APPENDIX D

PHOTOS OF APPROXIMATE SAMPLE LOCATIONS

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FIGURES

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Figure D.1. Sample Location 1, Main Floor Adjacent to Degreaser

Figure D.2. Sample Location 2, Deteriorated Concrete near Column A10

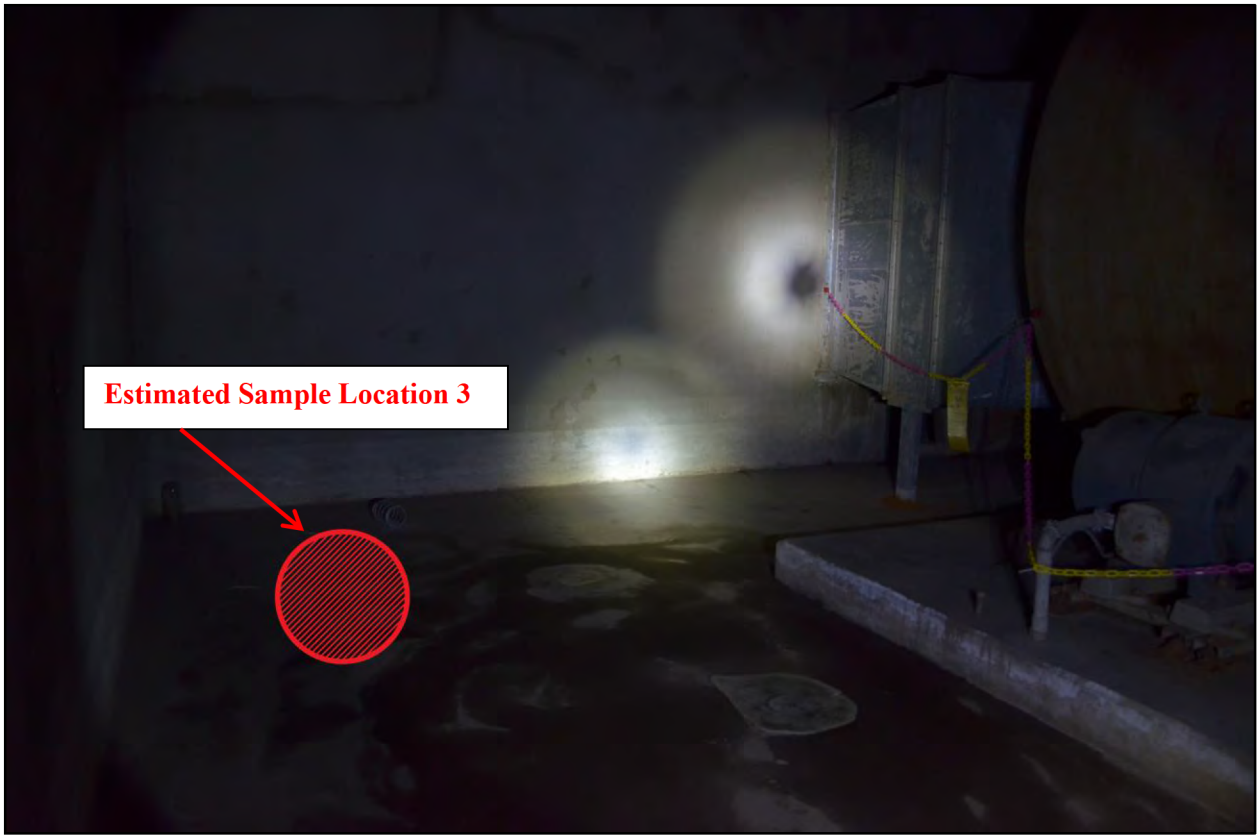

Figure D.3. Sample Location 3, Basement Furnace Room on North End

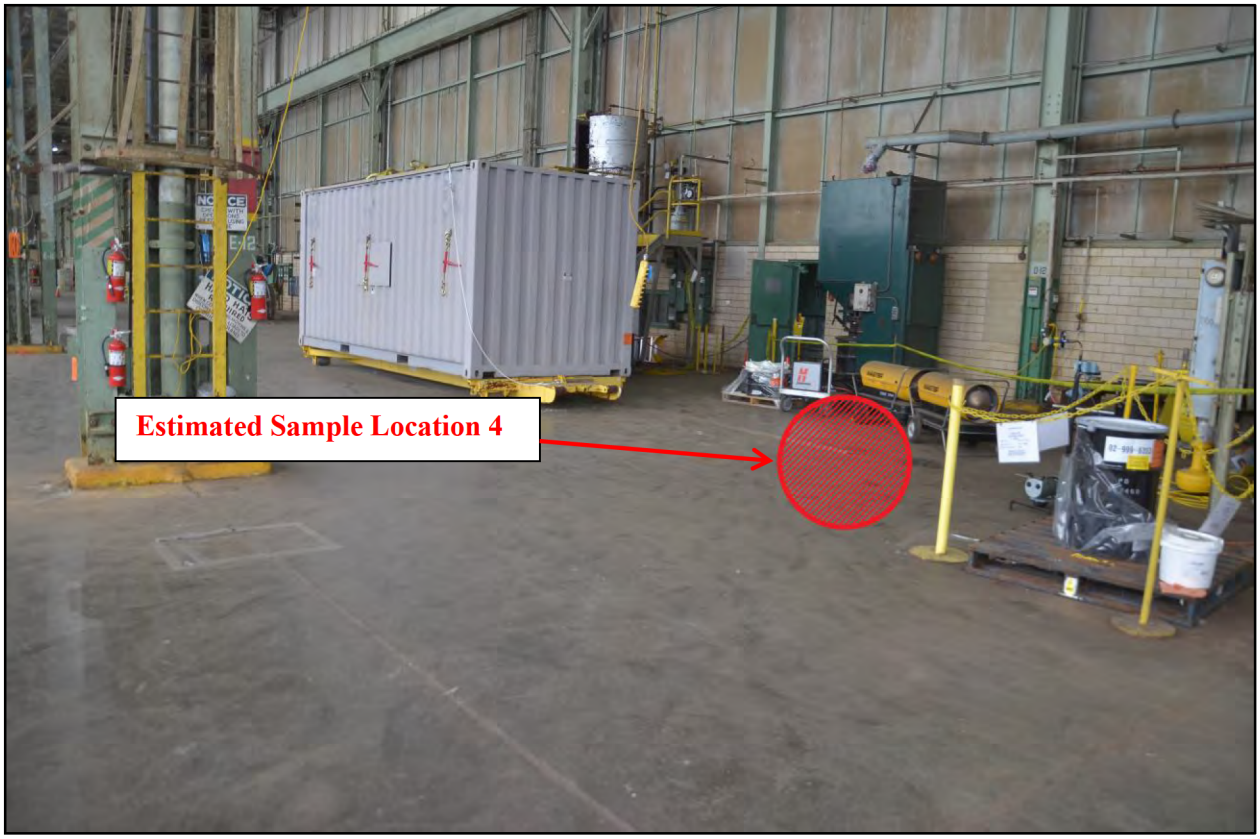

Figure D.4. Sample Location 4, Northeast Central, near Column D12

Figure D.5. Sampling Location 5, Basement Level Near Degreaser Tanks

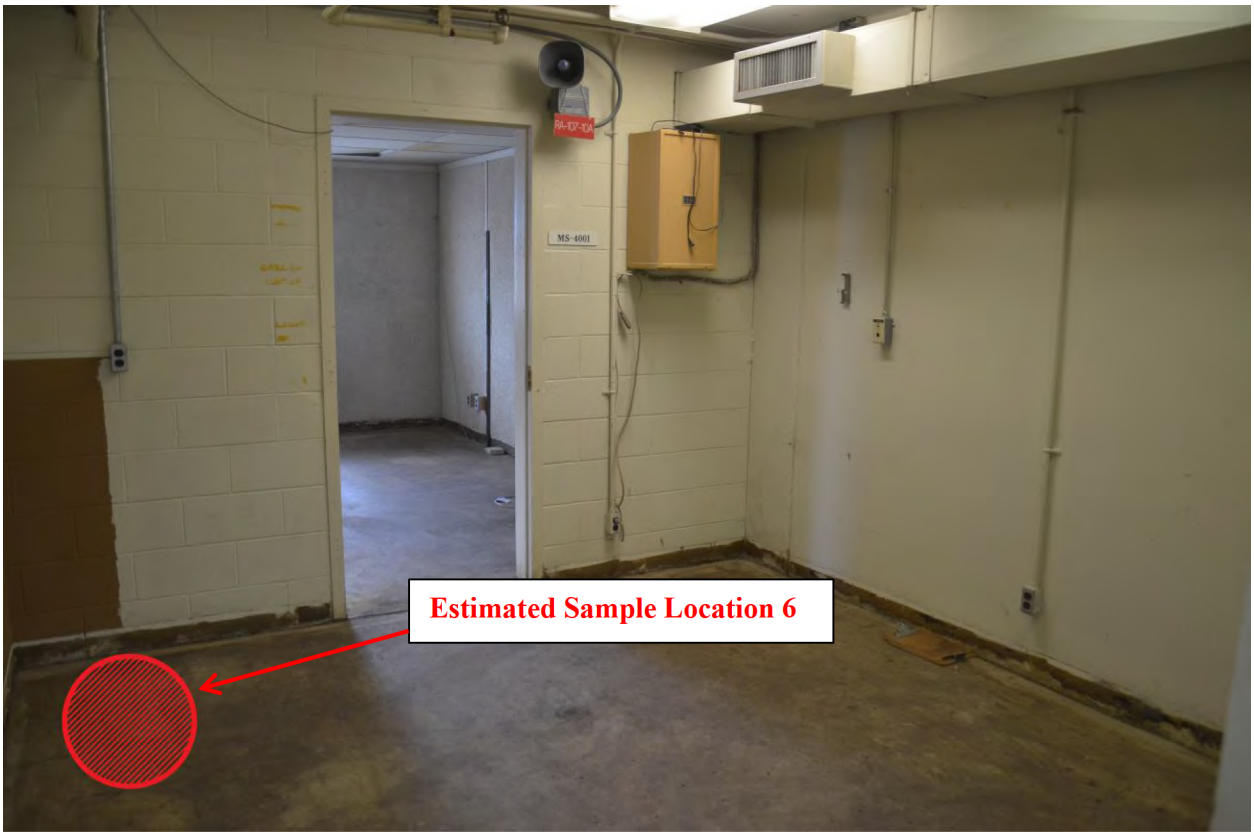

Figure D.6. Sample Location 6, Southeast Office

Figure D.7. Sample Location 7, Southeast Corner Near Column E2

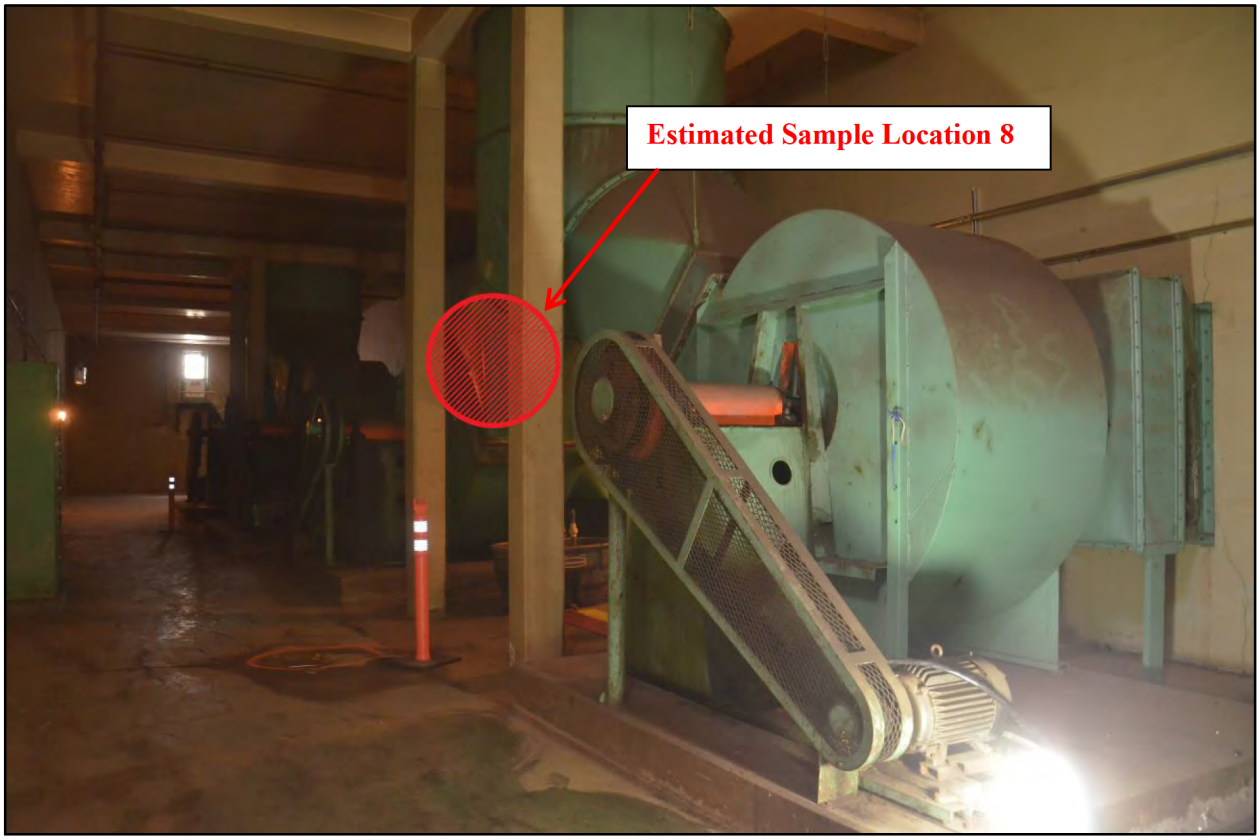

Figure D.8. Sample Location 8, Basement Fan Room Intake/Exhaust Plenum Fans 88/89

Figure D.9. Sample Location Ambient 1, West Location, 72 ft West of Building

Figure D.10. Sample Location Ambient 2, North Location, 50 ft North of Building

Figure D.11. Sample Location Ambient 3 Northeast, 87 ft East of Building, 54 ft North of Operation Stack

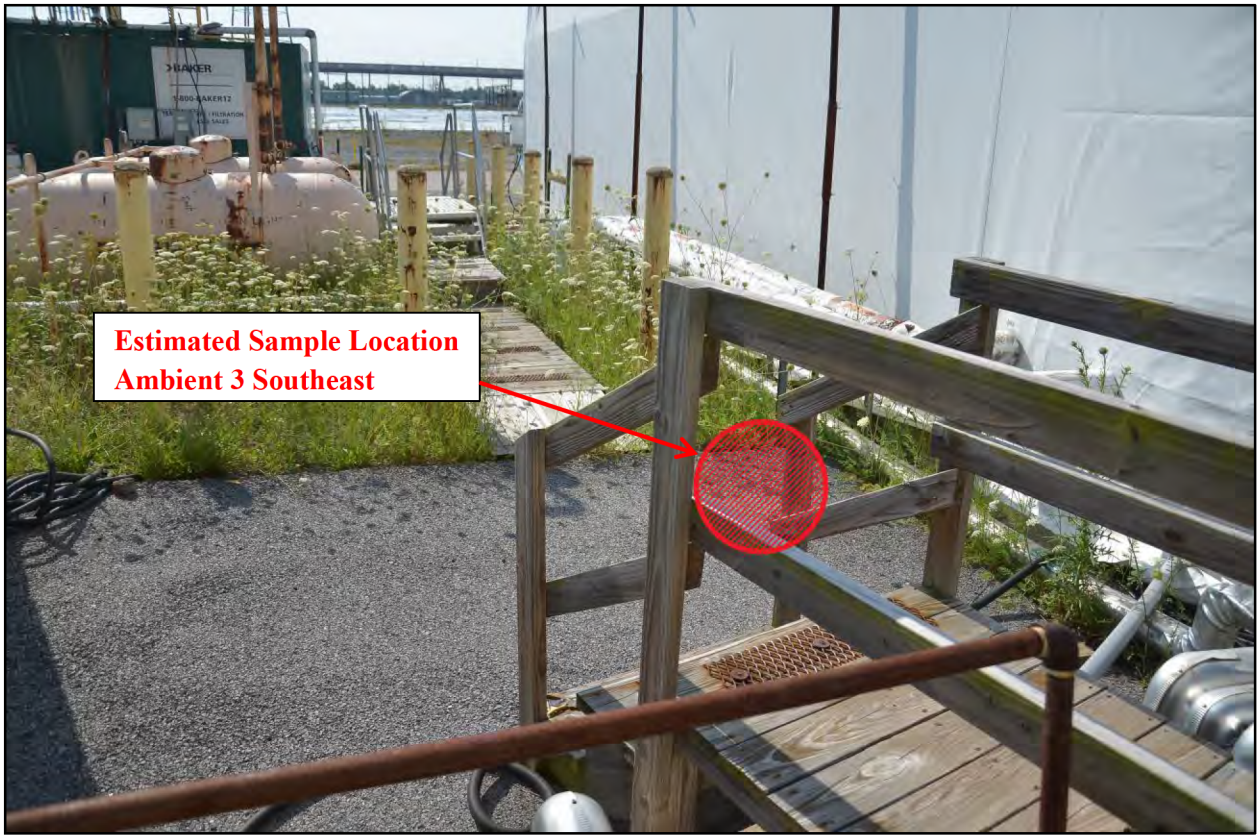

Figure D.12. Sample Location Ambient 3 Southeast, 87 ft East of Building, 54 ft North of Operating Stack

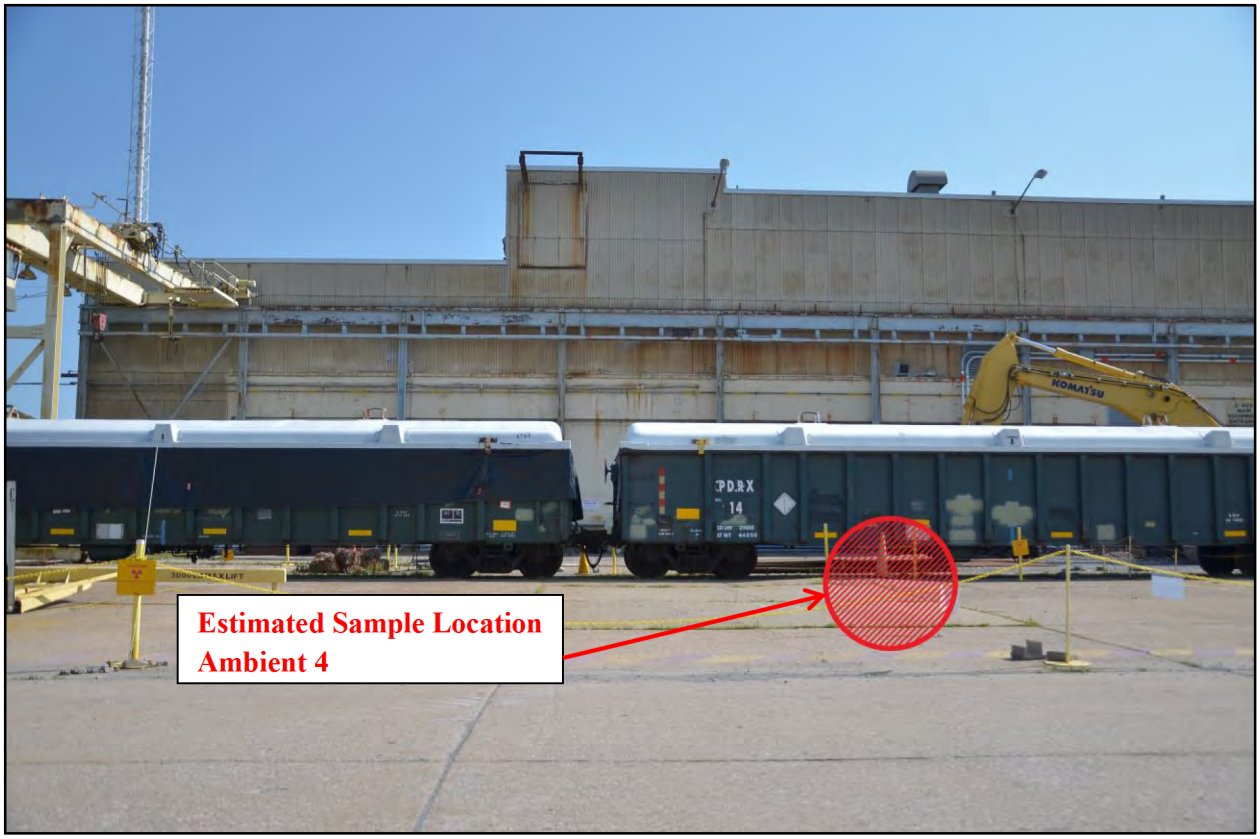

Figure D.13. Sample Location Ambient 4, South Location, 59 ft South of Building

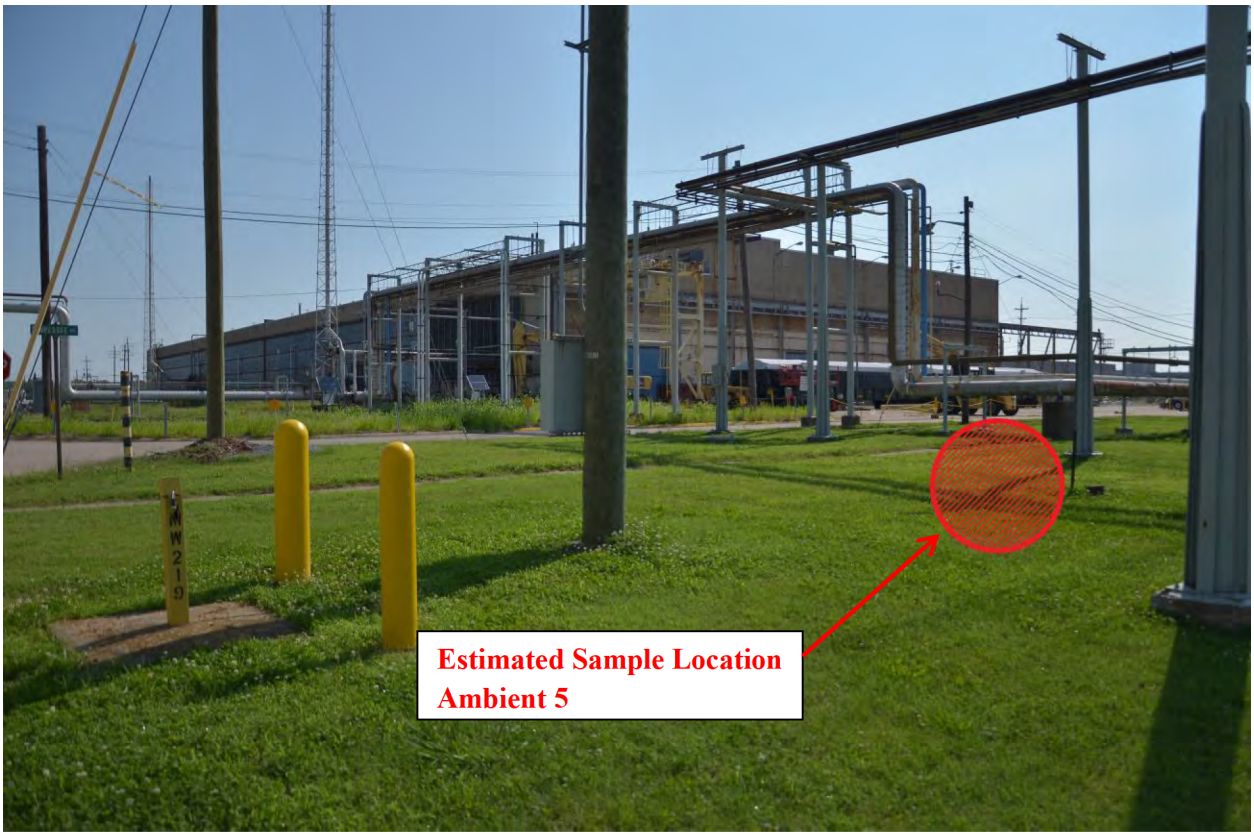

Figure D.14. Sample Location Ambient 5, Weather Station

CP2-ES-0025, *Paducah Environmental Monitoring Waste Management Plan* was deleted on 5-10-16

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CP2-ES-0063/R1

Environmental Monitoring Data Management Implementation Plan at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

FLUOR®

Environmental Monitoring Data Management Implementation Plan at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

Date Issued—June 2017

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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APPROVALS

Environmental Monitoring
Data Management Implementation Plan
at the Paducah Gaseous Diffusion Plant,
Paducah, Kentucky

CP2-ES-0063/R1

J. D. Sohl
LSRS Project Manager

6/8/2017
Date

Myrna E. Redfield
Environmental Management Director

6/12/17
Date

Effective Date: 6/15/17

Review Date: 6/12/18

Nuclear Safety Documentation: FPDP-17-0343-X

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CONTENTS

ACRONYMS

COC	chain-of-custody
DMIP	Data Management Implementation Plan
DOE	U.S. Department of Energy
EDD	electronic data deliverable
EM	Environmental Monitoring
EMP	environmental monitoring plan
ERPP	Environmental Radiation Protection Program
FB	field blank
FPDP	Fluor Federal Services, Inc., Paducah Deactivation Project
FY	fiscal year
GIS	Geographic Information System
HSPD	Homeland Security Presidential Directive
KPDES	Kentucky Pollutant Discharge Elimination System
MW	monitoring well
Paducah OREIS	Paducah Oak Ridge Environmental Information System
Paducah PEMS	Paducah Project Environmental Measurements System
PC	personal computer
PEGASIS	Portsmouth/Paducah Project Office Environmental Geographic Analytical Spatial Information System
PGDP	Paducah Gaseous Diffusion Plant
PPPO	Portsmouth/Paducah Project Office
QA	quality assurance
QC	quality control
RI	equipment rinseate
RM	records management
RTL	ready-to-load
SMO	Sample Management Office
SOW	statement of work
TB	trip blank

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EXECUTIVE SUMMARY

This Data Management Implementation Plan identifies and documents data management requirements and applicable procedures, expected data types and information flow, and roles and responsibilities for data management activities associated with environmental monitoring (EM) at the Paducah Gaseous Diffusion Plant. This document supports the environmental monitoring plan (EMP) and the EM Quality Assurance Project Plan (Appendix D of the EMP). The Data Management Implementation Plan (DMIP) will operate under the Fluor Federal Services, Inc., Paducah Deactivation Project (FPDP) Quality Assurance Program Description, with FPDP's quality organization providing oversight for quality activities associated with the EM DMIP. The DMIP and the EM Quality Assurance Project Plan address aspects of the data quality objectives of the EM Program.

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

Data types to be managed for the project include field data and analytical data. Historical data is downloaded from the Paducah Oak Ridge Environmental Information System (Paducah OREIS), if available. All historical data available in electronic format are stored in the project's Paducah Project Environmental Measurements System (Paducah PEMS). Field data are recorded on sample data forms and are entered into Paducah PEMS, as appropriate, for storage. Analytical data are planned and managed through Paducah PEMS and transferred to Paducah OREIS for long-term storage and reporting.

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1. INTRODUCTION

The purpose of this Data Management Implementation Plan (DMIP) is to identify and document data management requirements and applicable procedures, expected data types and information flow, and roles and responsibilities for all data management activities associated with environmental monitoring (EM) at the Paducah Gaseous Diffusion Plant (PGDP). This document supports the Environmental Monitoring Plan (EMP). Data management provides a system for efficiently generating and maintaining technically and legally defensible data that provide the basis for making sound decisions regarding the environmental characterization at PGDP.

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

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

The DMIP will operate under the Fluor Federal Services, Inc., Paducah Deactivation Project (FPDP) Quality Assurance Program Description, with FPDP quality organization providing oversight for quality activities associated with the EM DMIP. The DMIP and the EM Quality Assurance Project Plan address aspects of the data quality objectives of the EM Program.

1.1 PROJECT MISSION

Requirements and responsibilities described in this plan apply to activities conducted by the project team in support of EM. Specific activities involving data include, but are not limited to, sampling of groundwater, surface water, sediment, soil, and ambient air; storing, analyzing, and shipping samples; and evaluation, verification, validation, assessment, and reporting of analytical results.

1.2 DATA MANAGEMENT ACTIVITIES

Data management is implemented throughout the life cycle of EM. This life cycle occurs from the planning of data for environmental characterization, through the collection, review, and actual use of the data for decision-making purposes, to the long-term storage of data. Data management activities include the following:

- Acquire existing data
- Plan data collection
- Prepare for sampling activities
- Collect field data
- Collect field samples
- Submit samples for analysis

- Process laboratory analytical data
- Verify data
- Validate data
- Assess data
- Consolidate, analyze, and use data and records
- Submit data to the Paducah Oak Ridge Environmental Information System (Paducah OREIS)

Section 6 contains a detailed discussion of the activities listed above.

1.3 DATA MANAGEMENT INTERACTIONS

The Sample Management Office (SMO) oversees the use of the Paducah Project Environmental Measurements System (Paducah PEMS) and ensures that data deliverables meet DOE's standards. The Data Entry Specialist enters information into Paducah PEMS related to the fixed-base laboratory data once the samples have been delivered and the SMO has verified receipt of the samples. The fixed-base laboratory electronic data deliverables (EDDs) are loaded into Paducah PEMS by the data entry specialist. EM is responsible for data verification, validation if applicable, assessment, and for preparing the data for transfer from Paducah PEMS to Paducah Oak Ridge Environmental Information System (Paducah OREIS). The SMO is responsible for transferring the data from the ready-to-load (RTL) files to the Paducah OREIS database.

The SMO develops the statement of work (SOW) to be performed by an analytical laboratory in the form of a project-specific laboratory SOW. Analytical methods, reporting limits, and deliverable requirements are specified in this SOW. For routine work, a laboratory SOW is developed annually, prior to the beginning of the fiscal year (FY). Laboratory SOWs for nonroutine or special sampling events will be developed as needed throughout the FY.

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

2. DATA NEEDS AND SOURCES

Multiple data types are generated and/or assessed during this project. These data types include field data, analytical data (including environmental data), and Geographic Information System (GIS) data.

2.1 HISTORICAL DATA

Historical data consist of analytical data and lithologic descriptive data from borings and monitoring wells (MWs) previously installed in support of the project. Historical data that are available electronically are downloaded from Paducah OREIS, as needed. Historical data available in electronic format are stored in the project's Paducah PEMS and is evaluated when necessary.

2.2 FIELD DATA

Field data for the project includes sample collection information, field measurement analyses, and monitoring well water levels.

2.3 ANALYTICAL DATA

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

2.4 GIS COVERAGE

The Paducah GIS network is used for preparing maps used in data analysis and reporting of both historical and newly generated data. Coverage for use during the project is as follows:

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

3. DATA FORMS

Chain-of-custody (COC) forms, data packages with associated quality assurance/quality control (QA/QC) information, field forms, and sample data forms are maintained according to the requirements defined in procedure CP3-RD-0010, *Records Management Process.*

Field documentation is scanned electronically to an area on the network. EM records are submitted electronically to FPDP records management (RM). The electronic file is considered the record. Copies are flagged accordingly.

3.1 FIELD FORMS

Sample information is environmental data describing the sampling event and consists of the following: station (or location), date collected, time collected, sampler comments, and other sampling conditions. This information is recorded on COC forms, sample labels, or sample data forms and is entered directly into Paducah PEMS by the SMO. The EMP provides detailed information on sampling locations, types of samples, analytical parameters required at each location, and the frequency of collection for EM samples.

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

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

Information that is preprinted:	Information that is entered manually:
• Lab COC number	• Sample date and time
• Project name or number	• Sample comments (optional)
• Sample ID number (reflects sample type)	
• Sampling location	
• Sample matrix (e.g., WG = groundwater)	
• Analysis (e.g., TCE)	
• Sample container (volume, type, preservation)	

Sample identification numbers are identified in Paducah PEMS and are assigned by the SMO according to the project, sample type, and location. An example of the sample numbering schemes used for EM is provided below for each different type of media.

Groundwater Sampling Identification Numbers. Used for all groundwater, carbon-filtered, and QC samples, such as duplicates, field blanks (FBs), trip blanks (TBs), and equipment rinseates (RIs) (blanks) in the following format.

MW###LE-YY, where:

MW### is the sequential number of the monitoring well;
L is the location number such as C404 (for C-404), KG (for C-746-K), SG (for C-746-S and -T), or UG (for C-746-U); A (for Annual Environmental Surveillance and Geochemical wells); BI (for Biennial Environmental Surveillance wells); Q (for Northeast Plume wells); SA (for Northeast and Northwest Plume wells and semiannual Environmental Surveillance wells); C400 (for C-400 wells);
E is the number of the event of when the samples were collected (1 through 4); and
YY is the FY the sample was collected.

For example, sample identification number "MW420C4041-13" was collected at MW420, a monitoring well at a specific location near the C-404 Landfill, during the first event in FY 2013. A field duplicate sample is identified by the addition of a "D" after the "MW###" in the numbering scheme. "MW420DC4041-13" is the duplicate sample of "MW420C4041-13." Adding "TB" (for a trip blank), a "FB" (for a field blank), or a "RI" (for an equipment rinseate) to the front of the numbering scheme identifies the TBs, FBs, and RIs. For example, "TB1C4041-13" is a trip blank ("TB") that was collected at C-404 during the first groundwater sampling event of the FY 2013.

Water Policy Boundary Groundwater Sampling Identification Numbers. Used for all groundwater collected from residential wells and associated MWs, and associated QC samples, such as duplicates, FBs, TBs, and RIs (blanks) in the following format.

L###WPBFE-YY, where:

L### is the sequential number of the residential or monitoring well;
WPB indicates the sample ID is for the water policy boundary groundwater sampling program;
F is the frequency of the sampling event (Q for quarterly and A for annually);
E is the number of the event of when the samples were collected (1 through 4); and
YY is the FY the sample was collected.

For example, sample identification number "R19WPBQ1-13" was collected at R19, a residential well during the first quarter of FY 2013. An annual sample is identified by the addition of an "A" after the "L###WPB" in the numbering scheme. A field duplicate sample is identified by the addition of a "D" after the "L###" in the numbering scheme. "R19DWPBQ1-13" is the duplicate sample of "R19WPBQ1-13." Adding a "TB" (for a trip blank), a "FB" (for a field blank), or a "RI" (for an equipment rinseate) to the front of the numbering scheme identifies the TBs, FBs, and RIs. For example, "RIWPBQ1-13" is an equipment rinseate blank ("RI") that was collected during the first quarter of FY 2013.

Carbon Filter Treatment Sampling Identification Numbers. Used for sampling of the carbon filter treatment system in the following format.

LPXTM-YY, where:

L indicates the location of the carbon filters (in this instance, L is station R424);
PX indicates the port to be sampled; X is 1, 2, or 3;
T is the time of the sampling, before (B) or after (A) the filter has been changed;
M is the month of the year in which the samples were collected; and
YY is the calendar year the sample was collected.

For example, sample identification number "R424P3B2-13" was collected from R424, Port 3 before the filter was changed out in February 2013. Trip blanks are designated with a "TB." For example, "TB1CARB2-13" is a TB that was collected during the sampling event of February 2013.

Landfill Surface Water Sampling Identification Numbers. For surface water sampling associated with effluent monitoring at the landfills, a sample identification numbering system is made of a series of numbers in the following format.

LXE-YY, where:

L is the L series location number such as L150, L154, etc.;
X is the location/description such as SS (for C-746-S Landfill surface water) and US (for C-746-U Landfill surface water);
E is the number of the event of when the samples were collected; and
YY is the FY the sample was collected.

For example, sample identification number "L150US1-13" was taken at L150; "US" denotes surface water samples were collected at C-746-U; "1" denotes the sample was collected in the first event for the FY, and "13" denotes the FY 2013, in which the sample was taken. A field duplicate sample is identified by the addition of a "D" after the "L" in the numbering scheme. For example, "L150DUS1-13" is a duplicate surface water sample collected at location L150 at the C-746-U Landfill during the first event of FY 2013. Adding a "FB" (for a field blank) to the front of the numbering scheme identifies a field blank.

For example, "FB1US1-13" is a field blank ("FB") that was collected at the C-746-U Landfill during the first surface water sampling event of the FY 2013.

Environmental Surveillance Surface Water Sampling Identification Numbers. For surface water sampling associated with environmental surveillance monitoring, a sample identification numbering system is made of a series of numbers in the following format.

LEMPN-YY, where:

L indicates the location number such as L1, L10, L29, C612, etc.;
EMP denotes the samples were collected for EM;
N is the month in which the samples were collected; and
YY is the calendar year the sample was collected.

For example, "L6EMP11-12" is a sample identification number where "L6" denotes the sample was taken at a specified location; "EMP" denotes the samples were collected for EM; "11" denotes the sample was collected in November and "12" denotes the year, 2012, in which the sample was taken. A field duplicate sample is identified by the addition of a "D" after the "L" in the numbering scheme. For example, "L6DEMP11-12" is a duplicate sample collected at location L6 during November 2012. Adding a "TB" (for a trip blank), a "FB" (for a field blank), or a "RI" (for an equipment rinseate) to the front of the numbering scheme identifies the TBs, FBs, and RIs. For example, "TB1LEMP11-12" is the first trip blank ("TB") that was collected during the November 2012 sampling event.

C-613 Sediment Basin Water Sampling Identification Numbers. For surface water sampling associated with the C-613 Sediment Basin, a sampling identification numbering system is made of a series of numbers in the following format.

LEYY-NN, where:

L indicates the location number, which is C613;
E denotes the sampling event; Q (quarterly event);
YY is the FY the sample was collected; and
NN is the sequential sample collected.

For example, "C613Q13-01" is a sample identification number where "C613" denotes the sample was taken at the C-613 sediment basin; "Q" denotes the sample is from the quarterly event; "13-01" denotes the sample was collected in the first quarter FY 2013.

Kentucky Pollutant Discharge Elimination System (KPDES) Sampling Identification Numbers. Sample identification numbering system is made up of several different series of numbers in the following formats.

TLN-YY, where:

T is the time frame of collection such as a weekly (W1, W2, W3, or W4), a monthly sample (M), or a quarterly sample (Q);
L is the outfall location such as K001, K015, K017, K019, or K020;
N is the month in which the sample was collected; and
YY is the calendar year the sample was collected.

For example, "MK01710-12" is a sample identification number where "M" denotes a monthly sample was collected at Outfall K017; "10" denotes the sample was collected in the tenth month, October, and "12" denotes the year, 2012, in which the sample was collected. A field duplicate sample is identified by the addition of a "D" after the "L" in the numbering scheme. For example, "MK017D10-12" is a duplicate sample collected at Outfall K017 during October 2012. Adding a "TB" (for a trip blank), a "FB" (for a field blank), or a "RI" (for an equipment rinseate) to the front of the numbering scheme identifies the trip blanks, field blanks, and equipment rinseates. For example, "FBMK0171-13" is a field blank ("FB") that was collected at Outfall K017 during January 2013. For those TBs that are associated with multiple outfalls, the outfall location will be omitted from the sample identification number. For example, TB1M10-15 is a TB associated with multiple outfalls collected during October 2015.

KPDES Toxicity Sampling Identification Numbers. The following sample identification numbering scheme for toxicity samples is as follows.

QZTXLN-YY, where:

Q is the time frame of collection—in this case quarterly;
Z is the sequential sample collected for the toxicity sample, such as 1, 2, 3, and 4;
TX identifies this sample as one to be analyzed for toxicity;
L is the outfall location such as K001, K015, K017, K019, or K020;
N is the month in which the sample was collected; and
YY is the year the sample was collected.

For example, "Q1TXK00110-12" is the first quarterly toxicity sample that was collected at Outfall K001 during October 2012.

Sediment Sampling Identification Numbers. Sample identification numbering system is made of a series of numbers in the following format.

LSEMPN-YY, where:

L is the location number such as 746K, S1, S20, S21, S27, etc.;
SEMP denotes the samples were collected for EM sediment sampling program;
N is the month in which the samples were collected; and
YY is the calendar year the sample was collected.

For example, "S31SEMP11-12" is a sample identification number where "S31" denotes the sample was taken at a specified location; "SEMP" denotes the sample was collected under the EM sediment sampling program in November 2012. A field duplicate sample is identified by the addition of a "D" after the "L" in the numbering scheme. For example, "S31DSEMP11-12" is a duplicate sample collected at location S31 for EM sediment sampling program during November 2012. Adding a "TB" (for a trip blank), a "FB" (for a field blank), or a "RI" (for an equipment rinseate) to the front of the numbering scheme identifies the TBs, FBs, and RIs. For example, FBSEMP11-12, is the FB to be collected during the November 2012 sediment sampling event.

Environmental Radiation Protection Program (ERPP) Sampling Identification Numbers. For ERPP sampling, the sample identification number is made up of a series of numbers in the following format.

LERPPN-YY, where:

L is the location number such as L11, K020, S1, etc.;
ERPP denotes the samples were collected for the ERPP;
N is the month in which the samples were collected; and
YY is the calendar year the sample was collected.

For example, "L11ERPP11-14" is a sample identification number where "L11" denotes the sample was taken at a specified location; "ERPP" denotes the sample was collected for ERPP in November 2014. A field duplicate sample is identified by the addition of a "D" after the "L" in the numbering scheme. For example, "L11DERPP11-14" is a duplicate sample collected at location L11 for ERPP during November 2014. Adding a "FB" (for a field blank) to the front of the number scheme identifies a field blank.

Annual Leachate Sampling Identification Numbers. For annual leachate sampling at C-746-S&T and C-746-U, the sample identification number is made up of a series of numbers in the following format.

PPPPP-PP-NN, where:

PPPPP-PP is the project identification number; and
NN denotes a sequential sample that was collected (if needed).

For example, "ULS12-01-01" denotes an annual leachate sample from C-746-U Landfill for the 2012 project ID. Adding TB (for a trip blank), an "FB" (for a field blank), or an "RI" (for an equipment rinseate) to the front of the project identification number (ULS12-01) identifies the trip blanks, field blanks, and RIs. For example, "TBULS12-01" is a trip blank ("TB") that was collected during the annual leachate sampling event from C-746-U Landfill in 2012.

Ambient Air Sampling Identification Numbers. Sample identification numbering system is made up of several different series of numbers in the following formats.

TLE-YY, where:

T is the time frame of collection such as a weekly for the quarter (W) or the quarterly sample (Q);
L is the air monitor location such as AMD002;
E is the quarter in the FY in which the sample was collected; and
YY is the FY the sample was collected.

For example, "W01AMD0021-15" denotes the week 1 sample from location AMD002 during the first quarter FY 2015.

Special Request Sampling (Nonroutine) Identification Numbers. Used for nonroutine or special request sampling in the following format.

LTM-YY, where:

L indicates the location of the sampling;
T is the type of media or a description of the sampling event;
M is the month of the year in which the samples were collected; and
YY is the calendar year the sample was collected.

3.2 LITHOLOGIC DESCRIPTION FORMS

Lithologic description forms are not necessary for use during routine activities under EM.

3.3 WELL CONSTRUCTION DETAIL FORMS

Well logs and construction diagrams contain information recorded by the engineer or geologist during construction of the MWs. These forms are not necessary for use during routine activities under EM.

3.4 SAMPLE DATA FORMS

Sample data forms are utilized for recording sampling information during groundwater, surface water, ambient air, leachate, and sediment sampling, as well as special sampling events. Sample data forms are maintained according to CP4-ES-2700, *Logbooks and Data Forms*.

4. DATA AND DATA RECORDS TRANSMITTALS

4.1 PADUCAH OREIS DATA TRANSMITTALS

Data to be stored in Paducah OREIS is submitted to the SMO prior to reporting. Official data reporting will be generated from data stored in Paducah OREIS. Data used for the discharge monitoring report has been through the data review process, but, due to the quick turnaround time, may not be loaded to Paducah OREIS at the time of reporting.

4.2 DATA RECORDS TRANSMITTALS

EM personnel will make record transfers to FPDP RM according to CP3-RD-0010, *Records Management Process*.

5. DATA MANAGEMENT SYSTEMS

5.1 PADUCAH PEMS

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

- Initiate the project
- Plan for sampling
- Record sample collection and field measurements
- Record the dates of sample shipments to the laboratory (if applicable)
- Receive and process analytical results
- Verify data

- Access and analyze data
- Transfer project data (in RTL format) to Paducah OREIS

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

The information technology group performs system backups daily. The security precautions and procedures implemented by the SMO are designed to minimize the vulnerability of the data to unauthorized access or corruption. Only users approved by the SMO have access to the project's Paducah PEMS and the hard copy and electronic data files. Users have Homeland Security Presidential Directive (HSPD)-12 universal serial bus card readers installed on their personal computer (PC) to control access to the PC and the network.

5.2 PADUCAH OREIS

Paducah OREIS is the centralized, standardized, quality assured, and configuration-controlled data management system that is the long-term repository of environmental data (measurements and geographic) for Paducah environmental management projects. Paducah OREIS is comprised of hardware, commercial software, customized integration software, an environmental measurements database, a geographic database, and associated documentation. EM uses Paducah OREIS for the following functions:

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

5.3 PADUCAH ANALYTICAL PROJECT TRACKING SYSTEM

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

5.4 U.S. DEPARTMENT OF ENERGY—PORTSMOUTH/PADUCAH PROJECT OFFICE ENVIRONMENTAL GEOGRAPHIC ANALYTICAL SPATIAL INFORMATION SYSTEM

Portsmouth/Paducah Project Office (PPPO) Environmental Geographic Analytical Spatial Information System (PEGASIS) provides a systematic approach to retrieve, display, and download analytical, geotechnical, and hydrological data, maps, and geophysical information for PPPO sites using a Web browser. The information includes analytical sample results from various environmental studies, restoration reports and supporting documents, maps, and facility drawings managed by DOE and its contractors. PEGASIS is a Web site that allows project managers, DOE, state and federal regulators, and

the public to have access to sampling data for hundreds of investigative wells and sampling events, solid waste management units, and site-specific GIS features from all of the environmental studies at the site. Project data is uploaded from Paducah OREIS to PEGASIS on a quarterly basis.

6. DATA MANAGEMENT TASKS AND ROLES AND RESPONSIBILITIES

6.1 DATA MANAGEMENT TASKS

The following data management tasks are numbered and grouped according to the activities summarized in Section 1.2.

6.1.1 Acquire Existing Data

The primary background data for this project are historical analytical data and field information recorded in field logbooks, sample data forms, Paducah PEMS, and Paducah OREIS.

6.1.2 Plan Data Collection

Other documents for this project provide additional information for the tasks of project environmental data collection, including sampling and analysis planning, QA, waste management, and health and safety. Laboratory SOWs are developed annually, prior to the beginning of the FY based on the requirements identified in the EMP. In addition, SOWs are developed for other sampling events, as needed.

6.1.3 Prepare for Sampling Activities

The data management tasks involved in sample preparation, as specified in CP3-ES-5004, *Sample Tracking, Lab Coordination, and Sample Handling Guidance*, include identifying all sampling locations and preparing descriptions of these stations, developing sample and analysis summaries to be conducted at each sampling location, developing operational data collection sheets for routine operations and maintenance, identifying sample containers and preservation, developing sample data forms, preparing sample kits and COC forms, and coordinating sample delivery to the laboratory. The SMO conducts activities associated with the analytical laboratories. Coordinates for sample locations, which were surveyed during installation, are already established in Paducah OREIS. Coordinates for nonroutine sampling events are obtained using a global positioning system.

The sampling group and SMO perform data management activities with field sampling in accordance with CP4-ES-5007, *Data Management Coordination.*

The sampling group and SMO review field forms and sampling information for completeness.

6.1.4 Collect Field Data and Samples

Paducah PEMS is used to identify, track, and monitor each sample and associated data from the point of collection through final data reporting. Project documentation includes sample data forms, COC forms, laboratory data packages and electronic analytical results.

Data management requirements for sample data forms and field forms specify that (1) sampling documentation must be controlled from initial preparation to completion, (2) sampling documentation

generated must be maintained in a project file, and (3) modifications to planned activities and deviations from procedures shall be recorded.

The comprehensive sampling list in the EMP is used as the basis for finalizing the sample containers to be used for sample collection and ordering a sufficient number of containers and other supplies. Before the start of routine sampling, the SMO specifies the contents of sample kits, which includes sample containers provided by the laboratories, labels, preservatives, and COC forms. Sample labels and COC forms are completed according to CP4-ES-2708, *Chain-of-Custody Forms, Field Sample Logs, Sample Labels, and Custody Seals*.

The sampling group collects samples for the project. The field team records pertinent sampling information on the COC and sample data form. The SMO enters the information from the COC and sample data forms into Paducah PEMS. A QC check of the sample information and field measurement data entry is made and includes comparing printouts of 100% of the data in Paducah PEMS to the original COC and sample data form. The QC check is documented and added to the data assessment package to be maintained with the project files.

6.1.5 Submit Samples for Analysis

Before the start of field sampling, the sampling group coordinates the delivery of samples and receipt of results with the SMO who, in turn, coordinates with the analytical laboratories. The SMO presents a general sampling schedule to the analytical laboratories. The SMO also coordinates the receipt of samples and containers with the laboratories. The SMO ensures that data packages and EDDs from the laboratories contain the appropriate information and are in the correct format.

6.1.6 Process Laboratory Analytical Data

Data packages and EDDs received from the laboratory are tracked, reviewed, and maintained in a secure environment. Paducah PEMS is used for tracking project-generated data. The following information is tracked, as applicable: sample delivery group number, date received, number of samples, sample analyses, receipt of EDD, and comments. The laboratory EDDs are checked as specified in CP4-ES-5007, *Data Management Coordination*.

6.1.7 Laboratory Contractual Screening

Laboratory contractual screening is the process of evaluating a set of data against the requirements specified in the analytical SOW to ensure that all requested information is received. The contractual screening includes, but is not limited to, the analytes requested, methods used, units, holding times, and reporting limits achieved. Contractual screening is performed for 100% of the data. The SMO primarily is responsible for the contractual screening upon receipt of data from the analytical laboratory according to CP3-ES-5003, *Quality Assured Data*.

6.1.8 Data Verification

Data verification is the process for comparing a data set against a set standard or contractual requirement. Verification is performed by the SMO electronically, manually, or by a combination of both according to CP3-ES-5003, *Quality Assured Data*. Verification is performed for 100% of the data. Data verification may include contractual screening and criteria specific to EM. Data is flagged as necessary. Verification qualifiers are stored in Paducah PEMS and transferred with the data to Paducah OREIS.

6.1.9 Data Validation

Data validation is the process performed by a qualified individual for a data set, independent from sampling, laboratory, project management, or other decision-making personnel for EM. Data validation evaluates the laboratory adherence to analytical-method requirements. Data validation is managed and coordinated by the SMO. The data validator performs data validation according to the procedures identified in Appendix D of the EMP. Validation qualifiers are input and stored in Paducah PEMS and transferred with the analytical data to Paducah OREIS.

Groundwater data from the quarterly sampling events at the C-746-U and C-746-S&T Landfills and the semiannual sampling events at the C-404 Landfill will be validated in FY 2017. The groundwater data to be validated was chosen because groundwater comprises the majority of the media collected by EM. Additionally, the landfill requirements encompass the majority of all types of analyses specified within the EM program. Therefore, these programs are considered an adequate representation of EM data targeted for data validation. Data packages chosen for validation are validated at 100%.

6.1.10 Data Assessment

Data assessment is the process for assuring that the type, quality, and quantity of data are appropriate for their intended use. It allows for the determination that a decision (or estimate) can be made with the desired level of confidence, given the quality of the data set. Data assessment follows data verification and data validation (if applicable) and must be performed at a rate of 100% to ensure data is useable.

The data assessment is conducted by the EM project manager or their designee in conjunction with project team members according to CP3-ES-5003, *Quality Assured Data*. Assessment qualifiers are stored in Paducah PEMS and transferred with the data to Paducah OREIS. Data is made available for reporting upon completion of the data assessment, and associated documentation (Data Assessment Review Checklist) is filed with the project files. Any problems found during the review process are resolved and documented in the data assessment package.

6.1.11 Data Consolidation and Usage

The data consolidation process consists of the activities necessary to prepare the evaluated data for the users. The SMO prepares files of the assessed data from Paducah PEMS to Paducah OREIS for future use. The SMO is responsible for transferring the data to Paducah OREIS. Data used in reports (e.g., the quarterly landfill reports and the Annual Site Environmental Report) distributed to external agencies is obtained from data in Paducah OREIS and has been through the data review process. Data used for the discharge monitoring report has been through the data review process, but due to the quick turnaround time, may not be loaded to Paducah OREIS at the time of reporting. All data reported has the approval of the EM project manager.

6.1.12 Submit Data to Paducah OREIS

Official data reporting for the EM project will be generated from data stored in Paducah OREIS. The SMO is responsible for transmitting the data to Paducah OREIS once verification, validation, and assessment have been completed.

6.2 DATA MANAGEMENT ROLES AND RESPONSIBILITIES

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

6.2.1 EM Project Manager

The EM project manager is responsible for the day-to-day operation of EM and oversees the day-to-day operations of the SMO. The EM project manager ensures the requirements of policies and procedures are met, implements equipment maintenance and calibration requirements, and assesses operational data in accordance with CP3-ES-5003, *Quality Assured Data.* The EM project manager is responsible to flow down data management requirements to subcontractors, as required; for long-term storage of project data; and for transmitting data to external agencies according to the Paducah Site Data Management Plan, DOE/OR/07-1595, and the Paducah Data Management Policy. The EM project manager ensures compliance to procedures relating to data management with respect to the project and that the requirements of CP3-ES-5003, *Quality Assured Data* are followed.

6.2.2 Project Team

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

6.2.3 Data User

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

6.2.4 Data Entry Specialist

After receiving a notification that a fixed-base laboratory EDD is available to download, the data entry specialist loads the EDD to Paducah PEMS, performs electronic verification of the data, and then compiles the data assessment package. The data entry specialist also may prepare data for transfer from Paducah PEMS to Paducah OREIS. The data entry specialist coordinates submittal of electronic records, which include COCs, sample data forms, laboratory data packages, data assessment packages, and data validation reports. These activities also can be completed by a scientist or any other personnel appointed by the EM project manager.

6.2.5 Records Management Manager

The RM manager is responsible for the long-term storage of project records. The EM team interfaces with the RM manager and transfers documents and records in accordance with DOE requirements.

6.2.6 Quality

Quality will provide oversight of the data management process, which will include documentation reviews in support of the oversight requirements.

6.2.7 Sample Management Office

The SMO enters the data into Paducah PEMS, including COC information, field data, data assessment and validation qualifiers, and any pertinent sampling information. The SMO also is responsible for

contracting any fixed-base laboratory used during the sampling activities. The SMO also provides coordination for sample shipment to the laboratory, contractual screening of data packages, and transmittal of data packages to FPDP RM. The SMO populates Paducah PEMS in order to generate COCs, sample labels, and sample data forms. These roles can be completed by a scientist or any other personnel appointed by the EM project manager.

6.2.8 Sampling Group

The sampling group is responsible for preparing sample kits, performing sampling according to Appendix C of the EMP, and shipping samples to off-site laboratories. This group records field information on sample data forms and required field information on COC forms. The sampling group coordinates sample delivery to the laboratories with the SMO.

7. REFERENCES

CP2-ES-0006, *Environmental Monitoring Plan Fiscal Year 2017 Paducah Gaseous Diffusion Plant, Paducah, Kentucky*

CP2-QA-1000, *Quality Assurance Program Description for the Fluor Federal Services, Inc. Paducah Deactivation Project*

CP3-ES-5003, *Quality Assured Data*

CP3-ES-5004, *Sample Tracking, Lab Coordination, and Sample Handling Guidance*

CP3-RD-0010, *Records Management Process, Administrative Record, and Document Control*

CP4-ES-2700, *Logbooks and Data Forms*

CP4-ES-2708, *Chain-of-Custody Forms, Field Sample Logs, Sample Labels, and Custody Seals*

CP4-ES-5007, *Data Management Coordination*

DOE/OR/07-1595, *Paducah Site Data Management Plan*

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Volatile and Semivolatile Analyses Data Verification and Validation Paducah Gaseous Diffusion Plant, Paducah, Kentucky

FLUOR®

Volatile and Semivolatile Analyses Data Verification and Validation Paducah Gaseous Diffusion Plant, Paducah, Kentucky

Date Issued—May 2016

U.S. DEPARTMENT OF ENERGY
Office of Environmental Management

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

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APPROVALS

Volatile and Semivolatile
Analyses Data Verification and Validation
Paducah Gaseous Diffusion Plant,
Paducah, Kentucky

CP2-ES-5105/R0

Lisa Crabtree
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5/16/16
Date

Mark Duff
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5-16-16
Date

DOE Approval Letter: NA Date: NA

Nuclear Safety Documentation:
EXEMPTION #28 5-4-16
5-4-16

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CONTENTS

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TABLES

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ACRONYMS

CCV	continuing calibration verification
CFR	*Code of Federal Regulations*
CLP	Contract Laboratory Program
COC	chain of custody
DQO	data quality objective
EB	equipment blank
EDD	electronic data deliverable
EPA	U.S. Environmental Protection Agency
FB	field blank
GC/MS	gas chromatography/mass spectrometry
ICV	initial calibration verification
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
MB	method blank
MDL	method detection limit
MS	matrix spike
MSD	matrix spike duplicate
m/z	mass-to-charge
QAPP	quality assurance project plan
QC	quality control
RF	response factor
RL	reporting limit
RPD	relative percent difference
RRT	relative retention time
RRF	relative response factor
RSD	relative standard deviation
SDG	sample delivery group
SMO	Sample Management Office
SOW	statement of work
SPCC	system performance check compound
SQL	sample quantitation limit
SVOA	semivolatiles analysis
TIC	tentatively identified compound
VOA	volatiles analysis
%D	percent difference
%R	percent recovery
%RSD	percent relative standard deviation

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DEFINITIONS

NOTE 1: Qualifier definitions are listed in Appendix A.

NOTE 2: In this plan, the words "shall" and "must" are used to denote a requirement; the word "should" is used to denote a recommendation; and the word "may" is used to denote permission (neither a requirement nor a recommendation). In conformance to this plan, all steps shall be performed in accordance with its requirements, but not necessarily with its recommendations; however, justification must be documented for deviations from recommendations.

AFFECTED SAMPLE RESULT—A sample result is considered to be affected when it is significantly influenced by a quality deficiency and is qualified accordingly through analytical data validation.

ANALYTICAL DATA VALIDATION—Analytical data validation is a systematic process, performed independently from the data generator, which applies a defined set of performance-based criteria to a body of data that may result in physical qualification of the data. Data validation occurs prior to drawing a conclusion from the body of data.

ANALYTICAL DATA VERIFICATION—Analytical data verification is a systematic process of evaluating the completeness, correctness, consistency, and compliance of a set of facts against a standard or contract that is performed either by the data generator or by an entity independent to the data generator.

BATCH—A batch is a group of samples prepared at the same time in the same location using the same method, not to exceed 20 samples of similar matrix.

BROMOFLUOROBENZENE—An instrument performance check compound for volatile organics analysis by gas chromatography/mass spectrometry (GC/MS).

CASE—A finite, usually predetermined number of samples, that have been collected over a given time period from a particular site. A case consists of one or more sample delivery groups.

CHAIN OF CUSTODY (COC)—The history of the transfer of samples from the time of sample acquisition through archival and disposal of samples. COC documentation is required as evidence of sample integrity.

CONTINUING CALIBRATION VERIFICATION (CCV)—A standard solution analyzed at a specified frequency during an analytical run to assure continued validity of the calibration curve.

CORRECTABLE PROBLEM—Correctable problems are deficiencies within data packages that may be rectified through consultation with the laboratory. Correctable problems may be revealed during both data verification and data validation. Correctable problems revealed during verification are those deficiencies that can be addressed by obtaining additional information from the laboratory. Correctable problems revealed during validation are those deficiencies with analyses that can be solved either by a second preparation and/or by analysis of a sample.

DATA QUALITY OBJECTIVE (DQO)—DQOs are qualitative and quantitative statements derived from the outputs of each step of the DQO process that specify the study objectives, domain, limitations, the most appropriate type of data to collect, and specify the levels of decision error that will be acceptable for the decision.

DATA QUALITY OBJECTIVES PROCESS—The DQO process is a quality management tool based on the scientific method and developed by the U.S. Environmental Protection Agency to facilitate the planning of environmental data collection activities. The DQO process enables planners to focus their planning efforts by specifying the use of the data (the decision), the decision criteria (action level), and the decision maker's acceptable decision error rates.

HOLDING TIME—Holding time, as described in this plan, is defined as the period of time between sample collection and sample activity determination.

INITIAL CALIBRATION—Initial calibration, as described in this plan, is defined as the standardization of a GC/MS instrument against a traceable standard of known identity and quantity. This standardization prevails until such time as analytical conditions are deemed out of acceptable control limits.

INTERNAL STANDARD—Internal standards are nontarget compounds added to every volatile organic analysis (VOA) and semivolatile organic analysis (SVOA) standard, blank, matrix spike, duplicate, and sample extract at a known concentration, prior to instrumental analysis. Internal standards are used as the basis for quantitation of the target compounds.

LABORATORY CONTROL SAMPLE (LCS)—The LCS is a control sample of known composition. Aqueous and solid LCSs are analyzed using the same preparation, reagents, and method employed for field samples.

LABORATORY DUPLICATE—The laboratory duplicate is a randomly chosen split of an analytical sample into two aliquots prior to sample preparation. The purpose of a laboratory duplicate is to monitor the precision of the analytical method.

MATRIX SPIKE (MS)—The matrix spike is a split of a field-originating analytical sample in which one half of the split is spiked with a known amount of radionuclide of interest prior to sample preparation. The purpose of a matrix spike is to measure the effect of interferences from the sample matrix that will preclude accurate quantitation by the instrumentation.

METHOD BLANK (MB)—The MB is a laboratory-generated sample of the same matrix as the analytical samples, but in absence of the analyte of interest. The purpose of a MB is to monitor the presence of contamination of the analyte of interest in the sample preparation and analysis processes.

NONCORRECTABLE PROBLEM—Noncorrectable problems are deficiencies within data package that preclude the evaluation of data quality by predefined criteria. Noncorrectable problems may be revealed during both data verification and data validation.

PREPARATION BATCH—A preparation batch is a group of sample aliquots prepared together at the same time using the same method and related to the same quality control samples.

RELATIVE PERCENT DIFFERENCE (RPD)—RPD is the measure of precision between two values, defined as the absolute value of the difference between two values divided by the mean of the two values.

RELATIVE STANDARD DEVIATION (RSD)—RSD is the measure of precision between multiple values, defined as the standard deviation of multiple values divided by the mean of the values.

REPORTING LIMIT (RL)—The RL is a contractually specified detection limit that, under typical analytical circumstances, should be achievable.

SAMPLE DELIVERY GROUP (SDG)—An SDG is defined by one of the following, whichever occurs first: (1) case of field samples; (2) each 20 field samples within a case; (3) each 14-day calendar period during which field samples in a case are received, beginning with receipt of the first sample in the SDG.

SAMPLE QUANTITATION LIMIT (SQL)—SQLs are detection limits based on the RDL, which have been modified due to deviations from analytical method specifications such as sample weight and extract volume or due to dilution or percent moisture.

SAMPLE RESULT—A sample result, as described in this plan, is a numeric denotation of the concentration, amount, or activity of a specific analytical parameter uniquely associated with an aliquot of environmental media.

SEMIVOLATILE ORGANIC ANALYTE—Compounds analyzed by semivolatile analytical methods. These compounds are commonly divided into two fractions, base/neutrals and acids.

STATEMENT OF WORK (SOW)—The validation SOW is a document prepared to function as the mechanism by which validation requirements are communicated from the project to the validation organization.

SURROGATE—For semivolatiles and volatiles, surrogates are non-target standard compounds added to every blank, sample matrix spike, matrix spike duplicate and standard used to evaluate analytical efficiency by measuring percent recovery. SVOA surrogates are brominated, fluorinated, or isotopically labeled compounds similar to the compounds of interest in chemical composition. VOA surrogates are brominated or deuterated compounds. Surrogated are not expected to be present in environmental media.

SYSTEM PERFORMANCE CHECK COMPOUND (SPCC)—Compounds used to establish the calibration of an instrument for the SW-846 analytical methodologies applied to VOA and SVOA.

TENTATIVELY IDENTIFIED COMPOUND (TIC)—TICs are compounds detected in samples that are not target compounds, internal standards, system monitoring compounds, or surrogates. Up to 30 peaks (those > 10% of peak areas or heights of nearest internal standards) are subjected to mass spectral library searches for tentative identification.

TURN-AROUND TIME—Turn-around time is contractually specified as the amount of time that elapses between laboratory receipt of the raw samples and subsequent data receipt by the client.

VALIDATION QUALIFIER—A qualifier is an alphabetic character physically or electronically associated with a discrete sample result during validation due to a data quality deficiency, which provides guidance in data usability.

VALIDATION STATEMENT OF WORK—The validation SOW is a document prepared to function as the mechanism by which validation implementation requirements are communicated from the project to the validation organization.

VOLATILE ORGANICS ANALYSIS—Method based on the purge and trap technique for organic compound analysis.

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1. INTRODUCTION

1.1 PURPOSE, SCOPE, AND APPLICATION

1.1.1 Purpose

This plan defines the minimum requirements, responsibilities, and methodology for the volatile organic analysis (VOA) and semivolatile organic analysis (SVOA) data verification and validation processes for evaluating analytical data generated using gas chromatography/mass spectrometry (GC/MS).

This plan provides requirements for developing and implementing a validation methodology for volatiles and semivolatiles Contract Laboratory Program (CLP) and SW-846 (8260 and 8270) analytical methods primarily for analytes in aqueous and soil/sediment matrices. It is flexible enough to allow evaluation of data usability for project-specific data quality objectives (DQOs). Data produced by analytical methods for which this plan provides limited guidance (i.e., Method 8011, Appendix A of 40 *CFR* Part 136, *Protection of Environment*, Appendix A, "Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater," or "Superfund Low Concentration Statement of Work" methods) may necessitate development of modified criteria from this plan; however, the general validation strategy outlined in this plan should be applicable. In the absence of specific guidance contained herein, data validators are advised to seek guidance in the specific method employed and/or from other industry standards. Examples include the U.S. Environmental Protection Agency (EPA), CLP, National Functional Guidelines for Organic Data Review, EPA Regional Data Validation Guidance, and subject matter experts within the industry.

Specifications in this plan should be incorporated into project documentation such as the quality assurance project plan (QAPP), into contractual statements of work (SOWs) between the project and the analytical laboratories, and into contractual validation SOWs between the project and the organization chosen to validate the data. If data validation is performed by individuals within the project, the SOW is not required, but a mechanism to specify validation requirements is recommended. This plan shall be used as a baseline to create project-specific reports needed to perform volatile and semivolatile data verification and validation.

1.1.2 Scope and Application

This plan applies to volatile and semivolatile data verification and validation activities performed by the Sample Management Office (SMO) or its subcontractors.

2. RESOURCES

- Analytical Method
- Laboratory SOW
- Data Validation SOW
- Project-Specific QAPP

3. PREPERFORMANCE ACTIVITIES

Project manager shall ensure that individuals who perform volatile and semivolatile data verification and validation are knowledgeable of the latest version of this plan before beginning any activities.

4. GENERAL INFORMATION

4.1 REQUIRED ELEMENTS OF REVIEW AND VALIDATION

To the extent possible, all laboratory data packages will be produced by the laboratory performing the analysis as Level IV (i.e., EPA Stage 4) laboratory data deliverables. One hundred percent of the data deliverables will undergo a data quality review and validation comparable to a Level I validation (depending on analyte and method). As required by project-specific requirements, the data review and validation effort may be increased to cover a Level II, Level III, or a full Level IV validation of the data package. The activities included in the review and validation effort for each level are provided in Table 1.

Table 1. Required Elements of Review and Validation

Report Elements to be Reviewed*	**Level I**	**Level II**	**Level III**	**Level IV**
Cover/Signature Page	x	x	x	x
Table of Contents			x	x
Report Narrative	x	x	x	x
Executive Summary (if included)			x	x
Method Summary/Analyst Summary			x	x
Sample Summary/Sample Data Sheets	x	x	x	x
Shipping and Receiving Documents	x	x	x	x
Client Chain of Custody	x	x	x	x
Sample Receipt Checklist	x	x	x	x
Interlab COC (where applicable)		x	x	x
Internal COC (if required)			x	x
Glossary of Abbreviations	x	x	x	x
QC RESULTS				
QC Association Summary		x	x	x
Laboratory Chronicle			x	x
Surrogate and/or Tracer and Carrier Recovery Report		x	x	x
Blank Reports		x	x	x
LCS Reports		x	x	x
MS/MSD and Duplicate Reports		x	x	x
Hold Times and Preservation Requirements	x	x	x	x
(Extended Data Deliverables/Forms)				
CLP-Like Organics				
SUMMARY FORMS			x	x
Summary Forms (Org I–X)			x	x
QC SUMMARY			x	x
QC Forms (Org I–IV, VIII)			x	x
SAMPLE DATA			x	x
Quant Rpt + Chro + Spectra				x
STANDARDS DATA			x	x
Calibration Forms (VI–VII; for GC, VIII–X)			x	x

Table 1. Required Elements of Review and Validation (Continued)

Report Elements to be Reviewed*	Level I	Level II	Level III	Level IV
(Quant + Chro Follows Each Form Set)				x
QC DATA			x	x
Tune			x	x
Blank Form I			x	x
Blank Quant Rpt + Chro + Spectra				x
LCS/LCSD Form I			x	x
LCS/LCSD Quant Rpt + Chro + Spectra				x
MS/MSD Form I			x	x
MS/MSD Quant Rpt + Chro + Spectra				x
GEL Permeation Data				x
Florisil Data				x
Logs—Instrument, Prep, Standard			x	x
CLP-Like Inorganics				
Cover Page			x	x
Sample Forms (I) (CLP-like)			x	x
Calibration + QC Forms (exp.: II–XIV)			x	x
Instrument Data				x
Preparation Data				x
SHIPPING/RECEIVING DOCUMENTS				
Internal COC (if required)			x	x
Interlab COC (where applicable)			x	x
Client COC	x	x	x	x
Sample Receipt Checklist	x	x	x	x

*Report elements listed represent common elements. The laboratory may provide more or less information as required by the method being analyzed. For example, those wet chemistry methods with no true calibration information will not have calibration forms included in the data package.

The requirements of Level I and Level II review and validation effort will be referred to "Data Verification" and will be performed by a member of the SMO. The requirements of the Level III and Level IV review and validation effort will be referred to as "Data Validation," and typically is performed by an entity external to the project. This can be an internal staff member who is not associated with the project, or it may be an independent third party external to Paducah. The following sections summarize the requirements of each type of review and validation efforts.

4.2 DATA VERIFICATION REQUIREMENTS

Data verification is defined as a systematic process, performed either by the data generator (on-site or fixed-base laboratory) or by an entity external to the data generator, which results in evaluation of the completeness, correctness, consistency, and compliance of a data set against a standard or contract.

If data verification is performed by the data generator, a project-level surveillance must be established by which the performance of the verification process is evaluated.

Data verification, at the project level, is conducted by an SMO representative to expedite the review process. If data verification is conducted independently of the data validator, it includes two activities. The first activity entails inventory of the data package to ensure compliance with the contract and SOW, in terms of the required deliverables. The second activity entails various checks of the data quality to determine the need for qualification. This process is commonly referred to as the "contractual screen" and is the beginning of the data validation process in that it encompasses the review of the Level I and some

Level II validation elements identified in Table 1 above. The data verifier will qualify data based on the review and validation elements in accordance with Section 5 of this plan. If the data set is being reviewed and validated at the Level III or IV requirements, then the data verifier will provide a copy of the data verification checklist to the data validator to expedite the validation process, or the data validator will perform both the data verification and the data validation processes

Data verification should provide a mechanism for problem resolution with the laboratory; it should not be exclusively an after-the-fact identification of noncorrectable deficiencies.

A data verification checklist is completed by the data verifier and takes, as input, the steps in this plan that are listed as "Data Verification." The data verifier shall complete Form CP3-ES-5003-F03, "Data Verification Checklist," in accordance with CP3-ES-5003, *Quality Assured Data,* for all Level II, III, and IV validations.

4.3 ANALYTICAL DATA VALIDATION REQUIREMENTS

Analytical data validation, including laboratory data review, is defined as a systematic process, performed externally from the data generator, which applies a defined set of performance-based criteria to a body of data to determine the quality of reported results. Data validation is not performed by the analytical laboratory. Data validation provides a level of assurance, based on a technical evaluation, that an analyte is present or absent and, if present, the level of uncertainty associated with the measurement. Analytical data validation for volatile and semivolatile methods includes a technical review of the laboratory data package specified in the laboratory SOW. Data validation incorporates an evaluation of sample custody, sample handling and preparation, holding times, instrument calibration, instrument performance, batch quality control (QC) samples [e.g., laboratory control sample (LCS)], the identification and quantitation of target analytes, performance standards (e.g., surrogates, internal standards) and the effect QC performance and/or deficiencies have on the quality of analytical sample data.

A data validation report that includes the results of data validation activities must be completed by the data validator for Level III and Level IV data validation requests and takes, as input, the data verification checklist (or equivalent) and the steps in this plan that are listed as "Data Validation." Data validation requires that personnel performing it have the appropriate level of training and experience to ensure data review and qualification is completed in a reasonable manner and in accordance with industry practices. Professional judgment may be required when performing data validation. Where professional judgment is used, resulting in either qualification of data or data left unqualified, the rationale for the selection of this path will be fully documented in the validation report. Documentation will include the following: citations from this plan, other industry standards, and/or the literature demonstrating the reasonableness of the evaluation.

The actions described in this plan must serve as the baseline for incorporation into project data verification/validation activities. Project-specific procedures applying to analytical methods not covered in this document must be reviewed and approved prior to use.

Implementation of this plan is expedited through the agreement of work to be performed by an analytical laboratory in the form of a project-specific laboratory SOW. Deliverable requirements specified in the analytical SOW must be consistent with the requirements of this plan and with the Basic Ordering Agreement contract with the laboratory.

The validation SOW must be written consistent with the requirements and specifications of this plan. The validation SOW is prepared by a SMO representative and communicated to the validation organization (for Level III and Level IV validation only).

The validation SOW will include as attachments full copies of the analytical laboratory data package, as well as an electronic data deliverable (EDD) in the form of a Microsoft Excel file. Placement of the data validation qualifier may be assigned by hand writing on the laboratory report form, initialed and dated, or electronically on provided EDDs in the Validation Code field. If data are not qualified during data validation, an equals sign ("=") shall be entered on the sample result or placed in the Validation Code field of the provided EDD.

Form CP3-ES-5003-F03, "Data Verification Checklist," (in accordance with CP3-ES-5003, *Quality Assured Data)* must be completed for every sample delivery group (SDG) that undergoes Level II, III, or IV data validation. In addition to the data verification checklist, a data validation report must be completed for every SDG that undergoes Level III or Level IV data validation.

5. PROCEDURE

NOTE: Refer to Appendix A for qualifier descriptions. Refer to Appendix B for qualification guidance due to multiple quality deficiencies. Refer to Appendix C for a listing of relevant equations to use with this plan.

The following is a step-by-step approach to implement analytical data verification and data validation activities. This approach is based on current industry accepted standards. Because changes to methodology and the referenced guidance documents are not within the verifier's or the validator's control, the data verifier and the data validator should always follow the most current methodology and associated guidance documents referenced throughout this text to perform the review and validation of associated data.

5.1 DATA VALIDATION STRATEGY AND SOW DEVELOPMENT

The project team, with input as needed from a quality assurance specialist and/or a representative of the SMO, shall develop a data validation strategy based on inputs identified through the DQO process. The project-specific sampling and analysis plan will define the DQOs and the framework for performing data validation. A SMO representative shall prepare a validation SOW to communicate data verification and validation requirements to the organization performing the work (for Level III and Level IV validation only).

5.2 CUSTODY OF SAMPLES AND SAMPLE DOCUMENTATION

The chain of custody (COC) form provides the basis for the traceability of project samples, by documenting the sample from its origin through all steps of the sampling, sample handling, and analysis process. The COC serves as documentation of sample possession from collection through disposal to ensure that sample representativeness is maintained prior to analysis. By documenting personal accountability for samples, the COC is used to ensure that proper custody has been maintained from the time a sample is generated through its final disposition (cradle to grave). Any break in custody, as

demonstrated by the series of signatures denoting sample holders, could jeopardize the legal and/or technical defensibility of associated sample data.

While data verification/validation cannot replicate the custody history of a sample (i.e., fully assure the sample truly has been in custody from the field to the final result), an evaluation of field notes, laboratory records, and the COCs provide the best available indicator of sample traceability. A sample is defined as being under proper custody if any of the following conditions are met:

- The sample is within the possession of an authorized person (e.g., field personnel, laboratory personnel, etc.);
- The sample is within view of an authorized person;
- The sample was in an authorized person's possession and then was secured to prevent tampering; or
- The sample is placed in a designated secure area.

NOTE: Verification of sample documentation includes result report header checks for accuracy from the COC. If sample identity is in question, every attempt should be made to verify the true identity of each sample. When custody problems cannot be resolved, they will affect the defensibility of the sample.

5.2.1 Data Verification

The data verifier shall trace custody of all samples in the reporting batch from field sampling through receipt at the laboratory by reviewing the COCs. If the information is missing, the data verifier will seek to obtain field documentation from the sampler or laboratory to determine if the omission affects sample integrity. If there is a break in the signature chain on the COC, or other omissions in the custody record (e.g., date of sample collection, date of transfer to the laboratory, etc.), indicate the problem on the data verification checklist and provide this information to the data validator.

5.2.2 Data Validation

If sample data are not traceable through signature records on COCs, or other sample record information demonstrating custody (e.g., laboratory logbooks and/or sample data forms) cannot establish custody history, then the data validator shall qualify associated results rejected "R."

Custody of Samples	Yes	No	N/A
1. Does the data verification checklist or associated attachments in the data report indicate that samples are traceable?			

5.3 HOLDING TIME, TEMPERATURE, AND SAMPLE PRESERVATION

Holding times have been established by EPA to define the maximum period of time during which a sample remains representative of its sampling location. Holding times begin when a sample is collected in the field and are measured by determining the elapsed time from collection through extraction (when applicable) and/or analysis. If the reported data is the result of a dilution, reinjection, or reextraction and analysis, the result must have been generated within the prescribed holding time in order for the result to be considered definitive.

5.3.1 Deliverables

- Field Sampling Notes
- Field COCs
- Laboratory COCs
- Laboratory reports and/or raw data containing the following: dates of collection, preparation, and analysis for all samples, dilutions, and re-extractions.

5.3.2 Criteria

Table 2 provides current industry-accepted standards for sample preservation and holding times for volatile and semivolatile parameters. In all cases, the data verifier or validator shall always follow the most current methodology guidance for sample holding time, temperature, and preservation requirement.

Table 2. Holding Time and Sample Preservation Criteria

Parameters	Matrix	Preservatives	Holding Times
Volatile Organics	Water*	pH < 2 with HCl, H_2SO_4, or solid $NaHSO_4$, 0–6°C	14 days
	Water	0–6°C	7 days
	Soil (EnCores)	0–6°C	48 hours** 14 days
	Soil, sediment, other solids	0–6°C	14 days
		SW-5035 - low concentration pH < 2 with $NaHSO_4$, 0–6°C	14 days
		SW-5030 - high concentration Methanol, 0–6°C	14 days
Semivolatile (Extractable) Organics	Water	0–6°C	7 days** 40 days***
	Soil, sediment, other solids	0–6°C	14 days** 40 days***

*Aqueous samples known to contain carbonates or being analyzed for select target analytes should be collected unpreserved to minimize effervescence or destruction of target analyte upon acidification. These samples are chilled to 0–6°C and have a seven-day hold period.
**Time from collection of sample to extraction.
***Time from extraction to completion of analysis.

5.3.3 Data Verification

The data verifier shall verify the presence of the pertinent COC forms in laboratory deliverables. If information is missing, the data verifier will seek to obtain field documentation from the sampler and/or the contract laboratory to determine if the omission affects sample integrity. Upon receipt, this information will be placed in the data package for delivery to the data validator. If missing information cannot be obtained or reconstructed from field notes, COCs, etc., the data verifier will note omitted information on the data verification checklist as noncorrectable.

5.3.4 Data Validation

5.3.4.1 Holding times

Review the data verification checklist for holding times to confirm all holding times have been met. Holding times that are listed in hours from collection to analysis always will be calculated using the time collected to ensure the holding time in hours has not lapsed. Holding times that are listed in days will be calculated using dates only. The data validator shall review field and/or laboratory COC forms, field notes, laboratory report forms, and laboratory raw data, as necessary, to determine the elapsed time from sample collection to sample analysis for deviations identified on the data verification checklist.

If the elapsed time falls within the prescribed holding time, no actions will be taken and no qualification assigned.

If holding time is exceeded, qualify as follows:

- If the holding time is exceeded by a factor of < 2, qualify detected results as "J" and nondetected results as "UJ."

- If the holding time is grossly exceeded by a factor > 2, qualify detected results as estimated "J" and nondetected results as rejected "R."

5.3.4.2 Temperature/preservation

Review laboratory receiving records to determine if samples were received at the appropriate temperature and that proper preservative addition has resulted in the appropriate pH adjustment(s). If records demonstrate samples were received by the laboratory at the proper temperature and with the appropriate pH adjustment, no action is warranted.

If temperatures are exceeded and/or pH adjustment is incorrect, qualify as follows:

- If samples are received without the proper pH adjustment and not analyzed within an acceptable time frame for an unpreserved sample, qualify detected results as estimated "J" and nondetected results as "UJ" or rejected "R." Professional judgment will need to be used to determine the effect of the improper pH and whether the nondetect result should be qualified "UJ" or "R."

- If samples are received at elevated temperature (6°C < sample temperature < 10°C) but have received the proper pH adjustment, qualify detected results as "J" and nondetected results as "UJ," indicating the results are estimated. If sample temperatures upon receipt are > 10°C, the data validator must evaluate the integrity of the reported concentrations and the data may require qualification of "R."

- If samples are received at elevated temperature and proper preservation has not been followed (pH adjustment), professional judgment should be applied to determine the usability of the data.

- If samples are received with air bubbles in the vials, qualify detected results as estimated "J" and nondetected results as rejected "R."

Holding Times and Sample Preservation				Qualification Guidance	
Validation Step	Yes	No	N/A	Detects	Nondetects
1. Does the data verification checklist indicate that all samples were analyzed within the appropriate holding time?				J	UJ/R*
2. Were all samples preserved properly?				J	UJ/R

*Qualify "R" only if holding time has been grossly exceeded either on the first analysis or upon reanalysis.

5.4 GC/MS PERFORMANCE CHECK

5.4.1 Deliverables

- CLP Form V-VOA, Form V-SV or equivalent for SW-846 methods for each GC/MS system used
- Raw data (required for confirmation)

5.4.2 Frequency

The instrument performance check must be analyzed at the beginning of each 12-hour period during which samples and/or standards are analyzed. If different instruments are used on samples in a similar case, the performance check(s) must be analyzed at this frequency as well.

5.4.3 Criteria

Table 3 and Table 4 present ion abundance criteria for both CLP and SW-846 methods. The criteria in these tables are intended to be used as default criteria for quadruple instrumentation if optimized manufacturer's operating conditions are not available. Alternate tuning criteria may be employed (e.g., CLP or Method 625), provided that method performance is not adversely affected.

Table 3. Volatile Organic GC/MS Tuning Criteria

m/z	Ion Abundance Criteria (CLP SOW 5/99–OLM04.2)	Ion Abundance Criteria (SW-486 Method 8260B)*
50	8.0–40.0% of m/z 95	15.0–40.0% of m/z 95
75	30.0–66.0% of m/z 95	30.0–80.0% of m/z 95
95	Base peak, 100% relative abundance	Base peak, 100% relative abundance
96	5.0–9.0% of m/z 95	5.0 –9.0% of m/z 95
173	< 2.0% of m/z 174	< 2.0% of m/z 174
174	50.0 –120.0% of m/z 95	> 50.0% and < 120% of m/z 95
175	4.0 –9.0% of m/z 174	5.0 –9.0% of m/z 174
176	93.0 –101.0% of m/z 174	> 95.0%, but < 101.0% of m/z 174
177	5.0 –9.0% of m/z 176	5.0 –9.0% of m/z 176

*All ion abundances must be normalized to mass-to-charge (m/z) 95, the nominal base peak, even though the ion abundance of m/z 174 may be up to 120% that of m/z 95.

Table 4. Semivolatile Organic GC/MS Tuning Criteria

m/z	Ion Abundance Criteria (CLP SOW 5/99–OLM04.2)	Ion Abundance Criteria (SW–846 Method 8270D)
51	30.0–80.0% of m/z 95	10.0–80.0% of m/z 198
68	< 2.0% of m/z 69	< 2.0% of m/z 69
69	Present	Present
70	< 2.0% of m/z 69	< 2.0 of m/z 69
127	25.0–75.0% of m/z 198	10.0–80.0% of m/z 198
197	< 1.0% of m/z 198	< 2 0% of m/z 198
198	Base peak, 100% relative abundance	Base peak, or > 50.0% of m/z 442
199	5.0–9.0% of m/z 198	5.0–9.0% of m/z 198
275	10.0–30.0% of m/z 198	10.0–60.0% of m/z 198
365	> 0.75% of m/z 198	> 1.00% of m/z 198
441	Present, but < m/z 443	Present, but < 24.0% of m/z 442
442	40.0–110.0% of m/z 198	Base peak, or > 50% of mass 198
443	15.0–24.0% of m/z 442	1.0 –24.0% of m/z 442

*All ion abundances for SVOA analysis should be normalized to m/z 198, the nominal base peak, even though the ion abundance of m/z 442 may be up to 100% that of m/z 198.

5.4.4 Data Verification

The data verifier shall verify the presence of required reporting forms. If they are not provided, the data verifier shall contact the laboratory and request that the missing information be provided. If the missing information cannot be provided, the data verifier shall note the omitted information on the data verification checklist as noncorrectable.

5.4.5 Data Validation

The data validator shall review the data verification checklist to confirm the presence of the appropriate forms (Form V) for VOA and SVOA analyses. If the data verification checklist notes that the GC performance forms are missing and these occurrences cannot be resolved with the contract laboratory, they are considered noncorrectable problems. Place qualifier code "P05" on the affected data if noncorrectable deliverable deficiencies have occurred; qualify only if the deviation indicates an adverse effect on data quality.

If mass assignment is in error (such as m/z 199 is indicated as the base peak for SVOA analysis, rather than m/z 198), qualify all results "R."

The following ion abundances always must be satisfied:

- VOA ion abundances: m/z 95/96, 174/175, 174/176, 176/177
- SVOA ion abundances: m/z 198/199, 442/443, 68, 70, 197, 441

Raw data should be consulted to determine if associated sample and QC data can be considered usable or unusable if criteria for critical or noncritical ion-abundances are not met. Guidance to aid the application of evaluation of semivolatile compounds is as follows:

- m/z 198/199 and 442/443 are based on the natural abundances of C-12 and C-13 and should always be met.

- m/z 68, 70, 197, and 441 indicate the condition of the instrument and the suitability of resolution adjustment.

- m/z 365 is an indicator of suitable instrument zero adjustment. If m/z 365 is zero, minimum detection limits may be affected. If m/z 365 is present, but < 0.75%, the deficiency is not as serious.

The following ion abundances are of minor importance:

- Volatile: m/z 50 and 75
- Semivolatile: m/z 51, 127, and 275

For Level IV data validation only, conduct raw data confirmation of one of the ion abundance summaries. Inspect raw data to ensure that during the instrument performance check, three scans (apex and scans immediately preceding and following the apex) have been averaged and that a scan no more than 20 scans preceding the elution of 4-bromofluorobenzene or decafluorotriphenylphosphine is used for background subtraction.

If it is found that the laboratory made only minor calculation errors that do not affect the data quality, no qualification of the data is required.

If data is reported outside of the 12-hour clock of the instrument performance check, the data shall be reported as estimated "J" or "UJ" and a qualification code of "P06" assigned to the results.

If m/z ratios are not within the ion abundance criteria given within Tables 3 and 4, using the criteria indicated in the preceding paragraphs and using qualification code "P06," the data validator should use professional judgment in deciding the impact of the reported instrument performance of the data.

GC/MS Performance Check				**Qualification Guidance**	
Validation Step	Yes	No	N/A	Detects	Nondetects
1. Has the GC/MS instrument performance check been performed at the proper frequency?				*	*
2. Do all instrument performance checks satisfy ion abundance criteria?				Refer to Table 3 and Table 4 in Section 5.4 or the method being reviewed	
3. Does the raw data show proper averaging of scans? (Level IV validation only)				Refer to step 5.4.5 or the method being reviewed	

*Qualify only if the deviation indicates an adverse effect on data quality.

5.5 INITIAL CALIBRATION

Compliance requirements for satisfactory instrument calibration ensure that the instrument is capable of producing acceptable qualitative and quantitative data for volatile and semivolatile compounds on the Target Compound List. Initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run and of producing a linear calibration curve.

5.5.1 Deliverables

- CLP Form VI-VOA-1,2; VI-SVOA-1,2, or equivalent for SW-846 methods
- Raw data (required for confirmation)

5.5.2 Frequency

Initial calibration must be performed within 12 hours of the instrument performance check and prior to sample analysis.

5.5.3 Criteria

The following subsections present the most common requirements for calibration information related to VOA/SVOA analysis based on the methods identified in this plan; however, the data validator will need to review the requirements of a specific method and/or the laboratory method that is being reviewed and follow the requirements for that method when validating data. This may mean that the laboratory method will need to be obtained and reviewed prior to data validation. In all cases, specific method requirements for calibration should always be used as the primary guidance when evaluating VOA/SVOA data.

Table 5 lists performance criteria for initial calibration.

Table 5. On-Column Standard Concentrations and Performance Criteria for Initial Calibration

CLP Organic SOW 5/99 OLM04.2	SW-486 Method 8260 (VOA) Method 8270 (SVOA)
10, 20, 50, 100, 200 µg/L VOA	5 levels minimum, lowest near but > MDL
20, 50, 80, 120, 160 µg/L SVOA	SW8270–Mean RF for system performance check compounds (SPCCs) ≥ 0.05
Minimum RRF of ≥ 0.05 except CCCs*	RSD ≤ 40.0% for compounds in Table 4–6 or 30.0% for all other compounds
All compounds, RSD ≤ 30.0%	Linear calibration option: 0.995 or better
	Quadratic calibration option: 0.99 or better

*CCC = column control compounds relative response factor (RRF) of > 0.1

5.5.4 Data Verification

The data verifier shall confirm the presence of required reporting forms. If they are not provided, contact the laboratory and request they be provided. If these occurrences cannot be resolved with the analytical laboratory, they are considered noncorrectable problems and shall be identified in this way on the data verification checklist. Place qualification code C07 on the affected data, if noncorrectable deliverable deficiencies have occurred. Qualify only if the deviation indicates an adverse effect on data quality.

5.5.5 Data Validation

If initial RRF of any compound is < 0.05 in the initial calibration, all samples related to the initial calibration shall be qualified because of reduced instrument sensitivity. Results at or near the instrument detection limit are impacted and are qualified as "R" because of the potential for reporting false negatives. Detected results are qualified as "J."

If the RRF (CLP) or RF (SW-846) of any compound is < 0.05, qualify detected results with positive mass spectral identification as "J" and nondetected results as "R."

If the percent relative standard deviation (%RSD) among the calibration points is > 30% or 40% (for compounds listed in Table 6), and the RRF/RF is > 0.05, qualify detected results as "J" and nondetected results as "UJ." If upon inspection of raw data nondetected results are suspected to be reported falsely, apply professional judgment.

Table 6. Volatile and Semivolatile Target Compounds Exhibiting Poor Response

Volatile Compounds		Semivolatile Compounds	
Acetone	Isopropylbenzene	2,2'-Oxybis-(1-chlropropane)	Benzaldehyde
2-Butanone	Methyl acetate	4-Chloroaniline	4-Nitroaniline
Carbon disulfide	Methylene chloride	Hexachlorobutadiene	4,6-Dinitro-2-methylphenol
Chloroethane	Methylcyclohexane	Hexachlorocyclopentadiene	N-Nitrosodiphenylamine
Chloromethane	Methyl tert-butyl ether	2-Nitroaniline	3,3'-Dichlorobenzidine
Cyclohexane	*trans*-1,2-Dichloroethene	3-Nitroaniline	1,1'-Biphenyl
1,2-Dibromethane	4-Methyl-2-pentanone	2,4-Dinitrophenol	Dimethylphthalate
Dichlorodifluoromethane	2-Hexanone	4-Nitrophenol	Diethylphthalate
Cis-1,2-Dichloroethene	Trichlorofluoromethane	Acetophenone	1,2,4,5-Tetrachlorobenzene
1,2-Dichloropropane	1,1,2-Trichloro-1,2,2-trifluoroethane	Caprolactam	Carbazole
1,2-Dibromo-3-chloropropane	-	Atrazine	Butylbenzylphthalate
-	-	Di-n-butylphthalate	Di-n-octylphthalate
-	-	Bis(2-ethylhexyl)phthalate	-

If both the RRF/RF is < 0.05 and %RSD is > 30% or 40% (for compounds listed in Table 6), qualify detected results as "J" and non-detected results as "R."

If the %RSD is > 30% or 40% (for compounds listed in Table 6), this indicates nonlinearity in the calibration curve. Elimination of either the highest or lowest point in the curve may restore the %RSD. Recalculate the %RSD excluding the highest point and then excluding the lowest point.

- If elimination of either point does not restore %RSD < 30% or 40% (for compounds listed in Table 6), qualify detected results as "J" and nondetected results as "UJ" or "R."

- If elimination of the high point restores %RSD < 30% or 40% (for compounds listed in Table 6), qualify detected results as "J" and apply no qualification to nondetected results.

- If elimination of the low point restores %RSD < 30% or 40% (for compounds listed in Table 6), qualify low-level positive results as "J." Use professional judgment to qualify nondetected results.

The laboratory may elect to calculate a linear or quadratic calibration curve. If this method is used, there are two options as follows: Option 1: linear least squares regression $r \geq 0.995$; or Option 2: non-linear regression coefficient of determination ≥ 0.99 (6 points shall be used for second order; 7 points shall be used for third order).

If different matrices are included in the same SDG, verify that the correct initial calibration was used with each set of samples of similar matrix.

For Level IV data validation only, conduct raw data confirmation by inspecting for instances of manual integrations of peak areas. Recurring manual integrations on similar peaks within a calibration, manual integrations on peaks with normally good symmetry, and peak splitting manual integrations shall be inspected to determine the necessity for integration or if a systematic problem is occurring in the analyses.

Confirm the quantitation ions of two compounds in the initial calibration to determine whether the correct quantitation ions have been used to quantify the compounds. If incorrect ions have been shown, rationale should be provided in the data package for the noncompliance.

Equations for calculating RRF and %RSD are found in Appendix C. If calculated RRF and %RSD are > 10% error, the data validator should use professional judgment to determine impact on data and provide an explanation for the qualification made to the data.

Raw data must be consulted before qualifying based on initial calibration alone. Checks must be made for saturation, baseline shift, peak splitting, and other obvious interferences.

Initial Calibration				**Qualification Guidance**	
Validation Step	Yes	No	N/A	Detects	Nondetects
1. Has the initial calibration been performed within 12 hours of a GC/MS performance check **AND** prior to any sample analysis?				*	*
2. Are all compounds' average RRF $\geq$ 0.05 and CCC RRF $\geq$ 0.01?				J	R
3. Are all compounds' %RSD among calibration points < 30% or 40%***? Or does %RSD meet linear/quadratic requirements?				J	UJ
4. Does an elimination of either high or low points restore %RSD < 30% or 40% ***?				J**	UJ/R/NA*
5. Do samples with differing matrices have matching initial calibration matrices?				Refer to step 5.5.5 or the method being reviewed	
6. Have raw data been examined for anomalies? (Level IV validation only)				Refer to step 5.5.5 or the method being reviewed	
7. Have the quantitation ions of 2 compounds been confirmed at the correct ions for quantitation? (Level IV validation only)				Refer to step 5.5.5 or the method being reviewed	
8. Have raw data been inspected for manual integrations? (Level IV validation only)				Refer to step 5.5.5 or the method being reviewed	

*Qualify only if the deviation indicates an adverse effect on data quality.
**Qualify only peaks outside linear portion.
***Poor response compounds

5.6 INITIAL AND CONTINUING CALIBRATION VERIFICATION

Initial calibration verifications (ICVs) and continuing calibration verifications (CCVs) ensure that the instrument(s) is capable of consistently producing acceptable qualitative and quantitative data. The instrument(s) is checked over specific time periods during the sample analysis.

5.6.1 Deliverables

- CLP Form VII-VOA-1,2; VII-SVOA-1,2, or equivalent for SW-846 methods, for each GC/MS system used
- Raw data (required for confirmation)

5.6.2 Frequency

Calibration is verified for VOA and SVOA initially following calibration typically using a second source reference standard and once per 12-hour period in which samples are analyzed. The continuing calibration standard must be analyzed prior to sample analysis.

5.6.3 Criteria

The Table 7 lists performance criteria for ICV/CCV.

Table 7. ICV/CCV Performance Criteria

CLP Organic SOW 5/99-OLM04.2	SW-846 Method 8260 (VOA) Method 8270 (SVOA)
50 µg/L	Mid-level standard—run every 12 hours
Minimum RRF of ≥ 0.05, %D < 25% from initial calibration	8260—Mean RF for SPCCs: ≥ 0.3 for chlorobenzene and 1,1,2,2-tetrachloroethane ≥ 0.1 for bromoform, chloromethane, and 1,1-dichloroethane 8270—Mean RF for SPCC: ≥ 0.05 8260 and 8270—%D ≤ 40% for compounds in Table 6 or 25% for all other compounds from initial calibration

5.6.4 Data Verification

Verify the presence of required reporting forms. If they are not provided, contact the laboratory and request that they be provided. If these occurrences cannot be resolved with the analytical laboratory, they are considered noncorrectable problems and shall be identified in this way in the data validation report. Place qualification code "C07" on the affected data if noncorrectable deliverable deficiencies have occurred; qualify only if the deviation indicates an adverse effect on data quality.

5.6.5 Data Validation

If the percent difference (%D) exceeds ± 25% or 40% (for compounds listed in Table 6) and the RRF is ≥ 0.05, then qualify detected results as "J" and nondetected results as "UJ."

If the RRF is < 0.05, then qualify detected results with acceptable mass spectral identification as "J" and nondetected results as "R."

If both the RRF is < 0.05 and %D exceeds ± 25% or 40% (for compounds listed in Table 6), then qualify detected results as "J" and nondetected results as "R."

For Level IV validation only, conduct raw data confirmation by confirming the quantitation ions of two compounds in the continuing calibration to determine whether the correct quantitation ions have been used to quantify the compounds. If incorrect ions have been shown, rationale should be provided in the data package for the noncompliance.

Continuing Calibration				**Qualification Guidance**	
Validation Step	Yes	No	N/A	Detects	Nondetects
1. Has the continuing calibration been performed within 12 hours in which samples are analyzed?				*	*
2. Is average RRF of all compounds ≥ 0.05?				J	R
3. Is %D between initial and continuing calibration points < 25% or 40% for all compounds?**				J	UJ
4. Is RRF < 0.05 and %D > 25% or 40%**?				J	R
5. Do samples quantified against the initial calibration use 50 µg/L (VOA) and 80 µg/L (SVOA)?					

*Qualify only if the deviation indicates an adverse effect on data quality.
**Poor response compounds (Table 6).

5.7 BLANKS

Blank analyses serve to determine the existence and magnitude of contamination resulting from laboratory or field activities. A preparation blank or method blank (MB) is used to assess the level of contamination introduced to the analytical samples throughout the sample preparation and analysis process. If contamination is found in any blank, all associated data must be carefully evaluated to determine whether or not there is a systemic problem affecting greater than one sample or if the contamination is an isolated occurrence.

Trip blanks are a clean sample matrix that are taken from the bottle source (typically the laboratory) to the sampling site, and then transported back to the laboratory without being exposed to sampling procedures. Trip blanks are used to assess the level of contamination introduced during field handling, storage, and shipping of samples. A trip blank should be collected and included with all VOA samples collected for analysis.

Additionally, the project team may elect to collect and analyze field and equipment rinseate blanks to evaluate the existence and magnitude of contamination that may arise as a result of field level activities. The field blank provides an indication of ambient conditions during the sampling activities, as well as an indication that the source of decontamination water is free of targeted analytes. The equipment rinseate blank provides an indication as to whether or not non-dedicated sampling equipment has been properly decontaminated, and what, if any, carry over may arise between sampled locations. It has been EPA Region 4 data validation policy to evaluate the trip blanks, field blanks, and equipment rinseate blanks as part of the validation process, but not to qualify the data based on these field samples.

5.7.1 Deliverables

- CLP Form I VOA-1,2; VII-SVOA-1,2, and CLP Form IV VOA, SV or equivalent for SW-846 methods, for each method blank

- Raw data (required for confirmation)

5.7.2 Frequency

For CLP (Organic SOW-5/99 OLM04.2), the MB for VOA analysis should be analyzed after the calibration standards and once for every 12-hour time period beginning with the injection of 4-bromofluorobenzene. The MB for VOAs should be analyzed on each GC/MS system used to analyze samples of each matrix type. The IB for VOAs should be analyzed after any samples that have saturated ions from a given compound to check for carryover. For SVOA analysis, the MB should be analyzed once per SDG; each 14-day period during which samples are received; each 20 samples in an SDG; or whenever samples are extracted by the same procedure.

