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1.0 PURPOSE

This Quality Assurance Project Plan (QAPP) provides the blueprint that Sample Data Management (SDM) uses to obtain the type and quality of Environmental Monitoring data needed for specific decisions or applications. This QAPP an also documents how Quality Assurance/ Quality Control is applied to Environmental Monitoring data operations to ensure that the results obtained are of the type and quality needed and expected. This is in accordance with Manual 1Q, Procedure 21-1, *Quality Assurance Requirements for the Collection and Evaluation of Environmental Data*.

This QAPP is not intended as a compilation of all applicable Quality Assurance requirements; the SDM quality system includes higher tier requirements and implementing procedures that users must be familiar with. This QAPP references, but does not address the analytical services provided by laboratories external and internal to Savannah River Site (SRS). This QAPP applies specifically to the sampling, analysis, and the environmental monitoring activities conducted/directed by SDM for execution of the Environmental Monitoring Program for the SRS.

2.0 SCOPE

The provisions of this procedure apply to the Performing Entities at the Savannah River Site and to subcontractors performing work for the Performing Entities when required by subcontract or applicable law.

3.0 DEFINITIONS AND ABBREVIATIONS

> **NOTE**
>
> Additional terms, definitions, and abbreviations associated with this procedure may be found in Manual 3Q1, *Glossary*.

CLP-SOW - Contract Laboratory Program Statement of Work

COC - Chain-of-Custody

DOE - United States Department of Energy

DOECAP - U.S. Department of Energy Consolidated Audit Program

EC&ACP - Environmental Compliance & Area Completion Projects

EM - Environmental Monitoring

Environmental Monitoring Application System (EMSAPPS) (SAS) - a statistical application utilized by program owners for data review of radiological resultant data. This system has flexibility to run program-specific reports of concentration results and trend charts for data review.

3.0 DEFINITIONS AND ABBREVIATIONS (cont.)

Environmental Monitoring Data Review Application (EMDRA) - SDM supporting system that is used to review and transfer or reject radiological results after release from the EBL prior to being transferred to ERDMS and the SDM Reporting Database.

EPA - United States Environmental Protection Agency

EPM - Enterprise Performance Management

ERDMS - Environmental Restoration Data Management System

LIMS - Laboratory Information Management Systems

M&TE - Measurement and testing equipment

MFO - Management Field Observation

NPDES - National Pollutant Discharge Elimination System

Program Owners - professional personnel responsible for several environmental monitoring and surveillance programs in accordance with this procedure.

QA - Quality Assurance

QC - Quality Control

SCDHEC - South Carolina Department of Health and Environmental Control

SQL - Structured (or Standardized) Query Language

SRNL - Savannah River National Laboratory

SRNS - Savannah River Nuclear Solutions

STAR - Site Tracking, Analysis, and Reporting

4.0 RESPONSIBILITIES

4.1 Sample Data Management

Sample Data Management is responsible for:

- Maintaining the Data Management Program
- Evaluating and verifying environmental data
- Reviewing environmental monitoring documentation
- Preparing and publishing various environmental reports.

4.2 Environmental Monitoring

Environmental Monitoring is responsible for collecting the environmental samples.

4.3 Sample Data Manager

The Sample Data Manager is responsible for:

- Developing, implementing, and managing the requirements in this Environmental Monitoring Program QAPP
- Ensuring that all personnel involved in the work have direct access to a current version of this QAPP and all other necessary planning, implementation, and assessment documents.

4.4 First Line Managers

First Line Managers are responsible for ensuring the requirements of this QAPP are implemented for the activities they supervise.

4.5 All SDM Personnel

All SDM personnel are responsible for understanding and implementing the requirements of this QAPP as approved to ensure continued success of the Environmental Monitoring Program.

4.6 Quality Assurance

Quality Assurance for the Environmental Monitoring Program is provided by QA organizations which are external to EC&ACP. The QA function provides QA oversight of environmental requirements, functions, and activities. This includes, but is not limited to, environmental data collection, environmental technology programs, monitoring, reporting, regulatory documentation, and other compliance activities. The QA function will perform document reviews, assessments, and surveillances as needed to support the goals and objectives of the Environmental Monitoring Program at SRS.

