Fluor Federal Services, Inc.
Paducah Deactivation Project
P.O. Box 369
Kevil, KY 42053
USA

February 5, 2016

FPAD-16-1315

Ms. Marcia Fultz, Contracting Officer
U.S. Department of Energy
Portsmouth/Paducah Project Office
1017 Majestic Drive, Suite 200
Lexington, KY 40513

Dear Ms. Fultz:

Task Order DE-DT0007774: Fluor Federal Services, Inc., Paducah Deactivation Project—Transmittal of the Addendum to the Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant, DOE/LX/07-1280&D2/R2/A1—Appendix D, Quality Assurance Project Plan

Regulatory Due Date: February 13, 2016

Reference: Letter from J. Woodard to C. Murphy, "Comments on Transmittal of the Addendum to the Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant, DOE/LX/07-1280&D2/R2/A1 – Appendix D, Quality Assurance Project Plan" (PPPO-02-3364393-16), dated January 29, 2016

Fluor Federal Services, Inc., Paducah Deactivation Project (FPDP) is providing the subject addendum to the U.S. Department of Energy (DOE) Paducah Site Office for submittal to the Kentucky Department for Environmental Protection (KDEP) and the U.S. Environmental Protection Agency (EPA). This addendum contains the project-specific Quality Assurance Project Plan (QAPP) for the Northeast Plume Interim Remedial Action Optimization. The development of this QAPP was required for resolution of EPA General Condition 4 received on the D2/R1 *Northeast Plume Interim Remedial Action Optimization Remedial Action Work Plan*, DOE/LX/07-1280&D2/R2 (RAWP). This QAPP is being submitted separately from the D2/R2 RAWP so as not to encumber approval of the D2/R2 document. Approval of the QAPP by EPA and KDEP will result in its becoming an addendum to the RAWP (Appendix D), which then will be used for implementation of the optimization action. This version of the addendum incorporates comments received from DOE on January 29, 2016.

As agreed to by the Federal Facility Agreement parties during the December 14-15, 2015, scoping meetings, the QAPP should be submitted concurrently with the revision to the D2/R1 RAWP on or before February 13, 2016; however, because approval of the QAPP is required prior to implementation of the optimization action, FPDP requests that the subject addendum be submitted to the EPA and KDEP as soon as possible but not later than February 13, 2016.

Enclosed are a redlined Appendix D QAPP, comment response summary (for DOE use only), draft transmittal letter, and certification page.

If you have any questions, please contact Mark Duff at (270) 816-5434.

Sincerely,

R Nichols for

Joseph C. Poniatowski
Director, Prime Contract Management

Enclosures:

1. Draft Transmittal Letter
2. Addendum to the Northeast Plume RAWP, Appendix D, QAPP, DOE/LX/07-1280&D2/R2/A1–Clean
3. Addendum to the Northeast Plume RAWP, Appendix D, QAPP, DOE/LX/07-1280&D2/R2/A1–Redline
4. Certification Page
5. Comment Response Summary (for DOE use only)

e-copy:
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Mr. Brian Begley
Federal Facility Agreement Manager
Division of Waste Management
Kentucky Department for Environmental Protection
200 Fair Oaks Lane, 2nd Floor
Frankfort, Kentucky 40601

PPPO-02-XXXXXXX-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 ADDENDUM TO THE REMEDIAL ACTION WORK PLAN FOR OPTIMIZATION OF THE NORTHEAST PLUME INTERIM REMEDIAL ACTION AT THE PADUCAH GASEOUS DIFFUSION PLANT, DOE/LX/07-1280&D2/R2/A1—APPENDIX D, QUALITY ASSURANCE PROJECT PLAN

References:

1. Letter from J. Corkran to T. Duncan, "EPA Conditional Concurrence: Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, KY (DOE/LX/07-1280&D2/R1, August 2015), Submitted August 31, 2015 (PPPO-02-3100686-15), EPA ID KY8890008982, McCracken County, KY," dated November 2, 2015
2. Letter from A. Webb to J. Woodard, "Conditional Concurrence of the Remedial Action Work Plan for Optimization of Northeast Plume Interim Remedial Action (DOE/LX/07-1280&D2/R1), Paducah Gaseous Diffusion Plant, Paducah, McCracken County, Kentucky, KY8-890-008-982," dated October 30, 2015
3. Letter from J. Woodard to J. Corkran and A. Webb, "Explanation of Significant Differences to the Record of Decision for the Interim Remedial Action of the Northeast Plume at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, DOE/LX/07-1291&D2/R1, and Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, DOE/LX/07-1280&D2/R1," dated August 31, 2015

Enclosed for your review and approval is the certified addendum to the *Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant,* DOE/LX/07-1280&D2/R2/A1 (RAWP). This addendum contains the project-specific Quality Assurance Project Plan (QAPP) for the Northeast Plume Interim Remedial Action Optimization remedial action. As agreed to by the Federal Facility Agreement parties on December 15, 2015, the project-specific QAPP has been developed as an addendum to the RAWP in response to U.S. Environmental Protection Agency general condition #4 provided to the U.S. Department of Energy (DOE) on November 2, 2015 (Reference 1). Once approved, the QAPP will be considered part of the RAWP.

Because approval of the QAPP is required prior to implementation of the optimization action, DOE requests a 30-day review of the subject addendum.

If you have any questions or require additional information, please contact David Dollins at 270-441-6819.

Sincerely,

Tracey Duncan
Federal Facility Agreement Manager
Portsmouth/Paducah Project Office

Enclosures:

1. Addendum to the Northeast Plume RAWP, Appendix D, QAPP, DOE/LX/07-1280&D2/R2/A1–Clean
2. Addendum to the Northeast Plume RAWP, Appendix D, QAPP, DOE/LX/07-1280&D2/R2/A1–Redline
3. Certification Page

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DOE/LX/07-1280&D2/R2/A1
Primary Document

Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

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DOE/LX/07-1280&D2/R2/A1
Primary Document

Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

Date Issued—February 2016

U.S. DEPARTMENT OF ENERGY
Office of Environmental Management

Prepared by
FLUOR FEDERAL SERVICES, INC.,
Paducah Deactivation Project
managing the
Deactivation Project at the
Paducah Gaseous Diffusion Plant
under Task Order DE-DT0007774

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APPENDIX D

NORTHEAST PLUME OPTIMIZATION QUALITY ASSURANCE PROJECT PLAN

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ACRONYMS

CA	corrective action
CAS	Chemical Abstracts Service
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPC	chemical of potential concern
CRQL	contract-required quantitation limit
DOE	U.S. Department of Energy
DOECAP	DOE Consolidated Audit Program
DQI	data quality indicator
DQO	data quality objective
ECD	electron capture detector
EDD	Electronic Data Deliverable
EPA	U.S. Environmental Protection Agency
EW	extraction well
FFA	Federal Facility Agreement
FID	flame ionization detector
FPDP	Fluor Federal Services, Inc., Paducah Deactivation Project
GC	gas chromatography
GC-MS	gas chromatography mass spectrometer
KDEP	Kentucky Department for Environmental Protection
MCL	maximum contaminant level
MDA	minimum detectable activity
MDL	method detection limit
MS	matrix spike
MW	monitoring well
N/A	not applicable
NAL	no action level
NEPCS	Northeast Plume Containment System
OREIS	Paducah Oak Ridge Environmental Information System
PEGASIS	Portsmouth/Paducah Project Office Environmental Geographic Analytical Spatial Information System
PGDP	Paducah Gaseous Diffusion Plant
PQL	practical quantitation limit
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RAWP	Remedial Action Work Plan
RPD	relative percent difference
SOP	standard operating procedure
TBD	to be determined
UFP	Uniform Federal Policy
VOC	volatile organic compound

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INTRODUCTION

The Northeast Plume Optimization Quality Assurance Project Plan (QAPP) has been prepared by Fluor Federal Services, Inc., Paducah Deactivation Project (FPDP) based on the approved programmatic QAPP, DOE/LX/07/1269&D2/R2, *Programmatic Quality Assurance Project Plan*, which was based on the *Uniform Federal Policy for Quality Assurance Project Plans* (UFP-QAPP Manual) guidelines for QAPPs (IDQTF 2005), as updated by the *Optimized UFP-QAPP Worksheets* guidance (IDQTF 2012).

This QAPP will be included as Appendix D to the *Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-1280&D2/R2/A1. It describes the project-specific quality assurance activities that will be conducted to support monitoring and operation of the Northeast Plume Optimization Project.

This Northeast Plume Optimization QAPP does the following:

- Refers to the standard operating procedures (SOPs) already developed for the site and in place;
- Identifies analytical limits, units of reporting, and required methods (e.g., permits, maximum contaminant level (MCL), etc.); these values will be used to procure laboratory services. If the laboratory cannot meet the limits, units, or methods specified in the QAPP, the project manager and/or compliance organization will be contacted so a determination can be made if the proposed conditions are acceptable to meet current project objectives. If the conditions are found to be acceptable, the Sample Management Office will document the acceptance with rationale;
- Incorporates the *Data and Documents Management and Quality Assurance Plan for Paducah Environmental Management and Enrichment Facilities*, DOE/OR/07-1595&D2 (DOE 1998); and
- Standardizes data validation processes by linking the process to SOPs (see Worksheet #21).

This document supports *Explanation of Significant Differences to the Record of Decision for the Interim Remedial Action of the Northeast Plume at the Paducah Gaseous Diffusion Plant Paducah, Kentucky*, DOE/LX/07-1291&D2/R2, (DOE 2015) and *Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-1280&D2/R2 (DOE 2016) (RAWP).

QAPP Worksheets #1 and #2. Title and Approval Page

Site Name/Project Name: Paducah Gaseous Diffusion Plant (PGDP)
Site Location: Paducah, Kentucky
Site Number/Code: KY8890008982
Contractor Name: FPDP
Contractor Number: Task Order DE-DT0007774
Contract Title: Paducah Gaseous Diffusion Plant Paducah Deactivation Project
Work Assignment Number: N/A

Document Title: *Northeast Plume Optimization Quality Assurance Project Plan*

Lead Organization: U.S. Department of Energy (DOE)

Preparer's Name and Organizational Affiliation: Todd Powers, Fluor Federal Services, Inc., Paducah Deactivation Project (FPDP)

Preparer's Address, Telephone Number, and E-mail Address: 5511 Hobbs Road, Kevil, KY, 42053 Phone (270) 441-5791, todd.powers@ffspaducah.com

Preparation Date (Month/Year): 1/2016

Document Control Number: DOE/LX/07-1280&D2/R2/A1, Appendix D

FPDP Signature: _____ Date:_____
Mark J. Duff
Environmental Management, Director

FPDP Signature: _____ Date:_____
Myrna Espinosa Redfield
Regulatory Affairs Manager

FPDP Signature: _____ Date:_____
Lisa Crabtree
Environmental Monitoring Project Manager

QAPP Worksheets #1 and #2. Title and Approval Page (Continued)

1. Identify guidance used to prepare QAPP:

   Intergovernmental Data Quality Task Force, March 2005. *The Uniform Federal Policy for Implementing Environmental Quality Systems*, Version 2.0, 126 pages.

   Intergovernmental Data Quality Task Force, March 2005. *The Uniform Federal Policy for Quality Assurance Project Plans*: *Part 1 UFP QAPP Manual*, Version 1.0, 177 pages (DTIC ADA 427785 or EPA-505-B-04-900A).

   Intergovernmental Data Quality Task Force, March 2005. *The Uniform Federal Policy for Quality Assurance Project Plans*: *Part 2A UFP QAPP Worksheets*, Version 1.0, 44 pages.

   Intergovernmental Data Quality Task Force, March 2005. *The Uniform Federal Policy for Quality Assurance Project Plans: Part 2B Quality Assurance/Quality Control Compendium: Minimum QA/QC Activities*, Version 1.0, 76 pages.

   Intergovernmental Data Quality Task Force, March 2012. *Uniform Federal Policy for Quality Assurance Project Plans, Optimized UFP QAPP Worksheets*, 42 pages.

   Paducah Gaseous Diffusion Plant Programmatic Quality Assurance Project Plan, DOE/LX/07-1269&D2/R2

2. Identify regulatory program: Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); *Federal Facility Agreement for the Paducah Gaseous Diffusion Plant*, DOE/OR/07-1707 (FFA); Kentucky Department for Environmental Protection (KDEP) (Kentucky Division of Waste Management, Kentucky Division of Water); and DOE Orders.

3. Identify approval entity: DOE

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

5. List dates of scoping sessions that were held: Data Quality Objectives (DQO) as documented in *Operation and Maintenance Plan for the Northeast Plume Containment System Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-1535&D3/R4, August 2013

QAPP Worksheets #1 and #2. Title and Approved Page (Continued)

6. List dates and titles of QAPP documents written for previous site work, if applicable:

Title:	**Approval Date:**
Data and Documents Management and Quality Assurance Plan for Paducah Environmental Management and Enrichment Facilities, DOE/OR/07-1595&D2 (DOE 1998)	10/5/1998
Paducah Gaseous Diffusion Plant Programmatic Quality Assurance Project Plan, Paducah, Kentucky, DOE/LX/07-1269&D2/R2	4/8/2015
Environmental Monitoring Plan Fiscal Year 2015 Paducah Gaseous Diffusion Plant, Paducah, Kentucky, PAD-ENM-0055/R4	2/12/15

7. List organizational partners (stakeholders) and connection with lead organization:
   U.S Environmental Protection Agency (EPA) Region 4 (FFA member), KDEP (Regulates hazardous and solid waste landfills, effluent discharge permits, FFA member), DOE (Lead Organization), FPDP (DOE Prime Contractor)

8. List data users: DOE, FPDP, EPA Region 4, Commonwealth of Kentucky

9. This QAPP includes 28 worksheets that are required based on UFP-QAPP guidance.

Table 1. Crosswalk: UFP-QAPP Workbook to 2106-G-05-QAPP

Optimized UFP-QAPP Worksheets		**CIO 2106-G-05 QAPP Guidance Section**	
1 & 2	Title and Approval Page	2.2.1	Title, Version, and Approval/Sign-Off
3 & 5	Project Organization and QAPP Distribution	2.2.3	Distribution List
		2.2.4	Project Organization and Schedule
4, 7, & 8	Personnel Qualifications and Sign-off Sheet	2.2.1	Title, Version, and Approval/Sign-Off
		2.2.7	Special Training Requirements and Certification
6	Communication Pathways	2.2.4	Project Organization and Schedule
9	Project Planning Session Summary	2.2.5	Project Background, Overview, and Intended Use of Data
10	Conceptual Site Model	2.2.5	Project Background, Overview, and Intended Use of Data
11	Project/Data Quality Objectives	2.2.6	Data/Project Quality Objectives and Measurement Performance Criteria
12	Measurement Performance Criteria	2.2.6	Data/Project Quality Objectives and Measurement Performance Criteria
13	Secondary Data Uses and Limitations	Chapter 3	QAPP ELEMENTS FOR EVALUATING EXISTING DATA
14 & 16	Project Tasks and Schedule	2.2.4	Project Organization and Schedule
15	Project Action Limits and Laboratory-Specific Detection/Quantitation Limits	2.2.6	Data/Project Quality Objectives and Measurement Performance Criteria
17	Sampling Design and Rationale	2.3.1	Sample Collection Procedure, Experimental Design, and Sampling Tasks
18	Sampling Locations and Methods	2.3.1	Sample Collection Procedure, Experimental Design, and Sampling Tasks
		2.3.2	Sampling Procedures and Requirements
19 & 30	Sample Containers, Preservation, and Hold Times	2.3.2	Sampling Procedures and Requirements
20	Field QC	2.3.5	Quality Control Requirements
21	Field SOPs	2.3.2	Sampling Procedures and Requirements
22	Field Equipment Calibration, Maintenance, Testing, and Inspection	2.3.6	Instrument/Equipment Testing, Calibration and Maintenance Requirements, Supplies and Consumables
23	Analytical SOPs	2.3.4	Analytical Methods Requirements and Task Description
24	Analytical Instrument Calibration	2.3.6	Instrument/Equipment Testing, Calibration and Maintenance Require
25	Analytical Instrument and Equipment Maintenance, Testing, and Inspection	2.3.6	Instrument/Equipment Testing, Calibration and Maintenance Requirements, Supplies and Consumables
26 & 27	Sample Handling, Custody, and Disposal	2.3.3	Sample Handling, Custody Procedures, and Documentation
28	Analytical Quality Control and Corrective Action	2.3.5	Quality Control Requirements
29	Project Documents and Records	2.2.8	Documentation and Records Requirements
31, 32, & 33	Assessments and Corrective Action	2.4	Assessments and Data Review
		2.5.5	Reports to Management
34	Data Verification and Validation Inputs	2.5.1	Data Verification and Validation Targets and Methods
35	Data Verification Procedures	2.5.1	Data Verification and Validation Targets and Methods
36	Data Validation Procedures	2.5.1	Data Verification and Validation Targets and Methods
37	Data Usability Assessment	2.5.2	Quantitative and Qualitative Evaluations of Usability
		2.5.3	Potential Limitations on Data Interpretation
		2.5.4	Reconciliation with Project Requirements

QAPP Worksheets #3 and #5.
Project Organization and QAPP Distribution

Distribution is based on the position title. A change in the individual within an organization will not trigger a resubmittal of the QAPP. DOE may choose to update the sheet and submit changes to the document holders. These managers will be responsible for distribution of this QAPP, to their staff.

Controlled copies of the QAPP will be distributed according to the distribution list below. This list will be updated, as needed, and kept by the FPDP Records Management Department. Each person receiving a controlled copy also will receive any updates/revisions. If uncontrolled copies are distributed, it will be the responsibility of the person distributing the uncontrolled copy to provide updates/revisions.