For SW-486 (Method 8260—VOA and 8270—SVOA), the MB should be analyzed for each batch (maximum of 20 samples per batch).

5.7.3 Criteria

Compounds detected in blanks analyzed under CLP must be at levels < reporting limit (RL). Blank performance criteria are not specified for SW-846 methods. For the purposes of data validation, blank contamination shall be evaluated against CLP guidelines.

For volatile analyses, the blank must contain < 2.5 × RL for methylene chloride, < 5 × RL for acetone and 2-butanone, and < RL for all other target compounds.

For semivolatile analyses, the method blank must contain < 5 × RL for phthalate esters and < RL for all other target compounds.

5.7.4 Data Verification

Verify the presence of required reporting forms. If they are not provided, contact the laboratory and request that they be provided. If these occurrences cannot be resolved with the analytical laboratory, they are considered noncorrectable problems. Place qualification code "B07" on the affected data if noncorrectable deliverable deficiencies have occurred; qualify only if the deviation indicates an adverse effect on data quality.

5.7.5 Data Validation

Any compound that is reported in both the blank and sample must be evaluated; however, if the same compound is reported in a sample and more than one blank, the sample shall be evaluated against the blank with the highest concentration of the compound. Sample results must <u>not</u> be modified by subtracting blank values. When comparing blank results to analytical sample results, ensure that factors such as dilution and different sample weights have been taken into consideration.

If sample concentration is > RL and > 5 × blank concentration (10 × for common laboratory contaminants, see note below), then no qualification of results is necessary.

If sample concentration is > RL and < 5 × blank concentration (10 × for common laboratory contaminants), then qualify the reported result as "U."

If gross contamination (saturated peaks in blank) is present, then qualify all affected results as "R."

NOTE: For the common laboratory contaminants methylene chloride, acetone, and 2-butanone (VOA); phthalate esters (SVOA), use a factor of 10 (i.e., 10 ×).

If the reviewer can determine where contamination originated other than through blank contamination, an explanation must be presented in the data validation report, and sample data will be qualified appropriately. If large numbers of other target compounds are found at low levels in the blank, it may be indicative of a systemic laboratory problem.

An instrument blank must be analyzed following the analysis of an analytical sample showing saturated signals. If this is not done, the data validator must evaluate the analyses following the saturated sample analysis for carryover. For reported compounds significantly affected by instrument carryover, qualify results as "J." If gross contamination by instrument carryover is observed, qualify results as "R."

For Level IV validation only, conduct raw data confirmation by determining from raw data whether compounds reported in the method blank are detected above the RL.

Method Blank				**Qualification Guidance**	
Validation Step	Yes	No	N/A	Detects	Nondetects
1. Was the method blank analyzed at the appropriate frequency?				*	*
2. Was the method blank the same matrix as the samples?					
3. Are sample results > RL and > 5×** blank result?					
4. Is sample result > RL and < 5×** blank result?				U	N/A
5. Is sample result < RL and < 5×** blank result?				U	N/A
6. Gross contamination (use professional judgment)				R	N/A
7. Confirm from raw data that compounds reported in the method blank are detected above the RL.					

*Qualify only if the deviation indicates an adverse effect on data quality.
**10 × for common lab contaminants.

5.8 SURROGATE STANDARDS

Surrogate standards are nontarget compounds added to all analytical samples, blanks, and QC samples to assess overall system performance. These standards are added prior to GC/MS purge in water samples analyzed for volatiles, and before extraction in soil samples analyzed for volatiles and soil and water samples analyzed for semivolatiles.

5.8.1 Deliverables

- CLP Form II VOA-1,2; Form II-SVOA-1,2, or equivalent for SW-846 methods, including surrogate recoveries for all samples, blanks, and QC samples
- Raw data (required for confirmation)

5.8.2 Frequency

Surrogate standards are added to all analytical samples, blanks, and QC samples.

5.8.3 Performance Criteria

Table 8 lists recovery limits for volatile surrogates and Table 9 lists recovery limits for semivolatile surrogates.

Table 8. Volatile Surrogate Recovery Limits

Compound	Water		Soil	
	OLM04.2	SW-846 Method 8260	OLM04.2	SW-846 Method 8260
Toluene-d8	88-110	88-110*	84-138	81-117*
Bromofluorobenzene	86-115	86-115*	59-113	74-121*
1,2-Dichloroethane-d4	76-114	80-120*	70-121	80-120*
Dibromofluoromethane	Not required	86-118*	Not required	80-120*

*For Method 8260, compare surrogate %R to laboratory and established limits. If no laboratory limits are available, these limits may be used.

Table 9. Semivolatile Surrogate Recovery Limits

Compound	Water		Soil	
	OLM04.2	SW-846 Method 8270	OLM04.2	SW-846 Method 8270
Nitrobenzene-d5	35-144	Lab-determined limits**	23-120	Lab-determined limits**
2-Fluorobiphenyl	43-116	Lab-determined limits**	30-115	Lab-determined limits**
Terphenyl-d14	33-141	Lab-determined limits**	18-137	Lab-determined limits**
Phenol-d5	10-110	Lab-determined limits**	24-113	Lab-determined limits**
2-Fluorophenol	21-110	Lab-determined limits**	25-121	Lab-determined limits**
2,4,6-Tribromophenol	10-123	Lab-determined limits**	19-122	Lab-determined limits**
2-Chlorophenol-d14	33-110*	Not required	20-130*	Not required
1,2-Dichlorobenzene-d4	16-110*	Not required	20-130*	Not required

*Advisory limits.
**For Method 8270, compare surrogate %R to laboratory-established limits. If no laboratory limits are available, the CLP limits listed may be used.

5.8.4 Data Verification

Verify the presence of required reporting forms. If they are not provided, contact the laboratory and request that they be provided. If these occurrences cannot be resolved with the analytical laboratory, they are considered noncorrectable problems. Place qualification code "S06" on the affected data if noncorrectable deliverable deficiencies have occurred; qualify only if the deviation indicates an adverse effect on data quality.

5.8.5 Data Validation

Qualify data if either of the following conditions is met:

- One or more volatile surrogates is out of criteria, or

- One or more base-neutrals or one or more acid surrogates are out of criteria for semivolatiles. Professional judgment must be used if recovery is suspected to be affected by matrix interferences.

Volatile Analysis

- If any surrogate %R exceeds the upper control limit, then qualify detected results as "J" and accept nondetected results.

- If any surrogate %R is between 20% and the lower control limit, then qualify detected results as "J" and nondetected results as "UJ."

- If any surrogate %R < 20%, then qualify detected results as "J" and nondetected results as "R."

- If surrogates are "diluted out," the data validator must use professional judgment to determine if qualification of data is necessary.

Semivolatile Analysis

- If the surrogate %R exceeds the upper acceptance limit, then qualify detected results for that fraction as "J" and accept nondetected results.

- If one or more base-neutral or acid surrogate %R is between 10% and the lower control limit, then qualify detected results for that fraction as "J" and nondetected results for that fraction as "UJ."

- If any surrogate %R < 10%, then qualify detected results for that fraction as "J" and nondetected results for that fraction as "R."

- If surrogates are "diluted out," the data validator must use professional judgment to determine if qualification of the data is necessary.

- If recalculation of the surrogate concentrations or recoveries does not agree within 10%, then professional judgment should be used to determine impact on the reported data.

Reanalysis of samples must be inspected to determine which analysis provides the best results. The choice must be based on at least the following criteria:

- Surrogate % recoveries
- Holding times
- Comparison of concentration of target compounds
- Internal standard areas and retention times

Surrogate Standards				Qualification Guidance	
Validation Step	Yes	No	N/A	Detects	Nondetects
1. Have surrogate standards been analyzed at the proper frequency?				*	*
2. Have the proper surrogate standards been used?				*	*
3. Are all surrogate standard %R within established criteria?					
Is %R > upper control limit?				J	N/A
Is %R ≥ 10% and < lower control limit?				J	UJ
Is %R < 10%?				J	R

*Qualify only if the deviation indicates an adverse effect on data quality.

5.9 INTERNAL STANDARDS

Internal standards are used to ensure that GC/MS sensitivity and response are stable during analysis.

5.9.1 Deliverables

- CLP Form II VOA-1; Form VIII SV-1, or equivalent for SW-846 methods
- Raw data (required for confirmation)

5.9.2 Frequency

Internal standards are added to all analytical samples, blanks, and quality control samples prior to purging for volatile water and soils, and are added prior to extraction of semivolatile and volatile medium level soils.

5.9.3 Criteria

Table 10 provides volatile and semivolatile internal standards.

Table 10. Volatile and Semivolatile Internal Standards

SVOA Internal Standards (CLP & SW-846)	VOA Internal Standards (CLP)	VOA Internal Standards (SW-846)
1,4-Dichlorobenzene-d4	Bromochloromethane	Fluorobenzene
Napththalene-d8	1,4-Difluorobenzene	Chlorobenzene-d5
Acenaphthene-d10	Chlorobenzene-d5	1,4-Dichlorobenzene-d4
Phenanthrene-d10	-	-
Chrysene-d12	-	-
Perylene-d12	-	-

The retention time of the internal standard compound in the sample or blank must not vary more than ± 10.0 seconds from the RT of the same internal standard in the associated opening CCV or mid-point standard from the associated ICAL. The area response of each internal standard compound in all samples and blanks must be within the inclusive ranges of 50-200% of the area response of the same internal standard from the associated opening CCV or the mid-point standard from the associated ICAL.

5.9.4 Data Verification

Verify the presence of required reporting forms. If they are not provided, contact the SMO and request that they be provided. If these occurrences cannot be resolved with the analytical laboratory, they are

considered noncorrectable problems. Place qualification code "I07" on the affected data if noncorrectable deliverable deficiencies have occurred; qualify only if the deviation indicates an adverse effect on data quality.

5.9.5 Data Validation

The following provides guidance for qualification of samples due to poor internal standard performance. Resulting qualification of compounds is based on results for the associated internal standard.

If peak area %D < 50%, then qualify detected results as "J" and nondetected results as "UJ."

If peak area %D > 200%, then qualify detected results as "J" and accept nondetected results.

If a performance drop is indicated by extremely low area counts (< 20%), then qualify detected results as "J" or "R" if the performance drop has significantly affected sample results and nondetected results as "R."

If Internal Standard retention times vary by more than ± 10 seconds (between the sample internal standard and calibration internal standard), conduct confirmation of raw data for Level IV data validation only by examining the chromatographic profile for that sample to determine if any false positives or negatives exist. Qualify false positive results or false negative detection limits with professional judgment as appropriate.

Internal Standards				**Qualification Guidance**	
Validation Step	Yes	No	N/A	Detects	Nondetects
1. Have the proper internal standards been used?				*	*
2. Are peak areas %D between -50% and +100% of the continuing calibration internal standard peak areas?					
If %D < 50%				J	UJ/R
If %D > 200%				J	N/A
Extremely low area counts in more than one area				J/R	R
3. Does the internal standard retention time vary more than 10 seconds from continuing calibration?				J/R**	R**

*Qualify only if the deviation indicates an adverse effect on data quality.

**Qualify as appropriate.

5.10 MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The purpose of the matrix spike/matrix spike duplicate (MS/MSD) differs from the CLP 5/99 SOW to the SW-846 methods. For CLP, the MS/MSD are analyzed to determine long-term accuracy and precision of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. For SW-846, the MS/MSD are analyzed to determine the accuracy of the method. If recovery criteria are not satisfied for the SW-846 methods, there is difficulty in assessing whether the cause was the method or matrix-related interferences. To address this issue, LCS/LCS duplicate (LCSD) also are analyzed to verify whether the methods results themselves are satisfactory. If only the MS/MSD are affected, a matrix effect is likely.

NOTE: For a MS that does not meet the technical criteria, apply the action to all samples of the same matrix, if the reviewer considers the samples sufficiently similar. The reviewer will need to exercise professional judgment in determining sample similarity. The reviewer should make use of all available

data, including site and sampling documentation (e.g., location and type of sample, descriptive data, soil classification); field test data (e.g., pH, Eh, conductivity, chlorine); and laboratory data for other parameters (e.g., total suspended solids, total dissolved solids, total organic carbon, alkalinity or buffering capacity, reactive sulfide, anions) in determining similarity. The reviewer also should use the sample data (e.g., similar concentrations of analytes) in determining similarity between samples in the data package. The reviewer may determine that only some of the samples in the data package are similar to the MS sample, and that only these samples should be qualified. Or, the reviewer may determine that no samples are sufficiently similar to the sample used for the MS and, thus, that only the field sample used to prepare the MS sample should be qualified.

5.10.1 Deliverables

- CLP Form II VOA-1,2, SVOA-1,2, or equivalent for SW-846 methods
- Raw data (required for confirmation)

5.10.2 Frequency

MS/MSD are analyzed at a frequency of once per 20 samples of similar matrix and concurrently with the samples in the SDG, unless a MS/MSD analysis is not required.

5.10.3 Criteria

Tables 11 and 12 list CLP performance criteria for MS/MSD.

Table 11. Performance Criteria for VOA MS/MSD

VOA Compound	%R Water	RPD Water	%R Soil	RPD Soil
1,1-Dichloroethene	61-145	14	59-172	22
Trichloroethene	71-120	14	62-137	24
Benzene	76-127	11	66-142	21
Toluene	76-125	13	59-139	21
Chlorobenzene	75-130	13	60-133	21

Table 12. Performance Criteria for SVOA MS/MSD

SVOA Compound	%R Water	RPD Water	%R Soil	RPD Soil
Phenol	12-110	42	26-90	35
2-Chlorophenol	27-123	40	25-102	50
N-Nitroso-di-n-propylamine	41-116	38	41-126	38
4-Chloro-3-methylphenol	23-97	42	26-103	33
Acenaphthene	46-118	31	31-137	19
4-Nitrophenol	10-80	50	11-114	50
2,4-Dinitrotoluene	24-96	38	28-89	47
Pentachlorophenol	9-103	50	17-109	47
Pyrene	26-127	31	35-142	36

For SW-846 methods, the MS/MSD %R should fall within laboratory-determined limits. If MS/MSD results fall outside the laboratory-determined limits, a QC Check Standard or LCS must be analyzed and fall within those ranges. The CLP criteria can be used as a guide to evaluate laboratory performance if limits have not been established or are not provided.

5.10.4 Data Verification

Verify the presence of required reporting forms. If they are not provided, contact the laboratory and request that they be provided. If these occurrences cannot be resolved with the analytical laboratory, they are considered noncorrectable problems. Place qualification code "M05" on the affected data if noncorrectable deliverable deficiencies have occurred; qualify only if the deviation indicates an adverse effect on data quality.

5.10.5 Data Validation

A determination shall be made concerning what extent that noncompliant MS/MSD data has on other sample data in regard to the MS/MSD sample itself as well as specific compounds in samples associated with the MS/MSD. In those instances where it can be determined that the results of the MS/MSD affect only the sample spiked, then qualification shall be limited to that sample alone; however, it may be determined that the laboratory is having a systematic problem in the analysis of one or more compounds, which affects all associated samples. The MS/MSD also shall be reviewed to determine if there is an overall bias to the sample or base neutral acid fraction, such as the majority of compounds with either a high or low recovery. MS/MSD data alone shall not be used exclusively to qualify data, but in conjunction with other supporting QC data. Professional judgment shall be used to determine the need for qualification of reported compounds.

If MS/MSD analysis was required, but not performed, qualify only if the deviation indicates an adverse effect on data quality. Occasionally, limited sample volumes prevent the preparation and analysis of MS/MSDs. In these cases, it is common practice for the laboratory SOW to allow for the analysis of an LCS/LCS duplicate pair as a substitute to provide an evaluation of precision in the measurable range of the method.

The laboratory also may include a MS/MSD analysis in a data package that is performed on a parent sample that is not from the sample set being reviewed. This commonly is called a "batch QC sample." Data validation will not be made based on batch QC that is generated from a sample that is not from the data set being reviewed. In this case, the LCS/LCSD will be used to determine the accuracy and precision of the sample set.

In the absence of either the MS/MSD or LCS/LCSD, it is unlikely that a complete evaluation of method precision and accuracy can be completed. In this case, at a minimum, sample results should be considered estimated quantities due to the inability of data users to fully determine the quality of the reported results. Affected positive results shall be qualified as "J" and nondetects as "UJ" unless other quality deficiencies are observed.

If the MS or MSD has been provided and recovery difficulties have been noted, the following guidance shall be used for evaluating accuracy:

- If poor spike recovery occurs in a sample whose concentration is $> 4 \times$ the spiked amount, no qualification is warranted.

- If MS %R > upper control limit, qualify detected analytes as "J" estimated. Nondetects do not require qualification.

- If MS %R > 10% and < lower control limit, qualify detected analytes as "J" estimated and nondetects as "UJ."

- If MS %R < 10%, qualify detected analytes as "J" estimated and nondetects as "R" rejected.

If poor duplicate or MS/MSD precision is observed, the following guidance shall be used:

- If the relative percent difference (RPD) for water/liquid MS/MSD is > 30%, qualify associated detections as "J" and nondetects as "UJ."

- If the RPD for soil/sold matrices is > 40%, qualify associated detections as "J" and nondetects as "UJ."

Matrix Spike/Matrix Spike Duplicate				**Qualification Guidance**	
Validation Step	Yes	No	N/A	Detects	Nondetects
1. Was the MS/MSD analyzed at the appropriate frequency?				*	*
2. Are all MS/MSD compounds' %R within control criteria?				**	**
3. Are all MS/MSD RPD within control criteria?				**	**

*Qualify only if the deviation indicates an adverse effect on data quality.
**Qualify only after evaluating other QC data in the SDG.

5.11 DUPLICATES

A laboratory duplicate sample is analyzed for each matrix to evaluate the precision of the laboratory at the time of analysis. A field duplicate sample is collected and analyzed to evaluate the precision of both the sampling techniques as well as the laboratory methodology. A field duplicate also may provide information on the homogeneity of the sample. Nonhomogeneous samples can impact the apparent method precision; however, aqueous/water samples are generally homogenous and most soil/sediment samples are homogenous within a factor of two or three.

5.11.1 Deliverables

- CLP Form VI or equivalent for SW-846 methods
- Raw data (required for confirmation)

5.11.2 Frequency

One laboratory duplicate shall be analyzed in accordance with the sample methodology used. Typically, a laboratory duplicate is analyzed per each sample batch or once per 20 samples, whichever is more frequent. Field duplicates are collected at a frequency identified in associated project planning documents (QAPPs, etc.).

5.11.3 Criteria

- Samples identified as field blanks must not be analyzed as laboratory duplicate.

- For sample concentrations > 5 × RL, the laboratory duplicate precision for aqueous samples as measured by RPD must be within ± 25% for both VOA and SVOA analyses (lab duplicates and field duplicates). For solid matrices the RPD must be within ± 25% (lab duplicate) or ± 35% (field

duplicates) for both VOA and SVOA analyses. If the sample results are < 5 × RL, RPD does not apply. Instead, the absolute difference between sample and duplicate must be < 5 × RL.

5.11.4 Data Verification

The data verifier shall verify that field blanks were not analyzed as laboratory duplicates. If a field blank has been used, the SMO will be notified immediately to ensure timely corrective action. If reanalysis cannot be completed, this issue will be identified as noncorrectable on the data verification checklist.

The data verifier shall verify the presence of laboratory and field duplicate results. If they are not provided or if the required frequency of analysis is not demonstrated in the laboratory deliverable, the data verifier will seek to obtain the missing information from the laboratory. Upon receipt, this information will be placed in the data package for delivery to the data validator.

If the missing information cannot be obtained from the laboratory, they are considered noncorrectable problems and shall be identified in this way on the data verification checklist. As they are contract compliance related, all such occurrences shall be communicated to the SMO and to the data validator on the data verification checklist.

5.11.5 Data Validation

- Examine the raw data (if provided) for any anomalies (e.g., baseline shifts, negative absorbance, omissions, illegibility.)
- Verify that appropriate methods and amounts were used in preparing the samples for analysis.
- Verify that there are no transcriptions or reduction errors (e.g., dilutions, percent solids, sample weights) on one or more samples.
- Verify that results fall within the linear range(s) of the instrument, if applicable.

Laboratory and field duplicate qualification is provided in Table 13.

Table 13. Laboratory and Field Duplicate Qualification

Duplicate Type	Matrix	RPD	Sample Results	Qualification Instructions
Laboratory Duplicate	Aqueous	>25%	Sample and dup > 5 × RL	Qualify results > RL "J" Qualify nondetects "UJ"
	Solid	>25%		
	Aqueous	> 25%	Sample and dup < 5 × RL	Absolute difference > RL "J" Absolute difference < RL no action
	Solid	>25%		
Field Duplicate	Aqueous	>25%	Sample and dup > 5 × RL	Qualify results > RL "J" Qualify nondetects "UJ"
	Solid	>35%		
	Aqueous	>25%	Sample and dup < 5 × RL	Absolute difference > RL "J" Absolute difference < RL no action
	Solid	>35%		

*The above control limits are method requirements for matrix-specific duplicate samples. It should be noted that laboratory variability arising from the subsampling of nonhomogeneous matrices is a common occurrence; therefore, for technical review purposes only, regional policy or project DQOs may allow the use of less restrictive criteria (e.g., 35% RPD, 5 × the RL) to be used in assessing nonhomogeneous matrices. When project-specific DQOs mandate broader precision requirements, this information will be provided to the data validators as part of the validation SOW.

Duplicate				Qualification Guidance	
Validation Step	Yes	No	NA	Detects	Nondetects
1. Have the duplicate results been included in the data package?				----	----
2. Was the duplicate analyzed at the appropriate frequency? *				----	----
3. Were the duplicate RPDs within control criteria? **				J	UJ

*Qualify only if the deviation indicates an adverse effect on data quality.
**Qualify only if other QC data in the SDG is outside established criteria.

5.12 LABORATORY CONTROL SAMPLE

An LCS (QC check standard) is analyzed to provide accuracy of the analytical method.

5.12.1 Deliverables

- Report summary of all analytes in the LCS
- Raw data (required for confirmation)

5.12.2 Frequency

The LCS shall be analyzed with each analytical batch to demonstrate initial proficiency of the method and must be repeated when significant changes in instrumentation are made.

5.12.3 Criteria

The LCS must be analyzed and must fall within limits specified by the determinative method.

The LCS is not required for the CLP 5/99 SOW, but is required for the SW-846 methods 8260 and 8270. Four replicates of the LCS are extracted and analyzed as an initial, one-time demonstration of ability to generate acceptable accuracy and precision. The LCS procedure may need to be repeated if changes in instrumentation or methodology occur. A LCS must also be analyzed if MS/MSD results fall outside laboratory-determined limits.

It is recommended that this standard be the same matrix as the analytical samples, and for SVOA analysis prepared and analyzed with the batch of analytical samples (although the SW-846 requires analysis only). Unless prepared with the analytical samples, the LCS will not provide a representation of method accuracy. The LCS is prepared from addition of a LCS concentrate into the appropriate clean matrix, extracted and analyzed (analyzed only in the case of volatile purge and trap).

5.12.4 Data Verification

Verify the presence of required reporting forms. If they are not provided, contact the laboratory and request that they be provided. If these occurrences cannot be resolved with the analytical laboratory, they are considered noncorrectable problems. Place qualification code "K04" on the affected data if noncorrectable deliverable deficiencies have occurred; qualify only if the deviation indicates an adverse effect on data quality.

5.12.5 Data Validation

Confirm that the LCS was analyzed (VOA) or prepared and analyzed (SVOA). If the SVOA LCS was analyzed only (i.e., not prepared), it will provide limited value for method accuracy. The following provides guidance for qualification of samples due to poor LCS performance. Resulting qualification of compounds is based on the number of LCS compounds outside of the laboratory determined limits and the percent recovery of those compounds.

- If all LCS compounds were within laboratory determined limits, then accept all detected and nondetected results.

- If one LCS compound but fewer than 50% of the LCS compounds analyzed were outside of the laboratory determined limits and the %R > upper control limit, then qualify associated detected results as "J" and accept associated nondetects.

If one LCS compound but fewer than 50% of the LCS compounds analyzed were outside of the laboratory determined limits and the %R > 10% but < lower control limit, then qualify associated detected results as "J" and associated nondetects as "R."

- If more than 50% of the LCS compounds reported were outside of the laboratory determined limits, the reviewer should use professional judgment to determine the best approach to qualifying the associated results as this could be an indication of a systematic problem.

- If an LCSD is included with the analyses and the calculated RPD between the LCS and LCSD exceeds laboratory limits, qualify associated detected analytes "J" and nondetected analytes "UJ."

Laboratory Control Sample (SW-846 Methods Only)				**Qualification Guidance**	
Validation Step	Yes	No	N/A	Detects	Nondetects
1. Was the LCS analyzed at the proper frequency?				J	UJ
2. Was the LCS prepared and analyzed for SVOA compounds?				*	*
3. Were the %R and RPD (if a LCSD was analyzed) of the reported compounds within acceptance criteria?				J	UJ/R

*Qualify only if the deviation indicates an adverse effect on data quality.

5.13 REPORTING LIMITS/SAMPLE QUANTITATION LIMITS

Reporting limits (RLs) have been developed to enable the laboratory to meet realistic detection limit goals. RLs have been determined by EPA to be calculated as 3σ sigma above the method detection limit (MDL).

Due to deviations from method-specified sample weights, extract volume or aliquot used in analysis or due to dilution or soil % moisture, RLs are modified accordingly and are termed sample quantitation limits (SQLs).

5.13.1 Deliverables

- CLP Form I VOA-1,2, SV-1,2, or equivalent for SW-846 analytical methods for all samples

5.13.2 Frequency

RLs or SQLs are reported for all compounds that are not detected above the method MDL.

5.13.3 Data Verification

Verify the presence of required reporting forms. If they are not provided contact the laboratory and request that they be provided. If these occurrences cannot be resolved with the analytical laboratory, they are considered noncorrectable problems.

5.13.4 Data Validation

For all samples, the SQL must be $\leq$ RL, which are identified and communicated to the analytical laboratory in the laboratory SOW. If the SQL > RL, this may indicate matrix-related problems or analytical conditions precluding RL achievement.

All sample results should be reviewed to determine RL compliance. In cases where the SQL > RL, the project may decide to request a reanalysis.

Verify that compounds detected at levels below the SQL have been qualified as "J" by the analytical laboratory.

For one nondetected compound in each sample blank, verify that RLs have been adjusted for deviations from the nominal preparation and analysis conditions, such as sample size, aliquot, if necessary.

No additional validation qualifiers are necessary for results detected below the SQL unless directed in other sections of this plan.

Calculations for modifications to the RL can be found in Appendix C.

5.14 TARGET COMPOUND IDENTIFICATION

5.14.1 Deliverables

- CLP Form I VOA-1,2, SV-1,2, or equivalent for SW-846 analytical methods
- Raw data (required for confirmation)

5.14.2 Criteria

Mass spectra of the sample target compound and a current laboratory-generated standard must match according to the following criteria. All ions present in the standard mass spectrum at a relative intensity greater than 10% must be present in the sample spectrum.

All ions > 10 % relative intensity in the standard reference spectrum must be present in the sample mass spectrum. All ions > 10 % relative intensity in the sample mass spectrum but not present in the standard mass spectrum must be considered and accounted for.

The relative intensities of the ions must agree within ± 20% between the standard and sample spectrum.

The relative retention time (RRT) of the target compound must be within ± 0.06 units of the standard RRT.

5.14.3 Data Validation

The presence/absence and concentration of detected compounds in the samples are reviewed to determine whether or not the correct quantitation ions have been used for proper quantification of the compounds. If incorrect ions have been shown, rationale should be provided in the data package for the noncompliance. If no rationale has been provided, evaluation of the effect on quantitation of detected target compounds shall be made. If detected target compounds quantified against the incorrect ion are significantly affected, the affected compounds may be qualified as "R."

Inspect the data for instances of manual integrations of peak areas. Reoccurring manual integrations on similar peaks from sample to sample or from calibration to sample, or on peaks with normally good peak resolution, or for splitting of peaks should be inspected to determine the necessity for integration, or if a systematic problem is occurring in the analyses.

Situations that may tend to produce carryover to subsequent sample analyses, such as the analysis of samples showing high concentrations of compounds, shall be evaluated. If cross-contamination has had an effect on a compound, such as reporting of false positives or artificially elevating compound levels, affected data may be qualified as "R."

Samples are diluted and reanalyzed if compound signals exceed the dynamic range of the instrument (saturation) or if interferences preclude accurate quantitation of compounds. When a sample is reanalyzed and both analyses of that sample are included in the data package, indicate on the laboratory reporting forms which results are the most reliable.

5.15 MANUAL RECALCULATION OF ANALYTICAL RESULTS

The accuracy and consistency of sample result calculation by the laboratory can be addressed using two different techniques. The application of each strategy depends on the laboratory's ability to minimize transcription during reporting, and how familiar the project is with the performance of the laboratory. If sample results are produced primarily through software processing and minimal transcription is performed in the laboratory, the data system(s) can be evaluated during an audit or surveillance by performing two different tests on the software. First, supply the data system a consistent set of input designed to provide a consistent set of output. Next, supply the data system a set of nonconforming data to test the error detection routines. An additional evaluation of the laboratory's software configuration control and security is also necessary. Through this technique, a high level of confidence can be gained in the laboratory's reporting techniques and will result in a minimal need for manual recalculation of sample results.

If the laboratory has a high rate of manual transcription in generation of sample results, the project may choose to manually recalculate sample results at a determined frequency. If sample results cannot be reproduced through manual calculation, contacting the laboratory may be necessary to resolve the problem. Data may be qualified "R" as a last resort, if no actions can reproduce reported values.

Calculations for compound quantitation and rounding rules can be found in Appendix C.

5.16 TENTATIVELY IDENTIFIED COMPOUNDS

Tentatively identified compounds (TICs) are nontarget compounds that are not system monitoring compounds or internal standards. TICs are not always reported by the laboratory. If TICs are required for a project, then the requirement to report them will be included in the laboratory SOW.

5.16.1 Deliverables

- CLP Form I VOA, SV, or equivalent for SW-846 analytical methods for all samples
- Raw data (required for confirmation)

5.16.2 Criteria

TICs are qualitatively identified by using mass spectral identification from a mass spectra library search. The laboratory must identify the 10 largest VOA peaks and 20 SVOA peaks that are not surrogates, internal standards, or target compounds.

5.16.3 Data Verification

Verify the presence of the pertinent reporting forms. If the required reporting forms are not present and these and these occurrences are considered noncorrectable problems, indicate this on the data verification checklist.

5.16.4 Data Validation

Check raw data against TIC report ensuring that all TIC peaks are accounted on CLP Form I.

Two named TIC concentrations (not "unknowns") shall be recalculated using the calculations in Appendix C with a RRF of 1.0.

The following are guidance for identification/qualification of TICs:

- Qualify all TICs as "NJ," presumptively identified, at estimated concentration.
- Mass spectra for all samples with raw data and blanks shall be examined for TICs.
- All ions > 10% relative intensity in the reference spectrum should be in the sample spectrum.
- Relative intensity of the major ions should agree within $\pm$ 20% between sample and reference spectra.
- Molecular ions present in the reference spectrum should be present in the sample spectrum.
- Ions present in the sample spectrum but not in the reference spectrum should be reviewed for possible background contamination, interference, or co-elution of additional TIC or target compounds.
- If the identification is uncertain or there are extenuating factors affecting compound identification, the TIC result may be reported as "unknown."
- TICs < 10× the level in the blank should not be reported. If a TIC is reported at this level, qualify as "R."

- TICs may be reported as "either compound X or compound Y" if there are more than one reasonable match from the library search.

- All similar TICs may be reported as a total: (e.g., all alkanes may be reported as total hydrocarbons).

- If TIC evaluation from library search does not yield conclusive evidence from items stated above, change the identification of the TIC to "unknown." Professional judgment shall be used in comparing references spectra to sample spectra and the incidence of TICs in multiple samples and blanks.

- Common laboratory artifacts should not be reported as TICs. Qualify these compounds as "R" if reported as TICs.

- If a TIC is reported in one or all samples but not in the blank, check if the compound is a common laboratory artifact in the sample and inspect the blank for peaks that are < 10% of the internal standard area but are present in the blank chromatogram at a similar retention time. Qualify compounds as "R."

- Compounds reported as a TIC in one fraction shall be qualified as "R" in that fraction if that compound is reported as detected in another fraction.

- Blank chromatograms shall be examined to verify that TIC peaks present in samples are not found in blanks. When a low-level non-target compound, which is a common artifact or laboratory contaminant, is detected in a sample, a thorough check of blank chromatograms may require looking for peaks that are < 10% of the internal standard area but present in the blanks chromatogram at similar relative retention time.

- If target compounds are identified by nontarget library searches, the laboratory shall be contacted to resubmit the relevant forms with the target compound quantified against the correct quantitation ion.

The following list presents the common laboratory contaminants that should not be reported as TICs in either VOA or SVOA fractions.

Common Laboratory Contaminants

- CO_2 (m/z 44), (may be introduced by system leaks)
- Siloxanes (m/z 73) (common GC column bleed artifacts)
- Diethyl ether (1,1-oxybisethane)
- Hexane
- 1,1,2-trichloro-1,2,2-trifluoroethane (flurotrichloromethane or Freon 113)
- Phthalates at levels < 100 µg/L (waters) or 4,000 µg/Kg (soils)

Solvent Preservatives and By-Products

- Cyclohexane
- Cyclohexanone
- Cyclohexenone
- Cyclohexanol
- Chlorocyclohexene
- Chlorocyclohexanol

Aldol Reaction Products of Acetone

- 4-methyl-2-penten-2-one
- 4-hydroxy-4-methyl-2-pentanone
- 5,5-dimethyl-2(5H)-furanone

6. RECORDS

Generate and maintain all records in accordance with CP3-RD-0010, *Records Management Process.*

- Data Verification Checklist (for Level II, III, and IV validation only)
- Data Validation Report (for Level III and Level IV validation only)
- Copies of qualified or unqualified results reports (if applicable)

7. REFERENCES

NOTE: Use the most current versions of the references listed below for the data review, verification, and validation process.

Contract Laboratory Program National Functional Guidelines for Organic Data Review, EPA-540/R-00/008, U.S. Environmental Protection Agency, Washington, DC January 2010.

Contract Laboratory Program Statement of Work for Organic Analysis, Multi-media, Multi-Concentration, EPA-OLM04.2, May 1999, U.S. Environmental Protection Agency, Washington, DC, May 1999.

Guidance on Systematic Planning Using the Data Quality Objective Process, EPA/240/B-06/001, U.S. Environmental Protection Agency, Washington, DC, February 2006.

Paducah Gaseous Diffusion Plant Programmatic Quality Assurance Project Plan, DOE/LX/07-1269&D2/R2, U.S. Department of Energy, Paducah, KY.

Quality Assured Data, CP3-ES-5003, Fluor Federal Services, Inc., Paducah Deactivation Project.

Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Revisions through Update III, U.S. Environmental Protection Agency, Washington, DC, March 2009.

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APPENDIX A

DATA VALIDATION QUALIFIERS AND QUALIFICATION CODES

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DATA VALIDATION QUALIFIERS AND QUALIFICATION CODES

Data Validation Qualifiers

U	Analyte compound or nuclide considered not detected above the reported detection limit.
J	Analyte compound or nuclide identified; the associated numerical value is approximated.
NJ	Analyte compound or nuclide presumptively present at an estimated quantity.
UJ	Analyte compound or nuclide not detected above the reported detection limit, and the reported detection limit is approximated due to quality deficiency.
R	Result is not usable for its intended purpose.
=	"Equals" sign, indicates that no qualifier is necessary.

Data Validation Qualification Codes

Blanks

B01	Sample concentration was < the RL, and < 5 × the blank concentration (10 × for common contaminants).
B02	Sample concentration was > the RL, and < 5 × the blank concentration (10 × for common contaminants).
B03	Gross contamination exists; blank result impacted associated analyte data quality.
B04	Negative blank result impacted associated analyte data quality.
B05	Blanks were not analyzed at appropriate frequency.
B06	Sample not significantly different than radiochemical method blank.
B07	Blank data not reported.
B08	Instrument blank not analyzed after high level sample.
B09	Other (describe in comments)
B10	Method blanks not extracted at appropriate frequency.
B11	Sample results were corrected for blank contamination.
B12	Blank was not the same matrix as the analytical samples.
B13	Concentration of target compound detected in sample affected by carryover.

Calibration

C01	Initial calibration average RRF was < 0.05
C02	Initial calibration %RSD was exceeded
C03	Initial calibration sequence was not follows as appropriate
C04	Continuing calibration RRF was < 0.05
C05	Continuing calibration %D was exceeded
C06	Calibration or performance check was not performed at the appropriate frequency
C07	Calibration data not reported
C08	Calibration not performed
C09	Chemical resolution criteria were not satisfied
C10	Calibration standard matrix not the same as sample matrix
C11	Compounds quantitated against inappropriate standard or standard concentration level
C12	Compound quantitated against inappropriate ion
C13	Calibration factor RSD criteria were not satisfied
C14	Retention time of compound outside window
C15	Initial calibration % R was below lower acceptance limit
C16	Initial calibration % R was above upper acceptance limit
C17	Initial calibration curve fit was < 0.995
C18	Inappropriate standard concentrations

C19 Continuing calibration R was below the lower acceptance limit
C20 Continuing calibration %R was above the upper acceptance limit
C21 CRI %R was below the lower acceptance limit
C22 CRI %R was above the upper acceptance limit
C24 Standard curve was established with fewer than the appropriate number of standards
C27 Calibration verification efficiency outside control criteria
C28 Calibration verification background outside control criteria
C29 Calibration verification energy outside control criteria
C30 Calibration verification peak resolution outside control criteria
C31 Chromatogram does not show adequate gain setting
C32 Other (describe in comments)

Laboratory Duplicate/Dual Column Sample Confirmation
D01 Significant difference between sample and duplicate
D02 Laboratory duplicate was not analyzed at the appropriate frequency
D03 Laboratory duplicate exceeds RPD criteria
D04 Laboratory duplicate data not reported
D05 Other (describe in comments)
D06 %D between primary and secondary column confirmation exceeds acceptance criteria

Evidentiary Concerns
E01 Custody of sample in question
E02 Standard not traceable
E03 Other (describe in comments)

Interference Check Samples (ICS)
F01 ICS recovery below lower control limit or advisory limit
F02 ICS recovery above upper control limit or advisory limit

General
G01 Professional judgment was used to qualify the data
G02 Other (describe in comments)

Holding Times/Preservation
H01 Extraction holding times were exceeded
H02 Extraction holding times were grossly exceeded
H03 Analysis holding times were exceeded
H04 Analysis holding times were grossly exceeded
H05 Samples were not preserved properly
H06 Sample preservation cannot be confirmed
H07 Sample temperature exceeded criteria prior to preparation
H08 Other (describe in comments)

Internal Standards
I01 Area count was above upper control limits
I02 Area count was below lower control limits
I03 Extremely low area counts or performance was exhibited by a major drop off
I04 Internal standard retention time varied by more than 30 seconds
I05 Inappropriate internal standard used
I06 Inappropriate internal standard concentration(s) used

I07 Internal standard data not reported
I08 Other (describe in comments)

Laboratory Control Sample
L01 LCS recovery above upper control limit
L02 LCS recovery below lower control limit
L03 LCS was not analyzed at appropriate frequency
L04 LCS not the same matrix as the analytical samples
L05 LCS data not reported
L06 Other (describe in comments)

Matrix Spike and MS/MSD
M01 MS and/or MSD recovery above upper control limit
M02 MS and/or MSD recovery below lower control limit
M03 MS/MSD pair exceeds the RPD limit
M04 MS and/or MS/MSD not analyzed at the appropriate frequency
M05 MS and/or MS/MSD data not reported
M06 Other (describe in comments)

Instrument Performance
P01 High background levels or a shift in the energy calibration were observed
P02 Extraneous peaks were observed
P03 Loss of resolution was observed
P04 Peak tailing or peak splitting that may result in inaccurate quantitation were observed
P05 Instrument performance data not reported
P06 Instrument performance not analyzed at the appropriate frequency
P07 Other (describe in comments)
P08 Resolution Check Mixture (RCM) not analyzed at the beginning of the initial calibration sequence
P09 RCM criteria were not met
P10 RPD criteria in Performance Evaluation Mixture (PEM) was not met

Quantitation
Q01 Peak misidentified
Q02 Target analyte affected by interfering peak
Q03 Qualitative criteria were not satisfied
Q04 Cross contamination occurred
Q07 Analysis occurred outside 12 hour GC/MS window
Q09 TIC result was not above 10× the level found in the blank
Q10 TIC reported as detect in another fraction
Q11 Common artifact reported as a TIC
Q12 No raw data were provided to confirm quantitation
Q13 MDA > RL
Q14 Inappropriate aliquot sizes were used
Q15 Sample result < MDA
Q16 Sample result < 2σ uncertainty
Q17 Negative result
Q18 Compounds were not adequately resolved
Q19 Sample geometry different from calibration geometry
Q20 Sample weight greater than greatest weight on mass attenuation curve
Q21 Isotopes of same radionuclide do not show equilibrium

Q22 Peak not within appropriate energy range
Q23 Counting uncertainty ≥ 80% of sample result
Q24 Raw data anomaly
Q25 Other (describe in comments)
Q26 RT outside calculated RT window
Q28 Neither RL or the SQL are reported for a nondetect result
Q29 SQL > RL
Q30 Compound detected at < SQL and not qualified "J"
Q31 Presence of high molecular weight contaminants impacted sample quantitation

Surrogates
S01 Surrogate recovery was above the upper control limit
S02 Surrogate recovery was below the lower control limit
S03 Surrogate recovery was < 10%
S04 Inappropriate surrogate standard used
S05 Inappropriate surrogate standard concentration(s) used
S06 Surrogate data not reported
S07 Surrogate outside retention window
S08 Other (describe in comments)

Instrument Tuning
T01 Mass calibration ion misassignment
T02 Mass calibration was not performed every 12 hours
T03 Mass calibration did not meet ion abundance criteria
T04 Mass calibration data was not reported
T05 Scans were not properly averaged
T06 Other (describe in comments)

Pesticide Sample Cleanup
U01 Florisil performance requirements not met
U02 GPC calibration not checked at required frequency
U03 GPC calibration criteria not met
U04 GPC blank not analyzed after GPC calibration
U05 GPC blank greater than half the RL for target compound

Cleanup
V01 10% recovery or less was obtained during either check
V02 Recoveries during either check were > 120%
V04 Cleanup data not reported
V05 Cleanup check not performed at the appropriate frequency
V06 Other (describe in comments)

Dilutions
X01 Serial dilution not analyzed at the appropriate frequency
X02 %D between the original sample and the diluted result (or serial dilution) exceeded acceptance criteria
X03 Reported results not corrected for dilution factor
X04 Other (describe in comments)

Radiochemical Yield

Y01 Radiochemical tracer yield was above the upper control limit
Y02 Radiochemical tracer yield was below the lower control limit
Y03 Radiochemical tracer yield was zero
Y04 Radiochemical yield data was not present
Y05 Other (describe in comments)

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APPENDIX B

QUALIFICATION TABLES FOR MULTIPLE QUALITY DEFICIENCIES

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QUALIFICATION TABLES FOR MULTIPLE QUALITY DEFICIENCIES

Guidance for Data Qualification Due to Multiple Quality Deficiencies

This appendix provides guidance in the qualification of data due to instances of multiple quality deficiencies. Quality deficiencies can be categorized based on potential effect on sample data. The effect of quality deficiencies may be applicable to only a single sample or to all samples within the reporting batch. A validation qualifier should not be placed on sample data until all quality deficiencies have been identified within the reporting batch.

The following is a listing of data quality indicators and the probable effects on sample data.

Data Quality Indicator	Effect on Sample Data
GC/MS tuning	Compound identification
Initial calibration	Identification and quantitation
Continuing calibration	Quantitation
Surrogate standards	Positive or negative bias
Internal standards	Positive or negative bias
Method blank	Positive bias
LCS/LCS duplicate	Method bias and precision
MS/MS duplicate	Positive or negative bias and precision
QC check standard	Positive or negative bias

In the instance of multiple quality deficiencies the validation qualifier should be placed consistent with the acceptable level of uncertainty associated with the intended use of the data. The validation SOW should provide a summary of the intended use(s) of the data. (e.g., risk assessment, fate and transport modeling, waste management) to facilitate appropriate placement of validation qualifiers.

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APPENDIX C

RULES, CALCULATIONS, AND EQUATIONS

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RULES, CALCULATIONS, AND EQUATIONS

Rounding Rules

1. In a series of calculations, carry the extra digits through to the final result, and then round off.
2. If the digit to be removed is less than 5, the preceding digit stays the same.
3. If the digit to be removed is equal to or greater than 5, the preceding digit is increased by 1.

Calculations/Equations

C.1 Calculation for RRF

$$RRF = \frac{A_x}{A_{is}} x \frac{C_{is}}{C_x}$$

where:
- A_x = Area of the characteristic ion of the compound
- A_{is} = Area of the characteristic ion of the internal standard
- C_x = Concentration of the compound
- C_{is} = Concentration of the internal standard

C.2 Calculation for %RSD

$$\%RSD = \frac{\sigma}{\overline{X}_{(R1,R2)}} x100$$

where:
- σ = Standard deviation of the five initial calibration RRFs (per compound)
- $X_{(R1,R2)}$ = Mean of the five initial calibration RRFs (per compound)

C.3 Surrogate Standard Concentration

$$C_{ss} = \frac{A_{ss} x I_s}{A_{is} x RRF_{50}}$$

where:
- C_{ss} = Concentration of surrogate
- A_{ss} = Area of surrogate
- I_s = Concentration of internal standard
- A_{is} = Area of internal standard
- RRF = Relative response factor (from continuing calibration)

C.4 Percent Recovery

$$\%R = \frac{Measured}{Expected} x100$$

where: SSR = Spiked sample recovery
SR = Sample result
SA = Spike added

C.5 Matrix Spike Percent Recovery

$$Conc_{MS} = \frac{SSR - SR}{SA} x100$$

where: SSR = Spiked sample recovery
SR = Sample result
SA = Spike added

C.6 Relative Percent Difference

$$RPD = \frac{|R_1 - R_2|}{-R_1 R_2} x100$$

where: R1 = First sample value (original)
R2 = Second sample value (duplicate)

C.7 Sample Quantitation Limit

$$SQL = RL_{sow} x DF x \frac{SOW\ Weight}{Sample\ Weight} x \frac{SOW\ Aliquot}{Sample\ Aliquot} x \frac{1}{\%S}$$

where: RL_{SOW} = Required RL
DF = Dilution factor
%R = % solids (100 - % moisture)/100

C.8 Waters

$$\mu g/L = \frac{A_x x I_s x D_f}{A_{is} x RRF x V_o}$$

C.9 Soils (low level—dry weight basis)

$$\mu g/Kg = \frac{A_x x I_s}{A_{is} xRRFx W_s xD}$$

C.10 Soils (medium level—dry weight basis)

$$\mu g/Kg = \frac{A_x x I_s x V_t x1000x D_f}{A_{is} xRRFxW_s x V_a xD}$$

where:

	A_x	=	Area of the characteristic ion of the compound being measured
	A_{is}	=	Area of the characteristic ion of the internal standard
	I_s	=	Amount of internal standard added (ng)
	RRF	=	Daily response factor for compound being measured
	V_o	=	Volume of water purged (mL)
	W_s	=	Weight of sample
	D	=	% solids
	V_t	=	Volume of methanol (typically 10.0 mL)
	D_f	=	Dilution factor
	V_a	=	Volume of the aliquot of the methanol extract (µL) added to reagent water for purging

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CP2-ES-5107/R0

Inorganic Analyses
Data Verification and Validation
Paducah Gaseous Diffusion Plant,
Paducah, Kentucky

FLUOR®

Inorganic Analyses Data Verification and Validation Paducah Gaseous Diffusion Plant, Paducah, Kentucky

Date Issued—May 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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APPROVALS

Inorganic Data Verification and Validation
Paducah Gaseous Diffusion Plant,
Paducah, Kentucky

CP2-ES-5107/R0

Lisa Crabtree
Environmental Monitoring Project Manager

5/17/16
Date

Mark Duff
Environmental Management Director

5-17-16
Date

DOE Approval Letter: NA Date: NA

Nuclear Safety Documentation: EXEMPTION #28
5-17-16
5-17-16

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CONTENTS

TABLES

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ACRONYMS

AA	atomic absorption
CCB	continuing calibration blank
CCV	continuing calibration verification
CLP	contract laboratory program
COC	chain of custody
DQO	data quality objective
EDD	electronic data deliverable
EPA	U.S. Environmental Protection Agency
EB	equipment blank
ICB	initial calibration blank
ICP	inductively coupled plasma
ICP-MS	inductively coupled plasma/mass spectrometry
ICS	interference check sample
ICV	initial calibration verification
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
MDL	method detection limit
MS/MSD	matrix spike/matrix spike duplicate
PDS	post-digestion spike
PB	preparation blank
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RI	relative intensity
RB	rinseate blank
RL	reporting limit
RPD	relative percent difference
SD	serial dilution
SDG	Sample Delivery Group
SMO	Sample Management Office
SOW	statement of work
TDS	total dissolved solids
TOC	total organic carbon
TSS	total suspended solids
%R	percent recovery

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DEFINITIONS

NOTE 1: Qualifier definitions are listed in Appendix A.

NOTE 2: In this plan, the words "shall" and "must" are used to denote a requirement; the word "should" is used to denote a recommendation; and the word "may" is used to denote permission (neither a requirement nor a recommendation). In conformance to this plan, all steps shall be performed in accordance with its requirements, but not necessarily with its recommendations; however, justification must be documented for deviations from recommendations.

AFFECTED SAMPLE RESULT—A sample result is considered to be affected when it is significantly influenced by a quality deficiency and is qualified accordingly through analytical data validation.

ANALYTICAL DATA VALIDATION—Analytical data validation is a systematic process, performed independently from the data generator, which applies a defined set of performance-based criteria to a body of data that may result in physical qualification of the data. Data validation occurs prior to drawing a conclusion from the body of data.

ANALYTICAL DATA VERIFICATION—Analytical data verification is a systematic process of evaluating the completeness, correctness, consistency, and compliance of a set of facts against a standard or contract that is performed either by the data generator or by an entity independent to the data generator.

BATCH—A batch is a group of samples prepared at the same time in the same location using the same method, not to exceed 20 samples of similar matrix.

CASE—A finite, usually predetermined number of samples, that have been collected over a given time period from a particular site. A case consists of one or more sample delivery groups.

CHAIN OF CUSTODY (COC)—The history of the transfer of samples from the time of sample acquisition through archival and disposal of samples. COC documentation is required as evidence of sample integrity.

CONTINUING CALIBRATION VERIFICATION (CCV)—A standard solution analyzed at a specified frequency during an analytical run to assure continued validity of the calibration curve.

CORRECTABLE PROBLEM—Correctable problems are deficiencies within data packages that may be rectified through consultation with the laboratory. Correctable problems may be revealed during both data verification and data validation. Correctable problems revealed during verification are those deficiencies that can be addressed by obtaining additional information from the laboratory. Correctable problems revealed during validation are those deficiencies with analyses that can be solved either by a second preparation and/or by analysis of a sample.

DATA QUALITY OBJECTIVES (DQO)—DQOs are qualitative and quantitative statements derived from the outputs of each step of the DQO Process that specify the study objectives, domain, limitations, the most appropriate type of data to collect, and specify the levels of decision error that will be acceptable for the decision.

DATA QUALITY OBJECTIVES PROCESS—The DQO Process is a quality management tool based on the scientific method and developed by EPA to facilitate the planning of environmental data collection activities. The DQO Process enables planners to focus their planning efforts by specifying the use of the

data (the decision), the decision criteria (action level), and the decision maker's acceptable decision error rates.

HOLDING TIME—Holding time, as described in this plan, is defined as the period of time between sample collection and sample activity determination.

LABORATORY CONTROL SAMPLE (LCS)—The LCS is a control sample of known composition. Aqueous and solid LCSs are analyzed using the same preparation, reagents, and method employed for field samples.

LABORATORY DUPLICATE—The laboratory duplicate is a randomly chosen split of an analytical sample into two aliquots prior to sample preparation. The purpose of a laboratory duplicate is to monitor the precision of the analytical method.

MATRIX SPIKE (MS)—The matrix spike is a split of a field-originating analytical sample in which one half of the split is spiked with a known amount of radionuclide of interest prior to sample preparation. The purpose of a matrix spike is to measure the effect of interferences from the sample matrix that will preclude accurate quantitation by the instrumentation.

NONCORRECTABLE PROBLEM—Noncorrectable problems are deficiencies within data package that preclude the evaluation of data quality by predefined criteria. Noncorrectable problems may be revealed during both data verification and data validation.

PREPARATION BATCH—A preparation batch is a group of sample aliquots prepared together at the same time using the same method and related to the same quality control samples.

QUALITY-INDICATOR SAMPLE—Quality-indicator samples are those samples made ready in the laboratory that provide direct or indirect evaluation of the status of the analytical system and resulting data quality. Collectively, quality indicator samples are the laboratory control sample, laboratory duplicate, matrix spike, and method blank.

REPORTING LIMIT (RL)—The RL is a contractually specified detection limit that, under typical analytical circumstances, should be achievable.

SAMPLE DELIVERY GROUP (SDG)—An SDG is defined by one of the following, whichever occurs first: (1) Case of field samples; (2) Each 20 field samples within a case; (3) Each 14-day calendar period during which field samples in a case are received, beginning with receipt of the first sample in the SDG.

SAMPLE RESULT—A sample result, as described in this plan, is a numeric denotation of the concentration, amount, or activity of a specific analytical parameter uniquely associated with an aliquot of environmental media.

STATEMENT OF WORK (SOW)—The validation SOW is a document prepared to function as the mechanism by which validation requirements are communicated from the project to the validation organization.

TURN-AROUND TIME—Turn-around time is contractually specified as the amount of time that elapses between laboratory receipt of the raw samples and subsequent data receipt by the client.

VALIDATION QUALIFIER—A qualifier is an alphabetic character physically or electronically associated with a discrete sample result during validation due to a data quality deficiency, which provides guidance in data usability.

VALIDATION STATEMENT OF WORK—The validation SOW is a document prepared to function as the mechanism by which validation implementation requirements are communicated from the project to the validation organization.

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1. INTRODUCTION

1.1 PURPOSE, SCOPE, AND APPLICATION

1.1.1 Purpose

This plan defines the minimum requirements, responsibilities, and methodology for inorganic data verification and validation generated using instrumental methods.

This plan provides requirements for developing and implementing a validation methodology for inorganic Contract Laboratory Program (CLP) and SW-846 (6010, 6020, 7470, and 7471) analytical methods primarily for analytes in aqueous and soil/sediment matrices. It also covers the analysis of cyanide. It is flexible enough to allow evaluation of data usability for project-specific Data Quality Objectives (DQOs). Data produced by analytical methods for which this plan provides limited guidance [i.e., U.S. Environmental Protection Agency (EPA) 200 series methods] may necessitate development of modified criteria from this plan; however, the general validation strategy outlined in this plan should be applicable. In the absence of specific guidance contained herein, data validators are advised to seek guidance in the specific method employed and/or from other industry standards. Examples include EPA CLP, National Functional Guidelines for Inorganic Data Review, EPA Regional Data Validation Guidance, and subject matter experts within the industry.

Specifications in this plan should be incorporated into project documentation such as the Quality Assurance Project Plan (QAPP), into contractual SOWs between the project and the analytical laboratories and into contractual validation SOWs between the project and the organization chosen to validate the data. If data validation is performed by individuals within the project, the SOW is not required, but a mechanism to specify data validation requirements is recommended. This plan shall be used as a baseline to create project-specific reports needed to perform inorganic data verification and validation.

1.1.2 Scope and Application

This plan applies to inorganic data verification and validation activities performed by the Sample Management Office (SMO) or its subcontractors.

2. RESOURCES

- Analytical Method
- Laboratory Statement of Work (SOW)
- Data Validation SOW
- Project-Specific QAPP

3. PREPERFORMANCE ACTIVITIES

Project manager shall ensure that individuals who perform inorganic data verification and validation are knowledgeable of the latest version of this plan before beginning any activities.

4. GENERAL INFORMATION

4.1 REQUIRED ELEMENTS OF REVIEW AND VALIDATION

To the extent possible, all laboratory data packages will be produced by the laboratory performing the analysis as Level IV (i.e., U.S. EPA Stage 4) laboratory data deliverables. One-hundred percent of the data deliverables will undergo a data quality review and data validation comparable to a Level I validation (depending on analyte and method). As required by project-specific requirements, the data review and validation effort may be increased to cover a Level II, Level III, or a full Level IV validation of the data package. The activities included in the review and validation effort for each level are provided in Table 1.

Table 1. Required Elements of Review and Validation

Report Elements to be Reviewed[1]	**Level I**	**Level II**	**Level III**	**Level IV**
Cover/Signature Page	x	x	x	x
Table of Contents			x	x
Report Narrative	x	x	x	x
Executive Summary (if included)			x	x
Method Summary/Analyst Summary			x	x
Sample Summary/Sample Data Sheets	x	x	x	x
Shipping and Receiving Documents	x	x	x	x
Client Chain of Custody (COC)	x	x	x	x
Sample Receipt Checklist	x	x	x	x
Interlab COC (where applicable)		x	x	x
Internal COC (if required)			x	x
Glossary of Abbreviations	x	x	x	x
QC RESULTS				
Quality Control (QC) Association Summary		x	x	x
Laboratory Chronicle			x	x
Surrogate and/or Tracer and Carrier Recovery Report		x	x	x
Blank Reports		x	x	x
Laboratory Control Sample (LCS) Reports		x	x	x
Matrix Spike(MS)/Matric Spike Duplicate (MSD) and LCS Duplicate (LCSD) Reports		x	x	x
Hold Times and Preservation Requirements	x	x	x	x
[Extended Data Deliverables/Forms]				
CLP-Like Organics				
SUMMARY FORMS			x	x
Summary Forms (Org I-X)			x	x
QC SUMMARY			x	x
QC Forms (Org I-IV,VIII)			x	x
SAMPLE DATA			x	x
Quant Rpt + Chro + spectra				x

Table 1. Required Elements of Review and Validation (Continued)

Report Elements to be Reviewed[1]	Level I	Level II	Level III	Level IV
STANDARDS DATA			x	x
Calibration Forms (VI-VII; for GC- VIII-X)			x	x
(Quant + chro follows each form set)				x
QC DATA			x	x
Tune			x	x
Blank Form I			x	x
Blank Quant Rpt + Chro + spectra				x
LCS/LCSD Form I			x	x
LCS/LCSD Quant Rpt + Chro + spectra				x
MS/MSD Form I			x	x
MS/MSD Quant Rpt + Chro + spectra				x
GEL Permeation Data				x
Florisil Data				x
Logs—Instrument, Prep, Standard			x	x
CLP-Like Inorganics				
Cover Page			x	x
Sample Forms (I) (CLP-like)			x	x
Calibration + QC Forms (ex:II-XIV)			x	x
Instrument Data				x
Preparation Data				x
SHIPPING/RECEIVING DOCUMENTS				
Internal COC (if required)			x	x
Interlab COC (where applicable)			x	x
Client COC	x	x	x	x
Sample Receipt Checklist	x	x	x	x

[1] Report elements listed represent common elements. The laboratory may provide more or less information as required by the method being analyzed. For example, those wet chemistry methods with no true calibration information will not have calibration forms included in the data package.

The requirements of the Level I and II review and validation effort will be referred to as "Data Verification" and will be performed by a member of the SMO. The requirements of the Level III and IV review and validation effort will be referred to as "Data Validation" and typically is performed by an entity external to the project. This can be an internal staff member that is not associated with the project, or it may be an independent third party external to Paducah Site. The following sections summarize the requirements of each type of review and validation efforts.

4.2 DATA VERIFICATION REQUIREMENTS

Data verification is defined as a systematic process, performed either by the data generator (on-site or fixed-base laboratory) or by an entity external to the data generator, which results in evaluation of the completeness, correctness, consistency, and compliance of a data set against a standard or contract.

If data verification is performed by the data generator, a project-level surveillance must be established by which the performance of the verification process is evaluated.

Data verification, at the project level, is conducted by a SMO representative to expedite the review process. If data verification is conducted independently of the data validator, it includes two activities. The first activity entails inventory of the data package to ensure compliance with the contract and SOW in terms of the required deliverables. The second activity entails various checks of data quality to determine the need for qualification. This process is referred to commonly as the "contractual screen" and is the

beginning of the data validation process in that it encompasses the review of the Level I and some Level II validation elements identified in Table 1. The data verifier will qualify data based on the review and validation elements in accordance with Section 5 of this plan. If the data set is being reviewed and validated at the Level III or IV requirements, then the data verifier will provide a copy of the data verification checklist to the data validator to expedite the validation process, or the data validator will perform both the data verification and data validation processes.

Data verification should provide a mechanism for problem resolution with the laboratory; it should not be exclusively an "after-the-fact" identification of noncorrectable deficiencies.

A data verification checklist is completed by the data verifier and takes, as input, the steps in this plan that that are listed as "Data Verification." The data verifier shall complete Form CP3-ES-5003-F03, "Data Verification Checklist," in accordance with CP3-ES-5003, *Quality Assured Data,* for all Level II, III, and IV validations.

4.3 ANALYTICAL DATA VALIDATION REQUIREMENTS

Analytical data validation, including laboratory data review, is defined as a systematic process, performed externally from the data generator, which applies a defined set of performance-based criteria to a body of data to determine the quality of reported results. Data validation is not performed by the analytical laboratory. Data validation provides a level of assurance, based on a technical evaluation, that an analyte is present or absent and, if present, the level of uncertainty associated with the measurement. Analytical data validation for inorganic methods includes a technical review of the laboratory data package specified in the laboratory SOW. Data validation incorporates an evaluation of sample custody, sample handling and preparation, holding times, instrument calibration, instrument performance, batch QC samples (e.g., LCS), the identification and quantitation of target analytes, performance standards (e.g., surrogates, internal standards), and the effect QC performance and/or deficiencies have on the quality of analytical sample data.

A data validation report that includes the results of data validation activities must be completed by the data validator for Level III and Level IV data validation requests and takes, as input, the data verification checklist (or equivalent) and the steps in this plan that are listed as "Data Validation."

Data validation requires that personnel performing it have the appropriate level of training and experience to ensure data review and qualification is completed in a reasonable manner and in accordance with industry practices. Professional judgment may be required when performing data validation. Where professional judgment is used, resulting in either qualification of data or data left unqualified, the rationale for the selection of this path will be documented fully in the data validation report. Documentation will include the following components: citations from this plan, other industry standards, and/or the literature demonstrating the reasonableness of the evaluation.

The actions described in this plan must serve as the baseline for incorporation into project verification/validation activities. Project-specific procedures applying to analytical methods not covered in this document must be reviewed and approved prior to use.

Implementation of this plan is expedited through the agreement of work to be performed by an analytical laboratory in the form of a project-specific laboratory SOW. Deliverable requirements specified in the analytical SOW must be consistent with the requirements of this plan and with the Basic Ordering Agreement contract with the laboratory.

The validation SOW must be written consistent with the requirements and specifications of this plan. The validation SOW is prepared by a SMO representative and communicated to the validation organization (for Level III and Level IV validation requests only).

The validation SOW will include as attachments full copies of the analytical data package, as well as an electronic data deliverable (EDD) in the form of a Microsoft Excel file. Placement of the qualifier may be assigned by hand writing on the laboratory report form, initialed and dated, or electronically on provided EDDs in the Validation Code field. If data are not qualified during data validation, an equals sign ("=") shall be entered on the sample result or placed in the Validation Code field of the provided EDD.

Form CP3-ES-5003-F03, "Data Verification Checklist," (in accordance with CP3-ES-5003 *Quality Assured Data)* must be completed for every sample delivery group (SDG) that undergoes Level II, III, or IV data validation. In addition to the data verification checklist, a data validation report must be completed for every SDG that undergoes Level III or Level IV data validation.

5. PROCEDURE

NOTE 1: Refer to Appendix A for qualifier descriptions. Refer to Appendix B for Qualification guidance due to multiple quality deficiencies. Refer to Appendix C for a listing of relevant equations to use with this plan.

The following is a step-by-step approach to implement analytical data verification and validation activities. This approach is based on current industry accepted standards. Because changes to methodology and the referenced guidance documents are not within the verifier's or the validator's control, the data verifier and the data validator should always follow the most current methodology and associated guidance documents referenced throughout this text to perform the review and validation of associated data.

5.1 VALIDATION STRATEGY AND SOW DEVELOPMENT

The project team, with input as needed from a QA specialist and/or a representative of the SMO, shall develop a data validation strategy based on inputs identified through the data quality objective (DQO) process. The project-specific sampling and analysis plan will define the DQOs and the framework for performing data validation. A SMO representative shall prepare a validation SOW to communicate data verification and validation requirements to the organization performing the work (for Level III and Level IV validation only).

5.2 CUSTODY OF SAMPLES AND SAMPLE DOCUMENTATION

The COC form provides the basis for the traceability of project samples by documenting the sample from its origin through all steps of the sampling, sample handling, and analysis process. The COC serves as documentation of sample possession from collection through disposal to ensure that sample representativeness is maintained prior to analysis. By documenting personal accountability for samples, the COC is used to ensure that proper custody has been maintained from the time a sample is generated through its final disposition (cradle to grave). Any break in custody, as demonstrated by the series of signatures denoting sample holders, could jeopardize the legal and/or technical defensibility of associated sample data.

While data verification/validation cannot replicate the custody history of a sample (i.e., fully assure the sample truly has been in custody from the field to the final result), an evaluation of field notes, laboratory records, and the COCs provides the best available indicator of sample traceability. A sample is defined as being under proper custody if any one of the following conditions is met:

- The sample is within the possession of an authorized person (e.g., field personnel, laboratory personnel, etc.);
- The sample is within view of an authorized person;
- The sample was in an authorized person's possession and then was secured to prevent tampering; or
- The sample is placed in a designated secure area.

NOTE: Data verification of sample documentation includes result report header checks for accuracy from the COC. If sample identity is in question, every attempt should be made to verify the true identity of each sample. When custody problems cannot be resolved, they will affect the defensibility of the sample.

5.2.1 Data Verification

The data verifier shall trace custody of all samples in the reporting batch from field sampling through receipt at the laboratory by reviewing the COCs. If the information is missing, the data verifier will seek to obtain field documentation from the sampler or laboratory to determine if the omission affects sample integrity. If there is a break in the signature chain on the COC or other omissions in the custody record (e.g., date of sample collection, date of transfer to the laboratory), indicate the problem on the data verification checklist and provide this information to the data validator.

5.2.2 Data Validation

If sample data are not traceable through signature records on COCs or other sample record information demonstrating custody (e.g., laboratory logbooks and/or sample data forms) cannot establish custody history, then the data validator shall qualify associated results rejected "R."

Custody of Samples	Yes	No	N/A
1. Does the data verification checklist or associated attachments in the data report indicate that samples are traceable?			

5.3 HOLDING TIME, TEMPERATURE, AND SAMPLE PRESERVATION

Holding times have been established by EPA to define the maximum period of time during which a sample remains representative of its sampling location. Holding times begin when a sample is collected in the field and are measured by determining the elapsed time from collection through extraction (when applicable) and/or analysis. If the reported data is the result of a dilution, reinjection, or re-extraction and analysis, the result must have been generated within the prescribed holding time in order for the result to be considered definitive.

5.3.1 Deliverables

- Field Sampling Notes
- Field COCs
- Laboratory COCs
- Laboratory Reports and/or raw data containing the following information: dates of collection, preparation, and analysis for all samples, dilutions, and re-extractions.

5.3.2 Criteria

Table 2 provides current industry-accepted standards for sample preservation and holding times for inorganic parameters. In all cases, the data verifier or validator shall always follow the most current methodology guidance for sample holding time, temperature, and preservation requirements.

Table 2. Inorganic Preservation and Holding Time Criteria

Matrix	Parameters	Preservatives	Holding Times
Aqueous	Atomic Absorption (AA) and Inductively Coupled Plasma (ICP) Metals	HNO_3 to pH < 2, 0–6°C	180 days
	Mercury	HNO_3 to pH < 2, 0–6°C	28 days
	Cyanide	NaOH to pH > 12, 0–6°C	14 days
Soil/Sediment	AA and ICP Metals	0–6°C	180 days
	Mercury	0–6°C	28 days
	Cyanide	0–6°C	14 days

5.3.3 Data Verification

The data verifier shall verify the presence of the pertinent COC forms in laboratory deliverables. If information is missing, the data verifier will seek to obtain field documentation from the sampler and/or the laboratory to determine if the omission affects sample integrity. Upon receipt, this information will be placed in the data package for delivery to the data validator. If missing information cannot be obtained or reconstructed from field notes, COCs, etc., the data verifier will note omitted information on the data verification checklist as noncorrectable.

5.3.4 Data Validation

5.3.4.1 Holding Times

Review the data verification checklist for holding times to confirm all holding times have been met. Holding times that are listed in hours from collection to analysis always will be calculated using the time collected to ensure the holding time in hours has not lapsed. Holding times that are listed in days will be calculated using dates only. The data validator shall review field and/or laboratory COC forms, field notes, laboratory report forms, and laboratory raw data, as necessary, to determine the elapsed time from sample collection to sample analysis for deviations identified on the data verification checklist.

If the elapsed time falls within the prescribed holding time, no actions will be taken and no qualification assigned.

If holding time is exceeded, qualify as follows:

- If the holding time has been exceeded by a factor < 2, qualify detected results "J" and nondetected results "UJ."
- If the holding time has been exceeded by a factor > 2, qualify detected results "J" and nondetected results "R."

5.3.4.2 Temperature/Preservation

Review laboratory receiving records to determine if samples were received at the appropriate temperature and that proper preservative addition (if required) has resulted in the appropriate pH adjustment(s). If records demonstrate samples were received at the proper temperature and with the appropriate pH adjustment, no action is warranted.

If the pH of aqueous samples is ≥ 2 for metals or < 12 for cyanide at the time of sample receipt, determine if the laboratory adjusted the pH of the sample to < 2 for metals or > 12 for cyanide at the time of sample receipt. If not, use the following guidance:

- If samples are received without the proper pH adjustment and not adjusted by the laboratory on receipt, qualify positive results "J" and nondetects "R" in the affected samples.
- If samples are received at elevated temperature (6°C < sample temperature < 10°C) but have received the proper pH adjustment, qualify detected analytes "J" and nondetects "UJ." If sample temperatures upon receipt are > 10°C, the data validator must evaluate the integrity of the reported concentrations, and the data may require qualification of "R."
- If samples are received at elevated temperature and proper preservation has not been followed (pH adjustment), qualify all affected sample results "R" rejected.

Holding Times and Sample Preservation				**Qualification Guidance**	
Validation Step	Yes	No	N/A	Detects	Nondetects
1. Does the data verification checklist indicate that all samples were analyzed within the appropriate holding time?				J	UJ/R
2. Were all samples preserved properly?*				R	UJ/R

*If samples are received without the proper pH adjustment and not corrected by the laboratory or if sample temperatures upon receipt are > 10° C, the data validator must evaluate the integrity of the reported concentrations, and the data may require qualification of "R."

5.4 CALIBRATION

Calibration is performed to ensure that the instrument used for analysis is capable of producing quantitative data. Initial calibration demonstrates the instrument is capable of acceptable performance at the beginning of the analytical run, and of producing a linear calibration curve (if applicable for the instrumentation used). Initial calibration verifications (ICV) and continuing calibration verifications (CCV) demonstrate the instrument remains in control throughout sample analysis.

5.4.1 Deliverables

- CLP Form II-IN (Part A), Form XI-IN, Form XIII-IN, Form XVI-IN (or equivalent for SW-846 methods) for each initial calibration
- ICV/CCV Forms
- Analysis Results
- Standard Preparation Log
- Analytical Run Log
- Raw Data (required for confirmation)

5.4.2 Frequency

Initial calibration is method specific and must be performed daily (or every 24 hours), after CCV failure, or each time the instrument is set up.

Immediately after each system has been calibrated, the accuracy of the initial calibration must be verified and documented for each target analyte by the analysis of an ICV solution(s). If the ICV percent recovery (%R) falls outside of the control limits, the analysis should be terminated, the problem corrected, the instrument recalibrated, and all affected samples reanalyzed.

CCV samples shall be analyzed following each group of 10 samples or every two hours, whichever is more frequent, and following the last sample in the SDG. As required by a specific method, a low level CCV may also be analyzed during the analysis of samples.

5.4.3 Criteria

5.4.3.1 Initial calibration

- For ICP metals, at least one and up to five standards and a blank must be analyzed to develop the calibration curve.
- For ICP-MS metals, the mass spectrometer must be tuned properly, calibrated for, and checked for resolution in the mass regions of interest. Once proper performance has been demonstrated, at least one standard and a blank must be analyzed to develop the calibration curve.
- For mercury, four standards and a blank must be analyzed. The correlation coefficient must be ≥ 0.995.
- For cyanide, six standards and a blank must be analyzed. The correlation coefficient must be ≥ 0.995.

5.4.3.2 Calibration verification

Table 3 provides recovery criteria for calibration verification.

Table 3. Recovery Criteria for Calibration Verification

ICP and ICP-MS Metals	ICV: 90%–110% CCV: 90%–110%
Mercury	ICV: 85%–115% CCV: 85%–115%
Cyanide	ICV: 85%–115% CCV: 85%–115%

If a single calibration standard and blank are used to establish the initial calibration curve, then a low-level CCV should be included in the analytical sequence to verify the calibration curve is effective at the low end of the curve. Low-level CCVs are method specific and may not be included with all analytical results. When a low-level CCV is included, it should be within the laboratory's standard acceptable limits.

5.4.4 Data Verification

Data verifier shall verify that appropriate documentation of the initial calibration and the ICV/CCVs have been provided in the data package. If any one of the following occurs, the data verifier shall contact the laboratory immediately to obtain the missing information:

- Evidence of initial calibration is not included in the laboratory deliverable;
- Frequency of calibration has not been satisfied; and/or
- Required numbers of calibration standards or required standard concentrations were not used.

Upon receipt, this information will be placed in the data package for delivery to the data validator.

If these occurrences cannot be resolved with the analytical laboratory, they are considered noncorrectable problems and shall be identified in this way on the data verification checklist. As they are contract compliance related, all such occurrences shall be communicated to the SMO and to the data validator on the data verification checklist.

5.4.5 Data Validation

If the initial calibration, the ICV, or the CCV %R falls outside the acceptance windows, use professional judgment to qualify all associated data. If possible, indicate the bias in the review. Table 4 provides guidance for evaluating the calibration and the initial and continuing calibration verifications. See Appendix C for %R calculation.

When reviewing low-level CCVs, qualification for exceedances will be applied only to associated sample results that are within 20% of the low-level standard. Qualification of sample results based on the low-level CCV will follow the guidance for CCVs in Table 4.

Table 4. Calibration Actions for Data Validation

Method/Analyte	Calibration Result	Qualification Guidance
All	Calibration not performed	Qualify all results "R"
	Calibration incomplete	Use professional judgment Qualify results ≥ RL as "J" or "R" Qualify nondetects as "UJ" or "R"
	Correlation Coefficient < 0.995	Use professional judgment Qualify results ≥ RL as "J" or "R" Qualify nondetects as "UJ" or "R"
ICP/ICP-MS	ICV/CCV %R = 90-110%	No action
	ICV/CCV %R = 75-89%	Qualify results ≥ RL as "J"
	ICV/CCV %R < 75%	Qualify results ≥ RL as "J" or "R" Qualify nondetects as "R"
	ICV/CCV %R = 111-125%	Qualify results ≥ RL as "J" Results < RL = No Action
	ICV/CCV %R > 125%	Qualify results > RL as "J" or "R" Results < RL = No Action
Mercury	ICV/CCV %R = 85-115%	No action
	ICV/CCV %R = 70-84%	Qualify results ≥ RL as "J" Qualify nondetects as "UJ"
	ICV/CCV %R < 70%	Qualify results ≥ RL as "J" or "R" Qualify nondetects as "R"
	ICV/CCV %R = 116-130%	Qualify results ≥ RL as "J" Results < RL = No Action
	ICV/CCV %R > 130%	Qualify results ≥ RL as "J" or "R" Results < RL = No Action
Cyanide	ICV/CCV %R = 85-115%	No action
	ICV/CCV %R = 70-84%	Qualify results ≥ RL as "J" Qualify results < RL as "UJ"
	ICV/CCV %R < 70%	Qualify results > RL as "J" or "R" Qualify nondetects as "R"
	ICV/CCV %R = 116-130%	Qualify results ≥ RL as "J" Results < RL = No Action
	ICV/CCV %R > 130%	Qualify results ≥ RL as "J" or "R" Results < RL = No Action

5.5 BLANKS

Blank analyses serve to determine the existence and magnitude of contamination resulting from laboratory or field activities. Initial calibration blanks (ICB) and continuing calibration blanks (CCB) are used to ensure a stable instrument baseline before analysis of analytical samples. The preparation blank (PB) or method blank is used to assess the level of contamination introduced to the analytical samples throughout the sample preparation process. If contamination is found in any blank, all associated data must be evaluated carefully to determine whether a systematic problem affecting greater than one sample exists or whether the contamination is an isolated occurrence.

Additionally, the project team may elect to collect and analyze field and equipment rinseate blanks to evaluate the existence and magnitude of contamination that may arise as a result of field level activities. The field blank provides an indication of ambient conditions during the sampling activities, as well as providing an indication that the source of decontamination water is free of targeted analytes. The equipment rinseate blank provides an indication as to whether nondedicated sampling equipment has been

decontaminated properly and what, if any, carryover may arise between sampled locations. It has been EPA Region 4 data validation policy to evaluate the field blanks and equipment rinseate blanks as part of the validation process, but not to qualify the data based on these field samples.

5.5.1 Deliverables

- CLP Form III or equivalent for SW-846 methods
- Raw data for each blank (required for confirmation)

5.5.2 Frequency

Table 5 provides frequency of blank analyses.

Table 5. Blank Frequency

Parameter	Frequency
ICB	Immediately following the ICV
CCB	Immediately following each CCV
PB/MB	One for each sample batch and each sample matrix. The PB or MB will accompany no more than 20 samples for an individual matrix type.

5.5.3 Criteria

- No contaminants should be found in the blank.
- The absolute value of the analyte concentration in a blank analysis must be < method detection limit (MDL).
- All blanks in a SDG must be evaluated against sample results. All samples prepared together shall be evaluated against the associated PB.
- When evaluating blank results for solid matrices, the units of the PB will have solid reporting units (e.g., mg/kg).
- Dilution factors must be applied to blanks when evaluating sample results versus blank values.

NOTE: It is never permissible for the analytical laboratory or the data verifier/data validator to correct sample results by subtracting a blank value.

5.5.4 Data Verification

The data verifier shall verify the presence of the pertinent deliverables for blank analyses. If the required information is not present in the laboratory report, or if the frequency of analysis is not satisfied, the data verifier will contact the laboratory to obtain the omitted information. Upon receipt, this information will be placed in the data package for delivery to the data validator.

If the information cannot be obtained, these occurrences are considered noncorrectable problems and will be identified as such on the data verification checklist. As this is a contract compliance issue, the occurrence should be communicated to the SMO and the data validator on the data verification checklist.

5.5.5 Data Validation

Review the laboratory deliverable to determine if any one of these occurs:

- Sample results have been corrected for blank values;
- Blank concentrations for any analyte > MDL;
- Any negative blank value for any analyte > MDL; or
- Each sample matrix being evaluated has an associated preparation blank.

Qualification is considered when the absolute value of any blank associated with project samples is > the MDL. Table 6 describes the actions to be taken in these cases. The data validator will use the highest absolute value for all associated blanks to determine qualification requirements for sample data.

Table 6. Blank Qualification

Blank Type	Blank Result	Sample Result	Action for Samples
ICB/CCB	> MDL but < RL	Nondetect	No action
		> MDL but < RL	Qualify data "U"
		> RL	Use professional judgment
ICB/CCB	> RL	>MDL but < RL	Qualify data "U"
		> RL but < Blank Result	Report with "U" or qualify data as unusable "R"
		> Blank Result	Use professional judgment
ICB/CCB	< (-MDL) but > (-RL)	> MDL or nondetect	Use professional judgment
ICB/CCB	< (-RL)	< 10× RL	Qualify data "U"
PB/MB	> RL	> MDL but < RL	Qualify data "U"
		> RL but < 10× Blank Result	Qualify results as unusable "R" or estimated high "J"
		> 10× the Blank Result	No action
PB/MB	> MDL but < RL	Nondetect	No action
		> MDL but < RL	Qualify data "U"
		> RL	Use professional judgment
PB/MB	< (-RL)	< 10× RL	Qualify results > RL as estimated low "J" and nondetects as estimated "UJ"

Blanks				**Qualification Guidance**	
Validation Step	Yes	No	N/A	Detects	Nondetects
1. Were blanks (PB, ICB, CCB) prepared and/or analyzed at the appropriate frequency?				*	*
2. Were sample results verified as uncorrected for blank concentrations?				J	N/A
3. Were all blanks evaluated for contamination?				See plan text for guidance	
4. Were negative concentrations in blanks evaluated?				N/A	U
5. Was the presence of blank contaminants confirmed from raw data? (Applies to Level IV data only)				**	**

*Qualify only if the deviation indicates an adverse effect on data quality.
**Use professional judgment in qualifying data.

5.6 INTERFERENCE CHECK SAMPLE

The interference check sample (ICS) verifies the analytical instrument's ability to overcome interferences typical of those found in samples. It is required for ICP methods only. The laboratory should have analyzed and reported ICS results for all elements being reported from the analytical run and for all interferents (target and non-target) for those reported elements.

5.6.1 Deliverables

- CLP Form IV or equivalent for SW-846 methods
- Raw data (required for confirmation)

5.6.2 Frequency

The ICS consists of two solutions: Solution A and Solution AB. Solution A consists of the interferents, and Solution AB consists of the analytes mixed with the interferents. An ICS analysis consists of analyzing both solutions consecutively, starting with Solution A, for all wavelengths used for each analyte reported. An ICS must be run at the beginning of each sample analysis run. The ICS is not to be run prior to the ICV and is to be followed immediately by a CCV, which will be followed by a CCB.

5.6.3 Criteria

Results for the analysis of ICS solution A must fall within the control limits of ± RL, or ± 20% of the true value (whichever is greater) for the analytes and interferents.

Results for the analysis of ICS Solution AB must fall within the control limits of ± RL or ± 20% of the true value (whichever is greater) for the analytes and interferents included in the solution.

If the value of an ICS result exceeds ± RL, or ± 20% of true value (whichever is greater), the analysis should be terminated, the problem corrected, the instrument recalibrated, the new calibration then reverified, and the affected samples reanalyzed

5.6.4 Data Verification

The data verifier shall verify the presence of ICS results. If the results are not provided or if the required frequency of analysis is not demonstrated in the laboratory deliverable, the data verifier will seek to obtain the missing information from the laboratory. Upon receipt, this information will be placed in the data package for delivery to the data validator.

If this missing information cannot be obtained with the analytical laboratory, they are considered noncorrectable problems and shall be identified in this way on the data verification checklist. As they are contract compliance related, all such occurrences shall be communicated to the SMO and to the data validator on the verification checklist.

5.6.5 Data Validation

The data validator shall review the raw data and recalculate 5% of reported values to ensure results are correct. The data validator will determine if %Rs are within 80-120% recovery criteria and if nonanalyte results are ± RL. Inter-element corrections provided by the laboratory will be verified to determine which elements of interest are interfered with by ICS Solution A.

NOTE: For an ICS for ICP-MS that does not meet the technical criteria, apply the action to all samples reported from the analytical run.

The raw data may not contain results for interferents. In this case, the data validator shall use professional judgment to qualify the data. If the data does contain results for interferents, the data validator should apply the following actions to samples with concentrations of interferents that are comparable to, or greater than, their respective levels in the ICS:

- The ICS %R for an analyte is > 120% (or > the true value + the RL [for ICP-AES] or > the true value + 2× the RL [for ICP-MS] as applicable) and the sample results are nondetects, the data should not be qualified.

- If the ICS %R for an analyte is > 120% (or > the true value + the RL [for ICP-AES] or > the true value + 2× the RL [for ICP-MS] as applicable, qualify sample results that are ≥ MDL as estimated high "J." If the ICS %R (or true value) grossly exceeds the limits, use professional judgment to qualify the data.

- If the ICS %R for an analyte falls within the range of 50-79% (or < the true value -RL [for ICP-AES] or < the true value – 2× the RL [for ICP-MS] as applicable, qualify sample results that are ≥ MDL as estimated low "J."

- If the ICS recovery for an analyte falls within the range of 50-79% (or < the true value -RL [for ICP-AES] or < the true value -2× the RL [for ICP-MS] as applicable, the possibility of false negatives exists. Qualify sample nondetects as estimated "UJ."

- If the ICS Solution AB %R for an analyte or interferent is < 50%, qualify all sample results that are ≥ MDL and all sample nondetects as unusable "R."

If results that are ≥ MDL are observed for analytes which are not present in the ICS solution, the possibility of false positives exists. An evaluation of the associated sample data for the affected elements should be made. For samples with comparable or higher levels of interferents and with analyte concentrations that approximate those levels found in the ICS, qualify sample results that are ≥ MDL as estimated high "J." Nondetects should not be qualified.

If negative results are observed for analytes that are not present in the ICS solution, and their absolute value is ≥ MDL, the possibility of false negatives in the samples exists. An evaluation of the associated sample data for the affected analytes should be made. For samples with comparable or higher levels of interferents, qualify nondetects for the affected analytes as estimated "UJ," and results that are ≥ MDL, but < 10× the absolute value of the negative result as estimated low "J."

Actions regarding the interpretation and/or the subsequent qualification of ICP data due to the ICS analytical results can be extremely complex. Use professional judgment to determine the need for the associated sample data to be qualified. The data validator may need to obtain additional information from the laboratory. All interpretive situations then should be recorded in the data validation report.

Interference Check Sample				Qualification Guidance	
Validation Step	Yes	No	N/A	Detects	Nondetects
1. Was the ICS analyzed at the appropriate frequency?				*	*
2. Were all ICS %R within acceptance criteria?				See plan text for guidance	
3. Were samples evaluated for results for elements not present in the ICS solution?				N/A	J
4. Were negative results for elements not present in the ICS solution evaluated?				UJ	N/A

*Qualify only if the deviation indicates an adverse effect on data quality.

5.7 LABORATORY CONTROL SAMPLE

The LCS serves to monitor the overall performance of all steps in the analysis, including sample preparation and instrumental analysis.

5.7.1 Deliverables

- CLP Form VII or equivalent for SW-846 methods
- Raw data (required for confirmation)

5.7.2 Frequency

Aqueous/water, soil/sediment, wipe, and filter LCSs shall be analyzed for each analyte utilizing the same sample preparations, analytical methods, and Quality Assurance (QA/QC) procedures as employed for the samples. One LCS shall be prepared and analyzed for each matrix type being analyzed (e.g., aqueous or solid) or for each batch of samples digested, whichever is more frequent. The LCS will accompany no more than 20 samples for an individual matrix type.

5.7.3 Criteria

The LCS recovery should be within the laboratory's acceptable limits. In the absence of laboratory-specific limits, the recovery limit of 70-130% can be used.

The aqueous LCS solution may be provided to the laboratory by EPA. If unavailable, other industry recognized sources of standards will be utilized to obtain known standards for LCS preparation. The LCS solution can come from the same source as the ICV. It may not come from the same source as calibration or continuing calibration standards.

In rare cases, a matrix-specific LCS may not be available. In such cases, an LCS of similar matrix will be selected and analyzed. In absence of a similar matrix, an aqueous LCS may be used by the laboratory. The data validator should make a note if an aqueous LCS was used with solid field samples. If an aqueous LCS used for soil samples is out of %R criteria, careful inspection must be made to determine the effect(s) on sample data. In comparing an aqueous LCS to soil sample data, ensure that units are comparable. An LCS is required for mercury and cyanide analysis in aqueous matrices.

5.7.4 Data Verification

The data verifier shall verify the presence of LCS results. If results are omitted from the laboratory report, the data verifier will contact the laboratory to obtain the omitted information. Upon receipt, this information will be placed in the data package for delivery to the data validator.

If LCS analysis was required but not performed, this is considered a noncorrectable problem and shall be indicated on the data verification checklist. As this is a contract compliance issue, the occurrence should be communicated to the SMO and the data validator on the data verification checklist.

5.7.5 Data Validation

If the LCS criteria are not met, the laboratory performance and method accuracy are in question. Professional judgment should be used to determine if the data should be qualified or rejected. The following guidance is suggested for qualifying sample data associated with an LCS that does not meet the required criteria.

- For an LCS that does not meet the technical criteria, apply the action to all samples in the sample preparation batch.
- Review reported LCS results versus raw data (if provided) to ensure accuracy in the values. Recalculate 5% of reported LCS results to verify laboratory calculations.
- Review LCS types to ensure a matrix-specific LCS has been prepared for each matrix type being quantified in the SDG. If special circumstances are present such that another LCS matrix has been used, ensure laboratory documentation reflects this deviation.
- Determine if LCS performance is acceptable. If recovery criteria have not been met, qualify samples in accordance with Table 7.

NOTE: In the event poor LCS recoveries are observed for antimony and silver, data validators are advised to evaluate results for both elements knowing that both antimony and silver traditionally are very difficult to recover from solid matrices. In most cases, it is prudent to qualify antimony and silver results "J" estimated based on poor LCS recoveries, unless other QC difficulties are observed in conjunction with poor LCS performance.

Table 7. LCS Qualification

LCS %R	Sample Result	Qualification Guidance
40%—lower control limit or 40%–69%*	> MDL	J
	< MDL	UJ
> upper control limit or > 130%*	> MDL	J
	< MDL	No qualification
< 40%	> MDL	J
	< MDL	R

*These limits are used when laboratory defined limits are not available.

Laboratory Control Sample				Qualification Guidance	
Validation Step	Yes	No	N/A	Detects	Nondetects
1. Was the LCS prepared and analyzed at the appropriate frequency?				*	*
2. Was the LCS matrix the same as the analytical samples?				UJ	J
3. Were percent recoveries within acceptable limits?				See plan text for guidance	

*Qualify only if the deviation indicates an adverse effect on data quality.

5.8 MATRIX SPIKE

MS data are generated to determine the accuracy of the analytical method in the specific sample matrices. They provide a sample/project-specific measure of the method's ability to recover target analytes under real sample conditions. See Appendix C for %R calculation.

NOTE: For a MS that does not meet the technical criteria, apply the action to all samples of the same matrix, if the data validator considers the samples sufficiently similar. The data validator will need to exercise professional judgment in determining sample similarity. The data validator should make use of all available data, including site and sampling documentation (e.g., location and type of sample, descriptive data, soil classification); field test data (e.g., pH, Eh, conductivity, chlorine); and laboratory data for other parameters [e.g., total suspended solids (TSS), total dissolved solids (TDS), total organic carbon (TOC), alkalinity or buffering capacity, reactive sulfide, anions], in determining similarity. The data validator should also use the sample data (e.g., similar concentrations of analytes) in determining similarity between samples in the data package. The data validator may determine that only some of the samples in the data package are similar to the MS sample, and that only these samples should be qualified. The data validator also may determine that no samples are sufficiently similar to the sample used for the MS; thus, may determine only the field sample used to prepare the MS sample should be qualified.

5.8.1 Deliverables

- CLP Form V, Form XII, or equivalent for SW-846 methods
- Instrument printouts
- Raw data (required for confirmation)

5.8.2 Frequency

One MS sample shall be prepared and analyzed for each sample matrix and each analytical method used for analysis of an SDG. The MS will accompany no more than 20 samples for an individual matrix type.

5.8.3 Criteria

- Samples identified as field blanks shall not be used for the preparation and analysis of the MS.

- MS recoveries must be within the control limits defined in Table 8; however, if sample concentration is $\geq 4\times$ the added spike concentration, recovery criteria are not applicable and the data are acceptable for use without qualification.

- A post-digestion spike (PDS) shall be performed for any analyte (except silver) that does not meet the specific criteria. PDS %R must be within 75-125%. PDS are not required for silver. For cyanide, there should be a post-distillation spike instead of post-digestion spike.

- Qualifications will not be applied to data based on the recovery of a "batch" MS/MSD analysis (i.e., when a parent sample is not from the sample set being analyzed).

5.8.4 Data Verification

The data verifier shall verify that field blanks were not used for the MS. If a field blank has been used, the SMO will be notified immediately to ensure timely corrective action. If reanalysis cannot be completed, this issue will be identified as noncorrectable on the data verification checklist.

The data verifier shall verify the presence of MS results. If they are not provided or if the required frequency of analysis is not demonstrated in the laboratory deliverable, the data verifier will seek to obtain the missing information from the laboratory. Upon receipt, this information will be placed in the data package for delivery to the data validator.

If the missing information cannot be obtained from the analytical laboratory they are considered noncorrectable problems and shall be identified in this way on the data verification checklist. As they are contract compliance related, all such occurrences shall be communicated to the SMO and to the data validator on the data verification checklist.

NOTE: If the same sample that was used for duplicate analysis is used for predigestion spike analysis, spike calculations must be performed using the results of the "original sample."

5.8.5 Data Validation

- Review reported MS results versus raw data to ensure accuracy in the values. Recalculate 5% of reported MS results to verify laboratory calculations.

- Review MS types to ensure a matrix-specific MS has been prepared for each matrix type being quantified in the SDG. If special circumstances are present such that an MS has not been used from the associated sample set (e.g., insufficient sample volume), ensure laboratory documentation reflects this deviation.

- Determine if MS performance is acceptable. If recovery criteria have not been met, qualify sample results in accordance with Table 8.

Table 8. Matrix Spike Qualification

Spike Sample Results	Sample Qualification
ICP Methods	
MS %R < 30% PDS %R < 75%	Qualify affected results that are ≥ MDL "J" (estimated low) and affected nondetects "R"
MS %R < 30% PDS %R ≥ 75%	Qualify affected results that are ≥ MDL "J" and affected nondetects "UJ"
MS %R = 30-74% PDS %R < 75%	Qualify affected results that are ≥ MDL "J" (estimated low) and affected nondetects "UJ"
MS %R = 30-74% PDS %R ≥ 75%	Qualify affected results that are ≥ MDL "J" and affected nondetects "UJ"

Table 8. Matrix Spike Qualification (Continued)

Spike Sample Results	Sample Qualification
ICP Methods	
MS %R > 125% PDS %R > 125%	Qualify affected results that are ≥ MDL "J" (estimated high)
MS %R > 125% PDS %R ≤ 125%	Qualify affected results that are ≥ MDL "J"
MS %R < 30% No PDS performed (not for silver)	Qualify affected results that are ≥ MDL "J" (estimated low) and affected nondetects "R"
MS %R = 30-74% No PDS performed (not for silver)	Qualify affected results that are ≥ MDL "J" (estimated low) and affected nondetects "UJ"
MS %R > 125% No PDS performed (not for silver)	Qualify affected results that are ≥ MDL "J" (estimated high) and nondetects are not qualified
Mercury Analysis	
MS %R < 30%	Qualify affected results that are ≥ MDL "J" (estimated low) and affected nondetects "R"
MS %R = 30-74%	Qualify affected results that are ≥ MDL "J" (estimated low) and affected nondetects "UJ"
MS %R > 125%	Qualify affected results that are ≥ MDL "J" (estimated high) and nondetects are not qualified
Cyanide Analysis	
MS %R < 30% Post-distillation spike %R < 75%	Qualify affected results that are ≥ MDL "J" (estimated low) and affected nondetects "R"
MS %R < 30% Post-distillation spike %R ≥ 75%	Qualify affected results that are ≥ MDL "J" and affected nondetects "UJ"
MS %R = 30-74% Post-distillation spike %R < 75%	Qualify affected results that are ≥ MDL "J" (estimated low) and affected nondetects "UJ"
MS %R = 30-74% Post-distillation spike %R ≥ 75%	Qualify affected results that are ≥ MDL "J" and affected nondetects "UJ"
MS %R > 125% Post-distillation spike %R > 125%	Qualify affected results that are ≥ MDL "J" (estimated high)
MS %R > 125% Post-distillation spike %R ≤ 125%	Qualify affected results that are ≥ MDL "J"
MS %R < 30% No post-distillation spike performed	Qualify affected results that are ≥ MDL "J" (estimated low) and affected nondetects "R"
MS %R = 30-74% No post-distillation spike performed	Qualify affected results that are ≥ MDL "J" (estimated low) and affected nondetects "UJ"
MS %R > 125% No post-distillation spike performed	Qualify affected results that are ≥ MDL as estimated high "J" (nondetects are not qualified)

Matrix Spike/Matrix Spike Duplicate (MS/MSD)				**Qualification Guidance**	
Validation Step	Yes	No	N/A	Detects	Nondetects
1. Was the MS/pre-digestion spike analyzed at the appropriate frequency?				--	--
2. Were MS/pre-digestion spike %R within acceptance criteria?				See plan text for guidance	
3. Was the post-digestion spike (or post distillation spike for cyanide) analyzed at the appropriate frequency?				--	--
4. Are post-digestion spike %R within acceptance criteria?				See plan text for guidance	

5.9 DUPLICATES

A laboratory duplicate sample is analyzed for each matrix to evaluate the precision of the laboratory at the time of analysis. A field duplicate sample is collected and analyzed to evaluate the precision of both the sampling techniques as well as the laboratory methodology. A field duplicate also may provide information on the homogeneity of the sample. Nonhomogenous samples can impact the apparent method precision; however, aqueous/water samples generally are homogenous, and most soil/sediment samples are homogenous within a factor of two or three.

5.9.1 Deliverables

- CLP Form VI or equivalent for SW-846 methods
- Raw data (required for confirmation)

5.9.2 Frequency

One laboratory duplicate shall be analyzed in accordance with the methodology being used. Typically, a laboratory duplicated is analyzed per each sample batch or once per 20 samples, whichever is more frequent. Field duplicates are collected at a frequency identified in associated project planning documents (QAPPs, etc.).

5.9.3 Criteria

Samples identified as field blanks must not be analyzed as laboratory duplicates.

For sample concentrations > 5× the RL, the laboratory duplicate precision as measured by relative percent difference (RPD) must be within ± 20% for aqueous and solid samples (lab duplicate). For field duplicates, the RPD must be within ± 25% for aqueous samples and ± 35% for solid samples. If the sample values are < 5× the RL, RPD does not apply. Instead the absolute difference between sample and duplicate must be < 5× the RL.

5.9.4 Data Verification

The data verifier shall verify that field blanks were not analyzed as laboratory duplicates. If a field blank has been used, the SMO will be notified immediately to ensure timely corrective action. If reanalysis cannot be completed, this issue will be identified as noncorrectable on the data verification checklist.

The data verifier shall verify the presence of laboratory and/or field duplicate results. If they are not provided or if the required frequency of analysis is not demonstrated in the laboratory deliverable, the data verifier will seek to obtain the missing information from the laboratory. Upon receipt, this information will be placed in the data package for delivery to the data validator.

If the missing information cannot be obtained from the analytical laboratory, they are considered noncorrectable problems and shall be identified in this way on the data verification checklist. As they are contract compliance related, all such occurrences shall be communicated to the SMO and to the data validator on the data verification checklist.

5.9.5 Data Validation

NOTE: For a duplicate sample analysis that does not meet the technical criteria, apply the action to samples of the same matrix if the data validator considers the samples to be sufficiently similar. The data

validator will need to exercise professional judgment in determining sample similarity. The data validator should make use of all available data, when determining similarity, including the following: site and sampling documentation (e.g., location and type of sample, descriptive data, soil classification); field test data (e.g., pH, Eh, conductivity, chlorine); and laboratory data for other parameters (e.g., TSS, TDS, TOC, alkalinity or buffering capacity, reactive sulfide, anions). The data validator should also use the sample data (e.g., similar concentrations of analytes) in determining similarity between samples in the SDG. The data validator may determine that only some of the samples in the SDG are similar to the duplicate sample, and that only these samples should be qualified. Or the data validator may determine that no samples are sufficiently similar to the sample used for the duplicate, and thus only the field sample used to prepare the duplicate sample should be qualified.

- Examine the raw data (if provided) for any anomalies (e.g., baseline shifts, negative absorbance, omissions, illegibility).
- Verify that appropriate methods and amounts were used in preparing the samples for analysis.
- Verify that there are no transcriptions or reduction errors (e.g., dilutions, percent solids, sample weights) on one or more samples.
- Verify that results fall within the linear range(s) of the ICP instruments.

Table 9. Lab and Field Duplicate Qualification

Duplicate Type	Matrix	RPD	Sample Results	Qualification Instructions
Laboratory Duplicate	Aqueous	> 20%	Sample and duplicate > 5× RL	Qualify results > RL "J" Qualify nondetects "UJ"
	Solid	> 20%		
	Aqueous	> 20%	Sample and duplicate < 5× RL	Absolute difference > RL "J" Absolute difference < RL no action
	Solid	> 20%		
Field Duplicate	Aqueous	> 25%	Sample and duplicate > 5× RL	Qualify results > RL "J" Qualify nondetects "UJ"
	Solid	> 35%		
	Aqueous	> 25%	Sample and duplicate < 5× RL	Absolute difference > RL "J" Absolute difference < RL no action
	Solid	> 35%		

The above control limits are method requirements for matrix-specific duplicate samples. It should be noted that laboratory variability arising from the subsampling of nonhomogenous matrices is a common occurrence; therefore, for technical review purposes only, regional policy or project DQOs may allow the use of less restrictive criteria (e.g., 35% RPD, 5× RL) to be used in assessing nonhomogeneous matrices. When project-specific DQOs mandate broader precision requirements, this information will be provided to the data validators as part of the validation SOW.