4.7 Analytical Services

The performing analytical laboratories (on-site or off-site) are required to have a documented QA/QC program that is subject to periodic performance audits. These laboratories also will be subject to the QA/QC requirements defined in this QAPP. The laboratories will identify and comply with any applicable federal, state, or local laboratory certification requirements.

Services of off-site laboratories that conduct analytical work in support of radiological and non-radiological environmental monitoring programs are procured through formal contracts and are obligated to participate in the DOECAP.

4.8 DOE Consolidated Audit Program

DOE Consolidated Audit Program is a DOE-Headquarters program that conducts annual audits of analytical laboratories and commercial waste treatment, storage, and disposal facilities that have contracts or agreements to provide services to DOE. DOECAP audits are performed on behalf of, and with the participation of sites throughout the DOE complex and across all departmental program line organizations. Audits cover data quality in such functional areas as QA, radiochemistry, organic analysis, inorganic analysis, and laboratory information management systems. Each audit team is guided by a Lead Auditor who is certified and appointed by the DOECAP Program Office.

5.0 ENVIRONMENTAL SAMPLING AND MONITORING REQUIREMENTS

Written procedures for all environmental sampling and monitoring activities are utilized to ensure appropriate methods for sampling, measurement and analysis, data collection or generation, data handling, and QC activities are used and properly documented. These procedures are contained in Manual 3Q1, *Environmental Requirements and Program Documents.*

5.1 General Information

5.1.1 Objectives

The general objectives of the SRS Environmental Monitoring Program are:

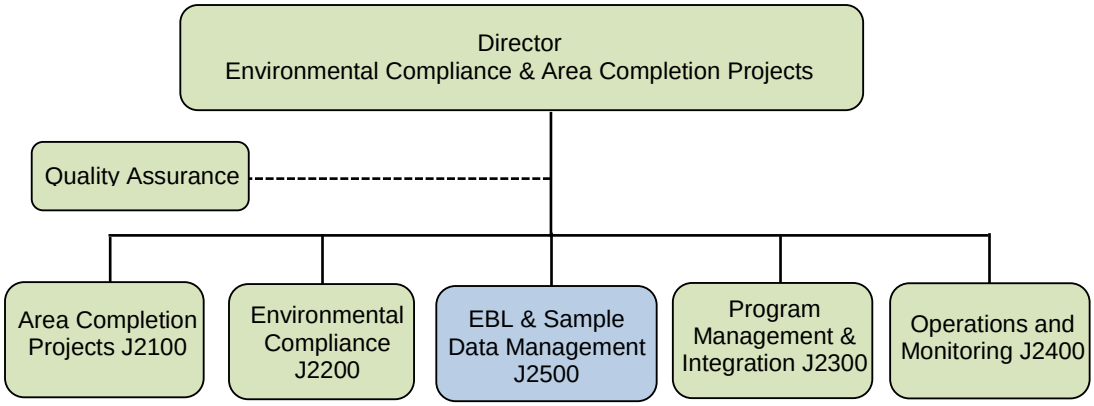
- To demonstrate compliance with DOE, EPA, SCDHEC, and SRNS requirements for environmental and radiation protection
- To assess actual or potential exposures to the public, critical groups and populations from the presence of radioactive and non-radioactive materials during normal site operations or from accidents
- To document trends in the performance of radioactive containment systems and the effectiveness of effluent controls.

The Annual SRS Environmental Report is the primary report that relies on the environmental monitoring data managed by SDM. The Annual SRS Environmental Report provides an annual report card to DOE and stakeholders for the SRS and addresses potential doses to the public and a summary of extensive environmental data collected throughout the year. The data managed by SDM is also used in a variety of reports to external agencies and stakeholders including weekly Tritium Monitoring reports, monthly radiological release reports, monthly NPDES Discharge Monitoring Reports, annual air emissions inventory, and various compliance reports. The credibility of these reports is very dependent on high quality data that can only be produced with a structured quality system which assures that work processes, products, or services satisfy stated expectations and specifications

The specific objectives and activities of the Environmental Monitoring Program are further described in the Manual 3Q1, Procedure 101, *Environmental Monitoring Program Management Plan*. Full implementation of this QAPP in conjunction with the aforementioned Program Management Plan ensures a high level of quality will be achieved in all SDM activities.