Position Title	Organization	QAPP Recipients	Current Telephone Number	Current E-mail Address	Document Control Number
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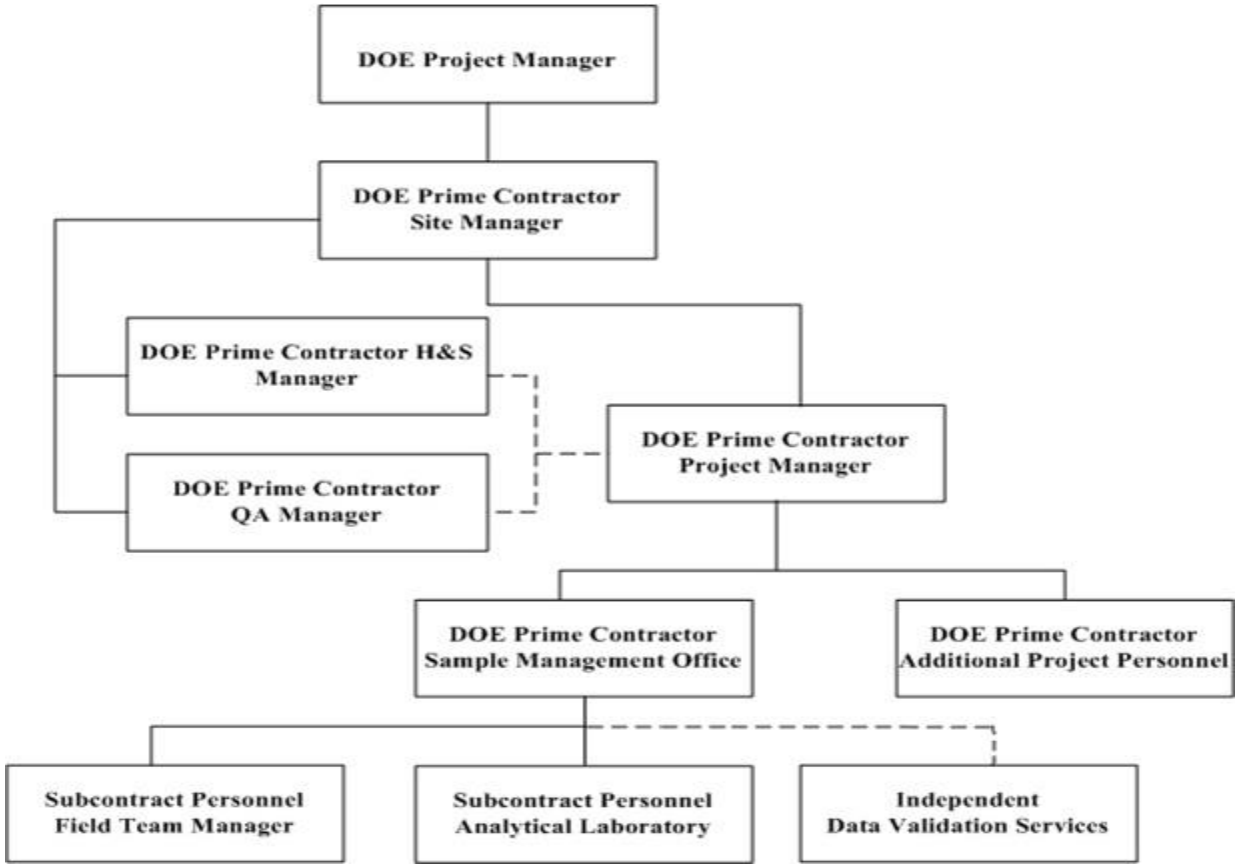
FFA Manager	FPDP	Jana White	(270) 441-5185	jana.white@ffspaducah.com	8
Quality Manager	FPDP	Jim Quinnette	(270) 441-5656	jim.quinnette@ffspaducah.com	9
Northeast Plume Optimization Project Manager	FPDP	Todd Powers	(270) 441-5791	todd.powers@ffspaducah.com	10
Environmental Monitoring Project Manager	FPDP	Lisa Crabtree	(270) 441-5135	lisa.crabtree@ffspaducah.com	11
Health and Safety Manager	FPDP	Steve Wentzel	(270) 441-6239	steve.wentzel@ffspaducah.com	12
Regulatory Compliance Manager	FPDP	Michael Gerle	(270) 441-6680	michael.gerle@ffspaducah.com	13
Senior Remedial Project Manager and FFA Manager	U.S. EPA, Region 4, Federal Facilities Branch	Julie Corkran	(404) 562-8547	corkran.julie@epa.gov	14
Division of Waste Management, Hazardous Waste Branch, PGDP Section Supervisor and FFA Manager	KDEP	Brian Begley	(502) 564-6716, ext 4641	brian.begley@ky.gov	15

QAPP Worksheet #5-A.
Project Level Organizational Chart



QAPP Worksheet #4.
Project Personnel Sign-Off Sheet: Sample Collection, Data Analysis, Data Validation

Personnel actively engaged in sample collection, data analysis, and data validation for the projects are required to read applicable sections of this QAPP and sign a Personnel Sign-off Sheet. The master list of signatures will be kept by the Northeast Plume Optimization Project Manager (or designee) and will be made available upon request.

Project Position Title	Organization	Specialized Training/Certification, if any	Signature	Date
Sample Team Leads	GEO Consultants	Per TPD		
Sample Management Office Manager	FPDP	Per TPD		
Independent Third-Party Data Validator	Los Alamos Technical Associates, Ohio	Bachelor degree plus relevant experience		
Environmental Radiation Protection and Risk Assessment Manager	FPDP	Per TPD		

N/A = not applicable
TPD = Training Position Description

QAPP Worksheet #7.
Personnel Responsibility and Qualifications Table

ORGANIZATION: FPDP

Name	Position Title Responsible	Organization Affiliation	Responsibilities	Education and Experience Qualifications[1]
Craig Jones	Project Manager	FPDP	Overall project responsibility	> 4 years relevant work experience
Myrna Redfield	Regulatory Affairs Manager	FPDP	Project environmental compliance responsibility	Bachelor degree plus > 4 years work experience
Jana White	FFA Manager	FPDP	Project compliance with the FFA	> 4 years work relevant experience
Todd Powers	Northeast Plume Optimization Project Manager	FPDP	Northeast Plume Optimization Project responsibility	> 4 years relevant work experience
Lisa Crabtree	Environmental Monitoring Project Manager	FPDP	Support project on sampling, data management, and reporting activities	> 4 years relevant work experience
Darren Tinsley	Health and Safety Representative	FPDP	Project safety and health responsibility	Bachelor degree plus > 1 year relevant experience
Mike Zeiss	Waste Coordinator	FPDP	Overall project waste management responsibility	> 4 years relevant experience
James Moore	Data Validator	Independent third party contractor	Performing data validation according to specified procedures	Bachelor degree plus relevant experience
TBD	Analytical Laboratory Project Manager	TBD	Sample analysis and data reporting	Bachelor degree plus relevant experience

TBD = to be determined

[1] Candidates who do not have a certificate or required degree but demonstrate additional "equivalent relevant work experience" can be considered when evaluating qualifications. This assessment will be conducted by the PM as he/she assembles the appropriate team for the project.

QAPP Worksheet #8.
Special Personnel Training Requirements Table

Personnel are trained in the safe and appropriate performance of their assigned duties in accordance with requirements of work to be performed. This QAPP has been developed as a generalized quality plan. There are no special training requirements other than what normally is required for work at the PGDP site. QAPP development uses a graded approach.

Project Function	Specialized Training—Title or Description of Course	Training Provider	Training Date	Personnel/Groups Receiving Training	Personnel Titles/ Organizational Affiliation	Location of Training Records/Certificates*
Project Tasks	There will be no specialized training required for this program other than what normally is required for site work at PGDP. The contractor will evaluate specific tasks and personnel will be assigned training as necessary to perform those tasks. Training may address health and safety aspects of specific tasks as well as contractor-specific, site-specific, and task-specific requirements.	FPDP	Prior to Monitoring	Based upon required duties	FPDP staff, subcontractors	Training files are maintained by the FPDP training organization. A training database is utilized to manage and track training.

*Training records are maintained by the FPDP training department. If training records and/or certificates do not exist or are not available, then this should be noted.

QAPP Worksheet #6.
Communication Pathways

NOTE: Forms of communication can include letter, e-mail, meetings, etc., and will occur throughout the project.

Communication Drivers	Organizational Affiliation	Position Title Responsible	Procedure
FFA, DOE/OR/07-1707	DOE Paducah Site Lead	Paducah Site Lead	All formal communication among DOE, EPA, and KDEP.
FFA, DOE/OR/07-1707	DOE Paducah	DOE Project Manager	All formal communication between DOE and contractor for Environmental Remediation Projects.
Project requirements	FPDP	Director of Environmental Management	All formal communication among the project, the Site Lead, and the DOE Project Manager.
Project requirements	FPDP	Project Manager	All communication between the project and the FPDP Director of Environmental Management.
Project Quality Assurance (QA) requirements	FPDP	Quality Manager	All project quality-related communication between the QA department and FPDP project personnel.
FFA compliance	FPDP	Regulatory Affairs Manager	All internal communication regarding FFA compliance with the FPDP Project Manager.

QAPP Worksheet #6. (Continued)
Communication Pathways

Communication Drivers	Organizational Affiliation	Position Title Responsible	Organizational Department Manager	Procedure
Project Requirements	FPDP	Northeast Plume Optimization Project Manager	Northeast Plume Optimization Project	All internal communication regarding project sample requirements.
Sampling Requirements	FPDP	Sample Team Leads	Environmental Monitoring	All internal communication regarding field sampling with the FPDP Project Manager.
Analytical Laboratory Interface	FPDP	Scientist	Environmental Monitoring	All communication between FPDP and analytical laboratory.
Waste Management Requirements	FPDP	Waste Coordinator	Waste Management	All internal communication regarding project waste management with FPDP Project Manager.
Environmental Compliance Requirements	FPDP	Regulatory Compliance Manager	Regulatory Affairs Manager	All internal correspondence regarding environmental requirements and compliance with the FPDP Project Manager.
Subcontractor Requirements (if applicable)	FPDP	Subcontract Administrator	Business Manager	All correspondence between the project and subcontractors, if applicable.
Health and Safety Requirements	FPDP	Health and Safety Representative	Health and Safety Manager	All internal communication regarding safety and health requirements with the FPDP Project Manager.

QAPP Worksheet #9.
Project Scoping Session Participant Sheet

Project scoping is the key to the success of any project and is part of the systematic planning process. The scoping that supports this QAPP is documented in Section 4 of *Operation and Maintenance Plan for the Northeast Plume Containment System Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-1535&D3/R4.

QAPP Worksheet #10.
Problem Definition

The problem to be addressed by the project: The following data gaps[1] have been identified:

1. Is the Northeast Plume Containment System retarding the migration of the highest concentration volume of the trichloroethene (TCE) groundwater plume?
2. Is the treatment system (air stripper) effectively stripping TCE from the contaminated groundwater?
3. Is the treatment system affecting environmental performance at the CERCLA Outfall 001?
4. What levels of TCE are being discharged into the atmosphere from the groundwater extraction process?
5. Is the Northeast Plume Containment System meeting the requirements stated in the Facility and Nuclear Safety evaluation?
6. Is the Northeast Plume Containment System running efficiently in terms of operation and maintenance?

The environmental questions being asked: What is the percent mass capture of the optimized extraction well (EW) system?

Is operation of the EW system causing or contributing to undesired migration of technetium-99 (Tc-99) contamination from the source areas(s) (e.g., C-400 Building and Northwest Plume)?

Observations from any site reconnaissance reports: Regular updates of site plume maps summarize the nature and extent of dissolved contamination to be addressed by the Northeast Plume Optimization Project. Site groundwater modeling predicts groundwater flow paths once operation of the optimized EWs begins.

A synopsis of secondary data or information from site reports: The site plume maps identify two centroids of contamination within the Northeast Plume. In the area of the optimized EWs, TCE levels are not expected to exceed 600 µg/L and Tc-99 activity is not expected to exceed 200 pCi/L.

The possible classes of contaminants and the affected matrices: The primary contaminant of concern is TCE. Other potential contaminants include 1,1-dichloroethene (DCE), and Tc-99.

The rationale for inclusion of chemical and nonchemical analyses: Worksheets #11 and #17-B present rationale for inclusion of chemical and nonchemical analyses.

Information concerning various environmental indicators: Groundwater investigations have indicated TCE contamination extends off-site in the Northeast Plume.

[1] Table 3 of *Operation and Maintenance Plan for the Northeast Plume Containment System Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-1535&D3/R4, August 2013.

QAPP Worksheet #10. (Continued)
Problem Definition

Project decision conditions ("If..., then..." statements):

1. If field data[2] collected from the monitoring well (MW) network at the extraction field indicate that the EWs are not effectively retarding the migration of the highest concentration volume of the plume, then operation of the extraction field will be reevaluated and adjustments made as necessary. Otherwise, operation of the extraction field will continue at existing levels.

2. If TCE levels in discharge effluents exceed 75% of the 30 µg/l discharge limit (22.5 µg/L), then operational conditions will be investigated and appropriate adjustments made as necessary. Otherwise, operation of the system will continue as outlined.

3. If any pollutant exceeds the outfall discharge criteria, then the possible contributions to that exceedance by the Northeast Plume Containment System (NEPCS) will be investigated, and operations will be altered or suspended as necessary. Otherwise, operation of the system will continue as outlined.

4. If air emissions of TCE from the NEPCS, as a single source or as a contributor to site emissions, exceed the regulatory guidelines, then the operating status will be reviewed and revised as necessary. Otherwise, operation of the system will continue as outlined.

5. If TCE or Tc-99 levels exceed the levels used in assumptions serving as the basis for safety,[3] environmental, or operating limiting conditions, then system operation will be suspended until the impacts can be evaluated and appropriate operating conditions can be reestablished. Otherwise, operation of the system will continue as outlined.

6. If system components are not operating within the manufacturer's specified performance criteria, then system operation will be evaluated. Otherwise, operation of the NEPCS will continue as outlined.

[2] Monitoring well groundwater sampling will be performed under the Northeast Plume Optimization Project. Frequencies and analytes are as follows:
- Every sampling event—depth to water, dissolved oxygen, pH, specific conductance, temperature, redox, and turbidity.
- Quarterly parameters—TCE; 1,1-DCE; Tc-99; and gross alpha and beta.

[3] The current safety basis for the Northeast Plume Containment System is contained in the sitewide industrial preliminary hazard screening, PHS-PH-INDSTRL-0067/R2, February 2014. This document assumes the maximum concentration for TCE (at the system inlet) is 3,600 µg/L, and the maximum activity for Tc-99 is the MCL for Tc-99 (900 pCi/L).

QAPP Worksheet #10. (Continued)
Problem Definition

Additional project decision conditions ("If..., then..." statements) identified in the 2015 Memorandum of Agreement for Resolution:[4]

7. The anticipated contaminant concentrations of Tc-99 and TCE in the transect monitoring wells are expected to be no higher than 200 pCi/L and 600 ug/L, respectively. If baseline contaminant concentrations in any of the transect monitoring wells during the initial quarterly sampling are detected at twice the anticipated contaminant concentrations, then the FFA parties agree to temporarily suspend start-up of the extraction wells until the parties meet to evaluate the identified discrepancy, its potential impact on the NW Plume source actions and the planned NE Plume optimization project.

8. If contaminant concentrations in any transect[5] well's quarterly samples are determined to be increasing and may double above the established baseline within a year of the quarterly samples showing an increase, then potential changes in groundwater flow or source impacts (e.g. rising contaminant concentrations in the NE Plume, source migration, etc.) will be further examined and the FFA parties will consider adjustments (e.g. adjusting extraction well pumping rates) for the optimized NE Plume interim action to minimize these potential impacts.

9. If the measures taken by the FFA parties (e.g. adjusting extraction well pumping rates) do not result in decreased or stabilized concentrations at the transect monitoring wells, or if such adjustments reduce the effectiveness of the optimized extraction wells or if Tc-99 concentrations continue to increase and are detected at twice their baseline concentration in any one (or more) of the transect wells for two consecutive quarters, then DOE must notify EPA and KDEP within 30 days of receiving sampling results or one of the aforementioned conditions occurring.

10. If FFA parties decide to implement a modification to the Interim Remedial Action to address the NE Plume contamination (including the expansion), then depending on the scope of the modifications it is possible that the FFA parties will decide to shut-down the optimized pump and treat system in part or in its entirety. If a determination is made to shut down he optimized pump and treat system either before a modification to the Interim Remedial Action or as part of a modification to the Interim Action, then DOE shall reinstate implementation of the NE Plume Interim Remedial Action (Interim ROD 1995).

[4] *Memorandum of Agreement for Resolution of Formal Dispute of the Explanation of Significant Differences to the Record of Decision for the Interim Remedial Action of the Northeast Plume at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky (DOE/LX/07-1291&D2), and Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky (DOE/LX/07-1280&D2),* U.S. Department of Energy, Paducah, KY, July 31, 2015.
[5] The 2015 Memorandum of Agreement for Resolution required installation of a north-south transect of RGA monitoring wells approximately 600 ft east of C-400 Building.

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

This QAPP has been prepared to detail the minimum standards, particularly for field and analytical data quality. Analytical data will be generated by DOE Consolidated Audit Program (DOECAP) laboratories utilizing approved laboratory test methods. The overall project quality objectives are to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting that will provide results that are legally defensible in a court of law. Specific procedures for sampling, chain-of-custody, instrument calibration/preventive maintenance, chemical analysis, internal quality control (QC), reporting data, audits, and corrective actions are described in other sections of this QAPP.

Who will use the data? DOE, FPDP, Commonwealth of Kentucky, and EPA.

What will the data be used for? Data will be used for evaluation of Northeast Plume Optimization Project and will be reported via FFA semiannual reports.

What type of data is needed? Target analytes, analytical groups, field screening, on-site analytical or off-site laboratory techniques, sampling techniques. Required list of analytes is specified in Table 4 of the project operations and maintenance plan. Both field screening and off-site laboratory analyses will be used for data collection. The target analytes include VOCs, Tc-99, and general water quality parameters.

How "good" do the data need to be in order to support the environmental decision? Data need to meet the measurement quality objective and data quality indicators (DQIs) established by the systematic planning process consistent with procedure *Quality Assured Data*; CP3-ES-1003, *Developing, Implementing, and Maintaining Data Management Implementation Plans*; and Section 9 "Data Management and Implementation Plan" of the *Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-1280&D2/R2 (February 2016).

Where, when, and how should the data be collected/generated? In the EWs, pump rates are recorded daily, water levels are measured weekly, and TCE and Tc-99 samples are collected quarterly. Monitoring wells are sampled quarterly. The CERCLA Outfall 001 is sampled weekly for general water quality parameters and volatile organic compounds (VOCs), quarterly for chronic toxicity and Tc-99.

Who will collect and generate the data? FPDP. Additionally, meteorological data may be acquired from other sources (as needed).

How will the data be reported? Field data will be recorded on chain-of-custody forms, in field logbooks, and field data sheets. The fixed-base laboratory will provide data in an Electronic Data Deliverable (EDD). Project data following verification assessment and validation will be placed into and reported from the Paducah Oak Ridge Environmental Information System (OREIS). Data loaded into Paducah OREIS will be made available to the public stakeholders via the Portsmouth/Paducah Project Office Environmental Geographic Analytical Spatial Information System (PEGASIS).

How will the data be archived? Electronic data will be archived in OREIS in accordance with Section 8.5 (Data and Records Archival) of the *Data and Documents Management and Quality Assurance Plan* (DOE 1998).

QAPP Worksheet #12-K.
Measurement Performance Criteria

Matrix	Water/Groundwater and Surface Water
Analytical Group[1]	VOC
Concentration Level	Low

Sampling Procedure[2]	**Analytical Method/SOP**[3, 4]	**DQIs**	**Measurement Performance Criteria**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)**
CP4-ES-2101, *Groundwater Sampling*, and CP4-ES-2203, *Surface Water Sampling*	SW846-8260 and EPA-624	Precision—Lab	RPD–≤ 25%	Laboratory Duplicates	A
		Precision	RPD–≤ 25%	Field Duplicates	S
		Accuracy/Bias	% recovery[6]	Laboratory Sample Spikes	A
		Accuracy/Bias-Contamination	No target compounds > PQL	Method Blanks/Instrument Blanks	A
		Accuracy/Bias Contamination	No target compounds > PQL	Field Blanks	S
		Accuracy/Bias Contamination	No target compounds > PQL	Trip Blanks	S
		Accuracy/Bias Contamination	No target compounds > PQL	Equipment Rinseates	S
		Completeness[5]	90%	Data completeness check	S&A

PQL = practical quantitation limit; RPD = relative percent difference
[1] If information varies within an analytical group, separate by individual analyte.
[2] See QAPP Worksheet #21.
[3] See QAPP Worksheet #23.
[4] The most current version of the method will be used.
[5] Completeness is calculated as the number of samples planned to be collected divided by the number of sample results that were rejected.
[6] Percent recovery is laboratory-specific, calculated from studies performed every six months. Percent recovery ranges will be provided in the laboratory data packages based on the most current study.