Duplicate				Qualification Guidance	
Validation Step	Yes	No	N/A	Detects	Nondetects
1. Was the laboratory duplicate prepared and analyzed at the appropriate frequency?				*	*
2. Were reported precision estimates for the laboratory and/or field duplicate(s) within acceptance criteria?				See plan text for guidance	

*Qualify only if the deviation indicates an adverse effect on data quality.

5.10 SERIAL DILUTION ANALYSIS

Serial dilution (SD) analysis determines whether significant physical or chemical interferences from the matrix spike are present and are affecting the analysis of samples. This dilution is prepared from a selected digested sample. SD is only applicable for ICP methods.

5.10.1 Deliverables

- CLP Form VIII or equivalent for SW-846 methods
- Raw data (required for confirmation)

5.10.2 Frequency

An ICP serial dilution analysis shall be performed on a sample from each group of samples with a similar matrix type (e.g., water or soil) or for each SDG, whichever is more frequent.

5.10.3 Criteria

- Field Blanks and Preparation Blanks must not be used for the serial dilution analysis.

- For ICP analysis, if analyte concentration is > 50× MDL, the SD analysis (a five-fold dilution) must agree within 10% difference of the original.

NOTE: The above criteria are method requirements for SD samples, regardless of the sample matrix type; however, for technical review purposes only, project DQOs may allow the use of less restrictive criteria (e.g., %D < 15) to be assessed against serial dilution soil samples.

5.10.4 Data Verification

The data verifier shall verify that field blanks and preparation blanks were not used for the SD analysis.

The data verifier shall verify the presence of SD results. If results are not provided or if the required frequency of analysis is not demonstrated in the laboratory deliverable, the data verifier will seek to obtain the missing information from the laboratory. Upon receipt, this information will be placed in the data package for delivery to the data validator.

If the missing information cannot be obtained from the analytical laboratory, they are considered noncorrectable problems and shall be identified in this way on the data verification checklist. As they are contract compliance related, all such occurrences shall be communicated to the SMO and the data validator on the data verification checklist.

5.10.5 Data Validation

NOTE: For a serial dilution that does not meet the technical criteria, apply the action to all samples of the same matrix if the data validator considers the samples sufficiently similar. The data validator will need to exercise professional judgment in determining sample similarity. The data validator should make use of all available data, including: site and sampling documentation (e.g., location and type of sample, descriptive data, soil classification); field test data (e.g., pH, Eh, conductivity, chlorine); and laboratory data for other parameters (e.g., TSS, TDS, TOC, alkalinity or buffering capacity, reactive sulfide, anions), in determining similarity. The data validator should also use the sample data (e.g., similar concentrations

of analytes) in determining similarity between samples in the SDG. The data validator may determine that only some of the samples in the SDG are similar to the serial dilution sample, and that only these samples should be qualified. Or the data validator may determine that no samples are sufficiently similar to the sample used for serial dilution, and thus only the field sample used to prepare the serial dilution sample should be qualified.

- Review reported SD results versus raw data to ensure accuracy in the values. Recalculate 5% of reported SD results to verify laboratory calculations. See Appendix C for %D calculation.

- Review SD types to ensure a matrix-specific SD has been prepared for each matrix type being quantified in the SDG.

- Determine if SD performance is acceptable. If SD %D > 10%, verify if undiluted sample result is > 50× the MDL. Qualify using the following guidance:

  — If undiluted sample result < 50× the MDL, no qualification of results is warranted.

  — If undiluted sample result > 50× the MDL, qualify associated sample results ≥ MDL "J" and nondetects "UJ."

If negative interference is found (i.e., results of diluted samples are higher than the original sample), use professional judgment in qualifying data.

Serial Dilution Analysis				**Qualification Guidance**	
Validation Step	Yes	No	N/A	Detects	Nondetects
1. Was the serial dilution analyzed at the appropriate frequency?				--	--
2. Was the serial dilution %D criterion satisfied?				See plan text for guidance	

5.11 INTERNAL STANDARDS

The analysis of internal standards determines the existence and magnitude of instrument drift and physical interferences and is applicable for ICP-MS analyses only. The criteria for evaluation of internal standard results apply to all analytical and QC samples analyzed during the run, beginning with the calibration.

5.11.1 Deliverables

Form XIII-IN, Form XV-IN, Form XVII-IN, instrument printouts, and raw data.

5.11.2 Frequency

All samples analyzed during a run, with the exception of the ICP-MS tune, shall contain internal standards. A minimum of five internal standards from the following list shall be added to each sample: Li (the ^{6}Li isotope); Sc; Y; Rh; Tb; Ho; Lu; and Bi. If the laboratory uses lithium as an internal standard, the laboratory shall use an ^{6}Li-enriched standard. The laboratory shall monitor the same internal standards throughout the entire analytical run and shall assign each analyte to at least one internal standard.

5.11.3 Criteria

The intensity of the internal standard response in a sample is monitored and compared to the intensity of the response for that internal standard in the calibration blank. The percent relative intensity (%RI) in the sample shall fall within 60-125% of the response in the calibration blank.

If the %RI of the response in the sample falls outside of these limits, the laboratory shall reanalyze the original sample at a two-fold dilution with internal standard added.

5.11.4 Data Verification

The data verifier shall verify that an internal standard has been analyzed and reported for ICP-MS analyses.

The data verifier shall verify the presence of ICP-MS internal standards results. If they are not provided or if the required frequency of analysis is not demonstrated in the laboratory deliverable, the data verifier will seek to obtain the missing information from the laboratory. Upon receipt, this information will be placed in the data package for delivery to the data validator.

If the missing information cannot be obtained from the analytical laboratory, they are considered noncorrectable problems and shall be identified in this way on the data verification checklist. As they are contract compliance related, all such occurrences shall be communicated to the Sample & Data Management manager and the data validator on the data verification checklist.

5.11.5 Data Validation

NOTE: Apply the action to the affected analytes for each sample that does not meet the internal standard criteria.

If no internal standards were analyzed with the run, the sample data should be qualified as unusable "R."

If fewer than five of the required internal standards were analyzed with the run or a target analyte(s) is (are) not associated to an internal standard, the sample data, or analyte data not associated to an internal standard, should be qualified as unusable "R."

If the %RIs for all internal standards in a sample is within the 60-125%, the sample data should not be qualified.

If the %R for an internal standard in a sample is not within the 60-125%, qualify the data for those analytes associated with the internal standard(s) outside the limit as follows:

- If the sample was reanalyzed at a two-fold dilution with internal standard %RI within the limits, report the result of the diluted analysis without qualification. If the %RI of the diluted analysis was not within 60–125%, report the results of the original undiluted analyses and qualify the data for all analytes that are ≥ MDL in the sample associated with the internal standard as estimated "J," and nondetected analytes associated with the internal standard as estimated "UJ."

- If the sample was not reanalyzed at a two-fold dilution, the data validator should use professional judgment to determine the reliability of the data. The data validator may determine that the results are estimated "J" or unusable "R."

5.12 SAMPLE RESULT CONFIRMATION

Raw data should be requested based on the level of review by the data validator and based on records requirements of the project.

If the laboratory has a high rate of manual transcription in generation of sample results, the project team may choose to recalculate manually the sample results at a determined frequency. If sample results cannot be reproduced through manual calculation, contacting the laboratory may be necessary to resolve the problem. Data may be qualified "R" as a last resort, if no actions can reproduce reported values.

If results are to be recalculated manually from raw data, the following strategy is recommended:

- Examine raw data for anomalies (e.g., baseline shifts, negative absorbance, omissions, illegibility, etc.).
- Verify from raw data two detected and two nondetected results for ICP analysis and two detected and two nondetected results for cyanide analyses in each SDG. For aqueous sample results, use the concentration reported in raw data; for soils, use equation C.7 in Appendix C to convert concentrations in per-volume in raw data to per-weight.
- Confirm from raw digestion logs that initial sample volumes are equivalent to final digestate sample volumes for ICP digestions. If volumes differ, confirm that sample results have been corrected for the difference in final vs. initial volumes.
- Confirm that results fall within linear range of the ICP and within calibration range for other non-ICP parameters.
- All analyses must fall within the calibration range. If outside, confirm that dilution results are corrected for dilution factor(s).
- Verify that appropriate methods and amounts were used in preparing the samples for analysis.

Sample Result Verification			
Validation Step	Yes	No	N/A
For the following evaluation, some qualification of sample data may be possible. For contractual noncompliance, a validation code is placed if the occurrence is noncorrectable.			
1. For each SDG, recalculate 2 detected and 2 nondetected results for each inorganic chemistry method from the raw data (applies to Level IV validation only).			
2. Did recalculation confirm reported results? If not, increase the frequency of recalculations until adequate confidence is gained in the reported results (applies to Level IV validation only)?			
3. Were reported results within the calibration range of the instrument?			
4. Were results from diluted samples corrected for the dilution factor?			

Action: Indicate instances of manual calculations not confirming reported results; where samples have been reanalyzed and both analyses are included in the data package, indicate on the laboratory reporting forms which results are the most reliable.

6. RECORDS

Generate and maintain all records in accordance with CP3-RD-0010, *Records Management Process.*

- Data Verification Checklist (for Level II, III, and IV validation only)
- Data Validation Report (for Level III and Level IV validation only)
- Copies of qualified or unqualified results reports (if applicable)

7. REFERENCES

NOTE: The most current versions of the references listed below should be accessed when using this plan for the data review, verification, and validation process.

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APPENDIX A

DATA VALIDATION QUALIFIERS AND QUALIFICATION CODES

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DATA VALIDATION QUALIFIERS AND QUALIFICATION CODES

Data Validation Qualifiers

U Analyte compound or nuclide considered not detected above the reported detection limit.
J Analyte compound or nuclide identified; the associated numerical value is approximated.
NJ Analyte compound or nuclide presumptively present at an estimated quantity.
UJ Analyte compound or nuclide not detected above the reported detection limit, and the reported detection limit is approximated due to quality deficiency.
R Result is not usable for its intended purpose.
= "Equals" sign, indicates that no qualifier is necessary.

Data Validation Qualification Codes

Blanks

B01 Sample concentration was < the RL, and < 5× the blank concentration (10× for common contaminants).
B02 Sample concentration was > the RL, and < 5× the blank concentration (10× for common contaminants).
B03 Gross contamination exists; blank result impacted associated analyte data quality.
B04 Negative blank result impacted associated analyte data quality.
B05 Blanks were not analyzed at appropriate frequency.
B06 Sample not significantly different than radiochemical method blank.
B07 Blank data not reported.
B08 Instrument blank not analyzed after high level sample.
B09 Other (describe in comments)
B10 Method blanks not extracted at appropriate frequency.
B11 Sample results were corrected for blank contamination.
B12 Blank was not the same matrix as the analytical samples.
B13 Concentration of target compound detected in sample affected by carryover.

Calibration

C01 Initial calibration average RRF was < 0.05
C02 Initial calibration %RSD was exceeded
C03 Initial calibration sequence was not follows as appropriate
C04 Continuing calibration RRF was < 0.05
C05 Continuing calibration %D was exceeded
C06 Calibration or performance check was not performed at the appropriate frequency
C07 Calibration data not reported
C08 Calibration not performed
C09 Chemical resolution criteria were not satisfied
C10 Calibration standard matrix not the same as sample matrix
C11 Compounds quantitated against inappropriate standard or standard concentration level
C12 Compound quantitated against inappropriate ion
C13 Calibration factor RSD criteria were not satisfied
C14 Retention time of compound outside window
C15 Initial calibration % R was below lower acceptance limit
C16 Initial calibration % R was above upper acceptance limit
C17 Initial calibration curve fit was < 0.995

C18 Inappropriate standard concentrations
C19 Continuing calibration R was below the lower acceptance limit
C20 Continuing calibration %R was above the upper acceptance limit
C21 CRI %R was below the lower acceptance limit
C22 CRI %R was above the upper acceptance limit
C24 Standard curve was established with fewer than the appropriate number of standards
C27 Calibration verification efficiency outside control criteria
C28 Calibration verification background outside control criteria
C29 Calibration verification energy outside control criteria
C30 Calibration verification peak resolution outside control criteria
C31 Chromatogram does not show adequate gain setting
C32 Other (describe in comments)

Laboratory Duplicate/Dual Column Sample Confirmation
D01 Significant difference between sample and duplicate
D02 Laboratory duplicate was not analyzed at the appropriate frequency
D03 Laboratory duplicate exceeds RPD criteria
D04 Laboratory duplicate data not reported
D05 Other (describe in comments)
D06 %D between primary and secondary column confirmation exceeds acceptance criteria

Evidentiary Concerns
E01 Custody of sample in question
E02 Standard not traceable
E03 Other (describe in comments)

Interference Check Samples (ICS)
F01 ICS recovery below lower control limit or advisory limit
F02 ICS recovery above upper control limit or advisory limit

General
G01 Professional judgment was used to qualify the data
G02 Other (describe in comments)

Holding Times/Preservation
H01 Extraction holding times were exceeded
H02 Extraction holding times were grossly exceeded
H03 Analysis holding times were exceeded
H04 Analysis holding times were grossly exceeded
H05 Samples were not preserved properly
H06 Sample preservation cannot be confirmed
H07 Sample temperature exceeded criteria prior to preparation
H08 Other (describe in comments)

Internal Standards
I01 Area count was above upper control limits
I02 Area count was below lower control limits
I03 Extremely low area counts or performance was exhibited by a major drop off
I04 Internal standard retention time varied by more than 30 seconds
I05 Inappropriate internal standard used
I06 Inappropriate internal standard concentration(s) used

I07 Internal standard data not reported
I08 Other (describe in comments)

Laboratory Control Sample
L01 LCS recovery above upper control limit
L02 LCS recovery below lower control limit
L03 LCS was not analyzed at appropriate frequency
L04 LCS not the same matrix as the analytical samples
L05 LCS data not reported
L06 Other (describe in comments)

Matrix Spike and MS/MSD
M01 MS and/or MSD recovery above upper control limit
M02 MS and/or MSD recovery below lower control limit
M03 MS/MSD pair exceeds the RPD limit
M04 MS and/or MS/MSD not analyzed at the appropriate frequency
M05 MS and/or MS/MSD data not reported
M06 Other (describe in comments)

Instrument Performance
P01 High background levels or a shift in the energy calibration were observed
P02 Extraneous peaks were observed
P03 Loss of resolution was observed
P04 Peak tailing or peak splitting that may result in inaccurate quantitation were observed
P05 Instrument performance data not reported
P06 Instrument performance not analyzed at the appropriate frequency
P07 Other (describe in comments)
P08 Resolution Check Mixture (RCM) not analyzed at the beginning of the initial calibration sequence
P09 RCM criteria were not met
P10 RPD criteria in Performance Evaluation Mixture (PEM) was not met

Quantitation
Q01 Peak misidentified
Q02 Target analyte affected by interfering peak
Q03 Qualitative criteria were not satisfied
Q04 Cross contamination occurred
Q07 Analysis occurred outside 12 hour GC/MS window
Q09 TIC result was not above 10× the level found in the blank
Q10 TIC reported as detect in another fraction
Q11 Common artifact reported as a TIC
Q12 No raw data were provided to confirm quantitation
Q13 MDA > RL
Q14 Inappropriate aliquot sizes were used
Q15 Sample result < MDA
Q16 Sample result < 2σ uncertainty
Q17 Negative result
Q18 Compounds were not adequately resolved
Q19 Sample geometry different from calibration geometry
Q20 Sample weight greater than greatest weight on mass attenuation curve
Q21 Isotopes of same radionuclide do not show equilibrium

Q22 Peak not within appropriate energy range
Q23 Counting uncertainty ≥ 80% of sample result
Q24 Raw data anomaly
Q25 Other (describe in comments)
Q26 RT outside calculated RT window
Q28 Neither RL or the SQL are reported for a nondetect result
Q29 SQL > RL
Q30 Compound detected at < SQL and not qualified "J"
Q31 Presence of high molecular weight contaminants impacted sample quantitation

Surrogates
S01 Surrogate recovery was above the upper control limit
S02 Surrogate recovery was below the lower control limit
S03 Surrogate recovery was < 10%
S04 inappropriate surrogate standard used
S05 Inappropriate surrogate standard concentration(s) used
S06 Surrogate data not reported
S07 Surrogate outside retention window
S08 Other (describe in comments)

Instrument Tuning
T01 Mass calibration ion misassignment
T02 Mass calibration was not performed every 12 hours
T03 Mass calibration did not meet ion abundance criteria
T04 Mass calibration data was not reported
T05 Scans were not properly averaged
T06 Other (describe in comments)

Pesticide Sample Cleanup
U01 Florisil performance requirements not met
U02 GPC calibration not checked at required frequency
U03 GPC calibration criteria not met
U04 GPC blank not analyzed after GPC calibration
U05 GPC blank greater than half the RL for target compound

Cleanup
V01 10% recovery or less was obtained during either check
V02 Recoveries during either check were > 120%
V04 Cleanup data not reported
V05 Cleanup check not performed at the appropriate frequency
V06 Other (describe in comments)

Dilutions
X01 Serial dilution not analyzed at the appropriate frequency
X02 %D between the original sample and the diluted result (or serial dilution) exceeded acceptance criteria
X03 Reported results not corrected for dilution factor
X04 Other (describe in comments)

Radiochemical Yield

Y01 Radiochemical tracer yield was above the upper control limit
Y02 Radiochemical tracer yield was below the lower control limit
Y03 Radiochemical tracer yield was zero
Y04 Radiochemical yield data was not present
Y05 Other (describe in comments)

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APPENDIX B

QUALIFICATION TABLES FOR MULTIPLE QUALITY DEFICIENCIES

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QUALIFICATION TABLES FOR MULTIPLE QUALITY DEFICIENCIES

GUIDANCE FOR DATA QUALIFICATION DUE TO MULTIPLE QUALITY DEFICIENCIES

This appendix provides guidance in the qualification of data due to instances of multiple quality deficiencies. Quality deficiencies can be categorized based on potential effect on sample data. The effect of quality deficiencies may be applicable to only a single sample or to all samples within the reporting batch. A validation qualifier should not be placed on sample data until all quality deficiencies have been identified within the reporting batch.

The following is a listing of data quality indicators and the probable effects on sample data.

Data Quality Indicator	Effect on Sample Data
Standard curve correlation coefficient	Quantitative uncertainty
Continuing calibration verification	Positive or negative bias
Method blank	Positive bias
Laboratory control sample	Positive or negative bias and precision
MS/MSD	Positive or negative bias and precision

In the instance of multiple quality deficiencies, the validation qualifier should be placed consistent with the acceptable level of uncertainty associated with the intended use of the data. The validation SOW should provide a summary of the intended use(s) of the data. (e.g., risk assessment, fate and transport modeling, waste management) to facilitate appropriate placement of validation qualifiers.

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APPENDIX C

RULES, CALCULATIONS AND EQUATIONS

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RULES, CALCULATIONS, AND EQUATIONS

Rounding Rules

1. In a series of calculations, carry the extra digits through to the final result, and then round off.
2. If the digit to be removed is less than 5, the preceding digit stays the same.
3. If the digit to be removed is equal to or greater than 5, the preceding digit is increased by 1.

Calculations/Equations

C.1 Initial/Continuing Calibration Verification %R

$$\%R = \frac{ICV_{Found}}{ICV_{True}} \times 100$$

Where,
Found = concentration (µg/L) of each analyte measured in the ICV or CCV solution
True = concentration (in µg/L) of each analyte in the ICV or CCV source

C.2 Interference Check Sample %R

$$\%R_{ICSAB} = \frac{AB_{Found}}{AB_{True}} \times 100$$

Where,
Found = concentration (µg/L) of each analyte measured in the ICS solution
True = concentration (in µg/L) of each analyte in the ICS

C.3 Laboratory Control Sample %R

$$\%R_{LCS} = \frac{LCS_{Found}}{LCS_{True}} \times 100$$

Where,
Found = concentration (µg/L for aqueous; mg/kg for solid) of each analyte measured in the LCS solution
True = concentration (in µg/L for aqueous; mg/kg for solid) of each analyte in the LCS source

C.4 Laboratory Duplicate RPD

$$RPD = \frac{|R1 - R2|}{\bar{\times}_{R1,R2}} \times 100$$

Where,
R1= first sample value (original)
R2 = second sample value (duplicate)

C.5 MS/Pre-digestion Spike %R

$$\%R_{PdS} = \frac{\text{Spiked Sample Result - Sample Result}}{\text{Spike Added}} \times 100$$

C.6 Serial Dilution %D

$$\%D = \frac{\text{Initial Result - Dilution Result}}{\text{Initial Result}} \times 100$$

C.7 Conversion of µg/L to mg/kg

$$\frac{mg}{kg} = \frac{ug}{L} \times \frac{vol(mL)}{wt(g)} \times \frac{1L}{1000mL} \times \frac{1000g}{Kg} \times \frac{1mg}{1000ug}$$

Where,
µg/L = concentration from raw data
vol = digestate volume in liters
wt = sample weight (1 g)

C.8 Conversion of soil/sediment wet weight to dry weight

$$\frac{mg}{kg} = \frac{mg}{kg}(wet) \times \frac{100}{\%solids}$$

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CP2-WM-0001/R2

Paducah Deactivation Project
Waste Management Plan
Paducah Gaseous Diffusion Plant,
Paducah, Kentucky

This document is approved for public release per review by:

David Hayden — 6-13-17

FPDP Classification Support — Date

CP2-WM-0001/R2

Paducah Deactivation Project
Waste Management Plan
Paducah Gaseous Diffusion Plant,
Paducah, Kentucky

Date Issued—June 2017

U.S. DEPARTMENT OF ENERGY
Office of Environmental Management

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

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APPROVALS

Paducah Deactivation Project
Waste Management Plan
Paducah Gaseous Diffusion Plant,
Paducah, Kentucky

CP2-WM-0001/R2

June 2017

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6/12/17
Date

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Program Manager

6/13/2017
Date

Effective Date: 8/7/2017

Review Date: 6/13/2020

USQ Exemption # 7. Remaglaveng 8-2-17

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REVISION LOG

Revision Number	Description of Changes	Pages Affected
0	Initial Release	All
1	Added Appendix B, Radioactive Waste Management Basis for FPDP Waste Storage Facilities, transition of WM, and general editorial.	All
2	Revisions due to CA-000475 and CA-000422. CA-000475— Revise document to update references. CA-000422—Revise Appendix B to include missing information and correct wrong document references, etc.	1-3, 7, 11, 13, 20, 22, 23, 26, 28, 32, 34-37, 39, 41, B-3, B-5, B-6, B-8, B-10, B-11 & B-12

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CONTENTS

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ACRONYMS

ACM	asbestos-containing material
AEA	Atomic Energy Act
AL	Authorized Limit
ALARA	as low as reasonably achievable
AOC	area of contamination
ARAR	applicable or relevant and appropriate requirement
ASL	Approved Suppliers List
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
CWA	Clean Water Act
D&R	Deactivation and Remediation
DOE	U.S. Department of Energy
DOE M	DOE Manual
DOE O	DOE Order
DOT	U.S. Department of Transportation
DQO	data quality objective
DSA	documented safety analysis
DSSI	Diversified Scientific Services, Inc.
EPA	U.S. Environmental Protection Agency
ERPP	Environmental Radiological Protection Program
FFA	Federal Facility Agreement
FOR	field operating record
GSA	generator staging area
HWFP	Hazardous Waste Facility Permit (KY8-890008-982)
ISMS	Integrated Safety Management System
IWTS	Integrated Waste Tracking System
KAR	*Kentucky Administrative Regulations*
KDWM	Kentucky Division of Waste Management
KPDES	Kentucky Pollutant Discharge Elimination System
LDR	land disposal restriction
LLW	low-level radioactive waste
MARSAME	Multi-Agency Survey and Assessment of Materials and Equipment Manual
MLLW	mixed low-level waste
NIC	NNSS Waste Implementation Crosswalk
NDA	nondestructive assay
NNSS	Nevada National Security Site
PGDP	Paducah Gaseous Diffusion Plant
PHS	Preliminary Hazard Screening
PK	process knowledge
PPE	personal protective equipment
PPPO	Portsmouth/Paducah Project Office
QA	quality assurance
QC	quality control
RADCON	radiological control
RCRA	Resource Conservation and Recovery Act
RP	radiation protection
RWMB	Radioactive Waste Management Basis
SAP	sampling and analysis plan

SCO	surface contaminated object
STP	site treatment plan
TSCA	Toxic Substances Control Act
TSDF	treatment, storage, and disposal facility
WAC	waste acceptance criteria
WCO	waste certification official
WCS	Waste Control Specialists, Inc.
WGF	waste generation forecast
WID	waste container identification number
WMP	waste management plan
WWTU	wastewater treatment unit

DEFINITIONS

Asbestos-containing material (ACM)—Material containing more than 1% asbestos.

Classified material—Any item or scrap that due to its composition, structure, or function reveals restricted data or other classified information, either directly or through analysis, in accordance with U.S. Department of Energy (DOE) CG-SS-4, DOE CGPGD-5, or other applicable classification guidance.

Commercial grade item—Containers and packaging supplies that are industry standard with existing pedigrees.

Data quality objective (DQO)—A set of criteria established for the collection of data to ensure the data is adequate to make the required decision. For waste characterization, the DQOs will include the analyses required, the analytes (the contaminants of concern), the type and number of samples, the quality control samples and analyses, and the degree of confidence required.

Data validation—The process of evaluating the available data against the project DQOs to make sure that the objectives are met. Data validation may be very rigorous or cursory depending on project DQOs. The available data reviewed will include analytical results, field quality control (QC) data and laboratory QC data, and also may include field records.

Debris—Solid material exceeding a 60 mm particle size that is intended for disposal and that is a manufactured object, plant or animal matter, or natural geologic material. The following materials are not debris: any material for which a specific treatment standard is provided in 40 *CFR* Part 268, Subpart D, namely lead acid batteries, cadmium batteries, and radioactive lead solids; process residuals such as smelter slag and residues from the treatment of waste, wastewater, sludges, or air emission residues; and intact containers of hazardous waste that are not ruptured and that retain at least 75% of their original volume.

Environmental media—Soil, sediment, groundwater, and surface water.

Hazardous waste—Solid waste that meets the criteria in 40 *CFR* § 261.3.

Low-level radioactive waste (LLW)—Radioactive waste that contains source, special nuclear, or by-product material, and which is not classified as high-level radioactive waste, transuranic (TRU) waste, spent nuclear fuel, or by-product material, as defined in Section 11e.(2) of the Atomic Energy Act (AEA), as amended.

Milk runs—A common practice in the waste management business whereby a waste transportation truck will pick up waste at one or more locations and thereby reduce the total number of off-site shipments to the extent practical.

Mixed waste—A waste that contains both Resource Conservation and Recovery Act (RCRA) hazardous waste and source, special nuclear, or by-product material subject to the AEA, as amended.

Orphan waste—Waste with no identified disposal path.

Polychlorinated biphenyl (PCB)-contaminated—A nonliquid material containing PCBs at concentrations ≥ 50 ppm but < 500 ppm; a liquid material containing PCBs at concentrations ≥ 50 ppm but < 500 ppm or where insufficient liquid material is available for analysis; a nonporous surface having a

surface concentration > 10 µg/100 cm^2 but < 100 µg/100 cm^2, measured by a standard wipe test as defined in § 761.123, Toxic Substance Control Act (TSCA) waste.

PCB article—See 40 *CFR* § 761.3. A manufactured article, other than a PCB container, that contains PCBs and whose surface(s) has been in direct contact with PCBs. "PCB article" includes capacitors, transformers, electric motors, pumps, pipes, and any other manufactured item (1) that is formed to a specific shape or design during manufacture, (2) that has end use function(s) dependent in whole or in part upon its shape or design during end use, and (3) that either has no change of chemical composition during its end use or only those changes of composition that have no commercial purpose separate from that of the PCB Article.

PCB bulk product waste—Waste derived from manufactured products containing PCBs in a nonliquid state, at any concentration where the concentration at the time of designation for disposal was ≥ 50 ppm PCBs. PCB bulk product waste does not include PCBs or PCB Items regulated for disposal under 40 *CFR* § 761.60(a) through (c), § 761.61, § 761.63, or § 761.64. PCB bulk product waste includes, but is not limited to, the following:

(1) Nonliquid bulk wastes or debris from the demolition of buildings and other man-made structures manufactured, coated, or serviced with PCBs. PCB bulk product waste does not include debris from the demolition of buildings or other man-made structures that is contaminated by spills from regulated PCBs that have not been disposed of, decontaminated, or otherwise cleaned up in accordance with subpart D of this part.

(2) PCB-containing wastes from the shredding of automobiles, household appliances, or industrial appliances.

PCB container—A package, can, bottle, bag, barrel, drum, tank, or other device that contains PCBs or PCB Articles and whose surface(s) has been in direct contact with PCBs.

PCB/radioactive waste—PCBs regulated for disposal under 40 *CFR* Part 761, Subpart D, that also contain source, special nuclear, or by-product material subject to regulation under the AEA, as amended, or naturally occurring or accelerator-produced radioactive material.

PCB remediation waste—See 40 *CFR* § 761.3. Waste containing PCBs as a result of a spill, release, or other unauthorized disposal, at the following concentrations: materials disposed of prior to April 18, 1978, that currently are at concentrations ≥ 50 ppm PCBs, regardless of the concentration of the original spill; materials that currently are at any volume or concentration where the original source was ≥ 500 ppm PCBs beginning on April 18, 1978, or ≥ 50 ppm PCBs beginning on July 2, 1979; and materials that currently are at any concentration if the PCBs are spilled or released from a source not authorized for use under this part. PCB remediation waste means soil, rags, and other debris generated as a result of any PCB spill cleanup, including, but not limited to, the following:

(1) Environmental media containing PCBs, such as soil and gravel; dredged materials, such as sediment, settled sediment fines, and aqueous liquids decanted from sediment.

(2) Sewage sludge containing < 50 ppm PCBs and not in use according to § 761.20(a)(4); PCB sewage sludge; commercial or industrial sludge contaminated as the result of a spill of PCBs, including sludges located in or removed from any pollution control device; aqueous decantate from an industrial sludge.

(3) Buildings and other man-made structures (such as concrete floors, wood floors, or walls contaminated from a leaking PCB or PCB-contaminated transformer), porous surfaces, and nonporous surfaces.

Transuranic (TRU) waste—Waste that contains TRU (atomic number > 92) alpha-emitting nuclides at concentrations > 100 nCi/g with half-life > 20 years.

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EXECUTIVE SUMMARY

This Waste Management Plan (WMP) addresses the safe and compliant management of wastes through the application of consistent waste management practices at the Paducah Site under the Deactivation and Remediation (D&R) contractor. The document sets forth the requirements for managing low-level radioactive, mixed low-level radioactive, Resource Conservation and Recovery Act (RCRA) hazardous, Toxic Substances Control Act (TSCA), sanitary, classified, and/or transuranic waste at the Paducah Site. Waste generated at the Paducah Site must be characterized and managed in accordance with applicable state and federal laws and regulations. These wastes also must be managed in accordance with U.S. Department of Energy (DOE) Orders and requirements and procedures developed by the D&R contractor, which are written and updated, as necessary, for compliance with the stated requirements. Additionally, the waste must be characterized and managed to meet the waste acceptance criteria (WAC) for receiving facilities engaged in the treatment and/or ultimate disposition of the waste. The approach outlined in this plan also is consistent with *Pollution Prevention/Waste Minimization Plan*, CP2-ES-0005.

This WMP is intended to replace project-specific WMPs that would be developed for future Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and non-CERCLA projects. Existing approved project-specific WMPs may be replaced as the project work instructions, procedures, and/or CERCLA work plans are updated and approved. The most current applicable or relevant and appropriate requirements and waste generation forecasts, classification, and characterization data will be provided. Implementation of this approach is intended to provide a consistent approach to the management of waste generated at the Paducah Site.

Work shall be planned, authorized, and accomplished under controlled conditions, in accordance with this WMP along with the approved work instructions and procedures. Incorporating careful planning into projects ensures end-point disposition paths are identified prior to waste generation, with priority placed on reuse and recycling of materials that would otherwise be disposed of. This planning also allows implementation of cost-effective pollution prevention techniques, practices, and policies, as outlined in CP2-ES-0005. Processes important to waste disposition activities (e.g., characterization, radiological surveys) shall have controls or verification steps identified as part of operating procedures. Controls shall be established and maintained to ensure the traceability of the waste from the point of generation through final disposition.

Requirements for waste management planning shall be incorporated into the contracts of subcontractors that are involved in the generation of waste. A waste representative (e.g., waste engineer, field engineer, field coordinator) shall be assigned to each subcontractor to assist in work planning and development.

The D&R contractor shall characterize waste in accordance with the applicable regulations, DOE Orders, profile and procedure requirements, and the applicable treatment, storage, and disposal facility (TSDF) WAC. Process knowledge shall be used to the extent practical to minimize additional sampling. Additional sampling and laboratory analysis or noninvasive characterization methods shall be performed, as necessary, when existing information is inadequate to make an accurate waste determination.

Sorting, segregation, and decontamination techniques shall be performed to the extent practical to reduce and, where possible, eliminate the generation and release of DOE wastes and pollutants thereby minimizing the amount of regulated waste (RCRA and TSCA) requiring treatment and disposal. Wastes shall be evaluated for the best technical and/or cost-effective disposition path with the following hierarchy:

(1) Reduce/reuse/recycle
(2) C-746-U Contained Landfill or on-site treatment
(3) Nevada National Security Site
(4) Commercial disposal
(5) Commercial TSDF for treatment/disposal

As a mechanism to ensure continuous improvement in waste management and support the targets and objectives outlined in CP2-ES-0005, the D&R contractor shall implement a program to track issues, corrective actions, and lessons learned. Issues and corrective actions shall be tracked in the issues and corrective actions tracking system database. Lessons learned (including operating experience lessons learned) shall be tracked in the lessons learned database. Each project shall be responsible for developing lessons learned, as applicable.

1. INTRODUCTION

1.1 PURPOSE AND SCOPE

The purpose of this Waste Management Plan (WMP) is to provide a systematic approach to the management of waste generated by U.S. Department of Energy (DOE) activities at the Paducah Site under the Deactivation and Remediation contractor (D&R) and to protect the health and safety of the worker, the public, and the environment. This plan covers wastes located at the Paducah Site, including but not limited to, wastes generated by past DOE contractors as well as newly generated wastes. The use of the term waste hereafter refers to both types of wastes. The scope of this document is to set forth the requirements for managing sanitary waste and waste meeting Authorized Limits (ALs) for C-746-U Landfill, low-level waste (LLW), Resource Conservation and Recovery Act (RCRA) waste, Toxic Substances Control Act (TSCA) waste, and/or transuranic (TRU) waste at Paducah Gaseous Diffusion Plant (PGDP). The plan also addresses the management of nonradioactive and nonhazardous waste for information purposes. The plan identifies the compliance drivers, organizational responsibilities, waste types, and specific elements that must be addressed during pre-planning, generation, management, and waste disposition.

Wastes generated during D&R contract activities must be characterized and managed in accordance with applicable state and federal laws and regulations. These wastes also must be managed in accordance with DOE Orders and requirements and procedures used by the D&R contractor, which are written and updated, as necessary, for compliance with the stated requirements. Additionally, the wastes must be characterized and managed to meet the waste acceptance criteria (WAC) for receiving treatment, storage, and disposal facilities (TSDFs) engaged in the treatment and/or ultimate disposition of the wastes.

Appendix A to this WMP is a protocol contained in the U.S. Environmental Protection Agency's (EPA) 1998 guidance, *Management of Remediation Wastes under RCRA*, outlining management options for remediation wastes. The protocol provides a regulatory background and application of selected regulatory policies that will be used for management of certain listed wastes at Paducah Site. These include the basis for hazardous waste listings, land disposal restrictions (LDRs), contained-in determinations, and health-based standards approved by the Kentucky Division of Waste Management (KDWM) and EPA Region 4, for the management of media and debris at the site.

This WMP shall be incorporated by reference into future Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) documents, which may eliminate the need for project-specific WMPs; however, the most current applicable or relevant and appropriate requirements (ARARs) and waste generation forecast, classification, and characterization data will be provided, as applicable, in project-specific work instruction, procedures, and/or CERCLA work plans. Approval of this WMP will mitigate inconsistencies with regard to waste management from project-to-project and also will streamline the development and approval process for forthcoming project-specific documents.

Appendix B to this WMP includes D&R contractor Radioactive Waste Management Basis for the DOE-owned waste management facilities located at the Paducah Site, which is a requirement of DOE Order (O) 435.1 Admin. Chg. 1, *Radioactive Waste Management*.

1.2 ORGANIZATION, STRUCTURE, AND RESPONSIBILITIES

The D&R contractor will implement the general requirements and responsibilities of DOE Manual (DOE M) 435.1-1, *Radioactive Waste Management Manual*, and through programs and procedures

identified in CP2-HS-1000, *Integrated Safety Management System Description*, CP2-ES-0101, *Fluor Federal Services, Inc., Paducah Deactivation Project Environmental Management System* and DOE O 458.1 Admin. Chg. 3, *Radiation Protection of the Public and the Environment*.

Specific functional waste management activities shall be integrated across the following areas:

Contracts and Purchasing. Establishes purchase orders or contracts with analytical laboratories, subcontractors, waste transportation companies, and TSDFs. Procures empty hazardous materials containers, labels, placards, and shipping forms, etc. .

Records Management. Manages/retains records generated during waste generation, management, and treatment/disposal in accordance with DOE O 200.1A, *Information Technology Management*, 243.1B, *Records Management Program*, and DOE O 414.1D Admin. Change 1, *Quality Assurance*. Waste management records are maintained in a combination of paper and electronic formats (e.g., tracking forms, shipment paperwork, characterization information, radiological data). Electronic records for waste containers and associated characterization information will be maintained within the Integrated Waste Tracking System (IWTS). Field operating records (FORs) are records that are compiled, revised, or made complete over time or are required by permit or procedure to be located at a designated work area. Due to the nature of FORs, an exception is granted to maintain the record copy at the work location until the project file is closed and all other recordkeeping requirements are met (e.g., RCRA).

Procedures Management. Maintains administrative and technical (operating) procedures in accordance with CP3-OP-0002, *Developing and Maintaining FPDP Performance Documents*. These procedures address cradle-to-grave waste management practices as well as routine and off-normal waste operations.

Sample and Data Management. Develops and implements sampling and data management activities for a sampling program that includes, as applicable, sampling/analysis of effluent discharges, groundwater, air emissions, and wastes [e.g., isotopic information, total activity, contributing radionuclides, fissile material mass, enrichments, hazardous characteristics/constituents, hazardous pollutants, polychlorinated biphenyls (PCBs)]. Activities will be performed in accordance with CP2-ES-0063, *Environmental Monitoring Data Management Implementation Plan at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*.

Waste Management. Refines the waste disposition strategy for each project or work scope. Provides waste management expertise to projects such as, but not limited to, waste cost estimates, waste trending, etc. Waste Management supports the projects by assisting in characterization of the waste, selection of appropriate containers, and oversight of waste packaging, container closure, tamper/intrusion indicating device application, requests for waste management support, and pre-transportation inspection of containers. Ensures proper management of waste during staging/storage on-site. Maintains inventory of waste generated and follows the process for compiling radiological and chemical material inventories to comply with facility nuclear safety basis documents inventory controls. Works with transportation group to dispose of the waste to the appropriate receiving facility.

Quality Assurance. Ensures that packaging supplies (containers, liners, absorbent, etc.) meet the requirements set forth by the project generating the waste (e.g., through receipt inspections) and maintains an Approved Suppliers List (ASL) in accordance with the D&R contractor quality assurance (QA) program.. Ensures that work is performed in accordance with approved plans/procedures. Conducts routine surveillances of waste management activities. Activities will be performed in accordance with CP2-QA-1000, *Quality Assurance Program Description for the Fluor Federal Services, Inc., Paducah Deactivation Project Paducah, Kentucky*, that meet the requirements of 10 *CFR* Part 830, Subpart A,

Quality Assurance Requirements; DOE O 414.1D Admin. Change 1, *Quality Assurance* and EM-QA-001, *EM Quality Assurance Program (QAP).*

Radiation Protection. Reviews and approves methods of conducting transportation surveys for the receipt and off-site shipment of hazardous materials, performs radiological surveys of packaging to determine the appropriate labels and transport index, and ascertains that appropriate surface contamination limits are not exceeded. A radiation protection (RP) representative will develop, as needed, radiological work permits prior to beginning work and provide job coverage of waste packaging activities. These activities shall meet the requirements of 10 *CFR* Part 835, *Occupational Radiation Protection,* and DOE O 458.1 Admin Chg. 3, *Radiation Protection of the Public and Environment*.

Regulatory Compliance. Ensures that appropriate regulations pertaining to waste determinations and waste generation, storage, and disposal are identified. Verifies that appropriate notifications, if required, are filed with regulatory agencies upon concurrence by DOE. Maintains environmental permits/approvals.

Training. Establishes and maintains the training implementation matrix and training files of D&R contractor personnel and subcontractors engaged in waste management activities, including fissile material certification. A training and qualification program shall be implemented for waste management program personnel and shall meet federal/state/local regulations (e.g., 40 *CFR* § 264.16, 49 *CFR* § 172.704) and, for personnel working in nuclear facilities, the requirements of DOE O 426.2 Admin. Chg. 1, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities.*

Waste Transportation. Provides guidance to the waste engineers/field engineers/field coordinators/generators regarding package selection, packaging, marking, and labeling of containers. Completes and certifies shipping papers and/or manifests for off-site shipments; calls and schedules carriers; inspects, coordinates, and provides guidance on loading and securing packages aboard the conveyance; ensures that carrier is offered the appropriate placards; instructs carrier; and provides emergency instructions to carriers. Waste shall be packaged and transported in accordance with federal/state/local regulations [e.g., 40 *CFR* Part 262, *Standards Applicable to Generators of Hazardous Waste*; 40 *CFR* Part 264, *Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities*; and 49 *CFR* Part 172, *Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements*)] and with DOE O 460.1C, *Packaging and Transportation Safety*, and DOE O 460.2A, *Departmental Materials Transportation and Packaging Management*.

Waste Certification Official (WCO). Certifies and releases waste for shipment and disposal to Nevada National Security Site (NNSS). Verify that waste is packaged and prepared for transport in accordance with the NNSS WAC.

1.3 SPECIFIC PROJECT RESPONSIBILITIES

The project manager shall be responsible for ensuring the requirements of this section are met. Procedures, methods, and work instructions shall be developed for each project at the Paducah Site involving waste management.

(1) Work shall be planned, authorized, and accomplished under controlled conditions, in accordance with this WMP along with the approved work instructions and procedures. Processes important to waste disposition activities (e.g., characterization, radiological surveys) shall have controls or verification steps identified as part of operating procedures and/or work control documents. Controls shall be

established to ensure the traceability of the waste from the point of generation through final disposition.

(2) Requirements for waste management planning shall be incorporated into the contracts of all subcontractors that are involved in the generation of waste. A waste representative typically is assigned to each subcontractor, if generating waste, to assist in work planning and development.

The following must be addressed on a project-specific basis:

(a) Waste Generation Forecast (WGF) (by waste stream). This information is provided to Regulatory Affairs annually (June 1st of each year for the next fiscal year) and as may be required by federal/state/local regulations. It will be provided in the CERCLA work plan for projects performed in accordance with CERCLA authority. The following information, as available, also shall be supplied to Waste Management as part of the WGF:

i. Waste category [e.g., LLW, mixed low-level waste (MLLW), TSCA LLW, TRU, RCRA, TSCA, asbestos-containing material (ACM)];

ii. Waste stream description [e.g., product, personal protective equipment (PPE), soil, debris];

iii. Waste codes or special identification;

iv. Special handling requirements (e.g., PCBs, asbestos, classified);

v. Estimated quantity (volume, mass, or estimated density for the various waste types);

vi. Planned disposition facility(ies);

vii. Type and number of containers to be used to package and transport the waste; and

viii. Type of absorbents and/or liners to be used to package the waste.

(b) Handling of Classified Waste. If classified waste is to be managed, the project shall address it. The D&R contractor/Swift & Staley Team security specialists will provide guidance in the preparation and handling of documentation concerning the generation, transport, and disposition of classified waste.

(c) Waste Characterization. Waste characterization specific information will be incorporated into the work plan for projects performed in accordance with CERCLA and will be included in work instructions/procedures for all projects. Waste characterization may be based upon the following:

i. Chemical characterization strategy [process knowledge (PK), sampling/analysis, field screening]; and

ii. Radiological characterization strategy (PK, sampling/analysis, field screening).

(d) Orphan Waste. Waste streams with no disposition pathway shall be generated only in accordance with approved conditions, which, at a minimum, will address the following:

i. Programmatic need to generate the waste;
ii. Characteristics and issues preventing the disposition of the waste;
iii. Safe and compliant storage of the waste until disposal can be achieved;

iv. Activities and plans for achieving final disposition of the waste; and
v. Methods of segregation that might limit wastes without an identified disposition pathway.

This information shall be presented to senior management and DOE during work planning and shall be incorporated into work instructions or procedures. The DOE Portsmouth/Paducah Project Office Field Element Manager must approve the generation of waste with no identified path to disposal.

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2. WASTE MANAGEMENT COMPLIANCE DRIVERS

Waste generated on the project shall be managed in accordance with DOE Orders, state and federal requirements, permits, and compliance agreements. The following does not constitute a complete list of compliance drivers but rather the primary requirements for planning.

- **DOE O 435.1, Chg. 1**, ***Radioactive Waste Management.*** This Order ensures that DOE radioactive waste is managed in a manner that is protective of worker and public health and the environment. Program documents and implementing procedures are identified in CP2-HS-1000, *Integrated Safety Management System Description*, and in Appendix B, *Radioactive Waste Management Basis for the Radioactive Waste Management Facilities, Fluor Federal Services, Inc., Paducah Deactivation Project.*

- **DOE O 458.1 Admin. Change 3**, ***Radiation Protection of the Public and Environment***.

- **RCRA.** Establishes the standards for hazardous and MLLW waste identification, treatment, storage, and disposal of solid and hazardous waste managed by the project.

- **TSCA.** Establishes requirements for identifying, storing, transporting, and treating PCB and PCB/Radioactive waste.

- **Department of Transportation (DOT).** Establishes the standards for packaging, classification, and communication of hazardous material in commerce.

- **Hazardous Waste Facility Permit (HWFP) No. KY8-890-008-982.** Specifies conditions for hazardous waste management units and corrective action for solid waste management units at the Paducah Site, including regulatory provisions for hazardous and MLLW treatment, storage, and disposal activities.

- **Solid Waste Permit Number 073-00045/073-00014/073-00015.** Specifies conditions for operation of the C-746-U Landfill and post closure care of the C-746-S&T Landfills, including the regulatory provisions for solid waste disposal activities of the project.

- **Federal Facility Agreement (FFA).** The FFA, as required by Section 120 of CERCLA, is a tri-party agreement among DOE, EPA, and Kentucky Energy and Environment Cabinet (Kentucky) (formerly the Kentucky Natural Resources and Environmental Protection Cabinet) signed in 1998. The FFA provides the legal and regulatory framework for conducting site cleanup activities under the RCRA/CERCLA corrective/remedial actions process at the site.

- **TSCA-Uranium Enrichment-Federal Facility Compliance Agreement.** This agreement was signed between the EPA and DOE in 1992 and requires the development and implementation of action plans for removal and disposal of PCB material.

- **2003 Agreed Order.** The October 1, 2003, Agreed Order between DOE and the KDWM sets forth establishment of health-based levels for environmental media and contaminated debris contaminated with hazardous waste.

- **DOE Memorandum**, "Secretarial Memorandum for Heads of Department Elements on the Release of Materials for Reuse and Recycle, Bill Richardson, Washington, DC, February 14, 2000.

- **DOE Memorandum**, "Secretarial Memorandum for Heads of All Departmental Elements on the Release of Surplus and Scrap Materials," Bill Richardson, Washington, DC, July 13, 2000.

- **Site Treatment Plan Agreed Order and Site Treatment Plan.** The two-party agreement between Kentucky and DOE was signed in September 1997 and sets forth a series of treatment milestones for volumes of mixed waste that are documented in a site treatment plan (STP). The STP is revised annually if mixed waste is stored over a year.

3. WASTE MANAGEMENT

Waste Management is an integrated, sitewide organization focused on safe, cost-effective, and compliant disposition of wastes from the D&R contract. For organizational structure, see latest version of the contractor's organization chart.

Waste Management is integrated into projects by assigning trained waste representatives (e.g., waste engineers, field engineers, field coordinators) directly to each project. These waste representatives specialize in waste planning and pollution prevention/waste minimization, characterization, disposition path planning, profile development, and transportation in cooperation with the Waste Transportation group. The waste management support process starts with waste stream identification, emphasizing waste minimization and elimination, and includes waste characterization/sampling strategies. End-point disposition paths are identified prior to generation, with priority placed on source reduction, reuse, recycling, and low-cost on-site disposal. By incorporating careful planning into waste management activities, waste shall be characterized and packaged in accordance with the acceptance requirements for disposition, and the need for long-term storage may be reduced.

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4. POLLUTION PREVENTION AND WASTE MINIMIZATION

The D&R contractor shall plan waste management activities to meet the obligations and responsibilities under Executive Order 12856, *Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements*; Executive Order 13101, *Greening the Government through Waste Prevention, Recycling, and Federal Acquisition;* and the *Pollution Prevention Act of 1990*.

CP2-ES-0005, *Pollution Prevention/Waste Minimization Plan*, establishes policy, goals, and roles/responsibilities related to pollution prevention and waste minimization. This plan also discusses the integration of pollution prevention and waste minimization into the environmental management system. The D&R contractor shall minimize the generation of waste per the following EPA hierarchy:

- Reduce
- Reuse/Recycle
- Dispose

Reduce. During project planning, every effort shall be made to minimize the amount of waste generated by the following means:

- Use the least hazardous chemicals/products possible,
- Purchase only the amount of materials required,
- Perform as many tasks outside a contamination area as possible,
- Limit the materials taken into contamination areas,
- Avoid unnecessary entry/reentry into contamination areas,
- Decontaminate items to the greatest extent practical, and
- Aggressively sort and segregate materials.

Reuse/Recycle. Recycling is limited at the Paducah Site by the DOE moratorium on the release of volumetrically contaminated metals (January 12, 2000) and by the DOE suspension on unrestricted release for recycling of scrap metals from radiation areas within DOE facilities (July 13, 2000). If the moratorium is lifted, this will allow the D&R contractor to increase the recycle efforts and, in some instances, offset disposal costs. As materials are identified and characterized as prospects for recycling or reuse, a trade-off analysis of economic, health, safety, and waste volume benefits that could be realized by innovative recycling approaches will be conducted.

Office wastes, including paper, plastic, aluminum cans, printer cartridges, etc., shall be recycled to the extent practicable. These items shall be placed in designated locations/containers located throughout the plant site. When sufficient quantities have been collected, they will be transported to a local recycling agency. Other waste, such as concrete, structural steel, and universal wastes (e.g., batteries, bulbs), are evaluated for release in accordance with CP3-RP-1109, *Radioactive Contamination Control and Monitoring*, then segregated and shipped for recycling. Excess property, such as equipment, spare parts, etc., is managed in accordance with CP3-PR-1001, *Property Management* and may be offered for use at other sites in lieu of disposal. Off-site release of these items must meet the requirements of DOE O 458.1 Admin. Chg. 3.

Dispose. The D&R contractor shall maintain treatment/disposal contracts for waste types generated. Selection of the disposition alternative typically will be based on being compliant and being the most cost-effective; however, circumstances may require another alternative to be selected, provided it is

compliant, because of other project-related issues (e.g., schedule, availability, recent quality of the disposition provider).

4.1 WASTE AVOIDANCE

When possible, the generation of waste shall be avoided or minimized. Material and equipment packaging shall be removed, whenever possible, before items are brought into contaminated areas to prevent cross contamination. Contamination control for equipment will be implemented to eliminate or reduce the need for decontamination. Contaminated tools shall remain within the contaminated area for reuse where possible. Entries into contamination areas shall be limited to those personnel required to perform, supervise, and oversee work to minimize the generation of secondary waste such as PPE.

4.2 VOLUME REDUCTION

In order to meet goals for waste minimization and to optimize the total costs associated with on-site waste management and ultimate disposition, volume reduction may be employed for any given project. Volume reduction shall be considered during work plan development and executed beginning with sorting and segregation activities. Volume reduction may be accomplished by compaction, disassembling, and cutting or shearing of system components and demolition debris to practical dimensions for container loading (based on equipment capabilities and cost-effectiveness of size reduction efforts). Activities that potentially would generate fugitive emissions will include plans for the control of emissions. Volume reduction that would constitute treatment of hazardous waste is discussed in Section 8 of this WMP.

5. REGULATORY CLASSIFICATION OF WASTE

Wastes are to be characterized at the point of generation in accordance with applicable federal/state/local regulations and DOE Orders. This section provides an overview of the various types of regulated wastes generated at the Paducah Site.

Classified waste is managed in accordance with the applicable regulations and the Site Security Plan.

5.1 SANITARY/INDUSTRIAL WASTE

Sanitary/industrial waste is solid waste, including ACM, which is not radioactive and is not hazardous. Sanitary waste may be disposed of in off-site disposal locations approved by the D&R contractor or may be disposed of in the C-746-U Contained Landfill in accordance with CP2-WM-0011, *Waste Acceptance Criteria for the Treatment, Storage, and Disposal Facilities at the Paducah U.S. Department of Energy Site*. Primary WAC considerations for the C-746-U Contained Landfill are that the waste must meet the AL for radionuclides (in accordance with DOE O 458.1 Admin. Chg. 3), be RCRA nonhazardous, contain no free liquids, and not exceed a PCB concentration of 49 parts per million (ppm). Primary considerations for off-site disposal of sanitary/industrial waste are that the waste meets the receiving facilities' requirements and has been approved for release in accordance with DOE O 458.1 Admin. Chg. 3 or is being disposed of under a DOE-approved AL. To determine if the waste meets ALs, sampling/surveying shall be conducted using a graded approach consistent with the requirements of DOE/HS-004, *Multi-Agency Radiation Survey and Assessment of Materials and Equipment Manual (MARSAME)*.

5.2 RADIOACTIVE WASTE

The following categories of radioactive wastes are defined in this plan (see "Definitions").

5.2.1 Low-Level Waste

Waste that exceeds the C-746-U Contained Landfill AL for radionuclides is RCRA nonhazardous and is not regulated under TSCA shall be characterized as LLW. LLW shall be managed in accordance with this Plan, DOE O 435.1, Chg. 1, and DOE M 435.1-1 Admin. Chg. 2. AL waste is managed as LLW until transported to the landfill. NOTE: Waste that meets AL is tracked as sanitary waste upon verification that it meets the ALs.

5.2.2 Transuranic Waste

Waste containing TRU (atomic number > 92) radionuclides emitting alpha radiation with a half-life greater than 20 years and with activity concentrations greater than 100 nCi/g will be characterized as TRU waste. TRU waste shall be managed in accordance with this plan, DOE O 435.1, Chg. 1, and DOE M 435.1-1 Admin. Chg. 2.

5.2.3 Mixed Waste

Waste containing both RCRA hazardous waste, as discussed in Section 5.4, and radioactive waste, as discussed in Section 5.2, shall be managed in accordance with the requirement for each respective component.

5.2.4 PCB/Radioactive Waste

PCB waste, regulated, as discussed in Section 5.3, that also contains radioactive waste, as discussed in Section 5.2, shall be managed in accordance with the requirement for each respective component; however, 40 *CFR* § 761.50 also provides the following guidance for PCB/radioactive waste:

> …if, taking into account only the properties of the PCBs in the waste (and not the radioactive properties of the waste), the waste meets the requirements for disposal in a facility permitted, licensed, or registered by a State as a municipal or non-municipal non-hazardous waste landfill (e.g., PCB bulk product waste under § 761.62(b)(1)), then the person may dispose of the PCB/radioactive waste, without regard to the PCB component of the waste, on the basis of its radioactive properties in accordance with all applicable requirements for the radioactive component of the waste.

5.3 PCB WASTE

The following categories of PCB wastes are defined in this plan (see definitions) and also may meet the definition of PCB radioactive waste.

5.3.1 PCB Articles

PCB articles (e.g., capacitors, transformers, electric motors, pumps, pipes) are regulated if the liquid/potting material contains PCBs greater than or equal to 50 ppm. These items are subject to marking, storage, treatment, and disposal requirements set forth in this plan and 40 *CFR* Part 761, *Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions*, Subparts C and D.

5.3.2 PCB Containers

Any container (e.g., B-25 box, intermodal, Sealand, bag, drum, or tank) that has been used to contain PCBs and whose surface(s) has been in direct contact with PCBs at a concentration greater than or equal to 50 ppm is subject to regulations until the container has been decontaminated in accordance with 40 *CFR* § 761.79. PCB containers used for PCBs either shall be decontaminated for reuse in accordance with 40 *CFR* § 761.79, disposed of in a chemical waste landfill, or incinerated in a high temperature incinerator. PCB containers used only for PCBs at a concentration of less than 500 ppm that is also radioactive waste, as discussed in Section 5.2, may be disposed of based solely upon the radioactive component of the waste (as discussed in Section 5.2.4).

5.3.3 PCB Bulk Product Waste

PCB bulk product waste (e.g., plastics, wire insulation, molded rubber parts, applied dried paints, adhesives, fluorescent light ballasts containing PCBs in the potting material) are regulated for disposal if the concentration of PCBs in the coating/plastic is greater than or equal to 50 ppm. For hard/dried coatings, plastics, rubber, and non-leaking ballast, 40 *CFR* Part 761, Subpart D, allows disposal in a state, licensed, municipal waste landfill (e.g., C-746-U Contained Landfill); however, *Kentucky Administrative Regulations* (*KAR*) (401 *KAR* 47:030 § 8) prohibit the disposal of PCB wastes at a concentration greater than 49 ppm. In KDWM correspondence dated August 11, 2008, KDWM provided regulatory guidance whereby a demonstration of the 49 ppm can be based upon the concentration of the PCBs using a representative sampling approach that allows consideration of both the coating and weight of the material (i.e., overall waste stream) to which the coating is applied. The concentration in the waste stream is

calculated based upon the concentration of PCBs in the coating multiplied by the estimated weight of the coating divided by the weight of the waste stream, including substrate materials removed.

5.3.4 PCB Remediation Waste

PCB remediation waste results from ongoing management of historical releases of PCBs and cleanup of PCB contamination around PGDP. This waste is regulated for disposal based upon identified method of accomplishment (e.g., if the project is being done under self-implementing authority for high occupancy use, the regulatory limit for PCB concentration is 1 ppm; however, if the project is being completed under CERCLA where a risked based concentration has been developed and approved by the EPA, the regulatory limit is this risk-based concentration). PCB remediation waste is characterized based upon the highest concentration removed from the cleanup. Phased cleanup can be utilized to minimize the generation of regulated PCB remediation wastes. PCB remediation waste greater than 500 ppm with potential for liquid separation shall be sent for high temperature incineration. Nonliquid PCB remediation waste with a concentration of less than or equal to 49 ppm may be disposed of in the C-746-U Contained Landfill.

5.3.5 PCB Decontamination

Debris and equipment identified may be decontaminated in accordance with 40 *CFR* § 761.79. Upon completion of the decontamination process, the debris and equipment (such as equipment used for the excavation of a PCB remediation site or for troughing activities) are not regulated for reuse and/or disposal. The decontamination solutions/residues are regulated for disposal in the same manner as the source. No equipment, including containers, shall be reused until it has been decontaminated in accordance with 40 *CFR* § 761.79.

Aqueous wastes containing PCBs also may be treated in accordance with 40 *CFR* § 761.79. Upon completion of the treatment process the wastewaters that meet Kentucky's water quality criteria may be discharged to the Kentucky Pollutant Discharge Elimination System (KPDES)-permitted Outfall 001. The treatment filters/residues are regulated for disposal in the same manner as the source.

5.3.6 PCB Spill Cleanup Residues

Wastes, such as absorbents, PPE, cleaning solutions, etc., resulting from PCB decontamination activities are characterized and managed in accordance with 40 *CFR* Part 761, Subpart D, requirements. These wastes result from the cleanup of spills of oils and liquids from PCB articles with PCB concentrations of 50 ppm or greater.

5.4 RCRA WASTE

RCRA hazardous waste (RCRA characteristic waste and RCRA listed waste) is fully defined in 40 *CFR* Part 261, *Identification and Listing of Hazardous Wastes*, and 401 *KAR* Chapter 31, *Identification and Listing of Hazardous Wastes,* and also may meet the definition of mixed waste. RCRA hazardous waste also is subject to the LDRs in 40 *CFR* Part 268 and 401 *KAR* Chapter 37.

5.4.1 RCRA Characteristic Waste

Wastes that exhibit one of the characteristics below are regulated as RCRA characteristic waste (40 *CFR* Part 261, Subpart C) and are specified with a D code:

- Ignitable (e.g., flashpoint < 140°F, oxidizer, ignitable compressed gas)
- Corrosive (e.g., pH < 2 or > 12.5, corrodes steel at ¼ inch per year)
- Reactive (e.g., explosive, cyanides, sulfides)
- Toxic [e.g., fail toxicity characteristic leaching procedure for lead, cadmium, chromium, trichloroethene (TCE), benzene, etc.]

5.4.2 RCRA Listed Waste

Wastes that are identified on one of the lists below are regulated as RCRA listed waste (40 *CFR* Part 261, Subpart D):

- F-List: nonspecific sources (e.g., spent solvents, plating operations)
- K-List: specific sources (no known at the PGDP)
- P-List: acute hazardous chemicals (e.g., unused epinephrine vials)
- U-List: toxic chemicals (e.g., unused TCE)

5.4.2.1 Environmental media that may contain a RCRA listed waste

Environmental media (e.g., soil, sediments, groundwater, and surface water) will be characterized and subsequently managed in accordance with Appendix A, Protocol for Management of Remediation Wastes at PGDP. The health-based levels identified in Appendix A originally were approved by KDWM in the 2003 Agreed Order and by EPA in correspondence dated March 5, 2009.

5.4.2.2 Debris that may be contaminated with a RCRA listed waste

Debris means solid material exceeding a 60 mm particle size that is intended for disposal and that is a manufactured object; plant or animal matter; or natural geologic material. The following materials are not debris: any material for which a specific treatment standard is provided in 40 *CFR* Part 268, Subpart D, namely lead acid batteries, cadmium batteries, and radioactive lead solids; process residuals such as smelter slag and residues from the treatment of waste, wastewater, sludges, or air emission residues; and intact containers of hazardous waste that are not ruptured and that retain at least 75% of their original volume. A mixture of debris that has not been treated to the standards provided by 40 *CFR* § 268.45 and other material is subject to regulation as debris if the mixture is comprised primarily of debris, by volume, based on visual inspection. Debris will be characterized and subsequently managed in accordance with Appendix A. The health-based levels identified in Appendix A originally were approved by KDWM in the 2003 Agreed Order and by EPA in correspondence dated May 19, 2009.

5.4.2.3 Related waste that may contain or be contaminated with a RCRA listed waste

Waste generated as a result of handling/sampling/management of environmental media and/or debris (e.g., investigation derived waste and PPE) will be managed in accordance with Appendix A.

5.4.3 RCRA Mixture Rule

When a solid waste is mixed with a hazardous waste, the resultant mixture must be managed as a hazardous waste. If the hazardous waste was characteristic or listed solely because of ignitability, corrosivity or reactivity, then the resultant mixture is hazardous only if it continues to exhibit the

characteristic of the hazardous waste. The mixture rule, including exemptions or exceptions to the rule, is addressed in 401 *KAR* 31:010 § 3 and 40 *CFR* § 261.3.

5.4.4 RCRA Derived-from Rule

When a solid waste is derived from RCRA hazardous waste (e.g., treatment residues or residues remaining in tanks or containers), the resultant waste is a hazardous waste. Similar to the mixture rule, if the hazardous waste was characteristic or listed solely because of ignitability, corrosivity, or reactivity, then the derived-from waste is hazardous only if it continues to exhibit the characteristic of the hazardous waste. The derived-from rule, including exemptions or exceptions to the rule, is addressed in 401 *KAR* 31:010 § 3 and 40 *CFR* § 261.3.

A key exception to the derived-from rule is the concept of "exempt in, exempt out." That is, if a waste is exempt from hazardous waste management standards, such as groundwater that no longer contains TCE listed waste, residues generated from its treatment, storage, or disposal also are exempt from regulation [58 *FR* 15286, March 22, 1993]. This concept is the basis for characterizing the media and debris-related waste streams discussed in Section 5.4.2 and further specified in Appendix A.

5.4.5 Treated Hazardous Waste

In some cases, wastes that were hazardous when first generated, but have been treated to eliminate the characteristic or have been deemed no longer to contain a hazardous waste, remain subject to the RCRA LDRs (see Appendix A; 401 *KAR* 37:040 § 10; and 40 *CFR* § 268.49).

5.4.6 Key RCRA Exemptions

- Universal wastes (i.e., batteries, light bulbs, thermostats, and pesticides) that have been authorized for free release can be sent for recycling. If sent for recycling, they are exempted from hazardous waste regulations provided they are marked as "Universal Waste" and sent for recycling within one year of accumulation.

- Used oil is any oil refined from crude oil or any synthetic oil that has been used and because of such use is contaminated by physical or chemical impurities. This includes lubricants, coolants, emulsions, etc. It does not include oil-based products used as solvents refined from crude oil or manufactured from synthetic materials. If recycled pursuant to 40 *CFR* Part 279, *Standards for the Management of Used Oil*, used oil is exempted from hazardous waste management requirements; however, it must meet DOE O 458.1 if it originates from within the Controlled Area RCRA wastewaters generally are treated on-site under the RCRA Wastewater Treatment Unit (WWTU) exemption provided they meet the WAC of the on-site treatment facility. The WWTU exemption is discussed further in Section 8 of this WMP.

- Area of Contamination (AOC) Policy. In what typically is referred to as the AOC policy, EPA interprets RCRA to allow certain discrete areas of generally dispersed contamination to be considered RCRA units (usually landfills). Because an AOC is equated to a RCRA land-based unit, consolidation and *in situ* treatment of hazardous waste within the AOC do not create a new point of hazardous waste generation for purposes of RCRA. This interpretation allows wastes to be consolidated or treated *in situ* within an AOC without triggering LDRs or minimum technology requirements. Treatment standards for *in situ* treatment or consolidation are established in the record of decision for each AOC. The AOC interpretation may be applied to any hazardous remediation waste (including non-media wastes) that is in or on the land. Note that the AOC policy only covers consolidation and

other *in situ* waste management techniques carried out within an AOC. The use of the AOC concept requires approval from KDWM, and for CERCLA projects, EPA as well.

5.5 ACM

ACM is defined in this plan (see definitions). The removal of asbestos is regulated under 40 *CFR* Part 61, *National Emissions Standards for Hazardous Air Pollutants*, Subpart M.

6. WASTE CHARACTERIZATION

Waste characterization activities at PGDP shall incorporate and follow the requirements of DOE O 435.1, Chg. 1, state and federal regulations and guidance, D&R contractor requirements, and the respective WAC for receiving facilities. Wastes generated will be characterized to determine proper storage requirements, to establish disposal path, to demonstrate that the waste meets the above stated requirements, and also to follow the protocol established in Appendix A.

6.1 PROCESS KNOWLEDGE-BASED DETERMINATIONS

Historical data exist that include information regarding physical form of material, construction of material, the nature of radioactivity present and/or details of the process(es). Historical data can be found about uranium materials, chemical trapping materials, ACM, PCBs, and other chemical hazards such as Freon, hydrocarbons, strong oxidizing agents, and arsenic. Estimates of waste can be calculated using building drawings, engineering designs or other documents that contain dimensions and specifications. Additional data can include radiological surveys, past intrusive sample data, technical basis documents, and/or performance data. All of this information can be considered Process Knowledge (PK). This information shall be traceable and documented.

PK-based determinations will be utilized for many waste streams and waste forms at the site. Throughout the waste characterization process, the D&R contractor will employ subject matter experts for technical support in areas such as waste characterization, packing, form completion, and shipping. PK-based determination includes the following:

- Generator knowledge of waste streams and materials,
- Waste analysis data obtained from previous projects at PGDP or from other facilities, and
- Knowledge of the waste matrix.

6.1.1 Generator Process Knowledge of Waste Streams and Materials

PK may be used to demonstrate that the generating process was well documented and controlled and did not involve the use or generation of any materials that could result in the waste being regulated. Conversely, PK may provide the necessary information to properly identify wastes as RCRA hazardous, MLLW, PCB, ACM, or combinations thereof. When PK is not sufficient to identify RCRA waste codes and or the regulatory status with regard to TSCA or ACM, sampling and analyses will be employed. Past processes will be evaluated by collecting the following information: the raw materials used in the process, the chemistry and physics of the process, and the product and/or wastes produced during the process. Personnel who were involved during past or ongoing operations will be sought to provide the knowledge base. Historical documents such as process drawings and operating logs will be obtained to supplement PK.

In some cases, PK is most appropriate. DOE and EPA have issued guidance (*Waste Analysis at Facilities that Generate, Store, Treat, and Dispose of Hazardous Wastes*, Office of Solid Waste and Emergency Response 9938.4-03) that discusses the appropriate application of PK for the characterization of mixed waste. The guidance states that PK is most appropriate for waste characterization when one or more of the following conditions exist.

1. Collection of representative samples from a waste stream is difficult due to its physical nature. This applies to solid matrices such as metals, glass, or wood materials.

2. Waste collection and analysis of material would result in an unacceptable risk of radiation exposure. DOE and Nuclear Regulatory Commission policy requires that exposure to hazardous material must be maintained as low as reasonably achievable (ALARA) (the use of ALARA means to optimize the activity, not that the exposure has to be zero).

3. Waste is heterogeneous in composition to the extent that collecting a representative sample is difficult.

6.1.2 Waste Analysis Data Obtained from Previous Projects

For waste streams and materials inherently similar by nature, the D&R contractor may rely on previous analytical data to make waste determinations.

6.1.3 Knowledge of the Waste Matrix

The physical characteristics of the waste matrix may preclude the waste from exhibiting certain properties. For example, by definition, a nonliquid waste matrix is not capable of exhibiting the RCRA characteristic of corrosivity. Similarly, bulk structural steel with virtually no absorptive capacity will not fail RCRA toxicity characteristic testing (provided no surface coatings have been applied). For coated materials, knowledge of the composition of the coating may be sufficient to make a waste determination.

6.2 FIELD SCREENING

As discussed further below, field screening must be conducted for compliance with health and safety procedures. These field screenings, along with any supplemental screenings, may be used to provide additional support for knowledge-based determinations. Field screenings often may be suitable to demonstrate a material is regulated (i.e., LLW, MLLW, RCRA, and TSCA). Field screenings also may be suitable to demonstrate a material is not regulated provided the detection limits are below regulatory levels of concern. Field screening must have sufficient quality to ensure data meets data quality objectives (DQOs).

6.2.1 Field Screening for Radioactive Materials

Radiological Control (RADCON) conducts radiological screening by emission type and physical condition. In general, RADCON determines fixed, loose, and total contamination levels for either alpha or beta/gamma radiation. Waste Disposition uses radiation surveys generated by RADCON to characterize surface contaminated objects (SCO) for conformance to DOE O 458.1 Admin. Chg. 3, DOE O 435.1, Chg. 1, C-746-U Contained Landfill ALs for waste disposal, and to the U.S. Department of Transportation (DOT) limits for SCO-I and SCO-II wastes and for contamination control.

6.2.2 Field Screening for Volatile Chemicals

Industrial hygiene conducts field screening of materials and containers to determine compliance with occupational exposure regulations. Typical equipment includes total vapor meters (photoionization detectors) and detector tubes. Waste Disposition may use this information to determine the presence or absence of specific contaminants based on the detection capabilities of the devices.

6.2.3 Field Screening for PCBs

Waste Management conducts field screening of PCBs in oils. Waste Management uses EPA's Method 9079 to screen for the presence of PCBs. If the screening kit indicates the possible presence of PCBs, samples are collected to quantify the concentration.

6.2.4 Field Screening for Lead

Waste Management uses lead test kits as a qualitative indicator of the presence and the relative abundance of lead on pieces of debris. Lead solids are declared RCRA hazardous for waste code D008. Debris with lead solder is characterized based on the amount of solder relative to the total mass of the piece of debris.

6.2.5 Field Screening for pH

Waste Management conducts field screenings of liquids for pH using pH test strips or pH meters. If pH is close to the regulatory action levels of RCRA, the liquid is sampled and tested for pH at a DOE-audited laboratory.

6.3 SAMPLING AND ANALYSIS

The sampling and analysis process is designed to generate objective data of known quality to support decision-making regarding the regulatory status and management requirements for waste and materials. The DQO process is utilized to establish the quality and quantity of data required to satisfy decision-making needs. CP3-ES-5003, *Quality Assured Data*, establishes that all data released for decision making and/or external use have received adequate quality assurance reviews. CP2-QA-1000 ensures that QA requirements are implemented on a consistent and appropriate basis throughout data gathering activities.

Project-specific sampling and analysis plans (SAPs) will provide the direction for specific sampling activities. SAPs reference standard operating procedures to implement specific sampling requirements and are written generically to cover sampling activities that follow the same protocol during each sampling event.

6.3.1 Sampling Protocol

The plan for sample collection must be responsive to both regulatory and scientific objectives. Determinations of whether a waste material should be categorized as a RCRA/TSCA waste shall be based on the specifications defined in SW-846, *Test Methods for Evaluating Solid Waste Physical/Chemical Methods*, Chapter Nine, latest revision.

The waste characterization process relies upon collecting samples that exhibit on average, the properties of a whole population. Sampling accuracy is dependent upon collecting unbiased samples from a population. Three forms of random sampling will be utilized for waste determinations: (1) simple random sampling, (2) stratified random sampling, and (3) systematic random sampling.

On occasion, with approval from the Waste Management manager or designee, judgmental sampling (i.e., biased sampling) can be used for waste determinations if supplemented by PK and/or if the sample(s) taken for waste determinations are based on screening data/information (surveys/staining) that indicates the area sampled has a high probability of conservatively addressing contaminants of concern. To characterize waste populations, this method shall be scrutinized because of the following:

- Potential for having higher life-cycle costs from sampling through disposition if the sample result causes waste to have a different characterization and disposition pathway than unbiased sampling,

- Can cause false high loading of contaminants being tracked in landfill(s), and

- Can cause discrepancies in material accountability (particularly with large waste streams).

6.3.2 Statistical Evaluation of Sampling Data

Statistical inference may be used to support waste characterization decision making. RCRA regulations and guidance generally require that waste generators determine with statistical confidence of 90% (one-sided) or greater to determine if specified parameters of concern for a given population exceed a regulatory threshold (e.g., toxicity characteristic determinations).

Some regulatory programs do not specify required confidence levels for demonstrating compliance with respect to a numerical threshold (e.g., TSCA regulations). When statistics are used to support waste characterization decisions, regardless of regulatory drivers or lack thereof, guidance found in CP3-WM-0437, *Waste Characterization and Profiling,* shall be used. This guidance includes evaluation of sample distributions (e.g., normal, lognormal, etc.), treatment of nondetect values for RCRA/TSCA determinations, how to report radiological data and associated error, treatment of duplicate analysis, and how to form a 90% confidence limit.

6.3.3 DQO Process

The DQO process addresses data quality indicators to support the generation of data of known quality. The process will be elaborated on within project-specific SAPs and QA plans.

6.3.4 Data Validation

Analytical data will be validated per DQO requirements and reviewed for compliance against disposal facility WAC. Once the data have been validated, summary statistics will be developed to support decision-making. For decisions that require comparison with a regulatory threshold, a 90% confidence limit will be applied. Based on this evaluation the waste will be assigned specific handling, packaging, treatment, and disposal procedures.

6.4 NONDESTRUCTIVE ASSAY

Where applicable, the D&R contractor shall use a multi-detector nondestructive assay (NDA) system to obtain the radiological characterization for waste streams. Each waste stream shall be evaluated to determine if NDA can be utilized effectively for waste characterization to meet the requirements of CP2-WM-0011; CP3-WM-3025, *Preparation and Processing of Paducah Landfill Packages*; and/or off-site TSDF WAC. NDA measurement data may be used if it originates from a DOE-Approved Quality System for Nondestructive Assay Program or it is historical NDA measurement data that was collected under a DOE Consolidated Audit Program-audited NDA Program and proper verification of data usability, via visual examination and/or physical weight comparisons with like components, has taken place.

6.5 PROFILE DEVELOPMENT

The D&R contractor shall develop broad profiles for sitewide application to the greatest extent practical. These profiles will be based on waste generation and physical, chemical, and radiological characteristics. Each project will develop container specific waste identifications for each waste stream that will be reviewed, approved, and verified into these broad profiles. Narrow, waste-stream-specific profiles shall be developed on a case-by-case basis for waste that is generated by a single project or cannot easily fit into a broad profile.

6.6 WASTE PACKAGE CERTIFICATION

The D&R contractor shall certify waste as meeting waste acceptance requirements at the applicable receiving facility prior to being transferred to the receiving facility. This certification shall be performed in accordance with CP3-QA-2501, *Waste Certification*, for NNSS waste and/or CP3-WM-3028, *Off-site Shipping*, for other TSDFs.

6.7 WASTE CHARACTERIZATION PROCESS

The waste characterization process establishes requirements for the physical, chemical, and radiological characterization of all wastes produced. This process is provided in CP3-WM-0437.

6.8 NNSS COMPLIANCE PLAN

The *Fluor Federal Services, Inc. Paducah Deactivation Project Nevada National Security Site Waste Acceptance Criteria Implementation Crosswalk (NIC*) *for the Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* CP2-QA-2500, demonstrates that programmatic compliance with specified requirements (key elements of the NNSS WAC) has been evaluated. The NIC is a tool to help generators evaluate their program documents for compliance with the NNSS WAC. Implementation of the D&R contractor's QA Program and applicable procedures, processes, or methods referenced in the NIC ensures compliance with NNSS WAC requirements. The WCO reviews and submits the NIC to Contractor Organization Radioactive Waste Acceptance Program Manager annually to ensure referenced data are current.

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7. WASTE STAGING AND STORAGE

The D&R contractor will utilize IWTS for cradle-to-grave tracking of wastes and recyclables. Each item or container in the database is identified by a unique tracking number and its on-site storage location; upon off-site shipment, the final destination and shipment details are included in the database. The information maintained is part of the RCRA Operating Record.

7.1 WASTE PACKAGING

Waste generation triggers requirements for the development and approval of work instructions for waste packaging. The waste packaging work instructions shall reference waste packaging procedures, which include the following:

- Roles and responsibilities;
- Container selection, inspection, and preparation, including use of absorbents;
- Waste preparation, including removal of prohibited items, sorting, and segregating;
- Waste packaging, container closure, security, and storage (application of intrusion indicating devises/tamper indicating devices);
- Consolidating waste containers to the extent practicable to minimize the number of shipments;
- Ensuring container types are appropriate for the physical properties of the wastes (e.g., bulk containers for bulk wastes, liquid rated containers for liquid wastes, vented containers for potentially flammable wastes);
- Ensuring container types are compatible with the chemical properties of the waste (e.g., corrosives, reactives, etc., may require liners);
- Ensuring that incompatible wastes are not placed in the same container;
- Ensuring that containers holding hazardous waste that is incompatible with wastes or materials stored nearby is separated from the other materials or protected from them by means of a dike, berm, wall, or other device;
- Ensuring container types are appropriate for the radiological properties of the wastes (e.g., IP-1, IP-2, Type A requirements); and
- Ensuring security requirements are satisfied.

The container management group purchases and leases DOT shipping containers based on the requirements and needs of the generator. The QA organization is responsible for the receipt inspection of new DOT containers in accordance with CP3-QA-2500, *Procurement, Inspection and Management of Items Critical for Paducah Off-Site Waste Shipments*.

The QA organization is responsible for the receipt inspection of the first time use of reusable DOT containers and Waste Management is responsible for pre-service inspection for subsequent reuse of these

containers in accordance with CP3-WM-2500. Receipt inspection is the process of verifying that the containers meet the manufacturer's design specifications. QA also maintains the list of approved vendors and verifies that the vendor's quality program meets DOT requirements.

7.2 CONTAINER MANAGEMENT AND TRACKING

The D&R contractor shall develop and implement a centralized container management function. All containers will be procured by container management per generator request, approved container specification and from the most cost effective container manufacturers.

Container contents are recorded at the point of generation and the status and location of the container is tracked through on-site movement, storage, on-site treatment or disposal, or off-site shipment.

A unique waste container identification number (WID) is assigned to each waste container used at the Paducah Site by the D&R contractor. As the status and/or location of waste containers change, updates to the container tracking must be made accordingly. Once filled, additional information must be tracked using the Waste Item Container Log, including the following:

- Date packaged;
- Waste type (LLW, MLLW, TSCA LLW, RCRA, TSCA, etc.);
- Waste weight, gross weight;
- Waste codes (as applicable by PK or analytical data);
- Waste description (including physical form);
- Waste location; and
- Radionuclides (as applicable by PK or analytical data).

Shipment information shall be tracked, including shipment number, date, and destination. The D&R contractor uses one site database for container tracking. In all cases, container-tracking information shall be maintained in IWTS. Projects may utilize temporary staging areas (i.e., 90-day areas, satellite accumulation areas, etc.) to temporarily stage waste. It is the projects responsibility to track waste accordingly and perform the necessary inspections and maintain the waste compliantly—see Staging and Accumulation Areas of this WMP.

7.3 CONTAINER MARKING, LABELING, AND POSTING

Containerized waste will be marked and labeled indicating the type of waste (e.g., hazardous waste, PCB, radioactive) in accordance with CP2-WM-0011, *Waste Acceptance Criteria for the Treatment, Storage, and Disposal Facilities at the Paducah U.S. Department of Energy Site*, and CP3-WM-3015, *Waste Packaging*.

7.4 STAGING AND ACCUMULATION AREAS

Waste accumulation and storage is performed in accordance with CP3-WM-1037, *Generation and Temporary Storage of Waste Materials.*

7.4.1 Satellite Accumulation Areas

Projects/generators may accumulate up to 55-gal of hazardous waste or mixed waste (or 1 quart of acutely hazardous waste) at or near the point of generation. Once this limit has been reached or the generation of this waste is complete, the container(s) either shall be transferred to a 90-day storage area, to an on-site TSDF or, in some cases, directly to an off-site TSDF. A waste representative(s) shall work with each project/generator in the establishment and management of satellite accumulation areas.

7.4.2 Generator Staging Areas

Projects/generators may accumulate nonhazardous waste or radiological waste to stage for shipment. A waste representative(s) shall work with each project/generator in the establishment and management of generator staging areas (GSAs). The staging time frames shall not exceed the requirements set for in DOE M 435.1 and documented safety analysis (DSA).

7.4.3 90-Day Accumulation Areas

Projects/generators may accumulate an unlimited quantity of hazardous waste in a storage area or containment building for up to 90 days. During this time period, final characterization of the waste shall be performed for the waste to be either transferred to an on-site TSDF or directly to an off-site TSDF. A waste representative(s) shall work with each project/generator in the establishment and management of 90-day storage areas and ensure waste is transferred from the areas within the allowed accumulation time.

7.4.4 30-Day Temporary TSCA Storage Areas

Projects/generators may accumulate PCB solid waste in a staging area for up to 30 days. On or before the expiration of the time period, the waste either must be transferred to an on-site TSDF or directly to an off-site TSDF. A waste representative(s) shall work with each project/generator in the establishment and management of 30-day temporary areas for PCB waste and ensure waste is transferred from the areas within the allowed storage time.

7.4.5 Universal Waste Storage

As a small quantity universal waste generator/handler, the D&R contractor, may accumulate universal waste for no longer than one year from the date the universal waste is generated or received from another handler. A waste representative(s) shall work with each project/generator in the establishment and management of universal waste storage areas and ensure universal waste is transferred from the areas within the allowed accumulation time.

7.4.6 CERCLA Storage

Section 121(e)(1) of CERCLA exempts on-site CERCLA actions from obtaining permits for management of waste. CERCLA still requires management of these wastes in accordance with the substantive requirements of ARARs. The CERCLA decision documents will identify ARARs that must be attained for each response action conducted under the FFA. In addition, to provide regulatory flexibility for cleanup actions, EPA has developed the following policies and rulemakings:

- Management within the AOC, as discussed further in Section 5.4.5; and

- Establishment of staging piles and temporary units for remediation waste; any utilization of staging piles or temporary units will be addressed on a project-specific basis.

7.4.7 Temporary Units

CERCLA hazardous waste may be stored in "temporary units" in tanks or containers, if they are described in a work plan. A temporary unit must be located within the contiguous property under the control of the owner/operator where the wastes to be managed in the temporary unit originated. For temporary units, the EPA Regional Administrator may replace the design, operating, or closure standard applicable to these units with alternative requirements that protect human health and the environment.

7.4.8 Staging Piles

CERCLA hazardous waste and/or PCB waste may be stored in a "staging pile," if waste is solid, nonflowing remediation waste (as defined in 40 *CFR* § 260.10). A staging pile must be located within the contiguous property under the control of the owner/operator where the wastes to be managed in the staging pile originated. The staging pile must facilitate a reliable, effective, and protective remedy. The staging pile must be designed so as to prevent or minimize releases of hazardous wastes and hazardous constituents into the environment, and minimize or adequately control cross-media transfer, as necessary to protect human health and the environment (for example, through the use of liners, covers, run-off/run-on controls, as appropriate). The staging pile must not operate for more than two years for hazardous waste; however, the regional administrator can authorize a 180-day extension. PCB remediation wastes may not be stored longer than 180 days.

7.4.9 Inspections of Staging and Accumulation Areas

Inspections of temporary storage locations shall be conducted in accordance with CP3-WM-1037, *Generation and Temporary Storage of Waste Materials*. These inspections include checking postings, labels, container integrity, and general housekeeping. Each project is responsible for assignment of inspectors for these areas.

7.5 INVENTORY CONTROL FOR WASTES

Inventory controls for specific permanent waste management facilities (as defined by the nuclear safety basis document) must be implemented in accordance with CP2-WM-0006, *Facility Safety Basis Inventory Control Plan for Paducah Waste Storage Facilities*. Other facility-specific inventory controls may apply to facilities not addressed in CP2-WM-0006. These other inventory controls shall be equivalent and implemented by the facility manager.

The IWTS database has the capability to track waste and associated characterization information, and it also has the capability to perform safety basis calculation and track nuclear and chemical inventory per building to ensure assigned thresholds are not exceeded. Use of the safety basis inventory control aspects of IWTS shall include appropriate validation against existing programs/systems currently used for inventory control. The IWTS shall be approved by the nuclear safety program manager prior to use for this function.

7.5.1 Inventory Control for Wastes Destined for Off-Site Disposition

The Waste Management group assigns a unique inventory number to containers prior to waste packaging. This inventory number is unique to the waste packaged in the container and allows reuse of shipping containers. For waste disposed of off-site, Waste Management tracks the inventory from packaging to transport to the off-site facility and the transportation group tracks the waste through treatment and

disposal and maintains required records associated with waste packages until the project is complete. Waste containers shipped to off-site disposal sites shall be tracked using the IWTS database.

For shipments with enriched material (greater than or equal to 0.7121 wt% U-235) with greater than 0.5 g total uranium or depleted material (less than 0.7121 wt% U-235) with greater than 500 g total uranium, a tally out form is provided in accordance with CP3-SS-3001, *Nuclear Materials Handling.*

7.5.2 Inventory Control for Wastes Destined for the C-746-U Contained Landfill

Waste destined for disposal at the C-746-U Contained Landfill is controlled in accordance with CP3-WM-3025, *Preparation and Processing of Paducah Landfill Packages*. Per this procedure, the Facility Manager is responsible to sign off on each landfill package prior to its acceptance for disposal. Inventory numbers are assigned based on the request for disposal number. Waste containers shipped to the C-746-U Landfill shall be tracked using the IWTS database.

7.6 STORAGE FACILITIES

Waste Management storage facilities are used to not only store waste containers but are also used to sort, segregate, survey, and repackage waste. Shipments directly from GSA (milk runs) shall be used to optimize waste shipments to off-site TSDFs only as necessary. If necessary, this shall be performed in accordance with the approved WAC and the HWFP. Routine inspections of waste storage areas/facilities are performed in accordance with CP3-WM-0023, *Inspection of DOE Waste Storage Facilities and Tanks*, and the HWFP, as applicable.

The HWFP and WAC (CP2-WM-0011) specify the waste streams and treatment methods acceptable (see Section 8 of this Plan), respectively, at the hazardous waste facilities. The primary waste storage facilities at the PGDP include the following:

- C-733—This permitted facility is used to store LLW, mixed waste, PCB waste, and hazardous waste. This facility is the only facility authorized to store ignitable hazardous waste with a flash point less than 100°F.

- C-746-H3—This facility is used to temporarily stage LLW, recycleable scrap metal, PCB waste, solid waste capable of meeting the Agreed Order for disposal at the C-746-U Contained Landfill. This facility is used to facilitate sorting and segregation activities.

- C-746-Q—This permitted facility is used to store LLW, TRU waste, greater than Class C waste, classified waste, mixed waste, PCB waste, hazardous waste and fissile material. Waste in this facility may be treated with absorbents to remove free liquids, repackaged (including sorting/consolidating to facilitate shipment), overpacked, or analyzed using NDA. This facility is also permitted for treatment, sampling, and repackaging of certain PGDP RCRA waste.

- C-746-Q1—This is not a permitted facility. This facility is used to store empty containers. It can be used to store nonhazardous fissile material or LLW.

- C-752-A—This permitted facility is used to store LLW, mixed waste, PCB waste, waste water and hazardous waste. Hazardous waste treatment, sampling, and repacking occur at this facility. The facility also serves as the pollution prevention waste minimization consolidation center. This facility may store ignitable waste with a flash point greater than 100°F. Waste water treatment activities also occur in this facility.

- C-753-A—This facility is used to store LLW and PCB waste. Spare equipment and storage of empty containers also occur in this facility.

- C-757—This facility is used to temporarily store LLW, mixed waste, and hazardous waste. This facility houses a RCRA 90-day accumulation area. This facility is used to facilitate sorting, sampling, and segregation activities.

- C-754—This facility is used to store LLW temporarily. This facility is used to facilitate sorting, segregation, and packaging activities.

- C-335 NCS Area—This area is used to store fissile and potential fissile waste material awaiting further characterization.

- C-301—This facility can be utilized to stage material for processing (primarily size-reduction) prior to off-site shipment.

8. TREATMENT

Wastewaters generated at the PGDP (e.g., landfill leachate, well development/purge waters, run-on surface waters, and decontamination solutions) generally are treated at on-site facilities permitted under the Clean Water Act (CWA), specifically the KPDES permit (No. KY0004049 and/or No. KY0102083).

In most cases, the D&R contractor will elect to manage wastewaters that carry a hazardous waste listing or hazardous characteristic in an on-site KPDES permitted unit that qualifies for the Wastewater Treatment Unit (WWTU) exemption [see 401 *KAR* 34:010 and 40 *CFR* § 264.1(g)(6)]. Following are the key qualifications for the WWTU exemption:

- Aqueous solutions must be wastewater, generally assumed to be wastes that "are substantially water with contaminants amounting to a few percent at most."
- Unit must be subject to the CWA (i.e., KPDES permitting program).
- Unit must meet the definition of a "wastewater treatment unit," as defined in 40 *CFR* § 260.10 (i.e., meets the definition of tank or tank system in 40 *CFR* § 260.10).

EPA has not promulgated a definition of wastewater, but has addressed this issue under guidance.

These wastewaters are required to be discharged at an authorized KPDES outfall flume, whereupon the hazardous waste listings and LDR treatment standards are RCRA-exempt as a point-source discharge [401 *KAR* 31:010 § 4(1)(b) and 40 *CFR* § 261.4(a)(2)]. Direct discharges or point-source discharges are from sources such as pipes and sewers. Section 502 of the CWA defines a "point source" as any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, or discrete fissure. The term "discharge" when used without qualification includes a discharge of a pollutant and a discharge of pollutants.

Wastewaters derived from environmental media (e.g., groundwater) that have been deemed to no longer contain a listed hazardous waste (see Appendix A, Protocol for Management of Remediation Wastes at the PGDP) may be eligible for management in impoundments permitted under the KPDES program provided the wastewater LDRs are met. Any such wastewaters that have been declared to no longer contain a listed waste, but still exceed the wastewater LDR of 0.054 mg/L TCE or 1,1,1-trichloroethane (TCA), cannot be managed in a surface impoundment and, consequently, are required to be managed in containers for off-site disposal or a WWTU (i.e., a tank or tank system).

Environmental media-related waste streams that have been deemed neither to be derived from nor mixed with a listed hazardous waste may be managed in impoundments permitted under the KPDES, because neither a hazardous listing nor an LDR has attached to the waste stream, provided they do not exhibit a characteristic.

Other nonhazardous wastewaters (e.g., run-on, decant, decontamination solutions) may be discharged directly to KPDES-permitted Outfall 001, if water quality criteria are met. If the water quality criteria are not met, these wastewaters may be treated on-site to meet KPDES-permit limits prior to discharge.

Non-wastewaters and other wastes generated at the Paducah Site and legacy wastes may require treatment to meet RCRA LDR treatment standards and/or disposal facility requirements, eliminate a hazardous characteristic, or to comply with DOT regulations for transportation of specific materials.

RCRA treatment authorized under the Paducah Site hazardous waste permit includes neutralization, oxidation, reduction, precipitation, and stabilization in containers. Waste requiring RCRA treatment not covered by the existing hazardous waste permit may require off-site treatment unless the permit is modified or such treatment is authorized by a CERCLA decision document.

The decision to treat waste on-site versus shipping to an off-site commercial or DOE facility must be evaluated based on several factors, including these:

- Can the waste be handled and managed on-site in a safe and compliant manner under existing permits and facilities?

- Does the option of treating waste on-site represent a cost savings over off-site treatment?

- Does the schedule required to treat the waste on-site meet regulatory commitments (e.g., Federal Facility Compliance Agreements, DOE Orders)?

- For CERCLA projects, consideration of the nine criteria contained in 40 *CFR* § 300.430(e)(9)(iii) and the CERCLA off-site rule, as provided in 40 *CFR* § 300.440, also are required.

Wastes acceptable for neutralization, precipitation, oxidation, reduction, stabilization, or a combination thereof may be transferred to either the C-746-Q or the C-752-A facilities for treatment. Fluorescent bulbs and miscellaneous lamps may be treated at the C-746-Q facility or recycled through an off-site recycler for mercury reclamation. Decanting and absorption of free liquids may occur at any of the permitted storage facilities. Treatment by compaction (volume reduction), macroencapsulation, or combination thereof may occur only at C-746-Q, C-752-A, or C-733. Treatment at the hazardous waste storage/treatment facilities must be in accordance with applicable conditions and requirements of the HWFP. The HWFP and WAC CP2-WM-0011 specify the waste streams and treatment methods acceptable, respectively, at the hazardous waste facilities.

MLLW, for which on-site treatment is not a viable option, shall be packaged and shipped to the appropriate off-site TSDF for treatment and disposal. Use of a commercial TSDF [e.g., Energy*Solutions*, Perma-Fix, and Waste Control Specialists (WCS)] may be requested for waste streams meeting the exemption criteria in DOE O 435.1, Chg. 1. Hazardous waste that does not contain a radioactive component may be packaged and shipped to an appropriate commercial TSDF (e.g., Clean Harbors, Heritage Environmental, Onyx, WCS). Hazardous waste containing residual amounts of radioactive material that has an approved DOE AL may be treated and disposed of at a D&R contractor-approved nonradioactive licensed facility. ALs for lube oil and transformer oil have been approved by DOE for thermal destruction at Clean Harbors, Deer Park, Texas, and Veolia in Port Arthur, Texas. Waste management facilities are considered critical suppliers and must be approved by D&R contractor for waste acceptance.

Off-site treatment may occur at any of the designated off-site disposition facilities discussed in Section 9 of this WMP or at off-site treatment facilities such as the Perma-Fix Diversified Scientific Services, Inc. (DSSI) facility in Oak Ridge, Tennessee, or a DOE-approved Basic Order Agreement (BOA) waste contractor.

9. WASTE DISPOSITION

Integral to the completion of cleanup activities under the FFA is cost-effective disposition of CERCLA waste. The evaluation of the various treatment and disposal methods for CERCLA waste will be conducted as part of the engineering evaluation/cost analysis for non-time-critical removal actions and in the feasibility study for remedial actions using the nine criteria specified under 40 *CFR* § 300.430(e)(9)(iii). The selected disposition method will be documented in the corresponding CERCLA decision documents (i.e., record of decision, action memorandum). Off-site disposal of CERCLA waste will be conducted in accordance with EPA's off-site rule, as required by Section 121(d)(3) of CERCLA and 40 *CFR* § 300.440.

Each waste type has unique disposal or treatment requirements, which are dictated by state and federal regulations and TSDF WAC. Waste disposition characterizes each waste stream to determine the applicable pathway for treatment/disposal. Factors that influence the final waste disposition pathway include these:

- Safety
- Packaging options
- Transportation options
- TSDF compliance history
- TSDF permit and license status
- Overall value to the government
- Schedule

9.1 DISPOSITION OF WASTEWATERS

Wastewater is generated as a result of the following:

- Sump water collection. Sump water is collected from C-733 and various other locations around the site on occasion. C-404 (inactive landfill) leachate is handled through the wastewater program.

- Waste repackaging activities that generate decant water. Decant water is collected as a part of waste repackaging efforts in preparation for disposition. Free liquids are decanted from waste being repackaged for disposal in the C-746-U Contained Landfill or at off-site locations like Energy*Solutions* or NNSS.

- Wastewater storage tank cleanout water/rinseate. Rinseate collection accounts for a sizeable portion of the wastewater inventory. Because tanks are reused, they must be cleaned out between uses to prevent cross contamination.

- Individual on-site project generated wastewater. On-site projects [e.g., decontamination and decommissioning projects] may generate wastewater without establishing a treatment system at their location. This wastewater may be collected and treated as part of the waste operations/disposition scope. The project that generates this wastewater covers the cost of the on-site treatment and disposal. In some instances, projects may coordinate with waste disposition wastewater subject matter expert(s) and Regulatory Compliance to treat and dispose of wastewater from their locations.

Wastewater that is collected for treatment and disposal by waste management is transported to storage in C-733, C-753-A, C-752-C, and C-752-A (the only heated permitted facility) for storage prior to discharge.

All wastewater is sampled for discharge determination. If the wastewater does not meet KPDES limits, the wastewater may be treated on-site through a carbon filtration system designed to remove PCB contaminates and solids to meet discharge protocols. Other types of wastewater contamination include radionuclides, metals, oil, and grease. If radiological contamination is in the solids, the treatment unit may be able to treat the water below KPDES limits and thus may be discharged on-site without further treatment. In cases where the radiological contamination is elevated above release criteria, the radioactive metals may be precipitated and filtered to separate the metals from the water enabling the water to meet the discharge limits. This treatment must be verified by analysis and approval for discharge supplied by regulatory compliance personnel and the Environmental Radiological Protection Program (ERPP) Manager or designee.

Wastewaters containing radionuclides discharged to the environment will be characterized, consistent with the potential for on- and off-site impacts. An assessment of radiological consequences, as necessary to demonstrate compliance with the requirements of DOE O 458.1, shall be conducted.

Leachate from the C-746-U and C-746-S Landfills currently is treated at the C-746-U Leachate Treatment System for discharge through Outfall 020. In the event that the C-746-U Leachate Treatment System has insufficient capacity to manage this leachate, there are two alternatives for dealing with the excess leachate. The first alternative is treatment at the C-615 Wastewater Treatment Facility with discharge to KPDES-permitted Outfall 008. If the leachate does not meet the C-615 WAC or if the C-615 facility does not have sufficient capacity, the second alternative is for the leachate to be treated in the C-752-A carbon filtration system with discharge to KPDES-permitted Outfall 001.

Hazardous waste leachate from the closed C-404 Landfill shall be stored at C-752-A pending a decision on waste disposition. Options for disposition of C-404 leachate may include treatment in the C-752-A carbon filtration system and discharge to KPDES-permitted Outfall 001, which may or may not include a step for uranium precipitation depending on analytical results, or the leachate may shipped off-site to a permitted facility for treatment and disposal.

9.2 DISPOSITION OF SOLID WASTES

The C-746-U Landfill is the preferred disposition path for all waste meeting the WAC, CP2-WM-0011, for the facility. In addition, PGDP has an approved ALs process for the C-746-U Landfill for requesting disposal of soil and debris waste with residual radioactive contamination from construction, maintenance, environmental restoration, and decontamination and decommissioning activities.

9.3 DISPOSITION OF ASBESTOS WASTES

ACM waste meeting the WAC for the C-746-U Landfill may be disposed of via ALs or no-rad-added determination at the C-746-U Landfill. ACM that does not meet the WAC for disposal at the C-746-U Landfill shall be disposed of at an off-site TSDF.

9.4 DISPOSITION OF LOW LEVEL WASTE

In accordance with DOE O 435.1, Chg. 1, radioactive waste shall be treated, stored, and, in the case of low-level waste, disposed of at the site where the waste is generated, if practical; or at another DOE

facility. If DOE capabilities are not practical or cost-effective, exemptions may be approved to allow use of non-DOE facilities for the storage, treatment, or disposal of DOE radioactive waste. Such exemptions may be requested for waste streams meeting the exemption criteria in DOE O 435.1, Chg. 1.

Currently, Energy*Solutions* is used as the primary disposal option for bulk waste and low activity waste streams not meeting the C-746-U Landfill WAC. This strategy is consistent with the annual exemption to DOE O 435.1, Chg. 1, which cites the following factors in favoring commercial disposal at Energy*Solutions* over disposal at the NNSS landfill:

- The waste can be transported more cost effectively by rail than truck (NNSS does not have rail access).