5.1.2 Organization

SDM within the EC&ACP is responsible for the SRS EM Program. The QA function associated with the EM Program is fulfilled by matrix support from the SRS QA organization. Within Operations and Monitoring, environmental monitoring sampling personnel conduct the field operations, including sample collection.



5.2 Sample Collection

5.2.1 Sampling and Monitoring System Design

The design of the sampling and monitoring networks is provided in Manual 3Q1, Procedure 101, *Environmental Monitoring Program Management Plan*. The design is implemented through sampling and monitoring procedures, contained in Manual 3Q1, *Environmental Requirements and Program Documents*, which provide:

- The type and number of samples required
- The sampling locations and frequencies
- Sample matrices
- Parameters of interest being measured.

5.2.2 Sampling Methods

Sampling methods are discussed in Manual 3Q1, Procedure 101, *Environmental Monitoring Program Management Plan*. The sample collection procedures identify the sampling methods and equipment and other materials needed to conduct the sampling or monitoring evolution. Airborne effluent samples are collected by Facility Radiological Control Operations personnel in accordance with their applicable procedures.

These activity-specific procedures describe:

- The methods for collecting samples and taking measurements
- The process for preparing and decontaminating sampling equipment, including the disposal of decontamination by-products
- The selection and preparation of sample containers.

5.2.3 Reusable Sample Bottles

Reusable sample bottles for some routine monitoring tasks are used to reduce the generation of solid waste. Written procedures prescribe the conditions under which sample bottles can be reused and include the following criteria:

- Methods for cleaning the containers between uses
- Methods for determining whether the cleaning is effective
- Requirements for identifying reusable sample bottles
- Methods for controlling reusable sample bottles to prevent inadvertent use.

5.2.4 Sample Handling and Control

Sample handling and control requirements are dependent on the specific objectives of the sampling routine and the laboratory receiving the samples. Sampling procedures in Manual 3Q1, *Environmental Requirements and Program Documents*, specify the requirements for obtaining and handling samples in the field and during transport to ensure the integrity of samples is not compromised. These instructions include requirements for sample preservation and packaging, as well as instructions for preparing and shipping samples to the laboratory. These procedures also provide examples of sample labels, packaging slips, and custody forms to ensure proper sample handling. Manual 3Q1, Procedure 1001, *Chain of Custody Procedure*, provides the requirements for initiating and maintaining sample COC forms.

Sampling procedures also specify the information from each sampling event which must be recorded in logbooks to document sampling activities and sample handling practices. First Line Managers perform a review of all logbooks to ensure accurate and complete entries.

5.3 Analytical Methods

5.3.1 Chemical Analyses

Organic, inorganic, and various wet chemical analyses are performed on samples for select programs within the Environmental Monitoring and Environmental Surveillance programs. The inorganic, organic, and wet chemical methods utilized are U.S. EPA methods or other standard methods commonly performed by commercial analytical laboratories.

5.3.2 Radiochemical Analyses

The laboratory performs radiochemical analyses in accordance with Manual L3.23, *Laboratory Area Projects Procedures,* or other approved methods.

5.4 Measurements

5.4.1 QC for Field pH Measurements

A blind field sample program is used to document the accuracy of field pH measurements and allows for continuous monitoring of field measurements and field calibrations so that corrective actions can be initiated, if required. Environmental sampling personnel transport "blind" solutions prepared by an environmental laboratory technician to the field when routine samples are collected. The sampling personnel do not know the pH of the blind solutions. The pH measurements are taken of these blind solutions in the field with the same equipment used for routine in situ measurements. The environmental sampling technician records measurements on a data sheet and returns the remaining solution and the data sheet to the laboratory. Another laboratory technician takes a final measurement on the remaining solution.

5.4.2 Non-Direct Measurements

SQL/LIMS database, EM Reporting Database, ERDMS, logbook, and COC are repositories for non-direct measurement data for radiological programs. Most non-direct measurement data are entered in the field using hand-held devices. This information is then transferred to SQL/LIMS and ERDMS for subsequent review by SDM personnel.