QAPP Worksheet #12-Q.
Measurement Performance Criteria

Matrix	Water/Groundwater and Surface Water
Analytical Group[1]	Radionuclides (Tc-99)
Concentration Level	Low

Sampling Procedure[2]	**Analytical Method/SOP**[3, 4]	**DQIs**	**Measurement Performance Criteria**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)**
CP4-ES-2101, *Groundwater Sampling*, and CP4-ES-2203, *Surface Water Sampling*	Liquid scintillation	Precision—Lab	RPD–≤ 25%	Laboratory Duplicates	A
		Precision	RPD–≤ 25%	Field Duplicates	S
		Accuracy/Bias	% recovery[6]	Laboratory Sample Spikes	A
		Accuracy/Bias-Contamination	No target compounds > MDA	Method Blanks/Instrument Blanks	A
		Accuracy/Bias Contamination	No target compounds > MDA	Field Blanks	S
		Accuracy/Bias Contamination	No target compounds > MDA	Equipment Rinseates	S
		Completeness[5]	90%	Data completeness check	S&A

MDA = minimum detectable activity
[1] If information varies within an analytical group, separate by individual analyte.
[2] See QAPP Worksheet #21.
[3] See QAPP Worksheet #23.
[4] The most current version of the method will be used.
[5] Completeness is calculated as the number of samples planned to be collected divided by the number of sample results that were rejected.
[6] Percent recovery is laboratory-specific, calculated from studies performed every six months. Percent recovery ranges will be provided in the laboratory data packages based on the most current study.

QAPP Worksheet #13.
Secondary Data Criteria and Limitations Table

Secondary Data	Data Source (Originating Organization, Report Title, and Date)	Data Generator(s) (Originating Org., Data Types, Data Generation/Collection Dates)	How Data Will Be Used	Limitations on Data Use
OREIS Database	Various	Various	Data will be used to determine the nature and extent of outfall surface water quality and Northeast Plume groundwater contamination.	Data have been verified, assessed, and validated (if validation is required). Rejected data will not be used if there is sufficient time to resample and obtain a result that will not be rejected during validation. All data are assessed based on *Quality Assured Data*, CP3-ES-5003.
Historical Documentation	Various	Various	Information will be used as guidance on Northeast Plume groundwater contamination.	Information from historical documents will be limited to the available documentation as it relates to a specific project. Use of historical data may be limited based on how long ago the data were collected and whether site conditions have changed since data collection.

QAPP Worksheet #14.
Summary of Project Tasks*

Sampling Tasks: Collect samples to assess contaminant levels in extraction and MWs and treatment system equalization tank, air stripper efficiency, and outfall compliance.

Analysis Tasks: Analysis according to current version of standard methods as listed in Worksheet 12.

Quality Control Tasks: QC will be per QAPP worksheets as follows:

- QC samples—Worksheets #20 and #28
- Equipment calibration—Worksheets #22 and #24
- Data review/validation—Worksheets #34, #35, #36, and #37

Secondary Data: See Worksheet #13

Data Management Tasks: Data management will be per procedures CP3-ES-5007, *Data Management Coordination*; CP3-ES-1003, *Developing, Implementing, and Maintaining Data Management Implementation Plans*; and Section 9, "Data Management and Implementation Plan" of *Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-1280&D2/R2 and, by reference, Section 10, "Data Management and Implementation Plan" of *Remedial Action Work Plan for In Situ Source Treatment by Deep Soil Mixing of the Southwest Groundwater Plume Volatile Organic Source at the C-747-C Oil Landfarm (Solid Waste Management Unit 1) at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-1287&D2/A1.

Documentation and Records: Documentation and records will be per procedure CP3-RD-0010, *Records Management Process.*

Assessment/Audit Tasks: Assessments and audits will be per procedure CP3-QA-1003, *Management and Self Assessments*.

Data Review Tasks: Data review tasks, including selection of data sets for validation by a third-party independent validator(s), will be per procedure CP3-ES-5003, *Quality Assured Data*, and the Section 9, "Data Management and Implementation Plan" of the *Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-1280&D2/R2 (February 2016).

*It is understood that SOPs are contractor specific.

QAPP Worksheet #16.
Project Schedule/Timeline Table

Activities	Organization	Dates (MM/DD/YY)		Deliverable	Deliverable Due Date
		Anticipated Date(s) of Initiation	Anticipated Date of Completion		
Routine sampling conducted throughout the period of the Northeast Plume Optimization Project	FPDP	Preoperational MW sampling will characterize 4 quarters before start-up of the optimization EWs.	Operational and monitoring well sampling will continue until the completion of the Northeast Plume Interim Remedial Action.	Project data will be summarized in semi-annual FFA reports.	The FFA semiannual reports are issued in April and October of each year.

QAPP Worksheet #15-A.
Project Action Limits Laboratory-Specific Detection/Quantitation Limits

Matrix: Water
Analyte Group: VOCs

VOCs	CAS Number	Project Action Limit/NAL (µg/L)	Project Action Limit Reference[a]	Site COPC?[b]	Laboratory-Specific	
					PQLs (µg/L)	MDLs (µg/L)
1,1-Dichloroethene	75-35-4	7/0.171	MCL/NAL	Yes	1	0.3
Trichloroethene	79-01-6	5/0.281	MCL/NAL	Yes	1	0.3

CAS = Chemical Abstracts Service
MDL = method detection limit
NAL = no action level for groundwater for the child resident scenario from the Risk Methods Document (DOE 2015)

[a] This QAPP references the MCLs. The worksheet also lists the NALs established by the Risk Methods Document (DOE 2015)(i.e., the no action level for groundwater for the child resident scenario).
[b] Analytes marked with COPC are from Table 2.1 of the Risk Methods Document (DOE 2015) and represent the list of chemicals, compounds, and radionuclides compiled from COPCs retained as contaminants of concern in risk assessments performed at PGDP between 1990 and 2008.

QAPP Worksheet #15-D.
Project Action Limits Laboratory-Specific Detection/Quantitation Limits

Matrix: Water
Analytical Group: Radionuclides

Radionuclides	CAS Number	Project Action Limit (pCi/L)	Project Action Limit Reference[a]	Site COPC?[b]	Laboratory-Specific MDAs (pCi//L)
Technetium-99	14133-76-7	4 mRem/year-dose (900 pCi/L)	MCL (NAL)	Yes	15–25

[a] This QAPP references the MCLs. The worksheet also lists the NALs established by the Risk Methods Document (DOE 2015) (i.e., the no action level for groundwater for the child resident scenario).
b Analytes marked with COPC are from Table 2.1 of the Risk Methods Document (DOE 2015) and represent the list of chemicals, compounds, and radionuclides compiled from COPCs retained as contaminants of concern in risk assessments performed at PGDP between 1990 and 2008.

QAPP Worksheet #15-K.
Project Action Limits Laboratory-Specific Detection/Quantitation Limits

Matrix: Surface
Analyte Group: CERCLA Outfall

Outfall Discharge Criteria with Effluent Limits	CAS Number	Project Action Limit	Site COPC?[a]	Laboratory-Specific	
				PQLs	MDLs
Total Suspended Solids	N/A	30 mg/L	No	5 mg/L	1 mg/L
Oil & Grease	N/A	10 mg/L	No	7 mg/L	3.5 mg/L

a Analytes marked with COPC (chemical of potential concern) are from Table 2.1 of the Risk Methods Document (DOE 2015) and represent the list of chemicals, compounds, and radionuclides compiled from COPCs retained as contaminants of concern in risk assessments performed at PGDP between 1990 and 2008.

QAPP Worksheet #17-B.
Sampling Design and Rationale (Groundwater Monitoring)

Analysis	Media Type	# of Samples	Test/Analytical Method	Project Reference Value	PQL
DO	Water	All Water	Hach Quanta Hydrolab	0.5 mg/L	0.2 mg/L
pH	Water	All Water	Hach Quanta Hydrolab	5 to 9 Std Units	02. Std Units
Redox	Water	All Water	Hach Quanta Hydrolab	50 mV against Ag/AgCl	20 mV
Temperature	Water	All Water	Hach Quanta Hydrolab	20°C	+/- 0.1°C
Specific Conductance	Water	All Water	Hach Quanta Hydrolab	N/A	0.001 mS/cm
Turbidity	Water	All Water	Hach Quanta Hydrolab	N/A	1 NTU

QAPP Worksheet #18.
Sampling Locations and Methods/Standard Operating Procedure Requirements Table for Screening Samples

Sampling Location/ID Number	Matrix	Depth (units)	Analytical Group	Concentration Level	Number of Samples (Identify Field Duplicates)	Sampling SOP Reference[a]	Rationale for Sampling Location
Northeast Plume Optimization Outfalls	Surface Water	Surface Water in Effluent Discharge	VOCs, Radionuclides, and General Water Quality	See Table 3 of Northeast Plume Optimization Explanation of Significant Differences for discharge limits	See Table 3 of Northeast Plume Optimization Explanation of Significant Differences for sample frequency	CP4-ES-2203, *Surface Water Sampling*	See Northeast Plume Optimization Operation and Maintenance Plan
Northeast Plume Optimization Extraction Wells and Monitoring Wells	Groundwater	Regional Gravel Aquifer	VOCs and Radionuclides	600 µg/L TCE and 200 pCi/L Tc-99	See Table 3 of Northeast Plume Optimization Explanation of Significant Differences for sample frequency	CP4-ES-2101, *Groundwater Sampling*	See Northeast Plume Optimization Operation and Maintenance Plan

[a] See Analytical SOP References Table (Worksheet #23).

QAPP Worksheet #19.
Analytical SOP Requirements Table

Matrix	Analytical Group	Concentration Level	Analytical and Preparation Method/SOP Reference*	Sample Volume	Containers (number, size, and type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/ analysis)
Water	VOC	See Worksheet #18	See Worksheet #23	120 mL	3 x 40 mL Glass VOA Vial	HCl; pH < 2, cool to < 4°C, no headspace	14 days for preserved
Water	RADs	See Worksheet #18	See Worksheet #23	3 liters	3 x 1 liter Plastic	HNO_3 pH < 2, Cool to < 4°C[a]	6 months

NOTE: Sample volume and container requirements will be specified by the laboratory. This table includes standard requirements for routine analytical groups.
*See Analytical SOP References table (Worksheet #23).
[a] Check with specific laboratory conducting analyses to ensure that acidification will not interfere with laboratory procedures.

HCl = hydrochloric acid
HNO_3 = nitric acid
RAD = radionuclide

QAPP Worksheet #30.
Analytical Services Table

Matrix	Analytical Group	Concentration Level	Sample Locations/ID Numbers	Analytical SOP*	Data Package Turnaround Time	Laboratory/Organization (Name and Address, Contact Person and Telephone Number)	Backup Laboratory/Organization (Name and Address, Contact Person and Telephone Number)
Water	Radionuclides	See Worksheet #18	TBD	See Worksheet #23	28-day	TBD	TBD
Water	VOCs	See Worksheet #18		See Worksheet #23	28-day		

*Analytical method SOPs for radiochemistry parameters are laboratory specific.

ID = identification

QAPP Worksheet #20.
Field Quality Control Sample Summary Table

Matrix	Analytical Group	Concentration Level	Analytical and Preparation SOP Reference	No. of Sampling Locations	No. of Field Duplicate Pairs	Inorganic	No. of Field Blanks	No. of Equip. Blanks	Total No. of Samples to Lab
						No. of MS			
Water (Groundwater and Surface Water)	VOCs	Low	See Worksheet #12-K	See Operations and Maintenance Plan	5%	5%	5%	5%	See Operations and Maintenance Plan
Water (Groundwater and Surface Water)	Radionuclides	Low	See Worksheet #12-Q	See Operations and Maintenance Plan	5%	5%	5%	5%	See Operations and Maintenance Plan

MS = matrix spike

QAPP Worksheet #21.
Project Sampling SOP References Table

Site-specific SOPs have been developed for site sampling and data management activities.

Reference Number	Title and Number[a]	Originating Organization[b]	Equipment Type	Modified for Project Work? (Y/N)	Comments
1	CP4-ES-0043, *Temperature Control for Sample Storage*	Contractor	Sampling	N	N/A
2	CP4-ES-1001, *Transmitting Data to the Paducah Oak Ridge Environmental Information System (OREIS)*	Contractor	N/A	N	N/A
3	CP4-ES-2100, *Groundwater Level Measurement*	Contractor	Sampling	N	N/A
4	CP4-ES-2101, *Groundwater Sampling*	Contractor	Sampling	N	N/A
5	CP4-ES-2203, *Surface Water Sampling*	Contractor	Sampling	N	N/A
6	CP4-ES-0074, *Monitoring Well Inspection and Maintenance*	Contractor	Sampling	N	N/A
7	CP4-ES-2700, *Logbooks and Data Forms*	Contractor	N/A	N	N/A
8	CP4-ES-2702, *Decontamination of Sampling Equipment and Devices*	Contractor	Sampling	N	N/A
9	CP4-ES-2704, *Trip, Equipment, and Field Blank Preparation*	Contractor	N/A	N	N/A
10	CP4-ES-2708, *Chain-of-Custody Forms, Field Sample Logs, Sample Labels, and Custody Seals*	Contractor	N/A	N	N/A

QAPP Worksheet #21. (Continued)
Project Sampling SOP References Table

Reference Number	Title and Number[a]	Originating Organization[b]	Equipment Type	Modified for Project Work? (Y/N)	Comments
11	CP3-ES-5003, *Quality Assured Data*	Contractor	N/A	N	N/A
12	CP3-ES-5004, *Sample Tracking, Lab Coordination, and Sample Handling*	Contractor	N/A	N	N/A
13	CP3-ES-5007, *Data Management Coordination*	Contractor	N/A	N	N/A
14	CP2-ES-5102, *Radiochemical Analyses Data Verification and Validation*	Contractor	N/A	N	N/A
15	CP2-ES-5105, *Volatile and Semivolatile Analyses Data Verification and Validation*	Contractor	N/A	N	N/A
16	CP3-ES-1003, *Developing, Implementing, and Maintaining Data Management Implementation Plans*	Contractor	N/A	N	N/A
17	CP4-ES-1002, *Submitting, Reviewing, and Dispositioning Changes to the Environmental Databases OREIS and PEMS*	Contractor	N/A	N	N/A
18	CP3-OP-0009, *Performance Observations*	Contractor	N/A	N	N/A
19	*DOE/LX/07-1280&D2/R2 Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, Section 7, "Waste Management Plan"	Contractor	N/A	N	N/A

[a] SOPs are posted to the FPDP S Drive.
[b] The work will be conducted by FPDP staff or a subcontractor. In either case, SOPs listed will be followed.

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

Field Equipment*	Calibration Activity	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
Water Quality Meter	Calibration check at the beginning of the day	Performed monthly and as needed	Measure solutions with known values (National Institute for Standards and Technology traceable buffers and conductivity calibration solutions)	Upon receipt, successful operation	Daily before each use	Per manufacturer's specifications	Recalibrate or service as necessary	Field Team Leader	Manufacturer's specifications
Colorimeter (for total residual chlorine)	Accuracy check at the beginning of each day's use	As needed	Measure with standard solution	Upon receipt, successful operation	Check daily before each use	Within range of manufacturer's standard	Service by manufacturer or replace	Field Team Leader	Manufacturer's specifications
Titrator (for total residual chlorine)	Accuracy check at the beginning of each day	As needed	Measure with standard solution	Upon receipt, successful operation	Check daily before each use	With range of manufacturer's standard	Service by manufacturer or replace	Field Team Leader	Manufacturer's specifications
Electronic Water Level Meter	Accuracy check annually against a steel tape	Replace as needed	Annual verification	Upon receipt, successful operation	Check daily before each use	Pass/Fail	Service by manufacturer or replace	Field Team Leader	Manufacturer's specifications
Hach flow meter	Calibrate to readings on flume	Quarterly and as needed	Measure against flume	Upon receipt, successful operation	Weekly as needed	Pass/Fail	Service by manufacturer or replace	Field Team Leader	Manufacturer's specifications

QAPP Worksheet #23.
Analytical SOP References Table

Reference Number*	Title, Revision Date, and/or Number	Definitive or Screening Data	Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work? (Y/N)
SW-846-8260/ EPA-624		Definitive	VOA (Unless noted below)	Per SOP	TBD	N
EPA-160.2/ SM 2540 D		Definitive	Miscellaneous (Total Suspended Solids)	Per SOP	TBD	N
EPA-1664 A		Definitive	Miscellaneous (Oil and Grease)	Per SOP	TBD	N
Liquid Scintillation		Definitive	Radionuclides (Technetium-99)	Per SOP	TBD	N

*Information will be based on laboratory used.

QAPP Worksheet #24.
Analytical Instrument Calibration Information

All laboratory equipment and instruments used for quantitative measurements are calibrated in accordance with the laboratory's formal calibration program. Whenever possible, the laboratory uses recognized procedures for calibration such as those published by EPA or American Society for Testing and Materials. If established procedures are not available, the laboratory develops a calibration procedure based on the type of equipment, stability, characteristics of the equipment, required accuracy, and the effect of operation error on the quantities measured. Whenever possible, physical reference standards associated with periodic calibrations, such as weights or certified thermometers with known relationships to nationally recognized standards, are used. Where national reference standards are not available, the basis for the reference standard is documented. Equipment or instruments that fail calibration or become inoperable during use are tagged to indicate they are out of calibration. Such instruments or equipment is repaired and successfully recalibrated prior to reuse. All high resolution mass spectrometer instruments undergo extensive tuning and calibration prior to running each sample set. The calibrations and ongoing instrument performance parameters are recorded and reported as part of the analytical data package.

The laboratory is responsible for maintaining instrument calibration information per their QA Plan, including control charts established for all instrumentation. This information is audited annually by DOECAP. Laboratory(s) contracted will be DOECAP audited.

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

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference*
GC-MS	Replace/clean ion source; clean injector, replace injector liner, replace/clip capillary column, flush/replace tubing on purge and trap; replace trap	QC standards	Ion source, injector liner, column, column flow, purge lines, purge flow, trap	As needed	Must meet initial and/or continuing calibration criteria	Repeat maintenance activity or remove from service	Laboratory Section Manager	See Worksheet #23
GC	ECD maintenance; replace/clip capillary column	QC standards	ECD, FID, injector, injector liner, column, column flow	As needed	Must meet initial and/or continuing calibration criteria	Repeat maintenance activity or remove from service	Laboratory Section Manager	See Worksheet #23
pH meter	Clean probe	QC standards	Probe	As needed	The value for each of the certified buffer solutions must be within ± 0.05 pH units of the expected value	Repeat maintenance activity or remove from service	Laboratory Manager	See Worksheet #22
Spectrophotometer	Flush/replace tubing	QC standards	Tubing	As needed	Must meet initial and/or continuing calibration criteria	Repeat maintenance activity of remove from service	Laboratory Manager	See Worksheet #23

*The laboratory is responsible for maintaining instrument and equipment maintenance, testing, and inspection information per their QA Plan. This information is audited annually by DOECAP. Laboratory(s) contracted will be DOECAP audited. Field survey/sampling instrumentation will be maintained, tested, and inspected according to manufacturer's instructions.