- Certain waste streams meet the acceptance criteria at Energy*Solutions* and do not require repackaging that would be necessary to facilitate NNSS burial; this eliminates potential exposure to asbestos and radiation and represents a level of effort cost avoidance.

In addition, the D&R contractor has added WCS as a disposal option for bulk waste and low activity wastes streams not meeting the C-746-U Landfill WAC.

9.5 DISPOSITION OF HAZARDOUS WASTE AND MIXED WASTE

Hazardous and mixed waste must meet applicable LDR treatment standards prior to ultimate disposal. The available treatment options for hazardous and mixed waste are discussed in Section 8 of this WMP. The primary disposal options for treated waste are Energy*Solutions*, NNSS, and WCS. Hazardous waste that does not meet the definition of mixed waste or TRU waste may be dispositioned at a commercial TSDF (e.g., Clean Harbors, Heritage Environmental, and Onyx).

9.6 DISPOSITION OF PCB WASTES

The Perma-Fix DSSI Facility in Oak Ridge, Tennessee, currently accepts PCB/radioactive waste liquids for thermal treatment.

For nonradioactive liquid PCB waste, commercial treatment at a TSCA-approved incinerator is the preferred option.

PCB remediation waste (see definition) generally is acceptable for burial at Energy*Solutions* in Clive, Utah, and WCS in Andrews, Texas.

PCB bulk product waste (see definition) is acceptable for land disposal at a TSCA-approved landfill, an approved solid waste landfill outside the Commonwealth of Kentucky, or the C-746-U Contained Landfill in accordance with site procedures and KDWM guidance outlined in correspondence dated August 11, 2008.

Solid waste that does not exceed 49 ppm PCBs or otherwise meet the definition of PCB contaminated waste (see definition) may be disposed of in the C-746-U Contained Landfill if it complies with all other requirements in CP2-WM-0011.

9.7 DISPOSITION OF TRU WASTE

Any future mixed TRU waste generated at PGDP will be managed in accordance with the STP and/or existing protocols for contact-handled TRU waste destined for the Waste Isolation Pilot Plant.

9.8 DISPOSITION AT NNSS

Where feasible and cost-effective, LLW and qualified mixed wastes will be disposed of at NNSS. Disposal at facilities other than NNSS are authorized by the DOE Portsmouth/Paducah Project Office (PPPO) Manager per an exemption under DOE O 435.1, Chg. 1. NNSS shall be used for classified and higher activity waste streams (greater than Class C as defined by the Nuclear Regulatory Commission under Title 10 of the *CFR*).

The D&R contractor shall maintain a certified NNSS program for PGDP. The WCO, with oversight from PPPO, shall serve as the single point of contact with NNSS and will be responsible for NNSS compliance through involvement in all activities pertaining to waste management for waste streams packaged and shipped to NNSS. These activities will involve the following:

- Waste Certification Program,
- Work package reviews and field activity oversight,
- Profile reviews,
- Shipping paperwork reviews,
- Data transfers of NNSS disposal documentation,
- Coordination with NNSS personnel to facilitate audits and surveillances, and
- Compliance with the NNSS WAC (DOE/NV-325, *Nevada National Security Site Waste Acceptance Criteria*).

10. TRANSPORTATION

On-site and off-site transportation of waste shall be coordinated through the D&R contractor transportation team. The core of the transportation program consists of two program plans: CP2-WM-0661, *Transportation Safety Document for On-Site Transport within the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*; and CP2-WM-0025, *Fluor Federal Services, Inc., Transportation Security Plan for the Transport of Hazardous Materials in Commerce*. The transportation program description is presented in these transportation program plans (primarily CP2-WM-0661) as well as individual plans for specific subject areas (special projects are created as needed). CP2-WM-0661 serves as a stand-alone safety basis document governing on-site transfers of hazardous materials and meets the requirements of DOE O 460.1C. CP2-WM-0025 provides security aspects to meet the requirements specified in 49 *CFR* Part 172, Subpart I.

The D&R contractor waste transportation program consists of four primary implementing procedures. Off-site transportations using highway and rail shall be performed in accordance with CP3-WM-3028, *Off-Site Shipping*. The movement of waste containers and support equipment shall be performed with CP3-WM-0019, *On-Site Transfer and Movement of Waste Containers and Other Support Equipment*. Use of commercial motor vehicles, both on-site and off-site, shall be performed in accordance with CP3-WM-3030, *Commercial Motor Vehicle Operations*. Additionally, all rail activities conducted by the D&R contractor shall be performed in accordance with CP3-WM-0618, *Paducah Railcar Operations*.

Only designated and trained shippers shall be authorized to complete shipping papers (e.g., uniform LLW manifests, uniform hazardous waste manifests, bills of lading) and review waste shipments for compliance with 49 *CFR* Part 172. Waste shipping personnel shall be trained in accordance with 49 *CFR* Part 172, Subpart H, and the D&R contractor Training Program.

Waste designated for off-site disposition will be transported by one of four modes:

1) Over the road trucking,
2) Rail,
3) A combination of truck and rail, or
4) Air.

Decisions regarding the selection of transportation modes will involve the location, respective WACs and logistics of prospective receiving facilities, technical requirements for material handling, and overall cost comparisons.

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11. PROBLEM IDENTIFICATION AND CORRECTIVE ACTIONS

11.1 ISSUES TRACKING AND CORRECTIVE ACTIONS

As a mechanism to ensure continuous improvement in waste management and support waste reduction programs, the D&R contractor shall implement a program to track issues, corrective actions, and lessons learned, including past packaging and transportation successes and problems throughout the site and with other DOE contractors. Issues and corrective actions shall be tracked in accordance with CP3-QA-3001, *Issues Management*. As applicable, nonconforming items and services are tracked according to CP3-QA-2005, *Nonconformance Control.* Lessons learned shall be tracked according to CP3-QA-3002, *Operating Experience/Lessons Learned,* in the lessons learned database. Each project shall be responsible for developing lessons learned as applicable. These lessons shall be utilized in work planning and shall be provided to the DOE field office in accordance with DOE O 460.1C.

Incidents or conditions related to waste management activities that meet the criteria of an occurrence as defined in CP3-QA-3005, *Occurrence Reporting,* shall be reported and documented in the Occurrence Reporting Processing System database.

11.2 STOP WORK AUTHORITY

The D&R contractor shall implement Integrated Safety Management System (ISMS) for waste management facilities, operation, and activities, including plans/procedures that will ensure waste is managed so that the following objectives are accomplished:

- Protect the public from exposure to radiation from radioactive materials,
- Protect the environment, and
- Protect workers, including following requirements for radiation protection.

Workers have the authority to stop or pause work in accordance with CP3-HS-2009, *Stop/Suspend Work.*

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12. MANAGEMENT AND INDEPENDENT ASSESSMENTS

12.1 MANAGEMENT ASSESSMENTS

The D&R contractor has established a formalized management assessment process to evaluate the adequacy and effectiveness of procedure implementation, work performance, and contract performance deliverables and expectations. This assessment process requires managers at every level to assess the performance of the activities assigned to their function or project and document their observations and findings. The management assessment also includes an evaluation to determine if an ISMS program is focusing on meeting both customer requirements and strategic goals. Management assessments for waste management activities shall be performed in accordance with CP3-QA-1003, *Management and Self-Assessments*.

12.2 INDEPENDENT ASSESSMENTS

Independent assessments (or audits) are planned, scheduled, and conducted routinely to evaluate compliance with environmental, health, safety, quality, and regulatory requirements; the adequacy of work performance; and to promote continuous improvement. These planned assessments are separate from and in addition to management assessments. Assessment schedules and the allocation of resources needed to meet these schedules are based on the status, hazard, and complexity of the activity or process being assessed. Schedule flexibility allows performance of additional assessments of the D&R contractor and subcontractor activities for identified areas of concern. The assessment process includes follow-up by project and/or functional management to assure corrective actions are implemented when deficiencies are identified. D&R contractor independent assessments for waste management activities shall be performed in accordance with CP3-QA-1004, *Independent Assessment Program*.

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APPENDIX A

PROTOCOL FOR MANAGEMENT OF POTENTIALLY LISTED REMEDIATION WASTES AT THE PADUCAH SITE

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A.1. REGULATORY BACKGROUND AND SELECT REGULATORY POLICIES REGARDING THE MANAGEMENT OF POTENTIALLY LISTED REMEDIATION WASTES

Sections A.1.1 through A.1.3 are excerpts from U.S. Environmental Protection Agency's (EPA's) October 14, 1998, guidance on Management of Remediation Wastes under Resource Conservation and Recovery Act (RCRA). They are included in this paper to give the regulatory background and context for the application of these polices at the Paducah Site, as discussed in Section A.2.

A.1.1 DETERMINATION OF WHEN CONTAMINATION IS CAUSED BY LISTED HAZARDOUS WASTE

Where a facility owner/operator makes a good faith effort to determine if a material is a listed hazardous waste, but cannot make such a determination because documentation regarding a source of contamination, contaminant, or waste is unavailable or inconclusive, EPA has stated that one may assume the source, contaminant, or waste is not listed hazardous waste; therefore, provided the material in question does not exhibit a characteristic of hazardous waste, RCRA requirements do not apply. This approach first was articulated in the Proposed National Oil and Hazardous Substances Pollution Contingency Plan (NCP) preamble, which notes that it often is necessary to know the source of a waste (or contaminant) to determine whether a waste is a listed hazardous waste under RCRA and also notes that, "at many Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) sites no information exists on the source of the wastes." The proposed NCP preamble goes on to recommend that the lead agency use available site information such as manifests, storage records, and vouchers in an effort to ascertain the sources of wastes or contaminants, but when this documentation is not available or inconclusive, the lead agency may assume that the wastes (or contaminants) are not listed RCRA hazardous wastes. This approach was confirmed in the final NCP preamble (see 53 *FR* 51444, December 21, 1988, for proposed NCP preamble discussion; 55 *FR* 8758, March 13, 1990, for final NCP preamble discussion). This approach also was discussed in the HWIR-Media proposal preamble, 61 *FR* 18805, April 29, 1996, where it was expanded to cover dates of waste disposal [i.e., if, after a good faith effort to determine dates of disposal, a facility owner/operator is unable to make such a determination because documentation of dates of disposal is unavailable or inconclusive, one may assume disposal occurred prior to the effective date of applicable land disposal restrictions (LDRs)]. This is important because, if hazardous waste originally was disposed of before the effective dates of applicable LDRs and media contaminated by the waste are determined not to contain hazardous waste when first generated (i.e., removed from the land or area of contamination), the media are not subject to RCRA requirements, including LDRs.

A.1.2 CONTAINED-IN POLICY

Contaminated environmental media, of itself, is not hazardous waste and, generally, is not subject to regulation under RCRA. Contaminated environmental media can become subject to regulation under RCRA if they "contain" hazardous waste.

If contaminated environmental media contain hazardous waste, they are subject to all applicable RCRA requirements until they no longer contain hazardous waste. EPA Region 4 and Kentucky Division of Waste Management (KDWM) consider contaminated environmental media no longer to contain hazardous waste (1) when they no longer exhibit a characteristic of hazardous waste, and (2) when

concentrations of hazardous constituents from listed hazardous wastes are below health-based levels. Generally, contaminated environmental media that do not (or no longer) contain hazardous waste are not subject to any RCRA requirements; however, in some circumstances, contaminated environmental media that contained hazardous waste when first generated (i.e., first removed from the land or area of contamination) remain subject to LDR treatment requirements even after they "no longer contain" hazardous waste.

The determination that any given volume of contaminated media does not contain hazardous waste is called a "contained-in determination." In the case of media that exhibit a characteristic of hazardous waste, the media are considered to "contain" hazardous waste for as long as they exhibit a characteristic. Once the characteristic is eliminated (e.g., through treatment), the media no longer are considered to "contain" hazardous waste. Since this determination can be made through relatively straightforward analytical testing, no formal "contained-in" determination by EPA or KDWM is required. Just like determinations about whether waste has been adequately characterized, generators of contaminated media may make independent determinations as to whether the media exhibit a characteristic of hazardous waste. In the case of media that are contaminated by listed hazardous waste, current EPA guidance recommends that contained-in determinations be made based on direct exposure using a reasonable maximum exposure scenario and that conservative, health-based, standards be used to develop the site-specific health-based levels of hazardous constituents below which contaminated environmental media would be considered no longer to contain hazardous waste. Since this determination involves development of site-specific health-based levels, EPA's or KDWM's approval is required.

In certain circumstances, the RCRA LDRs will continue to apply to contaminated media that has been determined not to contain hazardous waste. This is the case when contaminated media contain hazardous waste when they are first generated (i.e., removed from the land or area of contamination) and subsequently are determined no longer to contain hazardous waste (e.g., after treatment), but still contain hazardous constituents at concentrations above LDR treatment standards. It is also the case when media are contaminated as a result of disposal of untreated (or insufficiently treated) listed hazardous waste after the effective date of an applicable LDR treatment requirement. Of course, if no land disposal will occur (e.g., the media will be legitimately recycled), the LDR treatment standards do not apply. In addition, contaminated environmental media determined not to contain any waste (i.e., it is just media, it does not contain solid or hazardous waste) would not be subject to any RCRA Subtitle C requirements, including the LDRs, regardless of the time of the "contained-in" determination.

A.1.3 LAND DISPOSAL RESTRICTION TREATMENT STANDARDS FOR CONTAMINATED SOILS

On May 26, 1998, EPA promulgated LDR treatment standards specific to contaminated soils. Kentucky adopted these standards, effective June 13, 2007. These treatment standards require that contaminated soils that will be land disposed of be treated to reduce concentrations of hazardous constituents by 90% or meet hazardous constituent concentrations that are ten times the universal treatment standards (UTS), whichever is greater. (This typically is referred to as 90% capped by 10 times the UTS.) For contaminated soil that exhibits a characteristic of ignitable or contains reactive or corrosive hazardous waste, treatment also must eliminate the hazardous characteristic. The soil treatment standards apply to all underlying hazardous constituents reasonably expected to be present in any given volume of contaminated soil when such constituents are found at initial concentrations greater than ten times the UTS. For soil that exhibits a characteristic of toxic, ignitable, reactive or corrosive hazardous waste, treatment also is required for (1) in the case of the toxicity characteristic, the characteristic constituent; and (2) in the case of ignitability, reactivity, or corrosivity, the characteristic property. Although treatment is required for each underlying hazardous constituent, it is not necessary to monitor soil for the entire list of underlying hazardous

constituents. Generators of contaminated soil reasonably can apply knowledge of the likely contaminants present and use that knowledge to select appropriate underlying hazardous constituents or classes of constituents for monitoring. As with the LDR treatment standards for hazardous debris, generators of contaminated soil may use either the applicable universal treatment standards for the contaminating hazardous waste or the soil treatment standards.

A.2. APPLICATION OF REGULATORY POLICIES WITH REGARD TO MANAGEMENT OF REMEDIATION WASTES

Sections A.2.1 through A.2.3 discuss the application of the policies outlined in Section A.1 to Paducah projects.

A.2.1 DETERMINATION OF WHEN CONTAMINATION IS CAUSED BY LISTED HAZARDOUS WASTE

The U.S. Department of Energy (DOE) has chosen to take a conservative regulatory approach with regard to media and debris contaminated with trichloroethene (TCE) and 1,1,1-trichloroethane (TCA) at the PGDP site. DOE has concluded that media and debris contaminated with TCE and 1,1,1-TCA at detectable levels are subject to RCRA, (including the LDRs) and also RCRA guidance, such as the October 14, 1998, EPA guidance concerning *Management of Remediation Waste Under RCRA*. Conversely and to date, DOE has not reached a conclusive determination for media or debris contaminated with any other hazardous waste constituent at the site. In the event new information is made available by any means that would affect these determinations, DOE shall engage EPA Region 4 and KDWM with the information in an effort to make the appropriate determinations with regard to the applicability of RCRA and LDRs.

A.2.2 APPLICATION OF THE CONTAINED-IN POLICY

KDWM and EPA Region 4 have approved site-specific health-based levels for environmental media and debris at the Paducah Site with respect to TCE and 1,1,1-TCA. The health-based levels originally were approved by KDWM in the 2003 Agreed Order and by EPA in correspondence dated March 5, 2009, and May 19, 2009 (Table A.1).

Table A.1. Approved Health-Based Levels

Contaminant	Solids	Aqueous Liquids
TCE	39.2 ppm	0.081 ppb
1,1,1-TCA	2,080 ppm	N/A*

*Aqueous solutions that meet the health-based level for TCE also shall be deemed to no longer contain 1,1,1-TCA.

- Aqueous liquids (for purposes of implementing contained-in determinations) are defined as groundwater and surface water that require active management and include well purging and development water and sampling water.

- Solids (for purposes of implementing contained-in determinations) are defined as soils, sediments, debris, drill cuttings, and solid sample residuals.

- Contained-in determinations for solids are conditioned upon their not being characteristically hazardous.

- Contained-in determinations for aqueous solutions are conditioned upon their subsequent on-site treatment followed by discharge through a Kentucky Pollutant Discharge Elimination System (KPDES)-permitted outfall.

- For the groundwater at the Paducah Site, the health-based levels will be applied at the well-extraction head based on the most current monitoring data.

Because KDWM and EPA Region 4 have approved health-based levels for TCE and 1,1,1-TCA, contained-in determinations with respect to those compounds will be self-implementing by the generator at the PGDP site. Similarly, the generator on-site will be responsible for hazardous waste determinations for waste streams generated in conjunction with or subsequent to the management of environmental media (related waste streams).

For the purposes of hazardous waste determinations at the site, related waste streams are wastes that are derived from or mixed with environmental media. Related waste streams consist of the following:

- Debris such as personal protective equipment (PPE) and sampling materials;
- Drilling fluids;
- Decontamination water and decontamination materials;
- Landfill leachate;
- Wastewaters;
- Groundwater wastewater treatment media (filters, activated carbon, etc.); and
- Wastewater treatment sludges.

Hazardous waste determinations for related waste streams will utilize generator knowledge of the associated environmental media. If the associated environmental media does not exceed the health-based standards in Table A.1, the related waste stream will be deemed not to be derived from nor mixed with a listed hazardous waste. If the associated environmental media exceeds the health-based standards in Table A.1, the related waste stream will be deemed to be derived from or mixed with a listed hazardous waste (F001, F002, U228). Since the health-based levels in Table A.1 apply to debris, debris associated with environmental media that exceeds health-based standards may undergo analysis to determine if it is below health-based standards.

Environmental media and debris that are below the health-based standards in Table A.1 and do not exhibit a hazardous characteristic will be deemed not to contain a listed hazardous waste and will be managed as nonhazardous solid waste, subject to applicable LDRs.

Related wastes that are associated with media below health-based standards are deemed not to be derived-from nor mixed with a listed hazardous waste and will be managed as nonhazardous solid wastes, but they are not subject to LDRs because the hazardous waste listings and LDRs never were attached to the waste. Related wastes that are wastewaters in this category may be managed in impoundments permitted under the KPDES program.

A.2.3 APPLICATION OF LAND DISPOSAL RESTRICTIONS TO CONTAMINATED MEDIA AND RELATED WASTE STREAMS

In accordance with Kentucky and EPA hazardous waste regulations, all RCRA hazardous wastes are subject to the LDRs. As stated in Section 2.1, DOE has made the determination that LDRs also apply to media that has been deemed no longer to contain and debris that has been deemed to be no longer contaminated with F001, F002, and U228 (TCE and 1,1,1-TCA) listed waste. The applicable LDR Treatment Standards are presented in Table A.2.

Table A.2. LDR Treatment Standards

Contaminant	Alt Std. for Debris	Alt. Std for Soils	Nonwastewaters	Wastewaters
TCE	40 *CFR* § 268.45	60 ppm	6 ppm	0.054 ppm
1,1,1-TCA	40 *CFR* § 268.45	60 ppm	6 ppm	0.054 ppm

Media that has been deemed to no longer contain a F001, F002, and U228 (TCE and 1,1,1-TCA) listed waste and debris that has been deemed no longer to be contaminated with F001, F002, and U228 (TCE and 1,1,1-TCA) listed waste may be disposed of in a Subtitle D landfill provided they meet the applicable LDR treatment standards, do not exhibit a hazardous characteristic, and otherwise meet the receiving facilities waste acceptance criteria.

Aqueous media that has been deemed to contain a listed hazardous waste and/or exceeds wastewater LDRs and aqueous-related wastes that have been deemed to be derived-from or mixed with a listed hazardous waste shall be treated at a wastewater treatment unit permitted by the KPDES program. These wastewaters ultimately will be discharged through a KPDES outfall, whereupon the hazardous waste listings and LDR treatment standards no longer will apply at the point-source discharge [401 *KAR* 31:010 § 4(1)(b) and 40 *CFR* § 261.4(a)(2)].

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APPENDIX B

RADIOACTIVE WASTE MANAGEMENT BASIS FOR THE D&R CONTRACTOR RADIOACTIVE WASTE MANAGEMENT FACILITIES

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Documents listed in brackets will replace the document listed upon the completion of the consolidated Documented Safety Analysis (DSA).

B.1. PURPOSE AND SCOPE

The purpose of this document is to describe the Radioactive Waste Management Basis (RWMB) for the DOE-owned waste management facilities. This RWMB summarizes the waste management facilities and program documentation utilized by the D&R contractor.

An RWMB is required by DOE O 435.1, Chg. 1, *Radioactive Waste Management*. DOE Guide 435.1-1, *Crosswalk Tables Doe O 5820-2a vs DOE O 435.1/M 435.1-1,* states the objective of the RWMB is *"*to ensure that the hazards associated with radioactive waste management facilities, operations, and activities have been identified, their potential impacts analyzed, and appropriate controls documented, implemented, and maintained for the protection of workers, the public and the environment." The RWMB for the DOE waste management facilities is based on existing D&R contractor programs and procedures that systematically identify, assess, and control radiological hazards associated with radioactive waste management activities at Paducah Site and during transport for final disposition at permitted and DOE-approved waste treatment, storage, and disposal facilities (TSDFs). Material disposed under an AL is not subject to the requirements of the RWMB.

The major elements discussed in this RWMB document include the following:

- Identifying the types of radioactive wastes and the radioactive waste management facilities at Paducah Site.
- Identifying the safety basis (SB) documents applicable to the waste management facilities.
- Providing an overview and discussion of the D&R contractor Waste Management Program and requirements and procedures that will ensure radioactive wastes are identified, managed, and disposed of in compliance with federal and state hazardous waste management rules and regulations and DOE regulations, Orders, and guidance.

B.2. RADIOACTIVE WASTE MANAGEMENT BASIS DOCUMENTS

The purpose of this waste management plan is to provide a systematic approach to the management of waste generated that is designed to protect the health and safety of the worker, the public, and the environment. This document provides the required steps to implement DOE Order 435.1, *Radioactive Waste Management*, and DOE M 435.1-1, *Radioactive Waste Management Manual*, which requires the D&R contractor to systematically plan, document, execute, and evaluate the management of DOE radioactive waste and assist the government in planning, executing, and evaluating the management of DOE radioactive waste in accordance with the requirements of DOE O 435.1, Chg.1.

In addition to this plan, the primary documents establishing the basis for the programs that address RWMB requirements for Paducah Site are these:

- Task Order DE-DT0007774 with DOE for Deactivation of the Paducah Site.

- CP2-HS-1000, latest approved revision, *Integrated Safety Management System Description*—This document establishes a single, defined safety management system for integrating industrial safety management requirements into work planning and execution processes to effectively protect employees, the public, and the natural environment.

- PRS-NFS-1394 (CP1-NS-3000, Documented Safety Analysis for the Department of Energy Paducah Site Deactivation Project), latest approved revision, Safety Management Program Descriptions for Paducah Environmental Remediation Project Facilities—This document provides descriptions that collectively address Safety Management Plan (SMP) Descriptions for criticality protection, radiation protection; hazardous material protection; emergency planning; radioactive and hazardous material waste management; decontamination and decommissioning; initial testing; in service surveillance; and maintenance, management, organization, and institutional safety provisions, quality assurance; human factors; procedures and training; and operational safety. The purpose of the SMP Descriptions is to present information that is common to the Paducah Environmental Remediation Project's Hazard Category (HC) 2 and 3 Nuclear and nonnuclear facilities. It is intended to complement the facility-specific SB documents. FPAD-16-1610, Safety Management Program Transition Plan, transmitted a plan to DOE to transition from the two sets of SMPs (deactivation and remediation) currently implemented at the plant to just one set (deactivation). In accordance with this transmittal, acknowledged by DOE in PPPO-02-3447556-16A, "Response to Safety Management Program Transition Plan," PRS-NFS-1394 (CP1-NS-3000) will be cancelled. Upon cancellation, SMPs applicable to waste management will be provided by CP1-NS-3000, latest approved revision, Documented Safety Analysis for the Department of Energy Paducah Site Deactivation Project.

- CP2-WM-0006, latest approved revision, *Facility Safety Basis Inventory Control Plan for Paducah Waste Storage Facilities*—This plan documents the inventory control methodology for waste storage facilities at the Paducah Site. The goal of the inventory control methodology is to ensure compliance with chemical and radiological limits as stated both in this plan and in various facility SB documents.

- KY8-890-008-982, latest approved revision, Kentucky Division of Waste Management, *PGDP Hazardous Waste Management Permit*—This document is the DOE Paducah Site Resource Conservation and Recovery Act (RCRA) Part B Permit approved by the Kentucky Energy and Environment Cabinet's (KEEC) Division of Waste Management (KDWM) and incorporates applicable provisions of the Agreed Orders and Compliance Agreements. The Part B Permit establishes the enforceable requirements for facilities, operations, and activities that are managed and operated in compliance with this permit.

Additional requirements that may influence D&R contractor compliance with requirements of DOE Order 435.1 are set forth in the regulatory agreements among DOE, KEEC, EPA, and KDWM. The requirements set forth in these regulatory agreements are incorporated into affected D&R contractor procedures, plans, and work authorization documents. The regulatory documents impacting establishment and implementation of the RWMB at PGDP are these:

- Federal Facility Agreement (FFA) among DOE, KEEC, and EPA (1998)—Pursuant to 42 U.S.C.A. § 9620, the agreement directs the comprehensive remediation of the PGDP through the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process. The FFA will impact the process for closing radioactive waste management facilities, particularly those subject to RCRA permits.

- Agreed Order (2003), DWM-31434-042, DAQ-31740-060, DOW-26141-042—The D&R contractor complies with this agreement that establishes a risk-based contained-in basis and responsibilities to address storage and characterization of containerized wastes, remediation of environmental media, and disposal of wastes impacted by contained-in determinations. It also addressed requirements for characterization, remediation, and closure of DOE Material Storage Areas (DMSAs) at the DOE Paducah Site under federal and state environmental laws and regulations and applicable or relevant and appropriate requirements (ARARs). It also addressed issues of completing facility closures pursuant to the CERCLA FFA.

- Agreed Order/Site Treatment Plan, DWM-30039-042, latest approved revision and concurrences—the D&R contractor complies with applicable provisions of this agreement that establishes responsibilities and commitments for conducting actions required for storage and treatment of hazardous waste that is radioactively contaminated.

- *Toxic Substances Control Act Uranium Enrichment Federal Facilities Compliance Agreement*, latest approved revision and concurrences—the D&R contractor complies with applicable provisions of the this agreement, which establishes responsibilities and commitments for conducting actions required for polychlorinated biphenyl waste including waste that is radioactively contaminated.

- Implementing documents that flow down from the primary documents, listed above, that govern the development and implementation of SB documents include the following:

  — CP3-HS-2004, latest approved revision, *Job Hazard Analysis*—This procedure provides guidance for the protection of personnel and the environment by establishing a graded approach for systematically reviewing planned work to identify hazards and preventive measures to control those hazards.

  — CP3-NS-2002, latest approved revision, *Development and Control of Nuclear Safety Basis Documents*—This procedure implements requirements of 10 *CFR* 830 Subpart B, paragraph 202, and establishes the processes and requirements for development, review, approval, implementation planning, maintenance, and changes to nuclear safety basis documentation for Hazard Category 2 and 3 Nuclear Facilities.

  — CP1-NS-1001, latest approved revision, *Nuclear Criticality Safety Policy*—This document is a policy statement that brings the company values to the forefront and applies the principles of Integrated Safety Management (ISM) to integrate NCS into the daily planning and performance of D&R contractor work. The NCS Program shall meet the general and specific requirements of DOE O 420.1C, *Facility Safety*, Chapter III, Nuclear Criticality Safety.

  — CP3-NS-1051 [CP2-NS-1000, (latest approved revision) *Nuclear Criticality Safety Program Description Document*], latest approved revision, *Nuclear Criticality Safety Program (Remediation Scope)*—This procedure establishes the overall responsibilities and authority for the NCS Program that applies to remediation scope facilities to ensure that NCS hazards are evaluated, and NCS limits and controls are established and implemented to provide for the safety of personnel and the public. FPAD-16-1385, *Nuclear Criticality Safety Program Transition*, transmitted a plan to DOE to transition from the two NCS programs (deactivation and remediation) currently implemented at the plant to just one program (deactivation). In accordance with this transmittal, accepted by DOE in PPPO-02-3319293-16A, *Response to Revision to Nuclear Criticality Safety Program Description Document*, the remediation scope NCS program will be merged into the deactivation scope NCS program. In accordance with the transition plan, when CP3-NS-1051 is deleted, CP2-NS-1000, *Nuclear Criticality Safety Program Description*

Document, will become effective for remediation scope as well as deactivation scope. CP2-NS-1000 currently is effective for the deactivation scope.

— CP2-NS-1000, *Nuclear Criticality Safety Program Description Document* establishes the basis for the deactivation NCS program and ensures that NCS hazards are evaluated and that NCS limits and controls are established and effectively implemented to provide safety to the public, workers, and the environment.

— CP5-NS-0040, latest approved revision, *Fluor Federal Services Paducah Site Deactivation Project Hazard Categorization and Classification and Safety Basis Document List*—A controlled database of the applicable SB documents for each DOE Paducah Site nuclear facility is maintained and verified by the D&R contractor. This document is revised periodically to communicate the current list of applicable SB documents.

— CP5-NS-0041, latest approved revision, *Fluor Federal Paducah Site Deactivation Project Radioactive/Industrial Facility Hazard Categorization and Classification and Safety Basis Document List for Former LATA Kentucky Facilities*—a controlled database of applicable SB documents for each of the former LATA Kentucky radiological/industrial facility is maintained and verified by the D&R contractor. This document is revised periodically to communicate the current list of applicable SB documents.

— CP3-NS-2001 latest revision, *Unreviewed Safety Question Reviews*—This procedure establishes the process for determining whether proposed changes are adequately evaluated relative to the approved documented safety analysis (DSA) or Hazards Assessment Document. Those proposed changes determined to involve unreviewed safety questions are brought to the attention of the DOE for review and approval before changes are made.

— CP3-NS-2002, latest approved revision, *Development and Control of Nuclear Safety Basis Documents*—The purpose of this procedure is to implement requirements of 10 *CFR* Part 830, Subpart B, paragraph 202 and establish the processes and requirements for development, review, approval, implementation planning, maintenance, and changes to nuclear safety basis documentation for HC 2 and 3 nuclear facilities.

— CP3-NS-1008, latest approved revision, *Unreviewed Change Determinations for Radiological Hazard Category/Low Hazard Classification Facilities*—This procedure provides the process for evaluating changes involving less than HC 3 (radiological and nonnuclear) facilities. This procedure is used to determine approval authority requirements for proposed changes, as-found conditions, and potentially inadequate SB evaluations for less than HC 3 facilities and activities.

— CP3-NS-1009, latest approved revision, *Maintenance of Existing Hazard Assessment Documents*—The purpose of this procedure is to establish the requirements for review, approval, implementation, and maintenance of existing hazard assessment documents.

— CP4-NS-2005, latest approved version, *Preliminary Hazard Screening Process*—The purpose of this procedure is to implement specific requirements 10 *CFR* Part 830, Subpart B, *Safety Basis Requirements*; 29 *CFR* § 1910.119, *Process Safety Management of Highly Hazardous Chemicals*; and 48 *CFR* § 970.5223-1, *Integration of Environmental, Safety, and Health into Work Planning and Execution*. This procedure specifies requirements for hazards identification and the preparation of preliminary hazard screenings to document the initial hazard categorization and initial hazard classification based on the maximum expected radiological (including fissile material) and chemical inventories for a facility or project activity.

- CP2-WM-0011, latest approved revision, *Waste Acceptance Criteria for the Treatment Storage and Disposal Facilities at the Paducah U.S. Department of Energy Site*—This document establishes the waste acceptance criteria (WAC) for Paducah Site TSDFs and defines the requirements, terms, and conditions under which wastes will be accepted. This WAC applies to all newly generated or newly discovered wastes that are being offered for acceptance to any Paducah Site TSDF and includes low-level waste (LLW), RCRA waste, mixed low-level waste (MLLW), Toxic Substances Control Act (TSCA) and TSCA-LLW, and transuranic (TRU) waste.

- CP3-WM-0016, latest approved revision, *Waste Handling and Storage in DOE Waste Storage Facilities*—The purpose of this procedure is to implement the management of RCRA, TSCA, LLW, and mixed waste program requirements to provide regulatory compliance and ensure personnel safety while performing activities in DOE waste storage facilities.

- CP3-WM-0023, latest approved revision, *Inspection of DOE Waste Storage Facilities and Tanks*—The purpose of this procedure is to establish requirements for performing and documenting periodic inspections, controlling inspection forms, and tank-testing requirements for waste storage facilities operated by the D&R contractor.

- CP3-WM-0437, latest approved revision, *Waste Characterization and Profiling*—This procedure provides the requirements and methodologies for the characterization of waste streams and containers. This procedure establishes how waste characterization will be implemented to ensure that all waste is properly characterized for RCRA, TSCA, and radiological constituents and addresses waste profiling including both on-site (i.e., C-746-U Landfill) and off-site disposal.

- CP3-WM-1037, latest approved revision, *Generation and Temporary Storage of Waste Materials*—This procedure directs actions for establishment, operation, inspection, and discontinuance for temporarily storing hazardous and nonhazardous wastes in a safe and environmentally acceptable manner that complies with regulatory and company requirements.

- CP3-QA-2501, latest approved revision, *Waste Certification*—The purpose of this procedure is to establish waste certification activities at PGDP. This includes, but is not limited to, detailed methods for inspection of containers, container preparation activities, waste packaging oversight, shipment preparation, and certification of waste generated for disposal at the Nevada Nuclear Security Site (NNSS) in accordance with the latest revision of the WAC and other waste shipments as directed by management. This procedure also establishes the methods for scheduling and performing surveillances on functions critical to the NNSS Waste Certification Program.

- CP3-WM-3015, latest approved revision, *Waste Packaging*—This procedure provides the requirements to follow in order to oversee and direct the packaging of waste containers for on-site (C-746-U Landfill) and off-site (NNSS or other commercial TSDF) disposition.

- CP3-WM-3028, latest approved revision, *Off-Site Shipping*—This procedure provides instructions for preparing shipments of hazardous materials to ensure they are shipped properly. This procedure provides the processes to satisfy the requirements related to waste shipments. The requirements of this procedure apply to all off-site shipments of hazardous materials (HM) and wastes by highway and rail performed by the D&R contractor on behalf of DOE at PGDP, unless exempt from shipping papers per 49 *CFR*.

- CP3-WM-0015, latest approved revision, *Management of Fissile Waste Material*—This procedure applies to the labeling, sampling/characterization, on-site transportation, waste processing, inspection,

and storage of fissionable waste material and spacing-exempt containers. This procedure applies to waste material regulated under NCES-RM-WASTE-0008 or NCSE-RM-FISSMAT-0015.

- CP3-WM-1036, latest approved version, *Nuclear Criticality Safety Implementation Requirements for Handling and Storage of Fissile and Potentially Fissile Waste*—This procedure implements the NCS requirements for generating, handling, and storing fissile/potentially fissile (PF) waste and to implement Nuclear Criticality Safety Approval requirements for areas with container restrictions at the Paducah Site.

- CP3-WM-2100, latest approved revision, *Operation of Temporary Fissile Storage Areas*—This procedure establishes the requirements for handling, characterizing, and temporarily storing fissile and potentially fissile waste in temporary fissile storage areas.

- CP3-WM-2110, latest approved revision, *Waste Container Handling, Overpacking, and Transportation*—This procedure specifies the requirements for inspection, handling, overpacking, and transportation of containerized waste materials.

- CP3-WM-0589, latest revision, *Characterization for Movement, Storage, and Disposition of Potentially Fissile Materials*—This procedure applies to the characterization, handling, and storage of materials considered NCS-exempt.

B.3. RADIOACTIVE WASTE CATEGORIES AND WASTE MANAGEMENT FACILITIES

Newly generated waste generated by ongoing and future activities will include LLW, MLLW, TSCA-LLW, and mixtures of MLLW and TSCA-LLW.

Table B.1 lists the existing Paducah Site Waste Management-operated facilities covered by the D&R contractor RWMB, based on use, for storing, staging, or treating radioactive wastes. In addition, the associated facility hazard category and hazard classification are listed, as well as the type of regulated wastes that can be managed in those facilities. During generation activities, the generating projects will be responsible for management of wastes temporarily accumulated and/or staged prior to transfer to one of the designated on-site facilities or to off-site TSDFs.

CP5-NS-0040, latest approved revision, *Fluor Federal Services Paducah Site Deactivation Project Hazard Categorization and Classification and Safety Basis Document List* is a controlled database of the applicable SB documents for each DOE Paducah Site facility that is maintained and verified by the D&R contractor. CP5-NS-0041, latest approved revision, *Fluor Federal Paducah Site Deactivation Project Radioactive/Industrial Facility Hazard Categorization and Classification and Safety Basis Document List for Former LATA Kentucky Facilities*—a controlled database of the applicable SB documents for each of the Former LATA Kentucky radiological/industrial facility is maintained and verified by the D&R contractor. These documents are revised periodically to communicate the current list of applicable SB documents.

Closure of the DOE waste management facilities will be determined based on the progress and needs of current and future projects.

Table B.1. D&R Contractor Waste Management Facilities*

Facility ID	Authorization Basis Document	Facility Description	Active	SB Hazard Category	SB Hazard Classification
C-301	PHS-PH-INDSTRL-0067 (currently R2)	Roof-Covered Concrete Pad, LLW Storage\Vehicle Maintenance\Fluid Drainage	X	Other Industrial	Other Industrial
C-733	PHS-PH-RAD-0072 (currently R6)	Permitted RCRA Storage Facility\TSCA\LLW Flammable Liquid Storage Area	X	Radiological	Low
C-746-B-1	PHS-PH-RAD-0072 (currently R6)	Yard—Staging Area	X	Radiological	Low
C-746 H3	PHS-PH-RAD-0072 (currently R6)	(Concrete Pad)— processing/staging/loading area.	X	Radiological	Low
C-746-Q	BJC/PAD-462/R10 (DSA) & BJC/PAD-498/R11 (TSR)	Permitted RCRA Storage Facility\Fissile Storage Area	X	Category 2	High
C-746-Q1	CP1-NS-3000 R2 (DSA) & CP1-NS-3001 R1 (TSR)	LLW and Fissile Storage Facility	X	Category 2	Moderate
C-746-V	PHS-PH-INDSTRL-0067 (currently R2)	Outdoor Storage, Waste Operations, etc	X	Other Industrial	Other Industrial
C-752-A	PHS-PH-RAD-0072 (currently R6)	Environmental Restoration Waste Storage Facility	X	Radiological	Low
C-752-C	PHS-PH-RAD-0072 (currently R6)	Off-Site Decontamination Facility	X	Radiological	Low
C-753-A	PHS-PH-RAD-0072 (currently R6)	Indoor Waste Operations—TSCA	X	Radiological	Low
C-754	SAR-PGDP (current revision seems to be R140	Low Level Waste Storage	X	Radiological	Low
C-757	SAR-PGDP (current revision seems to be R140	Solid and Low Level Waste Storage	X	Radiological	Low
C-759	PHS-PH-RAD-0072 (currently R6)	Scrap Metal Staging Area—temporary staging areas for waste prepared for shipment	X	Radiological	Low
C-760	PHS-PH-RAD-0072 (currently R6)	Laydown Gravel Pad—temporary staging areas for waste prepared for shipment	X	Radiological	Low
C-761	PHS-PH-RAD-0072 (currently R6)	Truck Shipment Staging Area (along site access road)—temporary staging areas for waste prepared for shipment	X	Radiological	Low

*Not listed are the DMSAs that have been closed pursuant to DWM-31434-042, DAQ-31740-060, DOW-26141-042, Agreed Order (2003). Routine monitoring and surveillances are being conducted in DMSAs containing holdup materials inside larger in-place equipment. Temporary generator staging areas set up to facility collection/accumulation of wastes are not included on this table.

B.4. SAFETY BASIS DOCUMENTATION, EVALUATION, AND CONTROLS

The Integrated Safety Management System (latest version, CP2-HS-1000), and the Environmental Management System (latest version, CP2-ES-0101) establish a defined safety and environmental management system for integrating industrial safety management and environmental management requirements into work planning and execution processes to effectively protect employees, the public, and the natural environment.

The core requirements for identifying, evaluating, and controlling hazards associated with radioactive wastes are met using the D&R contractor Nuclear Safety Program, which provides for identification and the analysis of hazards and development of the appropriate SB documents and other associated documents for nuclear, radiological, and nonradiological facilities.

The D&R contractor Nuclear Safety Program provides a structured, graded approach that complies with 10 *CFR* § 830, Subpart B, *Safety Basis Requirements.* The program structure is designed to ensure the maximum possible level of quality by establishing standards for the overall program and the program elements, including standards for measuring program effectiveness and provisions for process improvement. The Nuclear Safety Program is governed by the following:

- CP3-NS-2002, *Development and Control of Nuclear Safety Basis Documents*
- CP4-NS-2005, *Preliminary Hazard Screening Process*
- CP3-NS-1009, *Maintenance of Existing Hazard Assessment Documents*
- CP1-NS-1001, *Nuclear Criticality Safety Policy*
- CP3-NS-1051, (CP3-NS-1031) *Nuclear Criticality Safety Program*, and *CP2-NS-1000, Nuclear Criticality Safety Program Description Document*

An approved list of SB documentation for each nuclear and radiological facility is maintained current, and is readily available to D&R contractor personnel requiring access to the information. The controlled list identifies specific nuclear facilities within the scope of the SB documentation and references the active SB documents, including these:

- DSA
- Technical Safety Requirements
- SMP Description
- Preliminary Hazard Screening (PHS)
- Hazard Assessment Document
- DOE Safety Evaluation Report
- Hazard Analysis

The approved list of SB documentation with attendant DOE approvals is maintained and updated as changes to the SB documentation are approved. The identification of the SB documents applicable to each of the identified waste management facilities is incorporated herein by reference to the approved SB

document list issued and maintained in CP5-NS-0040, *Fluor Federal Services Paducah Site Deactivation Project Hazard Categorization and Classification and Safety Basis Document List*, and CP5-NS-0041, *Fluor Federal Services, Inc., Paducah Site Deactivation Project Radiological/Industrial Facility Hazard Categorization and Classification and Safety Basis Document List for Former LATA Kentucky Facilities*.

An implementation matrix is maintained, in accordance with CP3-NS-2002, *Development and Control of Nuclear Safety Basis Documents*, for each DSA to document flow down of DSA requirements into implementing performance documents. The implementation matrix shall be utilized by the Facility Manager to assure that requirements are implemented and that personnel involved in facility management are knowledgeable of the SB requirements that govern his/her facility, the limiting hazards and initiating events, and the associated controls. A graded approach shall be applied in documenting implementation flow down for radiological and nonnuclear facilities in accordance with CP3-QA-1001, *Graded Approach*. Lower level SB documents, such as PHSs, are developed and implemented in accordance with CP4-NS-2005, *Preliminary Hazard Screening Process*.

CP2-WM-0006, *Facility Safety Basis Inventory Control Plan for Paducah Waste Storage Facilities*, documents the inventory control methodology for waste storage facilities at the Paducah Site. The goal of the inventory control methodology is to ensure compliance with chemical and radiological limits as stated both in this plan and in various facility safety basis documents. The Facility Manager must approve revisions to this plan prior to implementation. Approval by nuclear safety shall be obtained through the unreviewed safety question determination and unreviewed change determination process, as applicable.

B.5. RADIOACTIVE WASTE MANAGEMENT

The radioactive and hazardous waste management program, as described in this plan, establishes processes to generate, characterize, package, and control radiological and hazardous waste. This document establishes the framework to flow down programmatic strategies for managing waste from initial generation through final disposition. These programmatic strategies will provide the basis for the project work authorization and approval documents and address sitewide and project-specific needs for the following:

1. Pollution prevention and waste minimization (PP/WM) methods
2. Waste generation forecasts
3. Point of generation controls
4. Handling of classified waste
5. Staging and storage requirements
6. Transportation
7. Treatment/recycling/disposal requirements
8. Required training
9. Waste with no disposal path conditions

B.6. NUCLEAR CRITICALITY

The primary mission of PGDP operations is deactivation of site facilities. As such, an uncontrolled nuclear fission chain reaction has been the greatest potential hazard associated with the management of radiological materials. Control of fissile materials is a major component of the Nuclear Safety Program. The D&R contractor NCS activities to address risks identified in the facility SB documents are governed by CP1-NS-1001, *Nuclear Criticality Safety Policy*; and CP3-NS-1051 (CP3-NS-1031) *Nuclear Criticality Safety Program (Remediation Scope)* (to be replaced by CP2-NS-1000).

B.7. MAINTAINING RECORDS AND RWMB DOCUMENTS

Consistent administrative controls and assigned responsibility, as well as definitions of protocols for the identification, control, and management of documents and records, are found in CP3-RD-0010, *Records Management Process.* This procedure also establishes the requirements for transmitting records to Records Management. This procedure applies to all D&R contractor personnel and subcontractor employees who create, process, or use records for DOE. This applies to all types of record media.

Radioactive waste management records generated during waste identification, characterization, treatment, and processing include a variety of forms, as specified in the applicable procedures (e.g., CP3-WM-0437, *Waste Characterization and Profiling*). The original working copies of the forms are maintained in project files under direct control of the functional organization, including transportation, waste operations, waste generating services, and NNSS waste certification.

In addition, a database management group is maintaining database access and data transfer using a project tracking system.

WORKING COPY

VERIF. DATE: _____

INTIALS: _____

FLUOR®

Fluor Federal Services, Inc. Paducah Deactivation Project

CP3-ES-1003 **Rev. 0**	**TITLE:** Developing, Implementing, and Maintaining Data Management Implementation Plans	Page 1 of 18

DOCUMENT CATEGORY: ☒ Administrative ☐ Technical (Operations) ☐ Technical (Support)

LEVEL OF USE: ☒ Information Level ☐ Reference Level ☐ Continuous Use

ENVIRONMENTAL MANAGEMENT **SUBJECT MATTER AREA:** Environmental Monitoring	**SUBJECT MATTER EXPERT** Lisa Crabtree, Environmental Monitoring Manager Signature: [signature] for Date: 5/23/2016
NUCLEAR SAFETY REVIEW DOCUMENTATION: EXEMPTION #20 NPB 5/23/16 [signature] 5/23/16	**APPROVED BY** Lisa Crabtree, Environmental Monitoring Manager Signature: [signature] for Date: 5/23/2016
REQUIRED REVIEW DATE: 5/23/19	**EFFECTIVE DATE:** 5/27/16

REVISION/CHANGE LOG

Revision/Change Letter	Description of Changes	Pages Affected	Date of Revision/Change
0	Initial Release	ALL	5/23/16

TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure defines the process for environmental management projects to identify and document appropriate requirements and responsibilities for the management, quality assurance, use, and archival of environmental data collected by the project. These activities are documented in a project Data Management Implementation Plan (DMIP), as required by Fluor Federal Services, Inc. Paducah Deactivation Project (FPDP). A project DMIP must provide sufficient detail to clearly define what data types the project will generate and use; who is responsible for the various activities related to environmental data management; how the project will manage its data; and the process and schedule for project data deliverables. This procedure provides a template to facilitate the development of a project DMIP that meets U.S. and Department of Energy requirements for environmental data operations (see *Project Data Management Implementation Plan Template*.)

1.2 Scope

This procedure applies to all FPDP environmental management projects and associated contractors/subcontractors that will collect or use environmental data at the Paducah Gaseous Diffusion Plant (PGDP). Environmental data are any measurements or information that describes environmental processes or conditions or the performance of environmental technology. Environmental data include sampling and analysis data, data generated from field site preparation activities, geographic information, site survey data, information about construction activities, data generated from site and facility inspection and monitoring activities, and data generated from field measurement activities. Environmental data do **NOT** include financial or human resource data associated with a particular project. All FPDP environmental management projects that will collect or manage environmental data must develop a DMIP; even if the extent of a project's environmental data management activities is considered to be minor, a DMIP is required to document this fact. Ongoing projects that do **NOT** have a DMIP should prepare one after the completion of the current investigative or reporting phase and before the initiation of the next phase.

2.0 REFERENCES

2.1 Use References

None

2.2 Source References

American National Standards Institute/American Society for Quality (ANSI/ASQ) E4-2014, *Quality Management Systems for Environmental Information and Technology Programs*

3.0 COMMITMENTS

None

4.0 RESPONSIBILITIES

4.1 Project Manager

- Directs the project team in determining potential sources of existing data, identifying the study area and/or facility to be addressed by the project, and selecting the most effective data collection to pursue.
- Serves as the technical contact for subcontracted project support.

- Ensures that the flow down of data management requirements is defined in the statement of work (SOW), if applicable.

4.2 Scientist

- Serves as a single point of contact for the project manager on all technical issues.
- Provides technical support during project conceptualization, scoping, execution, and post-action evaluation.
- Serves as technical contact for subcontracted project support.
- Ensures that the flow down of data management requirements is defined in the SOW, if applicable.

4.3 Scientist/ Data Entry Specialist

- Reviews project DMIP
- Implements approved project DMIP.

5.0 GENERAL INFORMATION

5.1 A DMIP should be developed early in the planning phase of a project to ensure that the proper data management system, staff, and processes are securely in place before the project begins to acquire and manipulate environmental data and that scheduled milestones (i.e., reports, data deliverables) are met.

5.2 Project scoping meetings and/or the Data Quality Objective (DQO) process define project objectives and the data requirements needed to reach these objectives.

5.3 A DMIP documents the use, quantity, and quality of the data that a project will need to collect, thus facilitating the correct specification of the project's decision criteria, acceptable levels of uncertainty, and acceptable tolerances for an incorrect decision.

5.4 A DMIP leads to the development of an efficient sampling and analysis plan (SAP), a cost-effective strategy of data assessment, data verification, data validation, and proper reporting to the regulators.

6.0 INSTRUCTIONS

6.1 Initiate Development of a Project DMIP

Project Manager

6.1.1 Instruct the Scientist to lead the development of the project DMIP.

Scientist

6.1.2 Ensure that the requirement to develop a project DMIP, or the DMIP itself, is included in any SOW or contract/subcontract that will initiate project activities that collect or manage environmental data.

6.1.3 Contact the Environmental Monitoring Manager to assist with the development of a project DMIP.

6.1.4 Designate project team members to assume the responsibilities of all the roles specified and defined in the DMIP.

6.2 Develop Project DMIP

Scientist

NOTE:

A project DMIP either may be a stand-alone document or part of another document, such as a project work plan, as appropriate.

6.2.1 Work with Environmental Monitoring Manager to do the following:

- Summarize project data management activities.
- Summarize project data management interactions with other organizations.
- Identify project data needs and sources.
- Define **and** schedule project data and data records transmittals.
- Identify project database needs.
- Identify project data management tasks.
- Identify **and** define project data management roles and responsibilities.

NOTE:

Appendix B is a DMIP template to be used by the Project to facilitate the development of a project DMIP. **NOT** all subsections in the template will be applicable to a particular project. Within the template, italicized bold text are place-holding instructions for project-specific input and do **NOT** belong in the project DMIP; regular text may be used verbatim, modified, or deleted, as appropriate. The format for this template is simple so that a project can cut and paste into another document (e.g., project work plan), if desired.

Scientist

6.2.2 Develops the project DMIP following the template's instructions and incorporating applicable information to a particular project.

6.2.3 Distribute the project DMIP for review and approval; at a minimum, the following people need to review and approve the DMIP

- Project Manager
- Environmental Monitoring Manager

6.2.4 Distribute the approved DMIP, as appropriate.

6.2.5 Ensure that a copy of the approved DMIP is distributed to the Project Manager, and Environmental Monitoring Manager.

6.2.6 **If** the DMIP is incorporated into another document, **then** distribute entire document.

6.3 Implement and Maintain Project DMIP

Project Manager

6.3.1 Ensure that adequate funding is provided to implement effectively the project DMIP.

Scientist

6.3.2 Ensure that the DMIP is reviewed and updated, as necessary, to address changing project data management needs (an annual review before the beginning of the fiscal year is suggested for those projects that are ongoing).

Scientist/ Data Entry Specialist

6.3.3 Review the project DMIP **and** incorporate any changes.

6.3.4 Implement the approved project DMIP

7.0 RECORDS

7.1 Records Generated

The following records may be generated by this procedure:

DMIP

7.2 Records Disposition

The records are to be maintained in accordance with CP3-RD-0010, *Records Management Process*.

Appendix A – Acronyms/Definitions

ACRONYMS

ANSI – American National Standards Institute

ASQ – American Society for Quality

COC – chain- of- custody

DMIP – data management implementation plan

DQO – data quality objective

FFA – Federal Facility Agreement

FPDP – Fluor Paducah Deactivation Project

GIS – geographic information system

OREIS – Oak Ridge Environmental Information System

PEMS – Project Environmental Measurements System

PGDP –Paducah Gaseous Diffusion Plant

QC –quality control

RTL –ready-to-load

SAP –sampling analysis plan

SAS –statistical analysis system

SOW–statement of work

DEFINITIONS

Environmental Data - Any measurements or information that describe environmental processes or conditions or the performance of environmental technology, including sampling and analysis data, data generated from field site preparation activities, geographic information, site survey data, information about construction activities, data generated from site and facility inspection and monitoring activities, and data generated from field measurement activities.

Appendix B – Project Data Management Implementation Plan Template

THIS APPENDIX CONTAINS A "CONTROLLED" TEMPLATE

Please note that not all subsections in the DMIP template will be applicable to a particular project. Within this template, italicized bold text that is bracketed [such as this] are place-holding instructions and do not belong in the project DMIP; regular text may be used verbatim, modified, or deleted, as appropriate. For an electronic copy of this template, contact the Environmental Monitoring Manager.

CP2-XX-xxxx

Data Management Implementation Plan for the [Project Name]

Date Issued – ***[Month and Year]***

U.S. DEPARTMENT OF ENERGY
Office of Environmental Management

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

Appendix B – Project Data Management Implementation Plan Template (Continued)

APPROVALS

Data Management Implementation Plan
for the
[Name of Project]
at the
***[Full Name of Facility]*,**
[City and State]

CP2-XX-xxxx

_____ _____

Name
Title

Date

_____ _____

Name
Title

Date

DOE Approval Letter: _____ Date: _____

Nuclear Safety Documentation:

Appendix B – Project Data Management Implementation Plan Template (Continued)

CONTENTS

If the project DMIP is to be a stand-alone document, then after the DMIP is completed, mark the sections and generate a table of contents here.

Appendix B – Project Data Management Implementation Plan Template (Continued)

EXECUTIVE SUMMARY

[If the project DMIP is to be a stand-alone document, then an executive summary must be written here.]

Appendix B – Project Data Management Implementation Plan Template (Continued)

1. INTRODUCTION

The purpose of this data management implementation plan (DMIP) is to identify and document data management requirements and applicable procedures needed for the project, expected data types and flow, and roles and responsibilities for all data management activities associated with the ***[project name]***.

To meet current regulatory requirements for Fluor Federal Services, Inc. Paducah Deactivation Project (FPDP) environmental management projects, complete documentation of the information flow must be established. This necessitates that each phase of the environmental data management process (planning, collection, analysis, management, verification/validation, assessment, reporting, consolidation, and archival) be adequately planned and documented.

The primary purpose of environmental data management is to provide a system for efficiently generating and maintaining technically and legally defensible data that provide the basis for making sound environmental decisions.

The scope of this DMIP is limited to the ***[project name]*** environmental information. Environmental information includes electronic and/or hard copy records obtained by a project that describe environmental processes or conditions. Information generated by the project (e.g., analytical results from samples collected) and obtained from sources outside the project (e.g., historical data) fall within the scope of this DMIP. Certain types of information, such as personnel or financial records, are outside the scope of this DMIP.

1.1 PROJECT MISSION

[Briefly describe the project, its objectives, the types of data expected to be collected (e.g., field measurements, samples), and the specific use for the data types.]

1.2 DATA MANAGEMENT ACTIVITIES

[Summarize the project data management activities. The following data management activities should be addressed, as appropriate (i.e., not all projects will implement each activity listed)]:

- ***Scope Project,***
- ***Acquire Existing Data,***
- ***Plan Data Collection,***
- ***Prepare for Field Activities,***
- ***Collect Field Data,***
- ***Process Field Data,***
- ***Collect Field Samples,***
- ***Submit Samples for Analysis,***
- ***Process Laboratory Analytical Data,***
- ***Review Data,***
- ***Verify Data,***
- ***Validate Data, Consolidate Data and Records,***
- ***Analyze and Use Data, and***
- ***Submit Data to the Paducah Oak Ridge Environmental Information System (OREIS).***

Appendix B – Project Data Management Implementation Plan Template (Continued)

1.3 DATA MANAGEMENT INTERACTIONS

[Summarize the project's data management interactions with other organizations, agencies, etc. (e.g., Sample Management Office; Project Environmental Measurements System; Paducah Oak Ridge Environmental Information System; Industrial Hygiene; Health Physics; Site Compliance Organizations; Health and Safety).]

2. DATA NEEDS AND SOURCES

2.1 DATA TYPES

[Describe the data types needed by the project. General categories of these data types may include the following:]

- ***maps,***
- ***drawings,***
- ***photographs,***
- ***facility observations,***
- ***field measurements,***
- ***inspection checklists,***
- ***environmental media,***
- ***analytes,***
- ***sampling locations,***
- ***sampling dates,***
- ***total number of samples***
- ***necessary data quality.***

2.2 HISTORICAL DATA

[List all known historical sources.]

Existing and historical data will be evaluated prior to field activities (e.g., sampling, field measurements). Paducah OREIS will be queried for existing information relating to the project.

2.3 FIELD MEASUREMENTS

[Describe the types of field measurements that the project will collect (e.g., surface water flow measurements, surveys of monitoring locations, field screening instrument readings).]

2.4 ANALYTICAL DATA

[Describe the project's sample media, analytes of interest, types of analyses that will be performed, and the estimated number of samples that the project will collect.]

[List all analytical laboratories to be used by the project, reference the laboratory statement(s) of work (SOWs), including due dates.]

2.5 GEOGRAPHIC INFORMATION SYSTEM (GIS) COVERAGE

[Describe all known GIS coverages needed.]

Appendix B – Project Data Management Implementation Plan Template (Continued)

2.6 DATA FORMS/LOGBOOKS

[Identify all data forms and logbooks that the project will be using. Each form should be referenced, and a copy provided in the appendices. See the following subsection (2.6.1) as an EXAMPLE:]

2.6.1 Field Chain-of-Custody Forms

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

Field COC forms (Appendix __) are generated from the Project Environmental Measurements System (PEMS) with the following information:

Information that is preprinted:	**Information that is entered manually or through the use of a bar code reader:**
- COC number - project name or number - sample ID number - sampling location (e.g., W05C00-08) - sample type (e.g., REG=regular sample) - sample matrix (e.g., soil) - analysis (e.g., metals) - sample container (volume, type, quantity) - preservative - SOW Number - analytical method	- sample date and time - sample comments (optional) - sampler's name

3. DATA AND DATA RECORDS TRANSMITTALS

3.1 PADUCAH OREIS DATA TRANSMITTALS

NOTE: All data (measurements and geographic) contained in reports submitted to state and federal regulators are required by the Federal Facility Agreement (FFA) to be transferred to Paducah OREIS before or on the date of report submission.

[Identify the data types (see Sect. 2.1) and frequency of project data transmittals to Paducah OREIS. Coordinate with SMO to determine deliverable due dates and to ensure that all ready-to-load (RTL) mandatory fields are completed.]

3.2 DATA RECORDS TRANSMITTALS

4. DATA MANAGEMENT SYSTEMS

4.1 PROJECT ENVIRONMENTAL MEASUREMENTS SYSTEM (PEMS)

Appendix B – Project Data Management Implementation Plan Template (Continued)

The Project Environmental Measurements System (PEMS) is the data management system that supports the ***[Project Name]***'s sampling and measurements collection activities and the generation of Paducah OREIS RTL files. PEMS can be accessed by appropriate ***[Project Name]*** staff throughout the life cycle of the project. The ***[Project Name]*** will use PEMS for the following functions ***[call out only those functions that are applicable]***:

- Initiate the Project;
- Plan for Sampling;
- Collect Samples and Field Measurements;
- Ship Samples to the Laboratory;
- Receive and Process Analytical Results;
- Evaluate and Qualify Data;
- Analyze and Access Data; and
- Transfer Project Data (in RTL format) to OREIS.

4.2 PADUCAH OAK RIDGE ENVIRONMENTAL INFORMATION SYSTEM

The Paducah OREIS is the centralized, standardized, quality assured, and configuration controlled data management system that is the long-term repository for environmental data (measurements and geographic) for all environmental management projects. OREIS is comprised of hardware, commercial software, customized integration software, an environmental measurements database, a geographic database, and associated documentation. The [Project Name] will use OREIS for the following functions ***[call out only those functions that are applicable]***:

- Access to Existing Data;
- Analysis and Access to Project Data;
- Analysis and Access to Data Across Projects;
- Spatial Analysis;
- Report Generation;
- Long-Term Storage of Project Data; and
- Submit Data to Regulators.

4.3 PADUCAH ANALYTICAL PROJECT TRACKING SYSTEM

The Paducah Analytical Project Tracking System manages analytical sample analyses for all projects within the Paducah site. Paducah Analytical Project Tracking System performs cradle-to-grave tracking of sampling and analysis activities. This system generates the SOW, tracks collection and receipt of samples by the laboratory, and interfaces with PEMS (output from Paducah Analytical Project Tracking System automatically goes to PEMS).

4.4 U.S. DEPARTMENT OF ENERGY PORTSMOUTH/PADUCAH PROJECT OFFICE ENVIRONMENTAL GEOGRAPHIC ANALYTICAL SPATIAL INFORMATION SYSTEM

Portsmouth/Paducah Project Office (PPPO) Environmental Geographic Analytical Spatial Information System (PEGASIS) provides a systematic approach to retrieve, display, and download analytical, geotechnical, and hydrological data, maps, and geophysical information for PPPO sites using a Web browser. The information includes analytical sample results from various environmental studies, restoration reports and supporting documents, maps, and facility drawings managed by DOE and its contractors. PEGASIS is a Web site that allows project managers, DOE, state and federal regulators, and the public to have access to sampling data for hundreds of investigative wells and sampling events, solid waste management units, and site-specific GIS features from all of the environmental studies at the site. Project data is uploaded from Paducah OREIS to PEGASIS on a monthly basis.

Appendix B – Project Data Management Implementation Plan Template (Continued)

5. DATA MANAGEMENT TASKS AND ROLES AND RESPONSIBILITIES

5.1 DATA MANAGEMENT TASKS

The following data management tasks are numbered and grouped according to the activities summarized in Section. 1.2:

[Describe in detail the project's data management tasks. These tasks should map back to the appropriate data management activities that were summarized in Section. 1.2. Reference all procedures used to implement the specific tasks.]

5.2 DATA MANAGEMENT ROLES AND RESPONSIBILITIES

The following project roles are defined, and the responsibilities are summarized, for each data management task described in the previous subsection. Following the roles and responsibilities definitions is a table listing the project staff member(s) responsible for each task.

[Define the roles and summarize responsibilities, for each data management task described in the previous subsection. Create a table listing the person(s) responsible for each data management task described in the previous subsection. The following subsections describe general project data management roles and may be used as is, modified, or deleted, as appropriate]

5.2.1 Project Manager

The project manager has total responsibility for completing an assigned project. The project manager leads the effort to define the scope of an environmental problem or facility operation. With respect to data management, this involves directing the project team in determining potential sources of existing data, identifying the study area and/or facility to be addressed by the project, and selecting the most effective data collection approach to pursue. The project manager may also be the technical contact for subcontracted project support and should ensure that the flow down of data management requirements is defined in a statement of work (SOW).

5.2.2 Scientist

The scientist is the technical "owner" of a project and typically serves as a single point of contact for the project manager on all technical issues. This person will provide appropriate technical support during project conceptualization, scoping, execution, and post-action evaluation. The scientist also may be the technical contact for subcontracted project support and should ensure that the flow down of data management requirements is defined in a SOW.

5.2.3 Project Team

The project team consists of the technical staff and support staff (including the data management team) that conduct the various tasks required to successfully complete the project. Team members develop a conceptual model of the project site. Based on this model, they determine if more information is needed to make decisions about the site. If more sampling and analyses are needed, the team develops a work plan or sampling and analysis plan (SAP) to acquire that information. This team provides information needed by the decision makers (i.e., stakeholders).

5.2.4 Scientist/Data Entry Specialist

The scientist/data entry specialist enters field and analytical data into PEMS. The scientist/data entry specialist ensures that the project data are properly incorporated into Paducah OREIS. The scientist/data entry specialist must ensure that hard copy and electronic data records are processed according to project data records management requirements as stated in the DMIP.

Appendix B – Project Data Management Implementation Plan Template (Continued)

5.2.5 Sample Management Office

The sample management office has the responsibility for developing and implementing the project DMIP to ensure that project data management requirements are met. The sample management office sees to it that any existing data or new project data are properly incorporated into the project's hard copy data record file or data base, as appropriate. The sample management office is responsible for identifying and obtaining data management training for the project team. The sample management office is responsible for contracting any fixed-base laboratory utilized during the sampling activities. The sample management office also provides coordination of sample shipment to the laboratory and contractual screening of data packages.

The sample management office is responsible for ensuring implementation (when needed) of validation through the appropriate data validation plans. CP3-ES-5003, *Quality Assured Data,* along with applicable data validation plans, serves as the documented strategy for implementation of data validation to meet project needs and includes approaches for verifying that analytical and field data are complete and have accurately fulfilled requested analyses and contractual requirements.

The sample management office is responsible for laboratory data package deficiencies. When data validation is performed external to the project, the sample management office should prepare a validation SOW as the mechanism by which validation implementation requirements are communicated from the project to the validation organization.

The sample management office has the responsibility for ensuring that analytical and field data are validated against a defined set of criteria, (i.e., the project data validation plans) and includes evaluating associated QC samples to ensure that analyses were performed within specified control parameters. Validation problems must be identified and appropriately resolved. Qualifiers and reason codes may be assigned to the data to indicate usability concerns.

5.2.6 Environmental Monitoring Manager

The Environmental Monitoring Manager is responsible for long-term storage of project data and for transmitting data to external agencies according to the Paducah Site Data Management Plan and the Paducah Data Management Policy. The Environmental Monitoring Manager ensures compliance to procedures relating to data management with respect to the project and that the requirements of CP3-ES-5003, *Quality Assured Data,* are followed. The Environmental Monitoring Manager is also responsible for overseeing activities of the rest of the project data management team (for small projects, the data management team may be comprised of just a scientist).

5.2.7 Scientist

A scientist conducts specifically defined tasks associated with a project. A scientist will supervise the field team activities for preparation and surveys of field sites and facilities and field data collection. The scientist ensures that the field activities have been properly recorded and reviewed in the field logbooks or data collection forms. Responsibilities include identifying, recording, and reporting project non-conformance or deviations. The scientist also may be the technical contact for subcontracted project support and should ensure that the flow down of data management requirements is defined in a SOW.

Appendix B – Project Data Management Implementation Plan Template (Continued)

5.2.11 Field Team

The field team consists of those individuals who perform any activities taking place in the field (e.g., inspections, monitoring, sampling, well construction, purging, equipment installation). They will be responsible for recording field activities in field logs and data sheets.

A field team member will be responsible for reviewing field logs to determine if all applicable procedures were followed by the field team. This field team member ensures that all samples were properly labeled, instruments were calibrated prior to taking measurements, and information was recorded correctly.

5.2.12 Data User

Data users typically are members of the project team who require access to project information to perform reviews, analyses or ad hoc queries of the data. The data user determines project data usability by comparing the data against pre-defined acceptance criteria and assessing that the data are sufficient for the intended use. This person performs data reviews, as appropriate [e.g., quality checks; assessing precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS) parameter conformance; evaluating adherence to data quality requirements].

The data user also shall be responsible for retaining any unique computer code [e.g., SQL code, Statistical Analysis System (SAS) code, GIS coverage] used to generate data products (e.g., tables, graphs, maps) included in project reports. This requirement ensures that data products can be reproduced in the future.

WORKING COPY

VERIF. DATE: _____

INTIALS: _____

FLUOR

Fluor Federal Services, Inc. Paducah Deactivation Project

CP3-ES-5003 Rev. 0B	TITLE: Quality Assured Data	Page 1 of 38

DOCUMENT CATEGORY: ☒ Administrative ☐ Technical (Operations) ☐ Technical (Support)

LEVEL OF USE: ☒ Information Level ☐ Reference Level ☐ Continuous Use

ENVIRONMENTAL MANAGEMENT **SUBJECT MATTER AREA:** Environmental Monitoring	**WRITER :** Traci Curry, Scientist Signature: Traci Curry Date: 3/20/17
NUCLEAR SAFETY REVIEW DOCUMENTATION: FPDP-17-0167-S	**APPROVED BY:** Lisa Crabtree, Environmental Monitoring Manager Signature: Lisa Crabtree Date: 3/20/17
REQUIRED REVIEW DATE: 12/22/18	**EFFECTIVE DATE:** 3/21/17

REVISION/CHANGE LOG

Revision/Change Letter	Description of Changes	Pages Affected	Date of Revision/Change
0	Initial Release	ALL	12/22/15
0A	Changed CP3-ES-5007 to CP4-ES-5007, changed CP4-ES-5003-F01 to CP3-ES-5003-F01, changed page 1 to instructions page in 6.5 Note, changed page 4 to page 2 of CP3-ES-5003-F01 in section 6.5. Deleted Table D.2 (duplicate table); added Table D.4 in Appendix D. Added Paducah to Appendix H title. Revised forms: CP3-ES-5003-F01,-F02,-F03 changing CP4-ES-5003 to CP3-ES-5003 and adding form number to title.	3,6,7,8,9, 24,31,32, 33,34,35, 36,37,38	6/22/15
0B	Added Exceptions to section 1.2, added section 6.1 Note, and added language to section 6.5 Note regarding NCS and safety sample data.	3,5,8	3/20/17

TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure describes the process, including data collection and data review, to ensure consistent and quality assured data. This process ensures that all data released for decision making and/or external use have received adequate quality assurance reviews.

- Consistency is provided by the use of common resources and services such as the Sample Management Office (SMO), a centralized data system, and common definitions for data quality.
- Quality assured data is obtained through appropriate planning, adequate sampling and laboratory quality controls, and documented data review.

1.2 Scope

The requirements of this procedure apply to work performed by Fluor Federal Services, Inc. Paducah Deactivation Project (FPDP) for the U. S. Department of Energy (DOE)-owned Paducah Site and subcontractors. This procedure applies to screening and definitive data that is collected by all FPDP projects at Paducah. The procedure allows for flexibility in implementation for programs and projects based on data collection needs and final use of the data.

Exceptions:

This procedure does **NOT** apply to any of the following:

- Historical data as defined in Appendix A
- Data collected by the Safety and Health program
- Personnel and financial data
- Data generated through external agency operations, such as Kentucky Department for Environmental Protection
- Nondestructive assay (NDA) measurements
- Process technology data

ChgB

2.0 REFERENCES

2.1 Use References

- CP2-QA-1000, *Quality Assurance Program Description for the Fluor Federal Services, Inc., Paducah Deactivation Project*

2.2 Source References

- CP2-WM-0001, *Fluor Federal Services, Inc. Paducah Deactivation Project Waste Management Plan*
- CP4-ES-5007, *Data Management Coordination*
- EPA QA/G-4, *Guidance for the Data Quality Objectives Process*
- *EPA QA/G-9, Guidance for Environmental Data Quality Assessment*

ChgA

3.0 COMMITMENTS

NCSA GEN-001, *General Plant Limits for Activities Performed at PGDP*

4.0 RESPONSIBILITIES

4.1 Scientist/Data Entry Specialist

4.1.1 Assists the project in populating Project Environmental Measurements System (PEMS).

4.1.2 Performs loading of Electronic Data Deliverables (EDDs).

4.1.3 Performs electronic verification of data.

4.1.4 Tracks data assessment process.

4.2 Environmental Monitoring Manager

4.2.1 Ensures long-term electronic storage of data.

4.2.2 Performs loading of data into Paducah Oak Ridge Environmental Information System (OREIS).

4.2.3 Ensures compliance with Paducah Data Management Policy.

4.3 Data Reviewer

4.3.1 Performs data assessment.

4.3.2 Determines if quality assured data is generated.

4.4 Scientist

4.4.1 Serves as the primary contact for all matters relating to the analytical laboratories.

4.4.2 Performs contractual screenings.

4.4.3 Ensures that data validation deliverables meet the requirements specified in the Statement of Work (SOW).

4.5 Project Team

Assists team with the data collection planning, review, and decision making. May include but **NOT** limited to:

- Data Reviewer
- Environmental Monitoring Manager
- Project Manager
- QA Reviewer
- Quality Representative

- Requestor
- Sampling Personnel

4.6 QA Reviewer

Reviews data to ensure that data quality requirements are met.

4.7 Release Requester

Requests release of data to an external agency.

4.8 Requester

Coordinates sample collection, sample analysis, data assessment, and decision making.

4.9 Project Manager

Maintains responsibility and/or designates representatives, as needed:

- Technical lead
- Risk assessor
- Waste management coordinator
- Compliance coordinator
- Individual that needs data to support decision making

5.0 GENERAL INFORMATION

The collection, review, and management of data and information **NOT** addressed under this procedure are maintained in accordance with CP2-QA-1000, *Quality Assurance Program Description for the Fluor Federal Services, Inc., Paducah Deactivation Project.*

6.0 INSTRUCTIONS

NOTE:

Steps are performed sequentially unless otherwise noted.

6.1 Initiation of Data Collection

NOTE:

The DQO process used for data in support of making Nuclear Criticality Safety (NCS) decisions may deviate from Appendix D, *Options to Implementing and Documenting the DQO Process for Paducah Projects*, depending on NCS requirements. ChgB

Requester

6.1.1 Determine need for data to support the activity or program/project.

Requester/Project Team

6.1.2 Choose the Data Quality Objective (DQO) process option for the program or project outlined in Appendix D, *Options to Implementing and Documenting the DQO Process for Paducah Projects*.

6.1.3 Follow steps associated with the DQO process.

6.1.4 Select Quality Assurance (QA)/Quality Control (QC) requirements using Appendix E, *Data Quality Reference List* to incorporate into project plans.

6.1.5 Identify the data review steps for the project using Appendix F, *Options for Data Review*.

6.1.6 Ensure applicable plans, such as the Sampling and Analysis Plan (SAP), CP2-QA-1000, *Quality Assurance Program Description for the Fluor Federal Services, Inc., Paducah Deactivation Project*, Environmental Monitoring Plan (EMP), CP2-WM-0001, *Fluor Federal Services, Inc. Paducah Deactivation Project Waste Management Plan,* and Project Data Management Implementation Plan (DMIP) are in place.

6.1.7 Notify the SMO of electronic data quality checks that the project would like performed.

6.1.8 Contact the SMO to develop the analytical SOW for new activities **OR** to notify of sample requests that are routine.

NOTE:

Routine sampling activities [i.e., groundwater, environmental monitoring, Kentucky Pollutant Discharge Elimination System (KPDES), etc.] are reviewed on a periodic basis.

6.1.9 Ensure the SOW contains the required methods, detection limits, and deliverables. For samples requiring polychlorinated biphenyl (PCB) analysis (other than KPDES samples), the laboratory basic ordering agreement (BOA) includes the Toxic Substance Control Act (TSCA)/Federal Facilities Compliance Act (FFCA) signed agreement that is in place between DOE and the Environmental Protection Agency (EPA). The laboratory must comply with the agreement.

6.1.10 Ensure collection of samples and delivery/shipment to a SMO approved laboratory.

6.2 Laboratory Contractual Screening

Scientist

6.2.1 Upon receipt of data from the laboratory, conduct contractual screening using PEMS.

6.2.2 Resolve any issues identified during contractual screening with the laboratory.

6.2.3 Complete the appropriate sections of form CP3-ES-5003-F01, *Data Assessment Review Checklist and Comment Form* and document any exceptions to the SOW. ChgA

6.3 Data Verification

Scientist/ Data Entry Specialist

6.3.1 Perform electronic review **and** ensure data is flagged correctly.

6.3.2 Resolve any issues identified during electronic review.

6.3.3 **If** data has been corrected, **then** reevaluate using the electronic data review process **and** return to step 6.3.1.

Requester/Project Team/Scientist

6.3.4 **If** deviations in the data cannot be readily resolved with the samplers, laboratory, and requester, **then** determine the usability of the data or the need for additional review of the data.

Scientist/ Data Entry Specialist

6.3.5 Notify the Requester/Project Team that contractual screening and data verification has been completed and that the data is ready for assessment.

6.4 Data Validation

NOTE:

Data validation must be accompanied by data assessment and is performed concurrent with data verification and data assessment.

If Level II, Level III, or Level IV data validation is required, **then** completions of CP3-ES-5003-F03, *Data Verification Checklist* and CP3-ES-5003-F01, *Data Assessment Review Checklist and Comment Form* are required.

Requester/Project Team/Scientist

6.4.1 Initiate data validation as defined in Step 6.1.6.

6.4.2 **If** data validation is **NOT** required for the remaining data set, **then** proceed to Section 6.5.

Scientist

6.4.3 Develop a SOW for the validation activity.

6.4.4 Submit the laboratory data packages to the validator or validation service selected.

6.4.5 Upon receipt of the validation deliverables, conduct a contractual screening against the validation SOW.

6.4.6 Review the results of the validation process.

6.4.7 **If** validation or deliverables are **NOT** acceptable, **then** resolve discrepancies with validator or validation service until acceptable.

6.4.8 Enter validation qualifiers into PEMS **and** ensure a QC check is performed as required by CP4-ES-5007, *Data Management Coordination,* if validation qualifiers are entered manually. Chg A

6.4.9 Notify the Requester/Project Team that data validation is complete.

6.4.10 Provide the Requester/Project Team with an electronic and/or hard copy of the data, quality checks, and validation results (if applicable).

Requester/Project Team

6.4.11 Document the performance of data validation on CP3-ES-5003-F01, *Data Assessment Review Checklist and Comment Form.*

6.5 Data Assessment and Determination of Data Usability

NOTE:

Data validation can help ensure analyses are correct; however, data assessment must be performed to determine the data quality level (Data of Known Quality or Information only Data) and to ensure data is useable.

Additional instructions for completing CP3-ES-5003-F01, *Data Assessment Review Checklist and Comment Form,* are provided on instructions page of CP3-ES-5003-F01, *Data Assessment Review Checklist and Comment Form.* Chg A

Assay data may be provided to the project prior to undergoing data verification and data assessment due to projects having to make real-time decisions in the field.

The official lab data report that includes uncertainty will be provided for data collected in support of making NCS decisions. The data will be loaded to PEMS and will undergo data verification and data assessment, but data verification and data assessment will not be performed prior to providing the lab data report to the project and NCS. Chg B

UF_6 safety sample data will be provided to operations personnel prior to undergoing data verification and data assessment due to projects having to make real-time decisions in the field.

Scientist

6.5.1 Ensure data verification checks have been completed on CP3-ES-5003-F01, *Data Assessment Review Checklist and Comment Form,* or CP3-ES-5003-F03, *Data Verification Checklist,* if Level II, Level III, or Level IV data validation is required.

6.5.2 Print all verification queries such as contractual screening, holding time exceedances, etc.

6.5.3 Print any additional queries or reports generated from Paducah PEMS, field data report (if applicable), lab data report, lab comments, assessment information such as data loading notes, etc.

6.5.4 Note any questions, comments, or follow-up actions in the data assessment package as follows:

A. Initial **and** date the comments and notes in black or blue ink.

B. Write legibly.

C. Complete the forms in black ink.

6.5.5 Provide the data reviewer, assigned by the requestor/project team, with a data assessment package, which includes the information listed in Steps **6.5.1** and **6.5.2** as well as the required forms.

Data Reviewer assigned by the requestor / project team

6.5.6 Begin data assessment using CP3-ES-5003-F01, *Data Assessment Review Checklist and Comment Form.*

6.5.7 Review the analytical data by looking at the hard copy data printouts, queries, reports, and other documentation provided in the data assessment package.

6.5.8 Complete the applicable shaded areas and the questions on CP3-ES-5003-F01, *Data Assessment Review Checklist and Comment Form.*

6.5.9 **If** needed, **then** document any notes or comments on page 2 of CP3-ES-5003-F01, *Data Assessment Review Checklist and Comment Form* **and** perform the following: Chg A

A. Return form to the SMO.

or

B. Send comments via e-mail to the SMO.

6.5.10 Return the data assessment package to the SMO.

NCSA GEN-001

6.5.11 **If** samples are taken for NCS purposes, **then** verbal relay of analytical results shall be prohibited.

Scientist

6.5.12 Resolve any issues noted in the data assessment package by the Data Reviewer **and** ensure a documented response (either written or e-mail) is included in the data assessment package.

6.5.13 Provide the data assessment package to the DATA Reviewer to ensure all comments or issues have been resolved.

Data Reviewer assigned by the requestor/project team

6.5.14 Sign CP3-ES-5003-F01, *Data Assessment Review Checklist and Comment Form,* **AND** return the data assessment package to the SMO.

Scientist

6.5.15 Provide the data assessment package to the QA Reviewer.

QA Reviewer

6.5.16 Review the data assessment package.

6.5.17 **IF** needed, **then** document any notes or comments on page 2 of CP3-ES-5003-F01, *Data Assessment Review Checklist and Comment Form* **and** perform the following: Chg A

A. Return form to the SMO.

or

B. Send comments via e-mail to the SMO.

6.5.18 Return the data assessment package to the SMO.

Scientist

6.5.19 Resolve any issues noted in the data assessment package by the QA Reviewer **and** ensure a documented response (either written or e-mail) is included in the data assessment package.

6.5.20 Provide the data assessment package to the QA Reviewer to ensure all comments or issues have been resolved.

QA Reviewer

6.5.21 Sign CP3-ES-5003-F01, *Data Assessment Review Checklist and Comment Form,* **and** return the data assessment package to the SMO.

Data Entry Specialist/Scientist

6.5.22 Generate a "clean" hard copy data printout from Paducah PEMS to include any corrections that may have been made to the data set **and** place it in the data assessment package.

6.5.23 Format data for loading to Paducah OREIS by creating a Ready-to-Load (RTL) file.

6.5.24 Load data (RTL file) to Paducah OREIS.

6.5.25 After data has been loaded to Paducah OREIS, ensure all emails **and** the required forms are included in the data assessment package in proper order.

Requester/ Project Team

6.5.26 Make project decisions based on data.

6.5.27 **If** additional data needs to be collected, **then** return to Step **6.1.2**.

6.6 Data Release to External Agencies

Release Requester/SMO

NOTE:

A Derivative Classifier (DC) review is requested to ensure that the data or document does **NOT** contain any classified information. This review is required in order to flag data in Paducah OREIS as being approved for release. A Technical Information Officer (TIO) review is required prior to release of documents and/or information (e.g., data) to any parties outside FPDP, its subcontractors, and DOE. The DC and TIO reviews are only required for data related to non-environmental matrices.

6.6.1 Complete CP3-ES-5003-F02, *Paducah Data Release to External Agencies Form.*

6.6.2 Ensure all necessary signatures are present.

NOTE:

Electronic data formats will contain information to indicate data source and may contain data qualifier definitions. Hardcopy data formats will contain a cover letter to indicate data source.

6.6.3 Transmit data, either hard copy or electronically, as requested.

6.7 Records Management

Data Entry Specialist/Requester

6.7.1 Ensure all project records associated with the data collection activity, including all forms generated from this procedure, are transmitted to Records Management for submittal to Document Control for final disposition.

7.0 RECORDS

7.1 Records Generated

The following records may be generated by this procedure:

- Applicable queries, reports, and e-mails documenting identified deficiencies. CP3-ES-5003-F01, *Data Assessment Review Checklist and Comment Form*
- CP3-ES-5003-F02, *Paducah Data Release to External Agencies Form*
- CP3-ES-5003-F03, *Data Verification Checklist*
- DQOs (e-mails, meeting minutes, SAP, answers to Appendix D questions, if applicable).
- Data Validation deliverables consisting of the validation SOW, validation report, and validation-qualified laboratory results (qualified Form I's and e-mails documenting identified deficiencies)

7.2 Records Disposition

The records are to be maintained in accordance with CP3-RD-0010, *Records Management Process*.

Appendix A – Acronyms/Definitions

ACRONYMS

ASTM – American Society for Testing Materials

BOA –Basic Ordering Agreement

COC – Chain of Custody

DC – Derivative Classifier

DMIP – Data Management Implementation Plan

DOE – United States Department of Energy

DQO – Data Quality Objectives

EDD – Electronic Data Deliverables

EMP – Environmental Monitoring Plan

EPA – United States Environmental Protection Agency

FFCA – Federal Facilities Compliance Act

FPDP – Fluor Federal Services, Inc., Paducah Deactivation Project

KPDES– Kentucky Pollutant Discharge Elimination System

MS – Matrix Spike

MSD – Matrix Spike Duplicate

NCS – Nuclear Criticality Safety

NCSA – Nuclear Criticality Safety Approval

OREIS – Paducah Oak Ridge Environmental Information System

OVA – Organic Vapor Analysis

PARCCS – Precision, Accuracy, Representativeness, Completeness, Comparability, Sensitivity

PEMS – Project Environmental Measurements System

QA – Quality Assurance

QC – Quality Control

RMDC – Records Management and Document Control

RI/FS – Remedial Investigation/Feasibility Study

Appendix A – Acronyms/Definitions (Continued)

RTL – Ready-to-Load

SAP – Sampling and Analysis Plan

SMO – Sample Management Office

SOW – Statement of Work

TIO – Technical Information Officer

TSCA – Toxic Substance Control Act

VOA – Volatile Organic Analysis

WMP – Waste Management Plan

DEFINITIONS

Contractual Screening – A process of evaluating a set of data against the requirements specified in the SOW to ensure that all requested information is received. The contractual screening includes, but is **NOT** limited to, the chain of custody (COC), analytes requested, method used, electronic data deliverables, units, holding times, and reporting limits achieved.

Data Assessment – A process for assuring that the type, quality, and quantity of data are appropriate for their intended use. It allows for the determination that the decision (or estimate) can be made with the desired level of confidence, given the quality of the data set. Data Assessment follows Data Verification and can be performed in parallel with Data Validation. Data Assessment must be performed to ensure data is useable.

Data Assessment Package – A package that includes data printouts from the integrated data system (i.e., Paducah PEMS), laboratory and sample management comments, CP3-ES-5003-F01, *Data Assessment Review Checklist and Comment Form*, routine queries generated to aid in the review of the data, and after the review is completed, any questions or comments by the Data Reviewer, SMO, or QA Reviewer. This package is submitted as a record to RMDC.

Data of Known Quality – Data, along with appropriate laboratory, verification, validation, and assessment qualifiers, that can be used for decision making purposes and was collected and managed according to this procedure.

Data Quality Checks – A list of quality control elements associated with a data collection activity, which are evaluated during data verification, data validation, and/or data assessment

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

Appendix A – Acronyms/Definitions (Continued)

Data Validation – A process performed for a data set by a qualified individual independent from sampling, laboratory, project management, or other decision making personnel for the project. Data validation evaluates the laboratory adherence to analytical method requirements.

Data Verification – A process for comparing a data set against a set standard or contractual requirement. Verification may be performed electronically, manually, or by a combination of both. Data verification includes contractual screening and can include other data quality checks established by the project team.

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

Electronic Data Deliverables (EDD) – Data that is received in electronic format from a laboratory, either through transfer on physical media or direct communication between computerized data management systems. EDD contents must meet defined completeness, consistency, and format requirements. These criteria are defined in the analytical SOW for each project.

External Agency – Any organization external to FPDP, its subcontractors, and DOE.

Historical Data – Data which was collected and managed prior to implementation of this procedure.

Information Only Data – Data for which quality is **NOT** assured and may or may **NOT** contain the appropriate qualifiers; however, data can be used for informational purposes or can be used for decision making with relevant documentation.

PARCCS Parameters – Precision, Accuracy, Representativeness, Completeness, Comparability, Sensitivity, as explained in Appendix E.

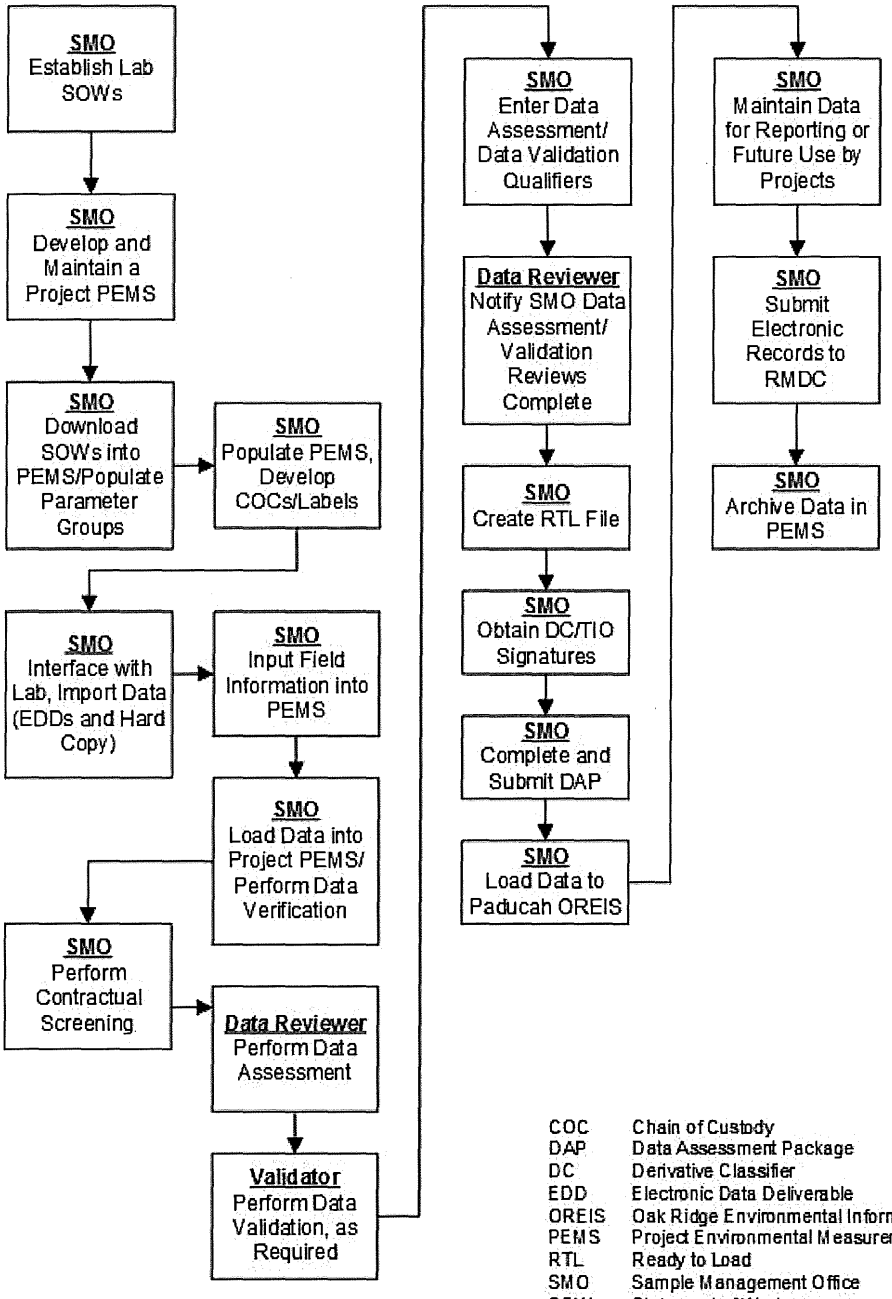
Quality Assured Data – Data that has undergone a documented review, as specified by this procedure, to provide adequate confidence that the data conforms to established technical requirements and is sufficient for the intended use.

Quality Reviewer –Performs independent review of data assessment package and verifies completion of assessment. QA Reviewer can be personnel from SMO, Waste Characterization Organization, project team, etc. Quality reviewer may not be the same personnel performing the data assessment review.

Screening Data – Measurements generated through the use of field or fixed laboratory methods in which the level of certainty in the data cannot be determined given physical evidence documenting the acquisition and analysis of the sample. Analytical methods producing field measurements or screening quality data include those that indicate the presence or absence of an analyte or class of analytes, or provide a semi-quantitative (estimated) result. Field measurement and other screening quality data include, but are **NOT** limited to, Draeger tube; organic vapor analysis (OVA); soil gas surveys; radiation and contamination monitoring; and measurements for pH, conductivity, temperature, dissolved oxygen, and turbidity. Screening data results may be confirmed by collecting a specified percentage of definitive data.

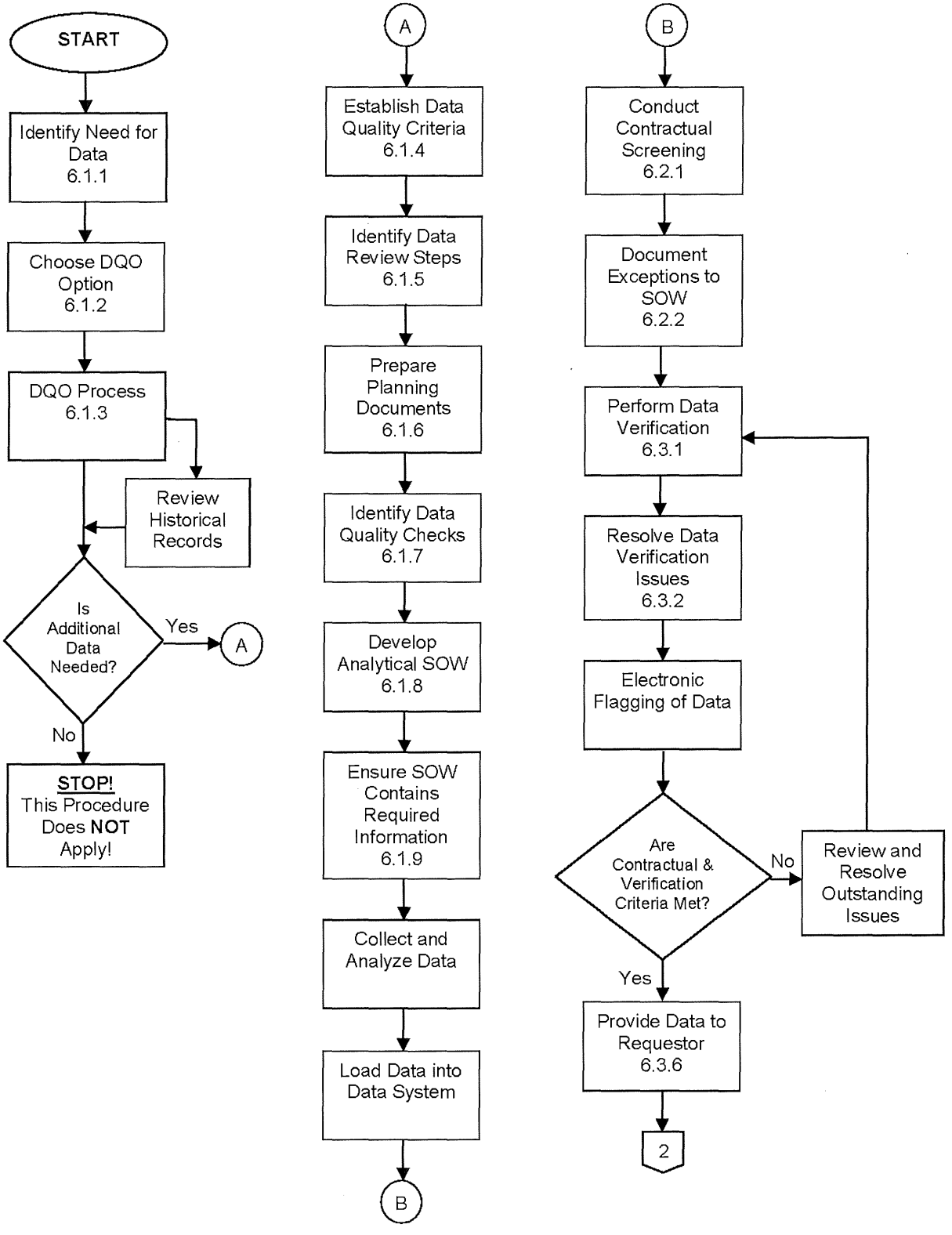
Statement of Work - The contractual agreement between the requesting organization and the service provider. The SOW defines the scope of work including associated QA/QC, schedules, and deliverables.

Appendix B – Paducah Sampling and Data Management Flowchart

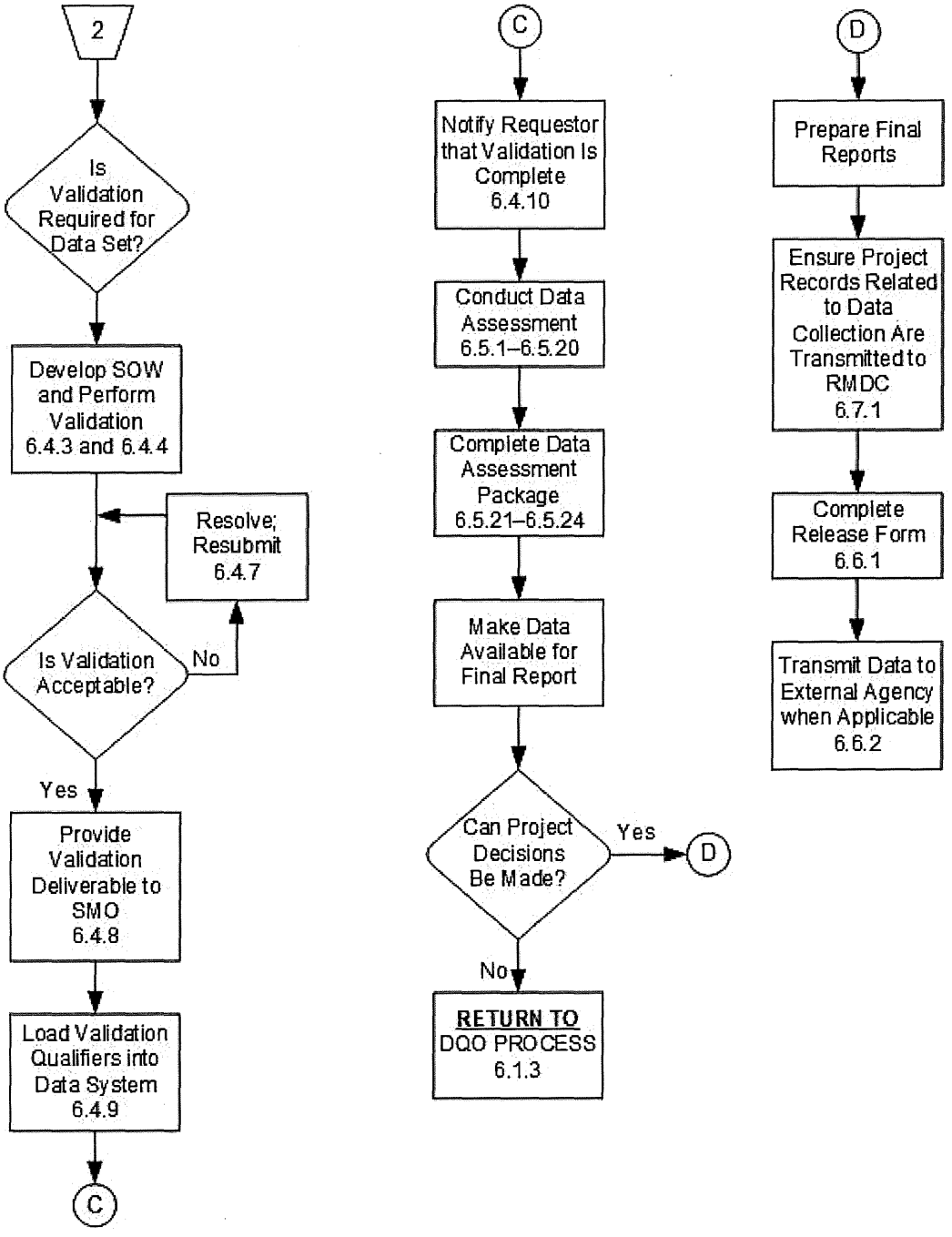


COC	Chain of Custody
DAP	Data Assessment Package
DC	Derivative Classifier
EDD	Electronic Data Deliverable
OREIS	Oak Ridge Environmental Information System
PEMS	Project Environmental Measurements System
RTL	Ready to Load
SMO	Sample Management Office
SOW	Statement of Work
TIO	Technical Information Officer

Appendix C – DATA CYCLE FLOWCHART



Appendix C – DATA CYCLE FLOWCHART (Continued)



Appendix D – OPTIONS TO IMPLEMENTING AND DOCUMENTING THE DQO PROCESS FOR PADUCAH PROJECTS

INTRODUCTION

The DQO process is a scientific and legally-defensible data collection and planning process to help users decide what type, quality, and quantity of data will be sufficient for decision making. This attachment is based on a series of planning steps designed to assure that data collected is adequate for the intended purpose.

