this SMP and an OU primary document, the OU primary document shall govern.

GROUNDWATER OPERABLE UNIT (PRE-GDP SHUTDOWN)

The Groundwater Operable Unit (GWOU) is being implemented in a phased approach consisting of sequenced response actions designed to accomplish the following goals:

(1) Prevent human exposure to contaminated groundwater;
(2) Prevent or minimize further migration of contaminant plumes;

(3) Prevent, reduce, or control contaminant sources contributing to groundwater contamination; and
(4) Restore the groundwater to its beneficial uses wherever practicable.

A series of actions already have been completed toward meeting these goals, as depicted in Figure 3.1. These previous actions are summarized in Appendix 1 (Actions Taken to Date).

The scope of the GWOU Pre-GDP shutdown consists of potential sources [e.g., dense nonaqueous-phase liquid (DNAPL) or buried wastes] that are contributing to groundwater contamination and the dissolved-phase groundwater plumes. The dissolved-phase groundwater consists of contaminated groundwater primarily in the Regional Gravel Aquifer (RGA), but also includes limited areas in the Upper Continental Recharge System (UCRS) that typically are associated with source areas. An interim remedy had been selected and was implemented for the C-400 source areas to address volatile organic compound (VOC) contamination, and a Focused Feasibility Study (FFS) has been developed for the Southwest Plume VOC source areas. The original FFS for the Southwest Plume source areas was revised to expand the evaluation of alternatives, which served as a basis for the Record of Decision signed in 2012. The dissolved-phase plumes will be addressed as a future response action through the remedial process.

C-400 Interim Remedial Action

Scope

This project addresses releases emanating near the southeast [Solid Waste Management Unit (SWMU) 11] and southwest (SWMU 533) areas of the C-400 Cleaning Building. These areas have been identified as the major sources of groundwater contamination at Paducah Gaseous Diffusion Plant (PGDP). The RAOs for this project are to do the following:

- Reduce exposure to contaminated groundwater by reducing the source concentrations of TCE and other volatile organic compounds (VOCs) in the RGA in the C-400 Cleaning Building area, thereby reducing the migration of these contaminants to off-site points of exposure (POE);

- Prevent exposure to contaminated groundwater by on-site industrial workers through institutional controls (e.g., excavation/penetration permit program); and

- Reduce contamination comprised of trichloroethene (TCE and other VOCs found in Upper Continental Recharge System (UCRS) soil in the C-400 Cleaning Building area to minimize the migration of these contaminants to RGA groundwater and to off-site POE.

A major component of the selected remedy is the reduction of the concentration of TCE and other VOCs in the soils in the C-400 Cleaning Building area through removal and treatment in both the UCRS and the RGA. Additional characterization to refine the mass estimate has been performed in the Phase II area and DOE proposed a modification to the remedy in response to the Phase I results. Key lessons learned and observations from Phase I indicate that, while the remedial action objectives were met in the UCRS and upper RGA using electrical resistance heating (ERH), target temperatures for ERH were not met in the lower RGA despite implementation of contingency measures intended to assist in attaining temperature goals. Since ERH was not found to be effective, DOE is evaluating technologies that are better suited for the RGA. As a result, Phase II of the remedy (southeast corner of C-400) has been divided into two phases. Phase IIa has addressed the UCRS and upper RGA. Phase IIb will address lower RGA.

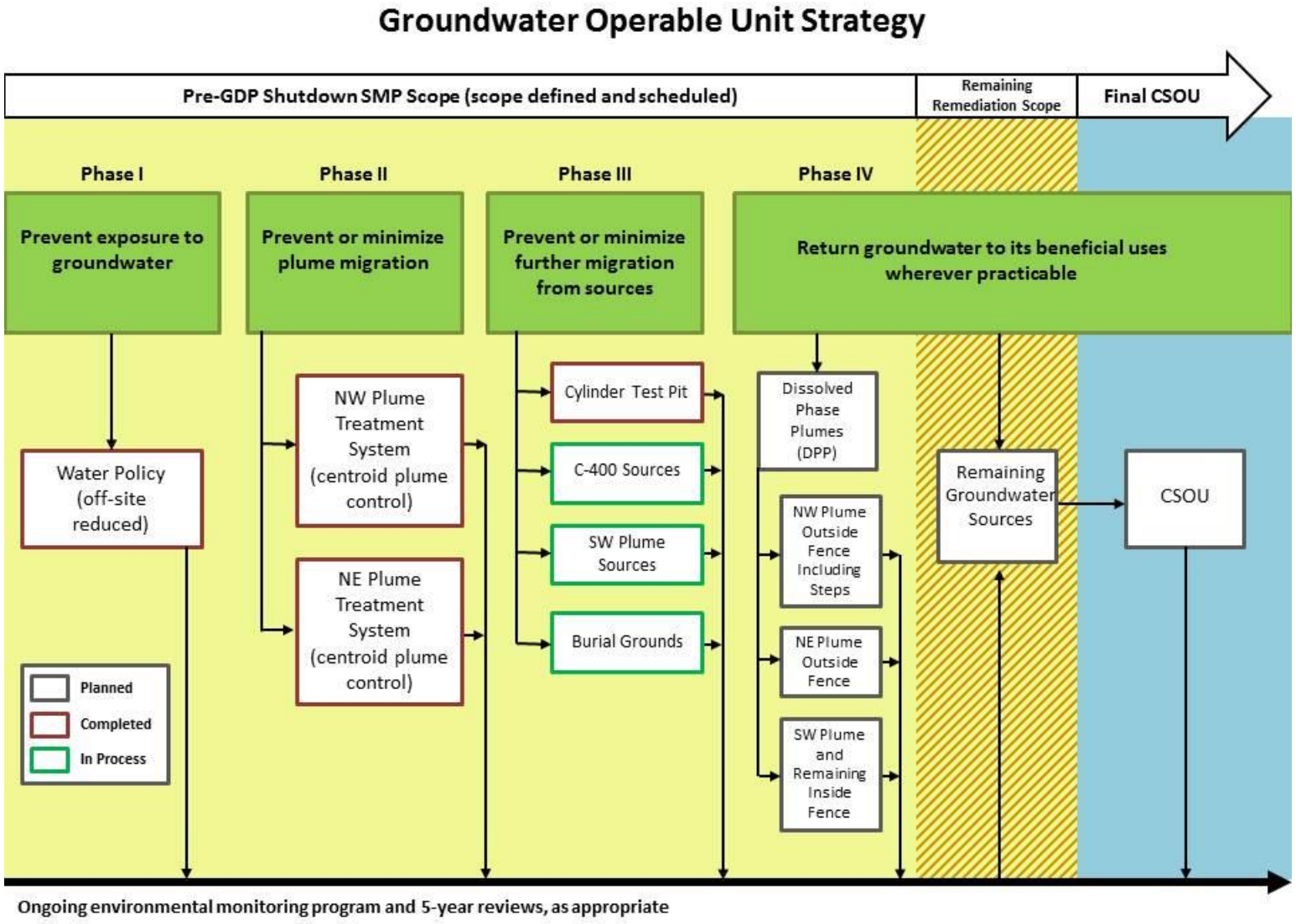

Figure 3.1. Current Groundwater Operable Unit Strategy

Key DOE Planning Assumptions from Life Cycle Baseline

(1) Installation and operation of a three-phase ERH system. The ERH system will be operated until monitoring indicates heating has stabilized in the subsurface and recovery of TCE, as measured in the recovered vapor, diminishes to a point at which further recovery is at a constant rate (recovery is asymptotic).

(2) Installation of a groundwater and vapor treatment system to remove VOCs from extracted vapor/groundwater.

(3) Collection of baseline and post operational soil and groundwater samples to analyze Interim Remedial Action effectiveness. Additional groundwater monitoring will be conducted through the Environmental Monitoring Program.

(4) Implementation of a two-phased deployment of ERH will be conducted. Phase 1 will involve treatment areas to the southwest and the east of the C-400 Cleaning Building, and Phase II will address a large treatment area to the southeast of the building. Phase II has been divided into two phases. Phase IIa will address the UCRS and upper RGA. Phase IIb will address the lower RGA.

(5) Based on the evaluation of the lessons learned from the Phase I operations and performance, it has been determined that ERH cannot be implemented effectively for Phase IIb. As a result, ERH will be utilized to remove contaminants in the UCRS and upper RGA (Phase IIa), and a treatability study for steam-enhanced extraction has been conducted, and results will be evaluated by the FFA parties prior to remedy selection for the lower RGA (Phase IIb).

Southwest Plume Sources Remedial Action

Scope

This project will address the following three areas in the Southwest Plume: the C-747-C Oil Landfarm (SWMU 1), the areas near the southeast and northeast (SWMU 211) areas of the C-720 Building, and part of the storm sewer between the south side of the C-400 Building and Outfall 008 (SWMU 102). An FFA dispute resolution agreement specifies that a primary RAO of this action is to address these source areas, including treatment and/or removal of principal threat wastes consistent with CERCLA, the NCP (including the Preamble), and any pertinent EPA guidance. Contamination emanating from these sources will be addressed consistent with the FFA dispute resolution agreements. TCE and its breakdown products [*cis*-1,2-dichloroethene (DCE), *trans*-1,2-DCE, and vinyl chloride] and 1,1-DCE are the primary contaminants of concern (COCs) associated with these sources. Evaluation of a final remedial action for additional COCs associated with direct contact exposure risks will be addressed as part of the Soils OU (see Appendix 4).

Key DOE Planning Assumptions from Life Cycle Baseline

(1) A remedy will be implemented in source areas [i.e., Oil Land Farm (SWMU 1) and Northeast and Southeast of the C-720 Building (SWMU 211 A & B)]. The SWMU 1 remedy is soil mixing with interim LUCs, and the remedy for SWMU 211-A and 211-B is *in situ* bioremediation with interim LUCs or long-term monitoring with interim LUCs.

(2) Membrane Interface Probe (MIP), correlated with soil bore samples, will be conducted prior to design and remedy implementation.

(3) As part of the design process, an RDSI will be performed for SWMU 1 and SWMU 211-A and 211-B.

(4) No further action will be required for SWMU 102 (Plant Storm Sewer).

(5) Additional sampling for SWMU 1 will be performed in the southern and eastern areas to address uncertainty. The investigation will include the drilling of four soil borings to a target depth of approximately 60 to 62 ft and the collection of soil samples from each 5-ft depth increment for analysis of VOCs. A memorandum to file will be placed in the Soils OU Administrative Record documenting the basis for the additional investigation, as well as the manner in which the work will differ from the standard Soils OU sampling protocol. Characterization data from this investigation for the 0-ft to 10-ft depth soils in the four deep soil borings will be reported and evaluated as part of the Soils OU. Characterization data for soils deeper than 10 ft will be reported in the Remedial Action Completion Report for the Southwest Plume Groundwater SWMU 1 action. If an additional source action is required as a result of this sampling, it will be conducted as part of the GWOU.

Dissolved-Phase Plumes Remedial Action[2]

Scope

This project includes conducting an RI (including a baseline risk assessment), FS, and remedy selection and implementation of any necessary response actions for the dissolved-phase groundwater contamination. The RI/Feasibility Study (FS) will evaluate dissolved-phase groundwater contamination, including, but not limited to, the Northwest Plume (NW) (SWMU 201), Northeast Plume (NE) (SWMU 202), and Southwest Plume (SWMU 210), and the groundwater contamination contributing to the Little Bayou Creek seeps. The RI/FS also may determine whether any follow-up actions or modifications to response actions for the GWOU are necessary. The primary RAO for this project is based on the resolution of dispute for the Southwest Plume dated March 24, 2008, as follows:

- Return contaminated groundwaters to their beneficial use(s) and attain chemical-specific applicable or relevant and appropriate requirements [e.g., maximum contaminant levels (MCLs)] and/or risk-based concentrations for all identified COCs throughout the plume (or at the edge of the waste management area depending on whether the waste source is removed), consistent with CERCLA, the NCP (including the Preamble), and any pertinent EPA guidance.

Key DOE Planning Assumptions from Life Cycle Baseline

The following elements summarize DOE's key planning assumptions and are illustrated in Figure 3.2.

(1) TCE and Tc-99 are expected to be the primary COCs that will drive the remediation approach.

(2) Implement the following actions for the pump-and-treat systems: (a) focus groundwater extraction for the NW Plume at the south well field to maximize removal of the higher TCE concentrations, thereby reducing mass flux contributing to the off-site NW dissolved-phase plume and (b) implement optimization of the NE plume extraction system, similar to the optimization of the NW Plume extraction system to improve reductions in contaminant mass migrating downgradient of PGDP.

[2] The scope and planning assumptions are consistent with the March 24, 2008, and May 20, 2010, SW Plume Dispute Resolutions.

(3) Conduct a technology demonstration/treatability study at Little Bayou Creek seeps to address the TCE concentrations in surface water contamination resulting from groundwater discharge. The treatability study may include testing technologies that will have broader application to other areas of the dissolved-phase plumes.

(4) Data collected from the NW plume extraction system optimization; the NE plume extraction system optimization; the treatability study at the Little Bayou Creek seeps; TCE degradation study; and the groundwater flow/transport model will be used to support the RI/FS process and will be documented accordingly.

(5) The remedial action for the dissolved-phase plumes will include the following: (a) focused mass removal technology to address "high" mass residual VOCs and Tc-99 in the RGA near source areas in the plant vicinity; (b) operation of groundwater extraction system(s) until they meet shut-down criteria established in the final dissolved-phase plume Record of Decision (ROD); and (c) *in situ* treatment (e.g., enhanced bioremediation or alternative technology) for distal lobes of dissolved-phase plumes.

(6) The extent of dissolved-phase plume groundwater contamination is expected to be limited to those areas already defined, consisting of the Northeast Plume, Northwest Plume, and Southwest Plume.

(7) A single RI/FS Work Plan will be developed, encompassing all components of the Dissolved-Phase Plume remedial action; however, the remedial investigations may be conducted separately and the results may be reported in three separate RI Reports—(1) Northwest Plume Outside Fence Including Seeps, (2) Northeast Plume Outside Fence, and (3) Southwest Plume and Remaining Inside Fence.

(8) In addition to the development and submittal of three separate RI Reports, three separate Feasibility Studies, Proposed Plans, Record of Decisions, Remedial Design Work Plans, Remedial Design Reports, Remedial Action Work Plans, and Remedial Action Completion Reports also may be developed and submitted for each subproject—(1) Northwest Plume Outside Fence Including Seeps, (2) Northeast Plume Outside Fence, and (3) Southwest Plume and Remaining Inside Fence.

(9) Investigation and remediation of the seep areas along Little Bayou Creek will be addressed as part of the Dissolved-Phase Plume remedial action.

REMAINING REMEDIATION GROUNDWATER OU

Scope

This OU consists of potential sources (e.g., DNAPL) that are contributing to groundwater contamination and the dissolved-phase groundwater plumes under a building structure or newly identified sources not addressed under the pre-GDP shutdown GWOU projects.

This OU includes remaining sources to groundwater contamination as identified in Appendix 4 under Remaining Remediation Groundwater Sources OU. Currently there are two units identified: SWMU 11 and SWMU 533. The FFA parties will work during FY 2016 to evaluate this scope and determine what resequencing is needed, if any.

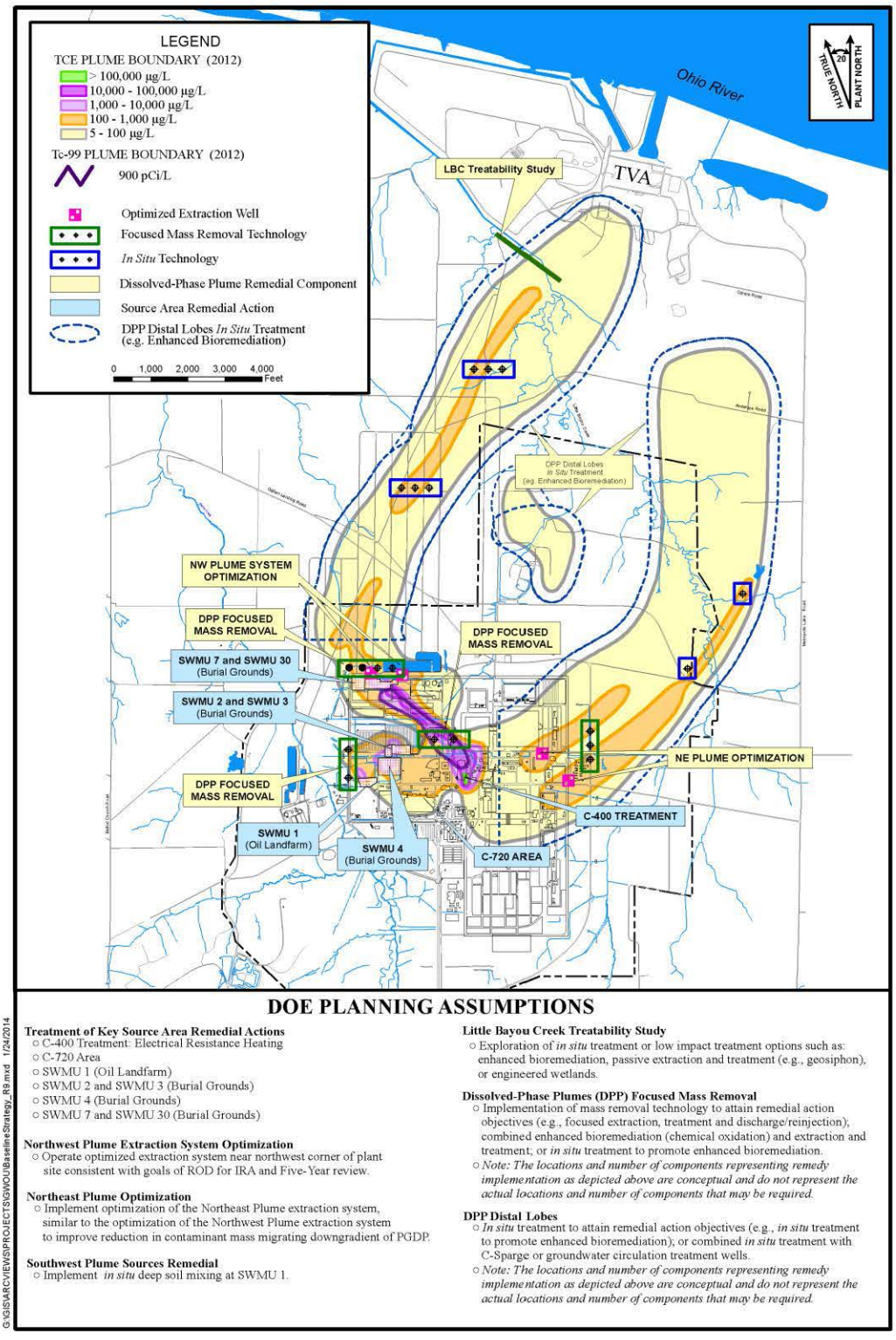

Figure 3.2. GWOU Baseline Strategy

BURIAL GROUNDS OPERABLE UNIT (PRE-GDP SHUTDOWN)

In order to facilitate the development of subsequent documents, the FFA parties have agreed to group the Burial Grounds OU (BGOU) SWMUs into more manageable remedial action subprojects.

The BGOU will employ the CERCLA remedial process to accomplish the following goals (based on February 10, 2012, BGOU dispute resolution):

- Contribute to protection of groundwater by eliminating, reducing, or controlling sources of groundwater contamination;

- Prevent exposure to waste and contaminated soils that present an unacceptable risk from direct contact; and

- Treat or remove principal threat wastes wherever practicable, consistent with 40 *CFR* § 300.430(a)(1)(iii)(A).

The SWMU-specific RAOs for SWMUs 5 and 6 are as follows:

- Contribute to the protection of groundwater by eliminating, reducing, or controlling sources of groundwater contamination that will result in an exceedance of the MCL or risk-based concentration for residential use of groundwater in the absence of an MCL in RGA groundwater.

- Prevent exposure to waste or waste-related contaminated soils that exceed target cumulative excess lifetime cancer risks (ELCRs) and cumulative noncancer hazard indices (HIs) for the future industrial and future outdoor worker receptors. The acceptable cumulative risk levels for this RAO are defined as follows:

  — Surface Soil: cumulative ELCR < 1E-05 and cumulative HI ≤ 1 for a future industrial worker
  — Subsurface Soil: cumulative ELCR < 1E-04 and cumulative HI ≤ 1 for an future outdoor worker

The SWMU-specific RAOs for SWMUs 2, 3, 7, and 30 have not been finalized.

Scope

The BGOU consists of the following 10 SWMUs.

- C-749: Uranium Burial Ground (SWMU 2)

- C-404: Low-Level Radioactive Waste Burial Ground (SWMU 3)

- C-747/748-B: Contaminated Burial Ground (SWMU 4)

- C-746-F: Burial Ground (SWMU 5)

- C-747-B: Burial Area (SWMU 6)

- C-747-A: Burial Ground and Burn Area (SWMUs 7 and 30)

- Residential/Inert Borrow Area/Old North-South Diversion Ditch (NSDD) Disposal Trench (SWMU 145)

- C-746-S: Residential Landfill (SWMU 9)[3]

- C-746-T: Inert Landfill (SWMU 10)[3]

The burial grounds contain materials such as sanitary waste, hazardous waste, radioactive waste, and pyrophoric uranium. Some of the burial grounds contain principal threat waste that have released or may in the future release to soils and groundwater. Surface soil within BGOU SWMUs is being addressed by BGOU rather than Soils OU.

The pre-GDP shutdown burial grounds are grouped as follows: (1) SWMUs 5 and 6; (2) SWMUs 2, 3, 7, and 30; (3) SWMU 4; and (4) SWMUs 9, 10, and 145. To facilitate phased implementation of remedial action, SWMUs 2, 3, 7, and 30 will be divided further and separate CERCLA documents (i.e., proposed plan, ROD, remedial design work plan, remedial design report, remedial action work plan, and remedial action completion report) will be developed for SWMUs 2 and 3 and SWMUs 7 and 30. The reason for the division of SWMUs 2, 3, 7, and 30 at the proposed plan stage is that SWMUs 2 and 3 are anticipated to require EPA and DOE remedy review boards. In addition, there is the likelihood that SWMUs 2 and 3 will require extensive time to reach a decision.

Key DOE Planning Assumptions

(1) A supplemental remedial investigation for optimizing the alternatives analysis and the associated RI Report Addendum will precede the SWMU 4 Feasibility Study.

(2) A supplemental remedial investigation and the associated RI Report Addendum will precede the SWMUs 9, 10, and 145 Feasibility Study.

(3) SWMU 2, SWMU 3, SWMU 4, and SWMU 7 contain principal threat waste.

(4) Soil cover (18-inch) is expected to be included in the remedy selected for SWMU 145.

(5) SWMUs 5 and 6 are expected to implement a Kentucky Subtitle D cap if containment is selected as the final remedy.

(6) SWMUs 7 and 30 are expected to implement a Kentucky Subtitle D cap if containment is selected as the final remedy.

(7) SWMUs 9 and 10 will be evaluated as part of the CERCLA process. Currently only limited actions (e.g., LUC evaluation) are assumed to be required in the baseline for SWMUs 9 and 10.

(8) Post-closure monitoring data are assumed to substantiate that capping remedies will provide long-term effectiveness, and supplemental remedial actions will not be required.

(9) An integrated groundwater monitoring system at each SWMU (e.g., upgradient and downgradient) will be employed to provide indication of future unanticipated releases and collect data on the effectiveness of the caps and *in situ* actions.

[3] Previously closed under solid waste regulations (C-746-T closed on 2/9/95; C-746-S closed on 8/4/95).

REMAINING REMEDIATION BURIAL GROUNDS SOURCES OU

Scope

This OU includes for remaining burial grounds, as identified in Appendix 4 under Remaining Remediation Burial Grounds Sources OU. Currently there are two units identified: SWMU 472 and SWMU 520. The FFA parties will work during FY 2016 to evaluate this scope and determine what resequencing is needed, if any.

SURFACE WATER OPERABLE UNIT (PRE-GDP SHUTDOWN)

The Surface Water Operable Unit (SWOU) is being implemented in a phased approach consisting of a series of sequenced remedial and removal actions designed to accomplish the following goals:

(1) Prevent human exposure to contaminated sediments presenting an unacceptable risk to on-site workers and off-site recreational users of surface water;

(2) Prevent or minimize further off-site migration of contaminated sediments and surface water;

(3) Reduce, control, or minimize contaminant sources contributing to sediment and surface water contamination; and

(4) Evaluate and select long-term solutions for off-site surface water contamination to protect recreational users and ecological receptors.

A series of actions already have been completed toward meeting these goals, as depicted in Figure 3.3. The previous actions are summarized in Appendix 1 (Actions Taken to Date).