ECD = electron capture detector; FID = flame ionization detector; GC = gas chromatography; GC-MS = gas chromatography mass spectrometer

QAPP Worksheet #26.
Sample Handling System

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT	
Sample Collection (Personnel/Organization):	Sampling Teams/DOE Prime Contractor and Subcontractors
Sample Packaging (Personnel/Organization):	Sampling Teams/DOE Prime Contractor and Subcontractors
Coordination of Shipment (Personnel/Organization):	Lab Coordinator/DOE Prime Contractor
Type of Shipment/Carrier:	Direct Delivery or Overnight/Federal Express or United Parcel Service
SAMPLE RECEIPT AND ANALYSIS	
Sample Receipt (Personnel/Organization):	Sample Management/Contracted Laboratory
Sample Custody and Storage (Personnel/Organization):	Sample Management/Contracted Laboratory
Sample Preparation (Personnel/Organization):	Analysts/Contracted Laboratory
Sample Determinative Analysis (Personnel/Organization):	Analysts/Contracted Laboratory
SAMPLE ARCHIVING	
Field Sample Storage (No. of days from sample collection):	The fixed-base laboratory will archive samples for 4 months or less
Sample Extract/Digestate Storage (No. of days from extraction/digestion):	120 Days
Biological Sample Storage (No. of days from sample collection):	Not applicable.
SAMPLE DISPOSAL	
Personnel/Organization:	Waste Disposition/Sample Management Office/DOE Prime Contractor and Subcontractors
Number of Days from Analysis:	6 months

QAPP Worksheet #27.
Sample Custody Requirements*

Chain-of-custody procedures are comprised of maintaining sample custody and documentation of samples for evidence. To document chain-of-custody, an accurate record of samples must be maintained in order to trace the possession of each sample from the time of collection to its introduction to the laboratory.

Field Sample Custody Procedures (sample collection, packaging, shipment, and delivery to laboratory):

Field sample custody requirements will be per DOE Prime Contractor procedures CP4-ES-2708, *Chain-of-Custody Forms, Field Sample Logs, Sample Labels, and Custody Seals*; and CP3-ES-5004, *Sample Tracking, Lab Coordination, and Sample Handling*.

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

These follow the DOECAP-audited laboratory's standard procedures. When the samples are delivered to the laboratory, signatures of the laboratory personnel receiving them and the courier personnel relinquishing them will be completed in the appropriate spaces on the chain-of-custody record, unless the courier is a commercial carrier. This will complete the sample transfer. It will be every laboratory's responsibility to maintain internal logbooks and records that provide custody throughout sample preparation and analysis process.

Sample Identification Procedures:

Sample identification requirements are specified in the Northeast Plume Optimization RAWP Section 9, "Data Management Implementation Plan."

Chain-of-custody Procedures:

Chain-of-custody requirements will be per DOE Prime Contractor procedures CP4-ES-2708, *Chain-of-Custody Forms, Field Sample Logs, Sample Labels, and Custody Seals*; and CP3-ES-5004, *Sample Tracking, Lab Coordination, and Sample Handling*.

*It is understood that SOPs are contractor specific.

QAPP Worksheet #28.
QC Samples Table

Matrix: Water (Groundwater and Surface Water)
Analytical Group/Concentration Level: VOC, Rad
Sampling SOP: See Worksheets #12-K and #12-Q
Analytical Method/SOP Reference: See Worksheet #23
Sampler's Name/Field Sampling Organization: GEO Consultants
Analytical Organization: Environmental Monitoring
No. of Sample Locations: See Operations and Maintenance Plan

QC Sample	Frequency/Number*	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
Field blank	Minimum 5%	≤ CRQL*	Verify results; reanalyze	Laboratory should alert project	Contamination—Accuracy/bias	See procedure CP3-ES-5003, *Quality Assured Data*
Trip blank	1 per cooler containing VOC samples	≤ CRQL*	Verify results; reanalyze		Contamination—Accuracy/bias	See procedure CP3-ES-5003, *Quality Assured Data*
Equipment blank	Minimum 5%	≤ CRQL*	Verify results; reanalyze		Contamination—Accuracy/bias	See procedure CP3-ES-5003,*Quality Assured Data*
Spiked field samples (MS and/or MSD)	1 per analytical batch	See data validation procedures CP2-ES-5102 and CP2-ES-5105	Check calculations and instrument; reanalyze affected samples	Laboratory should alert project	Accuracy/Precision	See procedure CP3-ES-5003, *Quality Assured Data*
Laboratory spiked blanks (LCS)	1 per analytical batch	See data validation procedures CP2-ES-5102 and CP2-ES-5105	Check calculations and instrument; reanalyze affected samples	Laboratory should alert project	Accuracy	See procedure CP3-ES-5003, *Quality Assured Data*

*CRQL = contract-required quantitation limit

QAPP Worksheet #28. (Continued)
QC Samples Table

Matrix: Water (Groundwater and Surface Water)
Analytical Group/Concentration Level: VOC, Rad
Sampling SOP: See Worksheets #12-K and #12-Q
Analytical Method/SOP Reference: See Worksheet #23
Sampler's Name/Field Sampling Organization: GEO Consultants
Analytical Organization: Environmental Monitoring
No. of Sample Locations: See Operations and Maintenance Plan

QC Sample	Frequency/Number*	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
Method blank	1 per analytical batch	See data validation procedures CP2-ES-5102 and CP2-ES-5105	Check calculations and instrument; reanalyze affected samples	Laboratory should alert project	Accuracy	See procedure CP3-ES-5003, *Quality Assured Data*
Surrogate standards	All samples, blanks, and QC samples	See data validation procedures CP2-ES-5102 and CP2-ES-5105	Check calculations and instrument; reanalyze affected samples	Laboratory should alert project	Accuracy	See procedure CP3-ES-5003, *Quality Assured Data*
Internal standards	All samples and standards	See data validation procedures CP2-ES-5102 and CP2-ES-5105	Check calculations and instrument; reanalyze affected samples	Laboratory should alert project	Accuracy	See procedure CP3-ES-5003, *Quality Assured Data*

QAPP Worksheet #28. (Continued)
QC Samples Table

Matrix: Water (Groundwater and Surface Water)
Analytical Group/Concentration Level: VOC, Rad
Sampling SOP: See Worksheets #12-K and #12-Q
Analytical Method/SOP Reference: See Worksheet #23
Sampler's Name/Field Sampling Organization: GEO Consultants
Analytical Organization: Environmental Monitoring
No. of Sample Locations: See Operations and Maintenance Plan

QC Sample	Frequency/Number*	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
Field duplicate	Minimum 5%	None	Data reviewer will place qualifiers on samples affected	Project	Homogeneity/ Precision	RPD ≤ 50% sediment, RPD < 25% aqueous
Laboratory duplicate	Per laboratory procedure	See data validation procedures CP2-ES-5102 and CP2-ES-5105	Verify results re-prepare and reanalyze	Laboratory analyst	Precision	See procedure CP3-ES-5003, *Quality Assured Data*
Tracers/Carriers	Each sample tested by a radiochemical separation method	See data validation procedure CP2-ES-5102	Check calculations and instrument; reanalyze affected samples	Laboratory analyst	Accuracy	See procedure CP3-ES-5003, *Quality Assured Data*

*The number of QC samples is listed on Worksheet #20.
**Unless dictated by project-specific parameters, ≤ CRQL.

QAPP Worksheet #29.
Project Documents and Records Table

All project data and information must be documented in a format that is usable by project personnel. The QAPP describes how project data and information shall be documented, tracked, and managed from generation in the field to final use and storage in a manner that ensures data integrity, defensibility, and retrieval.

Sample Collection Documents and Records	On-site Analysis Documents and Records	Off-site Analysis Documents and Records	Data Assessment Documents and Records*	Other
Data logbooks (electronic or paper) and associated completed sampling forms; sample chains-of-custody	Laboratory data packages, OREIS database, and associated data packages	OREIS database and associated data packages	CP3-ES-5003, Att. G, Data Assessment Review Checklist and Comment Form	CP3-OP-0009-F01, Observation Checklist Form

*It is understood that SOPs are contractor specific.

QAPP Worksheet #31.
Planned Project Assessments Table

FPDP will ensure that protocol outlined in the QAPP is implemented adequately. Assessment activities help to ensure that the resultant data quality is adequate for its intended use and that appropriate responses are in place to address nonconformances and deviations from the QAPP. Below is a list of assessments project teams may use.

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment (Title and Organizational Affiliation)	Person(s) Responsible for Responding to Assessment Findings (Title and Organizational Affiliation)	Person(s) Responsible for Identifying and Implementing Corrective Actions (CA) (Title and Organizational Affiliation)	Person(s) Responsible for Monitoring Effectiveness of CA (Title and Organizational Affiliation)
Independent Assessment/ Surveillance	A	Internal	QA Manager or designee	QA Specialists	Project Manager	Project Manager	QA Manager
Laboratory Audit	Annual	External	DOECAP	Laboratory Assessor	Laboratory	Laboratory	DOECAP
Management Assessments	Annual	Internal	Project Manager or designee	Project Manager	Project Manager	Project Manager	QA Manager
Performance Observations	B	Internal	Project Manager or designee	Project Manager	Project Manager	Project Manager	Project Manager
Performance Observation Follow-up surveillances	Quarterly	Internal	Project Manager or designee	Project Manager or designee	Project Manager	Project Manager	Project Manager

A = assessment frequency determined by QA Manager and conducted per CP3-QA-1003, *Management and Self Assessments*.
B = assessment frequency determined by Project Manager.
*Reference: CP3-OP-0009, *Performance Observations Desk Instructions*.

QAPP Worksheet #32.
Assessment Findings and Corrective Action Responses*

All provisions shall be taken in the field and laboratory to ensure that any problems that may develop shall be dealt with as quickly as possible to ensure the continuity of the project/sampling events. Field modifications to procedures in the QAPP must be approved before the modifications are implemented and then documented. The process controlling procedure modification is CP3-OP-0002, *Development, Approval, and Change Control for FPDP Performance Documents*. Field modifications are documented through the work control process per CP3-SM-1003. Corrective action in the field may be necessary when the sampling design is changed. For example, a change in the field may include increasing the number or type of samples or analyses, changing sampling locations, and/or modifying sampling protocol. When this occurs, the project team shall identify any suspected technical or QA deficiencies and note them in the field logbook. Worksheet #32 details how project teams will address assessment findings.

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (Name, Title, Organization)	Time frame of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (Name, Title, Org.)	Time Frame for Response
Management, Independent, and Surveillances	Form CP3-QA-1003-F02, Management/Self-Assessment Report, Form CP3-QA-1003-F03, Management/Self-Assessment Checklist, and Form CP3-QA-3001-F02, Issue Identification Form	Project management, issue owner, contractor	Upon issuance of Forms CP3-QA-1003-F02, Management/Self-Assessment Report and CP3-QA-1003-F03, Management/Self-Assessment Checklist, form CP3-QA-3001-F02, Issue Identification Form, will be completed and attached to the assessment report	CP3-QA-3001, Issue Identification Form, documents the issue response and/or corrective actions	Action owner as designated by issue owner, contractor	Fifteen days for initial issue response, corrective action schedule determined by issue owner, per CP3-QA-3001

*It is understood that SOPs are contractor specific.

QAPP Worksheet #33.
QA Management Reports Table

Reports to management include project status reports, field and/or laboratory audits, and data quality assessments. These reports will be directed to the QA Manager and Project Manager, who have ultimate responsibility for assuring that any corrective action response is completed, verified, and documented.

Type of Report	Frequency (daily, weekly monthly, quarterly, annually, etc.)	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation (Title and Organizational Affiliation)	Report Recipient(s) (Title and Organizational Affiliation)
Field Change Requests	As needed	Ongoing	Field staff	QAPP recipients
QAPP Addenda	As needed	Not Applicable	Project Manager	QAPP recipients
Field Audit Report	TBD by QA Manager	30 days after completion of audit	QA Manager	FPDP Project Manager QA Manager
Corrective Action Plan	As needed	Within 3 weeks of request	Project Manager	QA Manager

TBD = to be determined

QAPP Worksheet #34.
Verification (Step I) Process Table

This section of the QAPP provides a description of the QA activities that will occur after the data collection phase of the project is completed. Implementation of this section will determine whether the data conforms to the specified criteria satisfying the project objectives.

Verification Input	Description[a]	Internal/ External	Responsible for Verification (Name, Organization)
Field Logbooks/Data Forms	Field logbooks are verified per DOE Prime Contractor procedure, CP4-ES-2700, *Logbooks and Data Forms*, and CP3-ES-5003, *Quality Assured Data*.	Internal	Project Management or designee, Contractor
Chains-of-Custody	Chains-of-custody are controlled by DOE Prime Contractor procedure, CP3-ES-5004, *Sample Tracking, Lab Coordination and Sample Handling*. Chains-of-custody will be included in data assessment packages for review as part of data verification and data assessment.	Internal	Sample Management Office Personnel, and Project Management, Contractor
Field and Laboratory Data	Field and analytical data are verified and assessed per DOE Prime Contractor procedure, CP3-ES-5003, *Quality Assured Data*. Data assessment packages will be created per this procedure. The data assessment packages will include field and analytical data, chains-of-custody, data verification and assessment queries, and other project-specific information needed for personnel to review the package adequately. Data assessment packages will be reviewed to document any issues pertaining to the data and to indicate if data met the data quality objectives of the project.	Internal	Sample Management Office Personnel, and Project Management, Contractor
Sampling Procedures	Evaluate whether sampling procedures were followed with respect to equipment and proper sampling support using audit and sampling reports, field change requests and field logbooks.	Internal	Sample Management Office Personnel, Project Management, and QA Personnel,[b] Contractor
Laboratory Data	All laboratory data will be verified by the laboratory performing the analysis for completeness and technical accuracy prior to submittal to FPDP. Subsequently, FPDP will evaluate the data packages for completeness and compliance.	External/ Internal	Laboratory Manager, FPDP Sample Management Office Personnel
Electronic Data Deliverables (EDDs)	Determine whether required fields and format were provided.	Internal	Sample Management Office Personnel
QAPP	All planning documents will be available to reviewers to allow reconciliation with planned activities and objectives.	Internal	All data users

[a] It is understood that SOPs are contractor specific.
[b] QA specialist performs general QA review.

QAPP Worksheet #35.
Assessment, Verification, and Validation (Steps IIa and IIb) Process Table

Step IIa/IIb	Validation Input	Description[a]	Responsible for Validation (Name, Organization)
IIa	Data Deliverables, Analytes, and Holding Times	The documentation from the contractual screening will be included in the data assessment packages, per DOE Prime Contractor procedure CP3-ES-5003, *Quality Assured Data*.	Sample Management Office Personnel, Contractor
IIa	Chain-of-Custody, Sample Handling, Sampling Methods and Procedures, and Field Transcription	These items will be validated during the data assessment process as required by DOE Prime Contractor procedure, CP3-ES-5003, *Quality Assured Data*, and CP3-ES-1003, *Developing, Implementing, and Maintaining Data Management Implementation Plans*. The documentation of this validation will be included in the data assessment packages.	Sample Management Office Personnel, Contractor
IIa	Analytical Methods and Procedures, Laboratory Data Qualifiers, and Standards	These items will be reviewed during the data validation process as required by DOE Prime Contractor data validation procedures. Data validation will be performed in parallel with data assessment. The data validation report and data validation qualifiers will be considered when the data assessment process is being finalized.	Data Validation Subcontractor, and Sample Management Office Personnel, Project, Contractor
IIa	Audits	The audit reports and accreditation and certification records for the laboratory supporting the projects will be considered in the bidding process.	QA Personnel
IIb	Deviations and qualifiers from Step IIa	Any deviations and qualifiers resulting from Step IIa process will be documented in the data assessment packages.	Sample Management Office Personnel, Project, and QA Personnel, Contractor
IIb	Sampling Plan, Sampling Procedures, Collocated Field Duplicates, Project Quantitation Limits, Confirmatory Analyses, Performance Criteria	These items will be evaluated as part of the data verification and data assessment process per DOE Prime Contractor procedure, CP3-ES-5003, *Quality Assured Data*. These items will be considered when evaluating whether the project met their Data Quality Objectives.	Sample Management Office Personnel, Project, and QA Personnel, Contractor

[a] It is understood that SOPs are contractor specific.

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

Step IIa/IIb	Matrix	Analytical Group	Concentration Level	Validation Criteria	Data Validator (title and organizational affiliation)
Step IIa/IIb	Water	All	All	National Functional Guidelines; Worksheets #12-K and #12-Q, #15-A, D, and K, and #28; and CP2-ES-5102 and CP2-ES-5105	Data Validator[a]

[a] Validation is to be conducted by a qualified individual, independent from sampling, laboratory, project management, or other decision making personnel for the task. This could be an outside party or someone within FPDP who is not involved in the project.

QAPP Worksheet #37.
Usability Assessment*

FPDP shall determine the adequacy of data based on the results of validation and verification. The usability step involves assessing whether the process execution and resulting data meet project quality objectives documented in the QAPP.

Summarize the usability assessment process and all procedures, including interim steps and any statistics, equations, and computer algorithms that will be used: Field and analytical data are verified and assessed per procedure CP3-ES-5003, *Quality Assured Data*. Data assessment packages will be created per this procedure. Data assessment packages will include field and analytical data, chains-of-custody, data verification and assessment queries, and other project-specific information needed for personnel to review the package adequately. Data assessment packages will be reviewed to document any issues pertaining to the data and to indicate if DQOs of the project were met. For data selected for validation, the following procedures are used: CP2-ES-5102 and CP2-ES-5105.

Describe the evaluative procedures used to assess overall measurement error associated with the project: PARCCS parameters (precision, accuracy, representativeness, comparability, completeness, and sensitivity) will be evaluated per procedure CP3-ES-5003, *Quality Assured Data*. This information will be included in the data assessment packages for review by project personnel. Data assessment also will include documentation of QC exceedances, trends, and/or bias in the data set. Data assessment will document any statistics used.

Identify the personnel responsible for performing the usability assessment: Project personnel, as verified by QA personnel.

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

*It is understood that SOPs are contractor specific.

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Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

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Primary Document

Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

Date Issued—February 2016

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U.S. DEPARTMENT OF ENERGY
Office of Environmental Management

Prepared by
FLUOR FEDERAL SERVICES, INC.,
Paducah Deactivation Project
managing the
Deactivation Project at the
Paducah Gaseous Diffusion Plant
under Task Order DE-DT0007774

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APPENDIX D

NORTHEAST PLUME OPTIMIZATION QUALITY ASSURANCE PROJECT PLAN

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ACRONYMS

CA	corrective action
CAS	Chemical Abstracts Service
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPC	chemical of potential concern
CRQL	contract-required quantitation limit
DOE	U.S. Department of Energy
DOECAP	DOE Consolidated Audit Program
DQI	data quality indicator
DQO	data quality objective
ECD	electron capture detector
EDD	Electronic Data Deliverable
EPA	U.S. Environmental Protection Agency
EW	extraction well
FFA	Federal Facility Agreement
FID	flame ionization detector
FPDP	Fluor Federal Services, Inc., Paducah Deactivation Project
GC	gas chromatography
GC-MS	gas chromatography mass spectrometer
KDEP	Kentucky Department for Environmental Protection
MCL	maximum contaminant level
MDA	minimum detectable activity
MDL	method detection limit
MS	matrix spike
MW	monitoring well
N/A	not applicable
NAL	no action level
NEPCS	Northeast Plume Containment System
OREIS	Paducah Oak Ridge Environmental Information System
PEGASIS	Portsmouth/Paducah Project Office Environmental Geographic Analytical Spatial Information System
PGDP	Paducah Gaseous Diffusion Plant
PQL	practical quantitation limit
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RAWP	Remedial Action Work Plan
RPD	relative percent difference
SOP	standard operating procedure
TBD	to be determined
UFP	Uniform Federal Policy
VOC	volatile organic compound

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INTRODUCTION

The Northeast Plume Optimization Quality Assurance Project Plan (QAPP) has been prepared by Fluor Federal Services, Inc., Paducah Deactivation Project (FPDP) based on the approved programmatic QAPP, DOE/LX/07/1269&D2/R2, *Programmatic Quality Assurance Project Plan*, which was based on the *Uniform Federal Policy for Quality Assurance Project Plans* (UFP-QAPP Manual) guidelines for QAPPs (IDQTF 2005), as updated by the *Optimized UFP-QAPP Worksheets* guidance (IDQTF 2012).