PURPOSE

The purpose of this appendix is to provide options for implementing and documenting the DQO process.

DQO OPTIONS AND APPLICABILITY

Option 1

For Environmental Remediation projects, the detailed approach as found in the EPA *Guidance for the Data Quality Objectives Process* (EPA QA/G-4) is appropriate. For long-term environmental monitoring sampling programs and extensive waste sampling activities, this detailed and structured approach can be useful. However, full implementation of the process may not always be appropriate.

Option 2 (Minimum Requirements)

The following tables are provided for guidance in documenting a simplified version of the DQO process. Use the applicable table for your project.

Table D.1 – ENVIRONMENTAL MONITORING PROJECTS – DQO PROCESS
Table D.2 – ENVIRONMENTAL RESTORATION PROJECTS – DQO PROCESS
Table D.3 – SITE CHARACTERIZATION PROJECTS – DQO PROCESS
Table D.4 – WASTE CHARACTERIZATION PROJECTS – DQO PROCESS

Option 3

A user-defined DQO process that includes the minimum requirements from Option 2 and any additional actions needed.

Appendix D – OPTIONS TO IMPLEMENTING AND DOCUMENTING THE DQO PROCESS FOR PADUCAH PROJECTS (Continued)

APPLICABILITY EXCLUSIONS

This attachment is **NOT** applicable to PCB spills, asbestos events, and environmental spills due to the quick response time and the well-defined actions to be taken in the event of the occurrence.

DOCUMENTATION

Documentation of the DQO process is required and will do the following:

- Provide a source of historic data and process knowledge for related sampling,
- Provide a tool for conducting data assessment,
- Facilitate efficient project management transfers, or
- Allow decisions to be recalled and defended.

The documentation may be presented in various ways and will include:

- An outline or text form following the format shown in this attachment. Include responses to the questions as separate, brief accounts of the information gathered, its sources, and the rationale for decisions made.
- References to various other documents, such as SAPs, QAPs, EMPs, WMPs, DMIPs, etc., as necessary.
- An e-mail is routinely provided for special sampling requests. When special sampling is requested, the e-mail will be printed and will serve as the DQO documentation.

Appendix D – OPTIONS TO IMPLEMENTING AND DOCUMENTING THE DQO PROCESS FOR PADUCAH PROJECTS (Continued)

Table D.1 – ENVIRONMENTAL MONITORING PROJECTS – DQO PROCESS

1. **The Problem and the Decision**--(The drivers for data collection activities.)
   - What is the description of the area of concern? (Where is the current location?)
   - What are the contaminants or analytes of interest? (What is the media of concern? What are the suspected contaminants? How were they selected? What are the known or potential routes of migration? What are the known or potential human and environmental receptors? What are the exposure pathways?)
   - What decision needs to be made regarding the area (i.e., disposition of waste, etc.)?

2. **Inputs to the Decision**--(The sources of data and information used to make the decision.)
   - What historical data exists? Is it adequate for use?
   - What process knowledge exists? Is it adequate for use?
   - What additional data must be collected? (What are the analytes and analytical methods?)

3. **Physical Boundaries to be Considered**--(Physical characteristics that affect the sampling design.)
   - What is the location of the potential contamination? (What are the depth and boundaries/geometry of the potential contamination area?)
   - What considerations affect the sample location choices? (Is the intention to characterize the average of the environmental media? What are the site conditions that affect sampling [i.e., power lines, trees, concrete pad, etc.]? Is it homogenous? Is the contamination level expected to be a continuous range?)
   - Are there other sampling constraints, such as temporal, schedule, seasonal concerns, regulatory requirements, etc.?

4. **Decision Statement and Uncertainty**
   - What are the steps to be taken after the analytical results are received? (Is this preliminary sampling? What results will trigger further testing, verification, or action? What additional steps will be taken? If I find ...., then what will I do? Consider the potential impact for making an incorrect decision based on the data.)

5. **Develop the Data Sampling Design**
   - State the type of data to be obtained. (Will it be screening, definitive, or a combination?)
   - State the approach to sample selection. (Will it be grab or composite, judgmental [selective] or random? Will it be a statistically-based selection?)
   - Optimize the design and approach for efficiency and effectiveness. (What confidence intervals are needed? What QA/QC will be required by sample method or this procedure? For minimum quality criteria, see Appendix E. For data validation requirements, see Appendix F. What additional QA/QC is requested?)

Appendix D – OPTIONS TO IMPLEMENTING AND DOCUMENTING THE DQO PROCESS FOR PADUCAH PROJECTS (Continued)

Table D.2 – ENVIRONMENTAL RESTORATION PROJECTS – DQO PROCESS

1. **The Problem and the Decision**--(The drivers for data collection activities.)
   - What is the description of the area of concern? (Where is the current location?)
   - What are the contaminants or analytes of interest? (What is the media of concern? What are the suspected contaminants? How were they selected? What are the known or potential routes of migration? What are the known or potential human and environmental receptors? What are the exposure pathways?)
   - What are potential corrective actions for this problem?
   - What decision needs to be made regarding the area (i.e., disposition of waste, etc.)?

2. **Inputs to the Decision**--(The sources of data and information used to make the decision.)
   - What historical data exists? Is it adequate for use?
   - What process knowledge exists? Is it adequate for use?
   - What additional data must be collected? (What are the analytes and analytical methods?)

3. **Physical Boundaries to be Considered**--(Physical characteristics that affect the sampling design.)
   - What is the location of the potential contamination? (What are the depth and boundaries/geometry of the potential contamination area?)
   - What considerations affect the sample location choices? (Is the intention to characterize the average of the environmental media or do you need to know the "hot spots"? What are the site conditions that affect sampling [i.e., power lines, trees, concrete pad, etc.]? Is it homogenous? Is the contamination level expected to be a continuous range?)
   - Are there other sampling constraints, such as temporal, schedule, seasonal concerns, regulatory requirements, etc.?

4. **Decision Statement and Uncertainty**
   - What are the steps to be taken after the analytical results are received? (Is this preliminary sampling? What results will trigger further testing, verification, or action? What additional steps will be taken? If I find ...., then what will I do? Consider the potential impact for making an incorrect decision based on the data.)

5. **Develop the Data Sampling Design**
   - State the type of data to be obtained. (Will it be screening, definitive, or a combination?)
   - State the approach to sample selection. (Will it be grab or composite, judgmental [selective] or random? Will it be a statistically-based selection?)
   - Optimize the design and approach for efficiency and effectiveness. (What confidence intervals are needed? What QA/QC will be required by sample method or this procedure? For minimum quality criteria, see Appendix E. For data validation requirements, see Appendix F. What additional QA/QC is requested?

Appendix D – OPTIONS TO IMPLEMENTING AND DOCUMENTING THE DQO PROCESS FOR PADUCAH PROJECTS (Continued)

Table D.3 – SITE CHARACTERIZATION PROJECTS – DQO PROCESS

1. **The Problem and the Decision**--(The drivers for data collection activities.)
   - What is the description of the area of concern? (Where is the location?)
   - What are the boundaries of the area that will be characterized?
   - What are the contaminants or analytes of interest? (What is the media of concern? What are the suspected contaminants? How were they selected?)

2. **Inputs to the Decision**--(The sources of data and information used to make the decision.)
   - What historical data exists? Is it adequate for use?
   - What process knowledge exists? Is it adequate for use?
   - What additional data must be collected? (What are the analytes and analytical methods?)

3. **Physical Boundaries to be Considered**--(Physical characteristics that affect the sampling design.)
   - What is the location of the potential contamination? (What are the depth and boundaries/geometry of the potential contamination area?)
   - What considerations affect the sample location choices? (Is the intention to characterize the average of the environmental media? What are the site conditions that affect sampling [i.e., power lines, trees, concrete pad, etc.]? Is it homogenous? Is the contamination level expected to be a continuous range?)
   - Are there other sampling constraints, such as temporal, schedule, seasonal concerns, regulatory requirements, etc.?

4. **Decision Statement and Uncertainty**
   - What are the steps to be taken after the analytical results are received? (Is this preliminary sampling? For what event? What results will trigger further testing, verification, or action? What additional steps will be taken? If I find ...., then what will I do? Consider the potential impact for making an incorrect decision based on the data.)

5. **Develop the Data Sampling Design**
   - State the type of data to be obtained. (Will it be screening, definitive, or a combination?)
   - State the approach to sample selection. (Will it be grab or composite, judgmental [selective] or random? Will it be a statistically-based selection?)
   - Optimize the design and approach for efficiency and effectiveness. (What confidence intervals are needed? What QA/QC will be required by sample method or this procedure? For minimum quality criteria, see Attachment E. For data validation requirements, see Appendix F. What additional QA/QC is requested?)

Appendix D – OPTIONS TO IMPLEMENTING AND DOCUMENTING THE DQO PROCESS FOR PADUCAH PROJECTS (Continued)

Table D.4 – WASTE CHARACTERIZATION PROJECTS – DQO PROCESS

Chg A

The Problem and the Decision--(The drivers for data collection activities.)

- What is the description of the waste? (Where and when was it generated? What is the media and the volume? Where is it now?)
- Who needs information about the waste? Why do they need the information? (Waste Management for characterization purposes? Waste Management to determine TSD options? Waste Management to meet a specific vendor's WAC?)
- What are the contaminants or analytes of interest? (What are the suspected contaminants? How were they selected?)
- What decision needs to be made regarding the area (i.e., disposition of waste, etc.)?

2. **Inputs to the Decision**--(The sources of data and information used to make the decision.)
   - What historical data exists? Is it adequate for use?
   - What process knowledge exists? Is it adequate for use?
   - What additional data must be collected? (What are the analytes and analytical methods?)

3. **Physical Boundaries to be Considered**--(Physical characteristics of waste that affect sampling design.)
   - What is the location of the potential contamination? (Surface contamination or volumetric?)
   - What considerations affect the sample location choices? (Is the intention to characterize the average of the waste stream or do you need to know the "hot spots"?)
   - How is the waste containerized?
   - Are there sampling problems? (What is the geometry of the waste? Is it homogenous? Is the contamination level expected to be a continuous range?)
   - Are there other sampling constraints, such as temporal, schedule, seasonal concerns, regulatory requirements, etc.?

4. **Decision Statement and Uncertainty**
   - What are the steps to be taken after the analytical results are received? (Is this preliminary sampling? What results will trigger further testing, verification, or action? What additional steps will be taken? If I find ...., then what will I do? Consider the potential impact for making an incorrect decision based on the data.)

5. **Develop the Data Sampling Design**
   - State the type of data to be obtained. (Will it be screening, definitive, or a combination?)
   - State the approach to sample selection. (Will it be grab or composite, judgmental [selective] or random? Will it be a statistically-based selection?)
   - Optimize the design and approach for efficiency and effectiveness. (What confidence intervals are needed? What QA/QC will be required by sample method or this procedure? For minimum quality criteria, see Appendix E. For data validation requirements, see Appendix F. What additional QA/QC is requested?)

Appendix E – DATA QUALITY REFERENCE LIST

INTRODUCTION

The following information is an aid to the project manager, project scoping team members, and/or DQO facilitators to select the project data quality elements. This information should be obtained during the sampling design optimization step in Appendix D, Step 5, or the DQO Process, Step 7. The minimum requirements are listed for screening and/or definitive data. A program/project manager may choose to implement quality control above the minimum requirements; however, certain data quality elements are not applicable to screening data.

PURPOSE

The purpose of this appendix is to provide a reference list of data quality elements and data quality requirements for a data collection activity. The selected elements should be incorporated into applicable project plans.

SCREENING AND DEFINITIVE DATA

There are two types of data generated using this procedure. Screening Data is defined in Appendix A and generally refers to qualitative data. Screening data has been previously termed EPA Levels I and II. In order to increase confidence, screening data results should be confirmed by collecting a specified percentage of definitive data. The recommended percentage of definitive data for confirming screening data is 10 percent. This, in turn, makes the data more usable for decision making. Definitive Data also is defined in Appendix A and describes data usually generated from a fixed-based laboratory following appropriate quality control requirements for various analytical methods.

Definitive data has been previously termed EPA Levels III, IV and V. In this appendix and in appendix F, screening data is categorized by S, S1, or S2, depending on the level of detail needed for the data collection activity. Definitive data is categorized by D, D3A, D3B, D4, and D5. Appendix F provides additional explanation and examples for the categories.

Appendix E – DATA QUALITY REFERENCE LIST (Continued)

PARCCS PARAMETERS

Data are only useable if the precision and accuracy is known. Data is only useable for decision making if it is also precise, accurate, representative of the whole, comparable to expectations, complete as planned, and sensitive as needed. These requirements are known as the PARCCS parameters and are explained in detail below. Data quality criteria should be chosen to address all six parameters. The PARCCS parameters should be reviewed during data assessment.

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

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

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

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

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

Sensitivity – the sensitivity of analysis (or the detection limit) is determined by the analytical method and the laboratory analyst and instrumentation.

Appendix E – DATA QUALITY REFERENCE LIST (Continued)

DATA QUALITY REFERENCE LIST		
Data Quality Element	**Minimum For: Screening (S) Definitive (D)**	**PARCCS**
Field Sampling Quality Control		
Sample Logbooks	S, D	Representativeness, Completeness
Sample Chain of Custody (COC)	S, D	Representativeness, Completeness
Transcription - Logbook vs. COC	S, D	Representativeness, Completeness
Containers	S, D	Representativeness
Preservation	S, D	Representativeness
Field Duplicates	S, D (5% Min for S, D)	Precision
Trip Blanks (VOA Only)	S, D (5% Min for S, D)	Accuracy
Field Blanks	S, D (5% Min for S, D)	Accuracy
Equipment Rinseates	S, D (5% Min for S, D)	Accuracy
Sampling Completeness Requirement		Representativeness, Completeness
Field/Laboratory Methods[a]	**Screening:** Analyte or instrument specific **Definitive:** SW-846, EPA, ASTM	
Analytical/Measurement Quality Control[b]		
Initial Calibration of Instrument	S, D	Accuracy
Calibration Check of Instrument	S, D	Accuracy
Calibration Range	S, D	Accuracy
Reporting Detection Limits (Method)	S, D	Comparability, Sensitivity
Analytical Error Determination	D	Precision, Accuracy
Laboratory COC	S, D	Representativeness, Completeness
Transcription COC vs Samples	S, D	Representativeness, Completeness
Holding Times	S, D	Representativeness, Comparability
Analytical Method	S, D	Comparability
Method Units	S, D	Accuracy, Comparability
Calculation Verifications	S, D	Representativeness, Completeness
Transcription-Lab data vs. EDD/Report	D	Representativeness, Completeness
Analytical Completeness Requirement	S, D	Precision
Lab Duplicates	S[b], D[b]	Accuracy, Precision
Blank Duplicates	D	Accuracy
Reagent Blanks	D[b]	Accuracy
Method Blanks	D[b]	Accuracy
Spikes/Laboratory Control Samples	D[b]	Accuracy
Matrix Spikes	D[b]	Precision
Matrix Spike Duplicates	D[b]	Accuracy
Post Digestion Spikes	D[b]	Precision, Accuracy
Performance Samples	S[b], D[b]	Accuracy
Interference Check Samples	D[b]	Accuracy

Appendix E – DATA QUALITY REFERENCE LIST (Continued)

DATA QUALITY REFERENCE LIST		
Data Quality Element	**Minimum for: Screening (S) Definitive (D)**	**PARCCS**
Analytical Deliverables	Electronic Data Deliverables (EDD) and hard copy results	
Identification number (sample number or location name)	S, D	
Date/time sampled	S, D	
Lab sample number	D	
Date analyzed	S, D	
Date completed	S2, D	
Parameter/analyte	S, D	
Qualifier	S, D	
Results	S, D	
Units	S, D	
Comments	S2, D	
Method (lab and field)	S2, D	
Blanks	S2, D	
Spikes (MS*, MSD*, blank [DI water spiked-provides feedback on the matrix effect])	D	
Surrogates, if applicable		
Lab duplicates*	D	
Reporting Detection Limits	D	
Former Level III Data Package	D	
Former Level IV Data Package	These data packages include minimum definitive data elements plus additional information.	
Former Level V Data Package		
Data Verification Percentages	S, D 100% for both	
Data Validation Percentages	D 5% Min**	
Data Assessment[c]	100%	

[a] If ER, waste characterization, or compliance monitoring activities are planned, SW-846 methods must be considered. If SW-846 methods are **NOT** available, use EPA-approved methods. If a remedial design is planned, ASTM methods must be considered. If environmental monitoring data is collected, EPA methods must be considered.

[b] Analytical quality control is dependent on the method specified.

[c] NOTE: 100% of the data should be assessed. However, individual project records, such as logbooks, chain of custody forms, etc., should be reviewed on a project designated frequency.

* Lab duplicates are optional and can be performed at lab or customer request. If doing a field duplicate, a lab duplicate is not value added.

** A greater percentage of validation may be required for some projects (i.e., risk assessments and remedial investigations). The project teams can increase as needed to ensure valid data.

S = S1 or S2 as defined in Appendix F.

D = D3A, D3B, D4, or D5 as defined in Appendix F.

Appendix F – OPTIONS FOR DATA REVIEW

INTRODUCTION

To ensure the process for data quality continues, data review must be performed for results received from a data collection activity. The three elements of data review outlined in this procedure are verification, validation, and assessment.

PURPOSE

The purpose of this appendix is to provide guidelines for data review. The documentation checklist to be used for assessment of a data collection activity is also provided in this appendix.

DATA VERIFICATION

Data verification is the first step of data review. The preferred method for performing verification is electronic. Verification criteria are documented using the Data Assessment Review Checklist or the Data Verification Checklist (if Level II, Level III, or Level IV data validation is required). The extent of verification is based on the data category as demonstrated in the table below.

DATA VALIDATION

Data validation follows verification in the data review process. The data validation options in this appendix are similar to the format specified by the former EPA data quality levels with the exception of diverging from the former EPA Level III data validation. Grade 3A, as listed in the following Review Options and Applicability table, is a less rigorous form of validation based on the minimum data deliverable requirements. Grade 3B, Grade 4, and Grade 5 are the same as the former EPA Level III, Level IV, and Level V data validation, respectively. All grades of validation must be performed by a third party. Third party validation is defined as validation performed by persons independent from sampling, laboratory, and decision making for the project (i.e., not the project manager). Data validation is documented in a formal deliverable from the data validator. The option chosen (level and frequency) for validation is based on data category and the following considerations:

- Regulatory drivers/requirements
- End-user of data
- Future applicability of the data (other users such as regulatory agencies, risk assessment personnel, internal users, etc.)
- Legal ramifications and defensibility of data
- Confidence in laboratory

The data set to be validated may be determined programmatically or by the individual project. The option chosen for data validation should be made by the project team.

DATA ASSESSMENT

Data assessment is the last review step prior to release of the data from the project team. It is an integration of all information collected about a result. Data verification and validation can ensure analyses are correct; however, data assessment must be performed to evaluate data usability. This includes a review of the data itself, the results of all previous reviews of the data, and evaluation against the intended purpose for data collected. Data assessment must be performed for all data collection activities and documented using the Data Assessment Review Checklist. Data assessment is required prior to use of the data, or data release into the final data repository (i.e., Paducah OREIS). Data assessment frequency is determined based on decision making and releasibility requirements. This decision is made by the project team.

Appendix F – OPTIONS FOR DATA REVIEW (Continued)

REVIEW OPTIONS AND APPLICABILITY

Data Category	Examples for Generation of Category	Former Level of Data	Data Verification	Data Validation	Data Assessment
Screening Data S1	OVA Qualitative	Level I or A	100% Grade 1 or None Review only the sample results presented.	NA	100%
Screening Data S2	Portable field GC Hydrolab pH, Conductivity Qualitative Semiquantitative	Level II or B	100% Grade 2 Electronic review of data. Review of quality control samples as defined in the Data Assessment Review Checklist	NA	100% Comparison to definitive data results, if applicable.
Definitive Data D3A	Routine laboratory Quantitative	Level III or C	100% Grade 3A	5% Validation would consist of looking at the criteria in the minimum lab deliverable in Attachment E, plus any additional information required for the program/project.	100%
Definitive Data D3B	Routine laboratory RI/FS Quantitative	Level III or C	100% Grade 3B	5% Traditional Level III data validation on a data package.	100%
Definitive Data D4	Routine laboratory Quantitative, RI/FS More rigorous QC	Level IV or D	100% Grade 4	5% Same as Grade 3B plus raw data.	100%
Definitive Data D5	Not standard methods Unusual parameters	Level V or E	100% Grade 5	5% Same as Grade 3B on the user-defined lab.	100%

Appendix G – CP3-ES-5003-F01 - Data Assessment Review Checklist and Comment Form

Chg A

CP3-ES-5003-F01-Data Assessment Review Checklist and Comment Form

Data Project Number:			Data Project Title:				
ITEM			YES	NO	NA	COMMENTS	*
DATA VERIFICATION 1. Are analytical methods, units, and reporting detection limits correct as specified according to the laboratory SOW and regulatory limits?							
Data Quality Checks	Analytical Method	SMO:	Date:				
	Method Units	SMO:	Date:				
	Detection Limits	SMO:	Date:				
2. Have the impacts of holding time violations been evaluated?							
Data Quality Checks	Holding Times	SMO:	Date:				
3. Is data complete as planned?							
Data Quality Checks	Analytical Completeness	SMO:	Date:				
	Sampling Completeness	Data Reviewer:	Date:				
DATA VALIDATION 4. Does data validation indicate that data is useable?							
Data Quality Checks	Miscellaneous Laboratory Quality Control Samples	Data Reviewer:	Date:				
DATA ASSESSMENT 5. Are quality control sample results acceptable?							
Data Quality Checks	Field Duplicates	Data Reviewer:	Date:				
	Trip Blanks/Refrigerator Blanks (VOAs Only)	Data Reviewer:	Date:				
	Field Blanks	Data Reviewer:	Date:				
	Equipment Rinseates	Data Reviewer:	Date:				
6. Does the sampling design and data provide enough information to support Data Quality Objectives (DQOs) and the current decision?							
7. Have impacts of data qualifiers and laboratory comments from field samplers and laboratory technicians been considered?							
Data Quality Checks	Sample Logbooks	Data Reviewer:	Date:				
	Sample Chain of Custody	Data Reviewer:	Date:				
	Containers/Preservatives	Data Reviewer:	Date:				
8. Is data reasonable when compared to known/expected levels?							
9. Have outliers been evaluated to determine the possible cause?							
10. Is data of adequate quality to be used?							
DECISION DETERMINATION 11. Was this data generated according to Procedure "Quality Assured Data" and is data "Data of Known Quality?"							
12. Can current decision be made from this data based on this review?							

Data Assessment Performed By:
Data Reviewer: _____ Date: _____
(Performed assessment and data can be made available for final reporting.)

QA Reviewer: _____ Date: _____
(Reviewed and verified completion of assessment)
* Place a "check mark" in this column if assessment qualifiers are applied to the data.

Appendix G – CP3-ES-5003-F01 - Data Assessment Review Checklist and Comment Form (Continued)

Chg A

CP3-ES-5003-F01-Data Assessment Review Checklist and Comment Form (Continued)

Data Project Number:	Data Project Title:	
Comment	Action Required	Comment Resolved

Appendix G – CP3-ES-5003-F01 - Data Assessment Review Checklist and Comment Form (Instructions page 1 of 2)

Chg A

Data Assessment Review Checklist and Comment Form
(Instructions page 1 of 2)

INTRODUCTION

The Data Assessment Review Checklist will be used by applicable data review personnel to perform data assessment on a particular set of data. The purpose of this attachment is to document the **Data Quality Checks** and results of the review performed during **Data Assessment**.

DATA QUALITY CHECKS

Data Quality Checks are a list of field sampling and analytical/measurement quality control elements associated with a data collection activity, which are evaluated during data verification, data validation and/or data assessment. The table below identifies the Data Quality Checks that are routinely reviewed and the data review step where the Data Quality Check is evaluated. The Data Quality Checks are divided on the Data Assessment Review Checklist under the appropriate question to which it applies.

Data Quality Checks in the Data Review Process		
Data Verification	**Data Validation**	**Data Assessment**
• analytical method • method units • detection limits • holding times • analytical completeness	• initial and continuing calibration and the associated calibration range • analytical error determination • laboratory COC • calculations • laboratory duplicates • blank duplicates • reagent blanks • method blanks • spikes/laboratory control samples • matrix spikes/matrix spike duplicates • postdigestion spikes • performance samples • interference check samples	• sample logbooks • chain of custody records • containers • preservatives • field duplicates • trip blanks • refrigerator blanks • field blanks • equipment rinseates • sampling completeness • data quality objectives

Appendix G – CP3-ES-5003-F01 - Data Assessment Review Checklist and Comment Form (Instructions page 2 of 2)

Chg A

Data Assessment Review Checklist and Comment Form (Instructions page 2 of 2)

INSTRUCTIONS FOR COMPLETING THE ATTACHMENT

The **Project ID** and **Project Title** are to be documented at the top of the attached form, "Data Assessment Review Checklist."

The **Data Quality Checks** are indicated on the form by the shaded rows and are completed by either the **SMO** or the **Data Reviewer**. The first items to be completed on the form are the Data Quality Checks related to Data Verification. The SMO completes the checks related to Contractual Screening. These checks include **Analytical Method, Method Units, Detection Limits, Holding Times**, and **Analytical Completeness**. The **Sampling Completeness** check is completed by the Data Reviewer. Upon completion of performing the data verification steps, the SMO and Data Reviewer will initial and date the appropriate row, make any clarifying comments in the **Comments** column, document any significant information, comments, or questions by e-mail or with the "Data Assessment Comment Form" on page 2 of form CP3-ES-5003-F01.

The Data Reviewer will check the analytical/measurement quality control elements during Data Validation (see table on instructions page 1 of form CP3-ES-5003-F01 for a listing). If data validation was not performed for the data set, the Data Reviewer will indicate "N/A."

The Data Reviewer will check the field sampling quality control elements during Data Assessment (see table on instructions page 1 of form CP3-ES-5003-F01 for a listing) based upon information received from the Sampling group. If specific field sampling quality control elements were not performed for the data set, the Data Reviewer will indicate "N/A."

The Item column provides the major questions needed to perform data assessment. The Data Reviewer will proceed to review the information provided by the SMO, including the data set, and answer Question 1 through Question 12 on the "Data Assessment Review Checklist." The appropriate answer to the question will result in one of the **YES**, **NO**, or **N/A** columns being checked, and if necessary for explanation purposes, additional information written in the **Comments** column. Any significant information, comments, or questions must be documented either by e-mail or with the "Data Assessment Comment Form" on page 2 of form CP3-ES-5003-F01. If any data assessment qualifiers are applied during the review of the data, a "check mark" will be placed in the last column, denoted by the "*" to aid the Data Reviewer in ensuring the placement of the assessment qualifiers in the database. Once all questions are answered, the Data Reviewer will complete the form by signing on the "Data Assessment Performed By" signature.

The **QA Reviewer** is responsible for performing a final review of the data set and verifying that all issues and questions are resolved and that the checklist is complete. The QA Reviewer will complete the "Data Assessment Review Checklist" by signing on the "QA Reviewer" signature.

Appendix H – CP3-ES-5003-F02 - Paducah Data Release to External Agencies Form

Chg A

CP3-ES-5003-F02 - PADUCAH DATA RELEASE TO EXTERNAL AGENCIES

Data Reviewer:	Project ID:
Project Title:	

Data Quality Level:

☐ Data of Known Quality—Data, along with appropriate laboratory, verification, validation, and assessment qualifiers, can be used for decision making purposes and was collected and managed per procedure CP3-ES-5003.

☐ Information Only Data—Data quality is not assured and may or may not contain the appropriate qualifiers; however, data can be used for informational purposes or can be used for decision making with relevant documentation.

☐ Approval for Release to: 1. _____

2. _____

3. _____

(List specific organizations to release to.)

☐ Not Approved for Release: _____
(Explanation)

(Attach necessary documentation for additional release criteria.):

Data Reviewer (or Designated Alternate): _____ Date: _____
(Signature Required)

Site DC: _____ Date: _____

Site TIO: _____ Date: _____

Appendix I – CP3-ES-5003-F03 - Data Verification Checklist

ChgA

CP3-ES-5003-F03-Data Verification Checklist

Project ID:	Laboratory:	SDG(s):

Data Package Review	Yes	No	NA
1. What data package level was requested from the laboratory? (circle one) Level 1 Level 2 Level 3 Level 4 Other			
2. Has all data been received from the laboratory in the correct deliverable format?			
3. Has any missing information been requested and received from the laboratory?			
4. Is a laboratory case narrative and/or cover letter present?			
5. Are chain of custody (COC) forms present for all samples?			
6. Are samples traceable through inspection of signature records on field and laboratory COCs?			
7. Do the COCs or case narrative indicate any problems with the sample receipt, condition of the samples, analytical problems, or special circumstances that would affect the quality of the data?			
Action: For any samples not traceable upon inspection of COCs, indicate the identities below and where the break in traceability occurred. For any other issue noted with the data package review, please provide a brief description of what occurred and what effect, if any, on data quality it may have.			

Holding Times and Sample Preservation	Yes	No	NA
8. Has a holding time violation occurred in which the acceptable hold time from sample collection to extraction or preparation been exceeded?			
9. Has a holding time violation occurred in which the acceptable hold time from sample extraction (or preparation) to analysis been exceeded?			
10. For samples submitted to the laboratory on the same day as sample collection, is there evidence that ice (if required) was present in coolers and sample cooling had begun?			
11. For samples shipped to the laboratory, were temperatures of samples upon receipt within acceptance criteria when temperature preservation is required?			
12. Has the laboratory indicated that any samples were received with improper chemical preservation?			
Action: Identify all samples that are outside of hold time or do not meet sample preservation and provide a description of the problem. For any other issue noted with the data package review, please provide a brief description of what occurred and what effect, if any, on data quality it may have.			

Sample Methodology	Yes	No	NA
13. Have all analytical methods been verified to match the requested analytical method?			
14. Are any requested analytes missing from the reported data?			
15. Are all samples reported with the correct units?			
16. Were all required reporting limits achieve?			
Action: Please provide a brief description of any issues with methods, missing data, units, or reporting limits.			

Appendix I – CP3-ES-5003-F03 - Data Verification Checklist (Continued)

ChgA

CP3-ES-5003-F03-Data Verification Checklist

Surrogates	Yes	No	NA
17. Does a review of reported data indicate that a sample surrogate (if required) is outside acceptable criteria? (Note: This could be identified by the laboratory in the case narrative, or on footnotes and/or data qualifiers reported on Form 1s or equivalent.)			
Action: Identify the sample(s) affected and the surrogate recovery. Follow the guidelines in the appropriate Data Verification and Validation Plan for qualification requirements, or provide this information to the data validator for further qualification.			

Laboratory Control Samples	Yes	No	NA
18. Are LCS results included in the data package?			
19. Does a review of reported data indicate that the LCS recovery related to a sample is outside acceptance criteria? (Note: This could be identified by the laboratory in the case narrative, or on footnotes and/or data qualifiers reported on Form 1s or equivalent).			
Action: Identify the sample(s) affected. Follow the guidelines in the appropriate Data Verification and Validation Plan for qualification requirements, or provide this information to the data validator for further qualification.			

Blank Results	Yes	No	NA
20. Are results for method and/or prep blanks included in the data package?			
21. Were there any positive detections identified in the method or prep blank?			
22. Have any field QC blanks been included in the data package? This may include field blanks, rinseate blanks, trip blanks, etc.			
23. Were there any positive detections identified in the field QC blanks?			
Action: If associated sample results are nondetect for the analyte(s) detected in the blank, then no further action is required. For samples with positive results, identify the samples that are affected by a positive blank detection. In the case of a method or prep blank, the laboratory will typically place a "B" qualifier on affected data. For the field QC blanks, identify the samples that are associated with the blank. Follow the guidelines in the appropriate Data Verification and Validation Plan for qualification requirements, or provide this information to the data validator for further qualification.			

Matrix Spike/Matrix Spike Duplicates	Yes	No	NA
24. Are MS/MSD results included in the data package?			
25. Are the recovery limits for the MS/MSD within acceptable limits?			
26. Are RPD results reported for MS/MSD analysis within acceptance limits?			
Action: Identify the sample(s) affected. Never qualify data based on the MS/MSD alone. Follow the guidelines in the appropriate Data Verification and Validation Plan for qualification requirements, or provide this information to the data validator for further qualification.			

WORKING COPY

VERIF. DATE: _____

INTIALS: _____

CP3-QA-1003 Rev. 2 ECR 6-14-17	TITLE: Management and Self-Assessment	Page 1 of 14
DOCUMENT CATEGORY:	☒ Administrative ☐ Technical	
LEVEL OF USE:	☒ Information Level ☐ Reference Level ☐ Continuous Use	
FUNCTIONAL AREA: Performance Assurance	SUBJECT MATTER EXPERT: Diane Snow, Internal Assessment Lead Signature: Diane Snow Date: 6/14/2017	
NUCLEAR SAFETY REVIEW DOCUMENTATION: Exemption #23 7/26/2016, Robert Maglasang	APPROVED BY: Waynette Roberson, Contractor Performance Assurance Program Manager Signature: R Waynette Roberson Date: 6/14/2017	
REQUIRED REVIEW DATE: 6/14/2020	EFFECTIVE DATE: 6/15/2017	

REVISION/CHANGE LOG

Revision/Change Letter	Description of Changes	Pages Affected	Date of Revision/Change
0	Initial Release	All	10/20/2014
1	Process revision to include scope of work for waste shipped to NNSS and make changes to reflect newest version of the FPDP QAPD.	All	2/10/2016
1A	Process change to include explicit instructions for Functional Area Managers to identify requirements for planning, approving, and implementing annual and triennial program reviews. (II-FY16-1055-07) Include General Information referencing electronic system for electronic assessment management and clarify terms for attribute results in the new system.	3,4,5,6,9, 10	07/26/2016
2	We are updating the document to address Issues Management AI-0000738, to include updating the format, clarify the requirements for a self-assessment and management assessment. The procedure did not clearly delineate the differences and requirements associated with each type of assessment.	All	6/14/2017

TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure defines the Paducah Gaseous Diffusion Plant (PGDP) Deactivation and Remediation (D&R) Contractor process for conducting management and self-assessments. This procedure incorporates the criteria contained within CP2-QA-1000, Quality Assurance Program Description and applicable portions of ASME NQA-1-2008 (with Addenda through 2009).

Management assessments are conducted by, or on behalf of, the organization manager or an invited independent organization with management involvement. Self-assessments are conducted by the implementing organization and performed by the personnel doing the work.

1.2 Scope and Application

This procedure applies to management assessments and/or self-assessments performed on any organization, system, process, and/or facility managed by PGDP D&R Contractor. It covers planning, performing, notification, reporting, documenting, and dispositioning the results of management assessments and self-assessments. Self-assessments germane to the Safeguards and Security organization (for example, protective force operations) will be performed in accordance with CP4-SS-PFSA, Protective Force Self-Assessment Program. Management assessments may also apply to the work performed by PGDP D&R Contractor subcontractors.

Managers conduct management assessments as documented evaluations of how effectively policies, programs, management systems, and processes are implemented. Direct participation by managers is essential to the success of the management assessment process.

Self-assessments may be performed at the request of a manager or supervisor for the review of a limited area within a function, such as the implementation of the work package process, or the review of a particular function, or the review of a particular project training and qualification process. An assessment team leader is not required for a requested or self-performed self-assessment.

Self-assessments may also be performed by an individual, whenever appropriate to evaluate or review an activity or limited area within their own work function(s).

2.0 REFERENCES

2.1 Use References

- CP2-OP-1119, Readiness Review Program
- CP3-HS-2009, Stop/Suspend Work
- CP3-QA-1001, Graded Approach
- CP3-QA-2005, Nonconformance Control
- CP3-QA-3001, Issues Management
- CP3-QA-3002, Operating Experience/Lessons Learned
- CP4-SS-PFSA, Protective Force Self-Assessment Program
- CP5-QA-0002, FPDP Electronic Assessment Management User Guide

2.2 Source References

- CP2-QA-1000, Quality Assurance Program Description for the FPDP
- CP2-QA-3000, Contractor Performance Assurance Program Description
- ASME NQA-1-2008 (with Addenda through 2009), Quality Assurance Requirements for Nuclear Facility Applications
- Department of Energy (DOE) O 414.1D, Chg. 1, Quality Assurance, Criterion 3-Management/Quality Improvement, Criterion 9-Assessment/Management Assessment
- DOE O 226.1B, Contractor Requirement Document Att. 1, Implementation of DOE Oversight Policy
- DOE O 425.1D, Verification Of Readiness To Start Up Or Restart Nuclear Facilities
- DOE EM-QA-001, Rev. 1, EM Quality Assurance Program (QAP)
- 10 CFR § 830, Subpart A, Quality Assurance Requirements, Criterion 3-Management/Quality Improvement, Criterion 9-Assessment/Management Assessment.

3.0 COMMITMENTS

None

4.0 RESPONSIBILITIES

Responsibilities may be outlined in Section 6.0. The position titles used to identify responsible individuals in this procedure are understood to include designees.

5.0 GENERAL INFORMATION

5.1 The focus and intent of any particular assessment is to review, evaluate, and assess the status, adequacy, and effectiveness of an organization's own programs, processes, and/or procedures. This is particularly intended to identify proficiencies or deficiencies in processes, practices, behaviors, roles, responsibilities, and organizational expectations that may impede performance improvement, or any needs to improve status, efficiency and/or effectiveness.

5.2 If an operation or process is identified that jeopardizes safety, health, the environment or has life-threatening implications, then immediately stop work in accordance with CP3-HS-2009, Stop/Suspend Work.

5.3 Nonconforming items, services, procedures, or processes shall be documented and evaluated for significance and reporting in accordance with CP3-QA-2005, Nonconformance Control.

5.4 Findings and observations shall be documented in accordance with CP3-QA-3001, Issues Management.

5.5 Management assessments may be used as part of a Readiness Review or Readiness Assessment in accordance with CP2-OP-1119, Readiness Review Program.

5.6 For MA used as part of a Readiness Review or Readiness Assessment, team members must meet the qualification and training requirements specified in DOE O 425.1D, Attachment 1. This includes, 1) Technical knowledge of the area assigned for evaluation, including experience working in the technical area; 2) Knowledge of performance-based assessment processes and methods; and 3) Knowledge of facility, activity, or operation-specific information. In addition, the team leader must determine and document the qualifications of the team members and freedom from a conflict of interest in the areas they are assigned to review.

5.7 Management Assessments are the responsibility of line organizations and are not to be delegated to independent oversight organizations such as Quality or Safety, although their support may be requested to organize and develop assessment strategies and checklists and provide assessor training.

5.8 **If** using the electronic assessment management system to plan, conduct, and approve assessments; then signatures, forms, schedule development, and notifications are performed electronically as these functionalities are part of the system's designed workflow.

6.0 INSTRUCTIONS

NOTE:

Management Assessments are separate and distinct from independent assessments. They promote a proactive system for the early detection and correction of potential problems, and provide management at all organizational levels with an accurate and current awareness of their organization's performance and compliance with requirements. Any findings and observations resulting from a Management Assessment are to be documented in accordance with Section 6.4 and CP3-QA-3001 or CP3-QA-2005. Management Assessments meet the Integrated Safety Management (ISM) core function expectations by providing feedback and continuous improvement.

Self-Assessments are less formal than Management Assessments. It is recommended that a Self-Assessment follow the Management Assessment process, although it is not strictly required. Allowable deviations are: an Assessment Team Lead is NOT required, a formal assessment plan is not required, and a formal entrance meeting and exit meeting are not required. Any findings and observations resulting from a Self-Assessment are to be documented in accordance with Section 6.4 and CP3-QA-3001 or CP3-QA-2005.

6.1 Scheduling Assessments

NOTE:

The frequency and scope of Management and Self-Assessments are based on the safety significance of the program or process. Program Project Managers and WCO shall work with the Contractor Performance Assurance Program (CPAP) Manager to develop an assessment schedule based on risk and consequence factors with their area of responsibility.

Risk and consequence factors are determined using CP3-QA-1001, *Graded Approach* as necessary.

One or more management assessments shall be conducted annually by PGDP D&R Contractor to assess the adequacy and effective implementation of the Quality program. These Management Assessments in coordination with any applicable Independent Audits/Assessments meet the requirement in the Quality Assurance Program Description (QAPD) to review and validate the overall implementation and effectiveness of the QAPD on an annual basis.

Responsible Program/Project Manager/WCO

6.1.1 Develop a list of management and self-assessments necessary to assess the status, adequacy, and effectiveness of the organization's own programs, processes, and/or procedures. The list must include assessments necessary to meet periodic (for example, annual or triennial) program assessment requirements.

6.1.2 Review the following sources and requirements for the development of the assessment list:

- The Contract Task Order
- Project schedules and associated work tasks/activities
- Results of previous assessments (management, independent and self)
- Implemented corrective actions and effectiveness reviews
- Occurrences and other issues or events reportable to DOE
- Lessons Learned
- Adverse trends
- Assessments required by external agencies, such as Nevada National Security Site (NNSS)
- Performance problems, diminishing performance, and negative external assessment results

6.1.3 Work with CPAP Manager to develop an assessment schedule based on the risk and consequence of the assessment scope including the following as a minimum:

- Manager responsible for the assessment
- Subject area to be assessed
- Type of assessment (management or self)
- Scheduled completion date of the assessment

6.1.4 Provide the assessment schedule to the CPAP Manager for incorporation into a comprehensive management assessment schedule.

Contractor Performance Assurance Program Manager

6.1.5 Develop the comprehensive assessment schedule, scheduled surveillances, including management and self-assessments as applicable, based upon a review of the ongoing and planned activities, and the associated risks and consequences, with input from the responsible Program and Project Managers and WCO.

6.1.6 Maintain and arrange/re-arrange the assessment schedule to reflect, but not be limited to, the following:

- Combining scheduled assessment activities with other assessments being conducted in the same area
- Assessments may be cancelled or rescheduled based on such factors as changes in priorities, other assessments directed by functional organizations or external oversight groups, or the need to address newly identified problem areas
- Additional assessments may be identified and performed once the original schedule is finalized

- Cancellation or rescheduling of assessments required by the Contract Task Order policies/procedures must have written approval of the CPAP Manager (approval may be granted by e-mail, if required)
- Cancellation or rescheduling of assessments required by NNSS policies/procedures implementing NNSS requirements must be coordinated by the CPAP Manager and have written approval of the WCO (approval may be granted by e-mail, if required)

6.1.7 Update the assessment schedule at least once per quarter to reflect the assessments performed and completion dates.

6.1.8 Publish the assessment schedule in shared folder/location.

6.1.9 Maintain approved templates for self and management assessment plan, checklist on the PGDP D&R Contractor Intranet page under Tools/Assessment/Assignment Templates.

6.2 Planning an Assessment

Responsible Functional Manager

NOTE:
Where the Responsible Manager is also the Assessment Team Lead or the Assessor, the Manager can adjust, as necessary, the format, notifications, briefings, approvals, etc. discussed in this procedure.

6.2.1 Select assessment type.

6.2.2 Identify scope of the assessment.

6.2.3 Contact the Contractor Performance Assurance Program Internal Assessment Lead to obtain the applicable assessment number.

Contractor Performance Assurance Program/Internal Assessment Lead

6.2.4 Confirm assessment scope, assign assessment number, and provide appropriate templates for assessment plan, checklist and report.

Responsible Manager

6.2.5 Determine general criteria to be assessed along with any specific criteria to be assessed.

6.2.6 Based on assessment type, select Assessment Team Lead having experience and technical expertise in the area being evaluated.

6.2.7 Determine Assessment team make-up and qualification requirements based on scope, depth, degree of rigor to be achieved and type of assessment.

6.2.8 Brief Assessment Team Lead on assessment expectations and provide routine monitoring and coaching of assessment quality.

Assessment Team Lead/Assessor

NOTE:

Templates are obtained by contacting the Contractor Performance Assurance Program Group or from the PGDP D&R Contractor Intranet page under Tools/Assessments/Assessment Templates.

6.2.9 Agree on assessment scope and timeframe with the Responsible Manager.

6.2.10 Review prior assessments to determine if attributes/questions, information, or results may be used for the planned assessment.

6.2.11 Solicit Assessors, if required, for the Assessment type being performed.

6.2.12 Base selection of Assessors upon experience related to work scope and familiarity with the activities being assessed.

NOTE:

If approved by the Responsible Manager, **then** the Assessment Team Lead may utilize an alternative method of communicating pertinent information to the team, function, or project being assessed when an Assessment Plan is not feasible.

6.2.13 Develop Assessment Plan if needed, (MA require a plan) to include Purpose, Scope, Planned Assessment Dates, team members, resources required and any other pertinent information that should be communicated to the team and the function or project being assessed.

6.2.14 Complete Assessment Checklist to include each attribute/question [Line of Inquiry (LOI)] and the related source of that LOI in order to perform the assessment.

6.2.15 If there is no documented driver [(for example, a governing procedure, regulatory requirement, Operating Experience/Lessons Learned (OE/LL) record, etc.)], then state the source is “Management Expectation” or similar wording.

6.2.16 Research should include the following, as applicable to the assessment scope and objectives:

- Governing procedures
- Regulatory requirements
- OE/LL database
- Previously recorded Assessments for input pertaining to the purpose and scope of the Assessment to be performed
- Previous Corrective Action Plans (CAPs), CAP actions
- Trend reports
- Quality and/or regulatory assessments, audits, surveillances, inspections
- Support from personnel who are technically capable in the area being assessed
- Attributes/Questions with the amount of detail and rigor that is reflective of the scope of the assessment

6.2.17 Obtain Responsible Manager’s signature for the Assessment Plan.

6.2.18 Provide the assessment plan and checklist to appropriate management of the assessed organization.

Responsible Functional Manager

6.2.19 Sign for acceptance of the assessment plan, if applicable.

CPAP Manager/Internal Assessment Lead

6.2.20 Provide assessment numbers as requested, may assign numbers to scheduled assessments prior to request from responsible manager.

6.3 Performing Assessments

Assessment Team Leader/Assessor

6.3.1 Pre-assessment activities should include the following:

A. Schedule entrance meeting, if needed.

B. Notify management of the assessed function or project that the assessment will commence on the date established above.

C. Include in kickoff meeting information the assessment scope, goal, methodology selected, team members and assigned tasks.

D. Make arrangements for personnel, meeting locations and scheduling.

6.3.2 Use one or a combination of the following evaluation methodologies:

A. For Observation - Provide direct observation of work (both physical and/or process), when practical and available.

B. For Document Reviews - Provide objective evidence to substantiate compliance with applicable requirements, this technique should be combined with interviews, work observation and/or field observation to complete the performance picture.

C. For Interviews - Provide the means of verifying results of work observation, document review and/or field observation.

6.3.3 Conducting Assessment

A. Coordinate and conduct entrance meeting, if needed (required for MA).

B. Collect objective evidence within the limits imposed by the purpose and scope to address each assessment LOI.

C. Document results on the assessment checklist, and provide a clear and concise description of what was identified.

D. Utilize, as necessary, persons recognized as knowledgeable of the program, process or procedures to help determine the status of the LOI being assessed.

E. Assign one implementation result to each LOI on the checklist as follows:

- Satisfactory (SAT)/Acceptable – Fully meets related LOI; needed Process Improvements, and Proficiencies should be noted also. Acceptable replaces Satisfactory in the electronic assessment management system.

NOTE:

It is possible that a LOI could be fully met and a non-related finding/observation is identified during the assessment. The LOI would be marked SAT and the finding/observation would be documented in accordance with CP3-QA-3001 or CP3-QA-2005.

- Unsatisfactory (UNSAT)/Finding/Observation – Does NOT meet related LOI (Finding) or if NOT corrected will NOT meet related LOI (Observation). At a minimum all Findings and Observations are to be documented in accordance with CP3-QA-3001 or CP3-QA-2005. Finding/Observation replaces Unsatisfactory in the electronic assessment management system.
- Not Applicable (N/A) – If LOI was found to be not applicable to the function, process, program, etc. the LOI is pertinent to, or the LOI was not reviewed.

F. Identify areas which may serve as examples to or provide OE/LL for current and future projects.

G. Report OE/LL in accordance with CP3-QA-3002, Operating Experience/Lessons Learned.

H. Keep management apprised of the status of assessment efforts and results on a daily basis or periodicity agreed upon for the assessment.

I. Immediately notify management of conditions requiring prompt corrective action.

J. If any UNSAT results, then document Findings/Observations in accordance with CP3-QA-3001 or CP3-QA-2005.

K. If the UNSAT result is documented in accordance with CP3-QA-3001 and for identified Observations, then include the Corrective Actions and Preventive Actions (CAPA) number generated from the Reliance Issues Management System (ISM) in the result section of the applicable LOI.

L. If the UNSAT result is documented in accordance with CP3-QA-2005, then add the NCR number to the result section of the LOI.

M. When the assessment is completed, conduct an exit meeting with the manager of the assessed organization to discuss assessment results.

6.4 Assessment Reporting

Assessment Team Leader/Assessor

NOTE:

Attachments to the report should provide any supporting information relevant to the assessment.

6.4.1 Develop Assessment Report to include the following information:

- Provide dates of when the assessment was performed, date of the exit meeting, and an executive summary.
- The results section of the report should summarize the assessment results and correlate with the purpose and scope: Highlight findings, observations, process improvements, and proficiencies; include conclusions substantiated by facts, results should address effectiveness of program implementation, processes and procedures.
- Identify by name and position those personnel who were contacted during the assessment.

6.4.2 Identify the team members (such as, leader, assessor, and technical specialist).

6.4.3 Document CAPA number(s) for findings, observations and/or process improvements in the assessment report, as applicable.

6.4.4 If the LOI results in a nonconformance, then document the NCR number in the assessment report.

6.4.5 Include in each attachment/appendix the assessment number, attachment/appendix number, page number, and attachment/appendix title.

6.5 Review and Approval

Assessment Team Leader/Assessor

6.5.1 Review the Assessment Report with the assessment team members, if applicable, to ensure accuracy and completeness; make any corrections, as necessary.

6.5.2 Finalize and sign the report.

6.5.3 Obtain Responsible Manager's signature on the report.

6.6 Documentation

Assessment Team Leader/Assessor

6.6.1 Ensure that any UNSAT results are documented as Findings and ensure that Findings and Observations are documented in accordance with CP3-QA-3001 or CP3-QA-2005 with applicable cross-references listed in the assessment report.

6.6.2 Ensure that any process improvements are documented in accordance with CP3-QA-3001 with applicable cross-references listed in the assessment report.

Responsible Functional Manager/Assessment Team Leader (if assigned)

6.6.3 Ensure that the completed assessment report is submitted to the CPAP Manager for approval and distribution.

Contractor Performance Assurance Group

6.6.4 Distribute the approved assessment report to the following:

- Responsible Director of the assessed organization;

- Responsible Functional Manager;
- WCO, if NNSS Waste Certification Program related
- Nondestructive Assay (NDA) Program Manager, if NDA program related

Responsible Functional Manager

6.6.5 Distribute the assessment report to the following:

- Related stakeholders;
- Personnel who have been assigned actions within the report; and
- Others as determined applicable.

7.0 RECORDS

7.1 Records Generated

The following records may be generated by this procedure:

- Assessment Plan
- Assessment Report
- Assessment Checklist
- Alternative Assessment Documents
- Attachments to plans, reports, and checklists.

Forms are to be completed in accordance with CP3-OP-0024, Forms Control.

7.2 Records Disposition

The records are to be prepared, approved, and maintained in accordance with CP3-RD-0010, *Records Management Process*, and supporting procedures.

Appendix A – Acronyms/Definitions

ACRONYMS

CAP – Corrective Action Plan

CFR – Code of Federal Regulations

CPAP – Contractor Performance Assurance Program

D&R – Deactivation and Remediation

HSS&Q – Health, Safety, Support and Quality

LOI – Line of Inquiry

LL – Lessons Learned

ISM – Integrated Safety Management

N/A – Not Applicable

NDA – Nondestructive Assay

NNSS – Nevada National Security Site

O - Order

OE – Operating Experience

PGDP – Paducah Gaseous Diffusion Plant

QAP – Quality Assurance Program

QAPD – Quality Assurance Program Description

SAT – Satisfactory

UNSAT – Unsatisfactory

WCO – Waste Certification Official

DEFINITIONS

ASSESSOR – An individual who by education, experience, and other credentials has been selected to perform an assessment.

ASSESSMENT – A review, evaluation, inspection, test, check, surveillance, or audit to determine and document whether items, processes, systems, or services meet specified requirements and perform effectively.

ASSESSMENT TEAM LEADER – An individual who by education, experience, and other credentials has been selected to organize, perform, and direct an assessment; and report assessment results.

ATTRIBUTE – A process or activity that needs to be evaluated to ensure the Assessment Plan is satisfied.

Appendix A – Acronyms/Definitions (continued)

CHECKLIST – a document containing a series of statements and/or questions (for example, characteristics) used to gain sufficient information to evaluate processes based on defined performance criteria. Checklists are used as guidance and may be expanded or condensed during an assessment as circumstances warrant.

CORRECTIVE ACTION – Measures taken to rectify conditions adverse to quality and where necessary, to preclude repetition.

DOCUMENT REVIEWS – Technique used during an Assessment during which documents are evaluated to provide objective evidence to substantiate compliance with applicable requirements.

FINDING – A direct violation of or nonconformance to an existing requirement. A series of related or "like" findings or observations may be symptoms of an underlying systemic problem; therefore, a single issue should be developed that consolidates and cites the individual findings or observations as evidence of a system breakdown.

ISSUE – Generic term for problems, deficiencies, findings, observations, concerns, alerts, occurrences, potential noncompliance, and other events/conditions identified in the scope of this procedure requiring evaluation for corrective action.

LINE OF INQUIRY – Criteria, attribute/question to be assessed and included on the assessment checklist.

MANAGEMENT ASSESSMENT – A periodic introspective self-analysis, conducted by management, to evaluate management systems, processes, and programs ensuring the organization's work is properly focused on achieving desired results.

NONCONFORMANCE – A deficiency in characteristic, documentation, or procedure that renders the quality of an item or activity unacceptable or indeterminate.

OBJECTIVE EVIDENCE – Any documented statement of fact, other information, or record, quantitative or qualitative, pertaining to the quality of an item or activity based on the observation, measurement, or tests which can be verified.

OBSERVATION – An assessment conclusion identifying a condition that is **NOT** a deviation to a written requirement; however not corrected would become a deviation.

PROCESS IMPROVEMENT – An action that will result in positive impact on a process or service.

PROFICIENCY – Proficiency may be either an exemplary practice or an area of performance excellence identified during an assessment activity. It is not just doing what should be done. Proficiencies are not entered into Issues management. Proficiencies should be considered for submittal as "good practices" in the Lessons Learned (LL) system.

REQUIREMENT – Performance expectation derived from DOE orders, federal and state laws, applicable policies and procedures, and subcontractor contract and procedural requirements.

RESPONSIBLE MANAGER – A manager who has been assigned the role, responsibility, authority, and accountability for performance within a functional area or project.

SELF-ASSESSMENT – A type of assessment used for the review of a limited area within a function.

Appendix I – CP3-ES-5003-F03 - Data Verification Checklist (Continued)

ChgA

CP3-ES-5003-F03-Data Verification Checklist

Duplicates	Yes	No	N/A
27. Does the data package include field or lab duplicates?			
28. Does the calculated RPD and/or the mean difference meet acceptance criteria?			
Action: Identify the parent and field duplicate samples below. Calculate the RPD and/or mean difference between the two samples. Follow the guidelines in the appropriate Data Verification and Validation Plan for qualification requirements, or provide this information to the data validator for further qualification.			

By signing below, the person performing the Data Verification Checklist is verifying that all data received has been generated in accordance with the procedure CP3-ES-5003, *Quality Assured Data* and is *data of known quality*.

Data Verification
Performed by: _____ Date: _____

QA Review: _____ Date: _____

WORKING COPY

VERIF. DATE:_____

INTIALS: _____

CP3-QA-3001 Rev. 3	TITLE: Issues Management	Page 1 of 27

DOCUMENT CATEGORY: ☒ Administrative ☐ Technical

LEVEL OF USE: ☒ Information Level ☐ Reference Level ☐ Continuous Use

FUNCTIONAL AREA:	**SUBJECT MATTER EXPERT:**
Performance Assurance	Elizabeth Keeling, Contractor Performance Assurance Program Quality Specialist Signature: Elizabeth Keeling Date: 3/31/17
NUCLEAR SAFETY REVIEW DOCUMENTATION: FPDP-17-0209-D	**APPROVED BY:** R. Waynette Roberson, Contractor Performance Assurance Program Manager Signature: R. Waynette Roberson Date: 03/31/17
REQUIRED REVIEW DATE: 3-31-2020	**EFFECTIVE DATE:** 4-24-2017

REVISION/CHANGE LOG

Revision/Change Letter	Description of Changes	Pages Affected	Date of Revision/Change
0	Initial Release	All	10/20/2014
0A	Process change to incorporate requirements for the NNSS Waste Certification Program; add action for Issue Owner to sign for ownership of the issue, and replace cover page in accordance with current approved template.	1, 3, 7, 8, 10, 14, 21-28	3/01/2016
0B	Process non-intent change to clarify the purpose of forwarding the source document and Issue Identification form(s) to begin the approval process. II-FY16-0994-01 – Clarify timeliness for completion and approval of Form A.	7	5/2/2016
1	Complete rewrite to address Nonconformance Report tracking independent from Issues Management (5.2.1); correct inconsistencies in requirements for effectiveness reviews based on Issue Level (6.7.3 to Att. B); include guidance for conducting an effectiveness review (Att. B); simplify entering issues (II-FY15-0106-04); remove statement regarding Occurrence Reporting and Processing System (ORPS) Significance Category (SC) levels correlating with Issue Level (6.1.2 NOTE); clarify type of causal analysis required (6.1.3); properly assign responsibilities throughout (i.e., delegates for Quality Manager); clarify definition of Issue; including recommendations for integrating effectiveness reviews into the assessment process (II-FY15-0488-02); and confirm alignment with requirements in DOE O 232.2 (II-FY16-0735-02).	All	5/27/2016

1A	Step 6.1.2 replace and with an, Step 6.3 replace Correction with Corrective, Step 6.7.2 replace closure with closures, Step 6.8.4 replace initiates with initiate, Acronyms – correct SCAQ, delete acronym EHSS, update Appendix C to include a column for Deliverable, add (sign and date) next to Team Leader on Appendix E, and removed examples of Form F02 and F03 from procedure.	6, 8, 11, 12, 13, 18, 24, 25, 26, 27, 28 and 29	6/14/2016
2	Process revision to incorporate use of new electronic Issues Management System.	All	7/28/2016
2A	Revise the following: Step 5.2, Corrective Action Request changed to Findings per NNSSWAC revision, change examples for priority Levels 2 and 3 and correct a typo ("NO" should be "NOT") in Level 1, minor editorial in Level 4 and 5, changed "and" to "an" in note above step 6.2.1. removed two "manager" in step 6.2.4, delete acronyms CAR – Corrective Action Request and revise definition for Adverse Trend in Appendix A, revise step 6.2.9, replace Appendix B to change corrective action requests to findings at the bottom and remove shading.	5, 7, 8, 13, 14 and 17	11/8/2016
3	Complete rewrite to better represent workflow of electronic system and address Action Item AI-0000338, AI-0000552 and AI-0000699. Added recommendation for functional area managers to appoint a single contact person to track/manage issues and TSR information in Section 5; added NDA information in Section 6.6 and Appendix B; added requirement for NQA-1 Assessor to be an Effectiveness Review team member to Section 6.8 and appendix D; added use of apparent cause codes for trend analysis and periodic Senior Management assessments of process to Section 6.9 and revised CP3-QA-3001-F02 Part A. Deleted CP3-QA-3001-F02 Part B, Part C, Part D and CP3-QA-3001-F03.	All	3/31/2017

TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure defines the Paducah Gaseous Diffusion Plant (PGDP) Deactivation and Remediation (D&R) Contractor process for managing issues and corrective actions as described in CP2-QA-1000, *Quality Assurance Program Description*, CP2-QA-3000, *Contractor Performance Assurance Program Description*, and CP2-HS-1000, *Integrated Safety Management System Description*.

The Issues Management program is the PGDP D&R Contractor's process for managing and tracking issues and resulting actions identified in the normal course of assessments, self-evaluations, other reviews of project or functional activities, or as a result of required reporting. The Issues Management system is used in tracking identified issues and actions to closure.

1.2 Scope

This procedure applies to PGDP D&R Contractor and subcontractor issues and corresponding actions identified through the following source activities, as a minimum:

- Oversight source documents such as those issued by external reviews [for example, U.S. Department of Energy (DOE), state and federal regulatory agencies]
- Independent assessments, management assessments, self-assessments, performance observations, and surveillances
- DOE noncompliance screening, determinations, and reports
- Occurrence Reports (Occurrences are also reported in accordance with CP3-QA-3005, *Occurrence Reporting.*)
- Criticality Safety Incidents
- Management commitments and management concerns
- Any physical item or Structure, System, or Component (SSC) nonconformance identified as a result of project activities will be managed through CP3-QA-2005, *Nonconformance Control*

Supplier issues and nonconformances are **NOT** required to be entered into the Issues Management system when they are controlled under the Suppliers' corrective action/nonconformance program that has been accepted by PGDP D&R Contractor and they are subsequently overseen by PGDP D&R Contractor Quality.

2.0 REFERENCES

2.1 Use References

- CP3-OP-0002, *Developing and Maintaining FPDP Performance Documents*
- CP3-QA-3007, *Issue Investigation and Causal Analysis*
- CP5-QA-0001, *FPDP Electronic Issues Management Corrective Action and Preventive Action User Guide*
- DOE O 226.1B, *Implementation of Department of Energy Oversight Policy*
- DOE O 232.2A, *Occurrence Reporting and Processing of Operations Information*

2.2 Source References

- 10 CFR § 830, Subpart A, *Quality Assurance Requirements*
- ASME NQA-1-2008 (and Addenda through 2009), *Quality Assurance Requirements for Nuclear Facility Applications*
- CP2-HS-1000, *Integrated Safety Management System Description*
- CP2-QA-1000, *Quality Assurance Program Description*
- CP2-QA-3000, *Contractor Performance Assurance Program Description*
- CP3-QA-1003, *Management and Self-Assessments*
- CP3-QA-1004, *Independent Assessment Program*
- CP3-QA-2005, *Nonconformance Control*
- CP3-QA-3004, *Evaluation and Reporting of Potential PAAA Noncompliances*
- CP3-QA-3005, *Occurrence Reporting*
- DOE O 414.1D, *Quality Assurance*
- EM-QA-001, Rev. 1, *EM Quality Assurance Program (QAP)*

3.0 COMMITMENTS

None

4.0 RESPONSIBILITIES

The position titles used to identify responsible individuals in this procedure are understood to include designees.

Additional responsibilities may be outlined in Section **6.0**.

5.0 GENERAL INFORMATION

5.1 "CAPA", or Corrective Action and Preventive Action, is the electronic Issues Management System term for issues. The term "Issue(s)" may be used synonymously with "CAPA(s)".

5.2 Issues can be identified via an external source. Observations and findings from external oversight activities will be entered as issues.

5.3 Findings issued by National Nuclear Security Administration (NNSA)/Nevada Field Office (NFO) shall be assigned at a minimum a Priority Level 2 - High, and shall require a root cause analysis and documented corrective and preventive actions to preclude recurrence.

5.4 The DOE Noncompliance Tracking System (NTS) reportable conditions [such as, Price-Anderson Amendments Act (PAAA) and Worker Safety and Health (WSH) related noncompliances] will be assigned an Issue Level commensurate with the significance and complexity of the issue. Likewise, the level of rigor of the investigation, causal analysis (for example, up to and including root cause analysis, extent of the condition, extent of the cause), and corrective actions will apply a graded approach as needed to resolve the noncompliance(s) and to provide reasonable assurance that recurrences will be prevented.

5.5 Questions regarding the classification of information must be reviewed by a Derivative Classifier prior to entry into the Issues Management/CAPA module.

5.6 Unclassified Controlled Nuclear Information, Privacy Act, or classified information will **NOT** be entered into documents generated by this procedure.

5.7 Official Use Only (OUO) information must **NOT** be submitted into Issues Management, but may be sent to IssuesManagementCoordinator@FFSPaducah.com in an email as an attachment. Any OUO documents must be stamped and signed as OUO. Entry of OUO information will be evaluated on a case-by-case basis.

NOTE:

If using the hard copy form for Issue Identification, CP3-QA-3001-F02, *Issues Identification* Part A, can be found at S:\ControlledDouments\Approved Forms. The Part A should only be used for anonymity, pending the functionality being available in the electronic Issues Management System.

5.8 The electronic Issues Management system does **NOT** require the use of forms as the functionality is part of the designed workflow. [See Appendix F, *Electronic Issues Management/Corrective Actions and Preventive Actions (CAPA) Process Flow*]. Issues will be entered into the electronic Issues Management system via an authenticated login process.

5.9 When using the electronic Issues Management system, actions such as assignments, notifications, distribution, and electronic approvals will be performed electronically. Refer to CP5-QA-0001, *FPDP Issues Management Corrective Action and Preventive Action User Guide.*

5.10 Functional Area Managers (FAMs) should appoint an Issues Management Coordinator to track and manage issues within their functional area.

5.11 CAPAs related to Nondestructive Assay (NDA) must be assigned to the NDA FAM

5.12 **< TSR 5.8.3 >** The issue screening committee independent function [for example, Quality and Contractor Performance Assurance Program (CPAP)] supports the independent oversight function of TSR 5.8.3. For example, review of issues resulting from or associated with (1) violation of codes, DOE Orders, procedures; (2) occurrence reports; (3) significant unplanned radiological or hazardous material releases; (4) unanticipated deficiencies of SSCs that could affect nuclear safety; (5) and significant operating abnormalities.

6.0 INSTRUCTIONS

6.1 Issue Identification (Initiate Phase)

Originator

6.1.1 **If** the issue has potential to be a personnel/equipment safety hazard, operability concern, reportability concern, or environmental concern, **then immediately** contact Plant Shift Superintendent (PSS).

6.1.2 Initiate an issue, preferably prior to the end of shift or as soon as practical, either by the electronic Issues Management system by opening Issues Management/CAPA Module (click on New Document select CAPA - Initiate) or by Hardcopy using CP3-QA-3001-F02, Part A, for anonymity only.

6.1.3 Provide as much detail as possible [such as, who (by function, **NOT** name), what, when, where, and why] based on actual knowledge, identifying applicable system indications, alarms, operating status, effects on other equipment, and identifying any known similarity with other issues.

6.1.4 **If** known, **then** describe the extent-of condition.

6.1.5 Assign a priority for the issue, using the following guidance:

- **Level 1** - Issues having critical impact to environment, safety, health, of workers and the public (for example, results in fatality, criticality). Effectiveness Reviews are **NOT** subject to same completion schedule.
- **Level 2** - Issues having high impact to environment, safety, health, of workers and the public (for example, potential for criticality). Effectiveness Reviews are **NOT** subject to same completion schedule. This is the minimum level of an externally identified issue considered a significant condition adverse to quality (SCAQ).
- **Level 3** - Issues having a moderate impact to environment, safety, health, of workers and the public (for example, results in injury to worker or public requiring medical treatment other than first aid; results in damage to environment or Notice of Violation). This is the minimum level of an externally identified issue considered a condition adverse to quality (CAQ).
- **Level 4** - Issues having minor impact to environment, safety, health, of workers and the public (for example, results in first aid injury; unsafe act with little to **NO** potential for injury or insult to the environment; deviation from best practice or desired outcome).
- **Level 5** - Issues having negligible negative impact to environment, safety, health, of workers and the public (for example, desired improvement in efficiency, productivity, clarification, or method of doing work).

6.1.6 **If** known, **then** enter any recommendation for addressing issue, using Appendix B, *Minimum Requirements for Approval, Causal Analysis, and Extent of Condition Reviews Based on Issue Levels*, as guidance.

6.1.7 **If** submitting an Issue manually using a hardcopy form Part A, **then** forward a copy of the source document, if applicable, and the Issue Identification form(s) to the PSS.

6.1.8 **If** submitting an Issue electronically, **then** attach the source document or other supporting information to the Issue and forward from the Initiate Phase to the Screening Phase.

NOTE:

Issue numbers are generated by the electronic Issues Management system automatically upon saving the CAPA.

Issues Management System Coordinator/Quality Specialist

6.1.9 **If** a physical Part A is submitted, **then** enter the information from Part A into the electronic Issues Management system, attach the Part A **and** forward to Screening Phase.

6.2 Screening Phase

NOTE:

Issue notifications for Screening, automatically generated by the Issues Management system, include individual(s) from the following groups: PSS, Waste Certification Official (WCO), Environmental Compliance/Regulatory Affairs, Quality and CPAP. Collectively, this group is called the screening committee.

PSS

6.2.1 Review issue for immediate action(s) needed, internal/external notification requirements, and external reporting.

6.2.2 Incorporate additional information, as necessary into issue.

Issues Management System Coordinator/Quality Specialist

6.2.3 Conduct a review to identify duplicate issues, if needed, combine information prior to forwarding the duplicate to the Void Phase.

WCO

6.2.4 Review and determine if Nevada National Security Site (NNSS) Waste Certification Program related.

Reviewer

6.2.5 Determine or confirm appropriate assignment, completion of issue report fields, priority (Issue Level), and whether additional information/clarifications are needed from Originator.

6.2.6 Determine whether the issue should be tracked via work order (SOMAX), Nonconformance Report (NCR) process or voided.

6.2.7 Determine whether the issue meets external reporting criteria [for example, Occurrence Reporting and Processing System (ORPS), NTS, or other regulatory entities].

6.2.8 Determine whether similar or previously identified issues are recurring emerging trends or potential adverse trends. **If** considered recurring, **then** change recurring issue from 'No' to 'Yes' and consider elevating the Priority of the issue.

CPAP Personnel/Quality Specialist

6.2.9 **< TSR 5.8.3 >** Determine whether the issue resulted from or is associated with (1) violation of codes, DOE Orders, procedures; (2) occurrence reports; (3) significant unplanned radiological or hazardous material releases; (4) unanticipated deficiencies of SSCs that could affect nuclear safety; (5) and significant operating abnormalities.

Issues Management System Coordinator/Quality Specialist

NOTE:

Only non-intent (as defined by CP3-OP-0002, *Developing and Maintaining FPDP Performance Documents*) or Personally Identifiable Information can be changed in the Description of Problem field. Any other proposed changes must be concurred on by the originator. Screening comments or revisions are documented in the Comments area.

6.2.10 Once all screening is complete, forward from Screening Phase to Root Cause and Corrective Action Plan Phase.

6.2.11 **If** the issue pertains to the NNSS Waste Certification Program, **then** confirm electronic Issues Management system notification includes the FAM and the WCO.

6.3 Issue Analysis and Development of the Corrective Action Plan (Root Cause and Corrective Action Plan Phase)

Issue Owner/FAM

6.3.1 **If** assigned an issue **NOT** within your responsibility or authority, **then** send an email to the Originator, Issues Management Coordinator and proposed new owner to resolve ownership.

6.3.2 Analyze the issue, and **if** applicable based upon issue level using Appendix B, *Minimum Requirements for Approval, Causal Analysis, and Extent of Condition Reviews Based on Issue Levels***, then** apply the following:

- Identification of causal codes according to CP3-QA-3007, *Issue Investigation and Causal Analysis*, function/principle Integrated Safety Management System (ISMS);
- Determination of the existence of similar deficiencies or underlying causes (such as, Extent of Condition, Reference Appendix D, *Effectiveness Review/Extent of Condition*, for guidance on Extent of Condition Reviews)
- Determination of actions to preclude recurrence of like or similar deficiencies (for example, effectiveness of corrective actions).

6.3.3 **If** there are **NO** actions required for completion of the issue, **then** after adding apparent cause, ISMS function, ISMS principle, (on the Root Cause Analysis tab), comments describing why it is appropriate to close the issue without action (in Description of CAPA field on the Action Plan tab) and attaching any closure evidence, forward the issue to 'Closed without Actions.'

NOTE:

Appendix C, *Corrective Action Plan Template* is a suggested template used to develop a Corrective Action Plant (CAP) for review and concurrence, prior to entering into the Issues Management system. If needed, CPAP Organization may be contacted for assistance.

6.3.4 Develop corrective actions using Appendix C to include requirements from Appendix B, *Minimum Requirements for Approval, Causal Analysis, and Extent of Condition Reviews Based on Issue Levels*, for the issue.

6.3.5 Obtain WCO approval of actions for issues pertaining to the NNSS Waste Certification Program.

6.3.6 **If** corrective actions are associated with either Level 1 or 2 issues or external Level 3 issues and determined to need review by the Executive Review Board (ERB), **then** submit completed CAP to the ERB **and** copy Issues Management System Coordinator/Quality Specialist.

6.3.7 Submit all corrective actions for action item concurrence to assigned Action Owners.

6.4 Action Item Concurrence Phase

Action Owner

6.4.1 Review assigned action(s) and the target completion date(s).

6.4.2 Notify the Issue Owner of any non-concurrence with action item content/assignment or target completion date, sending CAPA backwards to the Root Cause and Corrective Action Plan Phase and listing in the comment field on the phase dialog box the changes needed to be made.

6.4.3 **If** action is correctly assigned and the 'Verifications to be Performed' are accomplishable within the target completion date time frame, **then** forward the Issue by using 'Assign to Next Person' or 'Plan Approval' in the upper right corner of the screen.

6.5 Plan Approval and External Approval Phase

Issue Owner/FAM/WCO (if NNSS Related)/CPAP Personnel

6.5.1 Once action item concurrence is complete, forward the Issue by using 'Assign to Next Person' or if applicable, 'External Approval' in the upper right corner of the screen.

CPAP Personnel

6.5.2 **If** issue is external, **then** reconfirm descriptions and target completion dates for the action items, attach applicable correspondence and forward the Issue to 'Implementation.'

6.6 Extending Actions

Issue Owner

NOTE:

Revisions to actions associated with either Level 1 or 2 issues or external Level 3 issues require ERB review and approval. Revisions to actions associated with Internal Level 3, 4, or 5 issues require FAM approval. Any revisions to NNSS related issues (all levels) require WCO approval.

6.6.1 **If** corrective actions **CANNOT** be completed as originally planned and scheduled in the Issues Management system, or the verification is rejected, **then** for each action requiring an extension, click on extension request button under Action Taken in the system.

6.6.2 Complete the extension request, by filling in the Requested Due Date and Reason for Extension fields and forward the Extension to the Approval phase.

6.6.3 **If** the CAP was approved in writing or requested by an external organization, (for example, CAPs from external assessments), **then** obtain the approving authority concurrence of the change.

6.6.4 **If** the corrective action was identified by or the information was forwarded to an external organization not requiring approval, **then** send a notification letter describing the revision(s) to the external organization.

6.6.5 **If** the CAP was prepared in response to either an ORPS Significance Category 2 (per DOE O 232.2) or higher or ORPS Report Level High (per DOE O 232.2A) and was approved by the DOE Facility Representative, **then** obtain the DOE Facility Representative's approval of the change.

6.6.6 **If** the CAP was approved by the ERB, **then** obtain the ERB Chair approval of the change.

6.6.7 **If** the CAP is associated with applicable NDA non-minor issues, **then** the NDA FAM should obtain DOE approval prior to changing the CAP.

FAMs/WCO (if NNSS Related)/CPAP Personnel

6.6.8 Approve the extension, the system will notify action owner once approved.

6.7 Action Completion and Verification of Action Closures (Implementation Phase)

NOTE:

All action closure documentation packages, if required, for corrective actions must be submitted as a complete package and attached to the action item.

Action Owner

6.7.1 Complete action items by their target completion date.

6.7.2 Once action is complete, prepare the action closure package(s) which consist of the following:

- Action closure summary (listed under Action Taken) describing resolution and the evidence of completion provided.
- Documentation (attached under Action Taken) providing objective evidence of completion, if required.

NOTE:

Level 1 and 2 issues and Level 3 External issues also require CPAP Personnel approval, listed as assigned to "Quality" in the electronic Issues Management system.

6.7.3 Forward the action closure package to 'Verification.'

NOTE:

Actions are closed when all approvals/verifications of action closures are completed. Upon approval of all action closures associated with an Issue, the Issue should be forwarded to Effectiveness Review, if required, or Closed.

Issue Owner/FAM/CPAP Personnel/WCO (if NNSS Related)

6.7.4 Review the action closure package to verify the following:

- Satisfactory completion of the corrective action(s),

- Necessary approvals, and
- Adequacy of objective evidence and closure summary, if required.

6.7.5 **If** the action closure package is **NOT** complete, **then** send back to 'Open', stating in the Comment box the reason for **NOT** accepting the closure **and** return to Step **6.7.1**.

6.7.6 **If** the action closure package is complete and acceptable, **then** approve action closures by forwarding to 'Completed'.

6.8 Effectiveness Review Phase

CPAP Manager/FAM/Quality Specialist

6.8.1 Establish Effectiveness review criteria.

6.8.2 Verify Effectiveness review team contains a trained, qualified NQA-1 assessor, not necessarily a Lead Assessor, per DOE O 226.1B, *Implementation of Department of Energy Oversight Policy*.

FAM/Quality Specialist/CPAP Personnel

6.8.3 Include WCO (if NNSS related) on distribution for effectiveness review determination.

6.8.4 Perform Effectiveness review using Appendix D, *Effectiveness Review/Extent of Condition,* and Appendix E, *Effectiveness Review Report Template,* as guidance. The effectiveness review phase is part of the designed workflow.

6.8.5 **If** corrective actions were determined **NOT** to be effective or Opportunities for Improvement were identified, **then** initiate a new issue.

6.9 Feedback and Improvement

CPAP Personnel

6.9.1 Perform trend analysis considering apparent and root cause codes, ISMS function and ISMS principle, or other criteria deemed appropriate to document any patterns which may provide an opportunity for improvement.

6.9.2 Provide availability to issue status reports for the responsible persons, line management, the WCO (if NNSS related), ERB and others, as applicable.

6.9.3 Perform assessments of the effectiveness of corrective actions and issue closures.

6.9.4 Evaluate issues to identify potential adverse trends **and** when identified, initiate an issue report.

Senior Management

6.9.5 Periodically perform assessments of the issues management process to evaluate its implementation and effectiveness.

7.0 RECORDS

7.1 Records Generated

The following records may be generated by this procedure:

- CP3-QA-3001-F02, *Issue Identification Form*, Part A
- Causal Analysis Report, when required
- Closure evidence

Forms are to be completed in accordance with CP3-OP-0024, *Forms Control*.

7.2 Records Disposition

The records are to be maintained in accordance with CP3-RD-0010, *Records Management Process.*

Appendix A – Acronyms/Definitions

ACRONYMS

CAP – Corrective Action Plan

CAPA – Corrective Action and Preventive Action

CAQ – Condition Adverse to Quality

CPAP – Contractor Performance Assurance Program

D&R – Deactivation and Remediation

DOE – U.S. Department of Energy

ERB – Executive Review Board

FAM – Functional Area Manager

ISMS – Integrated Safety Management System

NDA – Nondestructive Assay

NNSA – National Nuclear Security Administration

NNSS – Nevada National Security Site

NTS –Noncompliance Tracking System

ORPS – Occurrence Reporting and Processing System

OUO – Official Use Only

PGDP – Paducah Gaseous Diffusion Plant

PSS – Plant Shift Superintendent

SCAQ – Significant Condition Adverse to Quality

SME – Subject Matter Expert

SSC – Structure, System or Component

WCO – Waste Certification Official

Appendix A – Acronyms/Definitions (Continued)

DEFINITIONS

ACTION OWNER – Person responsible for completing and documenting completion of an action.

ADVERSE TREND – A series of similar occurrences that repeat at a frequency of three incidents in a month or four incidents in a three-month period and after evaluation have been determined to be an adverse trend.

ANOMALOUS CONDITION – An out of the ordinary condition. An unusual or abnormal condition where an infraction of procedures, violation, or deficiency may be present.

ASSESSMENT – A review, evaluation, inspection, test, check, surveillance, or audit to determine and document whether items, processes, systems, or services meet specified requirements and perform effectively.

CLOSURE EVIDENCE – Documentation or other tangible objective information providing evidence of completion of individual actions as defined in the approved corrective action plan. For Level 1 and 2 Issues, the evidence file must include objective evidence the corrective action has been completed in sufficient detail to allow for closure and verification.

CONCERN – A determination of a programmatic breakdown or widespread problem; supported by one or more findings. (Definition from DOE procedure PPPO-M-414.1-2, *General Assessment, Audit, and Surveillance Process*)

CONDITION ADVERSE TO QUALITY (CAQ) – An all-inclusive term used in reference to any of the following:

- Failures;
- Malfunctions;
- Deficiencies;
- Defective items;
- Out-of-Control processes; and
- Nonconformances.

CORRECTIVE ACTION – Measure taken to rectify a condition adverse to quality and, where necessary, to preclude recurrence.

DOCUMENT PACKAGE – The source document identifying the issue, a signed completed Issues Identification Form (CP3-QA-3001-F02), and documentation of closure of issues and actions.

EFFECTIVENESS – The ability of a corrective action or set of corrective actions to prevent recurrence of an issue, or reduce the rate or probability of recurrence.

EFFECTIVENESS REVIEW – An Effectiveness Review is an evaluation that determines whether the corrective actions implemented per the Corrective Action Plan were effective and corrected the identified condition as intended to sufficiently prevent recurrence.

EVENT DOCUMENT – An approved management or independent assessment report, external audit report, occurrence report, nonconformance report, etc., or email or other document if no other documenting vehicle is applicable.

Appendix A – Acronyms/Definitions (Continued)

EVENT NUMBER – A designated identifier for an action, or group of actions used to link items to a common source; should be predetermined for a group of issues or actions (for example, SNR-FLUOR-SY17-001, AS-00001, etc.).

EXECUTIVE REVIEW BOARD – The primary enterprise-level, decision-making body for PGDP D&R Contractor.

EXTENT OF CONDITION – A generic implication of a failure, malfunction, deficiency, defective item, weakness or problem; such as, the actual or potential applicability for an event or condition to exist in other activities, projects, programs, facilities, or organizations. Identifying and correcting issues extending across event or organizational boundaries will reduce risk and operating costs, and result in a safer working environment through the detection and correction of both latent and obvious adverse conditions.

EXTERNAL – Originated from or reported to organizations and sources outside of PGDP D&R Contractor for example, DOE Investigations, NNSS Assessments, State regulatory organizations).

FINDING – A direct violation of or nonconformance to an existing requirement. A series of related or "like" findings or observations may be symptoms of an underlying systemic problem; therefore, a single issue should be developed consolidating and citing the individual findings or observations as evidence of a system breakdown.

FUNCTIONAL AREA – A grouping of programs, processes, or activities intended to implement performance strategies and controls ensuring compliance within a group of related subject matter areas.

FUNCTIONAL AREA MANAGER (FAM) – Responsible for the planning and successful execution of the line and support work and also are responsible for the development, oversight, and maintenance of their function-specific implementing documents and processes to ensure complete and accurate flow down of Task Order requirements

INTERNAL – Originated from PGDP D&R Contractor organizational activities and assessments and not reported externally.

ISSUE – Generic term for problems, deficiencies, findings, observations, concerns, alerts, occurrences, potential noncompliance, and other events/conditions identified in the scope of this procedure requiring evaluation for corrective action.

ISSUE OWNER – Person responsible for addressing and resolving an issue usually the Functional Area Manager.

ISSUES MANAGEMENT SYSTEM – A system used by PGDP D&R Contractor for the tracking and trending of issues and the associated corrective actions.

NON-INTENT CHANGE – See CP3-OP-0002, *Developing and Maintaining FPDP Performance Documents*

OBSERVATION – An assessment conclusion identifying a condition that is **NOT** a deviation to a written requirement but could progress to a nonconformance if unresolved.

OCCURRENCE – An event or a condition as defined by DOE O 232.2 adversely affecting, or may adversely affect, DOE or contractor personnel, the public, property, the environment, or the DOE mission.

Appendix A – Acronyms/Definitions (Continued)

ORIGINATOR – The individual initiating Part A; may be an internal or external auditor/assessor, or any PGDP D&R Contractor personnel.

PROCESS IMPROVEMENT – A best management practice implementation, streamlined method of accomplishment, cost or resource saving measure, elimination of redundant activities, or other action that will result in a positive impact on a process or service.

ROOT CAUSE – The main underlying source of a condition adverse to quality that, when corrected, eliminates recurrence of the condition.

SIGNIFICANT CONDITION ADVERSE TO QUALITY (SCAQ) – A significant condition adverse to quality is one that, if uncorrected, could have serious effect on safety, the environment, or operability.

VERIFICATION – An evaluation to confirm specific actions were completed and implemented.

Appendix B – Minimum Requirements for Approval, Causal Analysis, and Extent of Condition Reviews Based on Issue Levels

Issue Level	Priority	Causal Analysis	Extent of Condition	Corrective Action Plan (CAP)	CAP Reviewer / Approver[3]	CAP Closure Approval[3]	Closure Evidence Required	Issue Response Timeline
1	Critical (SCAQ)	Root Cause and Investigation Required	Required Including Extent of Cause Formal Lessons Learned Required	Required to Remedy Problem, Prevent Recurrence, and Preclude Occurrence of Similar Problems Effectiveness Review Required	ERB Contractor Performance Assurance FAM WCO if NNSS-related	FAM Contractor Performance Assurance WCO if NNSS-related	YES	20 Calendar Days
2	High (SCAQ)	Root Cause Required	Required Including Extent of Cause Formal Lessons Learned Required	Required to Remedy Problem, Prevent Recurrence, and Preclude Occurrence of Similar Problems Effectiveness Review Required	ERB Contractor Performance Assurance FAM WCO if NNSS-related	FAM Contractor Performance Assurance WCO if NNSS-related	YES	20 Calendar Days
3	Moderate External (CAQ)	Apparent Cause	Optional	Remedy Problem At Least One Corrective Action is Required	ERB if Determined Significant FAM WCO if NNSS-related	FAM Contractor Performance Assurance WCO if NNSS-related	YES	30 Calendar Days
3	Moderate Internal (CAQ)	Apparent Cause	Optional	Remedy Problem At Least One Corrective Action is Required	FAM WCO if NNSS-related	FAM WCO if NNSS-related	YES	30 Calendar Days
4	Minor	Apparent Cause	Optional	May Be Limited to Impacted Facility or Project	FAM WCO if NNSS-related	FAM WCO if NNSS-related	YES If Actions Created	60 Calendar Days
5	Routine (Non-Quality related)	N/A	Optional	Process Improvement or Recommendation	FAM WCO if NNSS-related	FAM WCO if NNSS-related	NO	90 Calendar Days

Notes:
1. CP2-ND-1001, *Quality System for Nondestructive Assay Plan*, requires applicable NDA-related non-minor issue CAPs and changes to those CAPs be approved by DOE.
2. NNSA Findings are required to be at a minimum Level 2.
3. All internal independent assessment findings (all levels) require Contractor Performance Assurance personnel review/approval of CAP and action closures.

Appendix C – Corrective Action Plan Template

Corrective Action Plan for the: CAP Reference Title
Reference Number: CAP Reference Number.
CAPA Owner: CAP Owner. **Issue Number:** Issue Number.
Apparent Cause: **Date Due:**

No.	Finding / Observation No.	Issue Description	Corrective Action	Deliverable	Action Owner	Scheduled Completion Date
1						
2						
3						
4						
5						
6						

Appendix D – Effectiveness Review/Extent of Condition

Effectiveness Reviews

An Effectiveness Review is an evaluation that determines whether the corrective actions implemented per the Corrective Action Plan (CAP) were effective and if the actions corrected the identified condition as intended to sufficiently prevent recurrence of the issue.

An Effectiveness Review can also be an assessment of implementation of requirements. Effectiveness Reviews begin like compliance assessments, looking for implementation of requirements in procedures and compliance with the procedures in the workplace. This is followed by a determination whether pure compliance has led to effective implementation of the intent of the top-level requirements. The assessor is expected to determine whether a noncompliance or series of noncompliances with procedures could actually result in a failure to satisfy top-level requirements. The assessor must assure the top level requirements are being met. To determine the program effectiveness, the following example may be noted: "Staff are compliant with the procedures on how to prepare a work request–but there are many dissatisfied customers based on **NOT** receiving what they want due to the fact that the staff didn't know how to write specifications."

The objectives of an Effectiveness Review are to:

- Verify the completeness of the Corrective Action Plan to address the issue
- Provide adequate evidence that recurrence of the same or similar issue will be precluded.

The Project Directors are responsible for the implementation and effective conduct of Effectiveness Reviews within their area of responsibility. The manager responsible for the Issue and associated CAP is responsible for ensuring completion of the Effectiveness Review.

The individual performing an Effectiveness Review ensures sufficient time has elapsed such that changes implemented by the corrective actions have had an opportunity to demonstrate effectiveness. Too little time may limit the ability to determine sustainability, while too much time may unduly delay identifying ineffective corrective actions. Typically, an Effectiveness Review should be conducted six months after all of the corrective actions have been completed and fully implemented. The performer of the assessment should be trained and qualified as an NQA-1 assessor; if not, then make sure a team member who will be signing as a co-performer is qualified.

The individual performing an Effectiveness Review completes the following in preparation for the Effectiveness Review:

- Verifies all of the corrective actions have been completed and documented.
- Determines sufficient time has elapsed to ensure full implementation of the corrective actions.
- Knows and understands the root cause of the issue:
    - Reviews how the issue was discovered
    - Understands the extent of the original oversight coverage
    - Reviews the initial investigation and causal analysis
    - Knows the sources of information used to establish the issue such as documents reviewed, interviews conducted, and/or observations made.

Appendix D – Effectiveness Review/Extent of Condition (Continued)

- Examines the evidence used to close the corrective actions:
  - The specific actions taken
  - The specific documents or processes modified
  - The specific personnel and areas affected by the corrective action
  - The specific changes made to people, documents, processes, and facilities
  - The nature of the differences and changes from conditions prior to the corrective actions
- Determines if an Extent of Condition review was conducted to establish corrective action. If so, evaluate the Extent of Condition for adequacy of coverage and applicability.
- Develops the criteria and the review approach to be used for the Effectiveness Review. (**Note**: The Effectiveness Review must **NOT** be a simple repeat of the original investigation and causal analysis.)
  - Develops the lines of inquiry to be used for the review.
  - Determines the documents to be reviewed.
  - Determines the personnel to be interviewed.
  - Determines the observations to be made.
  - Determines the areas and/or activities to be reviewed.

The responsible individual performs the Effectiveness Review and analyzes the results to determine if the CAP has been effective to preclude recurrence of a same or similar issue. Each of the corrective actions is reviewed to determine if it has been effective, partially effective, or ineffective relative to its desired outcome. The responsible individual then analyzes these results to determine, in the aggregate, whether the CAP has been effective or ineffective to preclude recurrence of a same or similar issue.

The following is the criteria for rating the CAP as effective:

- Corrective actions, in aggregate, have precluded recurrence of the issue since its original occurrence.
- Corrective actions, with high confidence, will preclude recurrence of the issue in the future.
- Program or process is currently well documented, compliant, understood, and demonstrates consistent implementation by the appropriate personnel.
- Personnel are following process(es) to reliably and efficiently produce expected results without evidence of upset, delay, or management intervention.
- Personnel are taking an active role in finding and fixing problems; understanding and using the corrective action system, and involvement in continuous improvement is evident.

Appendix D – Effectiveness Review/Extent of Condition (Continued)

The following is the criteria for rating the CAP as ineffective:

- Corrective actions, in aggregate, did **NOT** preclude or reduce the occurrence of the original issue.
- Significant or critical aspects of program or process are **NOT** documented or are **NOT** implemented as documented. Errors or noncompliances are identified that impact safety, reliability, or regulatory compliance (or a combination).
- Personnel demonstrate they are unaware of their responsibility to perform in accordance with process or procedure or are unaware of process or procedure requirements.
- Process occasionally or frequently does **NOT** produce expected results due to delays, upsets, or errors.
- Inspection, test, or audit process does **NOT** always find problems; defective products are sometimes delivered to customer that result in customer complaints or rejections; workforce does **NOT** consistently use the Corrective Action Program as required; personnel use an unauthorized alternative issues management process in lieu of the Issues Management System.

The Effectiveness Review is documented on Appendix E, *Effectiveness Review Report Template*.

Extent of Condition Review

Extent of Condition is a generic implication of a failure, malfunction, deficiency, defective item, weakness or problem; such as, the actual or potential applicability for an event or condition to exist in other activities, projects, programs, facilities, or organizations. Identifying and correcting issues that extend across event or organizational boundaries will reduce risk and operating costs, and result in a safer working environment through the detection and correction of both latent and obvious adverse conditions.

An extent of condition evaluation should be performed by a subject matter expert (SME) or a staff member familiar with the substance of the issue. These individuals should have appropriate expertise in the areas being evaluated and across the site. They should also have the problem solving skills to understand the corrective actions needed to resolve issues on a site-wide basis. The level of effort required for the evaluation will depend on the significance and complexity of the issue. Some extent of condition evaluations may only require a review of documents while others may require a walk-down of a facility. Efforts should be made to avoid a “checklist” mentality.

Key questions to consider when performing an Extent of Condition may include:

- Have I seen this before?
- If I am seeing it again, why?
- Is the management system deficient in some way since this circumstance occurred? How?
- Could other activities and facilities at the site be experiencing the same problem?
- To what extent does this problem have an impact or potential impact on the project or activity?
- Can this matter affect the ability of the company to conduct work safely and in compliance with requirements at the site?

Appendix D – Effectiveness Review/Extent of Condition (Continued)

A properly scoped, implemented, and documented Extent of Condition evaluation can help identify and correct problems before they become events. This saves resources and creates a safer, better managed work environment. Key actions to perform include:

- Review the background and circumstance that led to identification of the issue or condition triggering the review. There may be multiple issues or conditions that should be evaluated.
- Assure the level of effort will help identify all relevant causal factors.
- Evaluate the issue or condition for uniqueness, recurrence, and potential or actual consequences.
- Determine what issues require follow-up and whether a SME needs to be utilized in the evaluation.
- Determine the breadth of facilities and activities at the site that might be similarly situated.
- Consider what might have been inadequate in previous assessments, investigations, critique results and cause determinations if this is a repetitive problem.
- Identify and/or investigate the extent of applicability to other activities, processes, equipment, programs, facilities, operations, and organizations.
- Assure involvement by both the appropriate SME and manager in the development of findings.
- Document such findings and assure incorporation of the findings in development of corrective actions. Recognize the problem solving loop might require going back to Extent of Condition issues during implementation of a CAP if new information of insights develop during the implementation process.

The following areas should be considered for an Extent of Condition evaluation:

- **Causal Factors**. A key element of the corrective action process is the determination of causes. Understanding an issue's causes, including apparent, contributing, direct, or root, as part of the issue's investigative phase, will have a definitive influence on Extent of Condition evaluations and resulting determinations. Similarly, an understanding of Extent of Condition issues could play a useful role in cause analysis. For example, in a case where an electrical safety noncompliance occurred because of failure to maintain equipment to current standards, an Extent of Condition evaluation will look at all similar pieces of equipment to determine if there are other examples at the site of a failure to upgrade standards. In fact, if such examples are numerous, it might lead to a fresh review of equipment maintenance requirements in general at the site. Thus, the Extent of Condition evaluations will contribute to more accurate identification of the underlying issue. Similarly, such a review could indicate that the issue is confined to a single piece of equipment or a single building. It is important to remember that in many situations it is **NOT** possible to conduct a causal analysis until the Extent of Condition is identified. The important thing is to have an inquiring mind and respond to the facts as they develop.
- **Seriousness (Potential or Actual)**. Factors to consider with respect to the seriousness of the matter under consideration include the potential for physical harm, environmental impact, public perceptions and regulatory and contractual performance requirements. Issues **NOT** meeting the criteria for a CAQ may **NOT** be an appropriate candidate for an extensive Extent of Condition evaluation. Matters involving multiple failures, on the other hand, would make such an evaluation more appropriate.

Appendix D – Effectiveness Review/Extent of Condition (Continued)

- **Uniqueness**. Uniqueness is another consideration in deciding the formality needed to evaluate Extent of Condition. If the issue uniquely relates to a single activity or process at the site, a graded approach to the formality and documentation of an Extent of Condition evaluation should be considered. On the other hand, if the issue is found to be generic or programmatic, then it is likely that an Extent of Condition evaluation should be performed and documented. For example, a failure to use a respirator properly in a particular facility may be considered unique if that is the only facility on site that utilized respirators. If, however, the source of the failure to use the respirator properly is inadequate training and such equipment is used in many places around the site, it would be appropriate to conduct an Extent of Condition evaluation. In at least some circumstances, the question of uniqueness may only be answerable after some preliminary Extent of Condition evaluation.
- **Recurrence**. If the issue under study is similar to other issues that have occurred at the site, then an Extent of Condition evaluation of the site as a whole may be warranted, probably in conjunction with a root cause analysis.
- **Cost**. It is expected that managers will make decisions regarding an Extent of Condition evaluation using the graded approach and taking the potential safety impact and cost into consideration.

Extent of Condition versus Extent of Cause Reviews

As previously stated, the Extent of Condition is defined as the extent to which the actual condition exists with other plant processes, equipment, or human performance. Extent of Cause is the extent to which the root cause(s) of the problem could impact other plant processes, equipment, or human performance.

The Extent of Condition review differs from the Extent of Cause review in that the Extent of Condition review focuses on the actual condition and its existence in other places. The Extent of Cause review should focus more on the actual root causes(s) of the condition and on the degree that these root causes have resulted in additional weaknesses.

The SME or a staff member familiar with the substance of the issue should reasonably bound the Extent of Condition and Extent of Cause reviews with regard to the relative risk they create for PGDP D&R Contractor.