The SWOU consists of the specific SWMUs and Areas of Concern (AOCs) identified in Appendix 4 (Source Area By Operable Unit), and includes the soils/sediments and storm water corresponding with the points of discharge from facility piping to ditches, outfalls and Bayou and Little Bayou Creeks. Metals, radionuclides, and PCBs are the likely contaminants of interest for the SWOU.

Surface Water Remedial Action

Scope

The scope of this project includes an RI/FS [baseline risk assessment (BRA)], remedy selection, and implementation of any necessary response actions for on- and off-site areas, including Bayou Creek, Little Bayou Creek, and Outfalls 001, 002, 008, 009, 010, 011, 012, 013, and 015, as well as scoping for and completion of a baseline ecological risk assessment for PGDP. The Surface Water Remedial Action includes evaluation of all areas located inside the limited area draining to Bayou and Little Bayou Creeks to the Ohio River, including those areas previously addressed in the SWOU Removal Action. The timing and sequence of any remedial actions will require coordination with ongoing plant operations to prevent recontamination and consideration of ongoing permitted discharges. The SWOU will address contaminated media (e.g., surface water and sediments) associated with ditches and creeks as part of the RI/FS consistent with the NCP and EPA guidance. Even though remediation of Outfalls, 005, 006, 017, and 019 and their associated ditches is not planned until after GDP shutdown, data associated with them [e.g., creek data upstream and downstream of the point of discharge, Kentucky Pollutant Discharge

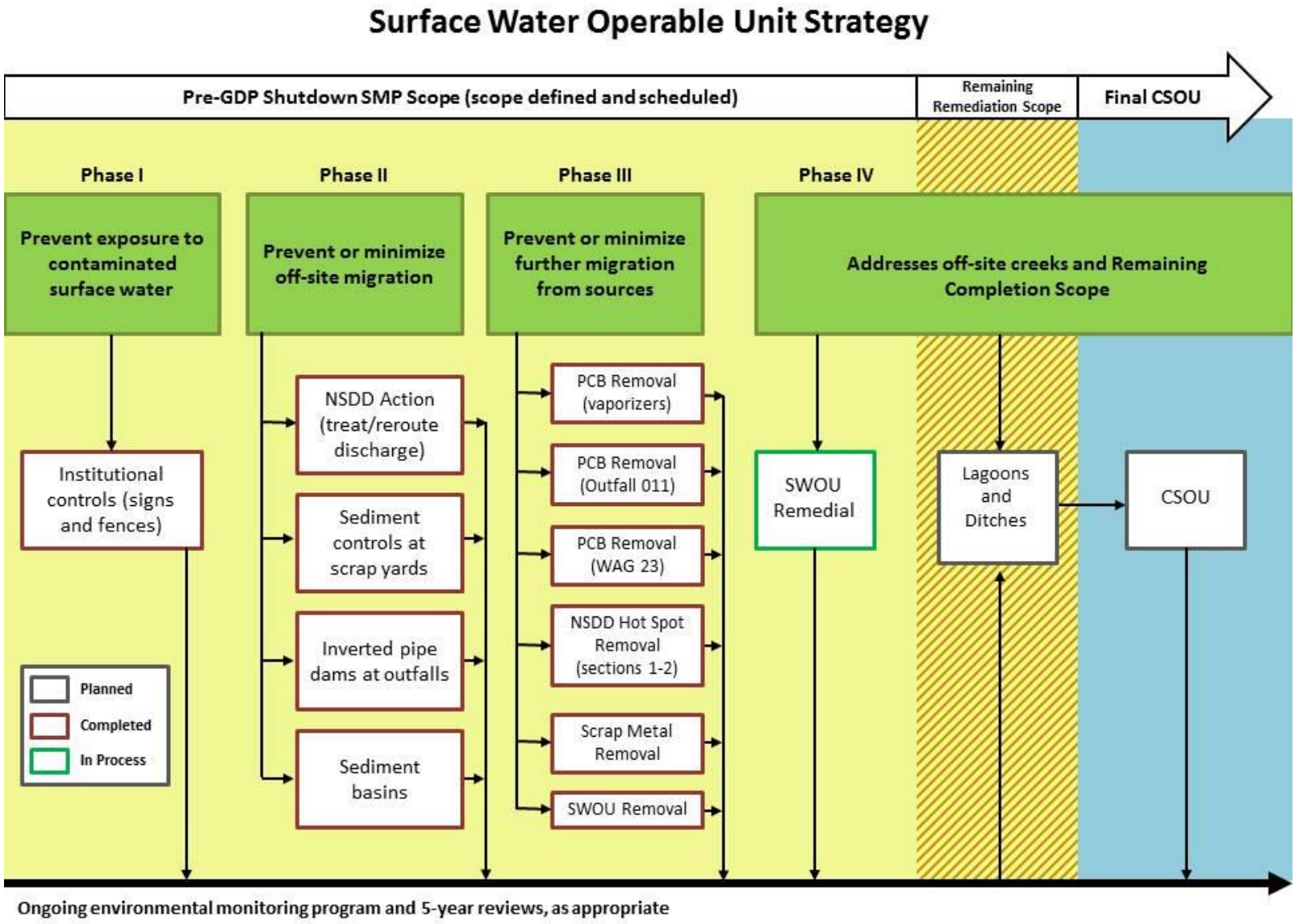

Figure 3.3. Current Surface Water Operable Unit Strategy

Elimination System (KPDES) monitoring data, and information on ecological receptors] will be included in the RI/FS and sitewide baseline ecological risk assessment associated with the SWOU during the pre-shutdown phase.

A final remedial action decision for the lagoons will be addressed as part of the post-GDP shutdown for the GDP Lagoons and Ditches OU, as discussed in Section 3.

Key DOE Planning Assumptions from Life Cycle Baseline

(1) RI characterization will be conducted in a phased approach with uranium-238, cesium-137, and Total PCBs being used as indicator parameters during the first phase, followed by a more comprehensive list of analyte sampling (i.e., PCBs, metals, radionuclides, and volatile organic analytes during the second phase).

(2) Existing information for internal ditches will be used for characterization. Additional sampling will focus primarily on areas between the KPDES compliance points and drainage into Little Bayou Creek and Bayou Creek[4].

(3) Little and Bayou Creeks will be investigated to the confluence with the Ohio River.

(4) Biota sampling will be required to support an ecological risk assessment for off-site portions of the SWOU.

(5) The assumed remedial action is excavation of contaminated sediments in outfalls and creeks and will involve coordination with the U.S. Army Corps of Engineers. No O&M period is assumed to be needed to achieve RAOs.

(6) The RI/FS Work Plan is comprehensive, encompassing all components of the SWOU remedial action; however, the document is divided by watershed (Little Bayou Creek and Bayou Creek) to support independent execution of sampling and documentation of results by watershed.

(7) An ecological risk assessment will be completed for both watersheds and included within the RI/FS Report. Upon shutdown of the GDP and coordination with decontamination and decommissioning (D&D) activities, a sitewide ecological risk assessment may be necessary to determine the risk to ecological receptors from potential operational releases that might have occurred between the initial watershed-specific ecological risk assessments and shutdown of the GDP.

(8) Individual Feasibility Studies, Proposed Plans, Record of Decisions, Remedial Design Work Plans, Remedial Design Reports, Remedial Action Work Plans, and Remedial Action Completion Reports may be developed and submitted per watershed.

(9) Investigation and remediation of the seep areas along Little Bayou Creek will be addressed as part of the Groundwater Operable Unit.

[4] DOE's current baseline and budget assume that the use of existing data will be sufficient for final characterization; however, EPA and Kentucky have raised concerns, based upon the extended time frame for implementation of the RI/FS and the potential for changing site conditions as a result of plant activities, that the collection of additional samples is warranted. The FFA parties agree to revisit the scope of characterizing the internal ditches prior to implementation of the RI/FS Work Plan.

REMAINING REMEDIATION LAGOON AND DITCHES OU

Scope

This OU consists of the specific SWMUs and AOCs identified in Appendix 4 (Source Area by Operable Unit). It includes lagoons, outfalls, and associated ditches, as well as soils/sediments. This OU includes the lagoons and outfalls, and their associated ditches identified in Appendix 4 under Remaining Remediation Lagoons and Ditches OU. Currently six lagoons are identified (SWMU 17, SWMU 18, SWMU 21, SWMU 22, SWMU 23, and SWMU 171, and five outfalls are identified (outfalls 005, 006, 017, 019 and 020). This OU will address the primary inputs to the outfalls to ensure no risk pathway will continue to contribute contamination to the PGDP outfalls once the remedial actions are completed. For example, the C-613 Sedimentation Basin will be addressed to the extent that no recontamination pathway exists. The FFA parties will work during FY 2016 to evaluate this scope and determine what resequencing is needed, if any.

SOILS OPERABLE UNIT (PRE-GDP SHUTDOWN)

The Soils OU is being implemented in a phased approach (i.e., pre-GDP shutdown and post-GDP shutdown) consisting of remedial and removal actions to accomplish the following goals:

- Prevent human exposure to contamination presenting an unacceptable risk;
- Prevent or minimize further off-site migration; and
- Reduce, control, or minimize contaminated soil hot spots contributing to off-site contamination.

The original scope of the Soils OU consisted of 86 SWMUs/AOCs; three inactive facilities (SWMUs 181, SWMU 40, and SWMU 19); and the soil/rubble areas that have been identified to date. The scope of the removal action for two of the three inactive facilities has been completed, the exception being the excavation of contaminated soil at the C-403 Neutralization Tank (SWMU 40). This activity will occur during Remaining Remediation scope. The scope for the soil/rubble areas also has been completed. During the development of the RI/FS Work Plan/Report, it was determined that only 63 of the 86 SWMUs/AOCs included within the original scope will be addressed under this OU prior to GDP shutdown based upon accessibility. Those SWMUs/AOCs identified as inaccessible will be addressed as part of the Remaining Remediation Soils and Slabs OU scope. Specific details about how the individual SWMUs/AOCs will be addressed is discussed further in the Soils OU Remedial Action (Pre-GDP shutdown) section.

The Soils OU pre-GDP shutdown scope focuses on accessible plant surface soils (ground surface to 10 ft below ground surface and 16 ft below ground surface in the vicinity of pipelines) not associated with PGDP operations. Slabs and underlying soils associated with facilities that have undergone D&D or SWMUs/AOCs that have been determined to be inaccessible during the development of the RI/FS Work Plan/Report will be addressed as Remaining Remediation Soils and Slabs OU scope. Sequencing of the work will be determined based on OU-specific circumstances, as mutually agreed by the FFA parties.

A series of Soils OU actions have been completed to date (See Figure 3.4). These previous actions are summarized in Appendix 1 (Actions Taken to Date).

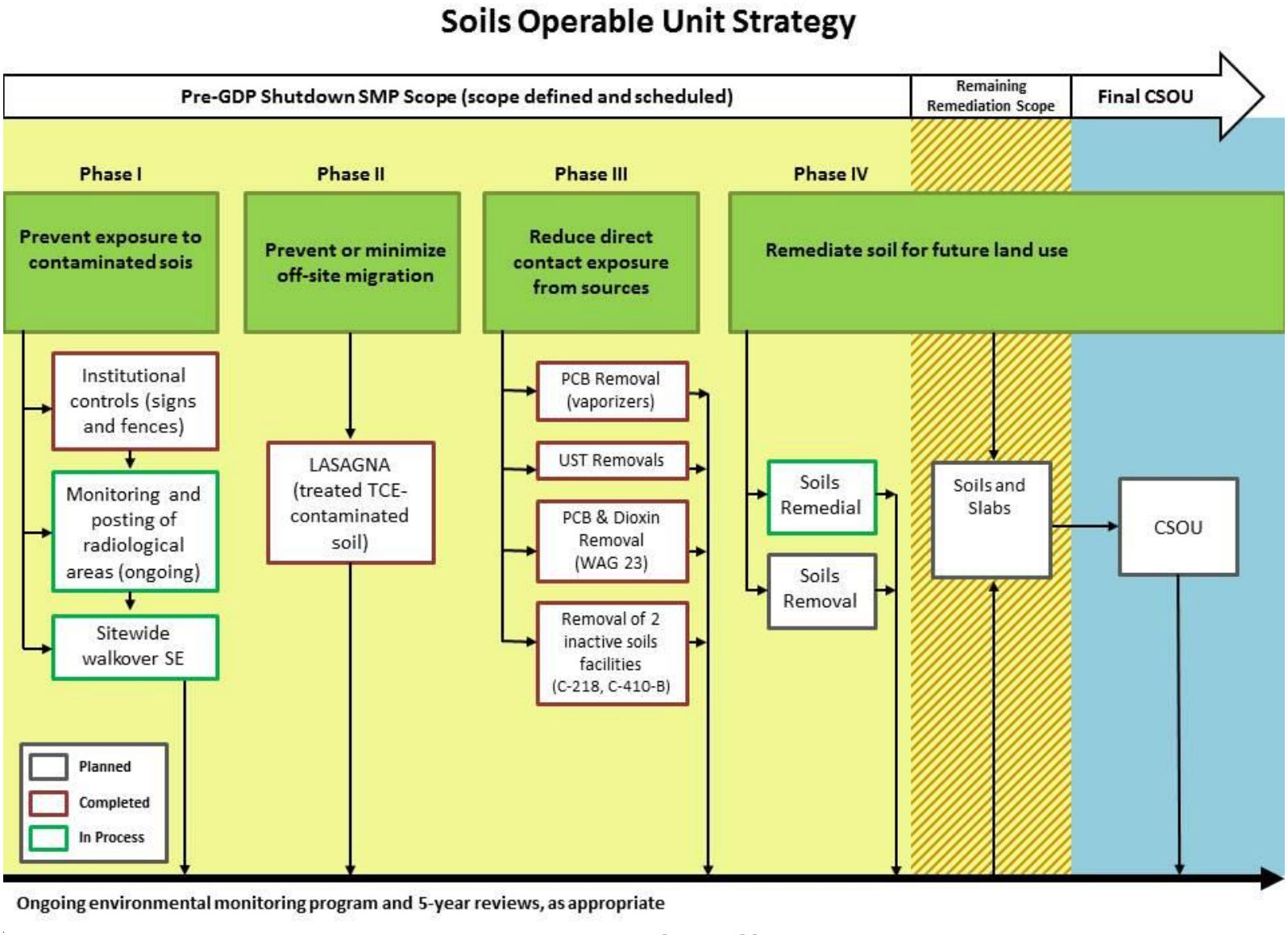

Figure 3.4. Current Soils Operable Unit Strategy

Soils OU Remedial Action

Scope

The scope of this project includes an RI/FS BRA, remedy selection, and implementation of any necessary response actions for the 63 SWMUs/AOCs listed in Appendix 4. Sites are included in this OU based on the expectation that they primarily pose a direct contact threat to on-site industrial workers and likely are not a migration threat to groundwater or surface water. The project has incorporated results from previous actions and sitewide evaluations/surveys. Results of the Soils OU RI will be used in scoping for and completion of the baseline ecological risk assessment conducted under the SWOU.

Key DOE Planning Assumptions from Life Cycle Baseline

(1) Radionuclides, metals, and PCBs are the primary COCs for pre-GDP shutdown. Other COCs will be considered on a case-by-case basis prior to GDP shutdown.

(2) SWMUs requiring action will be evaluated in multiple feasibility studies that will focus on the following likely response actions: no action, institutional controls, and excavation.

(3) Of the 63 SWMUs/AOCs, 50 will be addressed as part of the Soils OU FS, including SWMU 99B (C-745 Kellogg Building Site—Septic Leach Field). The remaining 13 SWMUs/AOCs were further evaluated under Soils OU RI 2 and will be addressed by a subsequent Soils OU feasibility study. Original Soils OU RI Report comments relating to the remaining 13 SWMUs/AOCs were addressed during the scoping of the Soils OU RI 2.

(4) The 25 remaining SWMUs/AOCs, including SWMU 99A (C-745 Kellogg Building Site—Cylinder Yard) will be addressed as part of Remaining Remediation Soils and Slabs OU.

(5) During scoping and site walkdown of the Soils OU RI 2, 4 of the 16 SWMUs/AOCs were identified to be addressed as part of post-GDP activities. The remaining SWMUs/AOCs, including SWMU 225-A (OS-14) and SWMU 225-B (Contaminated Soil Area near C-533-1 DMSA OS-14) will be addressed by the Soils OU RI 2.

(6) Portions of SWMU 1 treated as part of the Southwest Plume GWOU[5] will be disturbed by soil mixing activities. As a result, reassessment and recharacterization of this area will be required prior to remedial selection.

(7) SWMU 12 (C-747-A UF_4 Drum Yard) has been removed from the Soils OU and has been placed in the No Further Action section in Appendix 4.

(8) SWMU 13 has been removed from the BGOU scope and SWMU 13 will be addressed in its entirety (both surface and subsurface) as part of the Soils OU. SWMU 13 is one of the 16 remaining SWMUs/AOCs that will be evaluated further under a Soils OU RI 2. Comments and associated dataset on the SWMU 13 SER will be addressed during scoping, considered part of work plan development, and discussed within the Soils OU RI Report 2.

[5] Note: Subsurface VOC-contaminated soil at SWMU 1 is being addressed by the VOC Sources for the Southwest Plume project, as defined in the VOC Sources for the 2012 Southwest Plumes ROD. All non-VOC contaminated soils at SWMU 1 will be addressed in the Soils OU FS.

(9) SWMU 27 was sampled as part of Soils RI 2. Based upon the sampling results, the contents of the tank will be removed to the extent practicable and disposed of in accordance with the approved Time Critical Removal Notification.

(10) Individual Proposed Plans, Record of Decisions, Remedial Design Work Plans, Remedial Design Reports, Remedial Action Work Plans, and Remedial Action Completion Reports may be developed and submitted per grouping. It is currently anticipated that the Soils Remedial Action may be divided into two groupings based upon investigation results. Once the RI data are evaluated, the proposed grouping may be adjusted.

Soils OU Removal Action

This project is contingent upon historical or new sampling results of the RI for the Soils OU Remedial Action. Scope will include addressing any of the Soils OU SWMUs/AOCs which warrant a removal action. SWMU 27 is the only soil SWMU/AOC that has been identified that requires removal action. The following assumptions will remain for project planning purposes should additional soil removal actions be required in the future.

Key DOE Planning Assumptions from Life Cycle Baseline

(1) A single EE/CA and Action Memorandum will be developed and submitted for those SWMUs requiring removal action.

(2) SWMUs will be grouped into (1) outside-of-fence and (2) inside-the-fence and a Removal Action Work Plan will be developed and submitted for each grouping.

(3) Separate Removal Action Reports may be developed and submitted for each of the two grouping.

REMAINING REMEDIATION SOILS AND SLABS OU

Scope

This OU includes the units identified in Appendix 4 under Remaining Remediation Soils and Slabs OU. This OU currently has 86 units, 25 of which are soil units that were determined to be inaccessible during development of the Soils OU RI/FS Work Plan/Report of the Pre-GDP. The FFA parties will work during FY 2016 to evaluate this scope and determine what resequencing is needed, if any.

D&D OPERABLE UNIT

The D&D OU consists of two phases (See Figure 3.5): 1) the DOE facilities that were inactive and scheduled for D&D Pre-GDP shutdown, and 2) the facilities previously leased to USEC and/or other DOE facilities planned for D&D after shutdown of the GDP.

D&D OPERABLE UNIT (PRE-GDP SHUTDOWN)

This OU consisted of 15 small inactive facilities, C-340 Complex, and C-410/C-420 Complex. The remaining pre-GDP shutdown scope (Phase 1) of this OU consists of the D&D of C-410/420 Complex, which is currently underway. The work consists of infrastructure removal at the C-410/420 Complex as a CERCLA Non-Time-Critical Removal Action. Fieldwork implementing the Removal Action Work Plan is underway and projected to be completed in FY 2016. The completion of the C-410/C-420 Complex

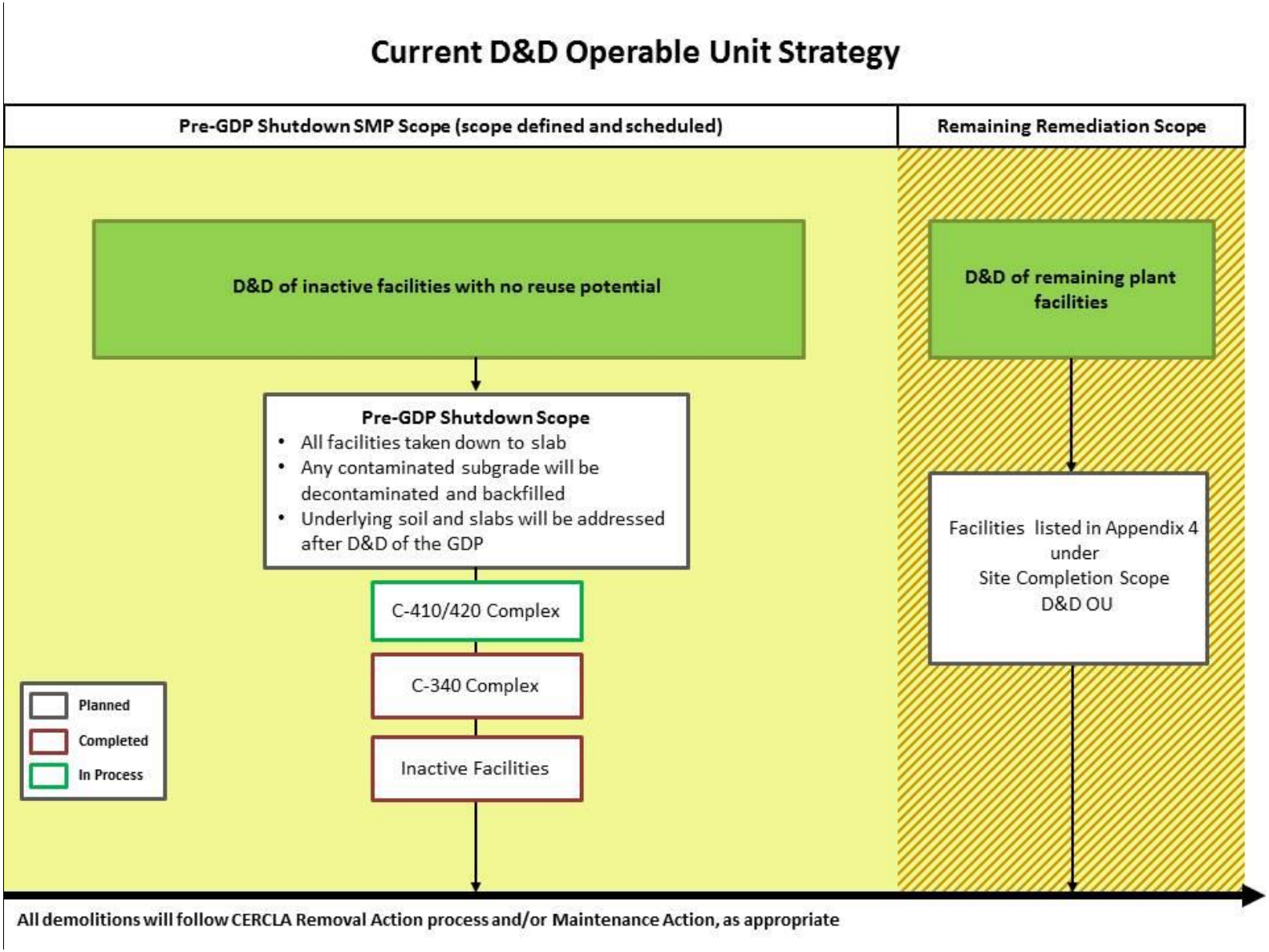

Figure 3.5. Current D&D Operable Unit Strategy

will mark the completion of the D&D OU Pre-GDP shutdown scope. Decommissioning of CERCLA facilities completed to date is summarized in Appendix 1 (Actions Taken to Date).

REMAINING REMEDIATION D&D OU

This OU currently includes 30 units identified in Appendix 4 under Remaining Remediation D&D OU. These units previously were identified as SWMUs or AOCs under CERCLA because they met the definition for either a SWMU or AOC under the FFA and have been included for action under the FFA. These units will be addressed under the CERCLA process unless the FFA parties agree that decommissioning and demolition do not pose a substantial threat of release of hazardous substances into the environment, and a CERCLA response action is not necessary to protect public health, welfare, or the environment. In accordance with the Joint 1995 Policy, it is DOE's intent to consult with EPA and Kentucky to reach consensus on the appropriate regulatory framework. The long-term strategy (i.e., Life Cycle Plan) will form the basis for future planning dates for these units; however, the Life Cycle Plan is not anticipated to be completed until FY 2017. This OU will employ the CERCLA removal action process to administer decommissioning activities of excess buildings (i.e., inactive with no reuse potential) that have a known or potential release of contamination to the environment. Consistent with the 1995 DOE and EPA Memorandum: *Policy on Decommissioning DOE Facilities under CERCLA,* DOE will employ the CERCLA Non-Time-Critical Removal Action framework unless the circumstances at the facilities make it inappropriate.