This QAPP will be included as Appendix D to the *Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-1280&D2/R2/A1. It describes the project-specific quality assurance activities that will be conducted to support monitoring and operation of the Northeast Plume Optimization Project.

This Northeast Plume Optimization QAPP does the following:

- Refers to the standard operating procedures (SOPs) already developed for the site and in place;
- Identifies analytical limits, units of reporting, and required methods (e.g., permits, maximum contaminant level (MCL), etc.); these values will be used to procure laboratory services. If the laboratory cannot meet the limits, units, or methods specified in the QAPP, the project manager and/or compliance organization will be contacted so a determination can be made if the proposed conditions are acceptable to meet current project objectives. If the conditions are found to be acceptable, the Sample Management Office will document the acceptance with rationale;
- Incorporates the *Data and Documents Management and Quality Assurance Plan for Paducah Environmental Management and Enrichment Facilities*, DOE/OR/07-1595&D2 (DOE 1998); and
- Standardizes data validation processes by linking the process to SOPs (see Worksheet #21).

This document supports *Explanation of Significant Differences to the Record of Decision for the Interim Remedial Action of the Northeast Plume at the Paducah Gaseous Diffusion Plant Paducah, Kentucky*, DOE/LX/07-1291&D2/R2, (DOE 2015) and *Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-1280&D2/R2 (DOE 2016) (RAWP).

QAPP Worksheets #1 and #2. Title and Approval Page

Site Name/Project Name: Paducah Gaseous Diffusion Plant (PGDP)
Site Location: Paducah, Kentucky
Site Number/Code: KY8890008982
Contractor Name: FPDP
Contractor Number: Task Order DE-DT0007774
Contract Title: Paducah Gaseous Diffusion Plant Paducah Deactivation Project
Work Assignment Number: N/A

Document Title: *Northeast Plume Optimization Quality Assurance Project Plan*

Lead Organization: U.S. Department of Energy (DOE)

Preparer's Name and Organizational Affiliation: Todd Powers, Fluor Federal Services, Inc., Paducah Deactivation Project (FPDP)

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Preparation Date (Month/Year): 1/2016

Document Control Number: DOE/LX/07-1280&D2/R2/A1, Appendix D

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Mark J. Duff
Environmental Management, Director

FPDP Signature: _____ Date: _____
Myrna Espinosa Redfield
Regulatory Affairs Manager

FPDP Signature: _____ Date: _____
Lisa Crabtree
Environmental Monitoring Project Manager

QAPP Worksheets #1 and #2. Title and Approval Page (Continued)

1. Identify guidance used to prepare QAPP:

   Intergovernmental Data Quality Task Force, March 2005. *The Uniform Federal Policy for Implementing Environmental Quality Systems*, Version 2.0, 126 pages.

   Intergovernmental Data Quality Task Force, March 2005. *The Uniform Federal Policy for Quality Assurance Project Plans*: *Part 1 UFP QAPP Manual*, Version 1.0, 177 pages (DTIC ADA 427785 or EPA-505-B-04-900A).

   Intergovernmental Data Quality Task Force, March 2005. *The Uniform Federal Policy for Quality Assurance Project Plans*: *Part 2A UFP QAPP Worksheets*, Version 1.0, 44 pages.

   Intergovernmental Data Quality Task Force, March 2005. *The Uniform Federal Policy for Quality Assurance Project Plans: Part 2B Quality Assurance/Quality Control Compendium: Minimum QA/QC Activities*, Version 1.0, 76 pages.

   Intergovernmental Data Quality Task Force, March 2012. *Uniform Federal Policy for Quality Assurance Project Plans*, *Optimized UFP QAPP Worksheets*, 42 pages.

   Paducah Gaseous Diffusion Plant Programmatic Quality Assurance Project Plan, DOE/LX/07-1269&D2/R2

2. Identify regulatory program: Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); *Federal Facility Agreement for the Paducah Gaseous Diffusion Plant*, DOE/OR/07-1707 (FFA); Kentucky Department for Environmental Protection (KDEP) (Kentucky Division of Waste Management, Kentucky Division of Water); and DOE Orders.

3. Identify approval entity: DOE

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

5. List dates of scoping sessions that were held: Data Quality Objectives (DQO) as documented in *Operation and Maintenance Plan for the Northeast Plume Containment System Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-1535&D3/R4, August 2013

QAPP Worksheets #1 and #2. Title and Approved Page (Continued)

6. List dates and titles of QAPP documents written for previous site work, if applicable:

Title:	**Approval Date:**
Data and Documents Management and Quality Assurance Plan for Paducah Environmental Management and Enrichment Facilities, DOE/OR/07-1595&D2 (DOE 1998)	10/5/1998
Paducah Gaseous Diffusion Plant Programmatic Quality Assurance Project Plan, Paducah, Kentucky, DOE/LX/07-1269&D2/R2	4/8/2015
Environmental Monitoring Plan Fiscal Year 2015 Paducah Gaseous Diffusion Plant, Paducah, Kentucky, PAD-ENM-0055/R4	2/12/15

7. List organizational partners (stakeholders) and connection with lead organization:
U.S Environmental Protection Agency (EPA) Region 4 (FFA member), KDEP (Regulates hazardous and solid waste landfills, effluent discharge permits, FFA member), DOE (Lead Organization), FPDP (DOE Prime Contractor)

8. List data users: DOE, FPDP, EPA Region 4, Commonwealth of Kentucky

9. This QAPP includes 28 worksheets that are required based on UFP-QAPP guidance.

Table 1. Crosswalk: UFP-QAPP Workbook to 2106-G-05-QAPP

Optimized UFP-QAPP Worksheets		CIO 2106-G-05 QAPP Guidance Section	
1 & 2	Title and Approval Page	2.2.1	Title, Version, and Approval/Sign-Off
3 & 5	Project Organization and QAPP Distribution	2.2.3	Distribution List
		2.2.4	Project Organization and Schedule
4, 7, & 8	Personnel Qualifications and Sign-off Sheet	2.2.1	Title, Version, and Approval/Sign-Off
		2.2.7	Special Training Requirements and Certification
6	Communication Pathways	2.2.4	Project Organization and Schedule
9	Project Planning Session Summary	2.2.5	Project Background, Overview, and Intended Use of Data
10	Conceptual Site Model	2.2.5	Project Background, Overview, and Intended Use of Data
11	Project/Data Quality Objectives	2.2.6	Data/Project Quality Objectives and Measurement Performance Criteria
12	Measurement Performance Criteria	2.2.6	Data/Project Quality Objectives and Measurement Performance Criteria
13	Secondary Data Uses and Limitations	Chapter 3	QAPP ELEMENTS FOR EVALUATING EXISTING DATA
14 & 16	Project Tasks and Schedule	2.2.4	Project Organization and Schedule
15	Project Action Limits and Laboratory-Specific Detection/Quantitation Limits	2.2.6	Data/Project Quality Objectives and Measurement Performance Criteria
17	Sampling Design and Rationale	2.3.1	Sample Collection Procedure, Experimental Design, and Sampling Tasks
18	Sampling Locations and Methods	2.3.1	Sample Collection Procedure, Experimental Design, and Sampling Tasks
		2.3.2	Sampling Procedures and Requirements
19 & 30	Sample Containers, Preservation, and Hold Times	2.3.2	Sampling Procedures and Requirements
20	Field QC	2.3.5	Quality Control Requirements
21	Field SOPs	2.3.2	Sampling Procedures and Requirements
22	Field Equipment Calibration, Maintenance, Testing, and Inspection	2.3.6	Instrument/Equipment Testing, Calibration and Maintenance Requirements, Supplies and Consumables
23	Analytical SOPs	2.3.4	Analytical Methods Requirements and Task Description
24	Analytical Instrument Calibration	2.3.6	Instrument/Equipment Testing, Calibration and Maintenance Require
25	Analytical Instrument and Equipment Maintenance, Testing, and Inspection	2.3.6	Instrument/Equipment Testing, Calibration and Maintenance Requirements, Supplies and Consumables
26 & 27	Sample Handling, Custody, and Disposal	2.3.3	Sample Handling, Custody Procedures, and Documentation
28	Analytical Quality Control and Corrective Action	2.3.5	Quality Control Requirements
29	Project Documents and Records	2.2.8	Documentation and Records Requirements
31, 32, & 33	Assessments and Corrective Action	2.4	Assessments and Data Review
		2.5.5	Reports to Management
34	Data Verification and Validation Inputs	2.5.1	Data Verification and Validation Targets and Methods
35	Data Verification Procedures	2.5.1	Data Verification and Validation Targets and Methods
36	Data Validation Procedures	2.5.1	Data Verification and Validation Targets and Methods
37	Data Usability Assessment	2.5.2	Quantitative and Qualitative Evaluations of Usability
		2.5.3	Potential Limitations on Data Interpretation
		2.5.4	Reconciliation with Project Requirements

QAPP Worksheets #3 and #5.
Project Organization and QAPP Distribution

Distribution is based on the position title. A change in the individual within an organization will not trigger a resubmittal of the QAPP. DOE may choose to update the sheet and submit changes to the document holders. These managers will be responsible for distribution of this QAPP, to their staff.

Controlled copies of the QAPP will be distributed according to the distribution list below. This list will be updated, as needed, and kept by the FPDP Records Management Department. Each person receiving a controlled copy also will receive any updates/revisions. If uncontrolled copies are distributed, it will be the responsibility of the person distributing the uncontrolled copy to provide updates/revisions.

Position Title	Organization	QAPP Recipients	Current Telephone Number	Current E-mail Address	Document Control Number
Paducah Site Lead	DOE	Jennifer Woodard	(270) 441-6820	jennifer.woodard@lex.doe.gov	1
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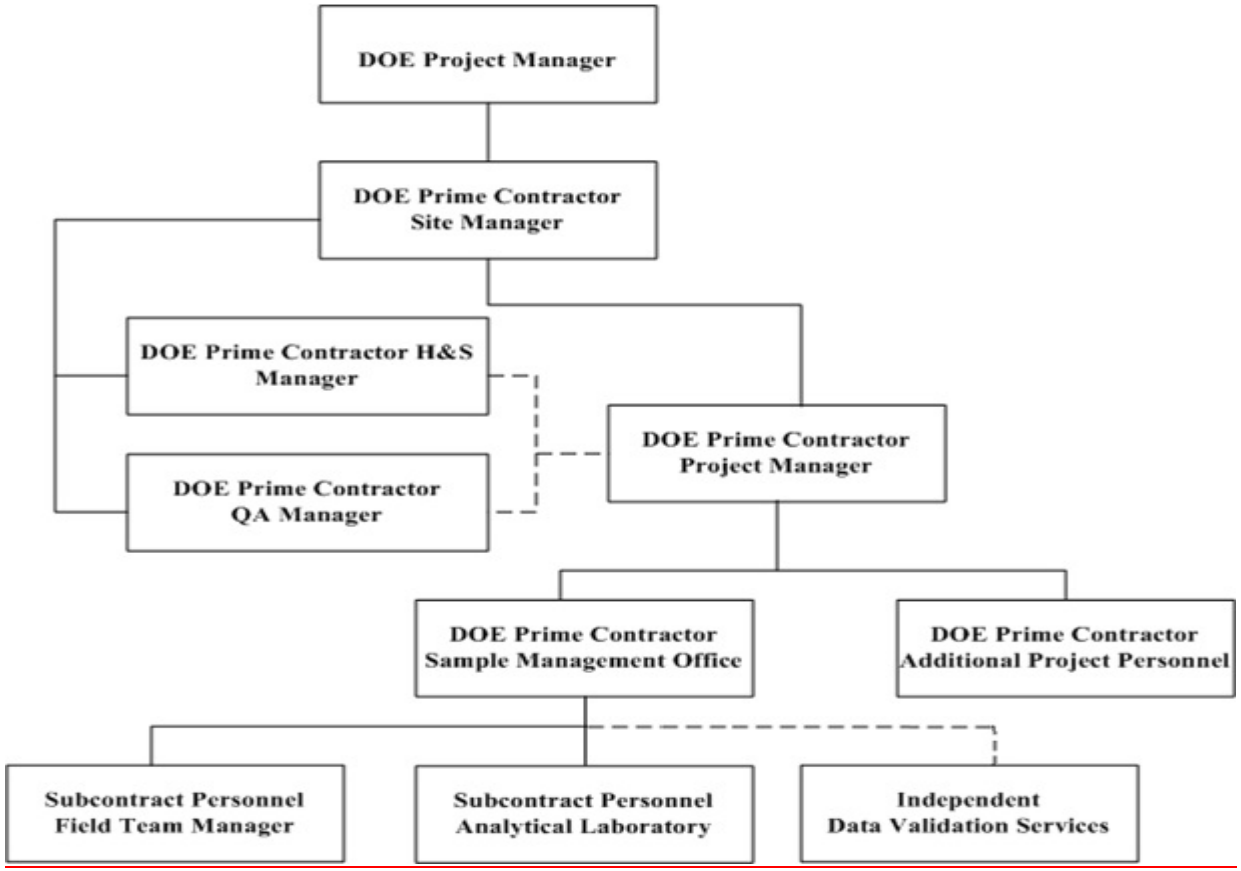
FFA Manager	DOE	Tracey Duncan	(270) 441-6862	tracey.duncan@lex.doe.gov	3
Director of Environmental Management	FPDP	Mark Duff	(270) 441-6127	mark.duff@ffspaducah.com	4
Regulatory Affairs Manager	FPDP	Myrna Redfield	(270) 441-5113	myrna.redfield@ffspaducah.com	5
LATA-Sharp Remediation Services, LLC, Project Manager	FPDP	Craig Jones	(270) 441-5114	craig.jones@ffspaducah.com	6
Environmental Radiation Protection and Risk Assessment Manager	FPDP	LeAnne Garner	(270) 441-5436	leanne.garner@ffspaducah.com	7
FFA Manager	FPDP	Jana White	(270) 441-5185	jana.white@ffspaducah.com	8
Quality Manager	FPDP	Jim Quinnette	(270) 441-5656	jim.quinnette@ffspaducah.com	9
Northeast Plume Optimization Project Manager	FPDP	Todd Powers	(270) 441-5791	todd.powers@ffspaducah.com	10
Environmental Monitoring Project Manager	FPDP	Lisa Crabtree	(270) 441-5135	lisa.crabtree@ffspaducah.com	11
Health and Safety Manager	FPDP	Steve Wentzel	(270) 441-6239	steve.wentzel@ffspaducah.com	12
Regulatory Compliance Manager	FPDP	Michael Gerle	(270) 441-6680	michael.gerle@ffspaducah.com	13
Senior Remedial Project Manager and FFA Manager	U.S. EPA, Region 4, Federal Facilities Branch	Julie Corkran	(404) 562-8547	corkran.julie@epa.gov	14
Division of Waste Management, Hazardous Waste Branch, PGDP Section Supervisor and FFA Manager	KDEP	Brian Begley	(502) 564-6716, ext 4641	brian.begley@ky.gov	15

QAPP Worksheet #5-A.
Project Level Organizational Chart



QAPP Worksheet #4.
Project Personnel Sign-Off Sheet: Sample Collection, Data Analysis, Data Validation

Personnel actively engaged in sample collection, data analysis, and data validation for the projects are required to read applicable sections of this QAPP and sign a Personnel Sign-off Sheet. The master list of signatures will be kept by the Northeast Plume Optimization Project Manager (or designee) and will be made available upon request.

Project Position Title	Organization	Specialized Training/Certification, if any	Signature	Date
Sample Team Leads	GEO Consultants	Per TPD		
Sample Management Office Manager	FPDP	Per TPD		
Independent Third-Party Data Validator	Los Alamos Technical Associates, Ohio	Bachelor degree plus relevant experience		
Environmental Radiation Protection and Risk Assessment Manager	FPDP	Per TPD		

N/A = not applicable
TPD = Training Position Description

QAPP Worksheet #7.
Personnel Responsibility and Qualifications Table

ORGANIZATION: FPDP

Name	Position Title Responsible	Organization Affiliation	Responsibilities	Education and Experience Qualifications[1]
Craig Jones	Project Manager	FPDP	Overall project responsibility	> 4 years relevant work experience
Myrna Redfield	Regulatory Affairs Manager	FPDP	Project environmental compliance responsibility	Bachelor degree plus > 4 years work experience
Jana White	FFA Manager	FPDP	Project compliance with the FFA	> 4 years work relevant experience
Todd Powers	Northeast Plume Optimization Project Manager	FPDP	Northeast Plume Optimization Project responsibility	> 4 years relevant work experience
Lisa Crabtree	Environmental Monitoring Project Manager	FPDP	Support project on sampling, data management, and reporting activities	> 4 years relevant work experience
Darren Tinsley	Health and Safety Representative	FPDP	Project safety and health responsibility	Bachelor degree plus > 1 year relevant experience
Mike Zeiss	Waste Coordinator	FPDP	Overall project waste management responsibility	> 4 years relevant experience
James Moore	Data Validator	Independent third party contractor	Performing data validation according to specified procedures	Bachelor degree plus relevant experience
TBD	Analytical Laboratory Project Manager	TBD	Sample analysis and data reporting	Bachelor degree plus relevant experience

TBD = to be determined

[1] Candidates who do not have a certificate or required degree but demonstrate additional "equivalent relevant work experience" can be considered when evaluating qualifications. This assessment will be conducted by the PM as he/she assembles the appropriate team for the project.

QAPP Worksheet #8.
Special Personnel Training Requirements Table

Personnel are trained in the safe and appropriate performance of their assigned duties in accordance with requirements of work to be performed. This QAPP has been developed as a generalized quality plan. There are no special training requirements other than what normally is required for work at the PGDP site. QAPP development uses a graded approach.

Project Function	Specialized Training—Title or Description of Course	Training Provider	Training Date	Personnel/Groups Receiving Training	Personnel Titles/ Organizational Affiliation	Location of Training Records/Certificates*
Project Tasks	There will be no specialized training required for this program other than what normally is required for site work at PGDP. The contractor will evaluate specific tasks and personnel will be assigned training as necessary to perform those tasks. Training may address health and safety aspects of specific tasks as well as contractor-specific, site-specific, and task-specific requirements.	FPDP	Prior to Monitoring	Based upon required duties	FPDP staff, subcontractors	Training files are maintained by the FPDP training organization. A training database is utilized to manage and track training.

*Training records are maintained by the FPDP training department. If training records and/or certificates do not exist or are not available, then this should be noted.

QAPP Worksheet #6.
Communication Pathways

NOTE: Forms of communication can include letter, e-mail, meetings, etc., and will occur throughout the project.

Communication Drivers	Organizational Affiliation	Position Title Responsible	Procedure
FFA, DOE/OR/07-1707	DOE Paducah Site Lead	Paducah Site Lead	All formal communication among DOE, EPA, and KDEP.
FFA, DOE/OR/07-1707	DOE Paducah	DOE Project Manager	All formal communication between DOE and contractor for Environmental Remediation Projects.
Project requirements	FPDP	Director of Environmental Management	All formal communication among the project, the Site Lead, and the DOE Project Manager.
Project requirements	FPDP	Project Manager	All communication between the project and the FPDP Director of Environmental Management.
Project Quality Assurance (QA) requirements	FPDP	Quality Manager	All project quality-related communication between the QA department and FPDP project personnel.
FFA compliance	FPDP	Regulatory Affairs Manager	All internal communication regarding FFA compliance with the FPDP Project Manager.

