Quality Assurance Project Plan for the License Termination Plan Development, Site Characterization and Final Status Survey Projects at Fort Calhoun Station

Revision 0

Authored By:	Robert Yetter, ES Director Radiological Site Closure	Date
Reviewed By:	Robert (Chris) Keene, ES VP Radiological Protection Operations	Date
Reviewed By:	Randy Hugenroth, FCS Manager Nuclear Oversight	Date
Reviewed By	Dan Whisler, FCS Manager Radiation Protection & Chemistry	Date
Reviewed By	Anthony Bejma, ES VP Nuclear Oversight	Date
Approved By	Joe Nowak, ES Project Director	Date

- ☐ Non-Proprietary
- ☒ Proprietary
- ☐ Restricted Information
- ☐ Safeguards Information
- ☐ Sensitive Security Information

- ☒ New
- ☐ Title Change
- ☐ Revision
- ☐ Rewrite
- ☐ Cancellation

Effective Date: _____

RECORD OF REVISIONS

Revision	Revision Title Description and Reason for Change
0	Initial issue.

Table of Contents

1 INTRODUCTION

The Fort Calhoun Station (FCS) is being decommissioned in accordance with the requirements of 10 CFR 50.82. The objective for the decommissioning of the FCS site is to reduce residual radioactivity to levels that permit release of the site for unrestricted use and for amendment of the license in accordance with the site release criteria set forth in 10 CFR 20. As required by 10 CFR 50.82, and to allow implementation of "at risk" Final Status Survey (FSS) activities, the FCS Decommissioning Project License Termination Plan (LTP) will be prepared and submitted in accordance with guidance provided in Regulatory Guide 1.179, Rev. 1, "*Standard Format and Content of License Termination Plans for Nuclear Power Reactors*" (Reference 2.1.1). The LTP relies on guidance given in NUREG-1575, "*Multi-Agency Radiation Survey and Site Investigation Manual" (MARSSIM)* (Reference 2.1.2) and NUREG-1757, "*Consolidated Decommissioning Guidance - Characterization, Survey, and Determination of Radiological Criteria" Volume 2*, Revision 1 (Reference 2.1.3) to develop, among other things, a Site Characterization Plan and a FSS Plan (Section 5 of the LTP).

The MARSSIM guidance also discusses the need for a quality system to ensure the adequacy of data used to demonstrate that site conditions are acceptable for release of the site from the facility license. Laboratory quality for the analysis of samples taken to support site characterization and FSS is discussed in NUREG-1576, "*Multi-Agency Radiological Laboratory Analytical Protocols Manual" (MARLAP)* (Reference 2.1.4) and Regulatory Guide 4.15, "*Quality Assurance for Radiological Monitoring Programs (Inception through Normal Operations to License Termination) - Effluent Streams and the Environment"* (Reference 2.1.5). Further, MARSSIM and MARLAP both indicate that a Quality Assurance Project Plan (QAPP) may be used in addition to, or in lieu of, existing quality systems to ensure data quality is achieved.

This QAPP has been prepared to ensure the adequacy of data being developed and used during the site characterization and FSS process. It supplements the quality requirements and quality concepts presented in Reference 2.1.5, Regulatory Guide 4.15, "Quality Assurance or Radiological Monitoring Programs (Inception through Normal Operations to License Termination) - Effluent Streams and the Environment", Revision 1which adequately encompasses other risk-significant decommissioning activities. All characterization and FSS activities essential to data quality will be implemented and performed using approved procedures. Effective implementation of characterization and FSS operations will be verified through audit and surveillance activities, including field walk downs by License Termination/Final Status Survey (LT/FSS) management and radiological engineering staff and program self-assessments, as appropriate. Corrective actions are to be prescribed, implemented, and verified in the event any deficiencies are identified. These measures will apply to any applicable services provided by off-site vendors, as well as on-site sub-contractors. Audit and surveillance of off-site vendors may be satisfied by accreditation as described in the NRC endorsed NEI 14-05, *"Guidelines for the Use of Accreditation In Lieu of Commercial Grade Surveys for Procurement of Laboratory Calibration and Test Services"* (Reference 2.1.6), or by accreditation by the National Environmental Laboratory Accreditation Program (NELAP).

1.1 Purpose

This QAPP will serve to ensure that site characterization, FSS, and other radiological surveys performed in support of decommissioning are performed using approved written procedures by trained individuals and using properly calibrated instruments that are sensitive to the potential radiological contaminants. This plan describes the quality assurance requirements and quality controls needed for sampling and analytical methodologies which limit the introduction of errors into analytical data required to support the release of the FCS site for unrestricted use in accordance with NRC requirements. This QAPP will be used to ensure applicable plans, procedures, and instructions have been followed and documented during the performance of site characterization, FSS and other radiological survey activities.