As part of planning and execution of this OU, the FFA parties plan to evaluate and consider incorporation of CERCLA documentation strategies developed in 2009 to streamline the decision making process. In instances, where appropriate, DOE may decommission the facility following deactivation activities that are completed as non-CERCLA actions in accordance with applicable regulations. The primary objective for this OU is to minimize or eliminate the potential threats to health and the environment caused by the potential uncontrolled release of hazardous substances from contaminated structures and to reduce long-term surveillance and maintenance costs. The FFA parties will work during FY 2016 to evaluate this scope and determine what resequencing is needed, if any.

OTHER PROJECTS

CERCLA Waste Disposal Alternative Evaluation

Scope

The scope of this project is to evaluate disposal options for the CERCLA waste that will be generated as a result of implementing removal and remedial actions for all of the OUs. The evaluation of disposal options will be conducted using the CERCLA remedial decision-making process. Accordingly, the scope of the RI/FS will be focused and tailored to the nature of this project (i.e., this is not a typical project where potential releases are investigated, evaluated, and remediated). Additionally, due to significant public interest in the project, frequent interactions with the public are expected throughout the project life cycle. The decision about whether to implement an on-site disposal facility will be documented in a ROD.

Key DOE Planning Assumptions from Life Cycle Baseline

(1) Existing information on waste types and volumes is sufficient for the RI/FS Report, and measurements of waste characteristics will not be needed for evaluation of alternatives. Assumed waste types include the following categories: low-level waste (LLW), RCRA, Toxic Substances

Control Act (TSCA), LLW/RCRA, LLW/TSCA, LLW/RCRA/TSCA, classified wastes, asbestos containing materials, and non-hazardous solid.

(2) A potential on-site CERCLA disposal facility will not accept transuranic waste.

(3) Sufficient information about the design, cost, and Waste Acceptance Criteria for the existing disposal facilities (e.g., Nevada Test Site, Energy*Solutions*, C-746-U Landfill) is available; no additional data collection is needed for the RI/FS Report.

(4) Implementation of the ROD[6] may require resequencing of other site work.

(5) Final Waste Acceptance Criteria will be defined during the post-ROD design phase.

FINAL COMPREHENSIVE SITE OPERABLE UNIT[7]

The final CSOU evaluation will occur following completion of Remaining Remediation D&D OU, D&D of the DUF_6 Conversion Plant, and completion of cleanup of each of the specific OUs (e.g., GDP Groundwater Sources, Soils and Slabs). As final actions for SWMUs are completed, those SWMUs will be placed in the CSOU section of Appendix 4 of the SMP to ensure that the results of the completed action are accounted for in the overall CSOU evaluation. The final CSOU will maximize use of the relevant data from previous cleanup activities and document the residual contamination and risk. Circumstances may dictate additional field activities as a result of evaluating existing information; however, it is the assumption of the FFA parties that any SWMUs entered into the CSOU will not require any additional response action. A work plan will compile and evaluate the existing information to determine if any data gaps related to conducting a sitewide evaluation exist. The RI will include a sitewide baseline human health and ecological risk assessment to evaluate residual risks and ensure all actions taken to date, when considered collectively, are protective of human health and the environment from a sitewide perspective. If the results of the final CSOU BRA conclude that overall protection of human health and the environment has been achieved, a final Proposed Plan and no further action ROD will be developed. If the BRA concludes that residual contamination still poses an unacceptable risk that exceeds the criteria established in Section XII of the FFA, a final feasibility study will be developed, followed by a final Proposed Plan, ROD, and implementation of the final remedy. DOE intends to conduct necessary long-term monitoring to evaluate progress toward achieving RAOs. When no further response is appropriate, and all the RAOs for all remedies have been achieved, PGDP will be eligible for deletion from the National Priorities List (NPL). It should be noted that partial NPL delisting may be pursued for eligible areas prior to the CSOU.

[6] Regulatory expectations are that sufficient design and waste acceptance criteria information will be available to support the ROD.

[7] The FFA, as currently written, contemplated multiple CSOUs, consisting of those associated with integrator units (i.e., groundwater, surface water) and a final CSOU completed after issuance of all final RODs for the site. The FFA parties acknowledge that the above scope description is intended to reflect the final CSOU, and a future FFA modification will address any inconsistencies between the FFA and SMP strategy.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX 4

SOURCE AREA BY OPERABLE UNIT

THIS PAGE INTENTIONALLY LEFT BLANK

Solid Waste Management Units/Areas of Concern by Operable Unit

GROUNDWATER				
Operable Unit	**Subproject**		**SWMU No.**	**Description**
GWOU	C-400 Action		11	C-400 TCE Leak Site
			533	TCE Spill Site from TCE Unloading Operations at C-400
	Southwest Plume Sources		1	C-747-C Oil Land Farm
			211 A	C-720 TCE Spill Site Northeast
			211 B	C-720 TCE Spill Site Southeast
	Dissolved-Phase Plumes		201	Northwest Groundwater Plume
			202	Northeast Groundwater Plume
			210	Southwest Groundwater Plume
Remaining Remediation Groundwater Sources OU	C-400 Residuals and Remaining Sources		11	C-400 TCE Leak Site
			533	TCE Spill Site from TCE Unloading Operations at C-400
SURFACE WATER				
SWOU	NSDD		59	NSDD (Inside)
	SWOU Remedial Action	Removal Action	58	NSDD (Outside) (includes KPDES 003)
			60	C-375-E2 Effluent Ditch (KPDES 002)[1]
			61	C-375-E5 Effluent Ditch (KPDES 013)[1]
			62	C-375-S6 SW Ditch (KPDES 009)[1]
			63	C-375-W7 Oil Skimmer Ditch (KPDES 008 and KPDES 004)
			66	C-375-E3 Effluent Ditch (KPDES 010)
			67	C-375-E4 Effluent Ditch (C-340 Ditch) (KPDES 011)
			68	C-375-W8 Effluent Ditch (KPDES 015)
			69	C-375-W9 Effluent Ditch (KPDES 001)
			92	Fill Area for Dirt from the C-420 PCB Spill Site
			97	C-601 Diesel Spill
			102B	Plant Storm Sewer associated with C-333-A, C-337-A, C-340, C-535, and C-537[1]
			168	KPDES Outfall Ditch 012[1]
			526	Internal Plant Drainage Ditches (includes KPDES 016)[2]
			64	Little Bayou Creek
			65	Bayou Creek
			93	Concrete Disposal Area East of Plant Security Area
			105	Concrete Rubble Pile (3)
			106	Concrete Rubble Pile (4)
			107	Concrete Rubble Pile (5)
			108	Concrete Rubble Pile (6)
			109	Concrete Rubble Pile (7)
			113	Concrete Rubble Pile (11)

[1] The results of the SWOU (On-Site) Site Investigation determined that there were no unacceptable levels of risk to current and anticipated future receptors that warranted inclusion of SWMU 60 (Outfall 002), SWMU 168 (Outfall 012), or SWMU 102 (PGDP storm sewer systems associated with C-333-A, C-337-A, C-340, C-535, and C-537). As a result, no action will be taken for these SWMUs as originally planned under the SWOU removal action. These SWMUs will be evaluated further as part of the SWOU remedial action. It also should be noted that during development of the Sampling and Analysis Plan (SAP) for SWOU (On-Site) Removal Action, Outfall 009 and Outfall 013 were evaluated. This assessment of the outfalls, which included a review of historical data, indicated that Outfall 009 and Outfall 013 did not require an early action, and further assessment of Outfall 009 and Outfall 013 would be addressed during the Comprehensive Site Operable Unit (CSOU). Based upon current site strategy, Outfall 009 and Outfall 013 also will be addressed as part of the SWOU remedial action.

[2] KPDES Outfall 016, in its entirety, will be addressed as part of the SWOU Remedial Investigation.

Solid Waste Management Units/Areas of Concern by Operable Unit (Continued)

SURFACE WATER (CONTINUED)			
Operable Unit	**Subproject**	**SWMU No.**	**Description**
SWOU	SWOU Remedial Action	129	Concrete Rubble Pile (27)
		175	Concrete Rubble Pile (28)
		185	C-611-4 Horseshoe Lagoon (includes KPDES 014)
		199	Bayou Creek Monitoring Station
		205	Eastern Portion of Yellow Water Line
		549	Dirt/Concrete Rubble Pile near Outfall 008
		550	Concrete Culvert Sections Located on the West Bank of the Ditch Leading to Outfall 001
Remaining Remediation Lagoons and Ditches OU		17	C-616-E Sludge Lagoon
		18	C-616-F Full-Flow Lagoon
		21	C-611-W Sludge Lagoon
		22	C-611-Y Overflow Lagoon (includes KPDES 006)
		23	C-611-V Lagoon (includes KPDES 005)
		171	C-617-A Lagoons
		Others	Outfalls 017, 018, 019/020, and 526 and associated ditches
BURIAL GROUNDS			
BGOU	BGOU Remedial	2	C-749 Uranium Burial Ground
		3	C-404 Low-Level Radioactive Waste Burial Ground
		4	C-747 Contaminated Burial Ground
		5	C-746-F Classified Burial Ground
		6	C-747-B Burial Area
		7	C-747-A Burial Ground
		9	C-746-S Residential Landfill
		10	C-746-T Inert Landfill
		30	C-747-A Burn Area
		145	Residential/Inert Landfill Borrow Area (P-Landfill)
Remaining Remediation Burial Grounds Sources OU		472	C-746-B Pad
		520	Scrap Material West of C-746-A
SOILS			
Soils OU	Soils Remedial	1	C-747-C Oil Land Farm
		13	C-746-P Clean Scrap Yard[3]
		14	C-746-E Contaminated Scrap Yard
		15	C-746-C Scrap Yard[3]
		19	C-410-B HF Neutralization Lagoon
		26	C-400 to C-404 Underground Transfer Line[3]
		27	C-722 Acid Neutralization Tank
		56	C-540-A PCB Waste Staging Area[3, 4]
		57	C-541-A PCB Waste Staging Area[4]
		76	C-632-B Sulfuric Acid Storage Tank
		77	C-634-B Sulfuric Acid Storage Tank[3, 5]
		80	C-540-A PCB Spill Site[3]

[3] These SWMUs/AOCs will be evaluated further under a Soils OU RI 2 and addressed by a subsequent Soils OU feasibility study.
[4] SWMUs 56 and 57 are located within, and will be addressed as part of, SWMUs 80 and 81, respectively.
[5] This SWMU was evaluated as part of the Soils Operable Unit. The soils and underlying slabs associated with this SWMU will be addressed under the Soils and Slabs OU as part of post-GDP shutdown activities.

Solid Waste Management Units/Areas of Concern by Operable Unit (Continued)

SOILS (CONTINUED)			
Operable Unit	**Subproject**	**SWMU No.**	**Description**
Soils OU (Cont.)	Soils Remedial (Cont.)	81	C-541-A PCB Spill Site
		99 B	C-745 Kellogg Bldg. Site—Septic Tank/Leach Field
		138	C-100 Southside Berm
		153	C-331 PCB Soil Contamination (West)
		156	C-310 PCB Soil Contamination (West Side)
		158	Chilled-Water System Leak Site
		160	C-745 Cylinder Yard Spoils (PCB Soils)
		163	C-304 Bldg./HVAC Piping System (Soil Backfill)
		165	C-616-L Pipeline & Vault Soil Contamination
		169	C-410-E HF Vent Surge Protection Tank
		170	C-729 Acetylene Bldg. Drain Pits
		180	Outdoor Firing Range (WKWMA)
		181	Outdoor Firing Range (PGDP)
		194	McGraw Construction Facilities (Southside)
		195	Curlee Road Contaminated Soil Mounds
		196	C-746-A Septic System
		200	Soil Contamination South of TSCA Waste Storage Facility
		204	Dykes Road Historical Staging Area[3]
		211 A	C-720 TCE Spill Site Northeast[3]
		212	C-745-A Radiological Contamination Area
		213	OS-02
		214	OS-03
		215	OS-04
		216	OS-05
		217	OS-06
		219	OS-08
		221	OS-10
		222	OS-11
		224	OS-13[3]
		225A	OS-14[3]
		225 B	Contaminated Soil Area near C-533-1 DMSA OS-14[3]
		227	OS-16
		228	OS-17
		229	OS-18[3]
		486	Rubble Pile WKWMA
		487	Rubble Pile WKWMA
		488	PCB Contamination Area by the C-410 Trailer Complex
		489	Septic Tank North of C-710 Laboratory
		492	Contaminated Soil Area Near Outfall 010
		493	Concrete Rubble Piles Near Outfall 001
		517	Rubble and Debris Erosion Control Fill Area
		518	Field South of C-746-P1 Clean Scrap Yard
		520	Scrap Material West of C-746-A
		531	Aluminum Slag Reacting Area (C-746-H4) near the C-746-A Facility
		541	Contaminated Soil Area South of Outfall 011
		561	Soil Pile I

Solid Waste Management Units/Areas of Concern by Operable Unit (Continued)

SOILS (CONTINUED)			
Operable Unit	**Subproject**	**SWMU No.**	**Description**
Soils OU (Cont.)	Soils Remedial (Cont.)	562	Soil Piles C, D, E, F, G, H, J, K, and P in subunit 1 north of Soil Pile I on the west bank of Little Bayou Creek.
		563	Soil Piles 20, CC, and BW in subunit 4 north of outfall 012 west of Little Bayou Creek
		564	Soil Pile AT in subunit 5 that consists of three soil areas on the east side of the North-South Diversion Ditch north of the P-, S-, and T-Landfills
		565	Rubble Area KY-19 (along Bayou Creek north of C-611 Water Treatment Plant)[3]
		567	Soil Pile K013 near Outfall 013, West of Little Bayou Creek
Remaining Remediation Soils and Slabs OU[6]		11	C-400 TCE Leak Site
		16	C-746-D Classified Scrap Yard
		20	C-410-E Emergency Holding Pond slab and underlying soils
		28	C-712 Laboratory Equalization Tank slab and underlying soils
		31	C-720 Compressor Pit Water Storage Tank slab and underlying soils
		32	C-728 Clean Waste Oil Tanks slab and underlying soils
		33	C-728 Motor Cleaning Facility slab and underlying soils
		38	C-615 Sewage Treatment Plant slab and underlying soils
		40	C-403 Neutralization Tank slab and underlying soils
		41	C-410-C Neutralization Tank slab and underlying soils
		42	C-616 Chromate Reduction Facility slab and underlying soils
		47	C-400 Technetium Storage Tank Area
		55	C-405 Incinerator building slab and underlying soils
		70	C-333-A Vaporizer slab and underlying soils
		71	C-337-A Vaporizer slab and underlying soils
		74	C-340 PCB Transformer Spill Site
		75	C-633 PCB Spill Site
		77	C-634-B-Sulfuric Acid Storage Tank slab and underlying soils
		78	C-420 PCB Spill Site
		79	C-611 PCB Spill Site
		82	C-531 Electric Switchyard slab and underlying soils
		83	C-533 Electric Switchyard slab and underlying soils
		84	C-535 Electric Switchyard slab and underlying soils
		85	C-537 Electric Switchyard slab and underlying soils
		86	C-631 Pumphouse and Cooling Tower slab and underlying soils
		87	C-633 Pumphouse and Cooling Tower slab and underlying soils
		88	C-635 Pumphouse and Cooling Tower slab and underlying soils
		89	C-637 Pumphouse and Cooling Tower slab and underlying soils
		98	C-400 Basement Sump slab and underlying soils
		99 A	C-745 Kellogg Bldg. Site–Cylinder Yard
		135	C-333 PCB Soil Contamination (North Side)
		137	C-746-A Inactive PCB Transformer Sump Area[7]
		154	C-331 PCB Soil Contamination (Southeast)

[6] SWMUs contained in facilities located on the ground floor of the building slabs have been identified as part of this scope. Those SWMUs located on the upper floors, that are expected to be totally removed as part of the decommissioning, have not been included.
[7] SWMU 137 was evaluated as part of the American Recovery and Reinvestment Act (ARRA), and the Soils Operable Unit. SWMU 137 will be addressed as part of GDP D&D OU.

Solid Waste Management Units/Areas of Concern by Operable Unit (Continued)

SOILS (CONTINUED)			
Operable Unit	**Subproject**	**SWMU No.**	**Description**
Remaining Remediation Soils and Slabs OU (Cont.)		155	C-333 PCB Soil Contamination (West)
		159	C-746-H3 Storage Pad slab and underlying soils
		161	C-743-T-01 Trailer Site (Soil Backfill)
		162	C-617-A Sanitary Water Line (Soil Backfill)
		166	C-100 Trailer Complex Soil Contamination (East Side)
		167	C-720 White Room Sump slab and underlying soils
		172	C-726 Sandblasting Facility slab and underlying soils
		176	C-331 RCW Leak Northwest Side
		177	C-331 RCW Leak East Side
		178	C-724-A Paint Spray Booth slab and underlying soils
		179	Plant Sanitary Sewer System
		192	C-710 Acid Interceptor Pit slab and underlying soils
		198	C-410-D Area Soil Contamination slab and underlying soils
		203	C-400 Discard Waste System slab and underlying soils
		209	C-720 Compressor Shop Pit Sump slab and underlying soils
		211 B	C-720 TCE Spill Site Southeast
		218	OS-07 slab and underlying soils
		220	OS-09 slab and underlying soils
		223	OS-12 slab and underlying soils
		226	OS-15
		463	C-746-A East End Smelter slab and underlying soils
		464	C-746-A West End Smelter building slab and underlying soils
		469	C-745-J Yard
		470	C-746-V Yard
		474	West of Vortec Site
		477	C-340 Metals Plant building slab and underlying soils
		478	C-410/420 Feed Plant building slab and underlying soils
		480	C-402 Lime House building slab and underlying soils
		482	C-415 Feed Plant Storage Building slab and underlying soils
		483	Nitrogen Generating Facilities slab and underlying soils
		494	Ash Receiver Area in C-410/420 slab and underlying soils
		495	C-410-I Ash Receiver Shed building slab and underlying soils
		497	C-410/420 F2 Cell Neutralization Room Vats slab and underlying soils
		498	C-410/420 Sump at Column D & E-1&2 slab and underlying soils
		499	C-410/420 Sump at Column H-9&10 slab and underlying soils
		500	C-410/420 Sump at Column U-10&11 slab and underlying soils
		501	C-410/420 UF_6 Scale Pit Sumps A&B slab and underlying soils
		502	C-410/420 Sump at Column U-9 slab and underlying soils
		503	C-410/420 Sump at Column G-1 slab and underlying soils
		504	C-410/420 Sump at Column L-10 slab and underlying soils
		505	C-410/420 Sump at Column A-3N slab and underlying soils
		506	C-410/420 Sump at Column Wa-9 slab and underlying soils
		507	C-410/420 Condensate Tank Pit slab and underlying soils
		508	C-410/420 Settling Basin slab and underlying soils
		509	C-410/420 Drain pit slab and underlying soils
		510	C-410/420 Sump at Column P&Q-2 slab and underlying soils
		511	C-410/420 Sump at Column Q&R-2 slab and underlying soils
		512	C-410/420 Sump at Column R-2 slab and underlying soils

Solid Waste Management Units/Areas of Concern by Operable Unit (Continued)

SOILS (CONTINUED)			
Operable Unit	**Subproject**	**SWMU No.**	**Description**
Remaining Remediation Soils and Slabs OU (Cont.)		513	C-411 Cell Maintenance Room Sump slab and underlying soils
		522	C-340 Work Pit at Ground Floor Level (B-7—B-9) slab and underlying soils
		523	C-340 Metals Plant Pit at Ground Floor (F-6 to F-11) slab and underlying soils
		524	C-340 Pickling System Sump (B-10 to B-11) slab and underlying soils
		529	C-340 Powder Plant Sump at Ground Floor Level slab and underlying soils
DECONTAMINATION AND DECOMMISSIONING			
D&D OU	Inactive Facilities (C-410 D&D)	41	C-410-C Neutralization Tank
		478	C-410/420 Feed Plant
		494	Ash Receiver Area in C-410/420
		495	C-410-I Ash Receiver Shed
		496	C-410 Fluorine/Hydrogen Filters (Northeast Mezzanine)
		497	C-410/420 F_2 Cell Neutralization Room Vats
		498	C-410/420 Sump at Column D&E-1&2
		499	C-410/420 Sump at Column H-9&10
		500	C-410/420 Sump at Column U-10&11
		501	C-410/420 UF_6 Scale Pit Sumps A&B
		502	C-410/420 Sump at Column U-9
		503	C-410/420 Sump at Column G-1
		504	C-410/420 Sump at Column L-10
		505	C-410/420 Sump at Column A-3N
		506	C-410/420 Sump at Column Wa-9
		507	C-410/420 Condensate Tank Pit
		508	C-410/420 Settling Basin
		509	C-410/420 Drain pit
		510	C-410/420 Sump at Column P&Q-2
		511	C-410/420 Sump at Column Q&R-2
		512	C-410/420 Sump at Column R-2
		513	C-411 Cell Maintenance Room Sump Pit
Remaining Remediation D&D OU	Remaining Remediation D&D	28	C-712 Laboratory Equalization Tank
		33	C-728 Motor Cleaning Facility
		38	C-615 Sewage Treatment Plant
		42	C-616 Chromate Reduction Facility
		70	C-333-A Vaporizer
		71	C-337-A Vaporizer
		82	C-531 Electric Switchyard
		83	C-533 Electric Switchyard
		84	C-535 Electric Switchyard
		85	C-537 Electric Switchyard
		86	C-631 Pumphouse and Cooling Tower
		87	C-633 Pumphouse and Cooling Tower
		88	C-635 Pumphouse and Cooling Tower
		89	C-637 Pumphouse and Cooling Tower
		98	C-400 Basement Sump
		137	C-746-A Inactive PCB Transformer Sump Area
		159	C-746-H3 Storage Pad
		164	KPDES Outfall Ditch 017 Flume - Soil Backfill

Solid Waste Management Units/Areas of Concern by Operable Unit (Continued)

DECONTAMINATION AND DECOMMISSIONING			
Operable Unit	**Subproject**	**SWMU No.**	**Description**
Remaining Remediation D&D OU	Remaining Remediation D&D	167	C-720 White Room Sump
		172	C-726 Sandblasting Facility
		178	C-724-A Paint Spray Booth
		179	Plant Sanitary Sewer System
		192	C-710 Acid Interceptor Pit
		203	C-400 Discard Waste System
		209	C-720 Compressor Shop Pit Sump
		482	C-415 Feed Plant Storage Building
	DUF_6 D&D	183	McGraw UST
		193	McGraw Construction Facilities (Southside Cylinder Yards)
		194	McGraw Construction Facilities (Southside)
		536	Concrete Truck Washout Area
FINAL COMPREHENSIVE SITE OPERABLE UNIT			
CSOU[8,9]	**SWMU No.**	**Description**	
	8	C-746-K Inactive Sanitary Landfill	
	91	UF_6 Cylinder Drop Test Area	
	100	Fire Training Area	
PERMITTED			
Permitted	3	C-404 Low-Level Radioactive Waste Burial Ground[10]	
	9	C-746-S Residential Landfill	
	10	C-746-T Inert Landfill	
	44	C-733 Hazardous Waste Storage Area	
	46A	C-746-Q Hazardous and Low-Level Mixed Waste Storage Facility	
	207	C-752-A ER Waste Storage Bldg.	
	208	C-746-U Solid Waste Contained Landfill	

[8] The FFA, as currently written, contemplated multiple CSOUs, consisting of those associated with integrator units (i.e., groundwater, surface water), and a final CSOU completed after issuance of all final RODs for the site. The FFA parties acknowledge that the above scope description is intended to reflect the final CSOU, and a future FFA modification will be conducted to resolve any inconsistencies between the FFA and SMP strategy.

[9] Historically, once an action has been completed for a particular SWMU whereby no additional active response actions are expected, such SWMUs have been placed in the CSOU for further evaluation; however, the FFA parties recognized the need to reach consensus on the criteria for assigning units to the CSOU. As a result, placement of SWMUs 8, 91, and 100 in the CSOU is provisional pending the FFA parties reaching consensus on such criteria.

[10] SWMU 3 was issued only a post-closure permit, was not permitted for construction and operation, and was not an engineered hazardous waste landfill.