5.5 Quality Control, Evaluation, and Management of Data

5.5.1 Quality Control of Data

SDM personnel perform data review per Manual 3Q1, Procedure 6001, *Environmental Monitoring Data Review and Calculation Procedure*.

Environmental sample results/data is transferred into ERDMS from the on-site and off-site laboratories.

Prior to transfer into ERDMS, on-site laboratory radiological data is approved by the program owners using the Environmental Monitoring Data Review Application (EMDRA). After approval, the data is transferred to the EM Reporting Database and ERDMS. Statistical analysis and reporting may then be performed using either the EMSAPPS (SAS) or ERDMS. EMSAPPS has flexibility to run program-specific reports of concentration results and trend charts for data review.

The generic data-review process involves reviewing the concentration results and/or the trend charts for each source/location in comparison to historical trends. In addition, various program-specific reports are generated from either EMSAPPS (SAS) or ERDMS including data tables for the annual Site Environmental Report.

If there are any data questions during the data review, the applicable logbook/COC may be reviewed and the laboratory may be notified for rechecks, reanalysis, and/or retransfer of results to the EM Reporting Database and ERDMS.

5.5.2 Data Evaluation

Laboratory data is received by SDM after all laboratory QA and QC tests have been performed. Data from on-site laboratories are approved by a laboratory QA officer/laboratory manager in accordance with Manual L.3.25*,* Procedure 00008, *Quality Control Program and Environmental Data Management*. Data from off-site laboratories are reviewed by the laboratory QA officer/laboratory manager in accordance with their documented QA/QC program and any data results that do not meet QA/QC requirements are identified, verbal notification provided to the appropriate SRNS Subcontract Technical Representative, and documented in the applicable analysis reports.

5.5.3 Data Management

SQL/LIMS database, EM Reporting Database, and ERDMS are repositories for radionuclide and chemical concentrations. Input into SQL/LIMS is done through the laboratories. Input into the EM Reporting Database and ERDMS occurs after review by SDM or EC&ACP's Data Management and Waste Engineering personnel.

SDM utilizes the EPM Application, EM statistical application system, EMSAPPS (SAS), the laboratory QA Officer, and Manual 3Q1, Procedure 6001, *Environmental Monitoring Data Review and Calculation Procedure,* to ensure that all environmental monitoring data is verified and of known accuracy and precision.

SDM implements Manual 1Q, Procedure 20-1, *Software Quality Assurance*, for a standard systematic approach for the quality control of computer software and firmware which is used in support of the EM Program.

The requirements for data handling and software configuration are described in Manual1Q, Procedure 20-1, *Software Quality Assurance*. For LIMS, the requirements are further defined in Manual E7, Procedure 5.01, *Software Engineering and Control*, and B-SQP-F-00031, *Software Quality Assurance Plan for Laboratory Support Programs*.

Modifications to the EM Reporting Database are monitored through Manual E7, Procedure 5.01, *Software Engineering and Control*, and Process & Control Engineering/Laboratory & Engineering Process Services Data Modification Tracker Desktop Instructions. Modifications are only made at the owner's request, document by data modification tracker and the results verified by the owner.

The EM statistical application system, EMSAPPS (SAS), is maintained by SRNL and is controlled under B-VVR-A-00002, *Verification & Validation for Commercial Statistical Packages Utilized by Applied Computational Engineering and Statistics*.

The ERDMS stores SDM data which is accessed by SDM personnel using Manual C3, *Vol. IX,* ER-SOP-043, *Obtaining and Managing Environmental Data for Area Completion Projects (U),* provides the general requirements and guidelines that are necessary for the documentation, mobilization, collection, verification, validation, and reporting of environmental data.

5.6 Data Verification and Usability

Data verification and usability activities occur after data collection is completed and are intended to determine whether or not the data conform to the specified criteria, thus satisfying the project objectives. The primary goal is to produce known data of sufficient quality. Data are considered known when all components associated with its derivation are thoroughly documented, and such documentation is verifiable and defensible.