This QAPP describes the application of quality to the scope of work performed by the LT/FSS Group to develop the FCS LTP for submittal to the NRC. When approved by the NRC, the LTP submittal becomes a License Amendment to the FCS NRC license DPR-040/Docket No. 05000285.

This QAPP also defines the methodology that the LT/FSS Group will use to meet the quality assurance requirements of 10 CFR 50 as applicable to these tasks.

1.2 Scope

This QAPP applies to decommissioning project activities performed by the LT/FSS Group and its suppliers and subcontractors for the duration of the project activities associated with development of the FCS LTP including Historical Site Assessment (HSA), site characterization, demonstration of compliance with license termination criteria and FSS design, implementation, data analysis and reporting of results.

The governing QA program for the site is the OPPD NO-FC-10, Quality Assurance Topical Report (QATR)(Reference 2.2.1). Energy*Solutions* will remain on the OPPD approved supplier list, and will execute the work in accordance with the Energy*Solutions* QA Implementing procedures listed in DD-QA-PN-006, "QA Program Implementation Plan for the Fort Calhoun Decommissioning Services" (QAIP)(Reference 2.2.2), as applicable.

1.3 Quality Objectives and Criteria for LTP Development

The LTP project involves activities that include design, procurement, sampling, analysis, and data collection that are subject to 10 CFR Part 50 regulatory requirements. The extent of the quality assurance criteria applicable to tasks associated with the LTP will, as a minimum, be in accordance with the QAIP and associated implementing procedures. The level of quality rigor applicable to a task is directly proportional to the task's impact on the public health and safety.

The LT/FSS Manager, along with FCS Project Management, should engage the NRC in dialog early in the LTP development process. Meetings should be held (via conference call or in-person) every two to three months, with the purpose of informing

the NRC of LTP development progress and to identify and rectify any issues that may arise.

The LTP consists of 8 major divisions or chapters:

Chapter 1 - *General Information*

Chapter 2 - *Site Characterization*

Chapter 3 - *Identification of Remaining Site Dismantlement Activities*

Chapter 4 - *Site Remediation Plans*

Chapter 5 - *Final Status Survey*

Chapter 6 - *Compliance with Radiological Criteria of License Termination*

Chapter 7 - *Updates of the Specific Decommissioning Costs*

Chapter 8 - *Supplement to the Environmental Report*

Instrument calibrations and laboratory analyses are considered QL-II activities. Other support studies and reports are considered QL-III activities and are accepted using the Calculations and Position Papers (CPP) process.

1.4 Quality Objectives and Criteria for Characterization/FSS Activities

Compliance with this plan ensures accuracy and reproducibility when obtaining direct measurements and/or representative samples for the qualification and quantification of radiological contaminants. Data quality must be sufficient to allow comparison with action levels and the unrestricted release criteria for license termination.

The Data Quality Objectives (DQO) process described by MARSSIM is a series of planning steps found to be effective in establishing criteria for data quality and developing survey plans. DQOs are qualitative and quantitative statements derived from outputs of each step of the DQO process that clarify the study objective and define the most appropriate type of data to collect and determine the most appropriate conditions from which to collect the data. The DQO process allows for systematic planning and is particularly designed to address problems that require a decision between two alternatives. Furthermore, the DQO process is flexible in that the level of effort associated with planning a survey is based on the complexity of the survey and nature of the hazards. Finally, the DQO process is iterative, allowing the survey designer to incorporate new knowledge and modify the output of previous steps to act as input to subsequent steps.

Each characterization and FSS survey design will incorporate survey-specific DQOs. Using the DQO process to design surveys will allow the survey designer to define specific data requirements and acceptable levels of decision error during planning before any data is collected. It will also ensure that selected instrumentation and processes will satisfy the intended purpose. This provides confidence that the survey results are accurate and any sources of uncertainty are identified and controlled.

DQOs are based on the seven-step process which is briefly described below.

Step 1: State the Problem – Concisely describe the problem to be studied. Review prior studies and existing information to gain a sufficient understanding to define the problem.

Step 2: Identify the Decision – Identify what question the study will attempt to resolve and what actions may result.

Step 3: Identify Inputs to the Decision – Identify the information that needs to be obtained and the measurements that need to be taken to resolve the decision statement.

Step 4: Define the Study Boundaries – Specify the time periods and spatial area to which decisions will apply. Determine when and where data should be collected.