Appendix E – Effectiveness Review Report Template

Effectiveness Review for Issue (CAPA) Number CA-000###

Date(s) of Effectiveness Review:

Effectiveness Review Team:

Team Leader *[Print, Sign and Date]*

Team Members

Issue (CAPA) Number:
Issue Description:

Extent of Condition:

Corrective Actions:
[GENERAL INFORMATION pertaining to all the following Corrective Actions or entire CAP]

1. *[FIRST corrective action NUMBER]*
   a. Corrective Action Description:

   b. Corrective Action Completion Date:

   c. Lines of Inquiry *[can also use separate checklist and pull this section out of each corrective action up to the GENERAL INFORMATION area and state "The Lines of Inquiry for each of the corrective actions below can be found on the attached checklist]*
      - Has the corrective action been closed in the Issues Management system? *[list results and Satisfactory or Unsatisfactory]*
      - Was objective evidence provided in the Issues Management system to support corrective action closure? *[list results and Satisfactory or Unsatisfactory]*
      - Is the corrective action continuing to be implemented in the field as applicable? *[list results and Satisfactory or Unsatisfactory]*

   d. Corrective Action Plan Effectiveness

2. *[SECOND corrective action Number]*
   a. Corrective Action Description:

   b. Corrective Action Completion Date

   c. Lines of Inquiry *[can also use separate checklist and pull this section out of each corrective action up to the GENERAL INFORMATION area and state "The Lines of Inquiry for each of the corrective actions below can be found on the attached checklist]*
      - Has the corrective action been closed in the Issues Management system? *[list results and Satisfactory or Unsatisfactory]*
      - Was objective evidence provided in the Issues Management system to support corrective action closure? *[list results and Satisfactory or Unsatisfactory]*
      - Is the corrective action continuing to be implemented in the field as applicable? *[list results and Satisfactory or Unsatisfactory]*

Appendix E – Effectiveness Review Report Template (Continued)

Effectiveness Review for Issue (CAPA) Number CA-000###

d. Corrective Action Plan Effectiveness

Effectiveness Review Evaluation:

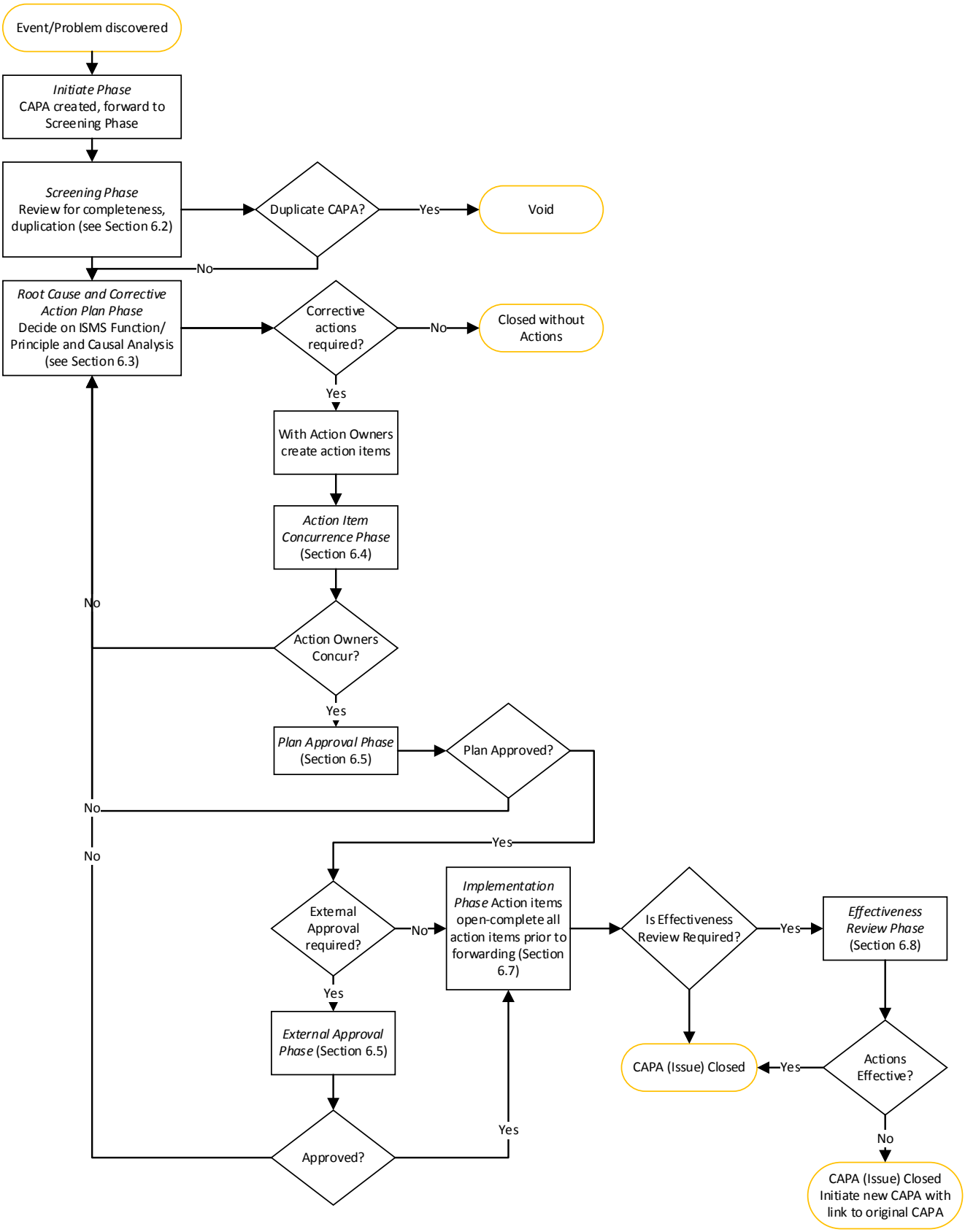
a. Lines of Inquiry

b. Documents Reviewed

c. Personnel Interviewed

d. Observations Performed

Appendix F – Electronic Issues Management
Corrective Action and Preventive Action (CAPA) Process Flow



WORKING COPY

VERIF. DATE: _____

INITIALS: _____

CP3-RD-0010 Rev. 6	TITLE: Records Management Process	Page 1 of 25

DOCUMENT CATEGORY: ☒ Administrative ☐ Technical

LEVEL OF USE: ☒ Information Level ☐ Reference Level ☐ Continuous Use

FUNCTIONAL AREA: Business Services **SUBJECT MATTER AREA:** Records Management	**SUBJECT MATTER EXPERT:** Ruby Toliver, Records Management Manager
NUCLEAR SAFETY REVIEW DOCUMENTATION: USQ Exemption #29. See Request No. 007-2015 signed by Rick Boyleston 12/9/15.	**APPROVED BY/DATE** (Signature on file): Lance Waddell, Business Services Director 7-24-17
REQUIRED REVIEW DATE (or expiration date for temporary change): 7/24/2020	**EFFECTIVE DATE:** 7/25/2017

REVISION/CHANGE LOG

Revision/Change Letter	Description of Changes	Pages Affected	Date of Revision/Change
0	Initial Release.	All	10/20/2014
1	General revision to improve FPDP processes Added 5.1.9 –Business Services Staff Changed 6.20 to reflect Business Services Staff role Deleted CP3-RD-0010-F05 *Correspondence Distribution*	All	1/7/2015
2	General revision to new format and to reorganize sections, Revised CP3-RD-0010-F01 Records Transmittal Form and removed all forms from appendices, Revised steps for processing records.	All	04/08/2015
3	Revision to Administrative Record Program and general revision to better align with new formatting guidelines.	All	7/23/2015
4	Revision to change Records Custodian section, Infrastructure Contractor name, Remove Correspondence Section for a separate procedure, Correct Appendix C, and correct formatting issues to better align with newest guidelines.	All	12/9/2015
4A	Add TSR 5.10.1 requirements.	4, 6, 7, 19	2/4/2016
5	Incorporate recommendations from PPPO audit including receipt control for QA records. Added information on handling contaminated records.	All	7/7/2016
6	Allow other knowledgeable personnel to correct records when originator is not available. Change FPDP to PGDP D&R. Update definition of originator.	All	7/24/2017

TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure defines administrative controls for records generated during the course of doing business by Paducah Gaseous Diffusion Plant (PGDP) Deactivation & Remediation (D&R) Contractor personnel and subcontractors.

1.2 Scope

This procedure addresses information of any type and in any form that meets the legal definition of a record, or needs to be addressed to facilitate the identification and management of record information. This includes paper documents, electronic files, email messages, computer systems and their data, etc., that are created by, or in the possession of, any PGDP D&R employee or contract labor resource personnel, or in any of the following circumstances:

- While working on any PGDP D&R business activities.
- While performing activities funded by the U. S. Department of Energy (DOE).
- While located at any PGDP D&R business location.
- At any time while using PGDP D&R equipment or resources, such as offices, computers, etc.

This procedure applies to all personnel who identify, generate, review, approve, store, transmit, receive, retain, or disposition records as a result of doing PGDP D&R business.

2.0 REFERENCES

2.1 Use References

- CP3-QA-3001, *Issues Management*
- CP3-RD-0014, *Record Identification and File Plan Creation and Maintenance*
- PGDP (Paducah Gaseous Diffusion Plant)Procedure 01.03.04, *Paducah Classification and Information Control*
- PGDP Procedure 01.03.18, *Unclassified Controlled Information (UCI) Management*

2.2 Source References

- 18 U.S.C. 2071, *Concealment, Removal, or Mutilation Generally*
- 44 USC 3106, *Unlawful Removal, Destruction of Records*

3.0 COMMITMENTS

- 36 Code of Federal Regulations (CFR), Chapter XII, Subchapter B, *Records Management*
- CP1-NS-3001, *Technical Safety Requirements (TSR) for the U. S. Department of Energy Paducah Site Deactivation Project*
- CP2-QA-1000, *Quality Assurance (QA) Program Description*
- DOE Order (O) 243.1B, *Records Management Program*
- DOE O 422.1, *Conduct of Operations*

- American Society of Mechanical Engineers (ASME) NQA-1-2008, *Quality Assurance Requirements for Nuclear Facility Applications*, (with Addenda through 2009)

4.0 RESPONSIBILITIES

4.1 Functional Area Managers

- Assume responsibility for all records received, created, or transmitted under their supervision.
- Designate Record Custodians to ensure organizational record programs are implemented and maintained in compliance with this procedure.
- Ensure all PGDP D&R personnel within their Functional Area who create, receive, or transmit records are aware of, and comply with, the requirements of this procedure.
- Enforce all maintenance requirements defined in this procedure for records generated, received, processed, transmitted, maintained, or stored by PGDP D&R activities and operations.
- Ensure that terminating or transferring personnel who create and maintain records perform turnover to an appropriate employee, and notify Records Management (RM) by e-mail of the change before leaving.

4.2 Record Custodians

- Identify records created and/or received within their organization or functional area as a result of doing business and document according to CP3-RD-0014, *Records Identification and File Plan Creation and Maintenance.*
- Organize, maintain, and protect records during custody.
- Provide input to RM to establish electronic folders for email records.
- Prepare and transmit records according to this procedure.
- Ensure records transmitted to RM meet the minimum standards of this procedure. Only unclassified information will be indexed or filed within the RM database.
- Ensure record file size is approximately 100 MB or less. Files exceeding 100 MB may need to be submitted in segments.
- Ensure electronic records include optical character recognition (OCR).
- Ensure electronic records created by scanning are compared to the original for legibility and complete document is properly scanned and meets quality requirements.

4.3 Procurement

- Ensure subcontracts and purchase orders specify the records to be generated, the storage requirements for those records, and the right of authorized site personnel to access those records.
- Ensure subcontracts and purchase order records generated and retained by subcontractors or vendors are accessible by authorized personnel.
- Ensure subcontracts and purchase orders specify that a subcontractor's or vendor's records are not disposed of until the required retention period has expired or regulatory requirements are satisfied.
- Submit records of subcontracts and/or purchase orders or vendor records to RM.

4.4 RM Personnel

- Develops and maintains a RM Program consisting of the following:
  - Records file plans for site records.
  - Vital Records Plan and Inventory.
  - Storage, maintenance, and retrieval of site records.
  - RM awareness through established plant training.
- Ensures access to business-sensitive and classified records is restricted to individuals with an appropriate need-to-know and appropriate access authorization for access in the performance of their job assignments.
- Develops and implements a disaster recovery plan to preserve and retrieve archived records.
- Develops procedures for handling individual records.

4.5 Technical Writer

Ensures new, changed, or revised procedures specify actions to identify, locate, and submit records to RM.

4.6 All PGDP D&R Personnel

- Complete training on RM Awareness.
- Distinguish (identify, segregate, and clearly mark) record from non-record material for all media types.
- Generate and maintain records according to this procedure.
- Ensure access to business-sensitive and classified records is restricted to individuals with an appropriate need-to-know and appropriate access authorization for access in the performance of their job assignments.
- Retain records according to approved DOE Records Schedules and protect federal records from unauthorized destruction.
- Capture email records and transfer to RM on a frequent and routine basis.
- Do **NOT** conceal or destroy any information, including noncompliance or potential noncompliance records as mandated by 18 U.S.C. 2071, *Concealment, Removal, or Mutilation Generally*.
- Work with organizational records custodian and RM personnel and ensure records are included in records inventories and file plans according to CP3-RD-0014, *Records Identification and File Plan Creation and Maintenance.*

5.0 GENERAL INFORMATION

5.1 In addition to the records requirements listed in this procedure, classified documents are handled according to PGDP Procedure 01.03.04, *Paducah Classification Information and Control*.

5.2 Administrative Record (AR) files are managed according to CP3-RA-4002, *Administrative Record Process*.

5.3 Lifetime QA records are maintained according to CP2-QA-1000, *Quality Assurance Program Description* until the item is no longer being used or it is retired from service.

6.0 INSTRUCTIONS

6.1 Record Custodian Designation

Director/Functional Area Manager/Designee

6.1.1 Assign Records Custodian.

6.1.2 Concur by signing CP3-RD-0010-F07, *Record Custodian Designation*.

RM Personnel

6.1.3 Complete the processing of CP3-RD-0010-F07 as follows:

A. Review form for accuracy and completeness.

B. Return to Director/Functional Area Manager (FAM)/Designee for correction if necessary.

C. Sign the form **and** return to Director, FAM, or Designee.

6.1.4 Provide the designated Record Custodian name to the PGDP D&R Training organization to assign training modules.

Training

6.1.5 Assign required training, as applicable.

6.2 Record Creation

Director/FAM/Designee

6.2.1 Work with Record Custodian to ensure records that are generated, supplied, and maintained are listed on the organization's file plan, according to CP3-RD-0014, *Record Identification and File Plan Creation and Maintenance*.

PGDP D&R Personnel

6.2.2 Create records that effectively and accurately document organization functions, policies, procedures, decisions, essential transactions, and work performed.

TSR 5.10.1

6.2.3 Ensure the following records are retained.

- Records and logs of facility operation
- Records and logs of principal maintenance activities, inspections, repairs, and replacements of principal equipment items related to nuclear safety
- All reportable events/occurrences
- Records of surveillance activities, inspections, and calibrations required by TSRs

TSR 5.10.1

- Records of changes made to procedures
- Records and drawing changes reflecting facility design modifications made to systems and equipment described in the DSA
- Records of radiation exposure for all individuals entering radiologically controlled areas
- Records of training and qualification for current members of the facility operations staff
- Records of USQ reviews performed for changes made to procedures or equipment

6.2.4 Ensure records are:

A. Accurate, legible, reproducible, and complete.

B. Developed according to appropriate guidelines.

C. Capable of producing a legible copy reflecting original quality when reproduced or printed from electronic media.

NOTE:

RM shall be contacted for guidance on permanent record scanning. Permanent records must be scanned at using lossless compression.

6.2.5 **If** image-scanning processes create electronic records, **then** utilize error prevention techniques such as legibility check and page count verification to ensure the complete document is captured. Use extra care when scanning involves 2-sided originals. Scan records at a minimum of:

- 300 ppi for non-quality records,
- 400 ppi for quality records, and
- 600 ppi for documents of inferior legibility.

6.2.6 Ensure records meet the following requirements:

A. Add record number, if applicable.

B. Title records to identify the item or activity that created the record. For example, *Canberra Gamma Spectrometry Log Book, June 1995 through September 1995*, rather than *lab notebook*. Additional information can be provided to further identify the record.

C. Group records in folders labelled with a descriptive title.

D. Maintain event driven records together to ensure proper disposition.

E. Ensure each record has keywords identified to aid in future retrieval of the records.

F. Ensure forms have not been altered, and/or information has not been *whited out* to create a copy of an approved form.

NOTE:

Dark, non-fluorescent highlighters which tend to obscure information should not be used.

G. Minimize notes or comments of non-record information on records. Use routing slips or other devices that can be attached without defacing the record material for non-record information.

H. **If** the records generated detail a potentially classified process or area, **then** ensure they are reviewed by a Derivative Classifier.

I. Ensure all records containing Business Sensitive or Classified information are marked according to PGDP Procedure 01.03.18, *Unclassified Controlled Information Management*.

J. Ensure data is entered, and signatures and dates are completed with dark ink. In cases where other than dark ink has been used, such as pencil or light colored ink, ensure readability of entries by photocopying or similar methods.

K. Ensure Quality records are authenticated and complete. **If** a line designated for a signature does **NOT** require a signature, **then** ensure 'N/A' is placed on the line.

L. Ensure corrections, if any, are made before submitting to the appropriate record custodian or RM according to Section **6.4**.

6.3 Transfer of Paper Record to Electronic Media

NOTE:

RM shall be contacted for guidance when scanning permanent records.

PGDP D&R Personnel

6.3.1 Transfer paper records to Record Custodian/designee in accordance with organizational process.

Record Custodian/Designee/PGDP D&R Personnel

6.3.2 Receive paper records to be scanned and converted to electronic media.

NOTE:

It is important to keep in mind double-sided pages and odd-sized pages. RM shall be contacted for guidance on permanent record scanning. Permanent records as identified on the organizational file plan must be scanned using lossless compression.

6.3.3 Scan paper files into electronic media. The following scanning requirements apply:

A. Output media must be neutral portable document format (pdf) file.

B. Scanning must be performed at a minimum of

- 300 ppi for non-quality records,
- 400 ppi for quality records, and
- 600 ppi for documents of inferior legibility.

C. **If** scanning a permanent record, **then** use a lossless compression technique.

D. Scanning should include OCR. **If** scanning does **NOT** include OCR, **then** perform OCR on document in Adobe once scanned.

E. All pages of original paper-record must be scanned.

6.3.4 Store files in designated electronic folder.

6.3.5 Perform a quality check of the files by comparing the paper records to the pending electronic files. The quality check must include:

- Optical character recognition process
- Verification of scanning resolution using pre-flight profile or other method
- Clear and legible text and markings
- Illegible text should be marked as “best available record” or “poor quality original”
- Pages rotated correctly
- Appropriate classification and business sensitive markings
- Removal of security settings
- Lossless file compression technique **if** permanent records (**NOT** lossy)
- Page count verification
- File size is approximately 100 MB or less **or** submitted in multiple files if applicable

6.3.6 Complete workflow for each file after quality check is complete by importing files into designated record folders.

6.3.7 At the direction of organization management, **either** maintain, completed and active electronic records within the organization until the records’ file cut off as dictated on organizational file plan, **or** proceed immediately to Section **6.8**.

6.3.8 **If** a hardcopy original exists, **then** maintain until notified by RM that they have received and verified the record.

NOTE:

The originator should make the corrections to the record copy. In the event the originator is not reasonably available, the record may be corrected by another member of the functional area that is knowledgeable of the activity.

6.4 Record Correction

PGDP D&R Personnel

NOTE:

Correction tape or whiteout fluid shall **NOT** be used to correct in-process documents.

6.4.1 **If** record is in-process, **then**

A. Draw a single line through the incorrect information, initial **and** date each correction.

B. Enter the correct information adjacent to the originally entered information.

C. **If** correction impacts NCS or TSR systems, **then** add a comment explaining the reason for the correction, sign, and date the comment.

6.4.2 **If** record was previously submitted to RM, **then**

A. Request a record copy (RC) from RM.

B. Draw a single line through the incorrect information, insert correct information, initial, **and** date each correction.

C. **If** correction impacts NCS or TSR systems, **then** add a comment explaining the reason for the correction, sign, and date the comment.

D. Complete CP3-RD-0010-F01, *Records Transmittal Form*.

E. In the comments field of CP3-RD-0010-F01, indicate this is a corrected record and reference the original record.

F. Submit the corrected record and transmittal to RM for processing.

6.5 Storage and Maintenance of Records

Director/FAMs

NOTE:

Due regard should be used for the risk of loss associated with the content of the record. The time and effort needed to reconstruct these are important considerations when determining what steps to take in maintaining and protecting the record.

Reference/convenience copies cannot be maintained longer than the original records. RM shall be contacted for guidance.

6.5.1 Approve records storage locations for all of your organization's on-going project records. Consider the following:

- Potential for a catastrophic event at the storage location.

- Potential for damage from rodents or other pests.
- Ability, or lack thereof, to reproduce or replace lost or damaged records (one-of-a-kind).
- Potential impact of lost or damaged records (safety, operations, cost, schedule, legal, license, permits, etc.).
- Potential damage from heat, cold, humidity or mold.
- Use of standard metal file cabinets for storage of records in rooms/facilities equipped with fire-suppression systems.

PGDP D&R Personnel

6.5.2 Protect all completed records by providing the following minimum storage requirements:

- Separate personal papers and non-record items from documents designated to become records and ensure records are clearly marked as records.
- Collect **and** organize records as they are completed, **and** ensure the applicable file plan is updated and maintained to expedite retrieval.
- Store records in a manner to prevent damage and/or loss due to moisture, temperature, and pressure. Other examples of hazards to be considered are light and electrical power fluctuations.
- Store records containing unclassified controlled information according to PGDP Procedure 01.03.04, *Paducah Classification and Information Control*.
- Place in locked or controlled access area.
- Maintain an Access Control List of personnel authorized to access records for each records storage area. Personnel **NOT** on the list shall obtain permission from the record custodian to access files.
- Use checkout cards or logs when removing records from record storage area.

6.5.3 **If** information is subject to a moratorium on destruction or legal hold, **then** protect the information in accordance with the specific instructions included in the direction concerning the moratorium on destruction or legal hold.

NOTE:

Privacy Act records are Official Use Only (OUO) and may be in any media

6.5.4 **If** records meet the definition of Privacy Act records, **then**

A. Mark according to PGDP Procedures 01.03.04, *Paducah Classification and Information Control* and 01.03.18, *Unclassified Controlled Information Management*.

B. Maintain proper access control.

1. Protect electronic files with passwords.

2. Store paper Privacy Act records in a locked drawer, file cabinet, or in a locked room.

3. Determine the *need-to-know* of persons requesting access to the information.

C. Designate as Privacy Act records on CP3-RD-0010-F01, *Records Transmittal Form*.

NOTE:

A QA Record is designated as lifetime or nonpermanent and is specified as such on the organizational file plan. This designation will help determine the appropriate retention period as a quality record. This does **NOT** negate the NARA requirements, in particular the NARA-approved retention requirements.

If doubt exists as to whether or not a record is a QA record, **then** the Quality Manager should be contacted for guidance.

6.5.5 **If** records are QA records, **then**

A. Ensure records are traceable to systems, processes, components, or activities involved.

B. Ensure records are initialed or signed and dated by authorized personnel for authentication prior to forwarding to record custodian and RM.

C. **When** transferring a quality record, maintain receipt control with **each** transfer.

1. Use CP3-RD-0010-F08, *QA Record Receipt Control*, or any other documentation that includes the following at a minimum:

- Record title
- Record/Document identifier/number
- Document change/revision, if applicable
- Record date
- Page count
- Printed name and signature or initials of originator/generator and date
- Printed name and signature or initials of recipient and date

2. **If** the record is transferred more times than the number of signature blocks contained on the form, **then** start another form.

D. Store using **one** of the following requirements:

- Use two-hour fire-rated cabinet, plus adequate smoke detection or fire suppression systems
- Maintain duplicate hard copy records in identified storage area in a separate location; duplicate records storage areas must be removed sufficiently from one another to eliminate circumstances where a single adverse event can damage records held at both locations;
- Maintain a duplicate of the information in another record media that is stored in a separate location. Access controls continue to apply to the electronically stored record.

RM Personnel

6.5.6 Store records on approved drives for the approved record retention period as specified in DOE records schedules and **if** records are QA records, **then** also as specified in NQA-1 requirements.

6.5.7 Ensure drives are backed up as needed to ensure continuity of operations.

6.6 Non-Record Material

PGDP D&R Personnel

6.6.1 Consider documents or materials that do **NOT** meet the definition of record as non-record material.

6.6.2 Maintain non-record material as needed in working files **and** ensure records and non-records are **NOT** intermingled.

6.6.3 Dispose of unneeded non-record material promptly and in accordance with content sensitivity and any guidance from the Security and/or Legal Organizations.

6.7 Contaminated, Damaged or Missing Records

PGDP D&R Personnel

NOTE:

Hardcopy records are considered damaged whenever pages are mutilated or print is degraded or obscured to the extent that information is not legible. Electronic records are considered damaged when files cannot be opened or retrieved.

6.7.1 **If** records are known or suspected to be contaminated with radiological or hazardous material, **then:**

A. Contact the RM Manager to assess status of records.

B. **If** records have met retention requirements **and** are eligible for destruction, **then** work with RM to obtain destruction approval and authorization from DOE.

C. **If** records need to be retained, **then,** based on the type of contamination, request Radiological Control and/or Industrial Hygiene, to survey records and provide direction for handling.

6.7.2 **If** a record has been damaged while in the custody of the organization, **then**:

A. Notify the RM Manager to assist in determining if the record needs to be restored or reconstructed.

B. Restore/reconstruct the record as follows:

1. Notify the organization responsible for generation or receipt of the damaged record **and** review related records to determine if the information is available from other data.

2. Contact RM to see if it can be restored/reconstructed from other existing records such as work permits that may be stored as individual records.

6.7.3 Based on the reexamination or reevaluation, re-create the record as deemed appropriate. **If** a record cannot be located, **then** perform the following:

A. Check the designated file location and other likely areas to see if the record was misfiled or recently removed and **NOT** returned.

B. Contact RM to determine if the record was transmitted to the Infrastructure Contractor.

C. **If** the missing record is classified, **then** immediately notify Security.

D. **If** the record cannot be located, **then** if appropriate, initiate CP3-QA-3001-F02, *Issue Identification Form*, according to CP3-QA-3001, *Issues Management*, **and** create a record that describes the situation that led to the loss or destruction of the record **and** describe the actions taken to try to replace the record.

E. File the explanatory document in place of the record that cannot be replaced.

6.7.4 **If** the damaged record is electronic, **then** contact Information Technology (IT) to see if the record can be opened or retrieved.

6.7.5 **If** a record has been reconstructed or restored, **then** ensure replaced or recreated records contain adequate annotation to explain the circumstances of loss or damage and the efforts to replace the lost or damaged record.

6.8 Records Transmittal to RM

NOTE:

All records sent to RM shall be in electronic format unless otherwise approved by the RM manager. Records of mixed disposition will **NOT** be accepted.

Additional information regarding email records can be obtained by contacting RM directly.

PGDP D&R Personnel

6.8.1 **If** transmitting email records, **then**

A. Remove any passwords or Entrust certificates.

B. Expand any distribution lists so that all recipients' names are visible.

C. Transfer to the appropriate email records folder established for your organization.

6.8.2 Segregate and submit records to RM according to the organizational file plan, which specifies record type and file cut-off.

6.8.3 Prepare the records for transmittal as follows:

A. Restore, reconstruct, **or** provide substitutes for damaged or missing records.

B. **If** document is from a classifiable subject area, **then** ensure the records have been reviewed by a Derivative Classifier and marked with the proper security classification.

C. Remove passwords from records containing OUO.

NOTE:

Personnel are expected to know how QA records are maintained, completed, and authenticated within their organization. Upon transmittal to RM, submitter is declaring records to be authenticated and complete according to applicable requirements.

6.8.4 **If** records being transmitted are identified as QA records, **then** ensure the following prior to transmittal:

- Data is entered, and signatures and dates are completed with dark ink. In cases where other than ink has been used, such as pencil or light colored ink, ensure readability of entries by photocopying or similar methods.
- Records are authenticated and complete. **If** a line designated for a signature does **NOT** require a signature, **then** ensure 'N/A' is placed on the line.
- Corrections, if any, are made according to Section **6.4**.
- Forms have **NOT** been altered, and/or information has **NOT** been *whited-out* to create a copy of a prescribed form.

6.8.5 Remove all duplicate and non-record material.

6.8.6 Remove paper clips, rubber bands, etc. before transmitting to RM.

6.8.7 Complete CP3-RD-0010-F01, *Records Transmittal Form.*

NOTE:

Upon completion of the records transmittal, the record custodian is attesting that the records are complete, have been authenticated as applicable, and the requirements of this procedure have been met. Records not transmitted in compliance with this procedure will **NOT** be accepted.

6.8.8 Ensure all information requested on the records transmittal form is complete and accurate.

6.8.9 **If** necessary, contact RM for assistance with completing CP3-RD-0010-F01, *Records Transmittal Form.*

6.8.10 Ensure the completed records transmittal form is the first page of the records file for transmittal to RM.

6.8.11 Save the PDF in the Records Transmittal folder on the shared drive designated by RM using the record title specified on the records transmittal form as the file name.

6.8.12 Send an email to FPDPRecords.Management@FFSPaducah.com to notify RM personnel of the transmittal.

6.8.13 Maintain the record media until RM verifies acceptance of the records and returns the completed transmittal to the Records Custodian/Submitter.

6.9 Record Receipt, Verification and Indexing

RM Personnel

6.9.1 Review the CP3-RD-0010-F01, *Records Transmittal Form*, and the submitted record files **and** ensure the following:

- Information on the form is complete and accurate.
- Records are being transferred according to cut-off instructions listed on organizational file plan.
- The file when reproduced will produce a legible copy reflecting original quality.
- Records presented in scanned files are in good repair without torn pages or missing pages and are like disposition.
- Record title is identified.
- Corrections made prior to submitting to RM are made with a single line, initialed, and dated, and **NO** correction tape or whiteout fluid has been used.
- Forms have **NOT** been altered, and/or information has **NOT** been "whited-out" to create a copy of an approved form.
- Records identified as containing UCI records are marked according to PGDP Procedure 01.03.18, *Unclassified Controlled Information Management*.
- Scanning requirements are met.

6.9.2 Ensure the record transmittal is filed as the first page of the record file.

6.9.3 **If** there is a discrepancy **or** quality concern with the record, **then** contact the record custodian for remediation and correction.

A. **If** correcting/modifying the record is **NOT** possible, **then** request record custodian to appropriately mark the record.

Record Custodian/ PGDP D&R Personnel

B. Mark the record as "best available record," "poor quality original," or similar wording as applicable.

RM Personnel

C. Document resolution on the transmittal and/or in Documentum when loaded.

6.9.4 Import the appropriate file into Documentum.

A. Enter/Update the required information for the record in the Properties field for the file(s).

B. **If** record is a case file **or** event driven record, **then** maintain as a collection and file in the properly labelled folder within Documentum.

6.9.5 **When** processing the record **and** periodic QA checks are complete, return a copy of the accepted records transmittal to the Record Custodian.

6.10 Access and Retrieval from Records Storage Area

RM Personnel

6.10.1 Develop **and** enforce an access list for the RM records storage areas to prevent the entry of unauthorized personnel.

NOTE:

An authorized individual may escort personnel not identified on an access list.

Contractor or Vendors

6.10.2 **If** maintaining records under this program at the vendor facility or other location, **then** make records available to appropriate Contract Technical Representative.

PGDP D&R Personnel

NOTE:

A request may be made by emailing FPDPRecords.Management@FFSPaducah.com and including the information as indicated on the CP3-RD-0010-F02, *Records Management Service Request*.

6.10.3 Request records using form CP3-RD-0010-F02, *Records Management Service Request,* including as much information about the requested record as possible **or** by emailing the applicable information to FPDPRecords.Management@FFSPaducah.com.

RM Personnel

6.10.4 Review the requests to ensure all customer information is completed, **and** ensure there is sufficient information to retrieve the record.

6.10.5 **If** the information is **NOT** sufficient, **then** contact the requestor to obtain additional information.

6.10.6 **If** the request involves sensitive records, **then** verify the requestor has authorization by checking the appropriate access authorization and need-to-know.

6.10.7 **If** needed, **then** make copies as indicated on the request.

6.10.8 **When** the request is filled, **then** verify the number of copies provided agrees with the number requested.

6.10.9 Indicate the date the request was completed in the *Date Completed* block at the top of the form.

6.10.10 File the original request **and** record.

6.10.11 **If** making a copy is **NOT** practical, **then** ensure the requestor has a *need-to-know* **and either** allow the requestor to review the document in the RM area **or** obtain approval from RM Management to loan the record copy.

A. **If** the record copy is loaned, **then** sign out using CP3-RD-0010-F06, *Record Loan Receipt*.

B. Place a Record Out card and a copy of the completed CP3-RD-0010-F06 in place of the record copy.

C. File CP3-RD-0010-F06 in designated area.

D. Ensure loaned records are returned to permanent storage at the end of the workday unless approved temporary storage is available.

E. Ensure loaned records are returned within 30 days.

F. **When** loaned record is returned, verify it has **NOT** been altered **and** refile.

6.10.12 **If** record copy is loaned for legal purposes, **then**

A. Create a new record copy by reproducing the file, and stamping *Record Copy* on the copy.

B. Sign out original record copy using CP3-RD-0010-F06, *Record Loan Receipt.*

C. Document projected return date on CP3-RD-0010-F06.

D. Place a Record Out card and a copy of the completed CP3-RD-0010-F06, in the file with the new record copy.

E. File CP3-RD-0010-F06 in designated area.

F. Once the loaned copy is returned, verify it has **NOT** been altered **and** replace the copy in the file with the returned original record copy.

6.11 Record Transfer to Infrastructure Contractor

RM Personnel

6.11.1 **If** records are to be transferred to the Infrastructure Contractor for disposition, **then** transfer using the appropriate method agreed to by management.

6.11.2 Notify Infrastructure Contractor Records team by email that records have been transferred.

7.0 RECORDS

7.1 Records Generated

The following records may be generated by this procedure:

- CP3-RD-0010-F01, *Records Transmittal Form*
- CP3-RD-0010-F02, *Records Management Service Request*
- CP3-RD-0010-F06, *Record Loan Receipt*
- CP3-RD-0010-F07, *Record Custodian Designation*
- CP3-RD-0010-F08, *QA Record Receipt Control*

Forms are to be completed in accordance with CP3-OP-0024, *Forms Control*.

7.2 Records Disposition

The records are to be maintained in accordance with CP3-RD-0010, *Records Management Process*.

Appendix A – Acronyms/Definitions

ACRONYMS

AR – Administrative Record

ASME – American Society of Mechanical Engineers

CERCLA – Comprehensive, Environmental Response, Compensation, and Liability Act of 1980

CFR – Code of Federal Regulations

D&R – Deactivation and Remediation

DOE – U. S. Department of Energy

FAM – Functional Area Manager

FPDP – Fluor Federal Services, Inc. Paducah Deactivation Project

IT – Information Technology

NARA – National Archives and Records Administration

NQA-1 – Nuclear Quality Assurance-1

OCR – Optical Character Recognition

OUO – Official Use Only

PDF – Portable Document Format

PGDP – Paducah Gaseous Diffusion Plant

PPI – Pixels Per Inch

QA – Quality Assurance

RC – Record Copy

RM – Records Management

TSR – Technical Safety Requirements

UCI – Unclassified Controlled Information

DEFINITIONS

ADMINISTRATIVE RECORD (AR) – The official body of documents that forms the basis of the selection of a particular response action (i.e., documents considered or relied upon in selecting a remedy) as required by the Comprehensive, Environmental Response, Compensation, and Liability Act (CERCLA) of 1980.

APPROVAL – The process of attesting to the authenticity and accuracy of a document.

Appendix A – Acronyms/Definitions (continued)

AUTHENTICATION – The act of attesting that the information contained within a document is accurate, complete, and appropriate to the work accomplished. Authentication is accomplished by one of the following methods: 1) A stamped, initialed, logged, or signed and dated document; 2) A written statement by the responsible individual or organization; or 3) Issuing a document which is clearly identified as a statement by the reporting individual or organization.

DISCREPANCY – A deviation between the statement of contents of a record as described on the transmittal and those records that actually exist in the record package.

DISPOSITION – Those actions taken regarding records no longer needed for the conduct of the regular current business of the creator. These actions include transfer to storage facilities or records centers, transfer of physical and/or legal custody to National Archives and Records Administration (NARA), and destruction.

ELECTRONIC RECORD – Information providing evidence concerning an activity that is stored as a file within a computer or in a form that only a computer can process or read.

FILE PLAN – Comprehensive outline that includes the file code, file organization, active file locations, file transfer instructions, file retention and disposition instructions, and other specific instructions that provide guidance for effective management of records, including vital records.

IN-PROCESS DOCUMENT – A document designated to become a record that has not been submitted to the appropriate record custodian or RM.

INVENTORY – A descriptive listing of each record series together with an indication of location and other pertinent data.

LIFETIME (In Regard to QA Records) – QA Records required to be maintained for the life of the particular item while it is installed in the plant or stored for future use. Therefore, lifetime QA records are those associated with "items."

LOSSLESS COMPRESSION – Data-file size reduction technique which employs compression algorithms that do not cause any data loss in the compression-decompression process. Commonly used in compression of text files, it does not generally provide very high compression ratios but the decompressed file is identical in every way to the original file.

NON-PERMANENT (In Regard to QA Records) – QA Records required to show evidence that an activity was performed in accordance with applicable requirements, but the records do not need to be retained for the life of the item. Therefore, non-permanent QA records are those associated with "activities."

NON-RECORD MATERIAL – Informational material excluded from the legal definition for record material which includes extra copies of documents retained for the convenience of reference, publications stocks and processed documents, and library or museum materials intended solely for reference or exhibition.

ORIGINATOR – A person who is responsible for maintaining records within his/her personal workspace. The originator may be multiple individuals since a record is usually generated by more than one person during the creation process. All records in the possession of an originator are administratively managed by a Record Custodian.

Appendix A – Acronyms/Definitions (continued)

PERMANENT RECORD – Any federal record that has been determined by NARA to have sufficient value to warrant its preservation in the National Archives of the United States, even while it remains in agency custody. Permanent records are those for which the disposition is permanent on SF 115, *Request for Records Disposition Authority*, approved by NARA on or after May 14, 1973. The term also includes all records accessioned by NARA into the National Archives of the United States.

PRIVACY ACT RECORDS – Records that fall under the jurisdiction of 10 *CFR* 1008, *Records Maintained on Individuals (Privacy Act)*, which may include the following types of records: personnel and employment records; supervisor maintained personnel records; appraisal and development records; applications for employment; payroll and leave records; reports of financial interest; accounts payable and receivable; domestic travel records; foreign travel records; personnel medical records; employee assistance records; personnel exposure records; occupational and industrial accident records; equal opportunity complaint files; labor standards complaints and grievances; legal files; personnel security files; security investigations; employee and visitor access control records; and security education and infraction report records.

QUALITY ASSURANCE (QA) RECORD – Federal record that is a completed document, furnishing evidence of the quality of items and/or activities affecting quality. QA Records are designated on the organization file plan.

RECORD – "…all recorded information, regardless of form or characteristics, made or received by a Federal agency under Federal law or in connection with the transaction of public business and preserved or appropriate for preservation by that agency or its legitimate successor as evidence of the organization, functions, policies, decisions, procedures, operations, or other activities of the United States Government or because of the information value of the data in them" (44 U.S.C. 3301, Definition of Records).

RECORDS CONTROL SCHEDULE – Provides mandatory instructions for the disposition of the records (including the transfer of permanent records and disposal of temporary records) when they are no longer needed by the agency.

RECORD COPY (RC) – The official copy of a record that is retained for legal, operational, or historical purposes.

RECORD CUSTODIAN – Person appointed to maintain organizational unit records and to ensure that information is managed in accordance with Records Management procedures. They are responsible to administratively control the records of all assigned personnel within the organization unit.

RECORD PACKAGE – A collection of documents supporting one topic files and processed as a single record (for example, work package, project files, etc.). The package will be held by the originating organization until the activity is complete.

RECORDS MANAGEMENT – The planning, controlling, directing, organizing, training, promoting, and other managerial activities related to the creation, maintenance and use, and disposition of records to achieve adequate and proper documentation of Federal policies and transactions and effective and economical management of agency operations.

RECORD NUMBER – A numeric or alphanumeric set of characters assigned to a record.

RETENTION PERIOD – The retention period is the mandatory amount of time a record must be saved before it can be destroyed and is based on the Records Control Schedule.

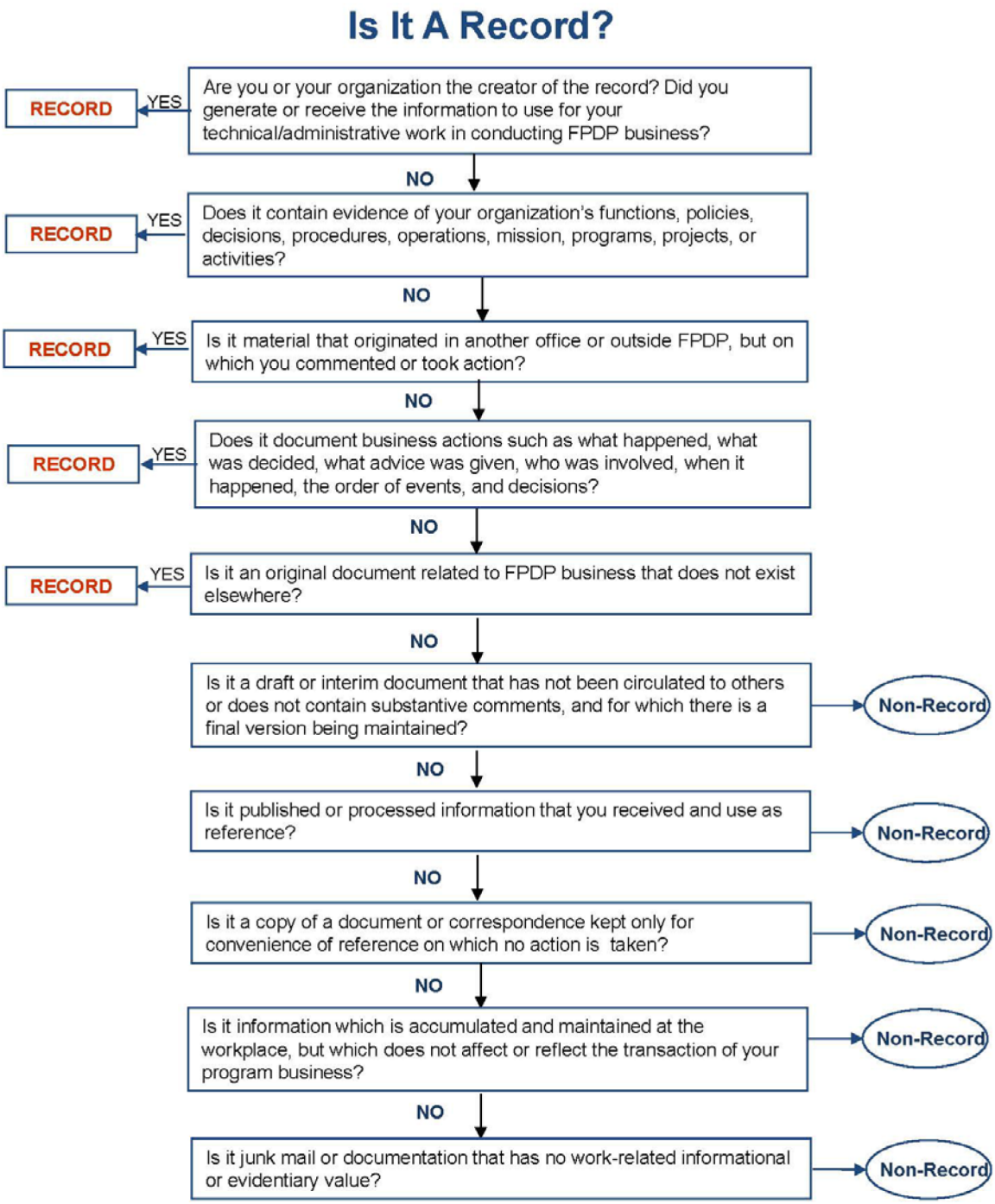
Appendix A – Acronyms/Definitions (continued)

UNCLASSIFIED CONTROLLED INFORMATION (UCI) – Information that is unclassified, but is explicitly controlled by statute, DOE Order, other DOE requirements, or by company requirements. Examples are listed in PGDP Procedure 01.03.18, *Unclassified Controlled Information Management.*

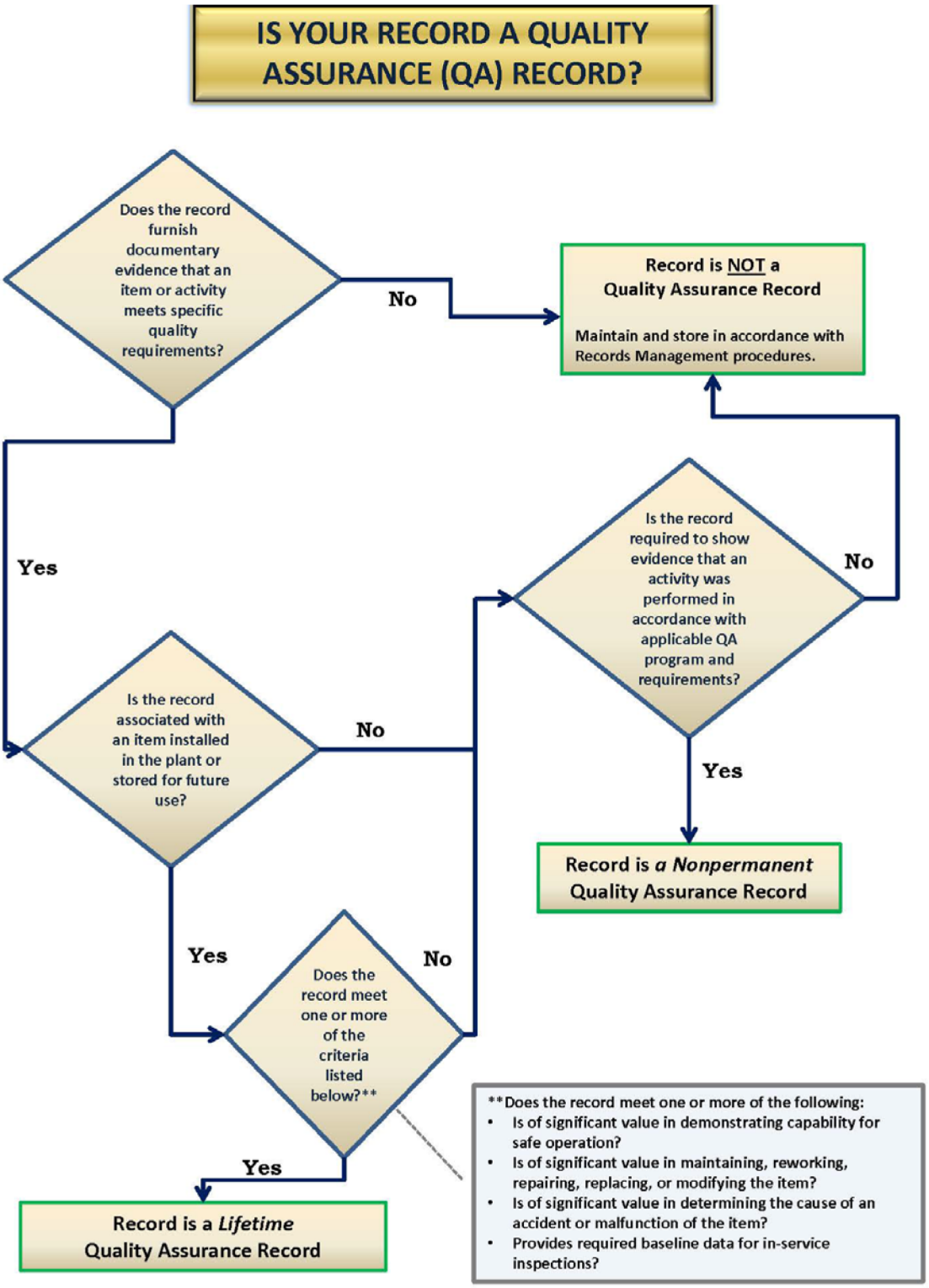
VITAL RECORDS – Essential agency records that are needed to meet operational responsibilities under security emergency, continuity events, or other emergency conditions (emergency operating and mission essential records) or to protect the legal and financial rights of the government and those affected by government activities (legal and financial rights records).

- **EMERGENCY-OPERATING RECORDS –** That type of vital records essential to the continued functioning or reconstitution of an organization during and after an emergency. Included are emergency plans and directive(s), orders of succession, delegations of authority, staffing assignments, and selected program records needed to continue the most critical agency operations, as well as related policy or procedural records that assist agency staff in conducting operations under emergency conditions and for resuming normal operations after an emergency.
- **LEGAL-AND-FINANCIAL RIGHTS RECORDS** – Vital records essential to protect the legal and financial rights of the Government and of the individuals directly affected by its activities. Examples include accounts receivable records, social security records, payroll records, retirement records, and insurance records. These records were formerly defined as "rights-and-interests" records. Records that have the properties of both emergency-operating and legal and financial rights records are treated as emergency-operating records.

Appendix B – Is It A Record?



Appendix C – Is It A Quality Assurance Record?



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VERIF. DATE: _____

INITIALS: _____

FLUOR

Fluor Federal Services, Inc. Paducah Deactivation Project

CP4-ER-1035 **Rev. 0**	**TITLE:** Vapor Sampling	Page 1 of 17

DOCUMENT CATEGORY: ☐ Administrative ☒ Technical (Operations) ☐ Technical (Support)

LEVEL OF USE: ☐ Information Level ☒ Reference Level ☐ Continuous Use

ENVIRONMENTAL REMEDIATION **SUBJECT MATTER AREA:** Environmental Monitoring	**WRITER:** Paul Coltharp, Senior Work Planner Signature: [signature] Date: 4/27/16
NUCLEAR SAFETY REVIEW DOCUMENTATION: FPDP-16-0548-D	**APPROVED BY:** Lisa Crabtree, Environmental Monitoring Manager Signature: [signature] Date: 4/29/16
REQUIRED REVIEW DATE: 4/29/19	**EFFECTIVE DATE:** 5/18/16

REVISION/CHANGE LOG

Revision/Change Letter	Description of Changes	Pages Affected	Date of Revision/Change
0	Initial Release. Developed from LATA Kentucky PAD-ENR-0035 R0	All	4/29/16

TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE

1.1 Purpose

To define the methods and equipment available to collect vapor samples.

1.2 Scope

The requirements of this procedure apply to work performed for Fluor Federal Services, Inc. Paducah Deactivation Project (FPDP) and its subcontractors at the U.S. Department of Energy (DOE) Paducah site. This procedure applies to sampling of vapor utilizing Tedlar bags, summa canisters, or a photoacoustic analyzer. The sample may be collected either passively (using an evacuated canister) or actively (using a pump).

2.0 REFERENCES

2.1 Use References

- CP2-SM-0017, *Measuring and Test Equipment Program*
- CP4-ES-2708, *Chain-of-Custody Forms, Field Sample Logs, Sample Labels, and Custody Seals*

2.2 Source References

None

3.0 COMMITMENTS

None

4.0 PRECAUTIONS AND LIMITATIONS

4.1 Precautions

- Sources of contamination include combustion engines, air conditioning compressors, cigarette smoke, room deodorizers, cleaning products, and perfumes. Care should be taken by sampling personnel to avoid cross-contaminating the sample collected with these and any other aerosol or vapor producers.
- Any anomalies in the way the equipment operates must be reported to line management and documented in the logbook used to document the sampling event.
- Care must be used with Summa canister valves, DO **NOT** OVER TIGHTEN the valves.
- Summa canisters should **NOT** be dented or punctured.
- Do **NOT** connect Summa canisters to a source with positive pressure greater than 40 psi unless authorized to do so by manufacturer or laboratory instructions.
- Do **NOT** remove the bar code or serial number labels from the Summa canisters.
- Do **NOT** make any markings directly on the Summa canisters or affix any labels.
- Summa canister flow controllers must be securely wrapped in bubble wrap prior to shipping back to the laboratory.

- Care should be taken to keep Summa canisters away from sources of heat or extreme cold. Canisters should be capped and stored in a dry, clean atmosphere when not in use.
- Refer to applicable project-specific Job Hazard Analysis (JHA) for precautions concerning specific hazards that may be encountered and to determine personal protective equipment (PPE) requirements.

4.2 Limitations

None

5.0 PREREQUISITES

5.1 Field personnel shall be familiar with project-specific documents prior to sampling. Project-specific documents may include, but are **NOT** limited to, the JHA, sampling and analysis plan, Health and Safety Plan, Quality Assurance Project Plan, Waste Management Plan, and necessary permits. These documents should be consulted, as necessary, to obtain specific information regarding equipment and supplies, health and safety, sample collection and identification, sample packaging, and decontamination.

5.2 Prior to performing sampling, notify Radiological Control Organization (RCO) and Safety Personnel for monitoring requirements

5.3 Current revisions of all documents referenced in this procedure shall be utilized. Field personnel shall be knowledgeable of the procedures listed in **5.1**before beginning any sampling activities using this procedure.

6.0 INSTRUCTIONS

Sampling Personnel

6.1 Equipment and Supplies Needed

Ensure that all needed materials are readily available to take to the field and all are in good working condition. The items listed in this section may be used as a guide; however, additional items also may be required. Gather the following items as applicable to each sampling event.

- A portable vacuum pump (Gilian is a common brand name) with Teflon or Tygon tubing. Tygon tubing shall not be used as the path through which the media to be sampled will travel.
- A U-tube manometer or Magnehelic gauge
- New Tedlar bags or laboratory-cleaned Summa canisters complete with necessary fittings
- A box in which a vacuum is created for Tedlar bags
- **If** connecting to a port, **then** a Teflon sampling tube typically less than or equal to 0.25 inches interior diameter with any necessary compatible connectors for the sample port
- A tool box containing a socket set, two adjustable wrenches, one pipe wrench, two flat-head screwdrivers (one large, one small), one Phillips screwdriver, one pair of channel lock pliers, one pair of vise grips, Teflon tape, spare tubing fittings, nipples for the fittings on the vacuum pump, etc.
- Logbook
- Indelible black ink pens and markers

- Chain of custody (COC) forms, custody seals (as required), sample labels
- PPE
- Two-way radio or cellular telephone

6.2 General Requirements

Sampling Personnel

NOTE:
The following steps may be performed in any order unless otherwise directed.

6.2.1 Operate all instrumentation according to the operating instructions as supplied by the manufacturer, unless otherwise specified in the project-specific work plan or instructions.

6.2.2 **Prior** to sampling/operation, verify necessary equipment calibration activities occur **and** documented in the logbook used to document the sampling event or other appropriate project record.

6.2.3 Verify measurement and test equipment (M&TE), which is designated by the owner/user based on the end use of the data gathered by the instrument is calibrated, if required, according to CP2-SM-0017, *Measuring and Test Equipment Program.*

6.2.4 Refer to the appropriate section for sampling steps:

- **If** sampling with Tedlar Bags, **then 6.3**
- **If** Summa Canisters-Grab Samples, **then 6.3**
- **If** Summa Canisters-Time Integrated Samples, **then 6.5**
- **If** Sampling with an Innova Photoacoustic Field Gas-Monitor Model 1412, **then 6.6**

6.3 Sampling with Tedlar Bags

Sampling Personnel

6.3.1 Keep the bags as far away as possible from sources of potential contamination during transportation and storage to minimize the chances of external contamination.

6.3.2 Bags must be attached only to clean Teflon tubing.

6.3.3 Fill out labels with a ballpoint pen, **NOT** a permanent marker. Permanent markers contain volatile compounds that may contaminate the sample.

NOTE:
Steps **6.3.4**through **6.3.7**may be performed in any order prior to step **6.3.8**.

6.3.4 **Prior** to sampling, review precautions in Section **4.1**.

6.3.5 Ensure the requirements in Section **6.2**are complete.

NOTES:

The flow rate for the vacuum pump must be defined prior to sampling.

The usual flow rate for bag sampling is 3 liters/minute. Project-specific requirements may specify a different flow rate.

6.3.6 Prior to arriving on site or at the site, adjust the flow rate of the vacuum pump, as needed to save time in the field. Set the flow rate by performing the following, if needed:

1) Assemble the train using a rotameter (**NOT** managed as M&TE unless otherwise indicated in project-specific requirements), vacuum pump, and a section of sampling tube (see Appendix B, *Typical Tedlar Bag System and Flow Rate Adjustment Train* for diagram). The section of sampling tube is a representative tube that is the same diameter, length, and material used for sampling.
2) Turn on the pump **and** adjust the flow using the pump until the float ball on the rotameter is aligned with the desired flow rate value.
3) Affix a sticker to the pump indicating the flow rate.

NOTE:

When shipped from the manufacturer, the valve on the Tedlar bag typically is in the open position. Occasionally, a piece of debris will clog the valve, making it necessary to close the valve stem to clear the debris.

6.3.7 **If** there is debris in the valve, **then** pull out the valve stem to close the valve. **If** the valve stem is difficult to pull, **then** spin the valve stem while pulling it.

6.3.8 Insert the valve stem on the Tedlar bag into the Teflon tube that runs through the vacuum box (see Appendix B). The Teflon tubing is the path through which the gaseous media will travel.

6.3.9 Check the O-ring gasket in the vacuum box to see if it is in place with the proper fit. O-rings that have been stretched out will **NOT** remain in place.

6.3.10 Place the Tedlar bag in the vacuum box **and** seal the vacuum box by applying pressure to the top and bottom (ensure that the O-ring is in place and unobstructed).

NOTES:

The seal between the top and bottom half of the vacuum box must be air tight in order for the system to work.

Occasionally, a corner of the Tedlar bag will stick out between the two halves of the vacuum box causing a poor seal.

6.3.11 Connect the vacuum pump to Tygon or Teflon tubing that is connected to the vacuum fitting on the vacuum box.

NOTES:

The pump evacuates the air in the vacuum box, creating a pressure differential causing the sample to be drawn into the bag.

The sample drawn into the Tedlar bag never flows through the pump.

6.3.12 **Before** opening the sample port **or** turning on the vacuum pump, don all PPE as defined in the project-specific JHA and/or Radiological Work Permit (RWP).

6.3.13 Connect the Teflon sample tube to the desired source **or** place the tube into the media of concern, then connect the other end of the sampling tube to the sample port on the vacuum box.

6.3.14 Check that all the fittings associated with the vacuum joints are securely in place.

NOTE:

When inserting the valve stem of the Tedlar bag into the Teflon tubing, the fitting may have been pushed loose.

6.3.15 Turn on the vacuum pump.

6.3.16 Allow the bag to fill. Observe the bag **and** listen to the changes in the sound of the pump.

CAUTION:

Since the bags will hold only a given volume, over inflation will cause the bags to break.

6.3.17 Turn off the vacuum pump **and** remove the tube from the pump.

6.3.18 Disconnect the Teflon sample tube from the source **or** remove the sample tube from the media of concern.

6.3.19 Remove the bag **and** pull out the valve stem.

6.3.20 Lock the valve stem.

CAUTION:

Adhesives found in the label may permeate the bag if placed on the body of the bag. DO **NOT** write on the bag itself.

6.3.21 Using a ball point pen, label the bag using a sticker placed on the edge of the bag **or** tie the labels to the metal eyelets provided on the bags

6.3.22 Place the Tedlar bag in a clean cooler or opaque trash bag to prevent photo degradation.

6.3.23 Purge the sampling tube with ambient air for a minimum of three minutes using the vacuum pump.

6.3.24 **Before** moving to the next location **or** finishing for the day, complete all entries in the logbook, data sheets, and COC forms as applicable.

NOTE:

It is essential that sample analysis be conducted within 48 hours from the time of collection; after this time, compounds may escape or become degraded.

6.3.25 Repeat Steps **6.3.4** through **6.3.24** until sampling is completed.

6.3.26 Go to Section **8.0**.

6.4 Summa Canisters-Grab Samples

NOTES:

For grab sampling, the canister valve is simply opened and the vacuum inside the canister draws in a sample within a matter of seconds.

Summa canister valve fittings typically are ¼" male Swedgelock fittings. Typically the inlet side of the Summa canister flow controller is 1/8" outer diameter. Typically the inlet side of the critical orifice assembly is ¼" outer diameter. Typically a stainless steel ¼" nut with rubber ferrule will be provided to attach sample point tubing to critical orifice assembly.

Sampling Personnel

6.4.1 Review precautions in Section **4.1**prior to sampling.

6.4.2 Ensure the requirements in Section **6.2**are complete.

6.4.3 Record the vacuum (negative pressure) in the Summa canister, which typically should be less than -25 inches of mercury (remember that -26 is less than -25 and -24 is greater than -25).

NOTE:

At the Paducah site, Southwest Research Institute (SWRI) is the lab commonly used to analyze the Summa canisters. SWRI doesn't distribute canisters for use with greater than -25 inches of mercury vacuum.

6.4.4 **If** a Summa canister is from SWRI **and** the gauge reads -24 inches of mercury or greater, **then** contact the Sample Management Office (SMO).

NOTE:

The gauges provided by the laboratory are provided to obtain a relative measure of change and not precise readings. **If** the exact gauge readings are needed by the project, **then** a calibrated gauge that is managed under CP2-SM-0017, *Measuring and Test Equipment Program*, should be used.

6.4.5 Ensure that the canister valve is in the fully closed position (check by turning knob completely clockwise).

6.4.6 Using a wrench or other appropriate hand tool, remove the brass cap above the valve on the top of the Summa canister.

6.4.7 **If** a particulate filter is to be used, **then** install the filter on Summa canister inlet port.

6.4.8 **Before** opening the sample port **or** opening the valve on the summa canister, don all PPE as defined in the project-specific JHA and/or RWP.

6.4.9 **If** collecting an ambient air sample, **then** place the summa canister in the area to be sampled and then go to Step **6.4.12**. If not, **then** go to Step **6.4.10**.

6.4.10 **If** sampling a port, **then** connect the Summa canister inlet port to the sampling port. It may be necessary to use Swedgelock fittings and Teflon or stainless steel tubing to make the connection.

6.4.11 After the Summa canister is connected to the sampling port, open the sampling port.

6.4.12 Open the canister valve, turning the knob counterclockwise until there is no resistance (approximately 1¼ turns), **then** turn back clockwise slightly until resistance is detected.

NOTE:

A hissing noise will be heard as the vacuum dissipates and draws in vapor. Once the hissing noise stops, the vacuum has fully dissipated and the sample has been collected. This takes approximately 5-30 seconds, depending on the degree to which the flow is restricted.

6.4.13 Shut off the hand valve immediately to avoid the canister becoming neutral with atmosphere (it should remain in a slight vacuum), then close the valve by turning the knob clockwise.

Caution:

Do not over tighten the valve to avoid damage to the valve.

6.4.14 **If** connected to a sampling port, **then** close the sample port **and** disconnect the Summa canister from the sample port.

NOTES:

During sampling, the gauge reading will move towards 0, at which time the canister pressure is almost at equilibrium with atmosphere. Be sure to include the final vacuum reading (taken from the same gauge used in Step **6.4.3**) on the COC form and logbook or data sheet.

The residual vacuum typically is between -10 and -2 inches of mercury.

6.4.15 Replace the brass cap on the canister valve **and** tighten it with a wrench or other appropriate hand tool.

6.4.16 Label the sample with the tag provided, **then** attach the tag to the canister with a plastic tie **and** note the canister ID number on the COC form.

6.4.17 **Before** moving to the next location or finishing for the day, complete all entries in the logbook, data sheets, and COC forms as applicable.

6.4.18 Repeat Steps **6.4.1**through **6.4.18**until sampling is complete.

6.4.19 Go to Section **8.0**.

6.5 Summa Canisters-Time Integrated Samples

Sampling Personnel

NOTES:

Time-integrated samples require an additional piece of laboratory calibrated equipment (flow controller or critical orifice) to be placed in line with the canister.

Flow controllers/critical orifice assemblies are equipped with fine particulate filters and are set for any user-defined duration (or flow rate) from 5 minutes up to 24 hours.

The sampling period of time is determined by the project to meet the project-specific needs.

Summa canister valve fittings typically are ¼" male Swedgelock fittings. Typically the inlet side of the Summa canister flow controller is 1/8" outer diameter. Typically the inlet side of the critical orifice assembly is ¼" outer diameter. Typically a stainless steel ¼" nut with rubber ferrule will be provided to attach sample point tubing to critical orifice assembly.

Steps 6.5.1 and 6.5.2 may be performed in any order prior to Step 6.5.3.

6.5.1 Review precautions in Section **4.2** prior to sampling.

6.5.2 Ensure the requirements in Section **6.2** are complete.

6.5.3 Record the vacuum (negative pressure) in the Summa canister, which typically should be less than -25 inches of mercury (remember that -26 is less than -25 and -24 is greater than -25).

NOTE:

At the Paducah site, SWRI is the lab commonly used to analyze the Summa canisters. SWRI doesn't distribute canisters for use with greater than -25 inches of mercury vacuum.

6.5.4 If a Summa canister is from SWRI and the gauge reads -24 inches of mercury or greater, contact the SMO.

NOTES:

The gauges provided by the laboratory are provided to obtain a relative measure of change and not precise readings.

If the exact gauge readings are needed by the project, then a calibrated gauge that is managed under CP2-SM-0017, Control and Calibration of Measuring and Test Equipment, should be used.

6.5.5 Ensure that the canister valve is fully closed (check by turning knob completely clockwise).

6.5.6 Using a wrench or other appropriate hand tool, remove the brass cap above the valve on the top of the Summa canister.

6.5.7 **If** a particulate filter is to be used, **then** install the filter on Summa canister inlet port.

6.5.8 Attach the flow controller or critical orifice assembly directly to the valve on the top of the canister **and** tighten down with the fingers first, then tighten gently with a wrench or other appropriate hand tool.

6.5.9 **Before** opening the sample port **or** opening the valve on the summa canister, don all PPE as defined in the project-specific JHA and/or RWP as applicable.

6.5.10 **If** collecting an ambient air sample, **then** place the summa canister in the area to be sampled and then go to Step **6.4.13**. **If not**, **then** go to Step **6.5.11**.

6.5.11 **If** sampling a port, **then** connect the Summa canister inlet port to the sampling port. It may be necessary to use Swedgelock fittings and Teflon or stainless steel tubing to make the connection.

6.5.12 After the Summa canister is connected to the sampling port, open the sampling port.

6.5.13 To open the canister valve, turn the knob counterclockwise until there is no resistance (approximately 1¼ turns), **then** turn back clockwise slightly until resistance is detected.

NOTE:

Since the flow controller restricts the airflow, a hissing noise will **NOT** be heard as the vacuum dissipates and draws vapor in.

6.5.14 At the end of the sampling period, close the valve by turning the knob clockwise. Do **NOT** over tighten. **If** connected to a sampling port, **then** close the sample port **and** disconnect the Summa canister from the sample port.

NOTES:

During sampling, the gauge reading will move toward 0 psig, at which time the canister pressure is almost at equilibrium with atmosphere. Be sure to include the final vacuum reading (taken from the same gauge used in step 3) on the COC form and logbook or data sheet.

The residual vacuum typically is between -10 and -2 inches of mercury.

6.5.15 Remove the flow controller/critical orifice assembly and/or analog gauge (used for time-integrated sampling only), then wrap securely in bubble wrap.

6.5.16 Replace the brass cap on the canister valve **and** tighten it with a wrench or other appropriate hand tool.

6.5.17 Label the sample with the tag provided, then attach the tag to the canister with a plastic tie.

6.5.18 Note the canister ID number on the COC form. For time integrated sampling, note the flow controller or critical orifice assembly identification number with the corresponding canister.

6.5.19 Place the COC form, the bubble-wrapped flow controller, **and** the canister back into the original boxes in which they were shipped.

6.5.20 **Before** moving to the next location or finishing for the day, complete all entries in the logbook, data sheets, **and** COC forms as applicable.

6.5.21 Repeat Steps **6.5.1**through **6.5.20**until sampling is completed.

6.5.22 Go to Section **8.0**.

6.6 Sampling with an Innova Photoacoustic Field Gas-Monitor Model 1412

Sampling Personnel

NOTE:

The following instructions assume that the photoacoustic analyzer has been set up for use as directed by the manufacturer's instructions.

CAUTION:

Never operate the 1412 Photoacoustic Field Gas-Monitor in potentially explosive environments.

6.6.1 **When** monitoring potentially flammable or toxic gases it is essential that the following applies:

- The instrument itself is placed in a well-ventilated area outside the potentially hazardous zone.
- A sufficiently long tube is connected to the air-outlet on the back panel so that the sampled gas is carried away to the open air or to an extraction and/or filtration unit.

6.6.2 Avoid water condensation in the instrument. **If** condensation is likely, **then** it is recommended that heated sample lines, a MICROPROBE, a sample dryer, **or** other project specified remedies be used to avoid water condensation in the instrument.

6.6.3 Switch off all equipment before connecting or disconnecting their digital interface. Failure to do so could damage the equipment.

6.6.4 Whenever it is likely that correct function or operating safety of the apparatus has been impaired, the apparatus must be tagged out of service.

CAUTION:

Any adjustment, maintenance and repair of the open apparatus under voltage must be avoided as far as possible and, if unavoidable, must be carried out only by trained personnel, qualified in service of electronic instrumentation.

6.6.5 **If** a fault is reported by the monitor that indicates correct function of the instrument may be impaired, **then** consult your local LumaSense Technologies representative.

CAUTION:

Under no circumstances should repair be attempted by persons **NOT** qualified in service of electronic instrumentation.

NOTE:

Steps **6.6.6**through **6.6.9**may be performed in any order prior to Step **6.6.10**.

6.6.6 Review the manufacturer's instructions before using the photoacoustic analyzer.

6.6.7 Ensure the photoacoustic analyzer has been set up for use according to the manufacturer's instructions prior to use.

NOTES:

Before a measurement task can begin, there are a variety of parameters that must be defined first. Chapter 7 in the instruction manual provides instructions on how to set up the monitoring system before starting to measure. The parameters can be defined using the PC Use instructions (i.e. when using a PC, or the stand-alone use instructions or when using the front panel push-keys on the monitor).

Before leaving the factory, each of the parameters found in the setup "tree" is given factory value (default value). When setting-up the Monitor as a stand-alone instrument, those values with a cursor underneath them are the active values. It is the active values that determine how the Monitor will operate. Failure to define any parameter may result in the default parameters being used. This can result in the monitor measuring incorrectly or being unable to start the measurement task.

6.6.8 Maintain a copy of the manufacturer's instructions in the field while the photoacoustic analyzer is being operated.

6.6.9 Ensure the requirements in Section **6.2** are complete.

6.6.10 Cut a short section of Teflon sampling tubing.

6.6.11 Attach one end of this tube to the air-inlet stub on the back-panel of the Monitor **and** push one end of the Teflon tubing through the non-threaded end of the nut.

6.6.12 Hold the end of the tubing between the fingers and gently push the tubing over the end of the Monitor's air-inlet stub as far as it will go. **If** the tubing is bent **or** broken during this step **then** remove the tubing from the stub **and** repeat this step using an undamaged length of tubing.

6.6.13 Screw the threaded nut firmly onto the end of the air-inlet stub.

6.6.14 Don all PPE as defined in the project-specific JHA and/or RWP before opening the sample port.

6.6.15 Set up the monitoring task according to the Innova Photoacoustic Field Gas-Monitor Model 1412 instruction manual Section 4.3.3 (if using a PC) or Section 4.4.4 (if using a stand-alone unit).

6.6.16 Open the sample port, if applicable.

6.6.17 Start the monitoring task according to the Innova Photoacoustic Field Gas-Monitor Model 1412 instruction manual's Section 4.3.4 (if using a PC) **or** Section 4.4.6 (if using stand-alone unit).

6.6.18 To stop a monitoring task, pull down the "Sequence" window **and** click on "Stop" if using a PC **or** stop a monitoring task according to the Innova Photoacoustic Field Gas-Monitor Model 1412 instruction manual's Section 4.4.6 (if using a stand-alone unit).

6.6.19 Close the sample port, if applicable.

6.6.20 Ensure that the results are recorded and transferred to the appropriate storage location.

6.7 Photoacoustic Analyzer Maintenance

Perform regular maintenance required for the Innova Photoacoustic Field Gas-Monitor Model 1412 according to the following:

- Calibration – approximately every 3 months (see Chapter 14 in the instruction manual).
- Changing the fine air-filter paper in the internal and external air filtration units (see Section 13.1 in the instruction manual).
- Cleaning of the filter in the ventilation unit (see Section 13.2 in the instruction manual).

7.0 ACCEPTANCE CRITERIA

None

8.0 POST PERFORMANCE WORK ACTIVITIES

Sampling Personnel

8.1 Complete logbook, data sheets, and COC forms as necessary.

8.2 Maintain custody of the samples according to CP4-ES-2708, *Chain-of-Custody Forms, Field Sample Logs, Sample Labels, and Custody Seals,* **and** transfer custody of the samples to the designated sample management facility or laboratory for analysis as soon as possible.

8.3 Coordinate with RCO for sample containers to undergo radiation surveys by a radiological controls technician (RCT) prior to off-site release according to applicable RCO procedures.

8.4 Following completion of sampling activities, submit samples and related COC documentation to the designated personnel for shipment to an off-site laboratory **or** deliver the samples to the on-site laboratory.

8.5 Submit a copy of the COC form and logbook pages to the FPDP Data Manager for entry into Paducah Environmental Measurements System.

9.0 RECORDS

9.1 Records Generated

The following records may be generated by this procedure:

- The field logbook
- Sample container Certificate of Analysis **or** certificates of cleanliness
- Calibration documentation
- COC forms

9.2 Records Disposition

The records are to be maintained in accordance with CP3-RD-0010, *Records Management Process.*

Appendix A – Acronyms/Definitions

ACRONYMS

COC – chain of custody

DOE – U. S. Department of Energy

FLM – Frontline Manager

FPDP – Fluor Federal Services, Inc. Paducah Deactivation Project

JHA – Job Hazard Analysis

M&TE – Measurement and Test Equipment

PM – Project Manager

PPE – personal protective equipment

RCO – Radiological Control Organization

RCT – Radiological Control Technician

RWP – Radiological Work Permit

SMO – Sample Management Office

SWRI – Southwest Research Institute

DEFINITIONS

Flow Controllers – A flow controller is used to regulate the sampling duration and/or volume on a Summa canister. It is pre-set to a specific flow rate prior to use.

Inches of Water – One of the systems of measurement used for pressure, either positive or negative (vacuum). It refers to the number of inches a column of water moves against the ambient or measured pressure at a specified temperature. Approximately 407 inches of water is equivalent to 29.9 inches of mercury or 14.7 psi.

pounds per square inch – A system of measurement for pressure. It generally refers to either a positive or negative pressure relative to that at sea level, which is considered to be 14.7 psi, and is normally read from a gauge that is set to read 0 at sea level.

Standard Reference Conditions - The National Institute of Standards and Technology version of standard reference conditions is a temperature of 20 °C (293.15 K, 68 °F) and an absolute pressure of 101.325 kPa (14.696 psi, 1 atm).

Summa Canister – A sampling device used to collect and store a gaseous sample. The inner metal surface of the canister is coated with a layer of passivated pure chrome-nickel oxide that is inert to most chemicals and able to preserve many organic compounds.

Tedlar bag – A plastic bag with a resealable port used for collecting and containing gas samples.

Appendix B - TYPICAL TEDLAR BAG SYSTEM AND FLOW RATE ADJUSTMENT TRAIN

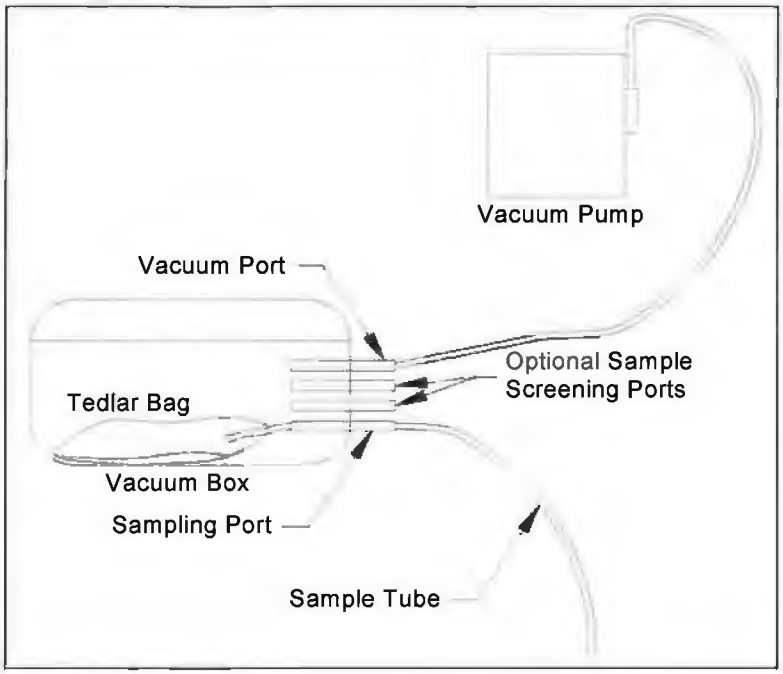

Figure 1. Typical Tedlar Bag System

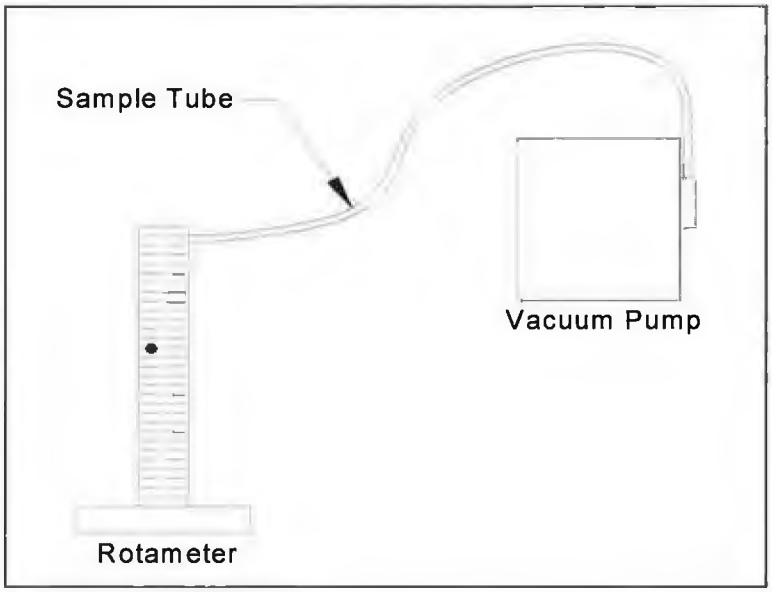

Figure 2. Flow Rate Adjustment Train

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CP4-ES-0043 Rev. 0	**TITLE:** Temperature Control for Sample Storage	Page 1 of 7

DOCUMENT CATEGORY: ☐ Administrative ☐ Technical (Operations) ☒ Technical (Support)

LEVEL OF USE: ☒ Information Level ☐ Reference Level ☐ Continuous Use

Environmental Management **SUBJECT MATTER AREA:** Environmental Monitoring	**WRITER:** Traci Curry, Scientist Signature: Traci Curry Date: 12/18/15
NUCLEAR SAFETY REVIEW DOCUMENTATION: EXEMPTION #20 12/17/15	**APPROVED BY:** Lisa Crabtree, Environmental Monitoring Manager Signature: Lisa Crabtree Date: 12/18/15
REQUIRED REVIEW DATE: 12/18/18	**EFFECTIVE DATE:** 12/22/15

REVISION/CHANGE LOG

Revision/Change Letter	Description of Changes	Pages Affected	Date of Revision/Change
0	Initial Release	ALL	12/18/15

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TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE

1.1 Purpose

To provide a system for the documentation and maintenance of controlled temperatures for storage areas holding samples requiring ≤6 °C preservation by 40 Code of Federal Regulations (CFR) 136.3 or other regulatory guidelines.

1.2 Scope

This procedure applies to any person performing environmental sampling activities for Fluor Federal Services, Inc. Paducah Deactivation Project and its subcontractors at the Paducah Gaseous Diffusion Plant. The requirements in this procedure apply to temperature controlled storage areas in C-730 and C-612.

2.0 REFERENCES

2.1 Use References

CP3-RD-0010, Records Management Process.

2.2 Source References

- Federal Register, 40 Code of Federal Regulations Part 136.3.
- SW-846, 3rd Edition, Test Methods of Evaluating Solid Waste.

3.0 COMMITMENTS

None

4.0 PRECAUTIONS AND LIMITATIONS

None

5.0 PREREQUISITES

5.1 The following are needed to complete CP4-ES-0043, *Temperature Control for Sample Storage*.

- Thermometer calibration must be traceable to National Institute of Standards and Technology (NIST) or equivalent
- Glycerin or water
- Recording disc
- CP4-ES-0043-F01, *Weekly Fridge Chart Change Out Form*

5.2 Refrigeration areas shall be inspected on normal working days to assure temperature requirements are met.

5.3 Compliance will be assumed for nonworking days if the days immediately preceding and following the nonworking days are in compliance.

5.4 Automated disk recorders shall be used to verify compliance with storage temperature requirements during normal working days and during off-normal hours. The automated disk recorder will be inspected the next working day following off-normal hours to identify any temperature variances that may have occurred during off-normal hours.

6.0 Instructions

6.1 Temperature Control Check

Sampler

Note:
Position the thermometer in an area representative of the overall temperature of the refrigerator.

6.1.1 Place the NIST traceable thermometer in water or glycerin **and** place in the refrigerator when the refrigerator is installed for sample storage.

NOTE:
Recorder disc should be replaced weekly. The date, time and initials should be recorded on the recorder disk at insertion and removal from recorder.

6.1.2 Record date, time, and initials on recording disk **and** insert disk into recorder according to manufacturer's instructions when the refrigerator is installed for sample storage.

6.1.3 Compare reading on NIST thermometer with removed recorder disk.

6.1.4 Log date and time of inspection on Weekly Fridge Chart Change Out Form.

6.1.5 **If** reading on disc does **NOT** reflect reading on thermometer $\leq 6°C$, **then** adjust temperature on disc recorder.

6.1.6 **If** thermometer reading is **NOT** within acceptance limits, **then** recheck the thermometer in approximately one hour.

6.1.7 **If** adjustment does **NOT** bring temperature into acceptable limits, **then** remove samples and place in an alternate refrigerator until temperature requirements are met.

6.1.8 Document any out of range temperature conditions and corrective actions on form CP4-ES-0043-F01, *Weekly Fridge Chart Change Out Form.*

7.0 ACCEPTANCE CRITERIA

None

8.0 POST PERFORMANCE WORK ACTIVITIES

File the recording disc in accordance with CP3-RD-0010, *Records Management Process.*

9.0 RECORDS

9.1 Records Generated

The following records may be generated by this procedure:

- Recording disc
- CP4-ES-0043-F01, *Weekly Fridge Chart Change Out Form*

Records Disposition

The records are to be maintained in accordance with CP3-RD-0010, *Records Management Process*.

Appendix A – Acronyms/Definitions

ACRONYMS

CFR –Code of Federal Regulations

NIST –National Institute of Standards and Technology

DEFINITIONS

None

Appendix B – Weekly Fridge Chart Change Out Form

Weekly Fridge Chart Change Out Form

	Week 1	Week 2	Week 3	Week 4	Week 5	Comments
Fridge #1						
Fridge #2						
Fridge #3						
Fridge #4						
Comments:						

	Week 1	Week 2	Week 3	Week 4	Week 5	Comments
Fridge #1						
Fridge #2						
Fridge #3						
Fridge #4						
Comments:						

	Week 1	Week 2	Week 3	Week 4	Week 5	Comments
Fridge #1						
Fridge #2						
Fridge #3						
Fridge #4						
Comments:						

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CP4-ES-1001 Rev. 0	**TITLE:** Transmitting Data to the Paducah Oak Ridge Environmental Information System	Page 1 of 6

DOCUMENT CATEGORY: ☒ Administrative ☐ Technical (Operations) ☐ Technical (Support)

LEVEL OF USE: ☒ Information Level ☐ Reference Level ☐ Continuous Use

ENVIRONMENTAL MANAGEMENT **SUBJECT MATTER AREA:** Environmental Monitoring	**SUBJECT MATTER EXPERT** Lisa Crabtree, Environmental Monitoring Manager: Signature: Teresa Overby for Date: 5/20/2016
NUCLEAR SAFETY REVIEW DOCUMENTATION: EXEMPTION # 20 Fax 5-20-16 Romaine 5-20-16	**APPROVED BY:** Lisa Crabtree, Environmental Monitoring Manager Signature: Teresa Overby for Date: 5/20/2016
REQUIRED REVIEW DATE: 5/20/19	**EFFECTIVE DATE:** 5/25/16

REVISION/CHANGE LOG

Revision/Change Letter	Description of Changes	Pages Affected	Date of Revision/Change
0	Initial Release	ALL	5/20/16

TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure describes the responsibilities and action steps for transmitting data including, but **NOT** limited to, analytical results, field measurements, and location data, to Paducah Oak Ridge Environmental Information System (OREIS.)

1.2 Scope

This procedure shall be used for the transmittal of data to Paducah OREIS by Fluor Federal Services, Inc. Paducah Deactivation Project (FPDP) and subcontractor personnel. This procedure describes (1) transmittal of data to Paducah OREIS by data provider, (2) review and standardization of transmitted data by Paducah OREIS staff, (3) review and authorization for release of data via Paducah OREIS by data provider, and (4) public release of data.

This procedure does **NOT** cover any data activities that are conducted after the data has been loaded into Paducah OREIS.

2.0 REFERENCES

2.1 Use References

CP3-ES-5003, *Quality Assured Data*

2.2 Source References

DOE/OR/07-1707 PRS-035 *Federal Facility Agreement for the Paducah Gaseous Diffusion Plant*

3.0 COMMITMENTS

None

4.0 RESPONSIBILITIES

4.1 Scientist/Data Entry Specialist

Initiates and completes data transmittal and data review and standardization process.

5.0 GENERAL INFORMATION

NOTE:

Data supporting the Kentucky Pollutant Discharge Elimination System (KPDES) Discharge Monitoring Report (DMR) are reported to the state prior to the data being loaded into Paducah OREIS due to the quick turnaround for the monthly report. All data that support the KPDES DMR are verified and assessed prior to being reported.

5.1 Data supporting regulatory reports are due to Paducah OREIS before the date the report is due to the regulators.

NOTE:

Groundwater, surface water, soil, and air environmental data is exempt from a derivative classifier (DC)/technical information office (TIO) review.

5.2 Data must meet uncontrolled, unclassified, clearance requirements (i.e., must be cleared for public release). Evidence of this clearance status must be provided on CP3-ES-5003-F02, *Paducah Data Release to External Agencies,* according to CP3-ES-5003, *Quality Assured Data.*

5.3 Project measurements and analytical data transmittal must be consistent with the Paducah OREIS Data Dictionary and the ready-to-load (RTL) format. These documents can be obtained from the Environmental Monitoring Project Manager.

5.4 Project measurements and analytical data must be transmitted in electronic format as TXT files.

6.0 INSTRUCTIONS

6.1 Data Transmittal Process

Scientist/Data Entry Specialist

6.1.1 Ensure that project measurements and analytical data are consistent with the latest revision of the Paducah OREIS Data Dictionary and the RTL and that CP3-ES-5003-F02, *Paducah Data Release to External Agencies,* has been completed before proceeding.

6.1.2 **If** data will be released to the regulators or the public, **then** ensure the data has had the appropriate reviews and approvals as evidenced by a signed CP3-ES-5003-F02, P*aducah Data Release to External Agencies,* and a completed CP3-ES-5003-F01, *Data Assessment Review Checklist and Comment,* according to CP3-ES-5003, *Quality Assured Data.*

6.2 Data Review and Standardization Process

Scientist/Data Entry Specialist

6.2.1 Create RTL file.

6.2.2 Address data inconsistencies.

6.2.3 Complete data processing.

6.2.4 Review the data assessment package.

7.0 RECORDS

7.1 Records Generated

The following records may be generated by this procedure:

-
- CP3-ES-5003-F01, *Data Assessment Review Checklist and Comment*
- CP3-ES-5003-F02, *Paducah Data Release to External Agencies*
- Data Assessment Package

Forms are to be completed in accordance with CP3-OP-0024, *Forms Control*.

7.2 Records Disposition

The records are to be maintained in accordance with CP3-RD-0010, *Records Management Process*.

Appendix A – Acronyms/Definitions

ACRONYMS

DC – derivative Classifier

DMR – Discharge Monitoring Report

FPDP –Fluor Federal Services, Inc. Paducah Deactivation Project

KPDES – Kentucky Pollution Discharge Elimination System

OREIS –Oak Ridge Environmental Information System

RTL –ready-to-load

TIO –technical information office

DEFINITIONS

None

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CP4-ES-1002 Rev. 0	**TITLE:** Submitting, Reviewing, and Dispositioning Changes to the Environmental Databases (OREIS and PEMS)	Page 1 of 6

DOCUMENT CATEGORY: ☒ Administrative ☐ Technical (Operations) ☐ Technical (Support)

LEVEL OF USE: ☒ Information Level ☐ Reference Level ☐ Continuous Use

ENVIRONMENTAL MANAGEMENT **SUBJECT MATTER AREA:** Environmental Monitoring	**SUBJECT MATTER EXPERT** Lisa Crabtree, Environmental Monitoring Manager Signature: Lisa Crabtree Date: 5/18/16
NUCLEAR SAFETY REVIEW DOCUMENTATION: EXEMPTION #20 JZV 5-18-16 RAMaples 5-18-16	**APPROVED BY:** Lisa Crabtree, Environmental Monitoring Manager Signature: Lisa Crabtree Date: 5/18/16
REQUIRED REVIEW DATE: 5/18/19	**EFFECTIVE DATE:** 5/25/16

REVISION/CHANGE LOG			
Revision/Change Letter	Description of Changes	Pages Affected	Date of Revision/Change
0	Initial Release	ALL	5/18/16

TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure describes the required actions for submitting, reviewing, and dispositioning proposed changes to the Fluor Federal Services, Inc. Paducah Deactivation Project (FPDP) Environmental Monitoring databases. These databases are the Paducah Oak Ridge Environmental Information System (OREIS) and Paducah Project Environmental Measurements System (PEMS.)

1.2 Scope

This procedure establishes both the configuration control and configuration management processes of Paducah OREIS and Paducah PEMS that involve submission, review, and disposition of a change request. It does **NOT** cover the subsequent development, quality assurance (QA), testing, and implementation. This procedure applies to (1) the sample management office (SMO), Paducah OREIS and Paducah PEMS users, and data providers who request changes; and (2) the individuals who are involved in the review and disposition processes as outlined in this procedure. Change requests to the databases may involve the following: (1) the commercial hardware and software; (2) the user interface and customized software (program changes); (3) the data model; (4) the data values; (5) the reference tables; and (6) documentation.

2.0 REFERENCES

None

3.0 COMMITMENTS

None

4.0 RESPONSIBILITIES

4.1 Requester/Project Manager

Submits a Paducah OREIS or Paducah PEMS change request.

4.2 Environmental Monitoring Project Manager

Oversees the implementation of changes to data and database structures approved by this procedure.

4.3 Scientist/Data Entry Specialist

Assists the Environmental Monitoring Project Manager with determining the implementation of a change request and processes approved Paducah OREIS or Paducah PEMS change request.

5.0 GENERAL INFORMATION

None

6.0 INSTRUCTIONS

6.1 Requester Information

Requester/Project Manager

6.1.1 Submit a Paducah OREIS or Paducah PEMS change request to the Environmental Monitoring Project Manager, or designee. Requests may be submitted via e-mail or telephone.

6.1.2 Include the description of the change, the affected database (OREIS or PEMS), and whether the request is a "Rush."

6.2 Paducah PEMS Change Request

Environmental Monitoring Project Manager

6.2.1 Review Paducah PEMS change request with SMO, as needed.

6.2.2 Determine if change requires updates to the Paducah PEMS configuration structure and/or user's guide.

6.2.3 **If** Paducah PEMS change request is rejected, **then** notify the requester of the change request rejection.

6.2.4 **If** Paducah PEMS change request is approved, **then** forward to SMO for processing.

Scientist/Data Entry Specialist

6.2.5 Process approved Paducah PEMS change request.

6.3 Paducah OREIS Change Request

Environmental Monitoring Project Manager

6.3.1 Review Paducah OREIS change request with SMO, as needed.

6.3.2 Determine if change requires updates to the Paducah OREIS Data Dictionary and/or the Paducah OREIS User Guide.

6.3.3 **If** Paducah OREIS change request is rejected, **then** notify the requester of the change request rejection.

6.3.4 **If** Paducah OREIS change request is approved, **then** forward to SMO for processing.

Scientist/Data Entry Specialist

NOTE:

The X_ACTION tables are used to store an original copy of the records before they are updated. The X_ACTION tables contain a detailed description of the changes along with the date the changes were implemented. This allows the SMO to access the original records, if needed.

6.3.5 Process approved Paducah OREIS change request utilizing the X_ACTION queries and tables in the Paducah OREIS database, as needed.

NOTE:

Any changes that affect the PPPO Environmental Geographic Analytical Spatial Information System (PEGASIS) web application will be incorporated on the next scheduled update.

6.3.6 Notify all Paducah OREIS users of implemented change request.

7.0 RECORDS

None

Appendix A – Acronyms/Definitions

ACRONYMS

FPDP –Flour Federal Services, Inc. Paducah Deactivation Project

OREIS –Paducah Oak Ridge Environmental Information System

PEMS –Project Environmental Measurements System

PEGASIS – PPPO Environmental Geographic Analytical Spatial Information System

QA–Quality Assurance

SMO–Sample Management Office

DEFINITIONS

Commercial hardware/software – Products purchased from commercial vendors and integrated into OREIS or PEMS that includes, but is not limited to, NT servers, UNIX server, operating systems, a relational database management system, or a geographic information system.

Configuration control – A process that involves establishing the baseline computer system and controlling system changes thereafter to be consistent with approved prioritization, quality, and budget parameters; the systematic evaluation, coordination, implementation, and documentation of all changes to a system after its completion.

Configuration management – Conducting configuration control of the Environmental databases as prescribed in this procedure, the OREIS Charter, and the OREIS and PEMS users guides.

Data Model – Representations of the data relevant to OREIS and PEMS and their interrelationships. The data model is a logical representation of the database structure and is used to develop the physical database structure.

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CP4-ES-2700 Rev. 0	TITLE: Logbooks and Data Forms	Page 1 of 14
DOCUMENT CATEGORY:	☒ Administrative ☐ Technical (Operations) ☐ Technical (Support)	
LEVEL OF USE:	☒ Information Level ☐ Reference Level ☐ Continuous Use	
ENVIRONMENTAL MONITORING SUBJECT MATTER AREA: Sampling	WRITER: Barry Kinsall/Environmental Scientist Signature: _____ Date: 2/25/16	
NUCLEAR SAFETY REVIEW DOCUMENTATION: WG Exemption #20 2/25/16	APPROVED BY: Signature: _____ Date: 2/25/16	
REQUIRED REVIEW DATE: 2/25/19	EFFECTIVE DATE: 3/2/16	

REVISION/CHANGE LOG			
Revision/Change Letter	Description of Changes	Pages Affected	Date of Revision/Change
0	Initial Release	ALL	2/25/16

TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE

1.1 Purpose

The purpose of this procedure is to establish requirements for content and control of data forms and logbooks and to provide guidelines for accurate and complete documentation of environmental monitoring activities.

1.2 Scope

The requirements of this procedure apply to work performed for Fluor Federal Services, Inc. Paducah Deactivation Project (FPDP) employees and its subcontractors at the Department of Energy Paducah Site.

These requirements apply to all data forms that document data or other pertinent information related to, sample collection, field measurements, and data assessment checklists and logbooks that document an activity (e.g., site, project, sampling, field laboratory, equipment calibration and maintenance).

Data forms that are used to record sample collection information are referred to as Sample Data Forms. The reference to data form requirements throughout this procedure will also include sample data forms.

The requirements in this procedure **DO NOT** apply to personal or communication logbooks. Chain-of-custody and sample labels that are specifically discussed in CP4-ES-2708, *Chain-of-Custody Forms, Field Sample Logs, Sample Labels, and Custody Seals*.

2.0 REFERENCES

2.1 Use References

- CP3-OP-0207, *Use of Procedures*
- CP3-OP-0208, *Required Reading/Crew Briefing*
- CP3-RD-0010, *Records Management Process*
- CP3-OP-0025, *Document Control Process*

2.2 Source References

U.S. Environmental Protection Agency, May 2013. Field Branches Quality System and Technical Procedures. Region 4, Science and Ecosystem Support Division, Athens GA.

3.0 COMMITMENTS

None

4.0 PRECAUTIONS AND LIMITATIONS

4.1 Precautions

4.1.1 Sample data forms are **NOT** required to be placed in a logbook.

4.1.2 Sample data forms shall be managed in the same manner as a chain-of-custody.

4.1.3 Data forms will be developed under a controlled process, such as a work plan, procedure, or Paducah Project Environmental Measurements System (PEMS).

4.1.4 Logbooks and data forms are a part of the permanent project records.

4.1.5 All entries shall be factual, detailed, and objective.

4.1.6 All entries shall be legible and made using black indelible ink.

4.1.7 Void entry errors by drawing a single line through the entry; and initial and date the correction.

4.1.8 Insertions after the initial entry should be initialed and dated.

4.2 Limitations

4.2.1 **DO NOT** record notes elsewhere for recopying of the information into the logbook at a later time.

4.2.2 **DO NOT** use correction tape or white-out to obliterate incorrect entries.

4.2.3 **DO NOT** remove any pages for any reason.

4.2.4 **DO NOT** skip lines or leave blank spaces or pages between entries.

5.0 PREREQUISITES

5.1 Prior to performing any action steps identified in CP4-ES-2700, *Logbooks and Data Forms,* for the first time, review this document based upon its level of use in accordance with CP3-OP-0207, *Use of Procedures*.

5.2 Prior to performing any action steps identified in this procedure, complete any required applicable training identified by the Training Position Description (TPD) for the position in accordance with CP4-TR-0102, *Conduct of Training,* and CP3-OP-0208, *Required Reading/Crew Briefing*.

6.0 INSTRUCTIONS

6.1 Data Form Development

Project Manager/Database Specialist/Scientist

6.1.1 Identify data forms that are required to support planned activity or determine if logbooks are required for sampling per project work plans.

6.1.2 **If** the use of logbooks is required for sampling, **then** proceed to Section **6.3**.

6.1.3 Provide project specific requirements for sample data forms in a timely manner to the Sample Management Office (SMO) in order to provide adequate time for preparation, review and approval.

6.1.4 Include on sample data forms, or any form generated from PEMS, an identifier on the bottom left hand corner of the form referencing the database source from which the form was generated.

Sample Management Office

6.1.5 **If** there are no project specific requirements for sample data forms, **then** provide the requestor with the existing sample data forms for the required matrix.

6.1.6 Sample data forms, at a minimum, shall include the following information:

- Project Identification Number

- Sample Identification Number
- Sample Location
- Sample Type
- Required field measurements to be collected, if applicable

6.1.7 In the event that PEMS is **NOT** available for sample data form generation, utilize a blank form to record the required information.

6.1.8 **If** a blank sample data form is used, **then** record the information listed in Section **6.1.14** Appendix B, *Example of PEMS Generated Sample Data Form*

NOTE(s):

The use of correction tape or white-out is **NOT** permitted.

Any error on a data form entry should be corrected by the same person who made the original entry, whenever feasible.

Obliteration of incorrect entries, including correction tape or fluid, is **NOT** allowed.

6.1.9 Indicate any deletions or corrections by marking through the original material with a single line; then initial **and** date the change

6.1.10 Indicate any insertion by initialing and dating the insertion.

6.1.11 **If** any blank lines within the data entries on a form are **NOT** used, **then** write "N/A" (**NOT** applicable) in the blank line or empty space.

6.1.12 Identify each unused section by filling in the unused area with a "Z" line, initials, and date.

6.1.13 Include the date and signature of the person recording the information.

NOTE:

Items **A** thru **C** may be pre-printed on the sample data form generated from PEMS.

6.1.14 Record the following information during field activities:

A. Station identification number

B. Sample identification number

C. Physical description of sample

D. Date (Month/Day/Year) at the top of the form.

E. Names of personnel assigned to the task.

F. Field measurements, with appropriate units of measure, collected prior to sample collection.

G. Time of sample collection.

H. Decontamination activities (BOX to CHECK), specifying decontamination practices used.

6.1.15 Record the following information in the comment section as necessary to describe the activity.

- Observations of field and/or sampling conditions that may be beneficial to recreating field activities.
- Descriptions of any problems encountered and resolutions found.
- Names, affiliations, and times of all visitors or observers to the work site.
- Start and stop times (24 hour clock) of field activities. The time should be recorded frequently and at the point of events or measurements that are critical to the activity being logged.
- Any deviations or difficulties encountered in the field activities in sufficient detail to completely describe the activity.

6.1.16 **If** additional information is necessary for documentation purposes and no additional space is available on the sample data form, **then** record the additional information on a approved pre-generated comment sheet, along with the date, corresponding project number, sampling location, and sample identification, as applicable.

6.2 Data Form Storage and Control

Project Personnel

6.2.1 Store data forms in accordance with CP3-RD-0010, *Records Management Process*.

6.2.2 Confirm the form used is the most current form from the current controlled process, such as a work plan, procedure, or PEMS to maintain control of blank data forms.

6.3 Logbook Development

Project Personnel

6.3.1 Record the following information, as applicable, on the outside of the front cover of each logbook using indelible ink (paint pen.)

- Project name and number
- Unique logbook name and number
- Document control number
- Activity or site name
- Start date of the logbook
- Completion date of the logbook

NOTE:

A pre-generated adhesive label may be used to record this information inside the logbook front cover.

6.3.2 Record the following information on the inside of the front cover of each logbook using black, indelible ink.

- Logbook number
- Project manager's name

- Return address
- Important phone numbers, as applicable
- Radio call numbers, as applicable
- Emergency contacts, as applicable

6.3.3 **If** pages have **NOT** already been pre-numbered, **then** manually number all of the pages before the initial use of the logbook.

6.3.4 Reserve the first three pages of the logbook for a table of contents.

6.3.5 Mark the first page with the following:

- TABLE OF CONTENTS
- EXAMPLE:

Page(s)	Description of Activity	Date
1-8	Sonic Drilling BRW-108	07/27/04

6.4 Logbook Entry Requirements

Project Personnel

NOTE(s):

Appendix C, *Example of Completed Logbook Pages,* is used as an example of logbook entry.

The intent of keeping a logbook is for the reader to be able to recreate an event as accurately and completely as possible based on the written information. A logbook is a factual, chronological record of the activities throughout the day. The logbook author must include observations and descriptive notations. However, the author must take care to be objective and record no opinions or subjective comments.

6.4.1 Pages are **NOT** removed for any reason.

6.4.2 The use of correction tape or white-out is **NOT** permitted.

6.4.3 Any error on a logbook entry should be corrected by the same person who made the original entry, whenever feasible.

6.4.4 Notes are **NOT** recorded elsewhere for recopying of the information into the logbook at a later time.

6.4.5 There shall be no blank spaces or pages between entries or skipped lines.

6.4.6 Record the information directly into the logbook.

6.4.7 Record legible entries in black, indelible ink, **and** enter on consecutive lines and pages.

NOTE:

Obliteration of incorrect entries, including correction tape or fluid, is **NOT** allowed.

6.4.8 Indicate any deletions or changes by marking through the original material with a single line; then initial **and** date the change.

6.4.9 Indicate any insertion by initialing and dating the insertion.

6.4.10 Precede each entry with the time (24-hour clock).

6.4.11 Start each day in the logbook on a new page.

6.4.12 Record the following information each day on the first page of the section of the logbook to be used for the

- Description of task to be performed
- Location of task
- Project Manager Name

6.4.13 Document relevant correspondence (e.g.,written, personal, and telephone conversations).

NOTE:

Items **A** through **N** are general information for sampling logbooks, that is used for a specific project where sampling data forms are **NOT** approved. Other logbooks also governed by this procedure (e.g., Geologist logbooks, Supervisor logs, Project logs, Field Lab Analysis logbooks, etc.) will **NOT** be required to present all the information listed here.

6.4.14 Record the applicable information during field activities, such as:

A. Station Identification Number.

B. Sample Identification Number.

C. Physical description of sample.

D. Date (month/day/year) at the top and bottom of each page.

E. Identification of personnel assigned to the task, including subcontractors.

F. A list of all field equipment that will be used and identifying or serial numbers.

G. Any observations or conditions that could affect sample quality, changes to the sample location (monitoring well damage, stream sampling point changes) or unsafe work conditions.

H. Names, affiliations, and times of arrival and departure of all visitors or observers to the work site. **If** unsure, **then** ask purpose of the visit **and** record.

I. Start and stop times (24-hour clock) of field activities. The time should be recorded frequently and at the point of events or measurements that are critical to the activity being logged.

J. Any deviations or one-time difficulties encountered in the field activities in sufficient detail to completely describe the activity or event.