5.6.1 Validation and Verification

Each laboratory is required to perform an internal data review before issuing their data report. Upon receipt in SDM, the appropriate program owner performs a final review before recording or issuing the data. SDM uses Manual 3Q1, Procedure 6001, *Environmental Monitoring Data Review and Calculation Procedure*, to calculate and review data. The general criteria in this procedure used to verify analytical data includes:

- Checks for compatibility of values with historical data
- Use of data plots and other graphics tools
- Tests for outliers.

5.6.2 Reconciliation with User Requirements

All laboratory results must be reviewed before data is verified to determine whether all samples and analyses have been performed as required. If an analytical result does not meet verification criteria, the result must be investigated to determine if a problem exists. If the integrity of the sample result appears to be compromised, the sample is reanalyzed when a sufficient amount of the sample is remaining, and the result is reevaluated. The analytical result is reported only after the investigation is complete and all verification criteria have been met or qualified.

5.6.3 Validation

Most environmental analytical data is verified and un-validated. Should the data be required to be validated, it would be validated in accordance with Manual C3, *Vol. IX,* ER-SOP-043, *Obtaining and Managing Environmental Data for Area Completion Projects (U), by EC&ACP's Data Management and Waste Engineering group personnel.*

5.7 Instruments and Supplies

5.7.1 Instrument Testing, Inspection, and Maintenance

M&TE such as balances, pipettes, and pH meters which are used for the EM Program for sample collection and field analysis require periodic calibration to ensure accuracy. The EM Program implements the M&TE Program in the Manual 1Q, Procedure 12-1, *Control of Measuring and Test Equipment*, for calibration, control, use, and maintenance of M&TE as well as for procurement of M&TE and M&TE calibration services.

All personnel are responsible for identifying and documenting potential nonconforming items. Manual 1Q, Procedure 15-1, *Control of Nonconforming Items*, is utilized for identifying and resolving nonconforming items to prevent their inadvertent use or installation.

5.7.2 Inspection/Acceptance of Supplies and Consumables

Manual 1Q, Procedure 7-2, *Control of Purchased Items and Services [NQA-1 2008/2009a],* is used to inspect and accept supplies and consumables (e.g., standard materials and solutions, sample bottles, calibration gases, reagents, hoses, electronic data storage media). Received items are examined for identification, quantity and damage to ensure they are acceptable prior to use or installation. Acceptance criteria are documented in procurement specifications under this program.

5.8 Program Assessment and Oversight

Assessments are conducted to ensure this QA Plan is implemented as prescribed and to determine the effectiveness of project implementation and associated QA and QC activities.

5.8.1 Assessments

Assessments are performed by management as well as subject matter experts immediately responsible for the work being assessed to identify and correct problems that hinder the organization from achieving its objectives. Management assessments are to be performed to determine effectiveness of management control systems, adequacy of resources and personnel, and effectiveness of training. Assessments are performed annually in accordance with Manual 12Q, Procedure SA-1, *Self-Assessment*, and also in accordance with Manual 12Q, Procedure MFO-1, *Management Field Observation Program*. The MFO program is an element of the Human Performance Improvement Program and compliments the Self-Assessment Program.

Independent assessments are provided by SRNS QA in accordance with Manual 1Q, Procedure 18-2, *Surveillance*, and the Independent Evaluation Board in accordance with Manual 12Q, Procedure FEB-1, *Facility Evaluation Board*.

5.8.2 Corrective Action Management

Manual 1B, Procedure 4.23, *Corrective Action Program,* is implemented for control of Findings and Deficiencies (i.e., Problems) including assessment findings, deficiencies, and non-conforming conditions. This is a company-level corrective action program which ensures that issues are promptly and systematically identified, analyzed, controlled, tracked, trended, reported, and satisfactorily resolved. This program is utilized for the management of all issues that are identified through events/incidents as well as issues identified through internal and external review processes.

All personnel are responsible for identifying and documenting issues for evaluation. Issues are entered into a company-wide database system called STAR. The STAR system is an electronic format where issues are entered; evaluation results captured, and associated actions tracked to closure.