Step 5: Develop a Decision Rule – Define the statistical parameter of interest, specify the action level, and integrate the previous DQO outputs into a single statement that describes the logical basis for choosing among alternate actions.

Step 6: Specify Limits on Decision Errors – Define the decision maker's tolerable decision error rates based on a consideration of the consequences of making an incorrect decision.

Step 7: Optimize the Design – Evaluate information from the previous steps and generate alternative data collection designs. Choose the most resource-effective design that meets all DQOs.

Since the radiological data collected for this project either will or may be used in risk-based corrective actions and remedies, data analytical limits must be set such that applicable federal risk-based action levels and project-specific DCGLs or action levels can be met. If project data needs change as work progresses, the DQOs may be modified to meet new project requirements.

2 REFERENCES

2.1 Regulatory Requirements

2.1.1 Regulatory Guide 1.179, Rev 1 "Standard Format and Content of License Termination Plans for Nuclear Power Reactors" - June 2011

2.1.2 NUREG-1575, "Multi-Agency Radiation Survey and Site Investigation Manual" (MARSSIM) - August 2000

2.1.3 NUREG-1757, "Consolidated Decommissioning Guidance - Characterization, Survey, and Determination of Radiological Criteria" Volume 2, Revision 1 - September 2002

2.1.4 NUREG-1576, "Multi-Agency Radiological Laboratory Analytical Protocols Manual" (MARLAP) - August 2001

2.1.5 Regulatory Guide 4.15, "Quality Assurance or Radiological Monitoring Programs (Inception through Normal Operations to License Termination) - Effluent Streams and the Environment", Revision 1

2.1.6 NRC Endorsed NEI 14-05, "Guidelines for the Use of Accreditation In Lieu of Commercial Grade Surveys for Procurement of Laboratory Calibration and Test Services", Revision 2

2.1.7 NRC Inspection Procedure No. 84750, "Radioactive Waste Treatment, and Effluent and Environmental Monitoring" - March 1994

2.1.8 ANSI N323A-1978, "Radiation Protection Instrumentation Test and Calibration, Portable Survey Instrumentation"

2.2 Procedures

2.2.1 NO-FC-10, "Quality Assurance Topical Report (QATR)"

2.2.2 DD-QA-PN-006, "QA Program Implementation Plan for the Fort Calhoun Decommissioning Services"

2.2.3 NCM-1, "Software Classification and Performance"

2.2.4 NCM-2, "Control of Software for Nuclear-Related Activities"

2.2.5 RM-FC-101, "Record Management Program"

2.2.6 RM-FC-102, "Control of Documents"

2.2.7 FCSD-RA-LT-201, "Characterization Survey Package Development"

2.2.8 FCSD-RA-LT-302, "Final Status Survey Package Development"

2.2.9 FCSD-RA-LT-306, "Radiological Assessments and Remedial Action Support Surveys"

2.2.10 FCSD-RA-LT-307, "Unconditional Release Surveys of Structures and Miscellaneous Materials and Equipment"

2.2.11 FCSD-RA-LT-301, "Survey Unit Classification"

2.2.12 FCSD-RA-LT-303, "Final Status Survey Isolation and Control Measures"

2.2.13 FCSD-RA-LT-203, "Sample Media Collection for Site Characterization and Final Status Survey"

2.2.14 FCSD-RA-LT-204, "Sample Media Preparation for Site Characterization and Final Status Survey"

2.2.15 FCSD-RA-LT-205, "Chain-Of-Custody Protocol for Site Characterization and Final Status Surveys"

2.2.16 FCSD-RA-LT-202, "Characterization Survey Data Assessment"

2.2.17 FCSD-RA-LT-304, "Final Status Survey Data Assessment"

2.2.18 FCSD-RA-LT-305, "Final Status Survey Data Reporting"

2.2.19 PL-FC-126, "Self-Assessment Program"

2.2.20 PI-FC-125, "Decommissioning Corrective Action Program"

3 GENERAL

3.1 Definitions

3.1.1 Quality Level II: Items, services, or activities that are important to the safe operation of components, systems or structures. They include those items, services, or activities whose failure or malfunction could indirectly result in a condition adversely affecting public health and safety. Instrument calibrations and laboratory analysis services are examples of QL-II services or activities.

3.1.2 Quality Level III: Items, services, or activities that have minor impact on the safe operation of components, systems or structures. These include those items, services, or activities whose failure would not be likely to create a situation adversely affecting public health and safety.

