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CP2-ES-0063/FR2

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

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CP2-ES-0063/FR2

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

Date Issued—July 2019

U.S. DEPARTMENT OF ENERGY
Office of Environmental Management

Prepared by
FOUR RIVERS NUCLEAR PARTNERSHIP, LLC,
managing the
Deactivation and Remediation Project at the
Paducah Gaseous Diffusion Plant
under Contract DE-EM0004895

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APPROVAL

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

CP2-ES-0063/FR2

July 2019

Approved by:

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ACRONYMS

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
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
FRNP	Four Rivers Nuclear Partnership, LLC
FY	fiscal year
GIS	Geographic Information System
HSPD	Homeland Security Presidential Directive
KPDES	Kentucky Pollutant Discharge Elimination System
MW	monitoring well
OREIS	Paducah Oak Ridge Environmental Information System
PC	personal computer
PEGASIS	Portsmouth/Paducah Project Office Environmental Geographic Analytical Spatial Information System
PEMS	Paducah Project Environmental Measurements 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 (DMIP) 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 DMIP will operate under the Four Rivers Nuclear Partnership, LLC, (FRNP) Quality Assurance Program Description, with FRNP'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 (OREIS), if available. All historical data available in electronic format are stored in the project's Paducah Project Environmental Measurements System (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 Four Rivers Nuclear Partnership, LLC (FRNP) Quality Assurance Program Description, with the FRNP 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 (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 (PEMS) and ensures that data deliverables meet DOE's standards. SMO personnel enter information into Paducah PEMS related to the fixed-base laboratory data once the samples have been delivered and receipt of samples has been verified. The fixed-base laboratory electronic data deliverables (EDDs) are loaded into Paducah PEMS. EM is responsible for data verification, validation if applicable, assessment, and 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 laboratory data package 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 FRNP 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, and/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 number of the event of when the samples were collected (1 through 4); and
YY is the FY the sample was collected.

For example, “L5EMP1-19” is a sample identification number where “L5” denotes the sample was taken at a specified location; “EMP” denotes the samples were collected for EM; “1” denotes the sample was collected in the first event of FY 2019. A field duplicate sample is identified by the addition of a “D” after the “L” in the numbering scheme. For example, “L5DEMP1-19” is a duplicate sample collected at location L5 during the first event of FY 2019. 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, “TB1LEMP1-19” is the first trip blank (“TB”) that was collected during the first event of FY 2019.

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, W4, or W5), a monthly sample (M), bi-monthly (M1 or M2), or a quarterly sample (Q);
L is the outfall location K001, K002, K004, K006, K008, K009, K010, K011, K012, K013, K015, K016, 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.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Outfall Sampling Identification Numbers. Sample identification numbering system is made up of several different series of numbers in the following formats.

TL-NYY, where:

T is the time frame of collection such as a weekly (W1, W2, W3, W4, or W5) or a quarterly sample (Q);
L is the outfall location, C001;
N is the two digit month in which the sample was collected; and
YY is the calendar year the sample was collected.

For example, “W1C001-0519” is a sample identification number where “W” denotes a weekly sample was collected at CERCLA Outfall C001; “05” denotes the sample was collected in the fifth month, May, and “19” denotes the year, 2019, 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, “W1C001D-0519” is a duplicate sample collected at CERCLA Outfall C001 during May 2019. 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, “TBC001W1-0519” is a trip blank (“TB”) that was collected for CERCLA Outfall C001 during May 2019.

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

QZTXL-NYY, 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, C001;
N is the two digit month in which the sample was collected; and
YY is the year the sample was collected.

For example, "Q1TXC001-0419" is the first quarterly toxicity sample that was collected at CERCLA Outfall C001 during April 2019.

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 (W01 through W13) or a quarterly sample (Q1, Q2, Q3, or Q4);
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 is loaded to Paducah OREIS prior to reporting. Official data reporting will be generated from data stored in Paducah OREIS. Data used for the KPDES 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 FRNP 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, provides cradle-to-grave tracking of sampling and analysis 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, track collection and receipt of samples by the laboratory, 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 generates the laboratory SOW. 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 environmental 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 personnel perform data management activities associated 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 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 SMO personnel 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 plans 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 are validated. 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. In addition, at least one air monitoring data set and C001 data set per FY are validated. Data packages chosen for validation are validated at 100% at Level III.

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*. Once data assessment is complete, a quality assurance (QA) review is completed by SMO personnel (personnel performing the QA review must be different than the personnel who performed data assessment). Assessment qualifiers are stored in Paducah PEMS and transferred with the analytical 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 personnel prepare files of the assessed data from Paducah PEMS for loading to Paducah OREIS for future use. 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 KPDES 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. SMO personnel are 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 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. Data are transmitted via PEGASIS. 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 SMO) 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 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.

6.2.5 Quality

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

6.2.6 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. After receiving the fixed-base laboratory EDD, the SMO loads the EDD to Paducah PEMS, performs electronic verification of the data, and then compiles the data assessment package. The SMO prepares data for transfer from Paducah PEMS to Paducah OREIS and coordinates submittal of electronic records, which include COCs, sample data forms, laboratory data packages, data assessment packages, and data validation reports. These roles can be completed by a scientist or any other personnel appointed by the EM project manager.

6.2.7 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*

CP2-QA-1000, *Quality Assurance Program Description for the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*

CP3-ES-5003, *Quality Assured Data*

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

CP3-RD-0010, *Records Management Process*

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*