Solid Waste Management Units/Areas of Concern by Operable Unit (Continued)

NO FURTHER ACTION[11]		
SWMU No.	**Description**	**NFA Approval By**
12	C-747-A UF_4 Drum Yard	FFA Managers Agreement– November 17, 2011; FFA Managers Meeting, 4/12/2012
24	C-750-D UST	KDWM 11/23/1999
25	C-750 1,000-gal Waste Oil Tank (UST)	KDWM 11/23/1999
29	C-746-B TRU Storage Area	KDWM
34	C-746-M PCB Waste Storage Area	KDWM
35	C-337 PCB Waste Storage Area	KDWM
36	C-337 PCB Waste Staging Area	KDWM
37	C-333 PCB Waste Staging Area	KDWM
39	C-746-B PCB Waste Storage Area	KDWM
43	C-746-B Waste Chemical Storage Area	KDWM
45	C-746-R Waste Solvent Storage Area	KDWM
46	C-409 Hazardous Waste Pilot Plant[12]	KDWM12/2/1993
48	Gold Dissolver Storage Tank (DMSA C400-03)	KDWM 7/8/2010
49	C-400-B Waste Solution Storage Tank	KDWM 9/26/1997
50	C-400-C Nickel Stripper Evaporation Tank	KDWM 12/2/1993
51	C-400-D Lime Precipitation Tank	KDWM 12/2/1993
52	C-400 Waste Decontamination Solution Storage Tanks	KDWM
53	C-400 NaOH Precipitation Unit	KDWM
54	C-400 Degreaser Solvent Recovery Unit	KDWM 7/8/2010
72	C-200 Underground Gasoline Tanks	KDWM 5/14/1997
73	C-710 Underground Gasoline Tanks	KDWM 5/14/1997
90	C-720 Petroleum Naphtha Pipe	KDWM 1/14/15
96	C-333 Cooling Tower Scrap Wood Pile	KDWM
101	C-340 Hydraulic System	EPA and KDWM 4/2/2015
102A	Plant Storm Sewer—between the south side of the C-400 Building and Outfall 008	EPA and KY via ROD 3/16/2012
103	Concrete Rubble Pile (1)	EPA and KY via ROD 9/29/1997
104	Concrete Rubble Pile (2)	EPA and KY via ROD 9/29/1997
110	Concrete Rubble Pile (8)	EPA and KY via ROD 9/29/1997
111	Concrete Rubble Pile (9)	EPA and KY via ROD 9/29/1997
112	Concrete Rubble Pile (10)	EPA and KY via ROD 9/29/1997
114	Concrete Rubble Pile (12)	EPA and KY via ROD 9/29/1997
115	Concrete Rubble Pile (13)	EPA and KY via ROD 9/29/1997
116	Concrete Rubble Pile (14)	EPA and KY via ROD 9/29/1997
117	Concrete Rubble Pile (15)	EPA and KY via ROD 9/29/1997
118	Concrete Rubble Pile (16)	EPA and KY via ROD 9/29/1997
119	Concrete Rubble Pile (17)	EPA and KY via ROD 9/29/1997
120	Concrete Rubble Pile (18)	EPA and KY via ROD 9/29/1997
121	Concrete Rubble Pile (19)	EPA and KY via ROD 9/29/1997
122	Concrete Rubble Pile (20)	EPA and KY via ROD 9/29/1997
123	Concrete Rubble Pile (21)	EPA and KY via ROD 9/29/1997
124	Concrete Rubble Pile (22)	EPA and KY via ROD 9/29/1997
125	Concrete Rubble Pile (23)	EPA and KY via ROD 9/29/1997
126	Concrete Rubble Pile (24)	EPA and KY via ROD 9/29/1997

[11] A portion of the SWMUs/areas of concerns listed may not qualify as NFAs per CERCLA and may require additional characterization for radionuclides under the appropriate Remaining Remediation OU.

[12] Radiological contamination associated with the sump in this unit will be addressed under the D&D program for the C-409 Stabilization Building.

Solid Waste Management Units/Areas of Concern by Operable Unit (Continued)

NO FURTHER ACTION (CONTINUED)		
SWMU No.	**Description**	**NFA Approval By**
127	Concrete Rubble Pile (25)	EPA and KY via ROD 9/29/1997
128	Concrete Rubble Pile (26)	EPA and KY via ROD 9/29/1997
130	C-611 550-gal Gasoline UST	KDWM 12/6/1996 EPA and KY via ROD
131	C-611 50-gal Gasoline UST	KDWM 12/6/1996 EPA and KY via ROD
132	C-611 2,000-gal Oil UST	KDWM 12/6/1996 EPA and KY via ROD
133	C-611 (unknown size) Grouted UST	KDWM 12/6/1996 EPA and KY via ROD
134	C-611 1,000-gal Diesel/Gasoline Tank	KDWM 12/6/1996 EPA and KY via ROD
136	C-740 TCE Spill Site	EPA and KY via ROD 8/10/1998
139	C-746-A1 UST	KDWM 5/14/1997
140	C-746-A2 UST	KDWM 5/14/1997
141	C-720 Inactive TCE Degreaser	KDWM 8/11/1992
142	C-750-A 10,000-gal Gasoline Tank (UST)	KDWM 3/25/1999
143	C-750-B 10,000-gal Diesel Tank (UST)	KDWM 3/25/1999
144	C-746-A Hazardous and Mixed Waste Storage Facility	KDWM 10/10/2011
146	Concrete Rubble Pile (40)	EPA and KY via ROD 9/29/1997
147	Concrete Rubble Pile (41)	EPA and KY via ROD 9/29/1997
148	Concrete Rubble Pile (42)	EPA and KY via ROD 9/29/1997
149	Concrete Rubble Pile (43)	EPA and KY via ROD 9/29/1997
150	Concrete Rubble Pile (44)	EPA and KY via ROD 9/29/1997
151	Concrete Rubble Pile (45)	EPA and KY via ROD 9/29/1997
152	Concrete Rubble Pile (46)	EPA and KY via ROD 9/29/1997
173	C-746-A Trash-Sorting Facility	KDWM 12/18/1992
174	C-745-K Low-Level Storage Area	KDWM 2/22/1993
184	Concrete Rubble Pile (29)	EPA and KY via ROD 9/29/1997
186	C-751 Fuel Facility	KDWM 10/21/2015
187	C-611 Septic System	KDWM 10/20/1993
188	C-633 Septic System	KDWM 10/20/1993
189	C-637 Septic System	KDWM 10/20/1993
190	C-337A Sewage Treatment Aeration Tank	KDWM 10/20/1993
191	C-333-A Sewage Treatment Aeration Tank	KDWM 10/20/1993
197	Concrete Rubble Pile (30)	EPA and KY via ROD 9/29/1997
206	C-755-A Toxic Substances Control Act Waste Storage Bldg.	KDWM 3/7/1997
208	C-746-U Solid Waste Contained Landfill	KDWM 3/7/1997
360	C-535	KDWM 11/23/2004
361	C-727–90 day	KDWM 8/28/2007
362	G-310-04	KDWM 12/18/1992
363	G-331-03	KDWM 2/22/1993
364	G-331-05	EPA and KY via ROD 9/29/1997
365	G-333-02	KDWM 5/12/03
366	G-333-03	KDWM 10/20/1993
367	G-333-04	KDWM 10/20/1993
368	G-333-08	KDWM 10/20/1993
369	G-333-10	KDWM 10/20/1993
370	G-333-20	KDWM 10/20/1993
371	G-335-01	EPA and KY via ROD 9/29/1997
372	G-337-02	KDWM 3/7/1997

Solid Waste Management Units/Areas of Concern by Operable Unit (Continued)

NO FURTHER ACTION (CONTINUED)		
SWMU No.	**Description**	**NFA Approval By**
373	G-337-03	KDWM 3/7/1997
374	G-337-13	KDWM 11/23/2004
375	G-337-14	KDWM 8/28/2007
376	G-337-15	KDWM 12/18/1992
377	C-337-22	KDWM 2/22/1993
378	G-340-01	EPA and KDWM 4/02/2015
379	G-340-03	KDWM 4/02/2015
380	G-340-04	KDWM 4/02/2015
381	G-340-05	KDWM 4/02/2015
382	G-340-06	KDWM 8/28/2007
383	G-400-01	KDWM 5/12/2003
384	G-400-02	KDWM 5/12/2003
385	G-409-25	KDWM 8/28/2007
386	G-410-01	KDWM 8/28/2007
387	C-416-01	KDWM 4/12/2004
388	C-416 Decontamination Pad	KDWM 6/29/2004
389	G-533-01	KDWM 6/29/2004
390	G-535-02	KDWM 11/23/2004
391	G-537-01	KDWM 2/14/2006
392	G-540-A-01	EPA and KDWM 4/02/2015
393	G-540-A-1-02	KDWM 2/14/2006
394	G-541-A-01	KDWM 4/12/2004
395	G-600-01	KDWM 3/8/2007
396	C-611-U-01	KDWM 3/8/2007
397	G-612-01	KDWM 3/8/2007
398	G-612-02	KDWM 3/8/2007
399	G-612-A-01	KDWM 3/8/2007
400	G-635-01	KDWM 3/8/2007
401	G-710	KDWM 1/4/2006
402	G-710-04	KDWM 9/11/2003
403	G-710-20	KDWM 1/4/2006
404	G-710-24	KDWM 9/11/2003
405	G-720-22	KDWM 2/14/2003
406	G-743-T-17-01	KDWM 6/29/2004
407	G-743-T-17-02	KDWM 3/8/2007
408	G-745-B-01	KDWM 3/8/2007
409	G-745-T-01	KDWM 11/23/2004
410	G-746-G-01	KDWM 6/29/2004
411	G-746-G-1-01	KDWM 3/8/2007
412	G-746-G-2-01	KDWM 11/1/2004
413	G-746-G-3-01	KDWM 11/1/2004
414	G-746-F-01	KDWM 1/4/2006
415	G-746-S-01	KDWM 8/28/2007
416	G-746-X-01 (PCBs)	KDWM 3/8/2007
417	G-746-X-01 (Asbestos)	KDWM 3/8/2007
418	G-748-B-01	KDWM 6/29/2004
419	G-752-C-01	KDWM 8/28/2007
420	G-752-C-02	KDWM 3/8/2007
421	G-754-01	KDWM 1/4/2006
422	G-755-A-01	KDWM 1/28/2004
423	G-755-C-01	KDWM 1/28/2004

Solid Waste Management Units/Areas of Concern by Operable Unit (Continued)

NO FURTHER ACTION (CONTINUED)		
SWMU No.	**Description**	**NFA Approval By**
424	G-755-T-07-01	KDWM 1/28/2004
425	G-755-T-08	KDWM 1/28/2004
426	G-755-T-2-3-01	KDWM 1/28/2004
427	G-755-T-3-1-01	KDWM 1/28/2004
428	G-755-T-3-2-01	KDWM 1/28/2004
429	S-310-04	KDWM 8/28/2007
430	S-331-02	KDWM 1/4/2006
431	S-333-12	KDWM 5/12/2003
432	S-335-09	KDWM 11/23/2004
433	S-337-11	KDWM 9/11/2003
434	S-340-01	EPA and KY 4/2/2015
435	S-409-100	KDWM 5/12/2003
436	S-409-20	KDWM 5/12/2003
437	S-409-40	KDWM 5/12/2003
438	S-409-60	KDWM 5/12/2003
439	S-409-80	KDWM 5/12/2003
440	S-410-05	KDWM 8/28/2007
441	S-540-A-2-01	KDWM 6/29/2004
442	S-612-01	KDWM 2/14/2006
443	S-709-01	KDWM 6/29/2004
444	S-709-02	KDWM 6/29/2004
445	S-710-05	KDWM 2/14/2006
446	S-710-06	KDWM 9/11/2003
447	S-710-09	KDWM 1/4/2006
448	S-710-16	KDWM 9/11/2003
449	S-710-18	KDWM 9/11/2003
450	S-710-32	KDWM 1/4/2006
451	S-710-41	KDWM 9/11/2003
452	S-710-44	KDWM 1/4/2006
453	S-710-46	KDWM 9/11/2003
454	S-743-T-17-01	KDWM 2/14/2006
455	S-755-T-16-01	KDWM 1/28/2004
456	S-755-T-16-02	KDWM 1/28/2004
457	S-755-T-16-03	KDWM 1/28/2004
458	S-755-T-2-3-01	KDWM 1/28/2004
459	S-755-T-3-1-01	KDWM 1/28/2004
460	S-755-T-3-2-01	KDWM 1/28/2004
461	S-755-T-3-2-02	KDWM 1/28/2004
462	S-755-T-3-2-03	KDWM 1/28/2004
465	Yard Rubble Pile and Crushate Storage Area (G-Yard)	KDWM 10/13/2009
466	South of Dyke Road, Pond Area	KDWM 8/17/2009
467	Concrete Cylinder Holders Storage Area on Western Kentucky Wildlife Management Area	KDWM 8/17/2009
468	Area Northwest of Outfall 015	KDWM 2/14/2006
471	Outside C-746-B South Storage Area	KDWM 8/17/2009
473	C-746-B Pad, West	KDWM 8/28/2007
475	C-745-G5-01 (Paint Enclosure)	KDWM 2/14/2006
476	Concrete Crusher	KDWM 2/14/2006
479	C-204 Disintegrator Building	KDWM 6/3/2002
481	C-410-A Hydrogen Holder	KDWM 4/2/2002

Solid Waste Management Units/Areas of Concern by Operable Unit (Continued)

NO FURTHER ACTION (CONTINUED)		
SWMU No.	**Description**	**NFA Approval By**
484	C-611-M Storage Tank	KDWM 8/02/02
485	C-611-N Sanitary Water Storage	KDWM 3/21/02
490	McGraw Fuel Facility Waste Oil Storage Tank	KDWM 12/4/2002
491	Mercury Spill at the C-611 Water Treatment Plant Vault	KDWM 3/22/04
514	C-340 Magnesium Fluoride Reject Silo	Letter approved by EPA and KY 4/2/2015
515	C-340 "Dirty" Dust Collection System	Letter approved by EPA and KY 4/2/2015
516	C-340 Derby Preparation Area Sludge Collection System	Letter approved by EPA and KY 4/2/2015
519	C-410 Sulfuric Acid Tank (C-634-B)	KDWM 1/10/2003
521	C-340 Saw System Degreaser	Letter approved by EPA and KY 4/2/2015
525	Concrete Water Tower Supports (KOW)	KDWM 8/28/2007
527	C-410 GSA/SAA at Column J-6	KDWM 8/28/2007
528	GSA/SAA at the Northwest corner of C-745-G3 Paint Enclosure	KDWM 2/14/2006
530	Soil and Debris Storage Area by C-745-T Yard	KDWM 3/8/2007
532	Photographic Solution Treatment Area in the C-102 Building	KDWM 5/21/2003
534	UST #18, within SWMU 193	KDWM 3/8/2007
535	S-755-T08-01 (Satellite Accumulation Area at C-755, Trailer 8)	KDWM 2/14/2006
537	S-400-001 (SAA Located Outside at the Southeast Corner of the C-400 Building)	KDWM 2/14/2006
538	S-MST-01-01 & S-MST-01-02 (Mobile Trailer 01)	KDWM 2/14/2006
539	S-MST-02-01 & S-MST-02-02 (Mobile Trailer 02)	KDWM 2/14/2006
540	S-MST-03-01 & S-MST-03-02 (Mobile Trailer 03)	KDWM 2/14/2006
542 A	G-746-B-01; S-746-B-01; S-746-B-02 (GSA/SAAs located outside C-746-A)	KDWM 1/28/2004
542 B	G-746-A-01; S-746-A-01; S-746-A-02 (GSA/SAAs located outside C-746-A)	KDWM 1/28/2004
543	T-746-S-01 (90 Day Storage Area)	KDWM 1/28/2004
544	T-752-C-01 (90 Day Storage Area)	KDWM 1/28/2004
545	C-755-T-22-01 and G-755-T-22	KDWM 1/28/2004
546	PGDP Post 67 Diesel Fuel Spill Area	KDWM 2/14/2006
547	PGDP Post 38 Diesel Spill Area	KDWM 2/14/2006
548	Staging Area for Concrete Piers, Wood and Rubble North Side of C-745-B Cylinder Yard	KDWM 8/28/2007
551	C-755-GSA-23 Located at C-755 near the East Fence Line	KDWM 8/28/2007
552	C-760 90-Day Accumulation Area	KDWM 8/28/2007
566	H-340-01	KDWM 12/02/2010
568	C-340 ST-90 Boxes	KDWM 12/02/2010
569	C-743-T-17 Sample Return Refrigerator	KDWM 5/24/2012
570	Sample Return Sealand	KDWM 5/24/2012

Solid Waste Management Units/Areas of Concern by Operable Unit (Continued)

PENDING NO FURTHER ACTION DECISION	
	TBD
SWMUs THAT WILL BE INVESTIGATED AND REMEDIATED BY THE U.S. ARMY CORPS OF ENGINEERS[13]	
94	KOW Trickling Filter and Leach Field
95	KOW Burn Area
157	KOW Toluene Spill Area
182	Western Portion of Yellow Water Line

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
CSOU = Comprehensive Site Operable Unit
D&D = decontamination and decommissioning
ER = environmental remediation
FY = fiscal year
GDP = gaseous diffusion plant
GSA = generator staging area
HVAC = heating, ventilating, and air-conditioning
KOW = Kentucky Ordinance Works
KPDES = Kentucky Pollutant Discharge Elimination System
NFA = no further action
NSDD = North-South Diversion Ditch
OU = operable unit
PCB = polychlorinated biphenyl
PGDP = Paducah Gaseous Diffusion Plant
RCW = recirculating cooling water
SAA = satellite accumulation area
SAP = Sampling and Analysis Plan
SWMU = solid waste management unit
SWOU = Surface Water Operable Unit
TBD = to be determined
TCE = trichloroethene
TSCA = Toxic Substances Control Act
UST = underground storage tank
WKWMA = West Kentucky Wildlife Management Area

[13] EPA review/approval of the CERCLA documentation associated with these SWMUs has not occurred.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX 5

ENFORCEABLE TIMETABLES AND DEADLINES; PLANNING DATES WITH LONG-TERM TARGETS

THIS PAGE INTENTIONALLY LEFT BLANK

Enforceable Timetables and Deadlines; Planning Dates with Long-Term Targets

Operable Unit/ OU Designation	Subproject	Deliverable	Enforceable Timetable and Deadlines[1]		Planning Dates with Long-Term Targets for Decision Documents[2]	Comments
			FY 2016–FY 2018	Out-Year		
GWOU (01)	Southwest Plume Sources—SWMU 1 (Soil Mixing)	D1 Remedial Action Completion Report	9/2/16			
	Southwest Plume Sources—SWMUs 211 A and 211 B (Enhanced *In Situ* Bioremediation)	D1 Remedial Design Report			1st Quarter 2020	If long-term monitoring is the remedy selected, the milestone date will be modified to 8/4/16.
		D1 Remedial Action Work Plan			1st Quarter 2020	If long-term monitoring is the remedy selected, the milestone date will be modified to 9/3/16.
		D1 Remedial Action Completion Report			2nd Quarter 2021[3]	If long-term monitoring is the remedy selected, the planning date will be modified to 2nd Quarter 2018.
	Northeast Plume Optimization	Field Start	9/27/16			
	C-400—Phase IIb	D1 Treatability Study Report	12/28/15			
		D1 Revised Proposed Plan	9/27/16			The Proposed Plan is submitted for public comment within two weeks of approval.
		D1 Record of Decision	3/26/17			D1 ROD is submitted 30 days after close of public comment period on the Proposed Plan (FFA Section XIV.D).
		D1 Remedial Design Work Plan	4/25/17			An RDSI is being considered for a C-400 sub-slab investigation. This would result in a schedule change for the subsequent documents.
		D1 Remedial Design Report	4/25/18			
		D1 Remedial Action Work Plan	5/25/18			
		D1 Remedial Action Completion Report			2nd Quarter 2021	

Operable Unit/ OU Designation	Subproject	Deliverable	Enforceable Timetable and Deadlines[1]		Planning Dates with Long-Term Targets for Decision Documents[2]	Comments
			FY 2016–FY 2018	Out-Year		
GWOU (01)	Dissolved-Phase Plumes	D1 RI/FS Work Plan			4th Quarter 2026	Project scoping will consider the available information from ongoing projects including the TCE degradation study results, NW Plume Optimization, SW Plume Sources action, NE Plume Optimization, and C-400 Source action.
		D1 Remedial Investigation Report			1st Quarter 2028	
		D1 Feasibility Study Report			4th Quarter 2028	D1 Feasibility Study is submitted 60 days after EPA and KY approve the RI Report.[4]
		D1 Proposed Plan			2nd Quarter 2029	D1 Proposed Plan is submitted 45 days after EPA and KY approval of the Feasibility Study.[4] The Proposed Plan is submitted for public comment within two weeks of approval.
		D1 ROD			4th Quarter 2029	D1 ROD is submitted 30 days after close of public comment period on the Proposed Plan (FFA Section XIV.D).
		D1 Remedial Design Work Plan			4th Quarter 2029	
		D1 Remedial Design Report			4th Quarter 2030	
		D1 Remedial Action Work Plan			4th Quarter 2030	
GWOU (01)	GWOU	D1 Interim Remedial Action Completion Report		9/30/32		D1 Remedial Action Completion Report is submitted 150 days after Remedial Action is completed.
D&D OU (02)	Disposition of Inactive Facilities at PGDP	D&D OU D1 Completion Notification Letter (C-410)	4/11/16			

Operable Unit/ OU Designation	Subproject	Deliverable	Enforceable Timetable and Deadlines[1]		Planning Dates with Long-Term Targets for Decision Documents[2]	Comments
			FY 2016–FY 2018	Out-Year		
Waste Disposal Options (06)	Waste Disposal Options	D1 Proposed Plan			TBD	D1 Proposed Plan is submitted 45 days after EPA and KY approval of the Feasibility Study.[4] The Proposed Plan is submitted for public comment within two weeks of approval. New enforceable milestone dates will be established as part of dispute resolution.
		D1 ROD			TBD	D1 ROD is submitted 30 days after close of public comment period on the Proposed Plan (FFA Section XIV.D). New enforceable milestone dates will be established as part of dispute resolution.
		D1 Remedial Design Work Plan			TBD	New enforceable milestone dates will be established as part of dispute resolution.
		D1 Remedial Design Report			TBD	New enforceable milestone dates will be established as part of dispute resolution.
		D1 Remedial Action Work Plan			TBD	New enforceable milestone dates will be established as part of dispute resolution.
SWOU (03)	Remedial Action (Little Bayou and Bayou Creek Watersheds)	D1 Remedial Investigation Report			1st Quarter 2029	The FFA Parties will be evaluating specific SWMUs under the Surface Water Operable Unit Remedial Action for potential actions.

Operable Unit/ OU Designation	Subproject	Deliverable	Enforceable Timetable and Deadlines[1]		Planning Dates with Long-Term Targets for Decision Documents[2]	Comments
			FY 2016–FY 2018	Out-Year		
SWOU (03)	Remedial Action (Little Bayou and Bayou Creek Watersheds)	D1 Feasibility Study Report			3rd Quarter 2029	D1 Feasibility Study is submitted 60 days after EPA and KY approve the RI Report.[4]
		D1 Proposed Plan			1st Quarter 2030	D1 Proposed Plan is submitted 45 days after EPA and KY approval of the Feasibility Study.[4] The Proposed Plan is submitted for public comment within two weeks of approval.
		D1 ROD			3rd Quarter 2030	D1 ROD is submitted 30 days after close of public comment period on the Proposed Plan (FFA Section XIV.D).
		D1 Remedial Design Work Plan			3rd Quarter 2030	
		D1 Remedial Design Report			3rd Quarter 2031	
		D1 Remedial Action Work Plan			3rd Quarter 2031	
SWOU (03)	SWOU	D1 Remedial Action Completion Report		9/30/32		D1 Remedial Action Completion Report is submitted 150 days after Remedial Action is completed.
Soils OU (04)	SWMU 27	D1 Removal Notification	6/22/16			
	Remedial Action 1 (Pre-GDP Shutdown)	D1 Remedial Investigation Report Addendum for SWMU 1	01/21/17			
		D1 Feasibility Study[5]			3rd Quarter 2025	
		D1 Proposed Plan			1st Quarter 2026	D1 Proposed Plan is submitted 45 days after EPA and KY approval of the Feasibility Study.[4] The Proposed Plan is submitted for public comment within two weeks of approval.