QAPP Worksheet #6. (Continued)
Communication Pathways

Communication Drivers	Organizational Affiliation	Position Title Responsible	Organizational Department Manager	Procedure
Project Requirements	FPDP	Northeast Plume Optimization Project Manager	Northeast Plume Optimization Project	All internal communication regarding project sample requirements.
Sampling Requirements	FPDP	Sample Team Leads	Environmental Monitoring	All internal communication regarding field sampling with the FPDP Project Manager.
Analytical Laboratory Interface	FPDP	Scientist	Environmental Monitoring	All communication between FPDP and analytical laboratory.
Waste Management Requirements	FPDP	Waste Coordinator	Waste Management	All internal communication regarding project waste management with FPDP Project Manager.
Environmental Compliance Requirements	FPDP	Regulatory Compliance Manager	Regulatory Affairs Manager	All internal correspondence regarding environmental requirements and compliance with the FPDP Project Manager.
Subcontractor Requirements (if applicable)	FPDP	Subcontract Administrator	Business Manager	All correspondence between the project and subcontractors, if applicable.
Health and Safety Requirements	FPDP	Health and Safety Representative	Health and Safety Manager	All internal communication regarding safety and health requirements with the FPDP Project Manager.

QAPP Worksheet #9.
Project Scoping Session Participant Sheet

Project scoping is the key to the success of any project and is part of the systematic planning process. The scoping that supports this QAPP is documented in Section 4 of *Operation and Maintenance Plan for the Northeast Plume Containment System Interim Remedial Action at the Paducah Gaseous Diffusion Plant*, *Paducah*, *Kentucky*, DOE/OR/07-1535&D3/R4.

QAPP Worksheet #10.
Problem Definition

The problem to be addressed by the project: The following data gaps[1] have been identified:

1. Is the Northeast Plume Containment System retarding the migration of the highest concentration volume of the trichloroethene (TCE) groundwater plume?
2. Is the treatment system (air stripper) effectively stripping TCE from the contaminated groundwater?
3. Is the treatment system affecting environmental performance at the CERCLA Outfall 001?
4. What levels of TCE are being discharged into the atmosphere from the groundwater extraction process?
5. Is the Northeast Plume Containment System meeting the requirements stated in the Facility and Nuclear Safety evaluation?
6. Is the Northeast Plume Containment System running efficiently in terms of operation and maintenance?

The environmental questions being asked: What is the percent mass capture of the optimized extraction well (EW) system?

Is operation of the EW system causing or contributing to undesired migration of technetium-99 (Tc-99) contamination from the source areas(s) (e.g., C-400 Building and Northwest Plume)?

Observations from any site reconnaissance reports: Regular updates of site plume maps summarize the nature and extent of dissolved contamination to be addressed by the Northeast Plume Optimization Project. Site groundwater modeling predicts groundwater flow paths once operation of the optimized EWs begins.

A synopsis of secondary data or information from site reports: The site plume maps identify two centroids of contamination within the Northeast Plume. In the area of the optimized EWs, TCE levels are not expected to exceed 600 µg/L and Tc-99 activity is not expected to exceed 200 pCi/L.

The possible classes of contaminants and the affected matrices: The primary contaminant of concern is TCE. Other potential contaminants include 1,1-dichloroethene (DCE), and Tc-99.

The rationale for inclusion of chemical and nonchemical analyses: Worksheets #11 and #17-B present rationale for inclusion of chemical and nonchemical analyses.

Information concerning various environmental indicators: Groundwater investigations have indicated TCE contamination extends off-site in the Northeast Plume.

[1] Table 3 of *Operation and Maintenance Plan for the Northeast Plume Containment System Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-1535&D3/R4, August 2013.

QAPP Worksheet #10. (Continued)
Problem Definition

Project decision conditions ("If..., then..." statements):

1. If field data[2] collected from the monitoring well (MW) network at the extraction field indicate that the EWs are not effectively retarding the migration of the highest concentration volume of the plume, then operation of the extraction field will be reevaluated and adjustments made as necessary. Otherwise, operation of the extraction field will continue at existing levels.

2. If TCE levels in discharge effluents exceed 75% of the 30 µg/l discharge limit (22.5 µg/L), then operational conditions will be investigated and appropriate adjustments made as necessary. Otherwise, operation of the system will continue as outlined.

3. If any pollutant exceeds the outfall discharge criteria, then the possible contributions to that exceedance by the Northeast Plume Containment System (NEPCS) will be investigated, and operations will be altered or suspended as necessary. Otherwise, operation of the system will continue as outlined.

4. If air emissions of TCE from the NEPCS, as a single source or as a contributor to site emissions, exceed the regulatory guidelines, then the operating status will be reviewed and revised as necessary. Otherwise, operation of the system will continue as outlined.

5. If TCE or Tc-99 levels exceed the levels used in assumptions serving as the basis for safety,[3] environmental, or operating limiting conditions, then system operation will be suspended until the impacts can be evaluated and appropriate operating conditions can be reestablished. Otherwise, operation of the system will continue as outlined.

6. If system components are not operating within the manufacturer's specified performance criteria, then system operation will be evaluated. Otherwise, operation of the NEPCS will continue as outlined.

[2] Monitoring well groundwater sampling will be performed under the Northeast Plume Optimization Project. Frequencies and analytes are as follows:
- Every sampling event—depth to water, dissolved oxygen, pH, specific conductance, temperature, redox, and turbidity.
- Quarterly parameters—TCE; 1,1-DCE; Tc-99; and gross alpha and beta.

[3] The current safety basis for the Northeast Plume Containment System is contained in the sitewide industrial preliminary hazard screening, PHS-PH-INDSTRL-0067/R2, February 2014. This document assumes the maximum concentration for TCE (at the system inlet) is 3,600 µg/L, and the maximum activity for Tc-99 is the MCL for Tc-99 (900 pCi/L).

QAPP Worksheet #10. (Continued)
Problem Definition

Additional project decision conditions ("If..., then..." statements) identified in the 2015 Memorandum of Agreement for Resolution:[4]

7. The anticipated contaminant concentrations of Tc-99 and TCE in the transect monitoring wells are expected to be no higher than 200 pCi/L and 600 ug/L, respectively. If baseline contaminant concentrations in any of the transect monitoring wells during the initial quarterly sampling are detected at twice the anticipated contaminant concentrations, then the FFA parties agree to temporarily suspend start-up of the extraction wells until the parties meet to evaluate the identified discrepancy, its potential impact on the NW Plume source actions and the planned NE Plume optimization project.

8. If contaminant concentrations in any transect[5] well's quarterly samples are determined to be increasing and may double above the established baseline within a year of the quarterly samples showing an increase, then potential changes in groundwater flow or source impacts (e.g. rising contaminant concentrations in the NE Plume, source migration, etc.) will be further examined and the FFA parties will consider adjustments (e.g. adjusting extraction well pumping rates) for the optimized NE Plume interim action to minimize these potential impacts.

9. If the measures taken by the FFA parties (e.g. adjusting extraction well pumping rates) do not result in decreased or stabilized concentrations at the transect monitoring wells, or if such adjustments reduce the effectiveness of the optimized extraction wells or if Tc-99 concentrations continue to increase and are detected at twice their baseline concentration in any one (or more) of the transect wells for two consecutive quarters, then DOE must notify EPA and KDEP within 30 days of receiving sampling results or one of the aforementioned conditions occurring.

10. If FFA parties decide to implement a modification to the Interim Remedial Action to address the NE Plume contamination (including the expansion), then depending on the scope of the modifications it is possible that the FFA parties will decide to shut-down the optimized pump and treat system in part or in its entirety. If a determination is made to shut down he optimized pump and treat system either before a modification to the Interim Remedial Action or as part of a modification to the Interim Action, then DOE shall reinstate implementation of the NE Plume Interim Remedial Action (Interim ROD 1995).

[4] *Memorandum of Agreement for Resolution of Formal Dispute of the Explanation of Significant Differences to the Record of Decision for the Interim Remedial Action of the Northeast Plume at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky (DOE/LX/07-1291&D2), and Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky (DOE/LX/07-1280&D2)*, U.S. Department of Energy, Paducah, KY, July 31, 2015.

[5] The 2015 Memorandum of Agreement for Resolution required installation of a north-south transect of RGA monitoring wells approximately 600 ft east of C-400 Building.

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

This QAPP has been prepared to detail the minimum standards, particularly for field and analytical data quality. Analytical data will be generated by DOE Consolidated Audit Program (DOECAP) laboratories utilizing approved laboratory test methods. The overall project quality objectives are to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting that will provide results that are legally defensible in a court of law. Specific procedures for sampling, chain-of-custody, instrument calibration/preventive maintenance, chemical analysis, internal quality control (QC), reporting data, audits, and corrective actions are described in other sections of this QAPP.

Who will use the data? DOE, FPDP, Commonwealth of Kentucky, and EPA.

What will the data be used for? Data will be used for evaluation of Northeast Plume Optimization Project and will be reported via FFA semiannual reports.

What type of data is needed? Target analytes, analytical groups, field screening, on-site analytical or off-site laboratory techniques, sampling techniques. Required list of analytes is specified in Table 4 of the project operations and maintenance plan. Both field screening and off-site laboratory analyses will be used for data collection. The target analytes include VOCs, Tc-99, and general water quality parameters.

How "good" do the data need to be in order to support the environmental decision? Data need to meet the measurement quality objective and data quality indicators (DQIs) established by the systematic planning process consistent with procedure *Quality Assured Data*; CP3-ES-1003, *Developing, Implementing, and Maintaining Data Management Implementation Plans*; and Section 9 "Data Management and Implementation Plan" of the *Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-1280&D2/R2 (February 2016).

Where, when, and how should the data be collected/generated? In the EWs, pump rates are recorded daily, water levels are measured weekly, and TCE and Tc-99 samples are collected quarterly. Monitoring wells are sampled quarterly. The CERCLA Outfall 001 is sampled weekly for general water quality parameters and volatile organic compounds (VOCs), quarterly for chronic toxicity and Tc-99.

Who will collect and generate the data? FPDP. Additionally, meteorological data may be acquired from other sources (as needed).

How will the data be reported? Field data will be recorded on chain-of-custody forms, in field logbooks, and field data sheets. The fixed-base laboratory will provide data in an Electronic Data Deliverable (EDD). Project data following verification assessment and validation will be placed into and reported from the Paducah Oak Ridge Environmental Information System (OREIS). Data loaded into Paducah OREIS will be made available to the public stakeholders via the Portsmouth/Paducah Project Office Environmental Geographic Analytical Spatial Information System (PEGASIS).

How will the data be archived? Electronic data will be archived in OREIS in accordance with Section 8.5 (Data and Records Archival) of the *Data and Documents Management and Quality Assurance Plan* (DOE 1998).

QAPP Worksheet #12-K.
Measurement Performance Criteria

Matrix	Water/Groundwater and Surface Water
Analytical Group[1]	VOC
Concentration Level	Low

Sampling Procedure[2]	Analytical Method/SOP[3, 4]	DQIs	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
CP4-ES-2101, *Groundwater Sampling*, and CP4-ES-2203, *Surface Water Sampling*	SW846-8260 and EPA-624	Precision—Lab	RPD–≤ 25%	Laboratory Duplicates	A
		Precision	RPD–≤ 25%	Field Duplicates	S
		Accuracy/Bias	% recovery[6]	Laboratory Sample Spikes	A
		Accuracy/Bias-Contamination	No target compounds > PQL	Method Blanks/Instrument Blanks	A
		Accuracy/Bias Contamination	No target compounds > PQL	Field Blanks	S
		Accuracy/Bias Contamination	No target compounds > PQL	Trip Blanks	S
		Accuracy/Bias Contamination	No target compounds > PQL	Equipment Rinseates	S
		Completeness[5]	90%	Data completeness check	S&A

PQL = practical quantitation limit; RPD = relative percent difference
[1] If information varies within an analytical group, separate by individual analyte.
[2] See QAPP Worksheet #21.
[3] See QAPP Worksheet #23.
[4] The most current version of the method will be used.
[5] Completeness is calculated as the number of samples planned to be collected divided by the number of sample results that were rejected.
[6] Percent recovery is laboratory-specific, calculated from studies performed every six months. Percent recovery ranges will be provided in the laboratory data packages based on the most current study.

QAPP Worksheet #12-Q.
Measurement Performance Criteria

Matrix	Water/Groundwater and Surface Water
Analytical Group[1]	Radionuclides (Tc-99)
Concentration Level	Low

Sampling Procedure[2]	Analytical Method/SOP[3, 4]	DQIs	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
CP4-ES-2101, *Groundwater Sampling*, and CP4-ES-2203, *Surface Water Sampling*	Liquid scintillation	Precision—Lab	RPD–≤ 25%	Laboratory Duplicates	A
		Precision	RPD–≤ 25%	Field Duplicates	S
		Accuracy/Bias	% recovery[6]	Laboratory Sample Spikes	A
		Accuracy/Bias-Contamination	No target compounds > MDA	Method Blanks/Instrument Blanks	A
		Accuracy/Bias Contamination	No target compounds > MDA	Field Blanks	S
		Accuracy/Bias Contamination	No target compounds > MDA	Equipment Rinseates	S
		Completeness[5]	90%	Data completeness check	S&A

MDA = minimum detectable activity
[1] If information varies within an analytical group, separate by individual analyte.
[2] See QAPP Worksheet #21.
[3] See QAPP Worksheet #23.
[4] The most current version of the method will be used.
[5] Completeness is calculated as the number of samples planned to be collected divided by the number of sample results that were rejected.
[6] Percent recovery is laboratory-specific, calculated from studies performed every six months. Percent recovery ranges will be provided in the laboratory data packages based on the most current study.

QAPP Worksheet #13.
Secondary Data Criteria and Limitations Table

Secondary Data	Data Source (Originating Organization, Report Title, and Date)	Data Generator(s) (Originating Org., Data Types, Data Generation/Collection Dates)	How Data Will Be Used	Limitations on Data Use
OREIS Database	Various	Various	Data will be used to determine the nature and extent of outfall surface water quality and Northeast Plume groundwater contamination.	Data have been verified, assessed, and validated (if validation is required). Rejected data will not be used if there is sufficient time to resample and obtain a result that will not be rejected during validation. All data are assessed based on *Quality Assured Data*, CP3-ES-5003.
Historical Documentation	Various	Various	Information will be used as guidance on Northeast Plume groundwater contamination.	Information from historical documents will be limited to the available documentation as it relates to a specific project. Use of historical data may be limited based on how long ago the data were collected and whether site conditions have changed since data collection.

QAPP Worksheet #14.
Summary of Project Tasks*

Sampling Tasks: Collect samples to assess contaminant levels in extraction and MWs and treatment system equalization tank, air stripper efficiency, and outfall compliance.

Analysis Tasks: Analysis according to current version of standard methods as listed in Worksheet 12.

Quality Control Tasks: QC will be per QAPP worksheets as follows:

- QC samples—Worksheets #20 and #28
- Equipment calibration—Worksheets #22 and #24
- Data review/validation—Worksheets #34, #35, #36, and #37

Secondary Data: See Worksheet #13

Data Management Tasks: Data management will be per procedures CP3-ES-5007, *Data Management Coordination*; CP3-ES-1003, *Developing, Implementing, and Maintaining Data Management Implementation Plans*; and Section 9, "Data Management and Implementation Plan" of *Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-1280&D2/R2 and, by reference, Section 10, "Data Management and Implementation Plan" of *Remedial Action Work Plan for In Situ Source Treatment by Deep Soil Mixing of the Southwest Groundwater Plume Volatile Organic Source at the C-747-C Oil Landfarm (Solid Waste Management Unit 1) at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-1287&D2/A1.

Documentation and Records: Documentation and records will be per procedure CP3-RD-0010, *Records Management Process.*

Assessment/Audit Tasks: Assessments and audits will be per procedure CP3-QA-1003, *Management and Self Assessments.*

Data Review Tasks: Data review tasks, including selection of data sets for validation by a third-party independent validator(s), will be per procedure CP3-ES-5003, *Quality Assured Data*, and the Section 9, "Data Management and Implementation Plan" of the *Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-1280&D2/R2 (February 2016).

*It is understood that SOPs are contractor specific.

QAPP Worksheet #16.
Project Schedule/Timeline Table

Activities	Organization	Dates (MM/DD/YY)		Deliverable	Deliverable Due Date
		Anticipated Date(s) of Initiation	Anticipated Date of Completion		
Routine sampling conducted throughout the period of the Northeast Plume Optimization Project	FPDP	Preoperational MW sampling will characterize 4 quarters before start-up of the optimization EWs.	Operational and monitoring well sampling will continue until the completion of the Northeast Plume Interim Remedial Action.	Project data will be summarized in semi-annual FFA reports.	The FFA semiannual reports are issued in April and October of each year.

QAPP Worksheet #15-A.
Project Action Limits Laboratory-Specific Detection/Quantitation Limits

Matrix: Water
Analyte Group: VOCs

VOCs	CAS Number	Project Action Limit/NAL (µg/L)	Project Action Limit Reference[a]	Site COPC?[b]	Laboratory-Specific	
					PQLs (µg/L)	MDLs (µg/L)
1,1-Dichloroethene	75-35-4	7/0.171	MCL/NAL	Yes	1	0.3
Trichloroethene	79-01-6	5/0.281	MCL/NAL	Yes	1	0.3

CAS = Chemical Abstracts Service
MDL = method detection limit
NAL = no action level for groundwater for the child resident scenario from the Risk Methods Document (DOE 2015)

[a] This QAPP references the MCLs. The worksheet also lists the NALs established by the Risk Methods Document (DOE 2015)(i.e., the no action level for groundwater for the child resident scenario).
[b] Analytes marked with COPC are from Table 2.1 of the Risk Methods Document (DOE 2015) and represent the list of chemicals, compounds, and radionuclides compiled from COPCs retained as contaminants of concern in risk assessments performed at PGDP between 1990 and 2008.

QAPP Worksheet #15-D.
Project Action Limits Laboratory-Specific Detection/Quantitation Limits

Matrix: Water
Analytical Group: Radionuclides

Radionuclides	CAS Number	Project Action Limit (pCi/L)	Project Action Limit Reference[a]	Site COPC?[b]	Laboratory-Specific MDAs (pCi//L)
Technetium-99	14133-76-7	4 mRem/year-dose (900 pCi/L)	MCL (NAL)	Yes	15–25

[a] This QAPP references the MCLs. The worksheet also lists the NALs established by the Risk Methods Document (DOE 2015) (i.e., the no action level for groundwater for the child resident scenario).
b Analytes marked with COPC are from Table 2.1 of the Risk Methods Document (DOE 2015) and represent the list of chemicals, compounds, and radionuclides compiled from COPCs retained as contaminants of concern in risk assessments performed at PGDP between 1990 and 2008.

QAPP Worksheet #15-K.
Project Action Limits Laboratory-Specific Detection/Quantitation Limits

Matrix: Surface
Analyte Group: CERCLA Outfall

Outfall Discharge Criteria with Effluent Limits	CAS Number	Project Action Limit	Site COPC?[a]	Laboratory-Specific	
				PQLs	MDLs
Total Suspended Solids	N/A	30 mg/L	No	5 mg/L	1 mg/L
Oil & Grease	N/A	10 mg/L	No	7 mg/L	3.5 mg/L

a Analytes marked with COPC (chemical of potential concern) are from Table 2.1 of the Risk Methods Document (DOE 2015) and represent the list of chemicals, compounds, and radionuclides compiled from COPCs retained as contaminants of concern in risk assessments performed at PGDP between 1990 and 2008.