The EC&ACP Issue Analyst reviews initial entries of issues into STAR to ensure data adequacy and consistency and to ensure proper assignment of Significance Categories to issues. The EC&ACP Review Board oversees correction of significant issues by:

- Reviewing initial reports to ensure completeness of the issue descriptions and responsible manager assignments
- Reviewing the results of root cause analyses and corrective actions, schedules assignments, and
- Reviewing the results of effectiveness reviews.

5.8.3 Stop Work Authority

All individuals have the responsibility to immediately stop their activities when work quality is unsatisfactory unless stopping would be detrimental to the safety or health of personnel or the environment, violate criticality rules, or unnecessarily result in damage to equipment. In such cases, work shall be stopped as soon as practicable. Individuals also have the responsibility to verbally request responsible management to stop work external to their activities to prevent a nonconforming item from further use, installation, or processing, or to prevent a nonconforming activity from proceeding. Prior to restart after a formal Stop Work Order, appropriate reviews or assessments are planned, performed, and documented to verify that conditions that warranted the Stop Work Order are resolved and corrective actions completed.

6.0 REFERENCES

1B, 3.31, *Records Management*

1B, 4.23, *Corrective Action Program*

1Q, 7-2, *Control of Purchased Items and Services [NQA-1 2008/2009a]*

1Q, 12-1, *Control of Measuring and Test Equipment*

1Q, 15-1, *Control of Nonconforming Items*

1Q, 18-2, *Surveillance*

1Q, 20-1, *Software Quality Assurance*

1Q, 21-1, *Quality Assurance Requirements for the Collection and Evaluation of Environmental Data*

3Q1, *Environmental Requirements and Program Documents*

3Q1, 101, *Environmental Monitoring Program Management Plan*

3Q1, 1001, *Chain of Custody Procedure*

3Q1, 6001, *Environmental Monitoring Data Review and Calculation Procedure*

12Q, SA-1, *Self-Assessment*

12Q, FEB-1, *Facility Evaluation Board*

12Q, MFO-1, *Management Field Observation Program*

40 CFR Part 141, *National Primary Drinking Water Regulations*

40 CFR Part 136, *Guidelines Establishing Tests Procedures for the Analysis of Pollutants*

40 CFR Part 261, *Identification and Listing of Hazardous Waste*

ANSI/ASQ E-4-2004, *Quality Systems for Environmental Data and Technology Programs*

6.0 REFERENCES (cont.)

B-SQP-F-00031, *Software Quality Assurance Plan for Laboratory Support Programs*

B-VVR-A-00002, *Verification & Validation for Commercial Statistical Packages Utilized by Applied Computational Engineering and Statistics*

C3, *Vol. X,* ER-SOP-043, *Obtaining and Managing Environmental Data for Area Completion Projects (U)*

Clean Air Act

Clean Water Act

Comprehensive Environmental Response, Compensation, and Liability Act

E7, 5.01, *Software Engineering and Control*

EPA QA/R-5, *EPA Requirements for Quality Assurance Project Plans*

L3.23, *Laboratory Area Projects Procedures*

L3.25, *Environmental Monitoring Quality Assurance Procedures*

L3.25, 00008, *Quality Control Program and Environmental Data Management*

National Pollutant Discharge Elimination System (NPDES)

Resource Conservation and Recovery Act

Safe Drinking Water Act

SW-846 (EPA Publication), *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*

U.S. EPA Contract Laboratory Program Statement of Work (CLP-SOW) methods

7.0 RECORDS

Records generated as a result of implementing this procedure are maintained in accordance with Manual 1B, Procedure 3.31, *Records Management*.

Records generated as a result of implementing this procedure include the results of effluent monitoring and environmental surveillance, supporting documentation related to sample collection/analysis, and documentation of the analytical results of the effluent monitoring, environmental surveillance and dose evaluation activities. Records generated as a result of this procedure include the following:

Assessment Reports

Calibration Documentation

Chain of Custody Forms

Data Tables for the SRS Annual Environmental Report

Laboratory Data Reports

Logbook

Monthly Radionuclide Release Reports

Software QA Documentation

8.0 ATTACHMENTS

None