Operable Unit/ OU Designation	Subproject	Deliverable	Enforceable Timetable and Deadlines[1]		Planning Dates with Long-Term Targets for Decision Documents[2]	Comments
			FY 2016–FY 2018	Out-Year		
Soils OU (04)	Remedial Action 1 (Pre-GDP Shutdown	D1 ROD			3rd Quarter 2026	D1 ROD is submitted 30 days after close of public comment period on the Proposed Plan (FFA Section XIV.D).
		D1 Remedial Design Work Plan			4th Quarter 2026	
		D1 Remedial Design Report			4th Quarter 2027	
		D1 Remedial Action Work Plan			4th Quarter 2027	
	Remedial Action 2 (Pre-GDP Shutdown)	D1 Remedial Investigation Report Addendum for SWMU 229	3/25/16			
		D1 Feasibility Study			3rd Quarter 2025	
		D1 Proposed Plan			1st Quarter 2026	D1 Proposed Plan is submitted 45 days after EPA and KY approval of the Feasibility Study.[4] The Proposed Plan is submitted for public comment within two weeks of approval.
		D1 ROD			3rd Quarter 2026	D1 ROD is submitted 30 days after close of public comment period on the Proposed Plan (FFA Section XIV.D).
		D1 Remedial Design Work Plan			4th Quarter 2026	
		D1 Remedial Design Report			4th Quarter 2027	
		D1 Remedial Action Work Plan			4th Quarter 2027	
Soils OU (04)	Soils OU	D1 Remedial Action Completion Report		9/30/30		D1 Remedial Action Completion Report is submitted 150 days after Remedial Action is completed.

Operable Unit/ OU Designation	Subproject	Deliverable	Enforceable Timetable and Deadlines[1]		Planning Dates with Long-Term Targets for Decision Documents[2]	Comments
			FY 2016–FY 2018	Out-Year		
BGOU (05)	SWMUs 5 and 6 Remedial Action	D2/R1 Proposed Plan	2/24/16			The Proposed Plan is submitted for public comment within two weeks of approval.
		D1 ROD	8/3/16			
		D1 Remedial Design Work Plan			TBD	New enforceable milestone dates will be established once the FFA parties agree on the path forward for this project.
		D1 Remedial Design Report			TBD	New enforceable milestone dates will be established once the FFA parties agree on the path forward for this project.
		D1 Remedial Action Work Plan			TBD	New enforceable milestone dates will be established once the FFA parties agree on the path forward for this project.
		Field Start			TBD	New enforceable milestone dates will be established once the FFA parties agree on the path forward for this project.
		D1 Remedial Action Completion Report			TBD	D1 Remedial Action Completion Report is submitted 150 days after Remedial Action is completed. New enforceable milestone dates will be established once the FFA parties agree on the path forward for this project.
	SWMUs 2 and 3 Remedial Action	D1 Proposed Plan			2nd Quarter 2022	D1 Proposed Plan is submitted 45 days after EPA and KY approval of the Feasibility Study.[4] The Proposed Plan is submitted for public comment within two weeks of approval.

Operable Unit/ OU Designation	Subproject	Deliverable	Enforceable Timetable and Deadlines[1]		Planning Dates with Long-Term Targets for Decision Documents[2]	Comments
			FY 2016–FY 2018	Out-Year		
BGOU (05)	SWMUs 2 and 3 Remedial Action	D1 ROD			4th Quarter 2022	D1 ROD is submitted 30 days after close of public comment period on the Proposed Plan (FFA Section XIV.D).
		D1 Remedial Design Work Plan			4th Quarter 2022	
		D1 Remedial Design Report			4th Quarter 2023	
		D1 Remedial Action Work Plan			4th Quarter 2023	
		D1 Remedial Action Completion Report			4th Quarter 2026	D1 Remedial Action Completion Report is submitted 150 days after Remedial Action is completed.
	SWMUs 7 and 30 Remedial Action	D1 Proposed Plan			4th Quarter 2023	D1 Proposed Plan is submitted 45 days after EPA and KY approval of the Feasibility Study.[4] The Proposed Plan is submitted for public comment within two weeks of approval.
		D1 ROD			2nd Quarter 2024	D1 ROD is submitted 30 days after close of public comment period on the Proposed Plan (FFA Section XIV.D).
		D1 Remedial Design Work Plan			2nd Quarter 2024	
		D1 Remedial Design Report			2nd Quarter 2025	
		D1 Remedial Action Work Plan			2nd Quarter 2025	
		D1 Remedial Action Completion Report			4th Quarter 2026	D1 Remedial Action Completion Report is submitted 150 days after Remedial Action is completed.
	SWMU 4 Remedial Action	Remedial Investigation Report Addendum	8/4/16			
		D1 Feasibility Study	3/2/17			Normal FFA schedule logic has not been applied.

Operable Unit/ OU Designation	Subproject	Deliverable	Enforceable Timetable and Deadlines[1]		Planning Dates with Long-Term Targets for Decision Documents[2]	Comments
			FY 2016–FY 2018	Out-Year		
BGOU (05)	SWMU 4 Remedial Action	D1 Proposed Plan			1st Quarter 2019	To maintain alignment with WDA, normal FFA schedule logic has not been applied. The Proposed Plan is submitted for public comment within two weeks of approval.
		D1 ROD			2nd Quarter 2020	To maintain alignment with WDA, normal FFA schedule logic has not been applied. The basis for linking the D1 ROD to the WDA schedule may be reevaluated by the FFA parties in the future.
		D1 Remedial Design Work Plan			2nd Quarter 2020	
		D1 Remedial Design Report			2nd Quarter 2021	
		D1 Remedial Action Work Plan			3rd Quarter 2021	
		D1 Remedial Action Completion Report			1st Quarter 2026	D1 Remedial Action Completion Report is submitted 150 days after Remedial Action is completed.
	SWMUs 9, 10, and 145 Remedial Action	Remedial Investigation Work Plan Addendum			2nd Quarter 2026	
		Remedial Investigation Report Addendum			3rd Quarter 2027	
		D1 Feasibility Study			2nd Quarter 2028	D1 Feasibility Study is submitted 60 days after EPA and KY approve the RI Report.[4]

Operable Unit/ OU Designation	Subproject	Deliverable	Enforceable Timetable and Deadlines[1]		Planning Dates with Long-Term Targets for Decision Documents[2]	Comments
			FY 2016–FY 2018	Out-Year		
BGOU (05)	SWMUs 9, 10, and 145 Remedial Action	D1 Proposed Plan			4th Quarter 2028	D1 Proposed Plan is submitted 45 days after EPA and KY approval of the Feasibility Study.[4] The Proposed Plan is submitted for public comment within two weeks of approval.
		D1 ROD			1st Quarter 2029	D1 ROD is submitted 30 days after close of public comment period on the Proposed Plan (FFA Section XIV.D).
		D1 Remedial Design Work Plan			2nd Quarter 2029	
		D1 Remedial Design Report			2nd Quarter 2030	
		D1 Remedial Action Work Plan			2nd Quarter 2030	
		D1 Remedial Action Completion Report			4th Quarter 2031	D1 Remedial Action Completion Report is submitted 150 days after Remedial Action is completed.
BGOU (05)	BGOU	D1 Remedial Action Completion Report		9/30/31		D1 Remedial Action Completion Report is submitted 150 days after Remedial Action is completed.
NA (00)	NA	D1 Five-Year Review			7/31/18	This is a statutorily required document that must be approved by 6/4/19.

[1] Enforceable Timetables and Deadlines are based on the planning scope assumptions contained in Appendix 3 and funding levels. While the FFA parties find these assumptions to be reasonable for bounding cost and schedule forecasts based on existing information, approval of the assumptions does not constitute decision making for the response actions described in this table.
[2] Not enforceable dates. Used for planning purposes only. The parties further agree that DOE can adjust the planning dates as part of the annual SMP update without having to submit an official request or justify "good cause" in accordance with Section XXIX of the FFA.
[3] This date formerly has been associated with the out-year completion date for the GWOU. A new out-year completion date for the Dissolved-Phase Plume that replaces the Southwest Plumes Sources date has been established and represents the final completion date for the GWOU for pre-GDP shutdown groundwater scope.
[4] Assumes that final approval is received on the D2 document.
[5] The D1 Feasibility Study for Soils OU Remedial Action 1 will evaluate volatile organic compound contamination at SWMU 1 that did not undergo active treatment (e.g., deep soil mixing) associated with Southwest Plume.

BGOU = Burial Grounds Operable Unit
DOE = U.S. Department of Energy
D&D = decontamination and decommissioning
EPA = U.S. Environmental Protection Agency
FFA = Federal Facility Agreement
FS = feasibility study
FY = fiscal year
GDP = gaseous diffusion plant
GWOU = Groundwater Operable Unit
NA = not applicable
OU = operable unit
PGDP = Paducah Gaseous Diffusion Plant
RI = remedial investigation
ROD = record of decision
SMP = Site Management Plan
SWOU = Surface Water Operable Unit
SWMU = solid waste management unit
TBD = to be determined
TCE = trichloroethene

APPENDIX 6

DATA MANAGEMENT PLAN

THIS PAGE INTENTIONALLY LEFT BLANK

DATE OF ISSUE: October 2, 1998

DOE/OR/07-1595&D2
Primary Document

DATA AND DOCUMENTS MANAGEMENT AND QUALITY ASSURANCE PLAN FOR PADUCAH ENVIRONMENTAL MANAGEMENT AND ENRICHMENT FACILITIES

J. R. Blewett
T. L. Brindley
L. K. Garner
J. L. White

Prepared by
Environmental Management and Enrichment Facilities
Kevil, Kentucky 42053
Managed by
BECHTEL JACOBS COMPANY LLC
for the
U.S. DEPARTMENT OF ENERGY
Under Contract No. DE-AC05-98OR22700

Blank Page

DATA AND DOCUMENTS MANAGEMENT AND QUALITY ASSURANCE PLAN APPROVALS

Approved by: D. L. Chumbler **Date:** 10/5/98

D. L. Chumbler
Bechtel Jacobs Company LLC
Quality Manager

Approved by: R. L. Foster **Date:** 10/5/98

R. L. Foster
Bechtel Jacobs Company LLC
Information Technology and Sample Management

Approved by: R. E. Scott **Date:** 10/5/98

R. E. Scott
Bechtel Jacobs Company LLC
Engineering and Technical Services

Approved by: J. C. Massey **Date:** 10/5/98

J. C. Massey
Bechtel Jacobs Company LLC
Paducah Manager of Projects

Approved by: J. C. Hodges **Date:** 10-5-98

J. C. Hodges
DOE FFA Project Manager

Blank Page

PREFACE

This plan is generated to define the roles, responsibilities, and activities affecting data management, document management, and quality for data collection between the Department of Energy (DOE) and the regulatory agencies that govern the Paducah Gaseous Diffusion Plant (PGDP) Federal Facility Agreement (FFA). Pursuant to the FFA section titled "Quality Assurance/Sampling Availability/Data Management," all quality-assured data or summaries of all quality-assured data from all samples collected, analyzed, and reported shall be available no later than 30 days after the analyses have been received and validated. Further, DOE shall maintain one consolidated database for the Site which includes all data/studies generated pursuant to this agreement. To fulfill this requirement, Paducah DOE has an integrated "data system" made up of many databases managed by one organization. Electronic formats and/or hard copies of all data/studies and related documents are made available upon request.

In addition to the requirements in the Federal Facility Agreement (FFA), other agreements require a consolidated data management process:

1) Environmental Protection Agency (EPA) Hazardous and Solid Waste Amendment Permit states:

   Condition I.D.9.d.—Monitoring and Records

   "All environmental monitoring data collected pursuant to Part II of this Permit shall be submitted to the Regional Administrator in a consistent format, with consistent parameters and concentration units. This will facilitate collection and recording of such data in a computer data file. Within one (1) year from the effective date of the Permit, this monitoring data shall also be routinely submitted electronically and on computer disc..."

   Condition II.E.3.b.—Interim Measures (IM) Reports

   "...The IM Report shall contain the following information at a minimum, (e) copies of all relevant laboratory/monitoring data, etc., in accordance with Condition I.D.9."

2) Kentucky Division of Waste Management Hazardous and Solid Waste Permit states:

   Condition III.E.9.a—Monitoring and Records

   "...All environmental and monitoring data collected pursuant to Part II.J and Part IV of the Permit shall be submitted to the Division, both in written and electronic format. Sampling data shall be submitted in accordance with the schedules described in this Permit."

3) Agreement in Principle states:

   "...DOE will promptly furnish to Kentucky environmental monitoring data in electronic format, if available, or paper copies. DOE data reports will be released to Kentucky within 90 days after receipt from the laboratory and completion of the appropriate level of review and quality assurance/quality control (QA/QC) validation..."

Blank Page

CONTENTS

CONTENTS (Continued)

CONTENTS (Continued)

Blank Page

ACRONYMS

AIP	Agreement in Principle
AR	Administrative Record
ASER	Annual Site Environmental Report
ASTM	American Society for Testing and Materials
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	chain-of-custody
DOE	Department of Energy
DMC	Document Management Center
DMP	Data Management Plan
DMS	Data Management System
DQO	Data Quality Objectives
EDD	Electronic Data Deliverable
EMEF	Environmental Management & Enrichment Facilities
EMP	Environmental Monitoring Program
EMP PEMS	Environmental Monitoring Program Project Environmental Measurements System
EMP RTL	Environmental Monitoring Program Ready-to-Load
EPA	Environmental Protection Agency
ER PEMS	Environmental Restoration Project Environmental Measurements System
ER RTL	Environmental Restoration Ready-to-Load
FFA	Federal Facility Agreement
GIS	Geographic Information System
GW PEMS	Groundwater Project Environmental Measurements System
GW RTL	Groundwater Ready-to-Load
IM	interim measures
NENW PEMS	North East/North West Project Environmental Measurements System
NENW RTL	North East/North West Ready-to-Load
OREIS	Oak Ridge Environmental Information System
PC	personal computer
PEMS	Project Environmental Measurements System
PGDP	Paducah Gaseous Diffusion Plant
QA	quality assurance
QAMS	Quality Assurance Management Staff
QC	quality control
RCRA	Resource, Conservation, and Recovery Act
SAP	Sampling and Analysis Plan
SMO	Sample Management Office
SOW	Statement of Work
SWMU	Solid Waste Management Unit
VOA	volatile organic analysis
VOC	volatile organic compound
WAG	Waste Area Grouping
WM PEMS	Waste Management Project Environmental Measurements System
WM RTL	Waste Management Ready-to-Load

Blank Page

DEFINITIONS

Administrative Record (AR)—Official body of documents that forms the basis of the selection of a particular response action.

Chain-of-Custody (COC)—A process used to document the transfer of custody of samples from one individual to another from collection until final disposition. A sample is under custody if:

1. it is in the field personnel's possession;
2. it is in the field personnel's view after being in their physical possession;
3. it was in the field personnel's physical possession and then it was secured to prevent tampering; or
4. it is placed in a designated secure area.

Data Backup—The process by which computerized data is copied from one electronic medium to another to guard against the loss of data.

Data Entry—The manual keying of information using data entry screens for transfer into a database.

Data Qualifiers—A set of predefined alphabetic or numeric codes applied to analytical data to signify its usability. Qualifiers pertaining to data include laboratory qualifiers, verification qualifiers, validation qualifiers, and assessment qualifiers.

Data Quality Checks—A list of quality control (QC) elements associated with a data collection activity which are evaluated during data verification and/or data validation.

Data Quality Objectives (DQO)—A set of criteria established for the collection of data. The DQO process is based on the DQO process developed by the Environmental Protection Agency (EPA), Region IV and is a planning tool based on the scientific method that clearly identifies an environmental problem; the remedial decisions to be made to address the problem; and the type, quantity, and quality of data needed to support decision making. The DQO process may be applied in modified form to any data collection activity. The DQO process balances risks with cost, in selecting the most appropriate data collection plan.

Paducah Department of Energy (DOE) Program Integrated Data System—An integrated computer system for data storage and retrieval that organizes data into tables consisting of one or more rows of information, each containing the same set of data items. Data files are cross-referenced to one another to provide flexible access so that data collection is complete, consistent, sufficiently documented, and reusable to the maximum extent possible. The Paducah DOE Program Integrated Data System is compatible with the central Oak Ridge Environmental Information System (OREIS) to comply with the Oak Ridge Federal Facilities Agreement (FFA).

Data Transfer—The exchange of data from one electronic medium to another.

Document—Writings, drawings, graphs, charts, photographs, electronic tapes, diskettes, and data compilation from which information can be obtained.

DEFINITIONS (Continued)

Document Management Center (DMC)—A location established for a targeted audience where individual documents are tracked and maintained for audit purposes. It also may be a center where collection of controlled documents is maintained. Paducah's established location is the document center at 761 Veterans Avenue, Kevil, Kentucky.

Document Management System (DMS)—A computerized system used by the DOE Program at the Paducah Gaseous Diffusion Plant (PGDP) to facilitate the electronic handling of bibliographic, file classification, and index information.

Electronic Data Deliverable (EDD)—Data that is received in electronic format either through transfer on physical media or direct communication between computerized data management systems. EDD contents must meet defined completeness, consistency, and format requirements. These criteria are defined in the Statement of Work (SOW) for each program or project.

Electronic Media—Data storage device such as diskette, disk drive, tape, or optical disk.

Field Logbooks—The primary record for field activities. They should include a description of any modifications to the protocols outlined in the work plan, field sampling plan, or health and safety plan with justifications for such modifications. They are intended to provide sufficient data and observations to enable participants to reconstruct events that occurred. All entries should be dated and signed by the data recorder and quality assured by another individual.

Historical Data—Data which was collected and managed prior to implementation of procedure PMSA-1001, "Quality Assured Data."

Metadata—Information about measurement data that helps to define data usability and associated context.

Quality Assurance (QA) and Data Management Plan (DMP)—A document written for each task that presents in specific terms the policies, organization, objectives, functional responsibilities, and specific QA/Quality Control (QC) activities designed to achieve the data quality goals.

Quality Assurance (QA) Record—A complete document that furnishes evidence of the quality of items, activities, or credentials and has been designated as a QA record. Such records are considered to be lifetime or nonpermanent records.

Protocol—A record or document utilized to provide guidance or work direction. Some examples of protocols would be procedures, SOWs, work guides, work instructions, sampling plans, etc.

Records—Books, papers, maps, photographs, machine-readable materials, or other documentary materials, regardless of physical form or characteristics, made or received by an agency of the U.S Government under federal law or in connection with the transaction of public business. Virtually all recorded, informational materials in the custody of the government (including information held by contractors that is considered by contract to be government information), regardless of the medium (hard copy, machine-readable, microfilm, etc.), are considered government "records."

DEFINITIONS (Continued)

Sample Delivery Group—A unit used to identify a group of samples for delivery. Each Sample Delivery Group is assigned a unique ID number.

Sampling and Analysis Plan (SAP)—A plan of action developed before implementation of field activities that describes the methods and protocols for obtaining representative portions of the environment being investigated. It also describes the methods for analysis and the required parameters.

Statement of Work (SOW)—The contractual agreement between the requesting organization and the service provider. The SOW defines the scope of work, including associated QA/QC, schedules, and deliverables.

Task Files—Files maintained at the PGDP Site Office pertaining to the site mission. A Task File is required for each task and usually pertains to a single task.

Blank Page

1. INTRODUCTION

1.1 PURPOSE

This plan will be used for the Paducah Department of Energy (DOE) tasks that are involved in the collection of data. Each section of the plan was written to meet the data quality requirements set forth by the Paducah DOE Program and defined in 10 CFR 830.120 and provides a description of the programmatic elements which should occur for each task. Appendix A provides additional information concerning the quality assurance (QA) and data management aspects which are specific to the task and cannot be defined at this level. Appendix A should be completed once the task has been planned or has documented the Data Quality Objectives (DQOs). This plan, along with a completed Appendix A, will serve as the "Quality Assurance and Data Management Plan" for the task, will be provided to appropriate personnel, and will be maintained as a project record.

For the purpose of this document, Appendix A is not completed but shows the information to be completed for each task involved in the collection of data. Each task will issue the task-specific "Quality Assurance and Data Management Plan" through the designated channels.

1.2 APPLICABILITY

The requirements of this plan apply to the collection and generation of data by Paducah DOE. This plan applies to screening and definitive analytical data as defined in Section 3.2, historical data, and locationally descriptive data which includes the Geographic Information System (GIS), lithology, geophysical data, etc. Implementation for tasks is based on data collection needs and final use of the data. The requirements of this plan do not apply to data collected by the Health and Safety Program or personnel and financial data.

2. PROGRAM ORGANIZATION, RESPONSIBILITY, AND TRAINING

This information describes the basic organization, responsibility, and training requirements for tasks. Specific task plans should be developed using Appendix A as a guide to define individuals and matrix responsibilities. The task will further define training needs based on activities performed in the field.

2.1 ORGANIZATION

The DOE Project Manager and the DOE Performance Management contractor establish task scope and prioritize work to ensure the Paducah DOE Program strategic plans are accomplished. Furthermore, they serve as the primary interface to ensure that task, regulatory agency, stakeholder, and other involved organizations objectives are met. They will ensure that requirements in this plan are incorporated into various protocols and other Statements of Work (SOWs). In addition, they will ensure adequate technical support is in place for the task and that QA and safety are first priorities throughout the task life cycle.

2.2 ROLES AND RESPONSIBILITIES

The functional responsibilities of task staff members shown below relate to their involvement with the data collection and the output process. This section identifies task activities with staff members performing the work. While the descriptions are identified by title, they indicate functional responsibilities that task staff perform rather than individual staff positions.

2.2.1 Stakeholders

- **DOE Project Manager**

The DOE Project Manager has direct communication with the DOE Performance Management contractor Project Manager and is responsible for task oversight, overall compliance for the task, and submitting various reports to, and interfacing with, the Environmental Protection Agency (EPA) and the Commonwealth of Kentucky.

- **Commonwealth of Kentucky**

The Commonwealth of Kentucky is the state regulatory stakeholder for the site. Activities including remedial action, enrichment facilities, and waste management of the Paducah DOE Program are reviewed, commented upon, and approved by the Commonwealth of Kentucky.

- **EPA, Region IV**

EPA is the federal regulatory stakeholder for the Site. Activities, including remedial action, enrichment facilities, and waste management of the Paducah DOE Program are reviewed, commented upon, and approved by EPA.

- **Kentucky Agreement in Principle (AIP)**

The Kentucky AIP reflects the understanding and commitments between DOE and the Commonwealth of Kentucky regarding DOE's provision to provide to the Commonwealth technical and financial support for the Commonwealth's activities in environmental oversight, surveillance, remediation, and emergency-response activities. The AIP is intended to support nonregulatory activities. Its goal is to maintain an independent, impartial, and qualified assessment of the potential environmental impacts of present and future DOE activities at the Paducah Gaseous Diffusion Plant (PGDP).

- **Federal Facility Agreement (FFA)**

The FFA reflects the understanding and commitments between DOE, EPA, and the Kentucky Division of Waste Management regarding the comprehensive remediation of PGDP. The purpose of the FFA is to provide a set of comprehensive requirements for remediation that coordinates the cleanup provisions of both Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Resource, Conservation, and Recovery Act (RCRA).

2.2.2 DOE Managing and Integrating Contractor

Bechtel Jacobs Company LLC as the managing and integrating contractor is responsible for ensuring the following functions are performed either by their staff or a subcontractor.

- **Data Manager**

The Data Manager is responsible for long-term electronic storage of data, loading Electronic Data Deliverables (EDDs), electronic verification of data, and ensuring compliance to policies and protocols relating to data management. The Data Manager has overall responsibility for the design, operations, and maintenance of the databases; ensures compatibility with central Oak Ridge Environmental Information System (OREIS); serves on the OREIS Steering Committee; reviews the system performance; determines the need for changes; authorizes changes; and oversees the electronic transfer of electronic data to external agencies. The Data Manager interfaces with the Sample Manager and the Project Data Coordinator to set up the Project Environmental Measurements System (PEMS) for each task. The Data Manager oversees the completion of task-specific Data Management Plans.

- **Data Requestor**

The requestor may be a task lead or his designated representative, such as a technical lead, risk assessor, waste management coordinator, compliance coordinator, or other individual who determines the need for data to support decision making. The requestor is responsible for coordinating sample collection, sample analysis, data assessment, and decision making. If the requestor is a designated representative, the task lead has ultimate responsibility.

- **Network Administrator**

The Network Administrator is responsible for implementing the system design for the Paducah DOE Program Integrated Data System platform; coordinating necessary network and personal computer (PC) maintenance; establishing user accounts to the network; and performing daily backups to system data.