K. Description of any issues, concerns, or problems and their resolution, including any equipment failures with a description of downtime, standby time, repairs, replacements, and/or recalibrations, as applicable.

L. Decontamination activities (if any), noting procedures used or reference to a project-specific plan specifying decontamination practices used.

M. Field measurements taken using instruments, if sample data forms are **NOT** approved to be used for a specific project, which may include the following:

1. Name of technician

2. Instrument(s) utilized

3. Calculations and results

4. Media that were measured

5. Type of measurement (e.g., temperature, turbidity, conductivity, pH)

6. Sample identification number from which the measurement was taken

7. Time of sample collection

8. Measurement results with appropriate units of measure

9. Any special comments/observations

N. Results of health and safety monitoring, including instrument make, model, serial number, and calibration standards used.

6.4.15 At the end of all entries for each day, or at the end of a particular event, if appropriate, draw a "Z" line through any blank space remaining at the bottom of each page **and** initial and date by the individual making the entry.

6.4.16 Identify each unused logbook page by filling in the unused area with a "Z" line, signature, and a date.

NOTE:

If a "Z" line and signature and date are used to void a blank page, **then** an additional signature and date at the bottom of the page are **NOT** required.

6.4.17 Sign **and** date the bottom of each page.

6.5 Logbook Storage and Control

Project Personnel

6.5.1 Store logbooks in accordance with CP3-RD-0010, *Records Management Process*.

6.5.2 Control logbooks to ensure tracking, handling, and usage so these are **NOT** lost or damaged.

6.5.3 **If** multiple logbooks are used for a project, **then** maintain a project logbook inventory.

6.5.4 Assign a sequential document control number to each logbook.

6.5.5 Keep logbooks on-site unless written permission has been given in advance by a project manager or designee to take a logbook off-site.

6.5.6 Use CP4-ES-2700-F01-*Logbook Sign In/Out Sheet* to identify the individual responsible for the logbooks care and custody.

6.5.7 Utilize CP4-ES-2700-F01 to identify the individual making entries into the logbook and to

provide a reference for unique initials.

6.5.8 Maintain responsibility for the logbook until such time that either custody is transferred to another team member, or the logbook has been returned to its designated storage location upon completion of the daily activities.

6.5.9 **If** the person maintaining custody of the logbook is present, **and** is being aided by a second person, **then** transfer of custody is **NOT** required.

6.5.10 **If** the custody of the logbook is transferred, **then** place an entry in the logbook that documents the change in custody.

6.5.11 Record full name of the person releasing custody **and** date in the logbook.

6.5.12 Record full name of the person receiving custody **and** date in the logbook.

6.6 Data Form and Logbook Reviews

Project Personnel

6.6.1 Conduct periodic reviews, at least monthly during field operations, of data forms and logbooks to verify the following:

- Accuracy of entries
- Legibility and clarity of entries
- Completeness to ensure that at least the minimum required information is recorded
- Consistency of information recorded
- Signature and date of entries by the designated team member
- Compliance to the requirements in this procedure

6.6.2 Notify appropriate personnel of corrections or clarifications that may be needed. **If** any discrepancies or deviations from this procedure are found, **then** inform the project manager as soon as practicable **and** obtain resolution before signing the logbook page or data form.

NOTE:

For a sample data form, reviews shall be performed by personnel, other than the original transcriber, involved in the sampling event.

Reviewer

6.6.3 **When** a logbook or data form review has been completed, sign **and** date the bottom right-hand corner of the logbook or data form page.

7.0 ACCEPTANCE CRITERIA

None

8.0 POST PERFORMANCE WORK ACTIVITIES

Submit logbooks and data forms to the SMO upon completion of the task.

9.0 RECORDS

9.1 Records Generated

The following records may be generated by this procedure:

- CP4-ES-2700-F01, *Sampling Logbook Sign In/Out Sheet*
- Logbooks
- Sample Data Forms

9.2 Records Disposition

The records are to be maintained in accordance with CP3-RD-0010, *Records Management Process* and CP3-OP-0025 *Document Control Process* .

Appendix A – Acronyms/Definitions

ACRONYMS

FPDP – Fluor Federal Services, Inc. Paducah Deactivation Project

PEMS – Project Environmental Measurements System

SMO – Sample Management Office

TPD – Training Position Description

DEFINITIONS

Data Forms – A loose, unbound, uniquely identified, single-sided or double-sided page(s) usually with pre-printed table for convenient, manual data entry. Data forms may be printed on sticker paper to be placed in a logbook. Forms are used for the permanent recording of information pertaining to various data collection activities (e.g., data assessment checklists, calibration forms, etc.).

Sample Data Forms – A loose, unbound, uniquely identified, single-sided page(s) with pre-printed information from PEMS for convenient, manual data entry of data pertaining to a sampling event.

Logbook – A bound book with sequentially numbered pages used to create a permanent, near real-time record of activities and conditions, significant events, observations, and measurements that occur during each day of field activities.

Project Manager – The person (or designee) responsible for ensuring that sampling activities are performed in accordance with the current, approved plans or other governing documents and associated procedures. The project manager approves (or coordinates the approval of) deviations from the approved plans or other governing documents.

Reviewer – A person who is knowledgeable about, but independent from, the tasks being performed and is responsible for verifying conformance to procedural requirements.

Appendix B – PEMS Generated Sample Data Form

MW GROUNDWATER DATA FORM

LOCATION: MW165A FREQUENCY: Semiannual DATE: _____

ARRIVAL TIME: _____ SAMPLE TIME: _____ DEPARTURE TIME: _____

SAMPLE ID(S): MW165SA1-16 TRIP BLANK: _____

LCOC NUMBER: GWACO16-05 PROJECT ID: GWACO16-05

SAMPLED BY: _____

WELL DEPTH: 68 POINT DATUM: TOC PURGE VOLUME: _____

WATER LEVEL(START): _____ WATER LEVEL(END): _____ BAROMETRIC PRESSURE: _____

PURGE START TIME: _____ PURGE END TIME: _____

Time	COND mS/cm / umhos/cm	D.O. (mg/L)	TEMP (deg F)	pH (su)	ORP (mV)	Turbidity (NTU)
	/					
	/					
	/					
	/					
	/					
	/					

EQUIPMENT INFORMATION:

HYDROLAB DISPLAY #: _____ HYDROLAB TRANSMITTER #: _____

SAMPLE BOX #: _____ DEPTH INDICATOR #: _____ DI WATER SOURCE: _____

EQUIPMENT DECONTAMINATION DESCRIPTION:

Decon sample control box, 600mL of DI Water.

FIELD COMMENTS AND OBSERVATIONS:

SIGNATURE: _____ DATE: _____

Data Form Verification

SIGNATURE: _____ DATE: _____

PEMS Entry Initials: _____ DATE: _____

MW Groundwater Data Form generated from ESPEMS database

Appendix C - Example of Completed Logbook Pages

20

C-400 RDSI Thursday 6/15/06

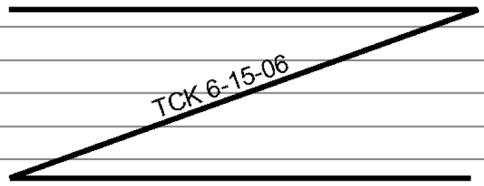
0630	Arrive on site and begin setting up at soil boring 001
0940	Start drilling soil boring 001
0648	Collect soil sample SB001-00-05
0700	Collect soil sample SB001-05-10
0708	Collect soil sample SB001-10-15, sweet odor was noticed coming from soil before the sample was placed in the jar.
0710	ES&H performed monitoring of the area and detected 50 ppm VOCs. Project manager was contacted and PPE was increased from level D to level B. See ES&H logbook for more info.
0730	Re-start drilling efforts
0740	Collect sample soil SB001-15-20
0750	Completed sampling activities at soil boring 001.
0755	Decontaminate sampling and drilling equipment.
0845	Collect ground water sample at MW-12 see page 22 for details on parameters.
0859	Begin setting up at soil boring 002
0900	Jim Johnson and Julie Smith arrive from DOE. They talked with Mike Clark.
0905	Start drilling soil boring 002
0915	Collect soil sample SB002-00-05
0921	Collect soil sample SB002-05-10
0930	Collect soil sample SB002-10-15

Tracy Kulik 6-15-06

21

C-400 RDSI Thursday 6/15/06

0942	Collect soil sample SB002-15-20
1000	Completed sampling activities at soil boring 002.
1010	Decontaminate sampling and drilling equipment and break for lunch.
1145	Begin setting up at soil boring 003
1155	Start drilling soil boring 003
1201	Collect soil sample SB003-00-05
1215	Collect soil sample SB003-05-10
1218	Hit refusal and decide to offset the boring.
1230	Begin setting up at offset soil boring 003 approximately 12 in south of the original location
1245	Begin drilling offset boring 003
1250	At approximately 9 feet BGS, hit refusal. A second attempt was made to continue down, and the Geoprobe broke down.
1300	Geoprobe will require extensive repairs and will need to be taken offsite.
1310	Decontaminate sampling and drilling equipment and stop for the day.



Tracy Kulik 6-15-06

WORKING COPY

VERIF. DATE: _____

INTIALS: _____

FLUOR®

Fluor Federal Services, Inc. Paducah Deactivation Project

CP4-ES-2702 **Rev. 0**	**TITLE:** Decontamination of Sampling Equipment and Devices	Page 1 of 14

DOCUMENT CATEGORY: ☐ Administrative ☒ Technical (Operations) ☐ Technical (Support)

LEVEL OF USE: ☐ Information Level ☒ Reference Level ☐ Continuous Use

ENVIRONMENTAL MANAGEMENT **SUBJECT MATTER AREA:** Sampling	**WRITER :** Traci Curry, Scientist Signature: Traci Curry Date: 4/11/16
NUCLEAR SAFETY REVIEW DOCUMENTATION: FPDP-16-0467-D	**APPROVED BY:** Lisa Crabtree, Environmental Monitoring Manager Signature: Lisa Crabtree Date: 4/11/16
REQUIRED REVIEW DATE: ~~4/11/16~~ TLC 4/11/16 4/11/19	**EFFECTIVE DATE:** 4/14/16

REVISION/CHANGE LOG

Revision/Change Letter	Description of Changes	Pages Affected	Date of Revision/Change
0	Initial Release	ALL	4/11/~~19~~ 16 TLC 4/12/16

TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure establishes methodologies for cleaning and decontaminating sampling equipment and devices that come into contact with non-fissile sample media and/or contaminants.

The objectives of decontamination are to remove contaminants from surfaces, mitigate the spread of contaminants to other uncontaminated surfaces, prevent cross-contamination of sample matrices, and to minimize personnel exposure and waste volume.

1.2 Scope

This procedure shall be used for decontamination of sampling equipment and devices used for characterization and cleanup verification activities performed by Fluor Paducah Deactivation Project (FPDP) personnel and subcontractors.

This procedure is **NOT** intended to provide direction on the decontamination of large field equipment and equipment components (e.g., backhoes, forklifts, track hoes, front loaders, graders, well drilling equipment, drill bits, drilling rods, etc.). For those decontamination activities, see CP4-ER-2701, *Large Equipment Decontamination.*

2.0 REFERENCES

2.1 Use References

- CP3-HS-2003, *Hazard Communication*
- CP3-HS-2004, *Job Hazard Analyses*
- CP3-HS-2005, *Personal Protective Equipment*
- CP3-HS-2032, *Hazardous Material Information and Inventory Process*
- CP3-RP-1108, *Posting and Labeling*
- CP3-RP-1109, *Radioactive Contamination Control and Monitoring*
- CP3-WM-1037, *Generation and Temporary Storage of Waste Materials*
- CP4-ES-2700, *Logbooks and Data Forms*
- CP4-ES-2704, *Trip, Equipment and Field Blank Preparation*
- Equipment or instrument-specific instructions provided by manufacturer
- Job Hazard Analysis (JHA)-11028, *Decontamination of Equipment*

2.2 Source References

- CP4-ER-2701, *Large Equipment Decontamination*
- Toxic Substances Control Act, Title 40 Code of Federal Regulations Part 761
- U.S. Army Corps of Engineers, February 2001, EM 200-1-3, *Requirements for the Preparation of Sampling and Analysis Plans*
- U.S. Environmental Protection Agency, November 2001, *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*, Region 4, Environmental Compliance Branch, Athens, GA., Appendices B and C

3.0 COMMITMENTS

None

4.0 PRECAUTIONS AND LIMITATIONS

4.1 Precautions

4.1.1 The sampling team performing the task of cleaning and decontaminating sampling equipment shall comply with the requirements of the CP3-HS-2005, *Personal Protective Equipment*, and any job-specific JHAs that address safety and health.

4.1.2 The sampling team also shall comply with additional requirements as described in the JHA; project-specific work plan, if applicable; and the radiological work permit (RWP) if required; which define the work area(s) and discuss expected radiological and non-radiological hazards, required training, personal protective equipment (PPE) requirements, hazard controls, etc.

4.2 Limitations

4.2.1 JHA-11028, *Decontamination of Equipment,* RWP, and project-specific work plan, as applicable, should be referred to for detailed limitations and other requirements associated with the work environment.

4.2.2 Additional cleaning and decontamination procedures and methods may be required because of differing contaminant characteristics.

5.0 PREREQUISITES

5.1 Contact **and** submit material safety data sheets (MSDS) / safety data sheets (SDS) to Health and Safety in accordance with CP3-HS-2032, *Hazardous Material Information and Inventory Process,* and CP3-HS-2003, *Hazard Communication,* for solvents that will be used for cleaning and decontamination.

5.2 Participate in the development and/or review and approval of the task-specific JHA in accordance with CP3-HS-2004, *Job Hazard Analyses*.

5.3 Prior to beginning work, read **and** sign off on the RWP, if required, and task-specific JHA.

NOTE:
The items listed may be used as a guide, but may **NOT** be a complete list.

5.3.1 Refer to the task-specific JHA(s); project-specific work plan, if applicable; and the RWP (if one is required) to determine what instruments, supplies, materials, and equipment are needed to safely execute the decontamination activities.

- Soap (phosphate-free laboratory detergent such as Liquinox®)
- Solvent, as applicable
- Tap water
- Analyte-free (deionized) water
- Organic-/analyte-free water
- Nitric acid, as applicable
- Steam cleaner or high pressure hot water washer capable of generating a pressure of at least 2500 pounds per square inch (PSI) and producing hot water and/or steam ≥ 200°F, with a soap compartment, as applicable
- Natural bristle brushes
- Buckets
- Aluminum foil, plastic wrap, zipper-type plastic bags, and clean plastic trash-size bags
- Plastic sheeting or other impermeable liner for decontamination area
- Paper towels, clean cloths, or rags
- Spill control kit
- Absorbent pads
- PPE and other safety equipment specified by the JHA and RWP
- MSDS, as applicable
- Indelible marking pens

5.3.2 Assemble the necessary equipment, tools, and supplies to ensure that sufficient materials and equipment are available for the decontamination activities.

5.4 Conduct decontamination of sampling equipment and devices at the designated decontamination area for the facility, if available.

5.4.1 **If** it is necessary to construct a temporary decontamination area, **then** locate area close to the work site to ensure that contaminants are not spread or transferred to other equipment.

5.4.2 Determine whether sampling equipment and devices are expected to be radiologically and/or chemically contaminated.

5.4.3 **If** known or potential radiological contamination is suspected, **then** construct decontamination area using clean material locating in an area that is posted as a Contaminated Area.

5.4.4 Select a location that has little to no surface contamination.

5.4.5 **If** temporary decontamination area is constructed in an un-posted area, **then** contact a radiological controls technician (RCT) to screen and post area according to CP3-RP-1108, *Posting and Labeling*.

5.4.6 **If** known or potential chemical contamination only is suspected, **then** construct decontamination area in an area known to be free of surface contamination.

5.4.7 Construct temporary decontamination area on a generally level surface that facilitates the capture, removal, and control of wastewater and precipitation (if any).

NOTE:

Impermeable plastic sheeting should **NOT** have any seams, rips, or tears.

5.4.8 Place impermeable plastic sheeting on surface to ensure decontamination area is capable of containing all decontamination fluids.

5.4.9 **If** potentially contaminated sampling equipment and devices need to be removed from a Radiological Area for decontamination, **then** contact a RCT to perform a survey.

NOTE:

Release of surveyed sampling equipment and devices to other areas must be approved by the RCT in accordance with CP3-RP-1109, *Radioactive Contamination Control and Monitoring*.

5.4.10 Ensure surveyed sampling equipment and devices are tagged according to CP3-RP-1108, *Posting and Labeling* prior to being re-located.

5.4.11 Ensure sawhorses or racks constructed to hold sampling equipment or devices while being decontaminated are high enough above the floor of the decontamination area (i.e., at least two feet) to prevent equipment from being splashed.

5.4.12 Refer to the manufacturer's instruction manual before selecting a cleaning or decontamination approach for specific field test equipment or instrumentation (e.g., pH meters, thermometers, dissolved oxygen meters) to avoid the possibility of damage to instrument components.

6.0 INSTRUCTIONS

6.1 General Requirements

Sampler

NOTE:

MSDS(s)/SDS(s) are readily available and accessible to employees to review prior to working with chemicals.

MSDS(s)/SDS(s) are located electronically or by maintaining printed hard copies.

When sampling equipment or devices are used to collect samples containing oil, grease or other hard to remove materials, rinsing the equipment several times using pesticide-grade acetone, hexane, or petroleum ether may be needed before proceeding with initial cleaning.

6.1.1 Clean sampling equipment or devices with tap water and soap using a brush to remove particulate matter and surface films.

NOTE:

Sampling equipment and devices may be cleaned with soap and high pressure steam or hot water as an alternative to brushing if appropriate and necessary.

Sampling equipment and devices that are cleaned with soap and high pressure steam or hot water should be placed on racks or saw horses at the decontamination area.

PVC or plastic items should **NOT** be cleaned with steam or hot water pressure.

6.1.2 Rinse sampling equipment or devices thoroughly with tap water.

NOTE:

Solvent and 10% nitric acid rinsates are to be collected in separate containers for treatment or proper disposal as investigation-derived waste (IDW).

Solvent or nitric acid rinsates should **NOT** be placed in the temporary decontamination area.

6.1.3 **If** required by the task-specific WP, **then** rinse Teflon® and glass sampling equipment and devices with a 10% nitric acid solution.

6.1.4 Rinse sampling equipment and devices thoroughly with analyte-free water.

NOTE:

Do **NOT** solvent rinse polyvinyl chloride (PVC) or plastic items.

6.1.5 **If** required by the task-specific WP, **then** rinse sampling equipment and devices thoroughly with an appropriate solvent (e.g., when collected samples undergo trace organic or inorganic constituent analyses).

NOTE:

Do **NOT** apply a final rinse with analyte-free water following a rinse with organic/analyte-free water.

A. **After** solvent rinse, **then** rinse sampling equipment and devices with an organic/analyte-free water and air dry.

B. **If** organic/analyte-free water is **NOT** available, **then** allow sampling equipment and devices to completely air dry.

6.1.6 Tag **and** label decontaminated sampling equipment and devices.

6.1.7 **If** sampling equipment is used in a contamination area (CA), **then** contact a RCT to survey equipment before tagging and labeling according to CP3-RP-1109, *Radioactive Contamination Control and Monitoring.*

6.1.8 Handle decontaminated sampling equipment and devices wearing clean, chemical resistant gloves to prevent recontamination.

6.1.9 Store new or cleaned (decontaminated) sampling equipment and devices separately from contaminated equipment.

6.1.10 Prepare equipment rinsate blanks in accordance with CP4-ES-2704, *Trip, Equipment and Field Blank Preparation.*

6.1.11 Additionally, document any deviations or difficulties encountered in the field concerning sample collection or related activities on the sample data form.

6.2 Well Sounder or Tape Decontamination

NOTE:

Only the portion of the well sounder cable or tape that has a potential to come into contact with contamination needs to be cleaned.

Sampler

6.2.1 Wash with soap and tap water.

6.2.2 Rinse with tap water.

6.2.3 Rinse with analyte-free water **and** air dry.

6.2.4 Tag **and** label decontaminated equipment and devices.

6.2.5 **If** sampling equipment is used in a CA, **then** contact a RCT to survey equipment before tagging and labeling.

6.2.6 Handle decontaminated sampling equipment and devices wearing clean, resistant gloves to prevent recontamination.

6.3 Pump Decontamination

CAUTION:

In order to avoid damage to pumps or other devices operated by a controller, make sure that the controller does not become wet during cleaning and decontamination activities.

6.3.1 Pump soapy water through the hose to flush out any residual purge water.

6.3.2 Scrub the exterior of the contaminated hose, pump, and electrical cord, with soap and tap water, using a brush or wipe.

6.3.3 Rinse the soap from the outside of the hose, pump, and electrical cord with tap water.

6.3.4 Rinse the hose with analyte-free water.

6.3.5 Pump tap water through the hose to flush out soapy water (approximately 1 gallon).

6.3.6 Pump analyte-free water through the hose to flush out the tap water.

6.3.7 **If** the pump has a reverse mode, **then** purge with the pump in reverse mode.

6.3.8 Rinse the tap water residue from the outside of hose, pump, and electrical cord with analyte-free water (approximately ¼ gallon) **and** let dry.

6.3.9 Tag **and** label equipment.

6.3.10 **If** sampling equipment is used in a CA, **then** contact a RCT to survey before tagging and labeling.

6.4 Polychlorinated Biphenyl Contaminated Sampling Equipment

6.4.1 Contact Waste Management for guidance on handling PCB waste.

NOTE:

Polychlorinated Biphenyl (PCB) contaminated sampling equipment (CSE) must be decontaminated and verified clean according to Toxic Substance Control Act (TSCA) specifications.

Any equipment to be reused that was suspected to have come in contact with material labeled as PCB and/or a PCB source $\geq$ 50 ppm is considered to be PCB CSE.

Do **NOT** leave PCB CSE unattended.

6.4.2 Following the sampling event:

- Wipe all PCB CSE free of loose liquids and materials at the sampling point.
- Double-wrap PCB CSE in plastic bags.
- Place PCB label on plastic bags.
- Transport bags to decontamination location.

NOTE:

The production of free liquid waste should be avoided.

- Decontaminate PCB CSE by swabbing with 100% penetone, hexane or approved equivalent with dampened rags.
- Double-wrap decontaminated equipment in plastic.
- Place PCB label on plastic.
- Store decontaminated equipment in a cabinet labeled PCB Dedicated Equipment Storage Cabinet.

6.4.3 Perform verification sampling on sampling equipment.

1. Obtain a 100-cm^2 wipe sample from an area on the equipment that was most likely contaminated.

2. Submit sample to the laboratory for analysis.

   - **If** the result for the 100-cm^2 wipe is <10 ug/wipe, **then** deem equipment non-TSCA **and** decontaminate sampling equipment.

   - **If** the result for the 100-cm^2 wipe is >10 ug/wipe, **then** dispose of the PCB CSE as PCB waste.

NOTE:

All waste produced from the decontamination operations of PCB contaminated sampling equipment is considered PCB waste.

7.0 ACCEPTANCE CRITERIA

None

8.0 POST PERFORMANCE WORK ACTIVITIES

Sampler

8.1.1 Record all decontamination activities on the sample data form in accordance with CP4-ES-2700, *Logbooks and Data Forms*.

8.1.2 Ensure sampling equipment and devices are surveyed by a radiological controls technician (RCT) after decontamination and meet the criteria in CP3-RP-1109, *Radioactive Contamination Control and Monitoring.*

NOTE:

Decontaminated sampling equipment and devices may be wrapped in aluminum foil or plastic after surveyed and by RCT.

RCT

8.1.3 **If** sampling equipment and devices are **NOT** going to be reused immediately in a Radiological Area, Soil Contamination Area, or Radiological Buffer Area **then** tag and label in accordance with CP3-RP-1108, *Posting and Labeling*.

Sampler/Waste Technician

8.1.4 Handle disposable sampling equipment and devices as investigation-derived waster (IDW) in accordance with the requirements in the approved, task-specific WP.

8.1.5 Collect **and** label any IDW generated by the decontamination process.

8.1.6 Segregate into appropriate containers **and** dispose of (or treat prior to disposal) according to CP3-WM-1037, *Generation and Temporary Storage of Waste Materials*.

8.1.7 Prior to transporting IDW, contact the transportation specialist.

8.1.8 Restore decontamination area by removing plastic sheeting.

9.0 RECORDS

9.1 Records Generated

The following records may be generated by this procedure:

Sample Data Form

9.2 Records Disposition

The records are to be maintained in accordance with CP3-RD-0010, *Records Management Process*.

Appendix A – Acronyms/Definitions

ACRONYMS

CA - contamination area

CSE – contaminated sampling equipment

DOE - U.S. Department of Energy

FPDP – Fluor Paducah Deactivation Project

IDW – investigation-derived waste

JHA – job hazard analysis

MSDS – material safety data sheet

PPE – personal protective equipment

RCT – radiological controls technician

RWP – radiological work permit

TSCA – toxic substances control act

WP – work package

DEFINITIONS

Analyte-Free (Deionized) Water – Tap water treated by passing through a standard deionizing resin column. It should contain no detectable heavy metals or other inorganic compounds at or above method detection limits as defined by a standard inductively coupled Argon Plasma Spectrophotometer (or equivalent) scan.

Equipment Rinsate Blank – A sample of analyte-free water poured over and/or through decontaminated sampling equipment. The purpose of the equipment rinsate blank is to assess the adequacy of the decontamination process.

MSDS/SDS – A technical bulletin that contains information about a hazardous material such as chemical composition, chemical and physical characteristics, health and safety hazards, and precautions for safe handling and use.

Nitric Acid (10%) Solution – A solution made from reagent-grade nitric acid and deionized water.

Organic-/Analyte-Free Water – Tap water treated with activated carbon and deionizing units. At a minimum, it must meet the analytical criteria of analyte-free water and should contain no detectable pesticides, herbicides, or extractable organic compounds, and no volatile organic compounds above minimum detectable levels as determined by the U.S. Environmental Protection Agency Region 4 laboratory for a given set of analyses.

PCB CSE – Any equipment to be reused that is suspected to have come in contact with PCB- labeled material and/or a PCB source 2 to 50 ppm.

Appendix A – Acronyms/Definitions (continued)

Solvent – Pesticide-grade isopropanol. Use of a solvent other than pesticide-grade isopropanol (e.g., pesticide-grade acetone, hexane, petroleum ether) for sampling equipment cleaning and decontamination purposes must be justified in the WP.

Tap Water – Water from any municipal water treatment system. Untreated potable water is not an acceptable substitute for tap water.

Appendix B – QC Data Form

QC DATA FORM

SAMPLE ID: PROJECT ID:

LCOC NUMBER:

SAMPLE DATE: SAMPLE TIME:

DI WATER SOURCE:

LOCATION OF QC SAMPLE PREPARATION:

IF Rinseate, description of equipment being deconned:

SAMPLED BY:

FIELD COMMENTS AND OBSERVATIONS:

SIGNATURE: _____ DATE: _____

Data Form Verification
SIGNATURE: _____ DATE: _____

PEMS Entry Inititals: _____ DATE: _____

QC Data Form generated from ESPEMS database

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VERIF. DATE: _____

INTIALS: _____

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CP4-ES-2704 Rev. 0	**TITLE:** Trip, Equipment, and Field Blank Preparation	Page 1 of 7
DOCUMENT CATEGORY: ☐ Administrative ☒ Technical (Operations) ☐ Technical (Support)		
LEVEL OF USE: ☐ Information Level ☒ Reference Level ☐ Continuous Use		
ENVIRONMENTAL MANAGEMENT **SUBJECT MATTER AREA:** Environmental Sampling	**WRITER:** Justin Riley, Environmental Monitoring Scientist Signature: Justin Riley Date: 4-4-16	
NUCLEAR SAFETY REVIEW DOCUMENTATION: FPDP-16-0453-D	**APPROVED BY:** Lisa Crabtree, Environmental Monitoring Program Manager Signature: Teresa Overby FOR Date: 4/4/2016	
REQUIRED REVIEW DATE: 4-4-19	**EFFECTIVE DATE:** 4-13-16	

REVISION/CHANGE LOG			
Revision/Change Letter	**Description of Changes**	**Pages Affected**	**Date of Revision/Change**
0	Initial Release	All	4-4-16

TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure describes guidelines for preparation and use of Quality Control (QC) samples including equipment rinsate blanks, field blanks, trip blanks, field duplicates, and field replicates collected during environmental sampling activities.

Environmental QC samples are used to determine the presence and concentration of contaminants resulting from field activities and to measure/control variables in sample handling.

Environmental QC samples assist in ensuring that the accuracy of analytical results are stated with a high level of confidence.

The frequency field QC samples are collected and their appropriate preservation requirements are defined by the task-specific Work Package (WP).

1.2 Scope

This procedure applies to Fluor Federal Services employees and subcontractors that perform collection of environmental QC samples at the Paducah U.S. Department of Energy Site.

2.0 REFERENCES

2.1 Use References

- CP3-WM-1037, *Generation and Temporary Storage of Waste Materials*
- CP4-ES-2700, *Logbooks and Data Forms*
- CP4-ES-2708, *Chain of Custody (COC) Forms, Field Sample Logs, Sample Labels and Custody Seals*
- Job Hazard Analysis (JHA) 11055, *Sample Bottle Preparation and Preservation.*

2.2 Source References

U.S. Environmental Protection Agency, November 2001, *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual.* Region 4, Environmental Compliance Branch, Athens, GA.

3.0 COMMITMENTS

None

4.0 PRECAUTIONS AND LIMITATIONS

4.1 Precautions

None

4.2 Limitations

Ensure only new and certified pre-cleaned sample containers are used for each sampling event.

5.0 PREREQUISITES

5.1 Review the WP for the sampling methods, equipment to be used, and number of QC samples to be collected.

5.2 Review JHA-11055, *Sample Bottle Preparation and Preservation.*

5.3 Label sample containers with known information before collection of the sample according to CP4-ES-2708, *Chain-of-Custody Forms, Field Sample Logs, Sample Labels, and Custody Seals.*

6.0 INSTRUCTIONS

6.1 Preparation of Equipment Rinsate Blanks

Sampler

NOTE:

Equipment rinsate blanks are required only when non-disposable or non-dedicated sampling equipment is being used.

6.1.1 Collect the number and type of QC samples as specified in the task-specific WP.

6.1.2 Prepare QC blank samples of peristaltic pump tubing by pumping analyte-free or organic-free water directly from the analyte-free water bottle, through the decontaminated tubing, and into the appropriate sample bottles.

6.1.3 Prepare QC blank samples of submersible pumps by pouring analyte-free or organic-free water into a clean container and pump water from the container through the decontaminated hose and into the appropriate sample bottles.

NOTE:

It may be necessary to add water to the pipe during pumping.

6.1.4 Prepare QC blank samples of bladder pumps by pumping analyte-free or organic-free water from a 3 meter length of at least 10 centimeter diameter clean pipe sealed at one end, or other container specified in the WP through the pump and into the sample bottles.

6.1.5 Prepare QC blank samples of miscellaneous sampling equipment and devices by pouring analyte-free or organic-free water over or through the decontaminated sample collection equipment or device and into the sample bottles.

6.2 Preparation of Field Blanks

NOTES:

Field blanks are collected in dusty environments and/or from areas where volatile organic contaminates are present in the atmosphere and originating from a source other than the media being sampled.

For groundwater monitoring, organic-free means American Society for Testing and Materials (ASTM) Type-II water or a documented equivalent.

6.2.1 Transport analyte-free or organic-free water to the field in a sealed container.

6.2.2 Open the container of analyte-free or organic-free water in the field near the sampling location **and** pour the field blank into the appropriate sample bottles.

6.3 Preparation of Field Duplicate Samples

NOTES:

Field duplicate samples are collected at the same time, using the same procedures, the same type of equipment, and in the same types of containers as the original samples.

Duplicate samples are also preserved in the same manner and submitted for the same analyses as the required samples.

6.3.1 Collect duplicate sample material using the same procedural requirements as the original sample.

6.3.2 Place samples in separate, but identical sample containers for analysis.

6.4 Preparation of Field Replicate Samples

NOTES:

Replicate samples may also be referred to as Split samples.

6.4.1 Collect sufficient sample volume in order to meet the volume needed to fill two sets of bottles for all analyses being conducted.

NOTE:

Samples for volatile organic compounds (VOCs) are not mixed prior to subsampling.

6.4.2 Mix the collected sample material to ensure the sample is homogeneous.

6.4.3 Place sample material in separate, but identical sample containers for analysis.

6.4.4 Designate the original sample and the replicate sample on the sample labels and sample data forms or logbooks.

6.5 Preparation of Trip Blank Samples

NOTES:

Trip Blanks are used when collecting environmental samples for VOCs.

Trip Blanks may be required when collecting environmental samples for Tritium analysis.

Unless specified otherwise in the site-specific sampling plan, aqueous Trip Blanks are used for either liquid or solid environmental samples.

6.5.1 Prepare 2 or 3 Trip Blank vials of organic-free water with the appropriate preservative.

6.5.2 Place a set of Trip Blank vials in each cooler used to contain VOC samples.

6.5.3 Ensure the Trip Blank vials remain unopened and are kept with the investigative samples they represent from the field to the laboratory.

7.0 ACCEPTANCE CRITERIA

None

8.0 POST PERFORMANCE WORK ACTIVITIES

8.1 Record any remaining information on the sample label.

8.2 Record all QC sample collection activities according to CP4-ES-2700, *Logbooks and Data Forms.*

8.3 As necessary, request survey of sample containers from radiological areas.

8.4 Seal sample containers **and** affix custody seals according to CP4-ES-2708, *Chain-of-Custody Forms, Field Sample Logs, Sample Labels, and Custody Seals.*

8.5 Store sample containers in a cooler with ice or blue ice to maintain the preservation temperature as required.

8.6 Manage waste generated during sampling activities according to CP3-WM-1037, *Generation and Temporary Storage of Waste Materials.*

8.7 Complete COC forms according to CP4-ES-2708, *Chain-of-Custody Forms, Field Sample Logs, Sample Labels, and Custody.*

8.8 Release samples and related COC documentation for shipment to an off-site laboratory **or** deliver to the on-site laboratory.

9.0 RECORDS

9.1 Records Generated

The following records may be generated by this procedure:

- Field Logbook Entries
- Data Form Entries

9.2 Records Disposition

The records are to be maintained according to CP3-RD-0010, *Records Management Process.*

Appendix A – Acronyms/Definitions

ACRONYMS

ASTM – American Society for Testing and Materials

COC – Chain of Custody

JHA – Job Hazard Analysis

QC – Quality Control

VOC – Volatile Organic Compounds

WP – Work Package

DEFINITIONS

Equipment Rinsate Blank – Equipment rinsate blanks are prepared in the field using analyte-free or organic-free water as required by the task-specific WP. These samples are used to determine if contaminants have been introduced by contact of the sample medium with contaminated sampling equipment. This serves as a QC check on the cleanliness of the sampling device and, therefore, the equipment decontamination process.

Field Blank - Field blanks are prepared at the sample site using analyte-free or organic-free water, or other acceptable material as required by the task-specific WP. Field blanks are used to evaluate the potential for contamination of a sample by ambient site contaminants from a source not associated with the media being sampled (e.g., air-borne fugitive dust or organic vapors).

Field Duplicate – Field duplicate samples are collected at the same time, using the same procedures, the same type of equipment, and in the same types of sample containers as the original samples. Duplicate samples are also be preserved in the same manner and submitted for the same analyses as the required samples. Data from duplicate sample may be used to assess sampling variability.

Field Replicate - Replicate samples are collected by initially collecting twice as much volume as is normally collected. The material is distributed, after mixing, if appropriate, into two sets of sample containers. Both sets of containers will be submitted for analyses with one set designated as an original sample, the other designated as a "replicate sample." Data from replicate samples may be used to assess sample handling variability and or analytical variability.

Trip Blank - Trip Blanks are used to determine if samples for VOC analysis are contaminated during storage and/or transportation to the laboratory. Each set of 2 or 3 vials is one Trip Blank sample.

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CP4-ES-2708 **Rev. 0**	**TITLE:** Chain-of- Custody Forms, Field Sample Logs, Sample Labels, and Custody Seals	Page 1 of 14

DOCUMENT CATEGORY: ☐ Administrative ☐ Technical (Operations) ☒ Technical (Support)

LEVEL OF USE: ☒ Information Level ☐ Reference Level ☐ Continuous Use

ENVIRONMENTAL MANAGEMENT **SUBJECT MATTER AREA:** Sampling	**WRITER:** Traci Curry, Scientist Signature: Traci Curry Date: 4/11/14
NUCLEAR SAFETY REVIEW DOCUMENTATION: FPDP-16-0469-D	**APPROVED BY:** Lisa Crabtree, Environmental Monitoring Manager Signature: Lisa Crabtree Date: 4/11/16
REQUIRED REVIEW DATE: 4/11/19	**EFFECTIVE DATE:** 4/14/16

REVISION/CHANGE LOG

Revision/Change Letter	Description of Changes	Pages Affected	Date of Revision/Change
0	Initial Release	ALL	4/11/~~19~~ 16 TC 4/12/16

TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE

1.1 Purpose

The purpose of this procedure is to describe the use of chain-of-custody (COC) forms to track samples and ensure the integrity of those samples by documenting possession of transfers from the time of collection to acceptance by the designated laboratory. It includes requirements for the generation, use, and completion of COC forms, sample labels, and custody seals.

1.2 Scope

This procedure applies to all sampling and analysis activities performed by Fluor Paducah Deactivation Project (FPDP) personnel and subcontractors at the U.S. Department of Energy (DOE)-owned Paducah site.

Independent samples for on-site laboratory processes are obtained and processed according to CP4-ES-0012, *Independent Sampling and Analysis*.

2.0 REFERENCES

2.1 Use References

- CP3-ES-1034, *Nuclear Criticality Safety Requirements for Sample Labeling, Handling and Assay Smears*
- CP3-WM-0015, *Management of Fissile Waste Materials*
- CP4-ES-0012, *Independent Sampling and Analysis*
- CP4-ES-2700, *Logbooks and Data Forms*

2.2 Source References

- U.S. Environmental Protection Agency, November 2001. *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*, Section 3.5, Region 4, Environmental Compliance Branch, Athens, GA

3.0 COMMITMENTS

None

4.0 PRECAUTIONS AND LIMITATIONS

4.1 Precautions

None

4.2 Limitations

4.2.1 Record entries on the COC form **and** sample labels using black indelible ink.

4.2.2 Do **NOT** erase, alter, or render illegible entry errors on the COC form and sample label.

4.2.3 Do **NOT** use correction tape or white-out to correct entry errors.

4.2.4 Draw a single line through the entry to void entry error.

4.2.5 Initial **and** date the correction.

5.0 PREREQUISITES

None

6.0 INSTRUCTIONS

6.1 Chain-of-Custody Form Generation

SMO

NOTE:

A separate COC form is used for each laboratory that will perform sample analysis.

6.1.1 Generate COC forms from the Paducah Project Environmental Measurements System (PEMS).

6.1.2 **If** Paducah PEMS database is not accessible, **then** generate COC number and form CP4-ES-2708-F01, *Sample Chain-of-Custody Record.*

6.2 Chain-of-Custody Form Completion

Sampler

6.2.1 Record date **and** time of sample collection using military time.

6.2.2 Record sampler's initials.

6.2.3 **If** required, **then** record volume of sample collected.

6.2.4 **If** necessary, **then** record any relevant comments.

6.2.5 **If** an ad hoc sample is collected in the field, **then** record required information on CP4-ES-2708-F01, *Sample Chain-of-Custody Record* form and on CP4-ES-2708-F02, *Blank Sample Data Form* or in field logbook according to CP4-ES-2700, *Logbooks and Data Forms*.

6.2.6 **If** samples are **NOT** collected, **then** draw a "Z" line through the Paducah PEMS- generated COC form.

A. Initial **and** date the "Z" line.

NOTE:

Explanation for uncollected sample must be more descriptive than "not collected" or "not needed" or "could not collect."

Acceptable explanations must state why the sample was not collected, why the sample was not needed, or why the sample could not be collected.

Examples of acceptable explanations are as follows:

- Not collected due to poor recovery from the boring.
- Not needed because sample is a matrix spike.
- Could not be collected because the well was dry.

B. Record explanation for why sample was not collected.

6.3 Sample Label Generation

NOTE:

Sample labels are required to provide identification of samples collected for analysis at laboratories.

When *in situ* measurements are taken, data should be recorded directly on CP4-ES-2708-F02, *Blank Sample Data Form* or in field log book at the time of sample collection, along with any identifying information and field observations.

SMO

6.3.1 Generate sample labels from the Paducah PEMS database.

6.3.2 **If** Paducah PEMS database is not accessible, **then** obtain a preprinted sample label provided with the bottle and record required information.

6.4 Sample Label Completion

Sampler

NOTE:

If feasible, sample containers should be labeled prior to collection of the sample.

6.4.1 Apply sample label to sample container.

NOTE:

All entries on sample labels should be made using black indelible ink.

6.4.2 Record following information on the sample label at the time of sample collection:

- Name or sampler's initials.
- Date **and** time (military time) of sample collection.

6.4.3 **If** an ad hoc sample is collected in the field, **then** record all of the required information on a preprinted sample label.

6.5 Special Sample Labels Required

Sampler

NOTE:

Waste Management Group should be contacted for guidance regarding any samples that may require special labeling.

Appropriate labels are applied based on process knowledge, source, or waste container labeling.

6.5.1 **If** samples to be collected contain material that exhibit any characteristic of hazardous waste such as ignitability, corrosivity, reactivity, toxicity, or are from a known or suspected asbestos or PCB source, **then** contact Waste Management for guidance for special labeling.

NOTE:

SMO should be contacted for guidance if it is unknown whether samples are potentially fissile (PF) or Nuclear Criticality Safety (NCS) Exempt.

6.5.2 **If** samples to be collected are PF, **then** label, handle, store and transport according to CP3-ES-1034, *Nuclear Criticality Safety Requirements for Sample Labeling, Handling and Assay Smears*.

6.6 Positive Control

NOTE:

"Positive control" requires one or more of the following:

- Physical possession
- Visual control/oversight
- Secured storage (i.e., lock and key) that only personnel authorized to handle the samples and COC forms can obtain keys to access
- Located in a secure area, with access to that area restricted to personnel authorized to handle the samples and COC forms

Ensure "positive control" of samples and COC forms is kept from the time of collection until transfer to another custodian.

6.7 Custody Seals

NOTE:

Custody seals include tape-like seals, tamper-indicating tape, and tamper-indicating devices that must be broken or removed to open the container after they are applied.

Custody seals are used to guard against tampering and as a means to observe visually if tampering has occurred.

Custody seals are **NOT** required for samples that are kept under positive control from the time of collection until the samples are delivered to the laboratory for analysis.

6.7.1 **If** an automatic composite sampler is used, **then** ensure sampler is secured with a custody seal or padlock to control access to the sample during collection.

6.7.2 **If** the samples are going to be shipped or cannot be kept under positive control, **then** apply custody seal.

- **If** an adhesive backed custody seal is used, **then** sign **and** date the custody seal.
- **If** a zip tie style (or similar) band tamper- indicating device is used, **then** record the unique identification number (s) on the COC and on the sample data form or in the logbook.

NOTE:

Attach custody seal so that the seal must be broken or removed to open the container.

6.7.3 Attach the seal or tamper-indicating device to the container across the opening (s).

6.7.4 **If** a sample or shipping container must be opened as part of the sampling or shipping process (e.g., filtering a sample, adding additional ice to a composite sampler, adding additional materials to a shipping container), **then** apply a new custody seal.

6.7.5 Record the action on the COC **and** on the sample data form or in the logbook.

6.8 Custody Transfer

Sampler/Scientist

6.8.1 **If** relinquishing sample, **then** ensure completeness of COC records.

NOTE:

Transfer of samples between field personnel in the same work group or between lab personnel in the same work group does **NOT** need to be documented on the COC form.

6.8.2 Sign the COC form as "relinquished by" **and** enter date and time.

6.8.3 **If** receiving sample, **then** verify sample container integrity **and** completeness of the COC form.

6.8.4 Sign the COC form as "received by" **and** enter date and time of receipt.

NOTE:

If the samples are shipped off-site, **then** the date/time will **NOT** be the same for the relinquished and received signatures.

6.8.5 **If** custody is transferred directly to another person, **then** the date/time will be the same for both the relinquished and received signatures.

6.9 On-site Laboratory Analysis

Sampler

NOTE:

Completed COC will be forwarded with analytical results to the Sample Management Office (SMO).

Transfer the samples and the original COC forms to the laboratory scientist.

6.10 Off-site Laboratory Analysis

Sampler

NOTE:

Common carriers (e.g., Federal Express) are **NOT** required to sign the COC form.

When samples are shipped to an off-site laboratory for analysis, the COC form is signed by the laboratory Sample Custodian upon receipt at the laboratory.

6.10.1 **If** the samples require off-site shipment, **then** place the original COC form in a watertight bag **and** secure the bag inside the shipping container.

6.10.2 Ensure the custody seals are applied to the containers.

6.10.3 Process the off-site shipment according to the applicable Department of Transportation regulations.

NOTE:

Completed COC will be forwarded with analytical results to the SMO.

7.0 ACCEPTANCE CRITERIA

None

8.0 POST PERFORMANCE WORK ACTIVITIES

None

9.0 RECORDS

9.1 Records Generated

The following records may be generated by this procedure:

COC form

9.2 Records Disposition

The records are to be maintained according to CP3-RD-0010, *Records Management Process*.

Appendix A – Acronyms/Definitions

ACRONYMS

COC - Chain-of-Custody

DOE – United States Department of Energy

FPDP – Fluor Paducah Deactivation Project

NCS – Nuclear Criticality Safety

PEMS – Project Environmental Measurements System

PF – Potentially Fissile

SMO – Sample Management Office

DEFINITIONS

Ad Hoc Sample – Unplanned sample.

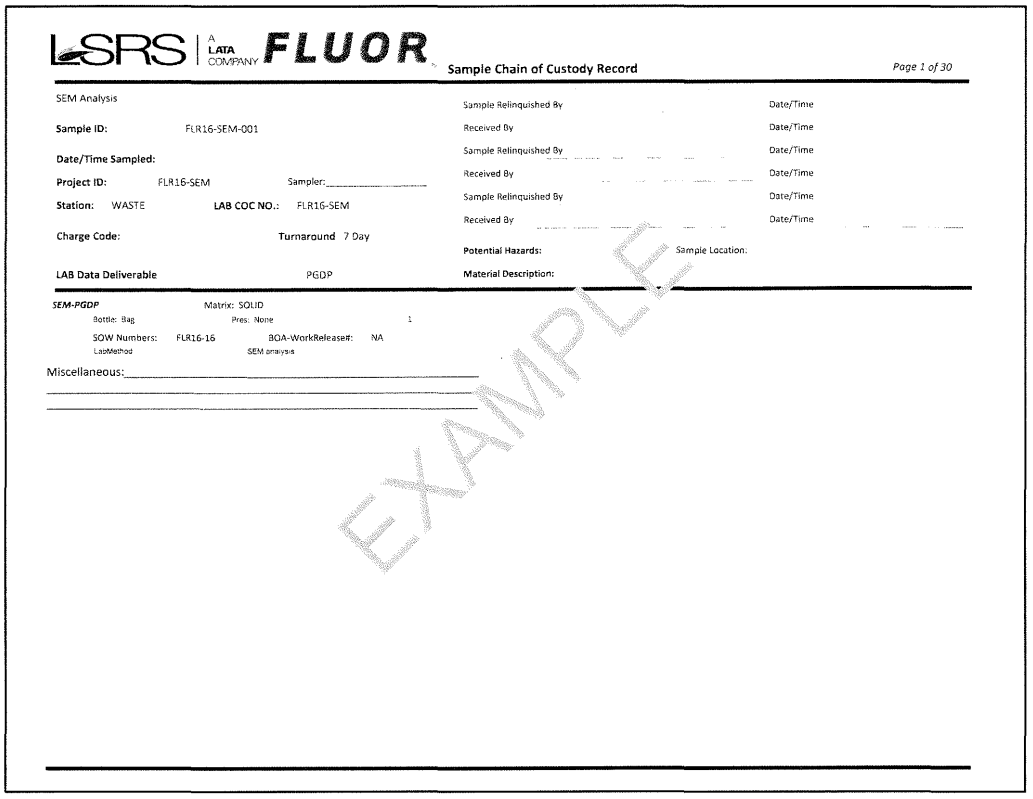
Chain-of-Custody – A process used to document the transfer of custody of samples from one individual to another from the time of collection until final disposition.

Custody – That process of assuring positive control of a sample's integrity from the time of collection to receipt by the laboratory that will analyze the sample and sometimes until the sample is disposed. Documentation of COC is accomplished by using a COC form.

Custody Seals – A tape-like seal, tamper-indicating tape, or tamper-indicating device that must be broken or removed to open the container after it has been affixed. Custody seals are used to guard against tampering and as a means to observe visually if tampering has occurred.

In-Situ Measurements – Field measurements of sample characteristics taken and recorded at the time of sampling. Examples of *in-situ* measurements include pH, temperature, dissolved oxygen, conductivity, and flow measurement.

Appendix B – PEMS-Generated Sample Chain-of-Custody Record



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Sample Chain of Custody Record

Page 1 of 30

SEM Analysis

Sample ID: FLR16-SEM-001

Date/Time Sampled:

Project ID: FLR16-SEM Sampler:_____

Station: WASTE **LAB COC NO.:** FLR16-SEM

Charge Code: **Turnaround** 7 Day

LAB Data Deliverable PGDP

Sample Relinquished By Date/Time

Received By Date/Time

Sample Relinquished By Date/Time

Received By Date/Time

Sample Relinquished By Date/Time

Received By Date/Time

Potential Hazards: Sample Location:

Material Description:

SEM-PGDP Matrix: SOLID

Bottle: Bag Pres: None 1

SOW Numbers: FLR16-16 BOA-WorkRelease#: NA

LabMethod SEM analysis

Miscellaneous:_____

EXAMPLE

Appendix C – Sample Chain-of-Custody Record

Sample Chain of Custody Record *Page ____ of ____*

Department of Energy Sampling
Sample ID: _____
Date/Time Sampled: _____
Project ID: _____
Station: _____
COC NO.: _____
Lab Code: _____

Chain of Custody
Sample Relinquished By: _____ Date/Time: _____
Received By: _____ Date/Time: _____
Sample Relinquished By: _____ Date/Time: _____
Received By: _____ Date/Time: _____
Sample Relinquished By: _____ Date/Time: _____
Received By: _____ Date/Time: _____

COC Relinquished By: _____ Date/Time: _____
Received By: _____ Date/Time: _____

Bottle: _____
Parameters: _____

Bottle: _____
Parameters: _____

Bottle: _____
Parameters: _____

Bottle: _____
Parameters: _____

Bottle: _____
Parameters: _____

Bottle: _____
Parameters: _____

Appendix D - Directions for Completing a Blank Chain-of-Custody Form

Most of the information needed below can be obtained from the SMO if it is not already known.

Sampling Description – Describe what is being sampled (e.g., asbestos sampling for doors in tank farm area).

Sample ID – Enter the unique sample ID number (e.g., DD06ASBDR-001D).

Date/Time Sampled – Enter the date and time that the sample was collected (e.g., 07/06/06 / 1245).

Project ID – Enter the Project ID for the sample (e.g., DD06-ASBDR).

Sampler – Enter the initials of the person who collected the sample.

Station – Enter the identifying location/station number (e.g., AHV14, MW389, WASTE, etc.).

Laboratory – Enter the Laboratory that will analyze the sample (e.g., PGDP, GEL, TALMO, etc.)

Lab COC No. – Enter the Lab COC No. (e.g., DD06-ASBDR).

Turnaround – Enter the turn-around time for the sample analysis (e.g., 14 days, 28 days, etc.).

Analysis Requested – Enter the analysis paragroup ID for the analysis that the lab will perform (e.g., DD-ASBESTOS, NEW-TC-99-PGDP, etc.).

Matrix Code – Enter the matrix code for the material being sampled from the list below.

MATRIX CODE	DESCRIPTION
AIR	Air
FILTER	Filter
GAS	Identifiable non-air gas, or unidentifiable gas
LIQUID	Identifiable non-water liquid, or unidentifiable liquid
OIL	Oil
SE	Sediment
SLUDGE	Sludge
SOIL	Soil
SOLID	Identifiable non-soil solid, or unidentifiable solid
TISSUE	Tissue
WATER	Water (QC)
WG	Groundwater

Appendix D - Directions for Completing a Blank Chain-of-Custody Form (Continued)

MATRIX CODE	DESCRIPTION
WIPE	Wipe
WS	Surface Water
WW	Waste Water

Bottle Type – Enter the type of bottle that will be used for the sample (e.g., wide-mouth glass).

Bottle Size – Enter the size of bottle that will be used for the sample (e.g., 2 ounce).

No. of Bottles – Enter the number of bottle that will be collected (e.g., 3).

SOW No. - Enter the SOW number for the sample (e.g., DD06-39).

Preservatives – Enter the type of preservative used for the sample (e.g., None, HCL pH<2, 4°C, etc.).

Sample Type – Enter the sample type for the sample from the list below.

SAMPLE TYPE	DESCRIPTION
FB	Field Blank - a sample that is prepared in the field to evaluate the potential for contamination of a sample by site contaminants from a source not associated with the sample collected.
FR	Field Duplicate - two or more samples collected at the same sampling location either side-by-side or one immediately following the other.
FTB	Filter Blank - analyte-free water passed through a filter and collected in a sample container.
REG	Regular - primary sample collected for analysis.
RB	Refrigerator Blank - analyte-free water that is used to detect any cross-contamination of samples stored in the laboratory refrigerator.
RI	QC Equipment Rinsate/Decontamination - a sample collected using analyte-free water which has been run over/through sample collection equipment used to determine if contaminants have been introduced by contact of the sample medium with sampling equipment.
TB	Trip Blank - a sample which is prepared prior to the sampling event and is stored with the investigative samples throughout the sampling event used to determine if samples were contaminated during storage and/or transportation to the laboratory.

Miscellaneous – Enter any other important information or comments regarding the sample.

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CP4-ES-5004 Rev. 0A	TITLE: Sample Tracking, Lab Coordination, and Sample Handling	Page 1 of 10

DOCUMENT CATEGORY: ☒ Administrative ☐ Technical

LEVEL OF USE: ☒ Information Level ☐ Reference Level ☐ Continuous Use

FUNCTIONAL AREA: Environmental Monitoring **SUBJECT MATTER AREA:** Environmental Monitoring/Sampling	**SUBJECT MATTER EXPERT:** Lisa Crabtree, Environmental Monitoring Manager
NUCLEAR SAFETY REVIEW DOCUMENTATION: FPDP-17-0443-S	**APPROVED BY/DATE** (Signature on file): Lisa Crabtree, Environmental Monitoring Manager Lisa Crabtree 8/22/17
REQUIRED REVIEW DATE (or expiration date for temporary change): 4/11/19	**EFFECTIVE DATE:** 8/24/17

REVISION/CHANGE LOG

Revision/Change Letter	Description of Changes	Pages Affected	Date of Revision/Change
0	Initial Release	ALL	4/11/16
0A	Added steps under 6.1.7 to ensure special instructions are included on the SOW for the C-712 Neutralization Pit. Added NCSE to references and added NCSE stamp. Updated cover page to correct template.	3,5,6	8/22/17

TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure describes the process for coordinating analytical services, sample collection and analysis, tracking sample shipment and analysis, maintaining a repository of sample data records, and use of Project Environmental Measurements System (PEMS).

1.2 Scope

This procedure applies to all sampling and analysis activities performed by Fluor Federal Services, Inc. Paducah Deactivation Project (FPDP) personnel and subcontractors at the United States Department of Energy (DOE)-owned Paducah site.

2.0 REFERENCES

2.1 Use References

- CP3-ES-5003, *Quality Assured Data*
- CP3-WM-1037, *Generation and Temporary Storage of Waste Material*
- CP3-WM-3015, *Waste Packaging*
- CP3-WM-9503, *Off-Site Shipments by Air Transport*
- CP4-ER-0012, *Groundwater Acceptance at the C-612 Northwest Plume Groundwater System*
- CP4-ES-2700, *Logbooks and Data Forms*
- CP4-ES-2708, *Chain-of-Custody Forms, Field Sample Logs, Sample Labels, and Custody Seals*

2.2 Source References

- BJC/PAD-141, *Paducah Gaseous Diffusion Plant, Department of Energy National Emission Standards for Hazardous Air Pollutants (NESHAP) Management Plan*
- CP2-ES-0006, *Environmental Monitoring Plan Fiscal Year 2016 Paducah Gaseous Diffusion Plant, Paducah, Kentucky*
- CP2-ES-0103, *Environmental Radiation Protection Program*
- CP2-SM-0017, *Measuring and Test Equipment Program*
- CP3-ES-1034, *Nuclear Criticality Safety Requirements for Sample Labeling, Handling and Assay Smears*
- CP3-WM-1036, *Nuclear Criticality Safety Implementation Requirements for Handling and Storage of Fissile Waste*
- CP4-ES-0043, *Temperature Control for Sample Storage*
- CP4-ES-2704, *Trip, Equipment and Field Blank Preparation*
- Federal Register, 40 Code of Federal Regulations Part 136.3
- NCSE 058, *Nuclear Criticality Safety Evaluation for the Drain System in the C-710 Facility at the Paducah Gaseous Diffusion Plant*

Chg A

3.0 COMMITMENTS

None

4.0 RESPONSIBILITIES

4.1 Project Manager

Coordinates sample collection, sample analysis, data assessment, and decision- making. Project manager has ultimate responsibility but designated representative may include the following:

- Technical lead
- Risk assessor
- Waste management coordinator
- Compliance coordinator
- Individual that needs data to support decision- making

4.2 QA Reviewer

Reviews data to ensure that data quality requirements are met.

4.3 Sampler

4.3.1 Ensures collection and delivery of samples to appropriate laboratory.

4.3.2 Ensures that field records (field logbook and/or sample data forms, and chain-of-custody [COC] records) are complete.

4.3.3 Communicates final disposition of "hold samples" or returned samples to the Sample Management Office.

4.4 Sample Management Office (SMO)

4.4.1 Ensures long-term electronic storage of data.

4.4.2 Performs loading of Electronic Data Deliverables (EDDs).

4.4.3 Performs electronic verification of data.

4.4.4 Ensures compliance with applicable Data Management Implementation Plan.

4.4.5 Maintains tracking system for samples.

4.5 Scientist

4.5.1 Serves as the primary contact for all matters relating to the analytical laboratories.

4.5.2 Creates statements of work (SOW).

4.5.3 Contracts laboratory services.

4.5.4 Performs contractual screenings.

5.0 GENERAL INFORMATION

None

6.0 INSTRUCTIONS

6.1 Sample Collection, Sample Shipment, and Sample Receipts

Project Manager

6.1.1 Provide the SMO with analytical requests using an appropriate template (Quality Assurance Project Plan, Sample Analysis Plan, Sample Request Form, or email containing pertinent information related to sampling analyses and requirements).

6.1.2 Instruct personnel that questions relating to sample results and sample material should be vetted through the SMO.

6.1.3 Ensure that CP3-ES-5003, *Quality Assured Data*, is followed throughout the sample collection process to ensure data quality.

Scientist

6.1.4 Establish Paducah PEMS for use during sample collection, if applicable.

6.1.5 Log the project into the Paducah Analytical Project Tracking System.

6.1.6 Prepare the laboratory SOW based on analytical request received from Project Manager.

NCSE 058

6.1.7 **If** preparing an SOW for the C-712 Neutralization Pit, **then** ensure the following is included in the SOW:

A. **If** samples contain water and sediment **then**;

1. Allow water and sediment to settle for 24 hrs.

2. After sediment has settled; decant free-flowing water.

3. Transfer sediment and any remaining liquid to a graduated cylinder.

4. Allow sediment to settle for approximately 30 minutes.

5. Record the volume of the sediment.

6. Adjust to desired volume in graduated cylinder.

7. Transfer contents of graduated cylinder to new sample container.

8. Analyze sediment material.

9. Report results in grams Uranium per Liter (gU/L) for the total volume of sediment in step **6.1.7.5.**

Chg A

B. **If** samples do not contain sediment **then**;

1. Analyze sample.

2. Report results in grams Uranium per Liter (gU/L) for the total sample.

C. **If** any sample has concentration > **5 gU/L**, **then** notify SMO immediately.

Chg A

6.1.8 Determine the analytical laboratory to be used.

6.1.9 Provide SOW to laboratory for review and approval.

6.1.10 Provide additional information requested by the laboratory, if applicable.

6.1.11 Request the sample container and preservative requirements from laboratory.

6.1.12 Request sample containers with appropriate preservatives to be shipped from laboratory.

6.1.13 Specify the quality control (QC) samples (such as trip blank, field blanks, equipment rinsates, or field duplicates) that are identified by using CP3-ES-5003, *Quality Assured Data*.

Sampler

6.1.14 Develop sampling schedule and train staff on proper procedures for sample identification, custody, and labeling.

NOTE:

Deactivated chains for "hold samples" are to document the disposal path for the sample.

6.1.15 Ensure that COC forms for samples, including "hold samples", are properly completed (or deactivated) according to CP4-ES-2708, *Chain-of-Custody Forms, Field Sample Logs, Sample Labels, and Custody Seals.*

6.1.16 Ensure that logbooks and/or sample data forms are properly completed according to CP4-ES-2700, *Logbooks and Data Forms*.

NOTE:

Proper radioactive screening tests and U.S. Department of Transportation approvals may be required prior to shipping samples off-site.

6.1.17 **If** applicable, **then** coordinate shipment or delivery of samples to the appropriate laboratory in accordance with CP3-WM-9503, *Off-site Shipments by Air Transport*.

6.1.18 Retain any samples that are collected and not submitted to a laboratory ("hold samples") using proper preservation and storage conditions until notified by the SMO for decision on additional analysis.

NOTE:

Samples are not considered or managed as waste by way of a RCRA exemption until determined to be no longer needed.

A disposal path for "hold samples" is required in advance to ensure that samples are managed quickly and compliantly.

6.1.19 Consult with Waste Engineer and/or regulatory compliance for proper waste disposal/storage of "hold samples" in advance to establish a proper disposal path.

6.1.20 **If** "hold samples" are no longer needed, **then** dispose of "hold samples" in accordance with regulatory compliance guidelines and/or existing procedures (CP4-ER-0012, *Groundwater Acceptance at the C-612 Northwest Plume Groundwater System*).

Scientist

6.1.21 Ensure the laboratory received the samples.

6.1.22 Log the date that the sample was received by the laboratory into Paducah PEMS.

6.1.23 Track the receipt of electronic data deliverables and laboratory data packages.

6.1.24 Perform contractual screening on all deliverables.

6.1.25 **If** validation is required, **then** prepare a validation SOW **and** send laboratory data packages to the data validator.

6.1.26 Provide the data assessment package to the data reviewer, in order to perform data assessment.

QA Reviewer

6.1.27 Perform a Quality Assurance review on data assessment packages as required.

Data Entry Specialist/Scientist

6.1.28 Ensure all comments or issues have been resolved.

6.1.29 Electronically load analytical data from Paducah PEMS database into Paducah Oak Ridge Environmental Information System (OREIS).

6.1.30 Ensure all applicable emails **and** required forms are included in the data assessment package.

6.1.31 Submit completed data assessment package and applicable laboratory data packages to Records Management.

Sample Management Office

6.1.32 Utilize a tracking system to denote if a sample is to be disposed by the laboratory **or** if the sample is to be returned to FPDP.

6.1.33 Provide the Project Manager, the Samplers, and the Waste Disposition and Generator Services Manager with a listing of samples to be returned.

6.1.34 **If** the project is considered closed, **then** notify Waste Disposition and Generator Services Manager.

NOTE:

Approval is to be obtained by Project Manager, Samplers, and Waste Disposition and Generator Services Manager before samples can be returned.

6.1.35 Notify the laboratory that samples are ready for return.

Sampler

NOTE:

Upon return of samples, samples will be managed as waste by the Project Manager in accordance with CP3-WM-1037, *Generation and Temporary Storage of Waste Material* and CP3-WM-3015, *Waste Packaging*.

Samples shipped to a laboratory are **NOT** candidates for RCRA waste consideration via an exemption.

A disposal path for samples returning from the lab is required in advance to ensure that samples are managed quickly and compliantly.

6.1.36 Receive the sample shipment **and** notify Project Manager.

6.1.37 **If** project is closed, **then** notify Waste Disposition and Generator Services Manager.

6.1.38 Notify SMO of the sample receipt **and** final disposition of the samples.

Sample Management Office

6.1.39 Document in the tracking system that samples have been received from the laboratory **and** applicable disposition information.

6.1.40 Confirm that all samples associated with the project have been denoted in the tracking system as follows:

- Disposed and/or consumed by the laboratory
- Disposed by FPDP as a returned sample
- Disposed by FPDP as a "hold sample"

7.0 RECORDS

7.1 Records Generated

The following records may be generated by this procedure:

- COC forms
- Logbooks and/or sample data forms
- Data assessment packages
- Laboratory data packages

7.2 Records Disposition

The records are to be maintained in accordance with CP3-RD-0010, *Records Management Process*.

Appendix A – Acronyms/Definitions

ACRONYMS

COC – chain of custody

DOE – United States Department of Energy

EDD – electronic data deliverable

FPDP – Fluor Federal Services, Inc., Paducah Deactivation Project

OREIS – Paducah Oak Ridge Environmental Information System

PEMS – Project Environmental Measurements System

QC- quality control

SMO – sample management office

SOW – statement of work

DEFINITIONS

Contractual Screening – A process of evaluating a set of data against the requirements specified in the SOW to ensure that all requested information is received. The contractual screening includes, but is **NOT** limited to, the COC, analytes requested, method used, electronic data deliverables, units, holding times, and reporting limits achieved.

Hold Samples – Samples that are collected for the purpose of potential analysis, generally dependent upon the results of a preceding screening sample. Hold Samples are collected and retained using proper preservation and are tracked in Paducah PEMS as any other active sample unless disposed.

Paducah Analytical Project Tracking System – A Paducah system developed to track sampling requests and projects by assigning either a system generated project number for some programs or allowing the user to assign a unique project number. The system is maintained by the SMO to track various information about the event such as the charge number, sampling time frame, status,etc.

Paducah PEMS – The data management system that supports the project's sampling and data management activities. The system generates COC forms, bottle labels, and field forms; tracks sampling progress, and stores project specific data.

WORKING COPY

VERIF. DATE: _____

INTIALS: _____

FLUOR®

Fluor Federal Services, Inc. Paducah Deactivation Project

CP4-ES-5007 **Rev. 0**	**TITLE:** Data Management Coordination	Page 1 of 7

DOCUMENT CATEGORY: ☒ Administrative ☐ Technical (Operations) ☐ Technical (Support)

LEVEL OF USE: ☒ Information Level ☐ Reference Level ☐ Continuous Use

ENVIRONMENTAL MANAGEMENT **SUBJECT MATTER AREA:** Sample Management Office	**WRITER:** Lisa Williams, Scientist Signature: [signature] Date: 4/11/16
NUCLEAR SAFETY REVIEW DOCUMENTATION: FPDP-16-0454-D	**APPROVED BY:** Lisa Crabtree, Environmental Monitoring Manager Signature: [signature] Date: 4/11/16
REQUIRED REVIEW DATE: 4/11/19	**EFFECTIVE DATE:** 4/12/16

REVISION/CHANGE LOG

Revision/Change Letter	Description of Changes	Pages Affected	Date of Revision/Change
0	Initial release	All	4/11/16

TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure describes data management coordination activities performed to organize and maintain the integrity of data generated at the Paducah site.

1.2 Scope

This procedure describes the process of gaining access to the Environmental databases [Paducah Oak Ridge Environmental Information System (OREIS) and Project Environmental Measurements System (PEMS)] as well as coordination activities performed by the various groups responsible for data management activities at the Paducah site.

2.0 REFERENCES

- Use ReferencesCP3-ES-5003, *Quality Assured Data*
- CP3-ES-5004, *Sample Tracking, Laboratory Coordination, and Sample Handling Guidance*

2.1 Source References

None

3.0 COMMITMENTS

None

4.0 RESPONSIBILITIES

4.1 Requester/Project Manager

Submits request for project sample data from the environmental databases (Paducah OREIS and PEMS).

4.2 Environmental Monitoring Project Manager/Data Entry Specialist

Manages the long-term electronic storage of data, loading data to Paducah OREIS, and ensures compliance to the Paducah Data Management Policy.

4.3 Scientist/Data Entry Specialist

Assists the project in populating PEMS. Manages loading electronic data deliverables, electronic verification of data and tracks the data assessment process. Interfaces with the project for activities relating to data.

4.4 Data Reviewer

Performs data assessment and determines if the data was generated according to this procedure.

5.0 GENERAL INFORMATION

None

6.0 INSTRUCTIONS

6.1 Obtaining Access to the Environmental Databases

NOTE:

A potential user must have a network account to be able to directly access the environmental databases.

Requester

6.1.1 Send request for access to the environmental databases to the Environmental Monitoring Project Manager. Request can be verbal or via e-mail.

Environmental Monitoring Project Manager

6.1.2 Grant appropriate access to requester.

6.1.3 Provide applicable system and user documentation and training to requester.

6.1.4 Conduct periodic checks of system access by approved users.

6.1.5 Request a list of database users from the Information Technology (IT) organization.

6.1.6 Review **and** approve user access to databases annually.

6.1.7 Terminate access approval when appropriate.

6.2 Data Management Coordination Activities

Requester/Project Manager

6.2.1 Provide Sample Management Office (SMO) with required analytical Statement of Work (SOW) information and sample information to populate the Paducah PEMS.

Scientist/Data Entry Specialist

6.2.2 Enter data into PEMS as required by CP4-ES-5004, *Sample Tracking, Laboratory Coordination, and Sample Handling.*

6.2.3 Enter other non-sample information required by PEMS (e.g., lithologic descriptions, well construction, etc.).

NOTE:

Verification should be completed by someone other than the person who entered the data.

6.2.4 Print data entry from PEMS **and** verify against the original.

6.2.5 Document verification by noting on the PEMS printout **and** initial and date the note.

6.2.6 **If** any entries are identified that need to be corrected, **then** make the necessary corrections in PEMS **and** go to **6.2.4.**

6.2.7 **If** Geographic Information System (GIS) coordinates are obtained for the project, **then** ensure plant coordinates and state plane coordinates are provided for loading into Paducah OREIS and the Paducah GIS.

6.2.8 Load laboratory Electronic Data Deliverables (EDDs) into PEMS once received from the laboratory.

6.2.9 Check 100% of the first 4 EDDs loaded to Paducah PEMS from a specific laboratory, and 10% of subsequent EDDs, by comparing the laboratory printouts or data packages to printouts of data loaded to Paducah PEMS.

6.2.10 **If** discrepancies are found, **then** notify the SMO immediately.

6.2.11 Ensure the following is documented in the electronics PEMS loading logs and/or the PEMS loading notes:

- Project Identification
- Statement(s) of Work Number(s)
- Date Loaded
- Number of Records Loaded
- Description
- Electronic Deliverable Origin
- Initial Detections
- Initial Verification Checks (if any)
- Errors Noted

6.2.12 Verify the data according to CP3-ES-5003, *Quality Assured Data.*

Data Reviewer

6.2.13 Assess the data according to CP3-ES-5003, *Quality Assured Data.*

6.2.14 Notify the SMO if there are any data assessment questions to be submitted to the laboratory.

Scientist/Data Entry Specialist

6.2.15 Once data assessment is complete, enter data assessment codes into PEMS, if applicable.

6.2.16 **If** data validation was performed, **then** enter data validation codes into PEMS.

6.2.17 Notify Data Entry Specialist that data is complete so that the Ready-To-Load (RTL) file can be created and loaded into Paducah OREIS.

6.2.18 Complete the data assessment package **and** submit to Records Management for archival.

7.0 RECORDS

7.1 Records Generated

The following records may be generated by this procedure:

- Data Assessment Package

7.2 Records Disposition

The records are to be maintained in accordance with CP3-RD-0010, *Records Management Process*.

Appendix A – Acronyms/Definitions

ACRONYMS

EDD – Electronic Data Deliverable

GIS – Geographic Information System

IT – Information Technology

OREIS – Oak Ridge Environmental Information System

PEMS – Project Environmental Measurements System

RTL – Ready-To-Load

SMO – Sample Management Office

SOW – Statement of Work

DEFINITIONS

Data Assessment Package – Includes, but is **NOT** limited to, completed forms from CP3-ES-5003, *Quality Assured Data* , PEMS loading notes, data sheets, any notations or information applicable to the data set provided by reviewers or data management group and data verification/assessment/validation results.

Data Integrity – The accuracy, consistency, and completeness of the data that are maintained by a computer system.

Geographic Information System – Location information designed to display data spatially.

Paducah OREIS – The database system used for long-term storage of data. Paducah OREIS is the primary database system used for official data reporting.

Project Environmental Measurements System – The database system used for field preparation and tracking of data collection activities. This system is provided to project personnel and pre-populated with project information. The system generates chains-of-custody, bottle labels, and other field forms; stores analysis type and preservative information; tracks sampling progress; and stores location information. It also is used to load analytical data to perform electronic data verification on analytical data.

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

September 7, 2017

FPAD-17-3109

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
Deliverable No. 101.26—DRAFT *Spill Prevention, Control, and Countermeasure Plan for the U.S. Department of Energy Paducah Site, McCracken County, Kentucky,* PAD-REG-1005/R2

Enclosed for your review is the draft *Spill Prevention, Control, and Countermeasure Plan for the U.S. Department of Energy Paducah Site, McCracken County, Kentucky*, PAD-REG-1005/R2 (SPCC). This SPCC was prepared in accordance with 40 *CFR* § 112, "Oil Pollution Prevention." The plan has been revised to align with the rule and to reflect the current status of the Paducah Site, including removal of oil products as part of deactivation activities.

If there are any questions, please contact Kelly Layne at (270) 441-6726.

Sincerely,

Michael S. Strickland
Director, Prime Contract Management

Enclosure

e-copy:
J. Woodard, PPPO/PAD
K. Knerr, PPPO/PAD
B. Ford, FPDP/PAD

PAD-REG-1005/R2

Spill Prevention, Control, and Countermeasure Plan for the U.S. Department of Energy Paducah Site, McCracken County, Kentucky

This document is approved for public release per review by:

_____ _____

FPDP Classification Support Date

DRAFT

PAD-REG-1005/R2

Spill Prevention, Control, and Countermeasure Plan for the U.S. Department of Energy Paducah Site, McCracken County, Kentucky

Date Issued—September 2017

Prepared for the
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

DRAFT

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PROFESSIONAL ENGINEER'S CERTIFICATION [40 *CFR* § 112.3(d)]

By means of this certification, I attest that I am familiar with the requirements of this part; that I or my agent has visited and examined the facility; that this Spill Prevention, Control, and Countermeasure Plan has been prepared in accordance with good engineering practice, including consideration of applicable industry standards and with the requirements of 40 *CFR* Part 112; that procedures for required inspections and testing have been established; and the plan is adequate for the facility.

Terry Fletcher, P.E.
KY Professional Engineer # 14560

Date

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MANAGEMENT APPROVAL (40 *CFR* § 112.7)

This Spill Prevention, Control, and Countermeasure (SPCC) Plan was prepared in accordance with good engineering practices and has the full approval of the U.S. Department of Energy (DOE); Fluor Federal Services, Inc., Paducah Deactivation Project; and Swift & Staley Team. Implementation of this plan minimizes the potential for discharges of oil and oil-related products at the DOE Paducah Site located in McCracken County, Kentucky. Management will make available personnel, equipment, and materials necessary to implement this SPCC Plan and control and mitigate any discharges that should occur. The priorities of response team members are based upon protection of human life, prevention of environmental harm, and protection of property, respectively.

This SPCC Plan will be reviewed and evaluated at least once every five years. This review will be documented in the SPCC Plan Management Review Record located on the following page of this SPCC Plan and will include a statement as to whether the SPCC Plan will be amended. Any technical amendments to the SPCC Plan will be certified by a professional engineer.

Paducah Site management is fully committed to the proper implementation of this SPCC Plan.

Bruce M. Ford/Fluor Federal Services, Inc. Acting Environmental Management Director	Date Signed
Bobby D. Smith/Fluor Federal Services, Inc. Program Manager	Date Signed
Tammy Courtney/Swift & Staley Team Project Manager	Date Signed
Jennifer Woodard/DOE Paducah Portsmouth Project Office, Paducah Site Lead	Date Signed

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SPCC PLAN MANAGEMENT REVIEW RECORD

(40 *CFR* § 112.5(b))

I have completed review and evaluation of the SPCC Plan for the Paducah Site and ___will ___will not amend the SPCC Plan within six months of the date of my review.

Signature	Date Signed
Printed Name	Title

I have completed review and evaluation of the SPCC Plan for the Paducah Site and ___will ___will not amend the SPCC Plan within six months of the date of my review.

Signature	Date Signed
Printed Name	Title

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CONTENTS

ACRONYMS

API	American Petroleum Institute
AST	aboveground storage tank
BMP	best management practice
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
CWA	Clean Water Act
DOE	U.S. Department of Energy
EMS	Environmental Management System
EPA	U.S. Environmental Protection Agency
ERO	Emergency Response Organization
FRP	facility response plan
IC	incident commander
ISMS	Integrated Safety Management System
KDEP	Kentucky Department for Environmental Protection
KPDES	Kentucky Pollutant Discharge Elimination System
KRS	Kentucky Revised Statute
OCB	oil circuit breaker
OSRO	oil spill response organization
OSHA	Occupational Safety and Health Administration
PA	public address system
PGDP	Paducah Gaseous Diffusion Plant
PPE	personal protective equipment
PSS	Plant Shift Superintendent
RCRA	Resource, Conservation, and Recovery Act
RQ	reportable quantity
SPCC	spill prevention, control, and countermeasure
STI	Steel Tank Institute
TSCA	Toxic Substances Control Act
UL®	Underwriters Laboratories Inc.®
USEC	United States Enrichment Corporation

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1. INTRODUCTION

The Paducah Gaseous Diffusion Plant (PGDP) is a government-owned plant that was constructed in the early 1950s and was operated by the U.S. Department of Energy (DOE) and its authorized agencies for manufacturing enriched uranium. PGDP enriched uranium from the early 1950s until 2013, when the United States Enrichment Corporation (USEC) ceased production operations. On October 21, 2014, the lease between USEC and DOE ended, and the PGDP leased facilities were transferred back to DOE. DOE is currently in the process of removing hazardous materials, including various oil products, from PGDP; preparing buildings for demolition; and remediating of the soils and surface waters to allow the site to be used for other purposes.

The Paducah Site is located in a generally rural area of McCracken County, Kentucky, 10 miles west of Paducah, Kentucky, and 3.5 miles south of the Ohio River. The Paducah Site consists of the inactive uranium enrichment facilities and extensive support facilities. The plant is on a 3,556-acre DOE site comprised of the following: approximately 628 acres within a fenced security area, approximately 809 acres located outside the security fence, 133 acres of acquired easements, and the remaining 1,986 acres licensed to the Commonwealth of Kentucky as part of the West Kentucky Wildlife Management Area (WKWMA).

Federal and state regulations prohibit the unauthorized discharge of oil and oil products (e.g., gasoline, diesel fuel, fuel oil, synthetic oil, hydraulic oil, waste oil). The policy of DOE and its contractors/subcontractors is to handle all oil and oil products in a manner that prevents discharges and protects persons and the environment from harm. The purpose of this Spill Prevention, Control, and Countermeasure (SPCC) Plan is to form a comprehensive spill prevention program that minimizes the potential for discharges. This SPCC is prepared in accordance with 40 *Code of Federal Regulation* (*CFR*) § 112, *Oil Pollution Prevention*. This SPCC Plan guides DOE and Paducah Site contractor/subcontractor personnel on avoiding and responding to discharges of oil and oil products into the environment from site mission-related projects and activities. This SPCC Plan is available electronically; copies will be provided to other groups, as appropriate. This SPCC Plan has been prepared for remediation, deactivation, and infrastructure-related projects and activities at DOE PGDP. Swift & Staley Team has voluntarily agreed to comply with this SPCC Plan. Mid-America Conversion Services, LLC, is not required to have an SPCC plan because they do not meet the threshold requirements for oil.

1.1. GENERAL SPCC APPLICABILITY—40 *CFR* § 112.1

Requirements to prevent the discharge of oil and oil products into navigable waters of the United States are established in 40 *CFR* § 112. These regulations are applicable to facilities that have oil and oil products and that reasonably could be expected to discharge oil into navigable waters of the United States; that have an aggregate aboveground capacity of more than 1,320 gal (counting only containers of 55 gal or greater); or have an aggregate underground capacity of more than 42,000 gal [excluding tanks subject to underground storage tank regulations (40 *CFR* § 280–281) and permanently closed tanks].

40 *CFR* § 112 does not apply to any container with a storage capacity of less than 55 gal of oil or oil products. Although the regulations do not specifically define "container," they do define "bulk storage container" as "any container used to store oil" except for "oil-filled electrical, operating, or manufacturing equipment." This means that oil-filled electrical, operating, or manufacturing equipment containing 55 gal or greater of oil or oil products is subject to the general regulations in 40 *CFR* § 112.7, but not to the specific requirements for bulk storage containers in 40 *CFR* § 112.8.

As a non-transportation-related on-shore facility, PGDP engages in activities that reasonably could be expected to discharge oil and other hazardous materials into navigable waters of the United States and therefore is subject to the spill prevention requirements of 40 *CFR* § 112.

1.2. AMENDMENT OF THE SPCC PLAN—40 *CFR* § 112.5

This SPCC Plan will be amended when a change in the facility design, construction, operation, or maintenance materially affects its potential for a discharge as described in 40 *CFR* § 112.1(b). Examples of changes that may require amendment of the Plan include, but are not limited to the following:

- Commissioning or decommissioning containers;
- Replacement, reconstruction, or movement of containers;
- Reconstruction, replacement, or installation of piping systems;
- Construction or demolition that might alter secondary containment structures;
- Changes of product or service; or
- Revision of standard operation or maintenance procedures at a facility.

Additionally, the Plan must be reviewed and evaluated at least once every five years. As a result of the review and evaluation, the SPCC will be amended within six months of the review to include more effective prevention and control technology if the technology has been field-proven at the time of the review and will reduce the likelihood of a discharge. Amendments must be implemented as soon as possible, but not later than six months following preparation of the amendment. Amendments will be documented using the SPCC Plan Management Review Record included at the beginning of the SPCC Plan. A Professional Engineer must certify any technical amendment to the Plan in accordance with 40 *CFR* § 112.3(d). The certification is located at the beginning of this Plan.

2. GENERAL SPCC REQUIREMENTS—40 *CFR* § 112.7

2.1 MANAGEMENT OVERSIGHT AND APPROVAL—40 *CFR* § 112.7

Paducah Site management strongly supports the prevention of discharges of oil and oil products. This SPCC Plan has the approval of management at a level and authority to commit the necessary resources toward spill prevention. All Paducah Site personnel are informed that pollution prevention is an integral part of job performance and of their responsibility for reporting and, where appropriate, correcting conditions that could lead to a discharge. All Paducah Site personnel are expected to follow applicable procedures and perform their jobs in a manner to prevent oil and oil product discharges.

Each of the contractors at the Paducah Site is required to implement an Integrated Safety Management/Environmental Management System (ISMS/EMS). The basic tenets of the ISMS/EMS are protection of the environment and conservation of resources. Implementing ISMS/EMS requires that regulatory compliance personnel review procedures and work instructions to ensure that any steps involving storage/transfers of oils or oil products include measures to protect the environment and minimize potential releases.

The Director of Environmental Management is responsible for development of the SPCC Plan and its implementation as a Paducah Site plan. Within the Environmental Management organization, Regulatory Compliance Specialists, knowledgeable about requirements related to discharge/spill prevention and response, are available to provide technical assistance to operating groups responsible for Paducah Site projects and activities. They also assist in developing training programs for employees related to discharge/spill prevention and response. Field walkdowns and assessments are conducted as an oversight measure to ensure compliance with the SPCC Plan. Discharge prevention also is a key element of the work control planning for facilities that store or use oil and oil products.

2.2 PLAN CONFORMANCE—40 *CFR* § 112.7(a)(1)

This SPCC Plan is written to comply with federal and state regulations requiring a written plan to prevent and respond to oil spills and releases. Spill and release prevention strategies are introduced in the SPCC Plan. The SPCC Plan also serves as a guide for PGDP personnel when responding to releases of oils or oil products. This SPCC Plan is maintained on-site and is readily accessible for use in emergencies and agency inspections.

Review and evaluation of the SPCC Plan are required every five years per 40 *CFR* § 112.5(b). Reviews will be documented on the SPCC Plan Management Review Record, located near the front of this SPCC Plan. The SPCC Plan will be amended within 6 months of a change in the facility's design, construction, operation, or maintenance that materially affects its potential for a discharge; the list of Incident Commander (IC) changes; the list of emergency equipment changes; or the SPCC Plan fails in an emergency. Technical amendments to the SPCC will be reviewed and approved by a licensed professional engineer.

The Paducah Site has containers, oil-filled electrical equipment, and other items containing oil or oil products with capacities of 55 gal or greater that are regulated under Resource Conservation and Recovery Act (RCRA) or Toxic Substances Control Act (TSCA). Spill prevention, controls, and countermeasures addressing temporary waste storage/accumulation areas [e.g., generator storage areas, 90-day accumulation areas, and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) storage areas] for oil containing RCRA/TSCA-regulated waste items are described in

Part G of the Contingency Plan of the Hazardous Waste Management Permit Application for the U.S. Department of Energy, Paducah Gaseous Diffusion Plant, Paducah, Kentucky, CP2-ER-1125, *Fluor Federal Services, Inc., Paducah Deactivation Project Contingency Plan for Temporary Staging Areas at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, and CP3-WM-1037, *Generation and Temporary Storage of Waste Materials*.

2.3 PLAN DEVIATIONS—40 *CFR* § 112.7(a)(2)

The PGDP SPCC Plan does not deviate from the requirements of the rule. This plan follows and is aligned with the requirements of 40 *CFR* § 112.

2.4 FACILITY LAYOUT—40 *CFR* § 112.7(a)(3)

Appendix A includes figures and tables showing the locations of the oil and oil products at PGDP and provides information on the individual containers, their location with respect to site facilities, their capacity, and the drainage/outfall that oil most likely would migrate to during a spill. As part of the revision to the SPCC Plan, an oil inventory review was conducted in 2017. The current oil and oil product capacity at PGDP is greater than one million gal. This inventory/capacity is described in the following subsections.

2.4.1 Description of Oil Storage—40 *CFR* § 112.7(a)(3)(i)

The Paducah Site uses bulk oil and fuel storage tanks, large oil-filled electrical transformers, and other oil-filled equipment. Hazardous waste storage and treatment areas also are in operation. All storage tanks are labeled according to criteria set forth in Occupational Safety and Health Administration (OSHA) 29 *CFR* § 1910.1200. All major storage tanks either are diked or of double-wall construction for spill control. In accordance with applicable regulatory requirements, hazardous waste accumulation areas also use containment dikes and other material control provisions.

One major location receiving oil products at the Paducah site is located at the C-600 Steam Plant. The C-600 Steam Plant was a coal, fuel oil, and natural gas-fired boiler plant that produced steam for the facility. In 2015, the two coal/fuel oil-fired boilers and one fuel oil/natural gas-fired boiler were replaced with five low and ultra-low emission package boilers. All five package boilers operate on natural gas; two of the boilers can also operate on fuel oil on an as needed or emergency basis such as natural gas curtailment. Two 420,000-gal tanks (C-601-A and C-601-B) are located at the facility and are built to American Petroleum Institute (API) Standard 650. The C-601-B tank is used to charge a 500-gal day tank, which is connected to the two package boilers that can operate on fuel oil. The 500-gal day tank is dual-walled with no dike. The C-601-A tank no longer is used for oil storage, but serves as emergency containment for the C-601-B tank in the event of a leak. Both tanks are located within a containment structure consisting of an earthen dike lined with a synthetic material impervious to oil.

The C-601-B tank currently is partially filled and contained approximately 111,500 gal of fuel oil at end of 2016. The C-601-B tank inventory represents the largest single accumulation of oil at the site and the highest risk for and impact from a potential release.

A 6,000-gal tanker truck replenishes the C-601-B tank as required. The location where fuel is transferred from the tanker truck is not diked. Personnel are instructed to use drop pans or buckets under connections to capture any released material during transfer. Additionally, site personnel provide continuous monitoring of the transfer operation, adhering to controlling procedures.

A 1,000,000-gal tank located in the C-600 area has been removed. This tank previously was maintained for spill storage capacity. Since removal of this tank, the C-601-A tank is maintained as emergency storage capacity.

In addition to the C-600 facility, other systems located throughout the facility pose a threat of a release of material due to routine operations and maintenance activities. Activities may include transfer of material from one tank to another, the recycling of oil within a system, or the transfer of material from a system or tank into containers or equipment.

Two aboveground storage tanks (ASTs) are located at the C-752-B facility, which serves as a satellite refueling station for mobile plant equipment. The two 4,000-gal Underwriters Laboratories Inc.® (UL®)-listed, dual-wall tanks are located on the concrete-bermed C-752-B pad. Each tank contains an interstitial leak detection device, which is a continuous monitor with visible and audible alarms. Both tanks have a capacity of 4,000 gal; however, each tank is split internally into a 3,000 gal and a 1,000 gal tank to allow the tank to hold two different types of fuel at the same time. One tank contains E85 and unleaded gasoline; the other tank contains on-road and off-road diesel. The second wall of the tanks is sufficiently impervious to contain oil per 40 *CFR* § 112.7(c)(l)(i) requirement for secondary containment. Additional containment is provided by the bermed concrete pad, and absorbent materials are available as a backup/defense in depth. Precipitation that accumulates on the pad is examined prior to manual discharge to ensure no oily products are discharged. Personnel are instructed by posted signs to use portable containment pans below the filling point each time a vehicle or piece of equipment is refueled. These tanks are operated, maintained, and inspected by the Infrastructure Contractor.

Two 1,000-gal gasoline ASTs are located at C-333 and C-337. The tanks are designed with double-wall construction and leak-detection monitors for the interstitial space; each AST is also equipped with an overfill prevention valve. Fuel facility personnel monitor the filling operations to identify potential for and prevent overfills. Personnel are instructed to use drop pans or buckets under connections to capture any released material during transfer. Additionally, site personnel provide continuous monitoring of the transfer operation, adhering to controlling procedures.

Eighteen diesel ASTs are located at C-200, C-310, C-331, C-333, C-335, C-337, C-600, C-607, C-611, C-611-U, C-631-1, and C-631-3, each equipped with an overfill prevention valve. Appendix A includes the specific capacity of each of these tanks. Fuel facility personnel monitor the filling operations to identify potential for and prevent overfills. The tanks are designed either with double-wall construction with leak detection monitors for the interstitial space or have diked secondary containment. The tanks are filled via tanker truck; the location where fuel is transferred from the tanker truck is not diked. Personnel are instructed to use drop pans or buckets under connections to capture any released material during transfer. Additionally, site personnel provide continuous monitoring of the transfer operation, adhering to controlling procedures.

Three ASTs located at C-333-A, C-337-A, and C-360 contain hydraulic oil; each of these tanks is located within bermed containment dikes.

Two fuel tanks are located at C-746-U. The 1,000-gal and 500-gal tanks located outside at C-746-U are manufactured by ConVault® and are UL® listed. Each system consists of a primary steel tank and secondary containment consisting of a 30-mil (0.78-millimeters)-thick polyethylene membrane enclosing the steel tank and insulation material. The primary steel tank and the secondary containment are encased in 6 inches of reinforced concrete, but no steel or insulating material comes in contact with the concrete. The tanks located at C-746-U are provided with a UL®-listed spill containment system that includes a normally closed valve to release any spilled product from refilling into the primary steel tank. The C-746-U area, including the location of the diesel and gasoline tanks, drains to a man-made containment

lagoon. Runoff of precipitation is accumulated in the sediment basin and manually discharged directly to Outfall 019 when the basin nears capacity. The accumulated water will be examined before discharge to Outfall 019 to ensure that no oil is discharged. The basin is discharged and monitored for compliance against KPDES permit conditions.

Transformer oil and oil circuit breaker (OCB) oil tanks are located at the C-531, C-533, C-535, and C-537 switchyards. The C-535 and C-537 switchyards no longer are energized. Additionally, storage tanks for transformer and OCB oils are located at C-540 and C-541; these tanks are located within concrete dikes fitted with drain valves. While not considered bulk storage tanks, electrical transformers, circuit breakers, and other electrical devices located in the four switchyards at the Paducah Site are listed in Appendix A, with the specific capacity of each of these equipment types since they are considered oil-filled operational equipment. This equipment includes an oil storage container (or multiple containers) in which the oil is present solely to support the function of the equipment. The equipment is located outdoors and does not have secondary containment due to electrical hazards associated with accumulated water in switchyards. If required, oil is delivered to these tanks by tanker truck or via piping systems between the storage tanks and the switchyards. Switchyard areas, including tanker truck loading/unloading areas and piping associated with switchyard equipment, do not have secondary containment dikes, but do flow into facility drainage systems that are equipped with engineered, oil diversion/retention structures. Underflow dams designed to permit the passage of water but contain floating materials, such as oil, have been constructed in the Paducah Site drainage ditches with the potential to receive an oil discharge. The dams are designed to provide effective oil containment. Spill control materials, such as oil pans and absorbent pads, are located at the switchyards to control drips and spills.

There are 67 polychlorinated biphenyl (PCB) transformers located in C-337. Transformers are considered to be oil-filled operation equipment. As part of the DOE efforts to remove significant volumes of oil from the PGDP, these transformers have been drained. Up to 10 55-gal drums of kerosene are stored at any one time inside a structure at C-733. C-733 is a partially enclosed facility permitted for storage/treatment of hazardous waste. The drums are located within secondary containment and a floor sump is inspected in accordance with the Hazardous Waste Facility Permit, KY8-890-008-982. The facility has a roof and secondary containment, but no walls to prevent buildup of explosive gas if a leak were to occur. The C-733 maximum container storage capacity is 38,500 gal.

A 250-gal AST at C-540 is used to hold kerosene. The tank is carbon steel and located in bermed secondary containment. A 150-gal tank at C-755-Y is used to hold used oil. Secondary containment is integrated into the tank design. A 330-gal UN31A poly-tank at C-750 is used to hold used oil; the tank is located within secondary containment. Additionally, eight 55-gal drums of new oil are routinely stored in C-750 for vehicle maintenance.

Two 500-gal ASTs are located at C-746-A and were used to hold gasoline and diesel. The tanks are located within bermed secondary containment. These tanks have been drained and have not been used since approximately 2001.

The process building lube oil systems including all supply and drain tanks have been drained. The lube oil system in each process building has tanks that were used for reservoirs. The C-310 and C-315 Buildings have one supply tank located on the cell floor and one drain tank located on the ground floor. The C-310-A supply tank has been drained and flowable fill added to the tank and piping trench. Each of the C-331 and C-335 Buildings has 4 drain tanks located on the ground floor and 4 supply tanks located on the cell floor. Each of the C-333 and C-337 Buildings has 12 drain tanks located on the ground floor and 6 supply tanks located in housing on the building roofs. The lube oil flowed from the supply tanks though the associated lubricating points throughout each facility to the drain tanks. The oil then was pumped back to the supply tank. All of the lube oil drain tanks are diked. During operations, any oil spill would have been

contained inside the dikes and inside of the process buildings. Even under operational conditions, a lube oil spill that would migrate outside the building and to navigable waters was highly unlikely.

The lube oil systems pose virtually no threat as currently configured. The motor couplings for all process lube and hydraulic system pumps have been removed. Suction piping has been removed to the hydraulic pumps and sight glasses. Holes were drilled at system low points and the drain tank flanges were removed to facilitate system drainage and to ensure that no accumulation of oil could occur. Funnels located on the cell floor and that were previously used to return accumulated oil from maintenance or housekeeping activities to the lube oil systems are locked. Each facility lube oil pipe connection formerly used to add bulk oil from a vendor truck to each lube oil system has a blank flange installed. Each unit lube oil system is independent of the other except for the bulk oil fill piping which connects to the top of each of the system drain tanks. While no accumulated oil is present in any process lube or hydraulic oil system, it would be impossible to backflow oil from one system to the other in the present system configuration. In order to put oil back in the system, some physical control must be violated.

A lube oil skid system for the purge and evacuation pumps has been installed in C-335 and in C-337. Each lube oil skid system has a capacity of 300 gal. They are located inside the process buildings.

The C-611 facility has a 1,500 gal diesel AST which is used to power the #4 and #5 diesel drive pumps. Other oil filled operational equipment at C-611 includes the #7 pump with a 450-gal diesel tank. The C-611-U facility has a diesel generator with a 450 gal diesel tank. The tank and equipment are kept in standby in the event of power failure.

Heavy equipment may be staged between projects at C-745-C in the center of PGDP. This storage yard drains to Outfall 001, which is protected with an underflow dam. Equipment staged for long periods will be drained of oil/oil products to the extent practical prior to placing in storage.

Heavy equipment may be stored in the C-740 yard that drains to Outfall 008. Heavy equipment also may be staged at C-750 and C-755. The C-755 storage area is located on the east side of the plant and drains to Outfalls 002 and 010. The C-750 storage area is located in the center of the plant and drains to Outfall 008. These Outfalls are equipped with oil containment dams. Spilled materials from these areas will be contained and collected upstream from the oil containment dams.

Other tanks and equipment on-site that typically contain 55 gal (or greater) of oil products include mobile equipment/vehicles and temporarily located equipment (e.g., generators). In addition, fuel tanker trucks periodically come on-site to refill on-site tanks and equipment. These mobile and temporary items range over a wide on-site area or are not at one location for a substantial period of time. When practical, temporary storage of equipment is done on temporary secondary containment. Transfer of fuel and fueling of mobile vehicles/equipment is performed over drip pads/pans to the extent practical.

2.4.2 Discharge Prevention Measures—40 *CFR* § 112.7(a)(3)(ii)

The handling of oil and oil products is addressed in policies, programs, procedures, and work control documents. Discharge prevention measures begin with management commitment to prevent discharges that may harm workers, the public, or the environment. Workers are trained to perform oil/oil product loading, unloading, and transfers in accordance with management-approved procedures and to recognize and appropriately respond to leaks, spills, and releases.

For example, controls for the C-601-B fuel oil tank are detailed in CP4-UT-0501, *No. 2 Fuel Oil Handling and Storage*. These controls include the following:

- Pre-loading tank level check with recorded verification of adequate capacity for delivery;
- Using a spotter at the unloading station to prevent accidents or contact between the tank and the tanker truck;
- Recording date, truck time in, ticket number, and net gal on Fuel Deliveries Form (CP4-UT-0501-F01);
- Chocking tanker truck wheels;
- Isolating other vehicle traffic from pump house;
- Connecting the truck to unloading station nozzle, being sure to place drip pans or buckets under connections;
- Connecting ground cable;
- Managing valves to specific, detailed instructions in the procedure;
- Communicating with tanker truck driver during unloading process;
- Monitoring unloading continuously for flow, evidence of leaks, and tank level;
- Visually inspect dike and tank area for leaks before, during, and after unloading; document on Fuel Deliveries Form;
- Following unloading, disconnect lines, draining hoses into buckets as needed.

The C-601-A and C-601-B tanks and other site ASTs have compliant secondary containment, either through dikes/curbing or dual-wall construction. Additionally, some tanks are equipped with overfill prevention valves. Larger site storage tanks generally are filled via 6,000-gal tanker truck from a local vendor. Fuel oil is delivered by the project to several small fuel tanks dispersed throughout the site to provide fuel for emergency generators. The areas where the tanker or transfer trucks sit during offloading are not diked; therefore, personnel are instructed to use drip pans or buckets under connections to capture any released material during transfer. Additionally, site personnel provide continuous monitoring of the transfer operation, adhering to controlling procedures.

The gasoline ASTs located at C-333 and C-337 are equipped with an overfill prevention valve. Fuel facility personnel monitor the filling operations to ensure there are no overfills. The area where the tanker truck sits during transfer of fuel is not diked.

The C-752-B Fueling Station tanks are contained by a bermed concrete pad. The fuel dispensing station at C-752-B has spill detection alarms and automatic shut-off devices. The area where the tanker truck sits during transfer of fuel is not diked; however, the delivery truck is designed with secondary containment around the hose connections, and there is secondary containment where the hoses are connected to the tanks.

Surveillance and Maintenance delivers diesel fuel to several small tanks dispersed throughout the site. Each of these tanks supplies fuel for emergency generators around the plant. Each of these tanks is diked; however, the area in which the bulk truck sits during transfer is not diked.

2.4.3 Discharge or Drainage Controls—40 *CFR* § 112.7(a)(3)(iii)

All oil storage tanks at PGDP are provided with secondary containment. Secondary containment areas located outside will hold at least 110% of the largest tank in the containment area. This will allow enough containment capacity for both expected rainfall and the entire contents of the tank. Secondary containment areas located inside the buildings will hold 100% of the largest tank in the containment area.

While not considered bulk storage tanks, electrical transformers and circuit breakers located in the four switchyards at PGDP are listed in Appendix A. This equipment is located outdoors and does not have secondary containment due to electrical hazards associated with accumulated water in switchyards.

Procedures establish the administrative controls and provide requirements and processes that govern installation, inspections, and generation of secondary containment systems. Each facility manager/operating group has the responsibility to control its environment and operations in such a manner as to prevent spills and discharges. To assist personnel in preventing spills or minimizing the effects of spills, procedures and work control documents are prepared for operation of equipment, handling of materials and wastes, and cleanup and containment of spills. Inspection techniques and frequencies for bulk storage containers, equipment, and containment dikes also are specified in procedures, work control documents, or other guidance. Appendix B contains examples of the inspection checklist used to inspect secondary containment areas. Records of these inspections are maintained in accordance with the FPDP Records Management Program.