QAPP Worksheet #17-B.
Sampling Design and Rationale (Groundwater Monitoring)

Analysis	Media Type	# of Samples	Test/Analytical Method	Project Reference Value	PQL
DO	Water	All Water	Hach Quanta Hydrolab	0.5 mg/L	0.2 mg/L
pH	Water	All Water	Hach Quanta Hydrolab	5 to 9 Std Units	02. Std Units
Redox	Water	All Water	Hach Quanta Hydrolab	50 mV against Ag/AgCl	20 mV
Temperature	Water	All Water	Hach Quanta Hydrolab	20°C	+/- 0.1°C
Specific Conductance	Water	All Water	Hach Quanta Hydrolab	N/A	0.001 mS/cm
Turbidity	Water	All Water	Hach Quanta Hydrolab	N/A	1 NTU

QAPP Worksheet #18.
Sampling Locations and Methods/Standard Operating Procedure Requirements Table for Screening Samples

Sampling Location/ID Number	Matrix	Depth (units)	Analytical Group	Concentration Level	Number of Samples (Identify Field Duplicates)	Sampling SOP Reference[a]	Rationale for Sampling Location
Northeast Plume Optimization Outfalls	Surface Water	Surface Water in Effluent Discharge	VOCs, Radionuclides, and General Water Quality	See Table 3 of Northeast Plume Optimization Explanation of Significant Differences for discharge limits	See Table 3 of Northeast Plume Optimization Explanation of Significant Differences for sample frequency	CP4-ES-2203, *Surface Water Sampling*	See Northeast Plume Optimization Operation and Maintenance Plan
Northeast Plume Optimization Extraction Wells and Monitoring Wells	Groundwater	Regional Gravel Aquifer	VOCs and Radionuclides	600 µg/L TCE and 200 pCi/L Tc-99	See Table 3 of Northeast Plume Optimization Explanation of Significant Differences for sample frequency	CP4-ES-2101, *Groundwater Sampling*	See Northeast Plume Optimization Operation and Maintenance Plan

[a] See Analytical SOP References Table (Worksheet #23).

QAPP Worksheet #19.
Analytical SOP Requirements Table

Matrix	Analytical Group	Concentration Level	Analytical and Preparation Method/SOP Reference*	Sample Volume	Containers (number, size, and type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/ analysis)
Water	VOC	See Worksheet #18	See Worksheet #23	120 mL	3 x 40 mL Glass VOA Vial	HCl; pH < 2, cool to < 4°C, no headspace	14 days for preserved
Water	RADs	See Worksheet #18	See Worksheet #23	3 liters	3 x 1 liter Plastic	HNO_3 pH < 2, Cool to < 4°C[a]	6 months

NOTE: Sample volume and container requirements will be specified by the laboratory. This table includes standard requirements for routine analytical groups.
*See Analytical SOP References table (Worksheet #23).
[a] Check with specific laboratory conducting analyses to ensure that acidification will not interfere with laboratory procedures.

HCl = hydrochloric acid
HNO_3 = nitric acid
RAD = radionuclide

QAPP Worksheet #30.
Analytical Services Table

Matrix	Analytical Group	Concentration Level	Sample Locations/ID Numbers	Analytical SOP*	Data Package Turnaround Time	Laboratory/Organization (Name and Address, Contact Person and Telephone Number)	Backup Laboratory/Organization (Name and Address, Contact Person and Telephone Number)
Water	Radionuclides	See Worksheet #18	TBD	See Worksheet #23	28-day	TBD	TBD
Water	VOCs	See Worksheet #18		See Worksheet #23	28-day		

*Analytical method SOPs for radiochemistry parameters are laboratory specific.

ID = identification

QAPP Worksheet #20.
Field Quality Control Sample Summary Table

Matrix	Analytical Group	Concentration Level	Analytical and Preparation SOP Reference	No. of Sampling Locations	No. of Field Duplicate Pairs	Inorganic	No. of Field Blanks	No. of Equip. Blanks	Total No. of Samples to Lab
						No. of MS			
Water (Groundwater and Surface Water)	VOCs	Low	See Worksheet #12-K	See Operations and Maintenance Plan	5%	5%	5%	5%	See Operations and Maintenance Plan
Water (Groundwater and Surface Water)	Radionuclides	Low	See Worksheet #12-Q	See Operations and Maintenance Plan	5%	5%	5%	5%	See Operations and Maintenance Plan

MS = matrix spike

QAPP Worksheet #21.
Project Sampling SOP References Table

Site-specific SOPs have been developed for site sampling and data management activities.

Reference Number	Title and Number[a]	Originating Organization[b]	Equipment Type	Modified for Project Work? (Y/N)	Comments
1	CP4-ES-0043, *Temperature Control for Sample Storage*	Contractor	Sampling	N	N/A
2	CP4-ES-1001, *Transmitting Data to the Paducah Oak Ridge Environmental Information System (OREIS)*	Contractor	N/A	N	N/A
3	CP4-ES-2100, *Groundwater Level Measurement*	Contractor	Sampling	N	N/A
4	CP4-ES-2101, *Groundwater Sampling*	Contractor	Sampling	N	N/A
5	CP4-ES-2203, *Surface Water Sampling*	Contractor	Sampling	N	N/A
6	CP4-ES-0074, *Monitoring Well Inspection and Maintenance*	Contractor	Sampling	N	N/A
7	CP4-ES-2700, *Logbooks and Data Forms*	Contractor	N/A	N	N/A
8	CP4-ES-2702, *Decontamination of Sampling Equipment and Devices*	Contractor	Sampling	N	N/A
9	CP4-ES-2704, *Trip, Equipment, and Field Blank Preparation*	Contractor	N/A	N	N/A
10	CP4-ES-2708, *Chain-of-Custody Forms, Field Sample Logs, Sample Labels, and Custody Seals*	Contractor	N/A	N	N/A

QAPP Worksheet #21. (Continued)
Project Sampling SOP References Table

Reference Number	Title and Number[a]	Originating Organization[b]	Equipment Type	Modified for Project Work? (Y/N)	Comments
11	CP3-ES-5003, *Quality Assured Data*	Contractor	N/A	N	N/A
12	CP3-ES-5004, *Sample Tracking, Lab Coordination, and Sample Handling*	Contractor	N/A	N	N/A
13	CP3-ES-5007, *Data Management Coordination*	Contractor	N/A	N	N/A
14	CP2-ES-5102, *Radiochemical Analyses Data Verification and Validation*	Contractor	N/A	N	N/A
15	CP2-ES-5105, *Volatile and Semivolatile Analyses Data Verification and Validation*	Contractor	N/A	N	N/A
16	CP3-ES-1003, *Developing, Implementing, and Maintaining Data Management Implementation Plans*	Contractor	N/A	N	N/A
17	CP4-ES-1002, *Submitting, Reviewing, and Dispositioning Changes to the Environmental Databases OREIS and PEMS*	Contractor	N/A	N	N/A
18	CP3-OP-0009, *Performance Observations*	Contractor	N/A	N	N/A
19	*DOE/LX/07-1280&D2/R2 Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, Section 7, "Waste Management Plan"	Contractor	N/A	N	N/A

[a] SOPs are posted to the FPDP S Drive.
[b] The work will be conducted by FPDP staff or a subcontractor. In either case, SOPs listed will be followed.

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

Field Equipment*	Calibration Activity	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
Water Quality Meter	Calibration check at the beginning of the day	Performed monthly and as needed	Measure solutions with known values (National Institute for Standards and Technology traceable buffers and conductivity calibration solutions)	Upon receipt, successful operation	Daily before each use	Per manufacturer's specifications	Recalibrate or service as necessary	Field Team Leader	Manufacturer's specifications
Colorimeter (for total residual chlorine)	Accuracy check at the beginning of each day's use	As needed	Measure with standard solution	Upon receipt, successful operation	Check daily before each use	Within range of manufacturer's standard	Service by manufacturer or replace	Field Team Leader	Manufacturer's specifications
Titrator (for total residual chlorine)	Accuracy check at the beginning of each day	As needed	Measure with standard solution	Upon receipt, successful operation	Check daily before each use	With range of manufacturer's standard	Service by manufacturer or replace	Field Team Leader	Manufacturer's specifications
Electronic Water Level Meter	Accuracy check annually against a steel tape	Replace as needed	Annual verification	Upon receipt, successful operation	Check daily before each use	Pass/Fail	Service by manufacturer or replace	Field Team Leader	Manufacturer's specifications
Hach flow meter	Calibrate to readings on flume	Quarterly and as needed	Measure against flume	Upon receipt, successful operation	Weekly as needed	Pass/Fail	Service by manufacturer or replace	Field Team Leader	Manufacturer's specifications

QAPP Worksheet #23.
Analytical SOP References Table

Reference Number*	Title, Revision Date, and/or Number	Definitive or Screening Data	Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work? (Y/N)
SW-846-8260/ EPA-624		Definitive	VOA (Unless noted below)	Per SOP	TBD	N
EPA-160.2/ SM 2540 D		Definitive	Miscellaneous (Total Suspended Solids)	Per SOP	TBD	N
EPA-1664 A		Definitive	Miscellaneous (Oil and Grease)	Per SOP	TBD	N
Liquid Scintillation		Definitive	Radionuclides (Technetium-99)	Per SOP	TBD	N

*Information will be based on laboratory used.

QAPP Worksheet #24.
Analytical Instrument Calibration Information

All laboratory equipment and instruments used for quantitative measurements are calibrated in accordance with the laboratory's formal calibration program. Whenever possible, the laboratory uses recognized procedures for calibration such as those published by EPA or American Society for Testing and Materials. If established procedures are not available, the laboratory develops a calibration procedure based on the type of equipment, stability, characteristics of the equipment, required accuracy, and the effect of operation error on the quantities measured. Whenever possible, physical reference standards associated with periodic calibrations, such as weights or certified thermometers with known relationships to nationally recognized standards, are used. Where national reference standards are not available, the basis for the reference standard is documented. Equipment or instruments that fail calibration or become inoperable during use are tagged to indicate they are out of calibration. Such instruments or equipment is repaired and successfully recalibrated prior to reuse. All high resolution mass spectrometer instruments undergo extensive tuning and calibration prior to running each sample set. The calibrations and ongoing instrument performance parameters are recorded and reported as part of the analytical data package.

The laboratory is responsible for maintaining instrument calibration information per their QA Plan, including control charts established for all instrumentation. This information is audited annually by DOECAP. Laboratory(s) contracted will be DOECAP audited.

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

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference*
GC-MS	Replace/clean ion source; clean injector, replace injector liner, replace/clip capillary column, flush/replace tubing on purge and trap; replace trap	QC standards	Ion source, injector liner, column, column flow, purge lines, purge flow, trap	As needed	Must meet initial and/or continuing calibration criteria	Repeat maintenance activity or remove from service	Laboratory Section Manager	See Worksheet #23
GC	ECD maintenance; replace/clip capillary column	QC standards	ECD, FID, injector, injector liner, column, column flow	As needed	Must meet initial and/or continuing calibration criteria	Repeat maintenance activity or remove from service	Laboratory Section Manager	See Worksheet #23
pH meter	Clean probe	QC standards	Probe	As needed	The value for each of the certified buffer solutions must be within ± 0.05 pH units of the expected value	Repeat maintenance activity or remove from service	Laboratory Manager	See Worksheet #22
Spectrophotometer	Flush/replace tubing	QC standards	Tubing	As needed	Must meet initial and/or continuing calibration criteria	Repeat maintenance activity of remove from service	Laboratory Manager	See Worksheet #23

*The laboratory is responsible for maintaining instrument and equipment maintenance, testing, and inspection information per their QA Plan. This information is audited annually by DOECAP. Laboratory(s) contracted will be DOECAP audited. Field survey/sampling instrumentation will be maintained, tested, and inspected according to manufacturer's instructions.

ECD = electron capture detector; FID = flame ionization detector; GC = gas chromatography; GC-MS = gas chromatography mass spectrometer

QAPP Worksheet #26.
Sample Handling System

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT	
Sample Collection (Personnel/Organization):	Sampling Teams/DOE Prime Contractor and Subcontractors
Sample Packaging (Personnel/Organization):	Sampling Teams/DOE Prime Contractor and Subcontractors
Coordination of Shipment (Personnel/Organization):	Lab Coordinator/DOE Prime Contractor
Type of Shipment/Carrier:	Direct Delivery or Overnight/Federal Express or United Parcel Service
SAMPLE RECEIPT AND ANALYSIS	
Sample Receipt (Personnel/Organization):	Sample Management/Contracted Laboratory
Sample Custody and Storage (Personnel/Organization):	Sample Management/Contracted Laboratory
Sample Preparation (Personnel/Organization):	Analysts/Contracted Laboratory
Sample Determinative Analysis (Personnel/Organization):	Analysts/Contracted Laboratory
SAMPLE ARCHIVING	
Field Sample Storage (No. of days from sample collection):	The fixed-base laboratory will archive samples for 4 months or less
Sample Extract/Digestate Storage (No. of days from extraction/digestion):	120 Days
Biological Sample Storage (No. of days from sample collection):	Not applicable.
SAMPLE DISPOSAL	
Personnel/Organization:	Waste Disposition/Sample Management Office/DOE Prime Contractor and Subcontractors
Number of Days from Analysis:	6 months

QAPP Worksheet #27.
Sample Custody Requirements*

Chain-of-custody procedures are comprised of maintaining sample custody and documentation of samples for evidence. To document chain-of-custody, an accurate record of samples must be maintained in order to trace the possession of each sample from the time of collection to its introduction to the laboratory.

Field Sample Custody Procedures (sample collection, packaging, shipment, and delivery to laboratory):

Field sample custody requirements will be per DOE Prime Contractor procedures CP4-ES-2708, *Chain-of-Custody Forms, Field Sample Logs, Sample Labels, and Custody Seals*; and CP3-ES-5004, *Sample Tracking, Lab Coordination, and Sample Handling.*

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

These follow the DOECAP-audited laboratory's standard procedures. When the samples are delivered to the laboratory, signatures of the laboratory personnel receiving them and the courier personnel relinquishing them will be completed in the appropriate spaces on the chain-of-custody record, unless the courier is a commercial carrier. This will complete the sample transfer. It will be every laboratory's responsibility to maintain internal logbooks and records that provide custody throughout sample preparation and analysis process.

Sample Identification Procedures:

Sample identification requirements are specified in the Northeast Plume Optimization RAWP Section 9, "Data Management Implementation Plan."

Chain-of-custody Procedures:

Chain-of-custody requirements will be per DOE Prime Contractor procedures CP4-ES-2708, *Chain-of-Custody Forms, Field Sample Logs, Sample Labels, and Custody Seals*; and CP3-ES-5004, *Sample Tracking, Lab Coordination, and Sample Handling.*

*It is understood that SOPs are contractor specific.

QAPP Worksheet #28.
QC Samples Table

Matrix: Water (Groundwater and Surface Water)
Analytical Group/Concentration Level: VOC, Rad
Sampling SOP: See Worksheets #12-K and #12-Q
Analytical Method/SOP Reference: See Worksheet #23
Sampler's Name/Field Sampling Organization: GEO Consultants
Analytical Organization: Environmental Monitoring
No. of Sample Locations: See Operations and Maintenance Plan

QC Sample	Frequency/Number*	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
Field blank	Minimum 5%	≤ CRQL*	Verify results; reanalyze	Laboratory should alert project	Contamination—Accuracy/bias	See procedure CP3-ES-5003, *Quality Assured Data*
Trip blank	1 per cooler containing VOC samples	≤ CRQL*	Verify results; reanalyze		Contamination—Accuracy/bias	See procedure CP3-ES-5003, *Quality Assured Data*
Equipment blank	Minimum 5%	≤ CRQL*	Verify results; reanalyze		Contamination—Accuracy/bias	See procedure CP3-ES-5003,*Quality Assured Data*
Spiked field samples (MS and/or MSD)	1 per analytical batch	See data validation procedures CP2-ES-5102 and CP2-ES-5105	Check calculations and instrument; reanalyze affected samples	Laboratory should alert project	Accuracy/Precision	See procedure CP3-ES-5003, *Quality Assured Data*
Laboratory spiked blanks (LCS)	1 per analytical batch	See data validation procedures CP2-ES-5102 and CP2-ES-5105	Check calculations and instrument; reanalyze affected samples	Laboratory should alert project	Accuracy	See procedure CP3-ES-5003, *Quality Assured Data*

*CRQL = contract-required quantitation limit

QAPP Worksheet #28. (Continued)
QC Samples Table

Matrix: Water (Groundwater and Surface Water)
Analytical Group/Concentration Level: VOC, Rad
Sampling SOP: See Worksheets #12-K and #12-Q
Analytical Method/SOP Reference: See Worksheet #23
Sampler's Name/Field Sampling Organization: GEO Consultants
Analytical Organization: Environmental Monitoring
No. of Sample Locations: See Operations and Maintenance Plan

QC Sample	Frequency/Number*	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
Method blank	1 per analytical batch	See data validation procedures CP2-ES-5102 and CP2-ES-5105	Check calculations and instrument; reanalyze affected samples	Laboratory should alert project	Accuracy	See procedure CP3-ES-5003, *Quality Assured Data*
Surrogate standards	All samples, blanks, and QC samples	See data validation procedures CP2-ES-5102 and CP2-ES-5105	Check calculations and instrument; reanalyze affected samples	Laboratory should alert project	Accuracy	See procedure CP3-ES-5003, *Quality Assured Data*
Internal standards	All samples and standards	See data validation procedures CP2-ES-5102 and CP2-ES-5105	Check calculations and instrument; reanalyze affected samples	Laboratory should alert project	Accuracy	See procedure CP3-ES-5003, *Quality Assured Data*

QAPP Worksheet #28. (Continued)
QC Samples Table

Matrix: Water (Groundwater and Surface Water)
Analytical Group/Concentration Level: VOC, Rad
Sampling SOP: See Worksheets #12-K and #12-Q
Analytical Method/SOP Reference: See Worksheet #23
Sampler's Name/Field Sampling Organization: GEO Consultants
Analytical Organization: Environmental Monitoring
No. of Sample Locations: See Operations and Maintenance Plan

QC Sample	Frequency/Number*	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
Field duplicate	Minimum 5%	None	Data reviewer will place qualifiers on samples affected	Project	Homogeneity/ Precision	RPD ≤ 50% sediment, RPD < 25% aqueous
Laboratory duplicate	Per laboratory procedure	See data validation procedures CP2-ES-5102 and CP2-ES-5105	Verify results re-prepare and reanalyze	Laboratory analyst	Precision	See procedure CP3-ES-5003, *Quality Assured Data*
Tracers/Carriers	Each sample tested by a radiochemical separation method	See data validation procedure CP2-ES-5102	Check calculations and instrument; reanalyze affected samples	Laboratory analyst	Accuracy	See procedure CP3-ES-5003, *Quality Assured Data*

*The number of QC samples is listed on Worksheet #20.
**Unless dictated by project-specific parameters, ≤ CRQL.

QAPP Worksheet #29.
Project Documents and Records Table

All project data and information must be documented in a format that is usable by project personnel. The QAPP describes how project data and information shall be documented, tracked, and managed from generation in the field to final use and storage in a manner that ensures data integrity, defensibility, and retrieval.