- **Project Data Coordinator/Data Management Team**

The Project Data Coordinator/Data Management Team is responsible for ensuring that the requirements relating to data management are met for the task. This includes accumulation of historical data, control of data generated by field activities or as a result of lab analyses, and storage of data as part of the task. The Project Data Coordinator ensures that all data are entered into PEMS. The Project Data Coordinator works with the Data Manager and the Sample Manager to ensure consistency throughout the task data, with other task's data, and the data systems in place. The Project Data Coordinator is responsible for data entry verification; assisting with the data evaluation and review process; data updates and deletions, as authorized by the Data Manager; and performing electronic transfer of data files from electronic data laboratory deliverables to the Paducah DOE Program Integrated Data System.

- **Project Manager**

The Project Manager has direct responsibility for the overall task oversight, including budget, schedule, and milestones. This responsibility includes the management of strategic planning, safety, quality, task activities, and for the successful completion of task assignments within budget and on schedule. The Project Manager ensures that implementation of the QA and Data Management Programs is consistent with guidelines and ensures requirements are adhered to, as stated in this plan. The Project Manager reports to the Bechtel Jacobs Company Manager of Projects and interfaces with DOE and the task team.

- **Task Team**

The Task Team is made up of personnel (i.e., Project Manager, Task Manager, Task Lead, Quality Engineer, Sample Manager, Data Manager, Technical Manager, Field Team Leader, and other field personnel) responsible for a specific task. The team is responsible for the data collection planning; fieldwork; sampling and analysis; data review; and decision making for a set task.

- **Quality Engineer**

The Quality Engineer is responsible for the overall QA concerns of the data and system functions relating to a task. The Quality Engineer is involved in the planning and review of data to ensure that data quality requirements are met. The Quality Engineer is also responsible for helping prepare QA plans, work agreements, protocols, and documents to establish and implement requirements, performing assessments, providing guidance/assistance in resolving quality problems, and ensuring that corrective action is taken and appropriately documented.

- **Records Clerk**

The Records Clerk is responsible for entering records; indexing data into Data Management System (DMS) records; indexing tables; assisting with the records storage and retrieval process; and performing data updates and deletions as authorized by the Records Manager.

- **Records Manager**

The Records Manager is responsible for maintaining all pertinent and required records associated with operating the DMS and preserving the data; determining which records must be stored and the storage requirements; establishing a records classification, inventory, and indexing system; maintaining the DMS records indexing tables; implementing a records storage and retrieval system; and coordinating with the Data Manager and Sample Manager to establish pointers to data processing records and associated metadata (e.g., laboratory data packages, regulatory documents, QA requirements, and program plans).

- **Project Records Coordinator**

The Project Records Coordinator is responsible for the task records. Duties include all activities relating to identification, acquisition, classification, indexing, and storage of task records related to field activities. The task records include data documentation materials; plans and protocols; and all task file requirements. Upon completion of the task, the Project Records Coordinator transmits all task files to the Paducah Document Management Center (DMC).

- **Release Requestor**

The Release Requestor is identified as the person who requests the release of data to an external agency. This responsibility could be filled by several different roles including, but not limited to, the Task Lead or the Technical Manager.

- **Sample Manager**

The Sample Manager is responsible for working with the Task Lead to develop specific analytical requirements for the task, interfacing with the Oak Ridge Sample Management Office (SMO) for procurement of laboratory services, contracting validation services, and coordinating contractual screening. The Sample Manager works with the task team to resolve issues identified during contractual screening or electronic data review of the data with the laboratory. The Sample Manager interfaces with the Data Manager, the Project Data Coordinator, and the task team.

- **Task Lead**

The Task Lead is responsible for direct task coordination, issuing technical reports, and maintaining the task is on schedule and within the budget. The Task Lead coordinates all team personnel working on the task and communicates regularly with the Task Team personnel on the status of task budgets and schedules; assuring all protocols are followed; deliverables are met; and that any issues or concerns associated with the task are properly addressed. The Task Lead ensures that implementation of the QA and Data Management Programs is consistent with guidelines and ensures requirements are adhered to as stated in this plan. The Task Lead reports to the Task Manager and interfaces with the task team.

- **Task Manager**

The Task Manager is responsible for ensuring that the proper resources are available and that personnel are appropriately trained for the assigned task. The Task Manager ensures that all requirements and protocols for the task are followed and that they are consistent with the overall mission of the Environmental Management and Enrichment Facilities (EMEF) Program. The Task Manager also ensures that implementation of the QA and Data Management Programs is consistent with guidelines and ensures requirements are adhered to as stated in this plan. The Task Manager reports to the Project Manager and interfaces with the Task Lead.

- **Technical Manager/Subcontractor Technical Representative**

The Technical Manager/Subcontractor Technical Representative is responsible for providing technical support and guidance to the task. This includes field observations and oversight of subcontractors, generating reports/documents, and making decisions regarding technical issues (i.e., sample locations, analytical methods, etc.).

2.3 TRAINING

Personnel assigned to the task, including field personnel and subcontractors, will be trained to perform the tasks to which they are assigned. Training requirements are defined in the task-specific SOWs and plans.

3. QA OBJECTIVES FOR MEASUREMENT DATA

QA objectives, for the purposes of this plan, apply to measurement data only. Other data (such as locationally descriptive information) is discussed in Section 8.

3.1 DQOs

DQOs are statements developed by data users to specify the quality of data from field and laboratory data collection activities to support specific decisions or regulatory actions. DQOs are qualitative and quantitative specifications that are used to design a study that will limit uncertainty to an acceptable level. The DQOs describe what data is needed, why the data is needed, and how the data will be used to address the problems being investigated. DQOs also establish numeric limits to ensure that data collected is of sufficient quality and quantity for user applications.

The DQO process is a planning tool based on the scientific method that clearly identifies a problem; the decisions to be made to address the problem; and the type, quantity, and quality of data needed to support the decision making. The DQO process may be applied in modified form to any data collection activity. The DQO process balances risks with costs in selecting the most appropriate data collection plan. When applicable, various regulatory agencies (i.e., EPA, Kentucky Department for Environmental Protection, etc.) may participate in the DQO sessions.

Specific DQOs and Sampling and Analysis Plans (SAPs) for tasks are developed per PMSA-1001 and will be documented in Appendix A.

3.2 ANALYTICAL DATA CATEGORIES

Two descriptive data categories have been specified by EPA in the *Data Quality Objectives Process for Superfund, Interim Final Guidance*, EPA/540/G-93/071 (EPA, 1993). These two data categories supersede the five quality control (QC) levels (Levels I, II, III, IV, and V). The two new data categories are associated with specific QA/QC elements and may be generated using a wide range of analytical methods. The type of data generated will be based on the qualitative and quantitative DQOs. The two data categories are:

Screening data—Measurements generated through the use of field- or fixed-laboratory methods in which the level of certainty in the data cannot be determined given physical evidence documenting the acquisition and analysis of the sample. Analytical methods producing field measurements or screening data include those that indicate the presence or absence of an analyte, or class of analytes, or provide a semiquantitative (estimated) result. Field measurement and other screening data include, but are not limited to, Draeger tubes; organic vapor analyses; soil gas surveys; and radiation and contamination monitoring. Screening data results must be confirmed by collecting a specified percentage of definitive data. Screening data should be used conservatively and not rule out the presence of a contaminant without some percentage of the data being confirmed by definitive data.

Definitive data—Analytical measurements for which the presence and corresponding concentration of the target analyte(s) can be determined with a known degree of certainty. The measurements are supported with appropriate physical evidence documenting the acquisition and analysis. Definitive data, in electronic form, must be supported with retrievable, but not necessarily retrieved, physical evidence in the laboratory. This evidence can include analytical results, QA/QC results, chains-of-custody (COCs), logbooks, standards information, etc.

Definitive data, or a combination of screening data, definitive confirmation, and definitive data, will be collected when the task is implemented. A minimum of ten percent of the screening samples will also be analyzed by a fixed-base laboratory using EPA SW-846 Methods (1986) to provide the required definitive data. When not available, other nationally recognized methods such as those of the American Society for Testing and Materials (ASTM), DOE, and EPA, will be used.

Applicable task documents summarize the data uses, data users, data categories, and data deliverable QC levels for each of the media and sample types that will be collected during the investigation.

4. APPLICABLE PROTOCOLS AND DOCUMENTS

Company protocols, sampling methods, administrative procedures, etc., utilize hierarchy documents that relate to data quality. Hierarchy documents such as EPA Quality Assurance Management Staff (QAMS) 005/80, *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans*, *EPA Region 4 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*, and Environmental Data Management Implementation Handbook for the Environmental Restoration Program (ES/ER/TM-88/R1) are used as flow-down documents in writing company protocols. Deviations are documented as described in Section 16. Protocols and documents applicable to the processes described will be defined in completion of Appendix A.

5. SAMPLE CUSTODY

COC is a process used to document the transfer of custody of samples from one individual to another from sample collection until final disposition. COC records are handled in accordance with applicable protocols. COC requires signature transfer of samples from sampling personnel to the sample custodians, who then transfer samples to the appropriate analytical laboratory personnel. The transfer of samples between individuals in the same work group located in the same general location (sampling or analytical) does not require a signature transfer since the integrity of the sample is maintained at all times. If the individuals are not in the same general location, a COC is required. This is accomplished by the samples being locked in a refrigerator when laboratory personnel are not available. Sample residuals are disposed of only after notification by the Task Lead that they no longer need archiving or once holding times have been exceeded. Sample custody protocols are identified in Appendix A.

6. CALIBRATION PROTOCOLS AND FREQUENCY

6.1 FIELD EQUIPMENT CALIBRATION PROTOCOLS AND FREQUENCIES

The calibration of field instruments will be checked in the field in accordance with manufacturer's specifications. Field calibration records will be documented in logbooks and/or on field data sheets. Calibration frequencies for field instruments will be defined in Appendix A.

6.2 LABORATORY CALIBRATION PROTOCOLS AND FREQUENCIES

The laboratory(ies) will use written, standard protocols for equipment calibration and frequency. These protocols are based on EPA guidance or manufacturer's recommendations and are given in the EPA-approved analytical methods. Supplemental calibration details, such as documentation and reporting requirements, are given in the laboratory QA Plan. The laboratory QA Plan will be reviewed and approved as part of the contract review process. When available, standards used for calibration will

be traceable by the National Institute of Standards and Technology. Corrective action protocols for malfunctioning equipment will be addressed in the laboratory QA Plan. Calibration records, in accordance with the laboratory QA Plan, will be maintained for each piece of measuring and test equipment and each piece of reference equipment. The records will indicate that established calibration protocols have been followed. Records of equipment use will be kept in the laboratory files.

7. ANALYTICAL PROTOCOLS

When available and appropriate for the sample matrix, SW-846 Methods will be used. When SW-846 Methods are not available or lower detection limits that are required cannot be achieved by SW-846 Methods, other nationally-recognized methods such as those of ASTM, DOE, and EPA will be used. Analytical methods, detection limits, sample preservation, holding times, and container requirements for field measurements and analytical parameters are defined during the DQO process and are incorporated in the analytical SOW for the task and applicable protocols and will be defined in Appendix A.

8. DETAILS OF DATA AND DOCUMENT FLOW

The components of data management include planning, collection, review, archival, and transmittal. Task activities follow identical paths to meet data management requirements. A flow chart (Figure 1) and narrative (Sections 8 and 9) are provided for each component of data and document flow. The Paducah DOE Program Integrated Data System is discussed first. The data system is core to each of the data management components.

8.1 INTEGRATED DATA SYSTEM

The Paducah DOE Program Integrated Data System provides a centralized system for management and storage of environmental information while allowing easy, yet controlled, access. The basis for the Paducah DOE Program Integrated Data System is to establish and maintain a program to provide the most efficient system of data collection, analysis, storage, and retrieval. DOE, as specified in the FFA, is to maintain one consolidated database for the Paducah Site. All data collected under this agreement (the FFA) is to be routinely submitted electronically in a consistent format to the stakeholders (see Section 9.2 and Appendix B). In addition, under the Kentucky AIP, AIP personnel require access to the electronic data that is maintained by the Paducah facility and its contractors. Consequently, the Paducah DOE Program Integrated Data System meets the regulatory requirements and provides Paducah EMEF with a platform to manage its data.

The Paducah DOE Program Integrated Data System is composed of integrated hardware and software to support the collection, management, analysis, and presentation of data associated with environmental restoration/remedial action, compliance, and monitoring activities at PGDP. All environmental measurements, analyses, and locationally descriptive information (e.g., GIS, lithology, and monitoring structure information), as applicable per this plan, is included. In addition, an extensive collection of descriptive and reference information about environmental tasks and permits is stored. A flow diagram for the Paducah DOE Program Integrated Data System is shown in Figure 2.

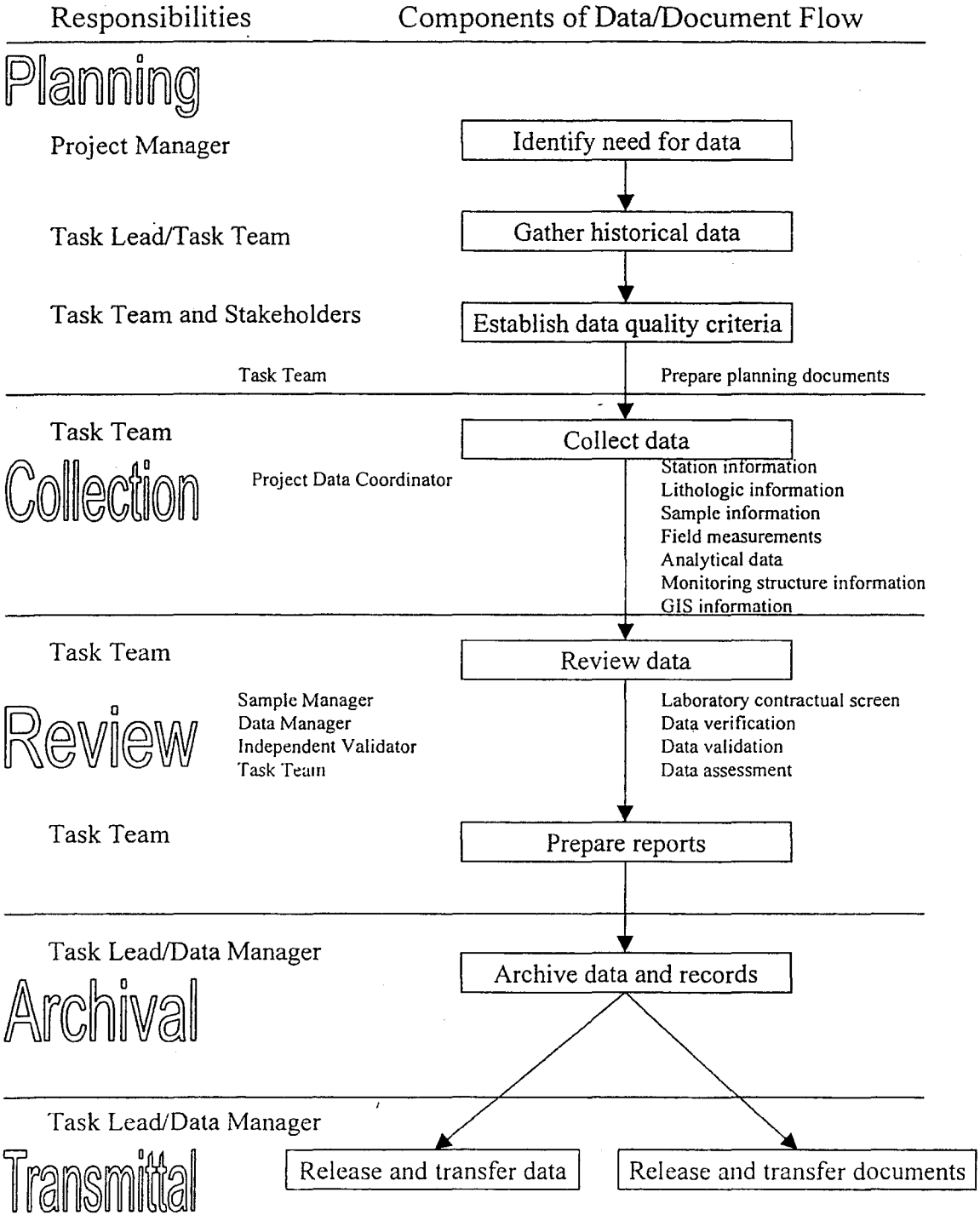

Figure 1. Detail of Data and Data Flow.

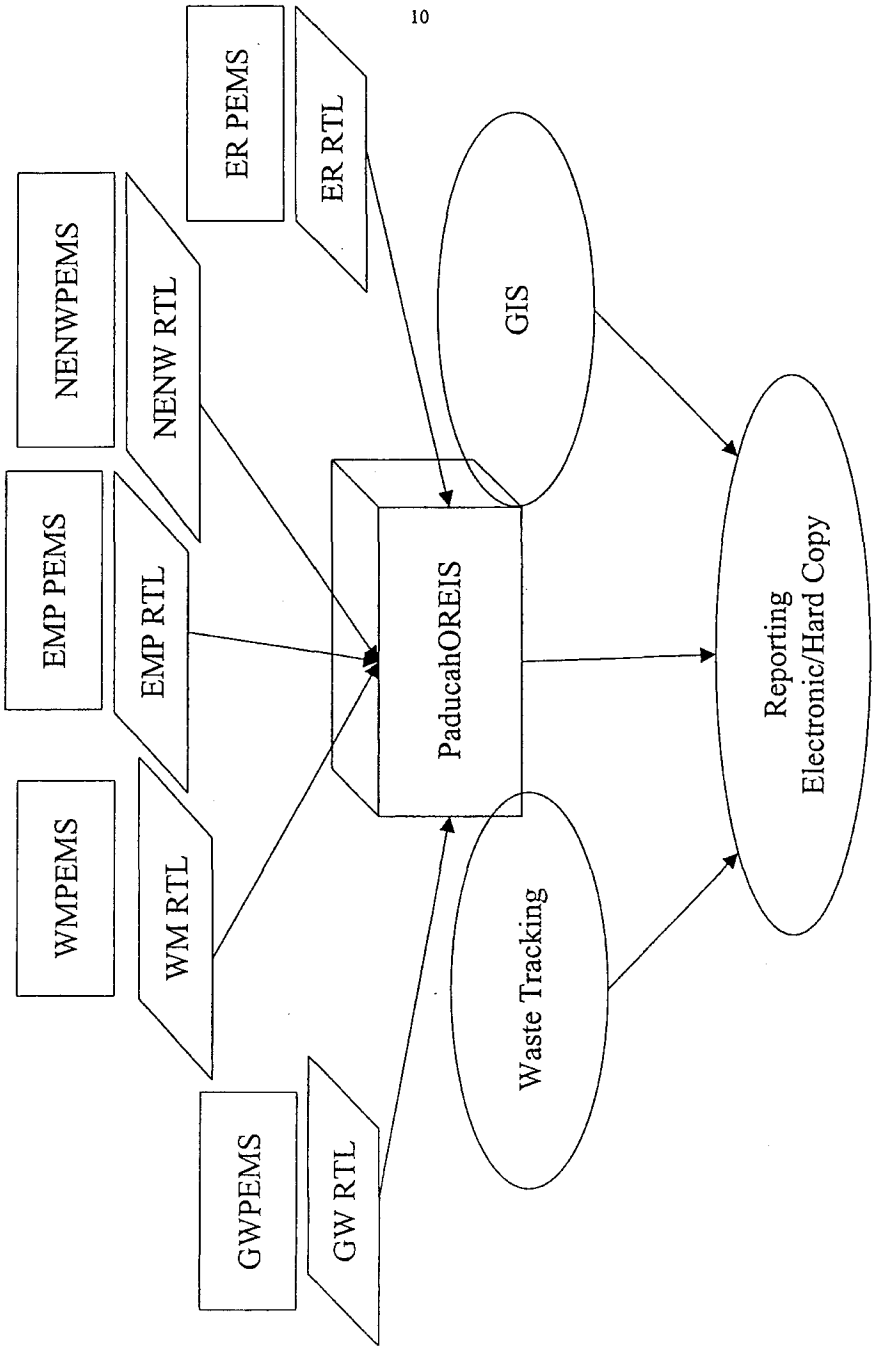

Figure 2. Paducah DOE Integrated Data System.

As part of the Paducah DOE Program Integrated Data System, each project utilizes a PEMS for sample scheduling, collection, and tracking each sample and associated data from point of collection through final data reporting. Each PEMS is established on a project-specific basis. PEMS tracking includes field forms, COCs, hard copy data packages, and EDDs. Project data is entered as the project progresses. All field measurement data, analytical data, lithologic descriptions, monitoring structure information, sample stations, and corresponding coordinates (as appropriate) are entered into PEMS.

Upon completion of the project, or on a routine basis, data from each PEMS is reviewed as described in Section 8.4 and transferred to Paducah OREIS for permanent retention. All final data reporting is reported from Paducah OREIS. Additionally, PEMS data is archived on a specified frequency to ensure data traceability.

The Paducah DOE Program Integrated Data System is accessed by a computer network. The system is designed to allow the electronic transfer of information between all branches of EMEF. A central file server is used to maintain the software and database applications. This server may be accessed from several PC workstations within the computer network.

8.2 DATA PLANNING

8.2.1 Initiation of Data Collection

The need for data collection is determined by the Task Lead and Project Manager to satisfy applicable regulatory requirements and/or DOE Orders. The Task Lead identifies the need for collection of data to support the task and is responsible for the development of applicable documents that outline the specific objectives of the data collection activity.

8.2.2 Historical Data Gathering

A substantial effort should be made by the data requestor (i.e., project manager/task lead) to acquire and analyze all historical data and documents relevant to the task (i.e., in numeric, spatial, attribute, and textual form) prior to the DQO process and/or data generation. For example, these documents and data might include prior work done for preliminary assessments, site characterization tasks, remedial investigations, annual monitoring reports, or data summaries provided by previous analysts. In addition, information specialists who would know of relevant documents, GIS information, and data sets should be consulted to acquire a comprehensive task background. In many cases, descriptive and qualitative information about the data (e.g., metadata) may be required. This is often the case with electronic files that may be received without the basic information provided through proper documentation. Some research may be required to prepare these metadata statements which are essential to the determination of data quality and usability.

If the data is in electronic form, the usable data and metadata should be entered into the Paducah DOE Program Integrated Data System for inclusion into Paducah OREIS. If the data is in document form, the usable data and metadata should be extracted and key-entered into the Paducah DOE Program Integrated Data System. If GIS information is required, themes/coverages should be updated as necessary.

8.2.3 Data Quality Criteria

With the usable historical data now in the Paducah DOE Program Integrated Data System, the data, along with the documents and metadata, can be retrieved, analyzed (both statistically and spatially), modeled, and used in support of DQOs for the task. This data, along with elements from the DQO process such as, contaminants of concern, QA/QC requirements, "Identification of Project Data Quality Checks" checklist, data review options, and the sampling design is used to generate applicable plans.

Field SOWs, sampling plans, and analytical SOWs are developed in support of field preparation. A field SOW describes the field activities to be undertaken and subsequent work to be performed. A sampling plan may be used to further expand on details of field activities. An analytical SOW is prepared which includes analytical parameters, methods, and detection limits. A validation SOW is also prepared when validation services are required to ensure the analytical laboratory's performance is acceptable.

Information from each of the SOWs and sampling plans is used to initiate sampling logbooks, labels, and other required field documentation. Documentation generated by the data collection activity shall be forwarded electronically and/or in hard copy to the Task Lead and the DMC to be indexed and filed as specified per the SOW.

8.3 DATA COLLECTION

Data collection information is recorded and maintained for all data collection activities. This information includes station information, lithologic information, sample information, field measurements, analytical data, monitoring structure information, and GIS information and is explained below.

8.3.1 Station Information

Station information is data describing the location from which a sample is taken. Station information includes plant coordinates (surveyed or estimated, as appropriate), station description, and station type. This information is input directly into PEMS. Methods for determining coordinates and relevant information necessary to determine and document accuracy should be recorded.

8.3.2 Lithologic Information

Lithologic information is data describing the lithology of a borehole. This information is input directly into PEMS.

8.3.3 Sample Information

Sample information is environmental data describing the sampling event and consists of the following: station, date collected, time collected, and other sampling conditions collected for every sampling event. This information is recorded in logbooks and may be included on the COC or sample labels. This information is input directly into PEMS.

8.3.4 Field Measurements

Field measurements are measurements of a parameter without physical collection of a sample which are collected real-time in the field. Field measurements may include water level measurements, pH, conductivity, flow rates, temperature, and dissolved oxygen. Field measurements are taken and recorded on appropriate field forms or in logbooks, and input into PEMS.

8.3.5 Analytical Data

The Sample Manager tracks progress of analytical samples as fieldwork continues. COCs are reviewed and lab receipt of samples is verified. Once samples have entered the laboratory, the laboratory is responsible for sample analysis, data reduction, and data reporting. The analytical data will be checked for completeness and reasonableness. A system is set up within the Paducah DOE Program Integrated Data System to log shipment of samples and receipt of data packages.