Procedures control the filling and transfer of oil products, as discussed in Section 2.4.2. Underflow dams designed to permit the passage of water but contain floating materials, such as oil, have been constructed in the drainage ditches with the potential to receive an oil discharge. The dams are designed to provide effective oil containment and were installed on ditches to 8 of the 15 outfalls, specifically Outfalls 001, 002, 008, 009, 010, 011, 012, and 015 (those most likely to be impacted by an oil spill), to contain the oil on facility property and prevent it from reaching Bayou or Little Bayou Creeks.

Major drainage ditches are equipped with inverted pipe dams designed to permit the passage of water but to contain floating material, such as oil. The dams are designed to provide effective oil containment in the event of a discharge. Furthermore, should a discharge reach a drainage ditch, inflatable pipe stoppers are available to fit any of the culverts in these ditches. Discharges can be contained within PGDP, if acted upon quickly. Booms and absorbent pads used to cleanup spills on-site also can be used to prevent off-site release when used in the creeks in the unlikely event a spill reaches the creeks.

Outfalls are checked on a daily basis per CP4-UT-0405, *Utilities Routine Duties, Checks, and Inspections*, with requirements to check for oil sheen. This procedure also provides for the inspection and draining of storage tank containment dikes. Checking for evidence of a spill, such as sheen, leak, or discoloration, is required, and the integrity of the dike, including drain piping, valve, and cap/plug, is visually inspected. The results of the inspections are noted on the area Narrative Log. If the diked area shows evidence of a spill, the dike is not to be drained, and the Plant Shift Superintendent (PSS) is called to determine the path forward with appropriate input from Regulatory Compliance.

2.4.4 Countermeasures, Response, and Cleanup—40 *CFR* § 112.7(a)(3)(iv)

Plant procedures contain the reporting process to be followed should a spill occur. All spills are to be reported immediately to the PSS. The PSS directs the emergency containment of any spill that may egress the building or immediate area or have the possibility of entering the environment and also direct initial cleanup operations. The PSS determines reportability of any spill with assistance from Regulatory Compliance as needed.

PGDP operates 24 hours a day, 7 days a week, with emergency response personnel on duty during this time. The Fire Services and Protective Force personnel are on duty, and each organization will perform its appropriate duties during an emergency situation. The E-Squad also is on duty 24 hours a day, 7 days a week, and will respond to an emergency situation as directed. While members of the Emergency Operations Center are not on duty 24 hours a day, 7 days a week, they are on call during off-shift hours and carry cell phones for emergencies. Initial oil response equipment at PGDP includes an oil skimmer, containment booms, and other miscellaneous equipment to help support an oil spill emergency. An agreement has been established with an oil spill response organization (OSRO) for emergency oil spill response. The PSS has the authority to contact the OSRO as required.

Response to oil spills is controlled by CP3-EP-1007, *Oil and Hazardous Materials Spills and Releases*, this SPCC Plan, and by the PGDP Facility Response Plan (FRP). Upon the reporting of a spill/discharge, the PSS serves as or appoints the on-scene IC. The IC will direct the emergency containment of any spill/discharge that may egress a building or immediate area or have the possibility of entering a plant drainage ditch. The PSS has the authority to call for assistance from the OSRO or other Mutual Aid Agencies as required. The PGDP FRP describes the response actions for small and medium discharges as well as the worst case scenario discharge. Emergency response personnel, spill cleanup equipment, communication systems, and external agency coordination are maintained and available on-site to respond to minor spills/releases. Minor spills are cleaned up quickly by operating personnel.

Upon discovery of a release of oil, the following immediate actions shall take place.

- Person discovering spill shall notify the PSS.
- PSS will notify the Plant E-Squad to report to the spill area.
- PSS will notify the OSRO to respond, if required.
- All unnecessary personnel will be evacuated from the area.
- Efforts to shut off the source of the spill or to contain the spill within the area where the spill initiated will be attempted.
- PSS will dispatch E-Squad personnel to the outfall that will be affected by the spill, if appropriate.
- Oil booms will be placed across the outfall to contain the spill, if appropriate.
- Outfalls may be plugged with devices, if necessary, to prevent any flow of spilled material through the oil containment dams.
- Depending on the size of the spill, sources of surface and process water to the particular outfall will either be slowed or stopped.
- OSRO, if notified, will arrive on-site and begin mobilization of equipment for cleanup efforts.
- Notifications to regulatory and company authorities, as necessary, will be made by the PSS or designee as part of the initial immediate response actions.

Following containment, the cleanup of spill/discharge materials may be accomplished by using portable pumps, containers, and other equipment and materials. All cleanup wastes generated will be managed properly and disposed of in accordance with applicable regulations and Paducah Site procedures. The IC

will follow this SPCC Plan and supporting procedures. The PSS tracks spills because the reportable quantity (RQ) is based on a 24-hour period. Spill emergency response includes collection and containment of spilled material, whereas emergency response under OSHA is limited to the containment of spilled material. Because the Paducah Site's emergency management organization is based on OSHA requirements, containment of a spill to the environment would be conducted by Fire Services and ESquad personnel. Collection of the spilled material and residues may be conducted by other plant organizations, as required. Minor spills within indoor containment areas will be contained by the project. The PSS directs containment, treatment, and initial cleanup activities, with the assistance of other plant groups, until properly relieved of his duty. Should OSRO assistance be required to address oil spill response and cleanup, the OSRO would be under the technical direction of the PSS and IC. PGDP has a number of agreements with local and regional entities to provide and/or share support during emergency situations. The IC requests outside assistance in accordance with CP3-EP-1012, *Offsite Emergency Response Assistance.*

An emergency response vehicle is maintained at C-200 that contains absorbent pads, pillows, booms, and granular material that may be used to contain and cleanup oil from the ground, drainage ditches, or surface waters. Floating plastic booms may be used to divert or contain the flow of oil or oil products on surface waters. Inflatable pipe stoppers and spill cleanup kits also are stored in this vehicle. Self-contained breathing apparatus cylinders in the emergency response vehicle supply the inflating gas. Additional spill containment and cleanup materials are kept at locations throughout the Paducah Site near tanks and equipment listed in Appendix A.

Storage capacity for spilled material is available in the empty C-601-A 420,000-gal tank. In addition, the Paducah Site maintains poly tanks for spill control operations and other containers that could be used in an emergency.

2.4.5 Disposal of Recovered Materials—40 *CFR* §§ 112.7(a)(3)(v)

Management of waste materials associated with an oil spill is conducted per CP3-WM-1037, *Generation and Temporary Storage of Waste Materials.* Materials generated from a spill response may include wastes such as unusable product, personal protective equipment (PPE); wastewater from decontamination; RCRA hazardous, PCB, radioactive, or mixed wastes. Wastes transferred or moved within the facility boundary to respond to the release will not require permits but must comply with the on-site transportation plan. Wastes being shipped for off-site treatment and disposal will be transported in accordance with applicable state and federal U.S. Department of Transportation and environmental regulations.

Decontamination of equipment will be conducted near the spill site. A temporary decontamination facility will be constructed by placing an impermeable membrane on the ground (e.g., Hypalon), diking the perimeter of the membrane, and, if necessary, constructing curtains to contain water spray. Depending on the product, several techniques for decontaminating equipment will be employed. These techniques may include hand washing with water and detergents or power washing with water and detergents.

After spill containment, product will be salvaged, if possible, and returned to bulk storage for reuse. If salvage is not possible or if the product has been mixed with other liquids such as fire suppressants or water, liquids will be pumped into containers and characterized to determine disposal alternatives. Waste liquids will be characterized pursuant to RCRA requirements and, if necessary, be analyzed for RCRA constituents, PCBs, and radionuclides. Material classified as hazardous waste will be disposed of pursuant to RCRA requirements. Because of the potential for radionuclide contamination, additional characterization would be needed for off-site disposal.

Liquid wastes that are not hazardous (e.g., water used for decontamination) will be containerized. Disposal options may include, but will not be limited to, carbon filtration, treatment at PGDP's wastewater treatment plant, or treatment off-site.

All PPE and adsorbents will be containerized and characterized pursuant to RCRA requirements. If necessary, these materials will be analyzed for RCRA constituents, PCBs, and radionuclides. Disposal options may include, but will not be limited to, on-site treatment for discharge, disposal as solid waste in the on-site C-746-U contained landfill, on-site hazardous waste treatments, or off-site treatment/disposal.

Contaminated soils generated from the response activities will be characterized pursuant to RCRA. If necessary, soil will be analyzed for RCRA constituents, PCBs, and radionuclides. Disposal options for soil may include, but will not be limited to, bioremediation, thermal treatment, incineration, or disposal as solid waste in a contained landfill.

2.4.6 Contacts—40 *CFR* § 112.7(a)(3)(vi)

The PSS has full authority to use any means available to control and contain a spill. The PSS also has the authority to contact outside agencies for emergency response support.

Upon discovering a spill or release of petroleum or petroleum products, PGDP personnel are required by plant policy to contact the PSS via one of the following methods.

- Telephones—Telephones are located throughout the Paducah Site. An emergency situation can be reported to the PSS by dialing 333 or 6211 on the normal (BellSouth) system or 555 on the interplant PAX system. Emergency calls are answered by or at the C-300 Central Control Facility. Calls from cells phones should be made to (270) 441-6333.

- Two-Way Radios—Two-way radios are used by the PSS, Fire Services, Protective Force, and other response personnel to aid in emergency communication. Any radio at the Paducah Site can be used to summon emergency assistance by using the dedicated emergency channel (Channel 16). The C-300 Central Control Facility monitors radio communications on all radio channels used at the Paducah Site.

- Public Address (PA) System—The PA system is used to communicate emergency instructions to all personnel. The PSS is in charge of all announcements made on the PA system.

- Messenger—A messenger may be sent to the C-300 Central Control Facility to notify the PSS of an emergency, if this presents a faster means of notification.

The Emergency Response Organization (ERO) is a structured organization with overall responsibility for initial and ongoing emergency response and mitigation. The ERO consists of experienced and trained personnel with overall responsibility for initial and ongoing emergency response and mitigation. These personnel are specially trained to respond to different types of emergencies including oil and hazardous substances discharges. The ERO establishes effective control at the scene of an event/incident and integrates ERO activities with those of local agencies and organizations that provide on-site response services. An adequate number of experienced and trained personnel, including designated alternates, are available on demand for timely and effective performance of ERO functions. The ERO members are required to participate in formal training (initial and refresher), drills, and exercises. Site-level ERO elements and resources participate in a minimum of one exercise annually.

During an actual emergency involving the discharge of oil that migrates from the facility and violates the requirements of Section 311 of the Clean Water Act (CWA), the PSS or designee will make the required notifications and complete the Oil Spill Response Notification Form as required by CP3-ES-0003, *Environmental Incident Reporting*. These required notifications will include the following organizations:

- U.S. Department of Energy, Paducah Site Office ..... (270) 441-6800
  After hours—Primary/Alternate DOE Facility Representative phone numbers on file with the PSS

- National Response Center ..... (800) 424-8802
  Kentucky Environmental Response Team ..... (502) 564-2380
  Alternate ..... (800) 928-2380

- Kentucky Emergency Response Commission ..... (800) 255-2587

- Kentucky Department for Environmental Protection ..... (270) 898-8468

- McCracken County Local Emergency Planning Committee ..... (270) 448-1530
  After hours 911

- Ballard County Local Emergency Planning Committee ..... (270) 335-3691

Organizations that might be notified in the event of an oil or hazardous substance release include the following organizations:

- U.S. Department of Energy, Headquarters Emergency Operations Center ..... (202) 586-8100
  SWS Environmental Services (OSRO) ..... (270) 444-8003

  SWS Environmental Services (OSRO) Emergency After Hours ..... (877) 742-4215

- U.S. Environmental Protection Agency Region 4 Air, Pesticides and Toxic Management Branch
  Leave voice mail, if necessary ..... (404) 562-9077

- U.S. Coast Guard (Paducah Branch) ..... (270) 442-1621
  Emergency number ..... (270) 217-0959

- Kentucky State Fire Marshal ..... (502) 573-0382

- Kentucky State Police (Post 1) ..... (270) 856-3721
  Alternate ..... (800) 222-5555

- McCracken County Office of Emergency Management ..... (270) 448-1530

- McCracken County Sheriff's Department ..... (270) 444-4719

- National Weather Service (NOAA Weather Radio) ..... (270) 744-6440
  Alternate ..... (800) 533-7189
- Massac County Illinois Local Emergency Planning Committee ..... (618) 524-2002 (Day)
  (618) 524-2918 (Night)

- Illinois Emergency Management Agency Response 800-782-7860

- Emergency Alert System
  - WKYX-AM ..... (270) 554-8255
  - WKYQ-FM ..... (270) 554-0093
  - WPSD-TV ..... (270) 415-1900
  - Illinois-American Waterworks (Cairo, Illinois) ..... (618) 734-4671
  - Locks and Dam No. 53 (Grand Chain, Illinois) ..... (618) 742-8286
  - Olmsted Locks and Dam ..... (618) 742-6213
  - Electric Energy Incorporated (Joppa, Illinois) ..... (618) 543-7531

2.5 DISCHARGE REPORTING—40 *CFR* § 112.7(a)(4)

This requirement is not applicable since the PGDP submitted an FRP in accordance with 40 *CFR* 112.20.

2.6 PLAN ORGANIZATION—40 *CFR* § 112.7(a)(5)

This requirement is not applicable since the PGDP submitted an FRP in accordance with 40 *CFR* 112.20.

2.7 POTENTIAL EQUIPMENT FAILURE—40 *CFR* § 112.7(b)

Appendix A contains listings of major equipment where there is a potential for failure that would result in a release of oil or hazardous materials. The lists include equipment description, location, capacity, and plant drainage areas most likely to be impacted. Appendix A also includes corresponding diagrams depicting the direction of flow for the plant drainage systems and outfalls. All outfalls serving drainage areas with the potential for oils spills due to equipment failure are equipped with underflow dams designed to prevent the oil from leaving the facility; therefore, flow rates and total amount of oil discharged from the property due to equipment failure is estimated to be near zero.

The largest oil inventories at the Paducah Site are associated with the C-601-B fuel oil tank and the switchyards. The C-601-B tank is located within secondary containment and the unused C-601-A tank is available to offload the inventory in the event of equipment failure. The switchyard tanks do not have secondary containment, but any spills, if not cleaned up at the tank location, would flow into facility drainage systems that are equipped with engineered, oil diversion/retention structures.

The drainage at the Paducah Site most likely to be impacted by an oil release would flow to Outfalls 001, 002, 008, 009, 010, 011, 012, and 015. Oil check inverted pipe dams have been installed in ditches leading to these outfalls to reduce the potential for discharges of the oil or oil products discussed above to enter Bayou Creek or Little Bayou Creek via outfall drainage ditches. Outfalls 019 and 020 include sufficient holdup capacities to allow removal of visible oil sheens prior to discharge. Appendix A indicates the most likely drainage ditch that such discharges would enter. Flow rates of a discharge would vary according to the size and location of the discharge and the weather conditions at the time. Remaining Outfalls 004, 006, 016, and 017 drain areas are not reasonably expected to receive spills from oils or oil products. Outfalls are inspected daily for evidence of oil and maintained in accordance with CP4-UT-0405, *Utilities Routine Duties, Checks, and Inspections.*

2.8 SECONDARY CONTAINMENT—40 *CFR* § 112.7(c)

Oil storage tanks at Paducah Site are provided with secondary containment dikes that are constructed to be impervious to the materials stored or have dual-wall construction to provide secondary containment. Typically, the dikes are concrete and painted or otherwise sealed. Descriptions of the secondary containment for the tanks are provided in Section 2.4.1. Secondary containment areas located outside are designed to hold at least 110% of the largest tank in the containment area. This will allow enough containment capacity for both expected rainfall and the entire contents of the tank. Secondary containment areas located inside the buildings are designed to hold 100% of the largest tank in the containment area.

For equipment or other containers without engineered secondary containment, such as areas where tanks are filled by vendor tanker trucks, best practices are used to limit the potential for release. Spill prevention techniques will be employed during all filling activities to include continuous visual attention to fill efforts, use of drip pad or pans under valves and connections, and final checks for leaks prior to the tanker exiting the site. Similarly, drip pad or pans, buckets, or other sorbent materials are staged at accessible locations to support oil transfers and other activities with potential to release oil.

The two 1,000-gal tanks at C-333 and C-337 are of double-wall construction with leak detection monitors for the interstitial space.

The 1,000-gal and 500-gal tanks located outside at C-746-U are manufactured by ConVault® and are UL® listed. Each system consists of a primary steel tank and secondary containment that consists of a 30-mil (0.78-millimeters)-thick polyethylene membrane that encloses the steel tank and insulation material. The primary steel tank and the secondary containment are encased in 6 inches of reinforced concrete, but no steel or insulating material comes in contact with the concrete. The tanks located at C-746-U are provided with a UL®-listed spill containment system that includes a normally closed valve to release any spilled product from refilling into the primary steel tank. During refilling, all equipment will be grounded properly. These tanks are equipped with standard pumps for refueling vehicles and other equipment. Personnel are required by procedure to use portable containment pans below the filling point each time the vehicle or equipment is refueled. The C-746-U area, including where the diesel and gasoline tanks are located, drains to a man-made containment lagoon. Runoff of precipitation is accumulated in the sediment basin and manually discharged directly to Outfall 019 when it gets near full and KPDES permit conditions can be met. The accumulated water will be examined before discharge to Outfall 019 to ensure that no oil will be discharged.

The two 4,000-gal steel tanks at C-752-B are UL®-listed, double wall, and staged on a bermed, concrete pad. These two tanks are split internally into 1,000 and 3,000 gal sections. The second wall of the tanks is sufficiently impervious to contain oil per 40 *CFR* § 112.7(c)(1)(i) requirement for secondary containment. Additional containment is provided by the bermed, concrete pad [40 *CFR* § 112.7 (c)(1)(iii)] and absorbent materials [40 *CFR* § 112.7(c)(1)(viii)] are available as a backup/defense in depth. Precipitation accumulated on the pad will be examined prior to manual discharge to ensure no oily products are discharged. Appropriate and nonexpended absorbent devices will be used as needed to ensure that only clean water is discharged. A spill collection pad along with spill collection devices (pans, pads, etc.) also may be used at the dispensing pumps to help ensure that oily products do not impact the environment if a spill occurs.

While not considered bulk storage tanks, electrical transformers, circuit breakers, and other electrical devices located in the four switchyards at the Paducah Site are listed in Appendix A. This equipment is located outdoors and does not have secondary containment due to electrical hazards associated with accumulated water in switchyards. Areas such as tanker truck loading/unloading areas and piping

associated with switchyard equipment also do not have secondary containment dikes. These tanker truck loading/unloading areas and switchyards do, however, flow into facility drainage systems that are equipped with engineered, oil diversion/retention structures. Underflow dams designed to permit the passage of water but contain floating materials, such as oil, have been constructed in the Paducah Site drainage ditches with the potential to receive an oil discharge. The dams are designed to provide effective oil containment and were installed on ditches to 8 of the 15 outfalls at the Paducah Site, specifically Outfalls 001, 002, 008, 009, 010, 011, 012, and 015, to contain the oil on facility property and prevent it from reaching Bayou or Little Bayou Creeks.

Up to 10 55-gal drums of kerosene are stored at any one time inside a structure at C-733. C-733 is a partially enclosed facility permitted for storage/treatment of hazardous waste. The drums are located within secondary containment, and a floor sump is inspected in accordance with the Hazardous Waste Facility Permit, KY8-890-008-982. The facility has a roof and secondary containment, but it has no walls to prevent buildup of explosive gas, if a leak were to occur.

A 250-gal AST at C-540 is used to hold kerosene. The tank is carbon steel and located in bermed secondary containment. A 150-gal tank at C-755-Y that contains used oil is located within secondary containment.

Two 250-gal ASTs are located at C-746-A and were used to hold gasoline and diesel. The tanks are located within bermed secondary containment. These tanks have not been used since approximately 2001.

All of the process building lube oil drain tanks are diked. The lube oil systems are located within the process buildings and have been drained and air-gapped. The process buildings no longer are operational with no path to future operations available due to the deactivation that has taken place to date.

A lube oil skid system for the purge and evacuation pumps has been installed in C-335 and C-337. Each lube oil skid system has a capacity of 300 gal. They are located inside the process buildings.

Heavy equipment may be staged between projects at C-745-C in the center of the Paducah Site. This storage yard drains to Outfall 001, which is protected with an underflow dam. Equipment staged for long periods will be drained of oil/oil products to the extent practical prior to placing in storage.

Heavy equipment may be stored in the C-740 yard that drains to Outfall 008. Heavy equipment also may be staged at C-750 and C-755. The C-755 storage area is located on the east side of the plant and drains to Outfalls 002 and 010. The C-750 storage area is located in the center of the plant and drains to Outfall 008. These Outfalls are equipped with oil containment dams. Spilled materials from these areas will be contained and collected upstream from the oil containment dams.

Other tanks and equipment on-site that typically contain 55 gal (or greater) of oil products include mobile equipment/vehicles and temporarily located equipment (e.g., generators). In addition, fuel tanker trucks periodically come on-site to refill tanks and equipment. These mobile and temporary items range over a wide on-site area or are not at one location for a substantial period of time. When practical, temporary secondary containment is put into place to support temporary storage of equipment. Transfer of fuel and fueling of mobile vehicles/equipment is performed over drip pads/pans to the extent practical.

Major drainage ditches are equipped with inverted pipe dams designed to permit the passage of water, but contain floating material, such as oil. The dams are designed to provide effective oil containment in the event of a discharge. Furthermore, should a discharge reach a drainage ditch, inflatable pipe stoppers are available to fit any of the culverts in these ditches.

2.9 IMPRACTICABILITY OF SECONDARY CONTAINMENT—40 *CFR* § 112.7(d)

Electrical transformers, circuit breakers, and other electrical devices located in the switchyards at the Paducah Site are listed in Appendix A with the specific capacity of each of these equipment types. This equipment is located outdoors and does not have engineered secondary containment due to electrical hazards associated with accumulated water in switchyards. Sorbent materials are available at the tank locations to address spills. Inspections in accordance with CP4-UT-0105, *Routine Station Checks and Maintenance C-531, C-533, C-535, C-537,* generally are conducted on day-shift work days. Leaks, drips, or other releases are noted, reported, and appropriately addressed. Repairs are conducted as required.

Secondary containment for mobile and temporary equipment, such as trackhoes and generators, usually is not practical or considered necessary. These items are designed and maintained to minimize discharges and inspected regularly. Where appropriate and practical, portable containment pans will be placed below the filling point each time the equipment is filled or emptied. For example, large trucks are refueled in accordance with applicable procedures that require the use of portable containment pans.

Additional information on conformance with the requirements of this subsection is provided in the FRP.

2.10 INSPECTIONS, TESTS, AND RECORDS—40 *CFR* § 112.7(e)

All equipment, containers, tanks, piping, and secondary containment with a capacity of 55 gal or more of oil or oil products are inspected/tested on a regular basis in accordance with this SPCC Plan and applicable procedures. The methods and frequency of inspections/testing are appropriate for the item as discussed below. Each inspection report will be signed by the qualified employee performing the inspection. Each Paducah Site contractor maintains procedures and work controls that provide for content, type, and recording of inspection/testing activities. Inspection reports, maintenance records, and other pertinent records are maintained in accordance with the Records Management Program.

2.10.1 Stationary Tanks and Containers

ASTs and portable containers are inspected and tested in accordance with applicable API 653 and/or Steel Tank Institute (STI) SP001 Standards as indicated in Table 1. Those tanks and containers that have been drained and removed from service are considered to be at a significantly reduced risk of discharge. This includes the Process Building Lube Oil Tanks and some of the diesel fuel tanks. Refer to Appendix A for a detailed list of those items that have been drained.

The following requirements apply to the inspection of nonmobile tanks, as applicable.

- Visual inspection of tank and tank site, signage, fire extinguisher and bollards; rusted areas will be cleaned and painted.

- Visual inspection of secondary containment, tank pad, and foundation for erosion, corrosion, cracking, and settling.

- Visual inspection of grout exterior (top, sides) for abrasion, cracking, holes, and excess wear.

- Visual inspection of venting systems, vent caps, level indicators, gauges, pumping systems, including hose and nozzle, and fill spouts.

Table 1. Inspection of Stationary Tanks and Containers

Tanks	Capacity (gal)	Inspections and Frequencies per API 653 and STI SP001
AST with Secondary Containment C-601-A/C-601-B Fuel Oil and Emergency Storage	420,000	Monthly and Annual Visual; 5-year external visual inspection; 20-year internal visual inspection
AST with Secondary Containment C-540/C-541 Transformer and OCB Oil	7,500 to 15,000	Monthly and Annual Visual; 20-year visual/external ultrasonic inspection
AST with Secondary Containment Process Building Lube Oil (Drained)	270 to 13,600	Monthly Visual
C-333-A/C-337-A/C-360 Hydraulic Oil	125 to 200	Monthly and Annual Visual
Dual-wall/Located within Secondary Containment Gasoline/Diesel/Kerosene	150 to 3,000	Monthly and Annual Visual
Gasoline/Diesel/Kerosene (Drained)	250 to 500	Monthly Visual
Drums/Totes	≥ 55	Monthly Visual

- Insert dip stick into leak detection tube and record presence of liquids and hydrocarbon odor.
- Record inspections on an inspection form and file in the office of the tank owner or designee.
- Any findings related to safety and as-designed operations will be repaired promptly using the designated work release program, as necessary.
- Repair records will be filed as part of work control documents or project file.

2.10.2 Portable Tanks and 55-Gal Drums

Portable tanks, such as transfer tanks secured in the beds of trucks, are inspected each time they are used. Heavy equipment associated with the C-746-U Landfill is inspected in accordance with CP4-WM-0619, *C-746-U Landfill Industrial Equipment Inspection and Maintenance.*

Mobile or portable bulk storage containers (e.g., 55-gal drums and totes) are inspected per STI SP001.

2.10.3 Mobile or Temporary Equipment

Mobile or temporary equipment, such as trackhoes or generators, are inspected prior to use and each time they are refueled for leaks/drips in accordance with site procedures (e.g., CP3-SM-0054, *Mobile Construction Equipment*). Heavy duty equipment, such as loaders and cranes, are inspected for leaks during use. Equipment staged for long periods will be drained of oil/oil products to the extent practical prior to placing in storage. Equipment will be maintained properly in accordance with applicable site procedures or manufacturing specifications to limit potential for release of oil or oil products.

2.11 PERSONNEL, TRAINING, AND DISCHARGE PREVENTION—40 *CFR* § 112.7(f)(1)-(3)

All Paducah Site personnel receive annual General Employee Training (referred to as "GET") which includes an overview of the SPCC including spill prevention and reporting. Paducah Site personnel handling oil and oil products or who assist in the transfer of such products to or from bulk storage

containers will be trained appropriately. In addition, a responsible person will be designated for each tank, container, and equipment item containing oil or oil products and having capacities of 55 gal or greater. These persons have additional training consistent with their role. At a minimum, training consists of proper operation and maintenance of equipment to prevent discharges, discharge procedure protocols, applicable regulations and procedures, descriptions of recent known discharges, and the contents of this SPCC Plan. Oil handling personnel receive refresher briefings at least once per calendar year by completing an annual on-line Oil Discharge Prevention Briefing.

Personnel assigned to the ERO are required to complete an initial training program satisfactorily prior to assignment. The initial ERO training program is composed of a collection of functional modules which emergency personnel receive based on their emergency assignment. This training program, includes classroom-type training (lectures, seminars), practical applications (tabletop drills, functional drills, and exercises), and self-study programs, has been developed for the ERO and support personnel. The training program ensures the continued emergency management response competency of all persons who may respond/participate during an emergency (CP3-EP-1016, *Emergency Management Training*). Annual refresher training is performed typically in conjunction with an annual drill or exercise. Additionally, any emergency response personnel will be trained according to Paducah Site procedures. This training will incorporate proper spill prevention and reporting training to ensure that personnel have adequate knowledge of this SPCC Plan.

The Paducah Site ERO receives training commensurate with assigned positions. These training requirements ensure the continued emergency management training of all persons who may respond/participate during a plant emergency. Specialized emergency management training is provided and includes, but is not limited to, the following categories of topics.

- **On-Scene Response Activities.** Topics covered include incident command, firefighting, HAZMAT response, including monitoring and emergency medical technician training.

- **Emergency Management Orientation.** Topics covered include concept of operations, emergency organizations, responsibilities and authorities, requirements, facilities and equipment overview, and off-site interface summary including public information.

- **Incident Classification and Notification.** Topics covered include classification systems, notification requirements, procedures, and emergency actions levels.

- **Hazard/Consequence Assessments and Protective Actions.** Topics covered include the spectrum of hazards and possible emergencies (man-made, natural, and security), reference material, site profile information, and site dispersion models. On- and off-site protective actions, protective action decision-making philosophy, and recovery decision making will be covered.

- **Ongoing Incident Assessment.** Topics covered include on-site incident monitoring, off-site field monitoring, personnel protection, and reporting.

Specific emergency training requirements for each position is described in an Emergency Plan Implementing Procedure, which includes frequency of retraining and the number of hours of initial and retraining that are provided to the ERO.

Emergency responders to oil or hazardous material spills performing mitigation tasks will be trained to the Hazardous Materials Technician level in accordance with the requirements of 29 *CFR* § 1910.120(q). Refresher training is provided annually to maintain qualifications.

The Regulatory Compliance Manager has the primary responsibility to prevent discharges of oil and oil products. The Regulatory Compliance group reviews work control documents and procedures to identify the potential for discharge and appropriate control measures.

The potential for spills/discharges is identified and analyzed during work planning with spill prevention hazard controls identified to prevent discharges to the environment. The resulting work planning documents are used by project managers and frontline supervisors to cover hazards and control measures each morning for the work to be accomplished that day.

2.12 FACILITY SECURITY—40 *CFR* § 112.7(g)

The mission of PGDP necessitates stringent safeguards and security requirements. The fact that the facility is a secured area assures that responsible personnel are always physically present at the site in the event of any incident. Protective Force personnel make regular rounds and would observe unusual incidents such as releases of oil or chemicals and would be aware of any explosions or fires that might have on- or off-site environmental impacts. Regular rounds also are made inside and outside buildings by operators.

Because the plant is a security area, the site is fenced and the public is excluded. This exclusion reduces the possibility of accidental or malicious incidents due to public interactions with the environmentally significant materials present on the plant site. Tanks, containers, and equipment containing oil and oil products and having capacities of 55-gal or greater will be located within the Paducah Site security fence or in fully fenced or locked areas with controlled access. Also, associated valves and pumps will be secured and locked in closed or off positions when they are not operational or on standby status. Vehicles/equipment may be locked to secure unauthorized access. In addition, adequate lighting will be provided for stationary equipment to allow for the discovery of discharges during hours of darkness and for the prevention of discharges occurring through acts of vandalism. Transfer/loading areas are locked to prevent access by unauthorized personnel. Delivery/vendor personnel, if involved, will be escorted by facility personnel during loading/unloading operations. Administrative controls and procedures/protocols dictate equipment operation to minimize the potential for inadvertent releases.

PGDP is a controlled access facility with fencing, gates, and numerous other features that contribute to the safety and security of the facility. Security at PGDP is maintained 24 hours a day by a staff of trained Protective Force personnel. All Protective Force personnel are equipped with two-way radios and have direct communications with PGDP protection personnel. Protective Force personnel control the entry of vehicles and equipment into the Limited Area. Visitors and contractors entering PGDP must process through the security offices before being allowed entry into the Limited Area.

The majority of the plant site is surrounded by an 8-ft high, security fence; all access gates to the Limited Area are locked or manned by Protective Force personnel. All gates and locks are checked routinely around the clock by Protective Force personnel. These and other measures minimize the likelihood of entry of unauthorized personnel.

2.13 LOADING/UNLOADING RACKS—40 *CFR* § 112.7(h)

Major bulk storage tanks on-site generally are filled via a 6,000-gal tanker truck from a local vendor, including the C-601-B 420,000-gal fuel tank; the transformer oil and OCB tanks at the C-531, C-533, C-535, and C-537 Switchyards; and the gasoline ASTs at C-333 and C-337. The loading areas for these

tanks are not diked. Site procedures control loading activities, including safety precautions such as the following:

- Use of drip pans or buckets
- Use of chocks on the tanker truck during loading
- Continuous site personnel monitoring of the loading operations
- Valve guides
- Traffic control during loading operations
- Leak inspections of valves, connections, and ground surface during and after loading

Operational tasks associated with unloading fuel oil from tanker trucks and supplying oil to the C-600 boilers are documented in CP4-UT-0501, *No. 2 Fuel Oil Handling and Storage.*

2.14 BRITTLE FRACTURE EVALUATION—40 *CFR* § 112.7(i)

The C-601-A and C-601-B fuel oil storage tanks are the only field constructed ASTs on-site. Should the fuel oil storage tanks undergo a repair, modification, or change in service that might affect the risk of discharge or failure, a brittle fracture evaluation will be performed according to appropriate standards.

2.15 CONFORMANCE WITH OTHER REQUIREMENTS—40 *CFR* § 112.7(j)

Section 311 of the Federal Water Pollution Control Act of 1973, as amended by the CWA, expressly prohibits the discharge (i.e., spill or release) of oils or hazardous substances that may affect the natural resources of the United States. It then charges the EPA to promulgate regulations that (1) determine the quantity of oils or of any hazardous substance that, if discharged, may be harmful to the public health and welfare; and (2) determine the conditions or circumstances under which oils or hazardous substances may be discharged. EPA, in response to this section, issued 40 *CFR*, Chapters 110, 112, 116, and 117. Kentucky's requirements are contained in 401 *KAR* 05 and *KRS* 224.01-400.

40 *CFR* § 110 prohibits the discharge of oil in harmful quantities, which are those that violate applicable water quality standards; cause a film or sheen on the surface of the water; or cause a sludge or emulsion to be deposited beneath the water surface or on the shoreline. Any releases of oil under 40 *CFR* § 110 are reported to the Natural Response Center and the Kentucky Department for Environmental Protection (KDEP). 40 *CFR* § 112 requires that an SPCC Plan be generated for any facility that has discharged or could reasonably be expected to discharge oil in harmful quantities. This SPCC Plan meets the requirements of 40 *CFR* § 112 and analogous Kentucky requirements.

The FRP for PGDP is written to comply with federal regulations outlined in the CWA, Section 311 (j)(5), as amended by the Oil Pollution Act, Section 4202 (a)(6). The regulation requires that owners/operators of certain non-transportation-related facilities, currently subject to the SPCC requirements of 40 *CFR* § 112, develop an FRP. Facilities that, because of their location and petroleum storage capacity, could cause "substantial harm" to the environment by discharging oil into or on the navigable water or adjoining shorelines must submit a FRP. The FRP shall be reviewed and evaluated at least once every five years or as deemed necessary. Updates and revisions shall be made with the change of facility information, emergency response action plan, and release vulnerability. The PGDP FRP was updated during 2017.

Notification requirements are implemented through procedures and KPDES permit requirements. 40 *CFR* § 125 and 401 *KAR* 05 require that persons who hold National Pollutant Discharge Elimination

System/KPDES permits incorporate Best Management Practices (BMPs) into their operations. BMPs, including spill control, are outlined in PAD-REG-1006, *Best Management Practices Plan*. BMPs are used to protect against the discharge of toxic and hazardous pollutants.

CERCLA Section 101(14) calls for a list of those materials already designated as hazardous or extremely hazardous under any one of five statutes. These hazardous or extremely hazardous substances and their reportable quantities (RQ) are designated in 40 *CFR* § 302.4, Table 302.4; 40 *CFR* § 117; 302; and 355. Additional substances can be added to the list by the EPA administrator under Section 102 of CERCLA. Releases of these substances in quantities exceeding their RQ must be reported to the National Response Center and KDEP if the RQ is exceeded. If the release also has the potential to go off-site, the release must be reported to the McCracken County and Ballard County Disaster Emergency Services. Kentucky Statute, *KRS* 224.01-400, in addition to releases of materials if the abovementioned RQs are exceeded, also sets RQs for petroleum products (gasoline, oil) that are specifically excluded from the CERCLA lists.

In addition to the plans mentioned above, FPDP procedure CP3-ES-0003, *Environmental Incident Reporting*, provides site direction for reporting spills or discharges. The PSS in concert with Regulatory Compliance makes event notifications to appropriate agencies/parties including EPA, DOE/DOE Contractors, Kentucky, etc., as required by regulation/policy in accordance with this procedure.

2.16 QUALIFIED OIL-FILLED OPERATIONAL EQUIPMENT—40 *CFR* § 112.7(k)

Electrical transformers and circuit breakers located in the four switchyards at PGDP meet the 40 *CFR* § 112.2 definition of qualified oil-filled operational equipment. This equipment is located outdoors and does not have secondary containment due to electrical hazards associated with accumulated water in switchyards. These areas do, however, flow into facility drainage systems that are equipped with engineered, oil diversion/retention structures. Underflow dams designed to permit the passage of water but contain floating materials such as oil have been constructed in the plant drainage ditches with the potential to receive an oil discharge. The dams are designed to provide effective oil containment and were installed as a pre-emptive response action to contain the oil on-site. This switchyard equipment is inspected daily (per shift) for leaks, spills, and other operational issues. Containment dikes are inspected daily, drained as required, and checked for valve closure. Daily inspections are conducted in accordance with CP4-UT-0105. Transfer of oil from oil storage tanks to equipment is controlled by CP4-SM-0072, *Oil House C-540-A and C-541-A Oil Filter Press*.

3. ON-SHORE NONPRODUCTION FACILITIES—40 *CFR* § 112.8(a)

3.1 FACILITY DRAINAGE—40 *CFR* § 112.8(b)

The Paducah Site is located approximately 3.5 miles south of the Ohio River in a generally rural area of McCracken County, Kentucky. The WKWMA completely surrounds the facility. There are two tributaries of the Ohio River running through WKWMA, Bayou Creek on the west and Little Bayou Creek on the east. These two streams join north of the site and discharge to the Ohio River. These creeks exhibit widely fluctuating discharge characteristics that are tied closely to local precipitation. Natural runoff makes up a small portion of the flow in Bayou and Little Bayou Creeks during the dry periods and was supplemented largely by continuous water discharge from the Paducah facility. Surface runoff from the facility drains through 1 of 11 permitted outfalls directly to one of the tributaries. Because the facilities discharge flow directly into WKWMA, the distance to a fish and wildlife and sensitive environment essentially is zero from the facility outfalls.

These creeks are not used as drinking water supplies, but are accessible to wildlife and recreationists. Both creeks are classified by the Commonwealth of Kentucky as being for "all uses" and, therefore, are subject to warm water aquatic habitat criteria standards in the creeks and drinking water standards at the nearest drinking water withdrawal location (Cairo, IL).

In general, plant drainage is divided into east and west systems with some overlap. A site drainage diagram is provided in Appendix C. Liquid discharges (including potentially released oil and oil products) would be expected to flow to the major drainage ditches and potentially to Bayou Creek or Little Bayou Creek. The flow rate would vary according to the size and location of the discharge and the weather conditions at the time.

3.1.1 Drainage from Diked Storage Areas—40 *CFR* § 112.8(b)(1) & (2)

Outdoor dikes are designed to contain 110% of the largest tank or container contents, and also will contain the maximum expected rainfall in addition to the container or tank contents. All dikes are equipped with manual drain valves that remain closed unless rainwater is being discharged following the determination that no material has been spilled within the containment area in accordance with plant procedures.

The facility manager of any area with secondary containment is responsible for inspecting and maintaining dikes in accordance with procedures. Appendix B contains examples of checklists that personnel use to inspect diked areas located at C-600 and at C-200. These examples document methods used for secondary containment inspections.

3.1.2 Drainage from Undiked Storage Areas—40 *CFR* § 112.8(b)(3)

Areas such as tanker truck loading/unloading areas, oil-filled equipment, and piping associated with storage tanks or oil filled equipment also do not have secondary containment dikes. These areas, in additional to the plant switchyards, do however flow into facility drainage systems that are equipped with engineered, oil diversion/retention structures. Underflow dams designed to permit the passage of water, but contain floating materials such as oil, have been constructed in PGDP drainage ditches with the potential to receive a medium or worst case oil discharge. Each outfall that has the potential to receive an oil discharge has an oil containment underflow dam installed to prevent the flow of oil to the flume and contain the oil on-site prior to reaching Bayou or Little Bayou Creeks.

Historically, the C-600 Steam Plant was the source of oil sheen in the Paducah Site effluent ditch leading to KPDES Outfall 008. The oil sheen was skimmed above the inverted pipe dam. An oil control area has been established at C-600, and a belt skimmer was installed. If any oil escapes the control area, it will be trapped downstream in the oil control structures established for the outfall.

The skimmer at Outfall 008 underflow dam consists of a dam, quiet zone, and weir. Adjacent to the dam is an oil containment pond. The dam creates a quiet zone with a three-hour retention time to allow oil and other buoyant materials to separate from the water. A skirted oil boom diverts floating materials to a slightly submerged float-controlled weir. Most of the ditch flow will underflow the floating boom and then overflow the dam. Diverted materials will flow to the containment pond and remain there for remediation. An underflow dam maintains the water level in the containment area.

Should an oil or chemical spill reach a drainage ditch, inflatable pipe stoppers are available to fit any of the culverts in these ditches. Spill containment can be provided within the perimeter fence, if necessary. Booms and absorbent pads can be used in the event a spill reached the creeks.

3.1.3 Drainage Diversion Systems—40 *CFR* § 112.8(b)(4)

The facility drainage system is equipped such that, in the event of an uncontrolled discharge, oil will be retained on facility property. Underflow dams designed to permit the passage of water, but that contain floating materials such as oil, have been constructed in the plant drainage ditches with the potential to receive a medium or worst case oil discharge. The dams are designed to provide effective oil containment and were installed as a preemptive response action for potential future spills to contain the oil prior to reaching Bayou Creek or Little Bayou Creek.

3.1.4 Facility Drainage Water Treatment—40 *CFR* § 112.8(b)(5)

Facility drainage waters are not treated continuously at the site prior to discharge.

3.2 BULK STORAGE CONTAINERS—40 *CFR* § 112.8(c)

Per 40 *CFR* § 112.2, bulk storage container means any container used to store oil. These containers are used for purposes including, but not limited to, the storage of oil prior to use, while being used, or prior to further distribution in commerce. Oil-filled electrical, operating, or manufacturing equipment is not a bulk storage container. Bulk storage containers are identified in Table A. Bulk storage containers will meet 40 *CFR* § 112.7 requirements outlined in Section 2.0 of this SPCC Plan and the following additional requirements.

3.2.1 Container Compatibility—40 *CFR* § 112.8(c)(1)

Bulk storage containers utilized at the site are constructed of steel, plastic, or another suitable material and are compatible with the materials being stored and storage conditions. Quality Control is responsible for inspecting the integrity of all the corrosive liquid storage tanks located on the plant site in accordance with plant procedures. Corrosive liquid storage tanks are any tanks which contain substances that can cause destruction of living tissue by chemical action. This includes oil storage tanks. A list of oil storage tanks and respective inspection criteria/scheduling is maintained by the Work Planning and Scheduling Group. Prior to any new containers being used or constructed on-site for bulk oil/oil product storage, the responsible project coordinates with Engineering and Regulatory Compliance to evaluate container compatibility and to ensure inclusion on the oil inventory as well as the identification of inspection/testing requirements.

3.2.2 Secondary Containment for Bulk Storage Containers—40 *CFR* § 112.8(c)(2)

Oil storage tanks at the site are provided with secondary containment. Secondary containment dikes are constructed to be impervious to the materials stored. Typically, the dikes are concrete and painted or otherwise sealed. In some cases, secondary containment is provided by dual-wall construction, which may be augmented by containment dikes. The in-service fuel oil storage tank at C-600 has an earthen dike lined with a synthetic material impervious to oil. Secondary containment areas located outside of buildings or facilities will hold at least 110% of the largest tank in the containment area. This will allow enough containment capacity for both expected rainfall and the entire contents of the tank. Secondary containment areas located inside the buildings will hold 100% of the largest tank in the containment area.

3.2.3 Valve Closure and Drainage—40 *CFR* §§ 112.8(c)(3)

All dikes are equipped with manual drain valves that remain closed unless rainwater is being discharged. Prior to discharge, a determination that no material has been spilled within the containment area is required in accordance with site procedures. Valve closure status is an element of periodic inspections identified in site procedures and is captured on inspection logs. Personnel conduct visual inspections of diked areas before draining as described in CP4-UT-0405, *Utilities Routine Duties Checks and Inspections*. Appendix B contains an example of checklists personnel use to inspect the diked area located at C-200 and C-600. These examples document methods used for secondary containment inspections. Records of these inspections are maintained in accordance with the Records Management Program.

3.2.4 Corrosion Protection of Buried/Partially Buried Storage Metallic Tanks—40 *CFR* § 112.8(c)(4) & (5)

The Paducah Site currently does not have any buried or partially buried metallic oil storage tanks in service.

3.2.5 Integrity Testing of Aboveground Containers—40 *CFR* § 112.8(c)(6)

Aboveground containers undergo inspection on a regular schedule and whenever material repairs are made. All aboveground tanks, with the exception of the C-601-A and C-601-B Fuel Oil Storage tanks, meet the following standards:

- Elevated or double-wall, such that the bottom of the primary tank is not in contact with the ground and can be visually inspected.
- Secondary containment or double-wall tank provides release prevention barrier of material sufficiently impervious to stored material.
- Leaks can be detected visually by operators.

All in-service tanks included in Appendix A are inspected periodically by operations personnel in accordance with site procedures. These inspections are documented on roundsheets or checklists, examples of which are included in Appendix B. For a list of AST inspection and testing criteria, refer to Table 1.

Integrity testing of the C-601-A and C-601-B Fuel Oil Storage Tanks is performed by a qualified contractor in accordance with requirements outlined in API-653. External and internal ultrasonic inspection is conducted by API/STI certified inspectors.

3.2.6 Internal Heating Coils—40 *CFR* § 112.8(c)(7)

The site has no bulk storage containers with internal heating coils.

3.2.7 Liquid Level Sensing—40 *CFR* § 112.8(c)(8)

The fuel storage locations at the C-600 facility are equipped with spill detection alarms and automatic shut-off devices. Originally, the oil supply line from the fuel oil storage tank to the C-600 boiler system was equipped with a flow alarm that would detect abnormal flow in the event of a leak. A remote shut-off valve was installed in the supply line. With replacement of the old boilers with the five package boilers, the configuration of the tank has been changed. Now the C-601-B tank is used to charge a 500-gal tank that connects to the two package boilers that can use fuel oil. Filling of the 500-gal tank from the C-601-B tank is conducted in accordance with site procedures and is monitored continuously by site personnel during the process.

The fuel dispensing station at C-752-B has spill detection alarms and automatic shut-off devices.

The ASTs at C-333 and C-337 are of double-wall construction with leak detection monitors for the interstitial space.

Other smaller containers are monitored directly by personnel during transfer operations using gauges, sight glasses, or other visual measurements. Liquid levels are included in periodic inspections and documented on inspection logs, which are maintained in accordance with the Records Management Program.

Discovery of alarms or a spill will be reported immediately to the PSS. The PSS will respond to the scene and determine if a spill actually has occurred, and, if so, the required level of response needed. Alarm response and spill response are addressed in site procedures.

3.2.8 Effluent Treatment Facilities—40 *CFR* § 112.8(c)(9)

The Paducah site has no effluent treatment facilities dedicated solely to treating drainage from storage areas.

3.2.9 Leakage Response—40 *CFR* § 112.8(c)(10)

Facility managers are responsible to inspect and drain dikes. If any visible discharge or leak has occurred, the material must be reported, removed, and properly dispositioned in accordance with site procedures. If necessary, repairs to storage container or associated equipment will be initiated immediately.

3.2.10 Mobile or Portable Storage Containers—40 *CFR* § 112.8(c)(11)

Product containers such as drums are stored in areas with secondary containment, typically, a portable system such as a drum pan. A 750-gal, portable oil tank trailer utilized in maintenance of electrical switchyard equipment typically is stored at one of the switchyard oil houses. As mentioned previously, no secondary containment is provided in these areas. The switchyards flow into facility drainage systems that are equipped with engineered, oil diversion/retention structures. Underflow dams designed to permit the passage of water, but contain floating materials such as oil have been constructed in the plant drainage ditches with the potential to receive a medium or worst case oil discharge. The dams are designed to provide effective oil containment and were installed as a preemptive response action for potential future spill to contain the oil on-site.

3.3 FACILITY TRANSFER OPERATIONS—40 *CFR* § 112.8(d)

3.3.1 Buried Piping at Transfer Operations—40 *CFR* § 112.8(d)(1)

The Paducah Site does not operate any buried piping associated with oil transfer operations.

3.3.2 Terminal Connections at Transfer Operations—40 *CFR* § 112.8(d)(2)

The primary oil transfer operations are associated with filling the C-601-B fuel oil storage tank and operation of electrical switchyard equipment. The terminal connections for piping systems associated with these systems are capped or plugged with appropriate fittings to prevent leakage in the event a valve fails or is not sealed properly.

3.3.3 Pipe Supports at Transfer Operations—40 *CFR* § 112.8(d)(3)

Support structures for aboveground oil transfer piping are engineered in accordance with established specifications to prevent abrasion and corrosion. Typically, these supports consist of painted metal structures anchored to concrete footings. The piping is attached to the supports using "U"-type bolts or piping hangers that will allow for proper expansion and contraction of the piping. Supports are inspected during periodic tank and pipe inspections and documented on inspection logs.

3.3.4 Inspections for Transfer Operations—40 *CFR* § 112.8(d)(4)

The piping systems associated with the facility transfer operations primarily related to switchyard equipment maintenance are inspected for leaks during use in accordance with site procedures.

3.3.5 Posting for Aboveground Piping—40 *CFR* § 112.8(d)(5)

Aboveground piping is used primarily for oil transfers in the electrical switchyards areas. The majority of this system is located so that vehicle traffic is not an issue. Access to the areas where it does cross roadways typically is restricted to authorized individuals only. Delivery and/or vendor vehicles, if allowed in the area, would be escorted by facility personnel.

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APPENDIX A

TANK EVALUATION

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TABLES

FIGURES

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Table A.1. Aboveground Storage Tanks Gasoline, Kerosene, E-85, or Diesel

Tank No.[1]	Area No.	Location	Maximum Capacity (gal)	Substance Stored	Secondary Containment Capacity (gal)	Drainage Ditch
A1	1	C-333[3]	250 (not in use)	Gasoline	900	009
A1a	1	C-333	1,000	Gasoline	1,100[2]	009
A2	2	C-337[3]	250 (not in use)	Gasoline	1,080	001
A2a	2	C-337	1,000	Gasoline	1,100[2]	001
A4	3	C-724	250	Gasoline	2,180	008
A5	4	C-746-A[3]	250 (not in use)	Gasoline	1,120	001
A6	4	C-746-A[3]	250 (not in use)	Gasoline	1,120	001
A7	5	C-750[3]	5,500 (not in use)	Gasoline	11,150	009
A8	6	C-540	250	Kerosene	600	011
N/A	7	C-752-B	3,000	Gasoline	7,400	009
N/A	7	C-752-B	1,000	E-85	7,400	009
N/A	7	C-752-B	3,000	Biodiesel	7,400	009
N/A	7	C-752-B	1,000	Diesel	7,400	009
N/A	8	C-746-U	1,000[2] (not in use)	Diesel	N/A	019
N/A	8	C-746-U[3]	500[2] (not in use)	Gasoline	N/A	019

[1] All tanks are diked and are carbon steel.
[2] This tank is double-wall with interstitial leak detection.
[3] Tanks have been drained.

Location of tanks for Areas 1–8 listed on page A-5 are shown on Figure A.1.

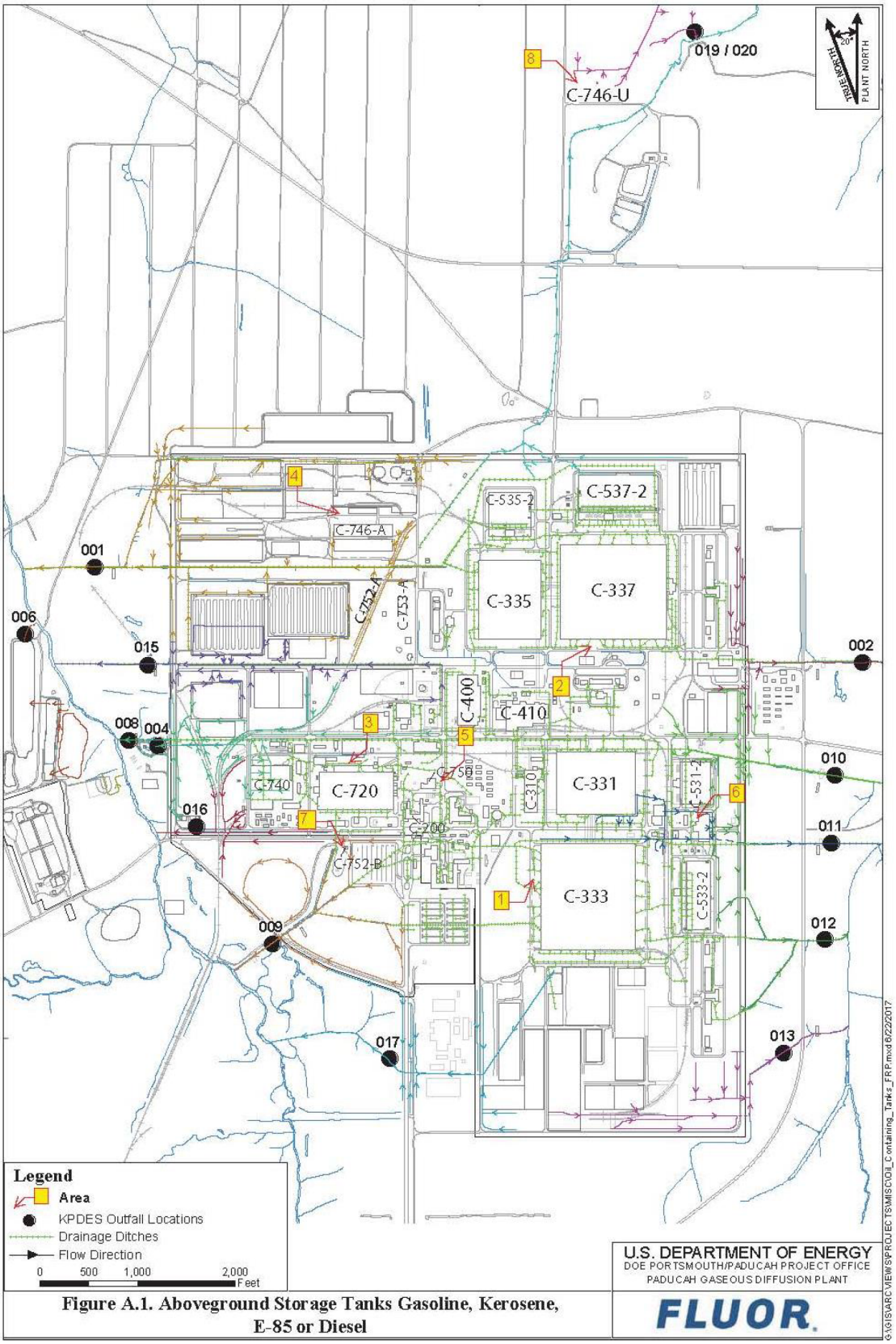

Figure A.1. Aboveground Storage Tanks Gasoline, Kerosene, E-85 or Diesel

Table A.2. Aboveground Storage Tanks Diesel

Tank No.[1]	Area No.	Location	Maximum Capacity (gal)	Secondary Containment Capacity (gal)	Drainage Ditch
A9	1	C-200	550	1,050	009
A10	2	C-310[2]	250 (not in use)	540	009
A11	3	C-331[2]	250 (not in use)	530	009
A12	4	C-331[2]	250 (not in use)	530	009
A13	5	C-333[2]	250 (not in use)	660	009
A14	6	C-333[2]	250 (not in use)	660	009
A15	7	C-333[2]	250 (not in use)	660	009
A16	8	C-333[2]	250 (not in use)	900	009
A17	9	C-335[2]	250 (not in use)	1,200	001
A18	10	C-335[2]	250 (not in use)	1,200	001
A19	11	C-337[2]	250 (not in use)	660	001
A20	12	C-337[2]	250 (not in use)	660	002
A21	13	C-337[2]	250 (not in use)	660	002
A22	14	C-337[2]	250 (not in use)	1,080	001
A23	15	C-607[2]	550 (not in use)	750	008
A24	16	C-611	1,500	2,090	006
A26	17	C-631[2]	250 (not in use)	660	008
A27	18	C-724[2]	500 (not in use)	2,180	008
N/A	19	C-600	500	N/A	008
N/A	20	C-631-3[2]	300 (not in use)	N/A	008

[1] All tanks are diked and carbon steel.
[2] Tanks have been drained.

Location of tanks for Areas 1–20 listed on page A-7 are shown on Figure A.2.

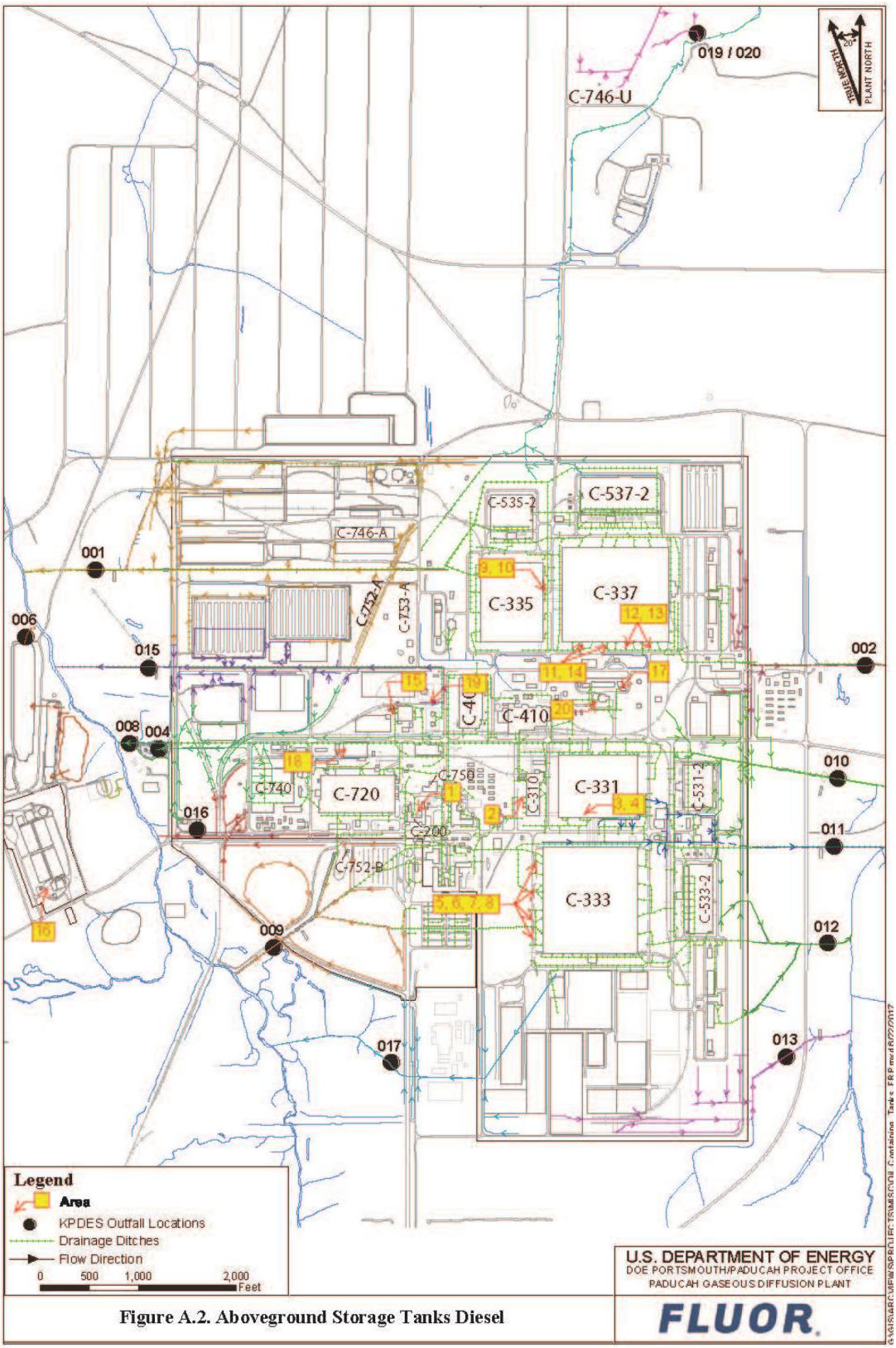

Figure A.2. Aboveground Storage Tanks Diesel

Table A.3. Aboveground Storage Tanks Oil

Tank No.[1]	Area No.	Location	Maximum Capacity (gal)	Substance Stored	Secondary Containment Capacity (gal)	Drainage Ditch
A28	1	C-601-A	420,000	Emergency Storage	675,000	008
A29	2	C-601-B	420,000	Fuel oil	675,000	008
A33	3	C-540 (NW)	15,000	Transformer oil	38,000	011
A34	4	C-540 (SW)	15,000	Transformer oil	38,000	011
A35	5	C-540 (NE)	7,500	OCB oil	11,400	011
A36	6	C-540 (SE)	7,500	OCB oil	11,400	011
A37	7	C-541 (SE)	15,000	Transformer oil	38,000	001
A38	8	C-541 (SW)	15,000	Transformer oil	38,000	001
A39	9	C-541 (NE)	7,500	OCB oil	11,400	001
A40	10	C-541 (NW)	7,500	OCB oil	11,400	001

[1] All tanks are diked and carbon steel.

Location of tanks for Areas 1-10 listed on page A-9 are shown on Figure A.3.

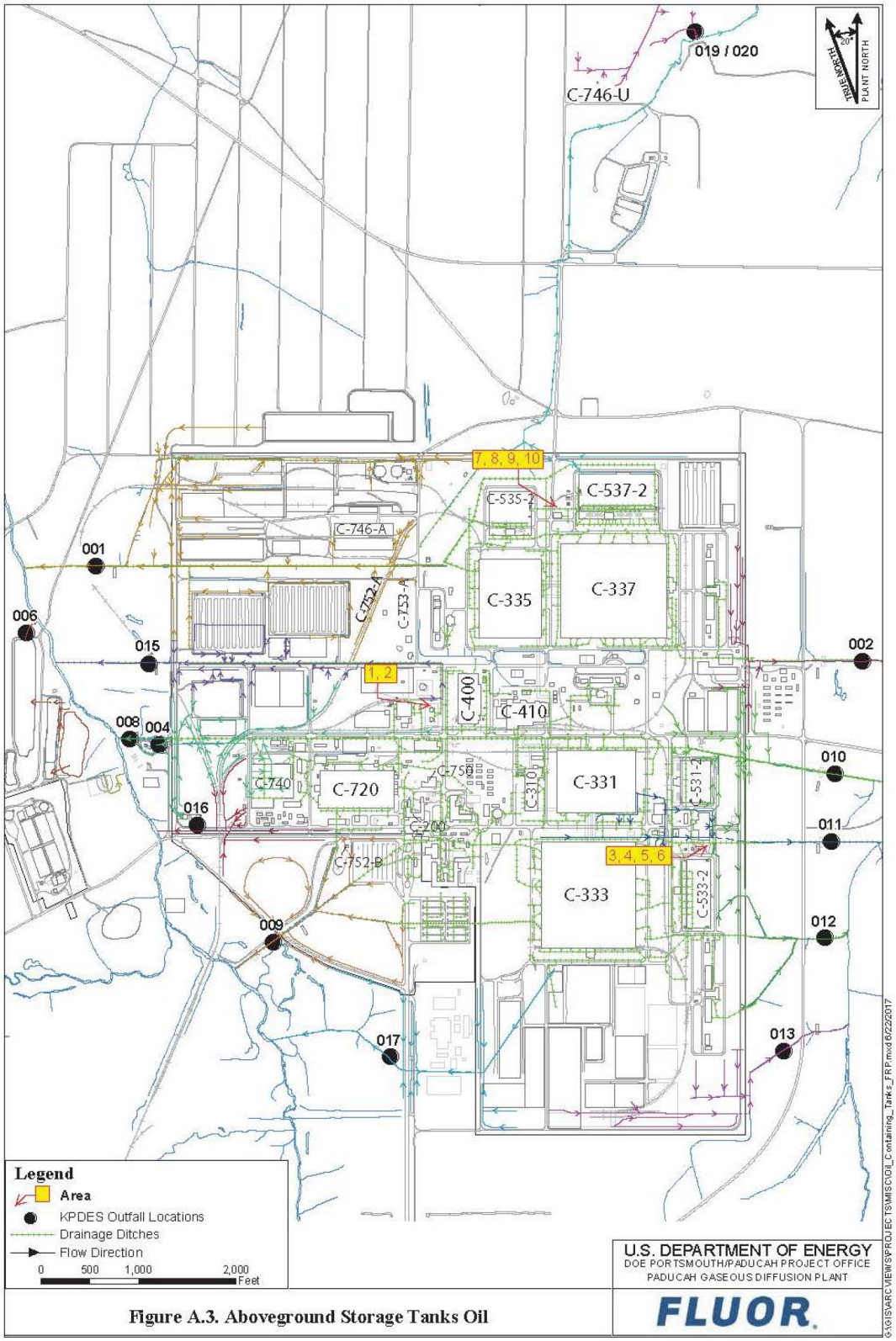

Figure A.3. Aboveground Storage Tanks Oil

Table A.4. Aboveground Storage Tanks Lube Oil

Tank No.[1,2]	Area No.	Location and Quantity	Function	Maximum Capacity[4] (gal)	Secondary Containment Capacity[3] (gal)	Drainage Ditch
A41	1	C-310-A (1)[5]	Supply	265	N/A	008
A42	2	C-310 (1)	Drain	14,700	16,159	008
A43	2	C-310 (1)	Supply	9,320	N/A	008
A44	3	C-315 (1)	Drain	380	636	011
A45	3	C-315 (1)	Supply	330	449	011
A46-49	4	C-331 (4)	Drain	13,600 (each)	25,248	008, 009, 010, 011
A50-53	4	C-331 (4)	Supply	7,200 (each)	N/A	008, 009, 010, 011
A54-65	5	C-333 (12)	Drain	10,100 (each)	30,298	009, 011, 012
A66-71	5	C-333 (6)	Supply	13,000 (each)	N/A	009, 011, 012
A72-75	6	C-335 (4)	Drain	13,600 (each)	25,248	001
A76-79	6	C-335 (4)	Supply	7,200 (each)	N/A	001
A80-91	7	C-337 (12)	Drain	10,100 (each)	30,298	001, 002
A92-97	7	C-337 (6)	Supply	13,000 (each)	N/A	001, 002

[1] All tanks are carbon steel.
[2] Tanks were installed in 1952.
[3] All drain tanks are diked with level alarms. All supply tanks are diked by the building.
[4] Lube oil tanks have been drained and removed from service.
[5] C-310-A lube oil tank was drained; flowable fill was added to tank and piping trench.

Location of tanks for Areas 1–7 listed on page A-11 are shown on Figure A.4.

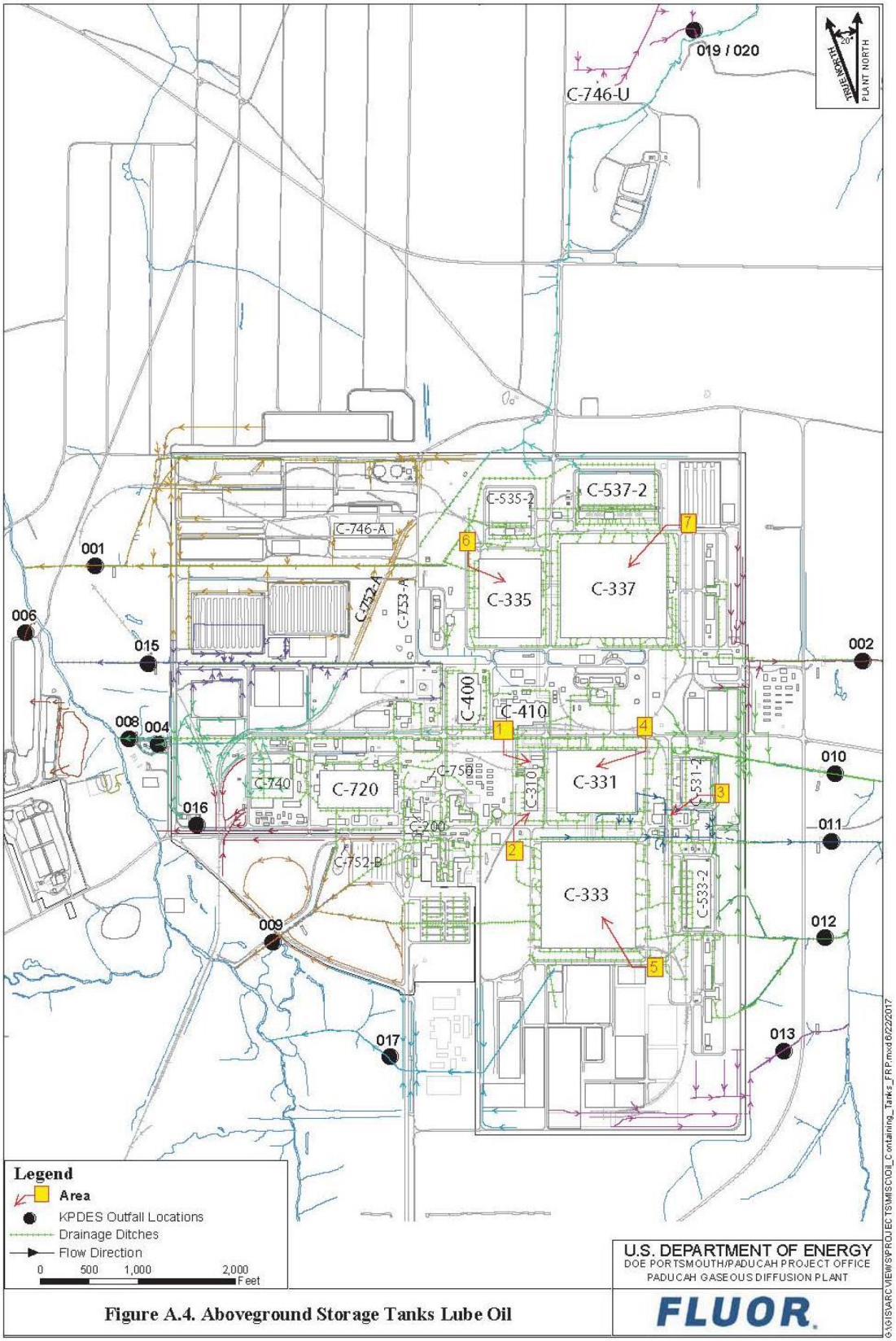

Figure A.4. Aboveground Storage Tanks Lube Oil

Table A.5. Hazardous Waste Facilities

Area No.	Location	Designation	Storage Capacity[1]	Drainage Ditch
1	C-335	RCRA 90-Day Storage Area	210 gal	001
2	C-733	Hazardous Waste Storage Area	38,500 gal	008
3	C-746-Q	Hazardous and Mixed Waste Storage Area	306,570 gal	012
4	C-752-A	Hazardous and Mixed Waste Storage Area	496,000 gal	015, 001
5	C-757	RCRA 90-Day Storage Area	5,000 gal	001

[1] When multiple tanks are utilized, the amount shown is the total.

Location of hazardous waste facilities for Areas 1-5 listed on page A-13 are shown on Figure A.5.

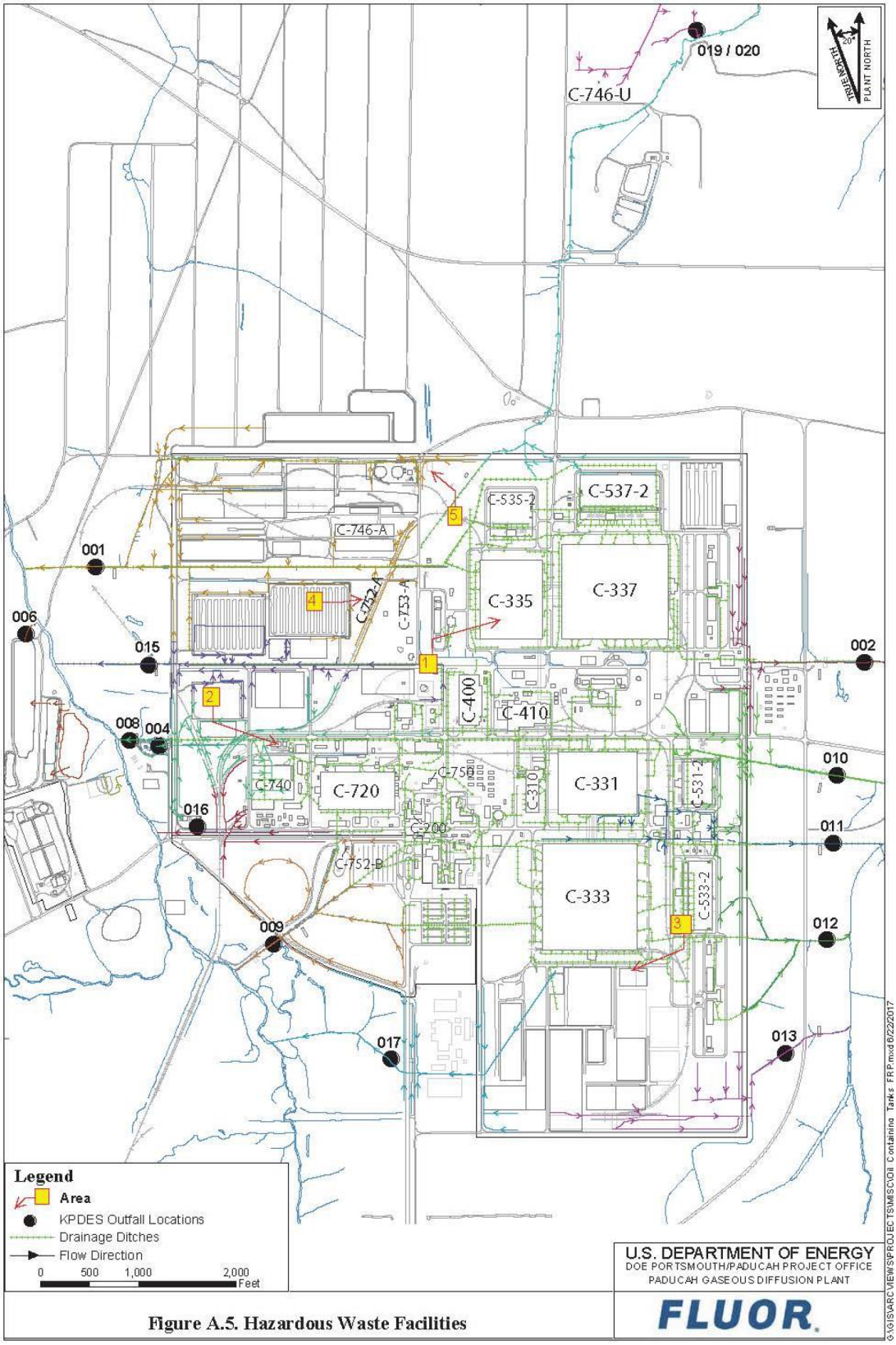

Figure A.5. Hazardous Waste Facilities

Table A.6. Oil-Filled Electrical Equipment Located in the Switchyards

Area No.	Quantity	Location	Maximum Capacity Per Tank (gal)*	Substance Stored	Equipment Type	Drainage Ditch
1	6	C-531	345	Oil	Potential transformer	010
	8		15,000		Power transformer	
	5		400		Grounding transformer	
	42		1,320		OCBs	
	2		14,310		Reactors	
	5		300		Neutral reactor	
2	12	C-533	800	Oil	Potential transformer	012
	12		15,000		Power transformer	
	12		400		Grounding transformer	
	105		1,835		OCBs	
	1		17,650		Reactor	
	12		300		Neutral reactor	
3	6	C-535	345	Oil	Potential transformer	001
	5		15,000		Power transformer	
	5		400		Grounding transformer	
	16		1,320		OCBs	
	5		300		Neutral reactor	
4	12	C-537	345	Oil	Potential transformer	001
	13		15,000		Power transformer	
	13		400		Grounding transformer	
	35		1,320		OCBs	
	3		21,481		Reactor	
	13		300		Neutral reactor	

*Maximum capacities are based on the largest tank located within each piece of equipment.

Location of oil-filled electrical equipment for Areas 1-4 listed on page A-15 are shown on Figure A.6.

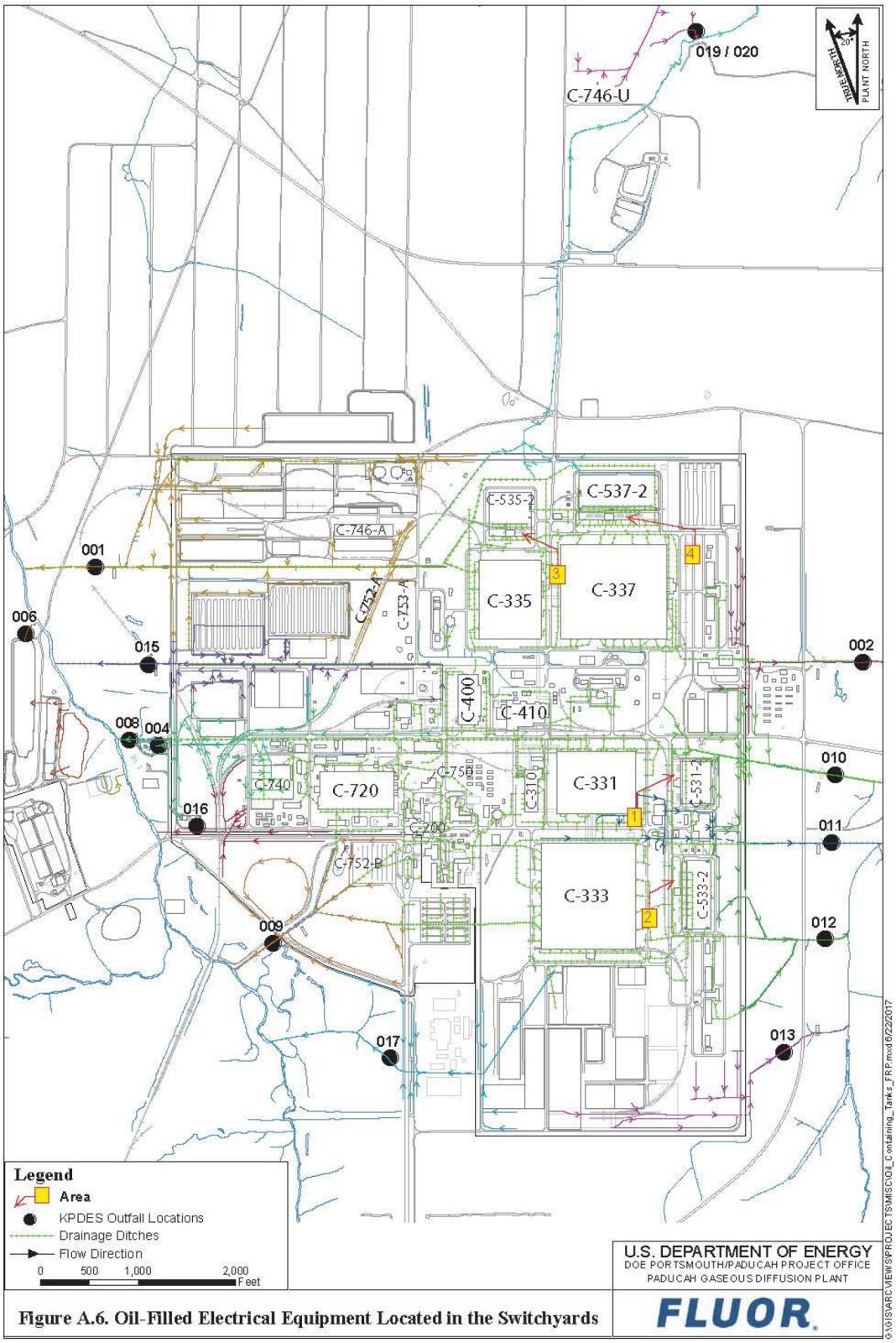

Figure A.6. Oil-Filled Electrical Equipment Located in the Switchyards

Table A.7. Miscellaneous Oil Containing Equipment and Containers

Area No.	Facility	Designation	Total Capacity	Drainage Ditch
1	C-333-A	Hydraulic Oil Tank	125 gal	009, 011, 012
2	C-335	Lube Oil Skid	300 gal	001
3	C-337	Lube Oil Skid	300 gal	001
3	C-337	31A Oil Totes (Quantity is 68)	23,800 gal	001
3	C-337	Drained PCB Transformers (Quantity is 67)[1]	105,000 gal	001
4	C-337-A	Hydraulic Oil Tank	125 gal	001
5	C-360	Hydraulic Oil Tank	200 gal	002, 010
6	C-750	Used Oil	330 gal	009
7	C-755-Y	Used Oil	150 gal	002
8	C-100	Diesel Generators (Quantity is 2)	616 gal	009
9	C-415	Diesel Generator	100 gal	010
10	C-611	#7 Pump	450 gal	006
11	C-611-U	Diesel Generator	450 gal	006
12	C-740-B	55-gal oil drums (Quantity is 82)	4,510 gal	008, 009
13	C-802	Diesel Generator	200 gal	009, 017

[1]PCB transformers have been drained.

Location of miscellaneous oil containing equipment and containers for Areas 1-13 listed on page A-17 are shown on Figure A.7.

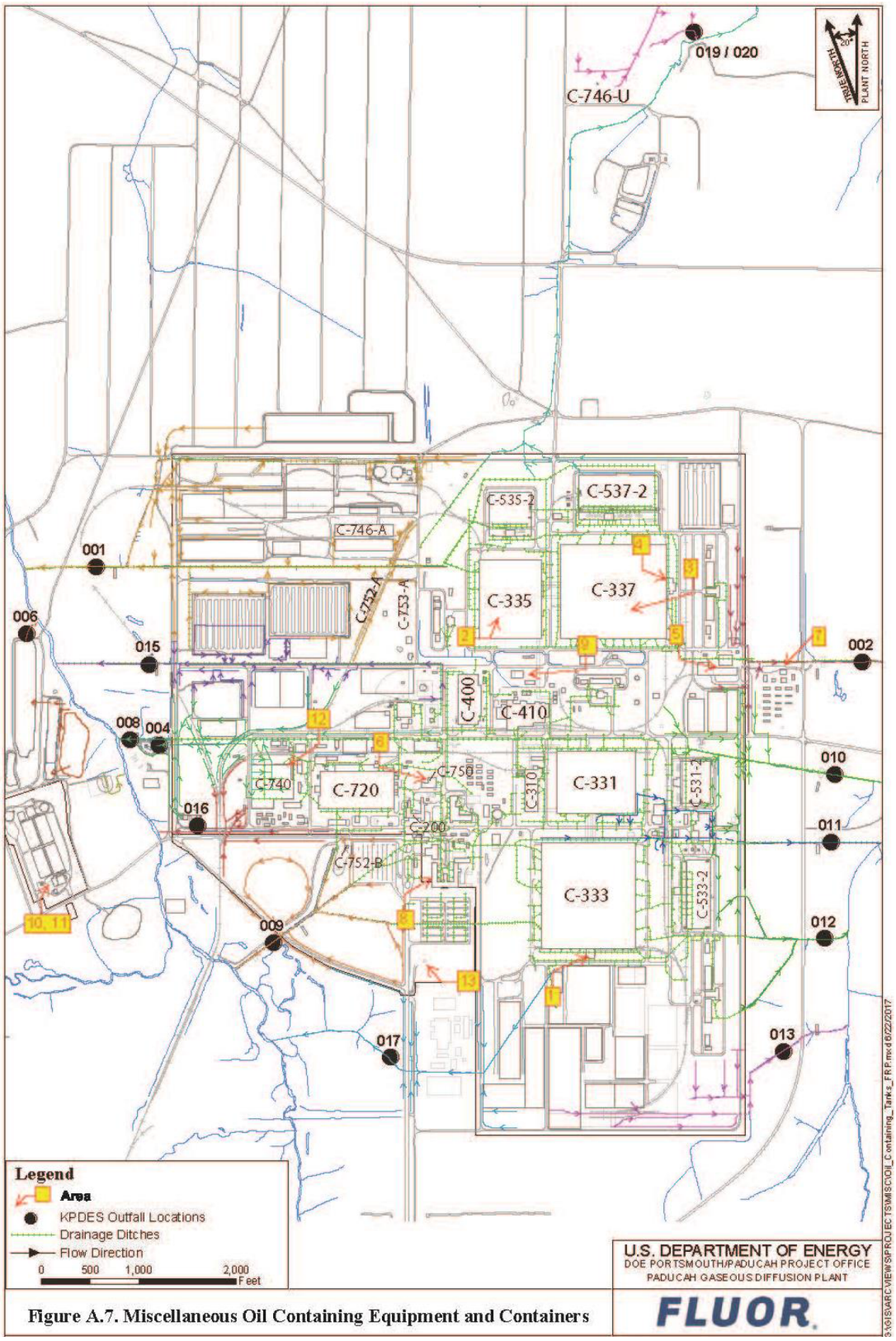

Figure A.7. Miscellaneous Oil Containing Equipment and Containers

APPENDIX B

EXAMPLES OF INSPECTION CHECKLISTS

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CP4-OP-1124-F04 - Facility Operations Monthly Emergency Equipment Inspection

Month:_____ Year:_____

SUPPLIES	MINIMUM REQUIRED	MINIMUM AVAILABLE	
		YES	NO
Sandbags	50		
Absorbent Media	50 bags, 40 lbs each, or equivalent		
Absorbent Rolls	2 rolls, approximately 38" X 100 ft each, or equivalent		
Absorbent Pillows	24, approximately 15" x 15"		
Absorbent Pads	200, approximately 16" x 20"		
Oil Booms – 8" by 10'	20		
Oil Booms – 5" by 10'	12		
Face Shields	8		
Splash Suits	4		
Tyvek Coveralls	20		
Gloves	20 pair		
Booties	20 pair		
EQUIPMENT	**MINIMUM REQUIRED (IN WORKING CONDITION)**	**MINIMUM AVAILABLE**	
		YES	NO
Oil Skimmer			
2" Pump	1		
4" Pump	1		

Comments:_____

_____

_____

_____

_____

_____

_____

_____

Inspected by:_____Badge Number:_____Date: _____

FLM Review:_____Badge Number:_____Date: _____

CP4-OP-1124-F04 R0

CP4-OP-1124-F01 – Chemical Operations Operator Rounds and Equipment Status Sheet

Date:	Time:

LOCATION		OK
C-400 BUILDING [Including breakrooms/changehouses/process areas/basement, etc. (minimum of 1 exhaust fan must be operating at least one hour prior to entering the basement)]		
Water Leaks		
Air Leaks		
Lighting		
Exhaust fans running [basement (minimum of 1 exhaust fan must be operating at one hour prior to entering the basement.)]		
Energized 480 Volt heater cord connections checked <110ºF. (Note heater locations where connections are >110ºF in Remarks section and notify FLM.)		
C-400 CAAS AIR BOOSTER COMPRESSOR		
Check air pressure on PI-136. **If** pressure ≥ 158.0 psig and compressor is running, **then** notify FLM.		
*Oil is at top of circle within bull's eye when compressor is shut down		
CAAS Compressor hour meter reading		
C-409 BUILDING (Including breakrooms/change houses/process areas, etc.)		
Water leaks		
Air leaks		
***Lighting		
C-409 CAAS AIR BOOSTER COMPRESSOR		
Check air pressure on PI-136. **If** pressure ≥ 158.0 psig and compressor is running, **then** notify FLM.		
*Oil is at top of circle within bull's eye when compressor is shut down		
CAAS Compressor hour meter reading		
C-410-D /C-410-K		
No evidence of fluorine leakage in area or equipment		
C-410-K alarm check performed		
C-410-D CAAS AIR BOOSTER COMPRESSOR		
Check air pressure on PI-136. **If** pressure ≥ 158.0 psig and compressor is running, **then** notify FLM.		
*Oil is at top of circle within bull's eye when compressor is shut down		
CAAS Compressor hour meter reading		
C-410-D AND C-410-K FLUORINE AREAS		
PRESSURES	Tank A (Max. 148 psia Min. 16 psia)	
	Tank B (Max. 148 psia Min. 16 psia)	
	Tank C (Max. 148 psia Min. 16 psia)	
	Header (Max. 22.7 psia Min. 15 psia)	
No evidence of leakage from tube truck		
C-742-B ClF_3 Cylinder Storage Yard		
No combustible waste or excessive vegetation within 10 feet of cylinders		
Cylinder labels, barricades and postings are free from damage and are legible		
C-745-A-1 F_2 Tube Truck		
No evidence of leakage from tube truck		
No evidence of damage to tubing or valves		
Truck labels and posting are free from damage and legible		

CP4-OP-1124-F01 – Chemical Operations Operator Rounds and Equipment Status Sheet

LOCATION	OK
C-410 L SPILL RESPONSE AREA	
Sliding door is sealed with TID and locked	

Comments: _____

_____

_____

_____

_____

Operator signature: _____ Badge # _____ Date _____

FLM signature: _____ Badge # _____ Date _____

* **If** oil below circle inside bull's eye, **then** add oil according to CP3-OP-0301. **If** above inside bull's eye, **then** notify FLM.
** Not required when truck is in winter storage.
*** Excludes lighting above C-409 Uranium Recovery Area

CP-23411 WEEKLY CHECKLIST

DATE:_____

CHEMICAL		PART NUMBER	CURRENT INVENTORY	MINIMUM AMOUNT	REORDER
Chemical Name	**Size**				
Hardness Indicator Powder	3 oz btl	460-S0277		>1 btl	
Hardness Buffer Solution	Qrts btl	42453		> 2 qrts	
Hardness Titrating solution	Qrts btl	460-S0274		> 1 qrt	
Water Conditioning Salt	40 # bag	N/A		> 5 bags	
Distilled Water	GAL	N/A		N/A	
Molyver 1	25 ml pk/100	1414669		1	
Molyver 2	25 ml pk/100	1414869		1	
Molyver 3	25 ml pk/100	1415869		1	
NALCO 3DT231	55 GAL drum			>.5	
STABREX ST70	55 GAL drum			>.5	
TRASAR 2	QT	460-S0920.74		>1	
TRASAR 3	QT	460-S0980.74		>1	
NEXGUARD 22350	55 GAL drum			>2	
NALCO 750 Anti-foam	55 GAL drum			>1	
Ultrion 8186	275 GAL tote			2	
Molybdate	55 GAL drum	1419301		1	
Remarks:					
Operator:					
FLM:					

CP-23411 WEEKLY CHECKLIST

DATE: _____

AREA	TYPE OF OIL	Stores Number	Estimated Amount	Minimum Amount	Reorder
C-600	BG Shell 68			30 gal.	
	ISO 32, #158 (Sump & motor bearing oil for all Centac's)				
C-620	A1000C Synthetic Lubricating Oil			55 gal.	
	Schaeffer # 112 Micron Moly HTC Machine Oil SAE 30 ISO-100			55 gal.	
	Molykote 44 grease			1 tube	
C-335	Lectrodryer Sealant	D8[illegible]666-0[illegible]		2 sticks	
	ISO 32, #158 (Sump & motor bearing oil for all Ce[illegible]'s)				

C-335 CENTAC HOUR METER READINGS	
#1 CENTAC	
#2 CENTAC	
#3 CENTAC	

REMARKS:

CP-23411 WEEKLY CHECKLIST

DATE: _____

Inspect/drain C-601 fuel oil storage tanks containment dike according to CP4-UT-0405	√	
C-200 Fuel Oil Tank Checked	√	

Eyewash Stations and Lights					
A. C-607 Battery	√		E. Lab	√	
B. Low Bay	√		F. South East Door	√	
C. Chemical Pump Area	√		G. C-600 Transformer Room	√	
D. C-604	√				

Coal Sump Pumps (oil)	√	
Sanitary Sump Pumps (grease)	√	
Check Fire Alarm Pull box lights	√	
Molybdate concentration Chilled Water well	√	
Safety Showers	√	

OPERATOR: _____

FLM: _____

C-611 ROUTINE WEEKLY DUTIES & INVENTORY

Date:_____

			INITIAL
DIKES	**1. FUEL OIL**	**Drains capped, no standing water, no sheen or no visual damage**	
	2. POLYMER		
C-611-O OVERFLOW		**@ _____%**	
INVENTORY DIESEL FUEL TANK _____ INCHES X 23 = _____gal.			
INVENTORY CHEMICAL STORAGE BINS, % FULL			
C-611-B	**LIME**		
	FERRIC		
	SODA ASH		
C-611-U	**LIME**		
	FERRIC		
	SODA ASH		
C-611-A	**POLYMER**		
INVENTORY CHEMICAL REAGENTS		Attach log sheet	
SAFETY SHOWER INSPECTIONS		Log Book	
SAA – GSA INSPECTIONS		Log Book	
PHOSPHATE BAGS IN C-611-H		**RECID #00476 _____**	
CRITICAL EQUIPMENT	**C-611-U EMERGENCY GENERATOR**		
	VALVE WRENCH GENERATOR		
	6" PUMPS (2)		

REMARKS/NEEDS_____

_____

_____

C-611 ROUTINE WEEKLY DUTIES & INVENTORY

Date:_____

ITEM	Container Size	STORES #	RECID #	AMOUNT	MIN.	SUPPLIER	Reorder
Calcium Indicator	3oz btl	65-081-4800	A0286	btl	>3btl	Material Request	
Hardness Buffer Solution	1qt. btl	03-530-1015	86293	btl	>1btl	In Stock	
Hardness Indicator Powder	3oz btl	03-530-1035	86292	btl	>2btl	BPA PO-574902	
Methyl Purple Indicator	32oz btl	03-549-3025	93086	btl	>3btl	In Stock	
PH 10 Buffer	1pt btl	03-508-0275	90038	btl	>8btl	In Stock	
PH 7 Buffer	1pt btl	03-508-0265	90037	btl	>8btl	In Stock	
PH Probe Storage Solution	1pt btl	65-181-3520	L5091	btl	>8btl	In Stock	
Phenolphthalein	1pt btl		00388	btl	>1b	Lab	
Potassium Chloride	500gram btl		00497	btl	>2btl	Util	
Potassium Hydroxide 8N	1qt btl		9562	btl	>1btl	Lab	
LOWER CABINET							
Ammonia Hydroxide	2.5lit	03-008-5123	00	gal	>.5gal	In Stock	
Acetic Acid	1gal btl	3-20-17	00015	gal	>.5gal	Material Request	
Potassium Iodide	1gal btl		00505	gal	>.5gal	Lab	
Sulfuric Acid	1gal btl		93632	gal	>.5gal	Lab	
Versenate Solution	1gal btl		B6010	gal	>.5gal	Lab	
Nitric Acid	1gal btl	03-001-3200	00275	gal	>.5gal	In Stock	
Sodium Hypochlorite	1gal btl	08-020-0355	06410	gal	>.5gal	Material Request	
Diesel Fuel		11-025-0901	A0786			Stores	

OPERATOR	SUPERVISOR

APPENDIX C

FACILITY DIAGRAM

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Table C.1. PGDP Major Building and Facilities

PGDP MAJOR BUILDINGS AND FACILITIES		
Administration Buildings	***Electrical Switchyards***	***Cooling Towers & Pumphouses***
C-100 C-102 C-101 C-103	C-531 C-535 C-533 C-537	C-631 C-635 C-633 C-637
Process Buildings	***Maintenance & Stores Buildings***	***Waste Storage Areas***
C-310 C-333 C-315 C-335 C-331 C-337	C-720 C-728 C-724 C-741 C-725 C-744 C-726 C-750	C-733 C-746-Q1 C-746-A C-752-A C-746-B C-753-A C-746-M C-754 C-746-Q
Guard & Fire Headquarters	***Central Control Building***	***Operations Office Buildings***
C-200 (Spill equipment location)	C-300	C-302 C-304
Plant Laboratory	***Drying Agent Storage Building***	***Waste Processing***
C-709 C-710	C-350	C-757
Parking Lots	***Scrapyards***	***Chemical Operations***
C-810 C-811	C-746-C C-746-E1 C-746-C1 C-746-P C-746-D C-746P1 C-746-E	C-400 C-409 C-410-D C-410-K C-410-L (Spill equipment location)
Toll Transfer & Sampling Building		***Cylinder Yards***
C-360		C-745-A C-745-L C-745-B C-745-M C-745-C C-745-N C-745-D C-745-P C-745-E C-745-Q C-745-F C-745-R C-745-G C-745-S C-745-H C-745-T C-745-J C-745-U C-745-K
Utilities		
C-600 Steam Plant C-611 Water Treatment Facility C-615 Sewage Disposal Plant C-616 Liquid Pollution Abatement Facility		

Table C.2. PGDP Effluent Ditches

Effluent Ditches	Major Drainage Areas
001	C-335 C-337 C-535 C-537 C-635 C-616 C-746-A C-746-B C-746 Scrapyards
002	C-337 C-637 C-635
008	C-310 C-331 C-400 C-409 C-410 C-600 C-631 C-720 C-740 C-727 C-615
009	C-100 C-200 C-300 C-310 C-331 C-333 C-720 C-750 C-810 C-811
010	C-331 C-531
011	C-315 C-331 C-333 C-533 C-620 C-531
012	C-333 C-533 C-633 C-746-Q
013	Cylinder Yards
015	Cylinder Yards
016	C-743
017	Cylinder Yards
019	C-746-U

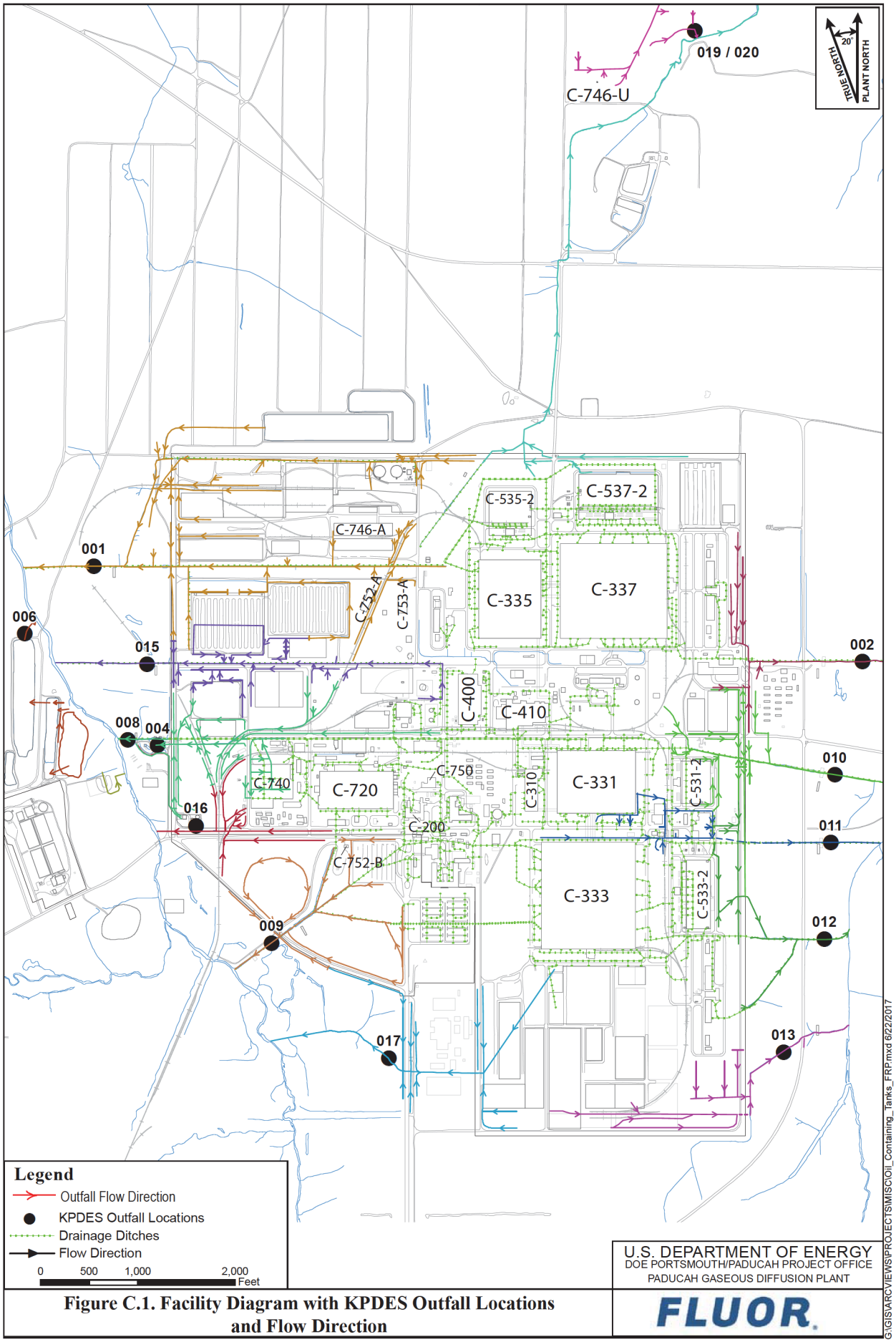

Figure C.1. Facility Diagram with KPDES Outfall Locations and Flow Direction

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