Sample Collection Documents and Records	On-site Analysis Documents and Records	Off-site Analysis Documents and Records	Data Assessment Documents and Records*	Other
Data logbooks (electronic or paper) and associated completed sampling forms; sample chains-of-custody	Laboratory data packages, OREIS database, and associated data packages	OREIS database and associated data packages	CP3-ES-5003, Att. G, Data Assessment Review Checklist and Comment Form	CP3-OP-0009-F01, Observation Checklist Form

*It is understood that SOPs are contractor specific.

QAPP Worksheet #31.
Planned Project Assessments Table

FPDP will ensure that protocol outlined in the QAPP is implemented adequately. Assessment activities help to ensure that the resultant data quality is adequate for its intended use and that appropriate responses are in place to address nonconformances and deviations from the QAPP. Below is a list of assessments project teams may use.

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment (Title and Organizational Affiliation)	Person(s) Responsible for Responding to Assessment Findings (Title and Organizational Affiliation)	Person(s) Responsible for Identifying and Implementing Corrective Actions (CA) (Title and Organizational Affiliation)	Person(s) Responsible for Monitoring Effectiveness of CA (Title and Organizational Affiliation)
Independent Assessment/ Surveillance	A	Internal	QA Manager or designee	QA Specialists	Project Manager	Project Manager	QA Manager
Laboratory Audit	Annual	External	DOECAP	Laboratory Assessor	Laboratory	Laboratory	DOECAP
Management Assessments	Annual	Internal	Project Manager or designee	Project Manager	Project Manager	Project Manager	QA Manager
Performance Observations	B	Internal	Project Manager or designee	Project Manager	Project Manager	Project Manager	Project Manager
Performance Observation Follow-up surveillances	Quarterly	Internal	Project Manager or designee	Project Manager or designee	Project Manager	Project Manager	Project Manager

A = assessment frequency determined by QA Manager and conducted per CP3-QA-1003, *Management and Self Assessments*.
B = assessment frequency determined by Project Manager.
*Reference: CP3-OP-0009, *Performance Observations Desk Instructions.*

QAPP Worksheet #32.
Assessment Findings and Corrective Action Responses*

All provisions shall be taken in the field and laboratory to ensure that any problems that may develop shall be dealt with as quickly as possible to ensure the continuity of the project/sampling events. Field modifications to procedures in the QAPP must be approved before the modifications are implemented and then documented. The process controlling procedure modification is CP3-OP-0002, *Development, Approval, and Change Control for FPDP Performance Documents*. Field modifications are documented through the work control process per CP3-SM-1003. Corrective action in the field may be necessary when the sampling design is changed. For example, a change in the field may include increasing the number or type of samples or analyses, changing sampling locations, and/or modifying sampling protocol. When this occurs, the project team shall identify any suspected technical or QA deficiencies and note them in the field logbook. Worksheet #32 details how project teams will address assessment findings.

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (Name, Title, Organization)	Time frame of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (Name, Title, Org.)	Time Frame for Response
Management, Independent, and Surveillances	Form CP3-QA-1003-F02, Management/Self-Assessment Report, Form CP3-QA-1003-F03, Management/Self-Assessment Checklist, and Form CP3-QA-3001-F02, Issue Identification Form	Project management, issue owner, contractor	Upon issuance of Forms CP3-QA-1003-F02, Management/Self-Assessment Report and CP3-QA-1003-F03, Management/Self-Assessment Checklist, form CP3-QA-3001-F02, Issue Identification Form, will be completed and attached to the assessment report	CP3-QA-3001, Issue Identification Form, documents the issue response and/or corrective actions	Action owner as designated by issue owner, contractor	Fifteen days for initial issue response, corrective action schedule determined by issue owner, per CP3-QA-3001

*It is understood that SOPs are contractor specific.

QAPP Worksheet #33.
QA Management Reports Table

Reports to management include project status reports, field and/or laboratory audits, and data quality assessments. These reports will be directed to the QA Manager and Project Manager, who have ultimate responsibility for assuring that any corrective action response is completed, verified, and documented.

Type of Report	Frequency (daily, weekly monthly, quarterly, annually, etc.)	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation (Title and Organizational Affiliation)	Report Recipient(s) (Title and Organizational Affiliation)
Field Change Requests	As needed	Ongoing	Field staff	QAPP recipients
QAPP Addenda	As needed	Not Applicable	Project Manager	QAPP recipients
Field Audit Report	TBD by QA Manager	30 days after completion of audit	QA Manager	FPDP Project Manager QA Manager
Corrective Action Plan	As needed	Within 3 weeks of request	Project Manager	QA Manager

TBD = to be determined

QAPP Worksheet #34.
Verification (Step I) Process Table

This section of the QAPP provides a description of the QA activities that will occur after the data collection phase of the project is completed. Implementation of this section will determine whether the data conforms to the specified criteria satisfying the project objectives.

Verification Input	Description[a]	Internal/ External	Responsible for Verification (Name, Organization)
Field Logbooks/Data Forms	Field logbooks are verified per DOE Prime Contractor procedure, CP4-ES-2700, *Logbooks and Data Forms*, and CP3-ES-5003, *Quality Assured Data*.	Internal	Project Management or designee, Contractor
Chains-of-Custody	Chains-of-custody are controlled by DOE Prime Contractor procedure, CP3-ES-5004, *Sample Tracking, Lab Coordination and Sample Handling*. Chains-of-custody will be included in data assessment packages for review as part of data verification and data assessment.	Internal	Sample Management Office Personnel, and Project Management, Contractor
Field and Laboratory Data	Field and analytical data are verified and assessed per DOE Prime Contractor procedure, CP3-ES-5003, *Quality Assured Data*. Data assessment packages will be created per this procedure. The data assessment packages will include field and analytical data, chains-of-custody, data verification and assessment queries, and other project-specific information needed for personnel to review the package adequately. Data assessment packages will be reviewed to document any issues pertaining to the data and to indicate if data met the data quality objectives of the project.	Internal	Sample Management Office Personnel, and Project Management, Contractor
Sampling Procedures	Evaluate whether sampling procedures were followed with respect to equipment and proper sampling support using audit and sampling reports, field change requests and field logbooks.	Internal	Sample Management Office Personnel, Project Management, and QA Personnel,[b] Contractor
Laboratory Data	All laboratory data will be verified by the laboratory performing the analysis for completeness and technical accuracy prior to submittal to FPDP. Subsequently, FPDP will evaluate the data packages for completeness and compliance.	External/ Internal	Laboratory Manager, FPDP Sample Management Office Personnel
Electronic Data Deliverables (EDDs)	Determine whether required fields and format were provided.	Internal	Sample Management Office Personnel
QAPP	All planning documents will be available to reviewers to allow reconciliation with planned activities and objectives.	Internal	All data users

[a] It is understood that SOPs are contractor specific.
[b] QA specialist performs general QA review.

QAPP Worksheet #35.
Assessment, Verification, and Validation (Steps IIa and IIb) Process Table

Step IIa/IIb	Validation Input	Description[a]	Responsible for Validation (Name, Organization)
IIa	Data Deliverables, Analytes, and Holding Times	The documentation from the contractual screening will be included in the data assessment packages, per DOE Prime Contractor procedure CP3-ES-5003, *Quality Assured Data*.	Sample Management Office Personnel, Contractor
IIa	Chain-of-Custody, Sample Handling, Sampling Methods and Procedures, and Field Transcription	These items will be validated during the data assessment process as required by DOE Prime Contractor procedure, CP3-ES-5003, *Quality Assured Data*, and CP3-ES-1003, *Developing, Implementing, and Maintaining Data Management Implementation Plans*. The documentation of this validation will be included in the data assessment packages.	Sample Management Office Personnel, Contractor
IIa	Analytical Methods and Procedures, Laboratory Data Qualifiers, and Standards	These items will be reviewed during the data validation process as required by DOE Prime Contractor data validation procedures. Data validation will be performed in parallel with data assessment. The data validation report and data validation qualifiers will be considered when the data assessment process is being finalized.	Data Validation Subcontractor, and Sample Management Office Personnel, Project, Contractor
IIa	Audits	The audit reports and accreditation and certification records for the laboratory supporting the projects will be considered in the bidding process.	QA Personnel
IIb	Deviations and qualifiers from Step IIa	Any deviations and qualifiers resulting from Step IIa process will be documented in the data assessment packages.	Sample Management Office Personnel, Project, and QA Personnel, Contractor
IIb	Sampling Plan, Sampling Procedures, Collocated Field Duplicates, Project Quantitation Limits, Confirmatory Analyses, Performance Criteria	These items will be evaluated as part of the data verification and data assessment process per DOE Prime Contractor procedure, CP3-ES-5003, *Quality Assured Data*. These items will be considered when evaluating whether the project met their Data Quality Objectives.	Sample Management Office Personnel, Project, and QA Personnel, Contractor

[a] It is understood that SOPs are contractor specific.

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

Step IIa/IIb	Matrix	Analytical Group	Concentration Level	Validation Criteria	Data Validator (title and organizational affiliation)
Step IIa/IIb	Water	All	All	National Functional Guidelines; Worksheets #12-K and #12-Q, #15-A, D, and K, and #28; and CP2-ES-5102 and CP2-ES-5105	Data Validator[a]

[a] Validation is to be conducted by a qualified individual, independent from sampling, laboratory, project management, or other decision making personnel for the task. This could be an outside party or someone within FPDP who is not involved in the project.

QAPP Worksheet #37.
Usability Assessment*

FPDP shall determine the adequacy of data based on the results of validation and verification. The usability step involves assessing whether the process execution and resulting data meet project quality objectives documented in the QAPP.

Summarize the usability assessment process and all procedures, including interim steps and any statistics, equations, and computer algorithms that will be used: Field and analytical data are verified and assessed per procedure CP3-ES-5003, *Quality Assured Data*. Data assessment packages will be created per this procedure. Data assessment packages will include field and analytical data, chains-of-custody, data verification and assessment queries, and other project-specific information needed for personnel to review the package adequately. Data assessment packages will be reviewed to document any issues pertaining to the data and to indicate if DQOs of the project were met. For data selected for validation, the following procedures are used: CP2-ES-5102 and CP2-ES-5105.

Describe the evaluative procedures used to assess overall measurement error associated with the project: PARCCS parameters (precision, accuracy, representativeness, comparability, completeness, and sensitivity) will be evaluated per procedure CP3-ES-5003, *Quality Assured Data*. This information will be included in the data assessment packages for review by project personnel. Data assessment also will include documentation of QC exceedances, trends, and/or bias in the data set. Data assessment will document any statistics used.

Identify the personnel responsible for performing the usability assessment: Project personnel, as verified by QA personnel.

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

*It is understood that SOPs are contractor specific.

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Response to U.S. Department of Energy Comments Submitted January 29, 2016, *Addendum to the Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant,* Appendix D, Quality Assurance Project Plan, DOE/LX/07-1280&D2/R2/A1, Dated January 2016

Specific Comments:

Comment 1, Title Page: Change date to February.

Response 1: The document has been revised as requested.

Comment 2, Appendix D Flysheet: This should be presented as changes from the programmatic QAPP and not a document where everything is in redline. For submittal to the regulators, this document should be revised so that only changes from the programmatic QAPP are in redline.

Response 2: The project specific QAPP is shown entirely in redline form because it is an addendum to the D2/R2 version of the Northeast Optimization Remedial Action Work Plan and is consistent with past practices. Additionally, the programmatic QAPP is a separate document which shouldn't be directly tied to the Northeast Optimization RAWP for comparison purposes.

The comment did not result in a change to the document.

Comment 3, page D-7, para. 2: Please verify if this should be D2/R2/A1 for this addendum?

Response 3: The reference has been revised as D2/R2/A1.

Additionally, a similar change was made to Worksheets #1 and #2 on page D-8 for consistency.

Comment 4, page D-7, para. 4: Please verify that the reference to the ESD is necessary, since the ESD is already approved.

Response 4: The QAPP supports both the ESD and RAWP. The RAWP references the ESD (e.g. ARARs listed in ESD) in multiple locations throughout the document.

This comment did not result in a change to the document.

Comment 5, page D-10: Change "To Be Determined" to 2/12/2015.

Response 5: The reference to the RAWP has been removed from this table and replaced with the Fiscal Year 2015 Environmental Monitoring Plan. The date has been revised to reflect DOE approval of the FY15 Environmental Monitoring Plan (2/12/15), as requested.

Comment 6, page D-10: Number 6 is specific to "previous site work" and the RAWP reference here is prospective work. Please delete the RAWP and replace it with a reference to the FY2015 RAWP. *Environmental Monitoring Plan Fiscal Year 2015 Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, PAD-ENM-0055/R4.

Response 6: Based on discussions with DOE, it was identified that the replacement for the RAWP should have stated the FY2015 Environmental Monitoring Plan as opposed to the FY2015 RAWP. The reference to the RAWP has been removed from this table and replaced with the Fiscal year 2015 Environmental Monitoring Plan, as requested.

Comment 7, page D-11: Please do not leave blank cells in this table.

Response 7: Comment addressed, rows have been merged where appropriate to remove blank cells.

Comment 8, Worksheets #3 and #5, page D-12:

a) Please add to this Worksheet: FFA Manager; DOE; Tracey Duncan; (270) 441-6862; tracey.duncan@lex.doe.gov

b) Change Dave Dollins to David Dollins.

c) Please verify if these titles are still correct.

Response 8:

a) Tracey Duncan to the worksheet,
b) Changed Dave Dollins to David Dollins, and
c) Verified titles, added FFA Manager to Julie Corkran and Brian Begley's title.

Comment 9, Worksheet #5-A, page D-13: Since Data Validation is supposed to be independent of the project, it seems like this should be a dashed line.

Response 9: Dashed line has been added between Sample Management Office and Independent Validation Services, as requested.

Comment 10, Worksheet #4, page D-14: Please verify if all these positions should be "Per TPD" as the each require unique skill sets to be successful. Please add definition for "TPD" here.

Response 10: "TPD" has been defined as requested. In addition, the "Specialized Training/Certification, if any" column of the table has been populated with training criteria.

Comment 11, Worksheet #6, page D-17: Please put Worksheets in the in numerical order, where possible - follow the PAD 2015 Programmatic QAPP ordering preference.

Response 11: Worksheets have been organized pursuant to the UFP optimized guidance format and mirror the programmatic QAPP ordering preference. This comment did not result in a change to the document.

Comment 12, Worksheet #10, page D-20:

a) The footnotes (and therefore call-out to footnotes) must be renumbered for this entire Worksheet #10. Currently, they are per page, but this is a "continued" worksheet and the footnotes should be, for example, 1, 2, 3, 4, 5, etc. - i.e, not re-started with Footnote 1 on each "(continued)" page.

b) Suggest adding here: ".... of the **TCE groundwater** plume?"

c) Add: “, from the contaminated groundwater?”

d) Please add the Outfall # here.

e) Please add “from” what process here, e.g., “from the groundwater extraction well process”.

f) Add: “)” here. Revise this “1.” to appropriate value, or delete it.

g) This rationale is not readily apparent on worksheet 11. Please clarify where the rationale is included on worksheet 11 or elsewhere. It appears that QAPP Worksheet #17-A. Sampling Design and Rationale should be included.

Response 12:

a) Comment addressed.

b) Comment addressed.

c) Comment addressed.

d) Comment addressed.

e) Text has been revised and is consistent with comment.

f) Comment addressed. Deleted “1. Water.”.

g) Text edited to incorporate reference to worksheet #17-B, reference to worksheet #11 is retained because analytical and field screening data types are discussed, for both chemical and nonchemical analyses.

Comment 13, Worksheet #10, page D-21:

a) Add “stopped” or “suspended” here, if true and appropriate.
b) Add “stopped” or “suspended” here, if true and appropriate.
c) Add “stopped” or “suspended” here, if true and appropriate.
d) Add “stopped” or “suspended” here, if true and appropriate.
e) Add the “exceeded levels used in assumptions” here or in footnote “b” to this Worksheet #10.

Response 13:

a) Comment did not result in a change to the document.

b) Comment did not result in a change to the document.

c) Comment did not result in a change to the document.

d) Comment did not result in a change to the document.

e) Comment addressed, This document assumes the maximum concentration for TCE (at the system inlet) is 3,600 µg/L, and the maximum activity for Tc-99 is the MCL for Tc-99 (900 pCi/L).

Comment 14, Worksheet #10, page D-22:

a) Please move the "a" inside the ":"
b) Please see previous comment on renumbering footnotes in consecutive order for Worksheet #10.

Response 14:

a) Punctuation is correct per the FPDP Style Guide and *The Chicago Manual of Style*.
b) Comment addressed.

Comment 15, Worksheet #11, page D-23:

a) Please consider deleting this text as it appears to be a duplication of the information contained in the header of this page.

b) used for evaluation of the Northeast Plume Optimization Project and will be

c) Are

d) Delete "(" and capitalize Target

e) Delete ")" and end with a period.

f) will be

g) need

h) February

i) Add the Outfall # here.

Response 15:

a) Comment addressed, sentence deleted.
b) Comment addressed.
c) No change made. Subject of sentence is "Type." The verb "is" agrees as sentence is written.
d) Comment addressed.
e) Comment addressed.
f) Comment addressed.
g) Comment addressed.
h) Comment addressed
i) Added CERCLA Outfall 001.

Comment 16, Worksheet 12-K, page D-24: Worksheet #21 has sequential numbers for the reference numbers. Consider replacing this text to read "See QAPP Worksheet #21".

Response 16: Comment addressed.

Comment 17, Worksheet 12-Q, page D-25: Worksheet #21 has sequential numbers for the reference numbers. Consider replacing this text to read "See QAPP Worksheet #21".

Response 17: Comment addressed.

Comment 18, Worksheet 14, page D-27: Change January 2016 to February 2016.

Response 18: Text revised, as requested.

Comment 19, Worksheet 15-A, page D-29:

a) Also define PQL and MCL in footer of this table.
b) Global comment: Add the word: "groundwater" to this sentence and similar sentences.

Response 19:

a) PQL and MCL and all acronyms are called out at first use and included on Acronyms in front matter if used more than once. Style Guide does not call for other callouts on individual worksheet.

b) NAL definition modified to incorporate "groundwater" into the definition. This was first use, so called out as requested.

Comment 20, Worksheet 20, page D-36:

a) This should be #12-K
b) This should be #12-Q

Response 20: Text added as requested

a) Comment addressed.
b) Comment addressed.

Comment 21, Worksheet 22, page D-39: Please verify if this is required quarterly and as needed or just as needed. Edit as appropriate.

Response 21: Comment addressed.

Comment 22, Worksheet 25, page D-42: pH is not included in worksheet #23. Please include the appropriate reference.

Response 22: Comment addressed by revising table entry as "See Worksheet #22."

Comment 23, Worksheet 28, page D-45:

a) This should be #12-K and #12-Q. This comment applies to all of the pages in this worksheet.
b) Please verify whether or not these lines should have the ** note also.

Response 23:

a) Text edited to identify Worksheets #12-K and #12-Q.
b) Asterisks added to CRQL for trip blank and equipment blank.

Comment 24, Worksheet 36, page D-54: This should be #12-K and #12-Q. This should be #15-A,D, and K.

Response 24: Comment addressed.

CERTIFICATION

Document Identification: **Addendum to the *Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-1280&D2/R2/A1, Appendix D, Quality Assurance Project Plan**

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.

_____ _____

Mark J. Duff, Environmental Management Director Date Signed

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 (DOE)

_____ _____

Jennifer Woodard, Paducah Site Lead Date Signed
Portsmouth/Paducah Project Office