All data packages received from the fixed-base and screening/field laboratories are tracked, reviewed, and maintained in a secure environment. The primary individual responsible for these tasks is the Sample Manager. The following information is tracked: sample delivery group number, date received, number of samples, sample analyses, receipt of EDD (if applicable), and comments. The Sample Manager compares the contents of the data package with the COC form and identifies discrepancies. Discrepancies are immediately reported to the laboratory and the data validators. All data packages are forwarded to the Bechtel Jacobs Company EMEF DMC for permanent storage.

8.3.6 Monitoring Structure Information

Monitoring structure information is data describing the monitoring wells and boreholes installed during the combined tasks. Information includes well screen depth; borehole and well diameter; screened aquifer; and datum information. This information is input directly into PEMS.

8.3.7 GIS Information

GIS information is metadata that is visually descriptive of the area around the location of a project. Information may include maps of roads, streams, underground utilities, etc. Projects creating new GIS information or causing required updates to existing GIS information supply the information to the Paducah DOE Program Integrated Data System.

8.4 DATA REVIEW

8.4.1 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 COC, number of samples, analytes requested, total number of analyses, methods used, QC samples analyzed, EDDs, units, holding times, and reporting limits achieved.

The Sample Manager conducts the screening upon receipt of data from the analytical laboratory. To the extent possible, the contractual screening should be done electronically. The Sample Manager identifies and documents any exceptions to the SOW on a Laboratory Deliverable Contractual Screening Checklist.

8.4.2 Data Verification

Data verification is the process for comparing a data set against a set standard or contractual requirement. Verification may be performed electronically, manually, or by a combination of both. Data verification includes contractual screening and can include other data quality checks established by the task team. Applicable task plans define the specific verification to be performed. Data is flagged as necessary.

Specific documentation associated with data verification is developed per PMSA-1001, Appendix G, entitled, "Identification of Project Data Quality Checks," and will be provided in Appendix A.

8.4.3 Data Validation

Data validation is the process for evaluating the laboratory adherence to analytical-method requirements. This is performed by a qualified individual for a data set, independent from sampling, laboratory, project management, or other decision-making personnel for the task. Data validation is performed according to PMSA-1001 and is coordinated by the Sample Manager. Validation qualifiers are stored in the Paducah DOE Program Integrated Data System. Documentation associated with data validation (the validation SOW, data validation reports, and exception reports, if applicable) is filed in the DMC. Specific documentation associated with data validation is identified in Appendix A.

8.4.4 Data Assessment

Data assessment is the process for assuring that DQOs are met, and 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 and must be performed on 100 percent to ensure data is usable.

The data assessment is conducted by a designated task team member in conjunction with other task team members according to PMSA-1001. Assessment qualifiers are stored in the Paducah DOE Program Integrated Data System. Data is made available for reporting upon completion of the data assessment and associated documentation (Data Assessment Review Checklist) is filed with the task files.

8.4.5 Report Preparation

Personnel will utilize the official Paducah OREIS data tables for all official data reporting. Prior to the release of any data, the "Data Release" form shall be completed according to PMSA-1001, Appendix I. Release of all data shall be approved by DOE and the Managing and Integrating Contractor.

8.5 DATA AND RECORDS ARCHIVAL

8.5.1 Data Archival

Data archival refers to the long-term storage of electronic data generated by a task in the Paducah DOE Program Integrated Data System. Long-term storage in a central repository assures maximum accessibility by the environmental engineering community. To ensure its future usability, sufficient documentation, including the associated metadata, must accompany archived data to describe the source, contents, and structure of the data. Paducah OREIS is the database that stores archived data for future use. In addition, the Paducah PEMS used for the task is archived both intact and as exported ASCII text with sufficient documentation to recreate task data. The archive of Paducah PEMS, as well as the back-ups for Paducah OREIS, are stored in the DMC.

8.5.2 Records Archival

The DMC is a repository for all EMEF documents and data. Each EMEF task transmits a copy of all task documentation to be filed in the DMC as the task file. This information is arranged by a file classification scheme and is filed on shelves in color-coded folders. The documents are shelved in mobile file cabinets which are located inside a two-hour-rated firewall vault. The vault is protected by a wet-pipe sprinkler system and intrusion alarm. The DMC staff utilizes the DMS, a database management system designed for management and retrieval of documents, to perform searches. DMS records contain bibliographic information (title; author; issue date; document type and number; etc.), file classification information (document location), and index information (subject keywords, document status, facility name/waste area grouping [WAG]/solid waste management unit [SWMU] number, cleared for public use flag, and administrative record [AR] codes).

By utilizing the DMC, all documents relevant to EMEF work will be located in a central repository and will be available to the EMEF organization as well as other identified users. The DMC will also provide controlled access to these documents.

Information that may be found in a task file include hard copies of all original field and analytical results; data reduction and summarization programs; data packages; logbooks; associated QA/QC forms; correspondence; contracts; meeting minutes; training records; plans; and reports. All contents of a task file are classified, indexed, and stored into appropriate file groups and record series within the task file.

Satellite document centers are sometimes established with routine transfer frequencies to the PGDP DMC. Task records are maintained by the Task Records Coordinator as record copy as specified in task data and document management plans and as required by protocol. Logbooks and field documentation are copied weekly unless maintained as record copies, which are kept in one-hour-rated, fire-resistant, locked file cabinets overnight. If the activities during logbook use could potentially damage the logbook or result in loss, then weekly copies are required. If copies are made, they are maintained separate from the original logbook and are forwarded to the task files and maintained as record copy until the originals are complete. At that time, the originals replace the copies as record copy. The record copy is transferred to the Paducah EMEF DMC. Upon completion of the task, all original logbooks (field and analytical), field documentation, and project deliverables will be forwarded to the DMC by the task manager or designee.

Documents will be selected for the AR from the task file. The AR files are duplicated and made available to the public at the Environmental Information Center. Documentation associated with data and records archival includes archive checklists; indexed and filed copies of all relevant hard copies; and lists of all items recommended for the AR file.

9. DOCUMENT AND DATA RELEASE AND TRANSFER

9.1 DOCUMENT RELEASE AND TRANSFER

A standard distribution list is maintained for regulatory documents submitted according to the FFA. Changes to this distribution list should be submitted through the DOE Site Office. Other documents generated for the EMEF Program may be specially requested through the DOE Site Office or their designee. Requested documents may be historical or newly generated and will be transmitted within a reasonable time frame.

9.2 ELECTRONIC DATA RELEASE AND TRANSFER

Once data has undergone verification, validation, and data assessment, it may be released to external agencies. Routine data or data specially requested by external agencies is downloaded into a standard format (see Appendix B) and transmitted either electronically or by physical transfer on electronic media (diskettes, etc.). If data is transmitted electronically, data files will be placed on an externally-accessible file server that is password protected. The external agency has the responsibility to protect the data that has been provided. Passwords shall not be shared with anyone outside the external agency. External agencies will be notified of data availability via electronic mail.

The Task Lead/Release Requestor will complete the "Paducah EMEF Data Release to External Agencies" form and obtain all appropriate signatures. Field QC data is not routinely transmitted with the data; however, this information is available upon request. Electronic data formats will contain a "Read Me" file that will identify the electronic data package and the number of files associated with the package. The "Read Me" file will also indicate the appropriate data qualifiers along with their associated definitions and the appropriate data quality level. Hard copy data formats will contain a cover letter that will identify the contents of the data package. The cover letter will also indicate the appropriate data qualifiers along with their associated definitions and the appropriate data quality level.

9.2.1 DOE Remedial Action Investigations

DOE will provide electronically-transmitted data concurrent with the D1 Report/Characterization Report or when the Project Completion Report is issued (if formal D1 is not required) for remedial action investigations.

9.2.2 DOE-Permitted Facilities/Routine Environmental Monitoring Reports

Permitted and routine sampling is outlined in Table 8.1. Additionally, Table 8.1 includes reporting and transfer frequencies. DOE will provide electronic-transmitted data per the agreed schedule in this document.

9.2.3 Special Requests

Data will be transmitted routinely as specified in Sections 9.2.1 and 9.2.2. Any additional data generated from sampling activities that are available electronically may be transmitted upon receipt of a special request correspondence. Special requests shall be submitted through the DOE Site Office, or their designee, specifying the sampling event information required.

Table 8.1. Regulatory and routine sampling.

PROGRAM	FREQUENCIES/SCHEDULE		
	SAMPLING	REPORTING	TRANSFER
Permit-Associated Sampling			
Kentucky Pollutant Discharge Elimination System Permit DOE Outfalls	Monthly and Quarterly	Monthly 28th of each month	Monthly 28th of each month
Toxicity Monitoring	Quarterly	Quarterly Publication of the ASER	Quarterly Concurrent with ASER
Bioaccumulation Study	Annually	Annually Publication of the ASER	Annually Concurrent with ASER
Fish Community	Semiannually	Annually Publication of the ASER	Annually Concurrent with ASER
C-746-K Surface Water	Quarterly	Semiannually June 30, December 30	Semiannually June 30, December 30
C-746-S&T Surface Water	Quarterly	Quarterly January 15, April 15, July 15, October 15	Quarterly January 15, April 15, July 15, October 15
C-746-U Surface Water	Quarterly	Quarterly January 15, April 15, July 15, October 15	Quarterly January 15, April 15, July 15, October 15
C-746-K Groundwater	Quarterly	Semiannually June 30, December 30	Semiannually June 30, December 30
C-404 Landfill Groundwater	Quarterly	Semiannually May 30, November 30	Semiannually May 30, November 30
C-746-S&T Landfill Groundwater	Quarterly	Quarterly February 30, May 30, August 30, November 30	Quarterly February 30, May 30, August 30, November 30
C-746-U Groundwater Monitoring	Quarterly	Quarterly February 30, May 30, August 30, November 30	Quarterly February 30, May 30, August 30, November 30
Environmental Monitoring Programs (EMP)			
EMP Surface Water Sampling	Bimonthly	Annually Publication of Annual Site Environmental Report (ASER)	Annually Concurrent with ASER
EMP Annual Sediment Sampling	Annually	Annually Publication of ASER	Annually Concurrent with ASER
EMP Annual Deer Sampling	Annually	Annually Publication of ASER	Annually November
Plume Groundwater Sampling	Monthly and Quarterly	Quarterly January 30, April 30, July 30, October 30	Quarterly January 30, April 30, July 30, October 30
Residential Groundwater Sampling	Monthly, Quarterly, and Annually	Annually Publication of ASER	Semiannually April and October
Surveillance Groundwater Sampling	Monthly, Quarterly, and Annually	Annually Publication of ASER	Semiannually January and July

PROGRAM	FREQUENCIES/SCHEDULE		
	SAMPLING	REPORTING	TRANSFER
Surveillance & Maintenance or Operation & Maintenance Activities			
C-404 Leachate	Per Permit As needed	Per Permit January 30, April 30, July 30, October 15	Annually * October 15
C-746-S&T Leachate	Per Permit As needed	Quarterly per permit	Quarterly per permit
C-746- U Leachate	Per Permit As needed	Quarterly per permit	Quarterly per permit
Northwest Plume/Northeast Plume	Daily	Quarterly and Annually January 30, April 30, July 30, October 30	Quarterly January 30, April 30, July 30, October 30

* If leachate samples were collected.

10. INTERNAL QC CHECKS

10.1 FIELD QC SAMPLES

Standard operating protocols are used for all routine sampling operations. Field QC sampling will be conducted to check sampling and analytical accuracy and precision for both laboratory and field analyses of the original samples. All QC samples will be handled, shipped, and analyzed as stated in Sections 5 and 7. Field QC samples will have sample numbers which are unique and which identify them as QC samples.

A **filter blank** is a sample of ASTM Type II water passed through, or over, a filter before any samples are filtered. Filter blanks are used as a measure of filter contamination. Samples are analyzed for the same parameters as the filtered sample. Filter blanks can be collected at a rate of one per lot number.

Field blanks serve as a check on environmental contamination at the sample site. ASTM Type II water is transported to the site, opened in the field, transferred into each type of sample bottle, and returned to the laboratory for analysis of all parameters associated with that sampling event. It is also acceptable for field blanks to be filled in the lab, transported to the field, and then opened. Field blanks may be used as a reagent blank as needed. It is recommended that field blanks be collected at a rate of 1:20.

Equipment blanks (may also be referred to as equipment rinseates) are samples of ASTM Type II water passed through decontaminated sampling equipment. Equipment blanks are used as a measure of decontamination-process-effectiveness and are analyzed for the same parameters as the sample collected with the equipment. Equipment blanks may also be used as a reagent blank as needed. Equipment blanks are required only when nondisposable equipment is being used. It is recommended that equipment blanks be collected at a rate of 1:20.

A **trip blank** is a sample used to detect contamination by volatile organic compounds (VOCs) during sample shipping and handling. Trip blanks are 40 mL volatile organic analysis (VOA) vials of ASTM Type II water that are filled in the laboratory, transported to the sampling site, and returned to the laboratory with VOA samples. Trip blanks are not opened in the field. One trip blank is to accompany each cooler containing VOA samples. Each trip blank is to be stored at the laboratory with associated samples, and analyzed with those samples. Trip blanks are only analyzed for VOCs.

Duplicates are two separate samples taken from the same source during the same sampling event and are analyzed for the same parameters. Data generated by duplicate samples includes sampling and analytical variability (precision). It is recommended that duplicates be collected at a rate of 1:20.

10.2 ANALYTICAL LABORATORY QC SAMPLES

Fixed-based analytical laboratories that provide services will have an approved QA plan that describes the laboratory QC sample program and the laboratory control sample program. The analytical laboratory has an established internal QC program that is managed by the laboratory supervisors. Analytical laboratory QC samples will be analyzed as required by the analytical method for the parameters of interest and the results will be included in the analytical report. Blind samples are samples in which the laboratory has no information on the sample location and, subsequently, would have no indication of the possible analytical results. These samples will be analyzed for the parameters of interest and the results will be included in the analytical report. Acceptable completion of the blind samples provides an indication of the laboratory's performance. DOE laboratories participating in the blind sample program will follow blind submittal frequencies determined by the SMO.

11. AUDITS AND SURVEILLANCES

11.1 AUDITS

Audits are qualitative reviews of task activity to check that the overall QA program is functioning. Audits should be conducted early in the task so that problems can be corrected quickly. The audit involves the review of all available and relevant task and contract documents and includes an evaluation of QC measures for office and field. Audits will be performed as requested by management.

11.2 SURVEILLANCES

Surveillances follow the same general format as an audit but are less detailed and require a less formal report. A surveillance is designed to give task staff rapid feedback concerning QA compliance and to facilitate corrective action. Surveillances will be performed as requested by management.

12. PREVENTIVE MAINTENANCE

Equipment is an inclusive term for tools, gauges, instruments, and other items. The equipment discussed in this section requires that specific preventive maintenance is serviced as specified by the manufacturer's recommended schedule. All services are documented and performed by qualified and trained individuals. Out-of-service equipment is controlled to prevent inadvertent use and its maintenance is recorded. A list is maintained of the critical, spare parts that should be stocked to minimize equipment downtime. Specific field equipment preventive-maintenance practices, frequencies, and spare parts are described in the factory manual for each instrument.

Preventive-maintenance protocols for laboratory equipment and instruments are provided in laboratory QA plans. All maintenance activities will be recorded in maintenance logs. Laboratories will be required to maintain an adequate inventory of spare parts and consumables to prevent downtime as a result of minor problems.

13. SPECIFIC ROUTINE PROTOCOLS

The precision, accuracy, and completeness parameters are quantitative tools by which data sets can be evaluated. These parameters can help ensure that DQOs are met and are defined as follows:

- **Precision**—A quantitative measurement of the variability of a group of measurements as compared to their average. Usually expressed as a percentage or a standard deviation, it evaluates the reproducibility of the system. Sample duplicates measure the reproducibility of the sampling event, while lab replicates measure the precision of the analytical process. The acceptable precision may be defined by the laboratory method used.

- **Accuracy**—A quantitative measurement of the bias of the data. It represents how close the measurement data is to the true value. Analytical accuracy is measured by percent recoveries associated with the laboratory analytical control spikes (blank spikes), surrogate spikes, or matrix spikes. The acceptable accuracy may be defined by the laboratory method used. Sampling accuracy can be assessed by evaluating field and trip blanks.

- **Representativeness**—A qualitative measurement of the ability of a sample or group of data to adequately describe or define the conditions being measured. Precision, accuracy, and completeness all affect representativeness. Sampling strategy (location, method, and frequency) are critical to ensure that the samples statistically represent the population. Laboratory precision and accuracy reflect how representative the data is of the sample.

- **Completeness**—A quantitative measurement of the percentage of acceptable data as compared to the number planned. Both sampling and analytical completeness can be measured.

- **Comparability**—A qualitative measurement of the confidence with which one data set can be compared with another. Comparability is achieved by using standard techniques for collection and analysis.

Protocols for assessing the precision, accuracy, and completeness are provided in the following text. It should be noted that there are no standard guidelines available for representativeness and comparability.

13.1 PRECISION

To determine the precision of the laboratory analysis, a routine program of replicate analyses, in accordance with the analytical method requirements, is performed by the laboratory. The results of replicate analyses are used to calculate the relative percent difference which is used to assess laboratory precision.

For replicate results C_1 and C_2:

$$\text{Relative percent difference} = \frac{|C_1 - C_2|}{\left(\frac{C_1 + C_2}{2}\right)} \times 100$$

Precision of the total sampling and analytical measurement process will be assessed from field duplicates. Although a quantitative goal cannot be set due to sample variability, the Task Lead will review relative percent difference values of field duplicates to estimate precision. Analytical precision can be measured separately from sampling precision through the use of laboratory duplicate and matrix spikes.

13.2 ACCURACY

To determine the accuracy of an analytical method and/or the laboratory analysis, a periodic program of sample spiking is conducted (minimum one spike and one spike duplicate per 20 samples). The results of sample spiking are used to calculate the QC parameter for accuracy evaluation, the percent recovery (% R).

For surrogate spikes and QC samples:

$$\%R = \frac{C_s}{C_t} \times 100$$

where--

C_s = measured spiked sample concentration (or amount)
C_t = true spiked concentration (or amount)

For matrix spikes:

$$\%R = \frac{|C_s - C_o|}{C_t} \times 100$$

where--

C_s = measured, spiked sample concentration
C_o = sample concentration (not spiked)
C_t = true concentration of the spike

Accuracy of the total sampling and analytical measurement process will not be determined. This would require the addition of chemical-spiking compounds to the samples in the field.

13.3 COMPLETENESS

To determine the completeness of data, the percentage of valid, viable data obtained from a measurement system is compared with the number of total measurements. The goal of completeness is to generate a sufficient amount of valid data to satisfy task needs.

Completeness, *C*, is calculated as follows:

$$\%\,C = \frac{\text{Number of valid measurements}}{\text{Number of total measurements}} \times 100$$

14. NONCONFORMANCES AND CORRECTIVE ACTIONS

Nonconforming equipment, items, activities, conditions, and unusual incidents that could affect compliance with task requirements will be identified, controlled, and reported in a timely manner. Nonconforming equipment will immediately be labeled or tagged, and segregated, if possible. Specific protocols for controlling nonconforming items will be described in applicable documents. Nonconformance Reports issued as a result of an audit or surveillance will identify the root cause of the problem. Laboratories must notify the appropriate personnel of any nonconformance or problems with analytical samples. Laboratory corrective actions reports are completed by the analytical laboratory when a nonconformance is recognized by laboratory personnel. Handling of any nonconformance is described in appropriate plans and protocols.

Corrective actions to audit/surveillance findings and nonconformances are managed. The Task Manager is notified of a nonconformance and/or surveillance finding. These are documented and a copy is furnished to the Task Lead as soon as possible. Copies of audits, surveillances, and/or nonconformances and their dispositions will be forwarded to the appropriate management personnel and will be placed in the DMC.

15. QA REPORTS TO MANAGEMENT

Upon request, QA personnel will provide to management a report which summarizes QA activities for the task, system, and performance audits conducted (internal and external); quality problems found; corrective actions initiated; and other applicable items. Some reports that present measurement data generated during the work assignment may require a QA section addressing the quality and limitations of the data. This QA section will address results of audits or surveillance of the measurement work; quality problems found and corrective actions taken; and deviations from applicable documents.

16. FIELD CHANGES

Field changes will be governed by control measures commensurate with those applied to the documentation of the original protocol. The task team identifies, documents, and approves field changes. These changes are communicated to the team through the use of Change Notices and Change Orders.

REFERENCES

10 CFR 830.120, "*Quality Assurance,*" April 1994.

Bechtel Jacobs Company LLC. Quality Assurance Program Plan, DRAFT, October 1998.

Energy Systems. *Environmental Measurements Data Management Plan Implementation Handbook for the Environmental Restoration Program*, ES/ER/TM-88/R1, 1996.

EPA. *Data Quality Objectives Process for Superfund*, Interim Final Guidance, EPA/540/G-93/071, 1993.

EPA. Hazardous and Solid Waste Amendment Permit, Permit #KY8890008982, August, 19, 1991.

EPA. *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans*, QAMS 005/80, December 20, 1980.

EPA. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 1986.

EPA. *EPA Region 4 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*, May 1996.

Kentucky Division of Waste Management Hazardous Waste Management Permit, Permit No. KY8890008982, August 19, 1991.

Kentucky Agreement in Principle, January 1, 1997.

Quality Assured Data, PMSA-1001, Bechtel Jacobs Company LLC Procedures Manual, April 1997.

Blank Page

APPENDIX A

TASK-SPECIFIC INFORMATION FOR QUALITY AND DATA ELEMENTS

Blank Page

TASK-SPECIFIC INFORMATION FOR QUALITY AND DATA ELEMENTS

Purpose and Introduction

This plan can be used and implemented for the Paducah DOE tasks requiring the collection of analytical data. Each section of the FFA QA/DMP was written to meet data-quality requirements and provides a description of the programmatic elements which should occur for each task. This appendix provides additional information concerning the QA and Data Management aspects which are specific to the task and cannot be defined at the programmatic level. This appendix should be completed once the task has been planned or once the DQOs have been documented. This completed appendix, along with the "Data and Documents Management and Quality Assurance Plan for the Paducah Environmental Management and Enrichment Facilities Program," will serve as the "Quality Assurance and Data Management Plan" for the task, will be provided to appropriate personnel, and will be maintained as a task record.

For the purpose of this document, this appendix is not completed but shows the information to be completed for each task involved in the collection of analytical data. This appendix should be completed, printed with attachments compiled, combined with the "Data and Documents Management and Quality Assurance Plan for the Paducah Environmental Management and Enrichment Facilities Program," and distributed to the appropriate personnel for review, approval, and use.

INSTRUCTIONS FOR COMPLETING THE QUALITY ASSURANCE/DATA MANAGEMENT PLAN (QA/DMP)

Use the following instructions to complete each section for the task-specific QA/DMP. Attachments may be used to serve as and/or supplement the information provided in the tables.

TITLE PAGE: Type over the task-specific information in the underlined/bolded/italicized portion of the text. Information needed is the issue date, document number, document title, and author(s). Document numbers must be obtained from the Records Manager.

APPROVAL PAGE: Type over the task-specific information in the underlined/bolded/italicized portion of the text. Information needed is the preparers' names and titles and the approvers' names and titles. Minimum approvals are the Task Lead, Project Manager, and QA Manager.

TABLE OF CONTENTS AND ATTACHMENTS: Include the appropriate page numbers to the table of contents and identify and document the attachments provided to supplement this QA/DMP.

SECTION 1.0—TASK ORGANIZATION, RESPONSIBILITY, AND TRAINING: Identify the task organizational chart listing additional roles and responsibilities, including those identified in Section 2.2 of the "Data and Documents Management and Quality Assurance Plan for the Paducah Environmental Management and Enrichment Facilities Program." Also, document in Table 1.1 the training requirements for key personnel. An organizational chart and/or training matrix may be attached to this QA/DMP.

SECTION 2.0—DATA QUALITY OBJECTIVES (DQOs) AND SAMPLE PLANNING: Refer to PMSA-1001, *Quality Assured Data*, Appendix C, for directions to complete DQOs for the project. Attach DQO documentation to this QA/DMP. Using the DQO documentation, with assistance from the task team, identify details of the SAP. The SAP is generated out of the data needs identified in the DQOs and will specify applicable samples (i.e., regular samples, QC samples, and waste characterization samples) to be collected. Complete Table 2.1 (if SAP is not available) and/or attach the task SAP for environmental data. Complete Table 2.2 for waste characterization.

SECTION 3.0—APPLICABLE PROTOCOLS, DOCUMENTS, AND WORK INSTRUCTIONS: Identify the applicable protocols and documents (to data quality activities) which will be followed for the data collection activity and document in Table 3.1. Work instructions may be required for task-specific tasks.

When available and appropriate for the sample matrix, SW-846 Methods will be used. When not available, other nationally-recognized methods such as those of ASTM, DOE, and EPA will be used. Analytical methods are listed in Table 2.0 and in analytical SOWs; therefore, an additional listing of analytical methods is not required in Table 3.1.

SECTION 4.0—CALIBRATION PROTOCOLS AND FREQUENCIES: This section addresses documentation of field equipment and field support laboratory equipment which is to be calibrated for the task. Fixed-base laboratory calibration protocols and frequencies are not required to be included in this plan but are covered in the laboratory QA plans and protocols. The SMO oversight/audit has ensured the laboratory has met the requirements of SW-846. Calibration protocols and frequency information may be attached to this QA/DMP.

Identify the field equipment and field support laboratory equipment to be used during the data collection activity and document in Table 4.1 or attach supplemental information concerning equipment calibrations, the protocols, and frequencies.

SECTION 5.0—DATA REVIEW PROCESS: For details on the data review process, refer to PMSA-1001, *Quality Assured Data*, Appendices E, F, G, and H. Complete verification and assessment.

For the purposes of this section, contractual screening, data verification, and data assessment frequencies are identified in Table 5.1, Table 5.2, and Table 5.4, respectively; however, responsible personnel for these tasks must be identified and documented in the appropriate tables. Complete and attach Appendix G, "Data Quality Checks," from PMSA-1001, *Quality Assured Data*, to better define verification and assessment criteria. Complete Table 5.3 to document the validation strategy defined by the task team.

SECTION 6.0—DOCUMENT AND RECORDS CONTROL AND TRANSFER: Identify the documents and records to be controlled during the task, the document or record name and type (i.e., a document such as a QA project plan or a record such as a logbook) and the frequency of transfer of the document or record to the EMEF DMC. Record this information in Table 6.1 for documents and Table 6.2 for records.

SECTION 7.0—QUALITY ASSESSMENT SCHEDULE: Identify and document in Table 7.1 the quality assessments to be performed for the task as requested by the Task Lead or other applicable managers.

DISTRIBUTION LIST: Identify and document the appropriate personnel to receive a copy of the QA/DMP.

REVIEWING, APPROVING, AND ISSUING THE QA/DMP: Upon completion of the above instructions, the QA/DMP should be printed, noticeably stamped "DRAFT," and provided to the appropriate personnel for review. Comments should be received and resolved in a timely manner. The revised QA/DMP should be printed, approved, and provided to the appropriate personnel as defined in the distribution list.

Blank Page

DATE OF ISSUE: *DATE* *DOCUMENT NO., REV. NO.*

PROJECT TITLE
QUALITY ASSURANCE AND DATA MANAGEMENT PLAN

AUTHOR(S)

Prepared by
Environmental Management and Enrichment Facilities
Kevil, Kentucky 42053
Managed by
BECHTEL JACOBS COMPANY
for the
U. S. DEPARTMENT OF ENERGY
Under Contract No. DE-AC05-98OR22700

Blank Page

PROJECT TITLE
QUALITY ASSURANCE AND DATA MANAGEMENT PLAN

APPROVALS

Prepared by: _____ **Date:** _____
Name
Title

Prepared by: _____ **Date:** _____
Name
Title

Approved by: _____ **Date:** _____
Name
Title

Approved by: _____ **Date:** _____
Name
Title

Approved by: _____ **Date:** _____
Name
Title

Approved by: _____ **Date:** _____
Name
Title

Approved by: _____ **Date:** _____
Name
Title

Blank Page

CONTENTS

ATTACHMENTS

Blank Page

1.0 TASK ORGANIZATION, RESPONSIBILITY, AND TRAINING

Table 1.1. Task Organization, Responsibility, and Training.

Job Title or Position	Name	Role, Responsibility, and Interface	Training*
DOE Project Manager			
Data Clerk			
Data Manager	M&I Data Manager/ Subcontractor Personnel		
Network Administrator	M&I Network Administrator		
Project Manager			
Project Engineer			
QA Specialist			
Records Clerk			
Records Manager	M&I Records Manager/ Subcontractor Personnel		
Sample Manager	M&I Sample Manager/ Subcontractor Personnel		
Task Lead			
Task Manager			
Field Team Leader	Subcontractor Personnel		
Samplers	Subcontractor Personnel		
Drillers	Subcontractor Personnel		
Other	Subcontractor Personnel		
Other	Subcontractor Personnel		

*The required training (GET, GERT, RAD II, etc.) should be identified for Subcontractor Personnel for this project.

Identify Location of Training Records for Subcontractor Personnel: _____

2.0 DATA QUALITY OBJECTIVES AND SAMPLE PLANNING

Table 2.1. DQOs and sample planning for environmental data collection.

Sampling Location	Matrix	Sampling Method(s)	Sampling Frequency	Data Type(s) (Screen or Def)	Analyte(s)	Analytical Method	Detection Limit(s)	Holding Time	Container	Preservative
Regular Samples										
QC Samples										

Table 2.2. DQOs and sample planning for waste characterization data collection.

Material/ Volume/ Container	Preliminary Classification	Characterization Method	Future Disposition	Analyte(s)	Analytical Method	Detection Limit(s)	Holding Time	Container	Preservative
Regular Samples									
QC Samples									

3.0 APPLICABLE DOCUMENTS, PROTOCOLS, AND WORK INSTRUCTIONS

Table 3.1. Applicable documents, protocols, and work instructions.

Protocol Number	Protocol Name	Applicability	
		Yes	No
	General		
	List appropriate protocols for to be used for chain-of-custodies, logbooks, ensuring quality data, etc.		
	Sampling		
	List appropriate sampling protocols to be used.		
	Data Management		
	List appropriate data management protocols to be used.		
	Data Validation		
	List appropriate data validation protocols to be used.		

4.0 CALIBRATION PROTOCOLS AND FREQUENCIES

Table 4.1. Field equipment and field support laboratory calibration protocols and frequencies.

Equipment & Serial No.	Field Usage	Calibration Check Frequency	Calibration Check Material	Calibration Check Protocol
Field Equipment				
Field Support Laboratory Equipment				

5.0 DATA REVIEW PROCESS

Table 5.1. Contractual screening.

Responsible Person: _____

Other: _____

Table 5.2. Data verification.

Responsible Person: _____

Other: _____

Table. 5.3. Details for performing data validation.

Frequency	Data Package Type	Analytes & Media	Protocol Used	Completed By

Responsible Person: _____

Table 5.4. Data assessment.

Responsible Person: _____

6.0 DOCUMENT AND RECORDS CONTROL AND TRANSFER

Table 6.1. Identification of documents.				
Document Name and Type	**Controlled Document (Yes* or No)**	**Storage Location**	**Frequency of Transfer**	**Comments**

* If a document is identified as a "controlled document", then a distribution list must be created, maintained, and updated, as needed. The access control method for the "controlled document" must be defined and implemented.

Table 6.2. Identification of records.				
Record Name and Type	**Quality Record (Yes or No)**	**Storage Location**	**Frequency of Transfer**	**Comments**

7.0 ASSESSMENT SCHEDULE

Table 7.1. Assessment schedule.

Audit/Surveillance/ Self Assessment No.	Subject/Topic	Date	Completed By

DISTRIBUTION

(List appropriate names and associated organization, if needed, for distribution of document.)

Blank Page

APPENDIX B

DATA DICTIONARY AND FORMATS FOR PADUCAH OREIS TRANSMITTALS

Blank Page

TRANSMITTAL FORMAT

Transmittal format for all data transmittals will be in exported database format (.dbf) and as a Microsoft Access table (version 97 or more recent). The file will be added to the password-protected external server under the base directory \\home\oreis\data\ in a zipped file named according to the structure outlined below that corresponds to Table 1 in addition to other applicable transmittals.

KPDES Permit DOE Outfalls, Toxicity Monitoring, Bioaccumulation Study, Fish Community
...\data\permit\KPDES\KPDESTYYYY-MM

where T corresponds to the sample type (i.e., R=regular permitted sampling, T=toxicity sampling, B=bioaccumulation sampling, F=fish community sampling)
YYYY corresponds to the calendar year, and
MM corresponds to the month

C-746-K Surface Water, C-746-K Groundwater
...\data\permit\C746K\KMYYYY-SA

where M corresponds to the media (i.e., S=Surface water, G=Groundwater)
YYYY corresponds to the calendar year, and
SA corresponds to the 1st or 2nd half of the year

C-746-S&T Surface Water, C-746-S&T Groundwater, C-746-S&T Leachate
...\data\permit\C746S&T\S_TMYYYY-QQ

where M corresponds to the media (i.e., S=Surface water, G=Groundwater, L=Leachate)
YYYY corresponds to the calendar year, and
QQ corresponds to the quarter

C-746-U Surface Water, C-746-U Groundwater, C-746-U Leachate
...\data\permit\C746U\UMYYYY-QQ

where M corresponds to the media (i.e., S=Surface water, G=Groundwater, L=Leachate)
YYYY corresponds to the calendar year, and
QQ corresponds to the quarter

C-404 Groundwater, C-404 Leachate
...\data\permit\C404\404MYYYY-SA

where M corresponds to the media (i.e., S=Surface water, G=Groundwater, L=Leachate)
YYYY corresponds to the calendar year, and
SA corresponds to the 1st or 2nd half of the year

Environmental Monitoring Surface Water Sampling
...\data\envmon\SW-YYYY

where YYYY corresponds to the calendar year

Environmental Monitoring Sediment Sampling
...\data\envmon\SD-YYYY

where YYYY corresponds to the calendar year

Environmental Monitoring Deer Sampling
...\data\envmon\D-YYYY

where YYYY corresponds to the calendar year

Environmental Monitoring Plume Groundwater Sampling
...\data\envmon\Pl-GW\PlGWYYYY-QQ
where YYYY corresponds to the calendar year, and
QQ corresponds to the quarter

Environmental Monitoring Residential Groundwater Sampling
...\data\envmon\Res-GW\ResGWYYYY-SA
where YYYY corresponds to the calendar year, and
SA corresponds to the 1st or 2nd half of the year

Environmental Monitoring Surveillance Groundwater Sampling
...\data\envmon\Sur-GW\SurGWYYYY-SA
where YYYY corresponds to the calendar year, and
SA corresponds to the 1st or 2nd half of the year

S&M/O&M Northwest Plume Operations Sampling
...\data\sm_om\NWYYYY-QQ
where YYYY corresponds to the calendar year, and
QQ corresponds to the quarter

S&M/O&M Northeast Plume Operations Sampling
...\data\sm_om\NEYYYY-QQ
where YYYY corresponds to the calendar year, and
QQ corresponds to the quarter

DOE Remedial Action Investigations
...\data\ra\PROJCODE
where PROJCODE corresponds to the PROJ_CODE in Paducah OREIS (e.g., ERI-WAG6, ERI98-698W22, etc.)

Special Requests
...\data\requests\YYYYMMDD-A
where YYYY corresponds to the calendar year,
MM corresponds to the month,
DD corresponds to the day of the request, and
A corresponds to the sequential number for the request.

Lithology
...\data\lith\PROJCODE
where PROJCODE corresponds to the PROJ_CODE in Paducah OREIS from which the lithology description was collected (e.g., ERI-WAG6, ERI-WAG 27, LASAGNA, etc.)

GIS Themes/Coverages
...\data\gis\

Each file will be named to appropriately describe the theme/coverage. Updates to themes/coverages will be named identical to the previous version with a revision number immediately following (e.g., roads, roads1, roads2,etc).

GIS Themes/coverages will be in a format compatible to be viewed in ArcView 2.0 or higher (i.e., ArcInfo Coverages, AutoCAD drawings, etc.)

DATA DICTIONARY INFORMATION

CODE

The CODE table contains the codes used in Paducah OREIS tables and their descriptions.

CODE	Code referenced in other Paducah OREIS tables.
CODE_DESCRIPTION	Description of the coded value. This is the 'decoded' value.
CODE_TYPE	Column name for the codes and descriptions. This value identifies the type of coded value.

PROJECT FLD SMP MEAS

The export of PROJECT FLD SMP MEAS table contains the measurement data taken in the field, which is associated with specific SAMPLEs collected during a STATION_EVENT. Examples are flow rate, depth, and temperature. Only those field measurements directly associated with a SAMPLE will be stored in the FLD_SMP_MEAS table. Field measurement data collected, not directly associated with a SAMPLE (e.g., water level suites) will also be in this format.

PROJ_CODE	Acronym assigned by the project (e.g., "ERI-WAG6" for the WAG 6 Environmental Restoration Field Investigation).
STA_NAME	Unique station name assigned by the individual projects (e.g., 400-212 or MW156).
PROJ_SAMPLE_ID	Unique sample identifier assigned by the project.
SAMPLE_COMMENTS	Comments about the sample.
SMP_STRT_LEVEL	For a measurement taken over a range of elevations or depths, the upper vertical distance in feet of the measurement from ground surface.
SMP_END_LEVEL	For a measurement taken over a range of elevations or depths, the lower vertical distance in feet of the measurement from ground surface.
MED_TYPE	Coded value that represents the part of the environment from which a sample is collected, or on which a field measurement or observation is made. See CODE table where CODE_TYPE = MED_TYPE for a list of valid values and their descriptions.
SMP_TYPE	Coded value that represents the type of sample collected. See CODE table where CODE_TYPE = SMP_TYPE for a list of valid values and their descriptions.
D_COLLECTED	Date sample was collected.
CHEMICAL_NAME	Description of the chemical or measurement parameter. For CAS numbers, this is the preferred name defined by the Common Lab Practices Committee.
CAS_NUM	Chemical Abstract Services number with dashes, blank if no CAS number is available.
LAB_CODE	Coded value assigned by the project that represents the analytical laboratory that performed the analysis of the sample. See the CODE table where CODE_TYPE = LAB_CODE for a list of valid values and their descriptions.
RESULTS	Measurement for a given parameter.
RSLT_PREFIX_QUALIFIER	A qualifier indicating whether the result is below, within, or above range limits. See CODE table where CODE_TYPE = RSLT_PREFIX_QUALIFIER for a list of valid values and their descriptions.

RSLTQUAL	Coded value that documents any conditions associated with the results of the analysis. See CODE table where CODE_TYPE = RSLTQUAL for a list of valid values and their descriptions.
UNITS	Coded value that represents the units of measure used to report the parameter value. See CODE table where CODE_TYPE = UNITS for a list of valid values and their descriptions.
NON_COMPLI_CODE	For Paducah OREIS, this field designates electronic verification qualifiers assigned during the Data Assessment process according to PMSA-1001. See CODE table where CODE_TYPE = NON_COMPLI_CODE for a list of valid values and their descriptions. A null field may indicate no criteria were established or may indicate verification was clear. Non-standard criteria are established on a project-by-project basis.
VALIDATION	Coded value that represents the outcome of the data validation process. See CODE table where CODE_TYPE = VALIDATION for a list of valid values and their descriptions.
ASSESSMENT	Coded value describing assessment qualifiers added to data as a result of PMSA-1001. Applies only to data generated after effective date of procedure. See CODE table where CODE_TYPE = ASSESSMENT for a list of valid values and their descriptions.
FLD_COMMENTS	Comments about the measurement.
ANA_METHOD	Method number used to identify a standard analysis method.
ANA_TYPE	Coded value of the chemical group to which the analyte belongs. See CODE table where CODE_TYPE = ANA_TYPE for a list of valid values and descriptions.

PROJECT LAB MEAS

The export of PROJECT LAB MEAS table contains the measurement data analyzed by an analytical laboratory, which is associated with specific SAMPLEs collected during a STATION_EVENT.

PROJ_CODE	Acronym assigned by the project (e.g., "ERI-WAG6A" for the WAG 6 Environmental Restoration Field Investigation).
STA_NAME	Unique station name assigned by the individual projects (e.g., 400-212 or MW156).
PROJ_SAMPLE_ID	Unique sample identifier assigned by the project.
SAMPLE_COMMENTS	Comments about the sample.
SMP_STRT_LEVEL	For a measurement taken over a range of elevations or depths, the upper vertical distance in feet of the measurement from ground surface.
SMP_END_LEVEL	For a measurement taken over a range of elevations or depths, the lower vertical distance in feet of the measurement from ground surface.
MED_TYPE	Coded value that represents the part of the environment from which a sample is collected, or on which a field measurement or observation is made. See CODE table where CODE_TYPE = MED_TYPE for a list of valid values and their descriptions.
SMP_TYPE	Coded value that represents the type of sample collected. See CODE table where CODE_TYPE = SMP_TYPE for a list of valid values and their descriptions.
D_COLLECTED	Date sample was collected.

CHEMICAL_NAME	Description of the chemical or measurement parameter. For CAS numbers, this is the preferred name defined by the Common Lab Practices Committee.
CAS_NUM	Chemical Abstract Services number with dashes, blank if no CAS number is available.
LAB_CODE	Coded value assigned by the project that represents the analytical laboratory that performed the analysis of the sample. See the CODE table where CODE_TYPE = LAB_CODE for a list of valid values and their descriptions.
RESULTS	Measurement for a given parameter.
RSLT_PREFIX_QUALIFIER	A qualifier indicating whether the result is below, within, or above range limits. See CODE table where CODE_TYPE = RSLT_PREFIX_QUALIFIER for a list of valid values and their descriptions.
RSLTQUAL	Coded value that documents any conditions associated with the results of the analysis. See CODE table where CODE_TYPE = RSLTQUAL for a list of valid values and their descriptions.
UNITS	Coded value that represents the units of measure used to report the parameter value. See CODE table where CODE_TYPE = UNITS for a list of valid values and their descriptions.
RAD_ERR	The counting error for a specific radionuclide expressed as 2 standard deviations.
NON_COMPLI_CODE	For Paducah OREIS, this field designates electronic verification qualifiers assigned during the Data Assessment process according to PMSA-1001. See CODE table where CODE_TYPE = NON_COMPLI_CODE for a list of valid values and their descriptions. A null field may indicate no criteria were established or may indicate verification was clear. Non-standard criteria are established on a project-by-project basis.
VALIDATION	Coded value that represents the outcome of the data validation process. See the CODE table where CODE_TYPE = VALIDATION for a list valid values and their descriptions.
ASSESSMENT	Coded value describing assessment qualifiers added to data as a result of PMSA-1001. Applies only to data generated after effective date of procedure. See CODE table where CODE_TYPE = ASSESSMENT for a list of valid values and their descriptions.
LAB_COMMENTS	Comments about the individual sample.
ANA_METHOD	Method number used to identify a standard analysis method.
ANA_TYPE	Coded value of the chemical group to which the analyte belongs. See CODE table where CODE_TYPE = ANA_TYPE for a list of valid values and descriptions.

STATION-LOCATION

The export of STATION-LOCATION table contains the data about sampling points associated with one or more projects. Each point has a distinct station name/station type within a project. Locational information contains coordinate and other information describing a point on the ground. Most location are points described by x,y coordinates, but a location could be a line or a polygon where measuring events occur. In those cases, a single point, such as the estimated center point, is used.

STA_NAME	Unique station name assigned by the individual projects (e.g., GW101).
STA_TYPE	Coded value that represents the type of station (e.g., seep, spring, well). See CODE table where CODE_TYPE = STA_TYPE for a list of valid values and their descriptions.
STATION_COMMENTS	Comments about the station.
STA_DESC	Description of the specific sampling or measuring location.
GRND_ELV	Elevation of ground surface (for groundwater, soil, or sediment sampling) at a sampling or measuring location in feet above mean sea level (msl).
ADMIN_EAST	X-value of the distance in feet of a sampling or measuring location from the reference location based on the administrative coordinate grid system.
ADMIN_NORTH	Y-value of the distance in feet of a sampling or measuring location from the reference location based on the administrative coordinate grid system.
SWMU	Acronym for Solid Waste Management Unit, if applicable.
LOCATION_COMMENTS	Comments about the location.
DATUM	Coded value that represents the method by which reference points were established (e.g., NAD27, NAD83). Datum should be associated with the state plane coordinate system. It is not valid for administrative grid. See CODE table where CODE_TYPE = DATUM for a list of valid values and their descriptions.
SPLANE_EAST	X-value of the distance in meters of a sampling or measuring location from the reference location based on the state plane coordinate grid system.
SPLANE_NORTH	Y-value of the distance in meters of a sampling or measuring location from the reference location based on the state plane coordinate grid system.
LOC_ERROR	Station location error in feet.
LOC_METHOD	Coded value that represents the method used for locating the station. See CODE table where CODE_TYPE = LOC_METHOD for a list of valid values and their descriptions.

LITHOLOGY

The LITHOLOGY export provides a description of a material (e.g., sand, gravel) encountered underground at a given location at a specific interval within a well, borehole, etc. and the discrete fixed top and bottom points of the interval where the sample was taken.

CONSTR_DEPTH_VAL	The total measurement from the ground surface of a hole downward to the bottom of the screening material in a well, expressed in feet.

HOLE_DIAM	Diameter in inches of the well. If more than one diameter is available, this column will contain the smallest diameter and the others will be listed in the COMMENTS column.
LOG_FLAG	A flag which indicates that reference source information (e.g., geophysical logs) exists.
LOG_TYPE	Coded value that represents a specific geophysical log. An example would be CL for Caliper Log, GRL for Gamma Ray Log. A name or abbreviation representing a type of LOG used in geologic work (e.g., driller, caliper, gamma). See CODE table where CODE_TYPE = LOG_TYPE for a list of valid values and their descriptions.
TOT_DRILLED_DEPTH	The total measurement from the ground surface to the bottom of a newly-constructed well after any plug back material has been added, expressed in feet.
INT_BOT_DEPTH_VAL	The distance in feet, from the ground surface to the bottom of a monitored interval.
INT_TOP_DEPTH_VAL	The distance in feet, from the ground surface to the top of a monitored interval.
MONIT_INT_NAME	The name (or number) assigned to a given monitored interval at a given location.
MONIT_ZONE_CODE	Coded value that represents the generic interval of a saturated zone that a hole monitors. A monitored interval can cut across multiple zones. See CODE table where CODE_TYPE = MONIT_ZONE_CODE for a list of valid values and their descriptions.
INT_MATL_CODE	Coded value that represents a specific characteristic or set of characteristics of the solid content found at a specific location. See CODE table where CODE_TYPE = INT_MAT_TYPE for a list of valid values and their descriptions.
STRAT_SEQ	Number assigned by the site geologist to each distinct lithologic layer at a site.
VISUAL_DESC	Textual and mineralogical description of the material comprising the layer to augment or qualify the lithtype code (e.g., grain sizes, color, secondary characteristics).

Blank Page

DISTRIBUTION

Bechtel Jacobs Company LLC

R. Barber
J. R. Blewett
B. A. Bowers
T. L. Brindley
R. D. Brooksbank
J. E. Buckmaster
D. L. Chumbler
R. D. Ferguson
R. L. Foster
J. G. Garner
L. K. Garner
P. A. Gourieux
D. R. Guminski
A. L. Harrington
D. A. Hill
C. S. Jones
R. J. Keeling
D. M. Massey
J. C. Massey
A. S. Masvidal
G. R. Miller
J. W. Morgan
L. D. Payne
R. E. Scott
M. H. Shanks
J. W. Thiesing
R. R. Veazey
D. Whitaker-Sheppard
J. L. White
J. G. Williamson
Information Resource Center-OR
PGDP EMEF DMC – RC (2)

Department of Energy

D. M. Carden, ORO
N. L. Carnes, ORO
D. W. Dollins, PAD
G. S. Hartman, ORO
J. C. Hodges, PAD (3)
K. Kates, ORO
M. E. Redfield, PAD
R. C. Sleeman, ORO
D. B. Williams, HQ

Environmental Protection Agency

C. R. Froede, Jr. (3)

Jacobs Engineering Group

B. E. Phillips (2)

Kentucky Department of Fish and Wildlife

W. L. Davis

Lockheed Martin Energy Research

C. T. Rightmire

Natural Resources Trustees

J. A. Barber
A. H. Loudermilk
A. B. Perkins
A. Robison

Site-Specific Advisory Board

M. Donham
V. W. Jones
SSAB Office File

State of Kentucky

R. H. Daniell
S. Hampson
T. Mullins
T. M. Taylor (3)
J. A. Volpe

Systematic Management Systems

W. F. Redfield

Tennessee Valley Authority

T. Whitaker

USEC

T. M. Taimi

U.S. Geological Survey

T. Mesko

West Kentucky Wildlife Management Area

W. D. Hendrick