3.2 Acronyms

ANSI	American National Standards Institute
ASL	Approved Suppliers List
COC	Chain of Custody
CPP	Calculations & Position Paper
DCGL	Derived Concentration Guideline Level
DQA	Data Quality Assessment
DQO	Data Quality Objectives
FASA	Focused Area Self-Assessment
FPC	Flow Proportioned Composite
FSS	Final Status Survey
HPGe	High Purity Germanium
HSA	Historical Site Assessment
HTD	Hard to Detect
ISOCS	In-Situ Object Counting System
LT	License Termination
LTP	License Termination Plan
MARLAP	Multi-Agency Radiological Laboratory Analytical Protocols Manual
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDC	Minimum Detectable Concentration
NaI	Sodium Iodide
NEI	Nuclear Energy Institute
NELAP	National Environmental Laboratory Accreditation Program

NIST	National Institute of Standards and Technology
NRC	United States Nuclear Regulatory Commission
NUREG	U.S. Nuclear Regulatory Commission Regulation
OJT	On-the-Job Training
OPPD	Omaha Public Power District
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
QL	Quality Level (Energy*Solutions* terminology)
RA	Radiological Assessment
RASS	Remedial Action Support Survey
ROC	Radionuclides of Concern
RPM	Radiation Protection Manager
SSC	Systems, Structures, and Components
TC	Time Composite
TCVV	Time-Constant/Varying Volume
TVCV	Time-Varying/Constant Volume
URS	Unconditional Release Survey

3.3 Responsibilities

3.3.1 The Project Director or designee is responsible for:

- Ensuring personnel conduct activities in accordance with established programs and procedures, including the LT/FSS activities described herein.
- Interfacing directly with the client, as appropriate, on all issues pertaining to decommissioning project activities at FCS.
- Ensuring that the NRC are engaged early in the LTP development process and continuing to meet every 2 to 3 months with the purpose of informing the NRC of LTP development progress and to identify and rectify any issues that may arise.

3.3.2 LT/FSS Project Organization

The FCS Decommissioning Services Project has established the LT/FSS Group with sufficient management and technical resources to fulfill project objectives and goals. The LT/FSS Group is responsible for:

- The planning and performance of Site Characterization (initial and continuing);
- LTP development and implementation;

- The planning and performance of FSS; and
- The planning and performance of additional radiological surveys performed to support decommissioning such as:
    - Radiological Assessments (RA) performed to verify an area is suitable for FSS;
    - Remedial Action Support Surveys (RASS) performed to verify post-remediation contamination levels are below the established release criteria; and
    - Unconditional Release Surveys (URS) performed on secondary side structures to verify surfaces are below the limits established for releasing the post-demolition materials from site.

3.3.3 The VP of Nuclear Oversight is responsible for:

- Reviewing and approving this plan to ensure it interfaces with DD-QA-PN-006, "QA Program Implementation Plan for the Fort Calhoun Decommissioning Services" (Reference 2.2.12).
- Verification of facility and site Quality Control (QC) implementation through the auditing and surveillance processes.
- The reviews of QL-II vendors for accreditation based on NELAP or NRC endorsed NEI 14-05 revision 2 guidance (Reference 2.2.1) and maintaining the Approved Suppliers List (ASL).

3.3.4 The LT/FSS Manager reports to the Project Director and is responsible for:

- The organization, administration, development, and implementation of the Site Characterization, License Termination Plan, and Final Status Survey projects.
- Ensuring activities conducted as part of the LT/FSS Group are performed in accordance with this QAPP, the LTP and applicable procedures.
- The management of personnel assigned to the LT/FSS Group.
- Approving Characterization Survey sample plans, FSS sample plans, FSS Survey Unit Release Records and FSS Final Reports.
- Ensuring all contractual and licensing obligations, as they pertain to LTP development, site characterization and FSS, are satisfied.
- Approving site characterization and FSS implementing procedures and other program documents.
- Approving personnel access to LT/FSS file cabinets and computer data bases.

- Reviewing vendor accreditation to verify technical acceptability for intended scope for off-site LT/FSS testing and calibration vendors.

3.3.5 LT/FSS Radiological Engineer is responsible for:

- The development of technical support documents.
- The development of the LTP.
- The technical review of survey packages survey data.
- Resolving and documenting any survey design, instruction, or performance discrepancies.
- Providing review of FSS release records and final reports.

3.3.6 LT/FSS Specialist reports to the LT/FSS Manager and is responsible for:

- The development of all characterization and FSS sample plans and providing technical direction in their implementation.
- Preparing DQOs for survey design.
- Preparing and maintaining survey packages.
- Supervising data collection, if necessary.
- Performing data review, verification and validation.
- Supporting the preparation of characterization and FSS reports and release records.

3.3.7 LT/FSS Supervisor reports to the LT/FSS Manager and is responsible for:

- Control and implementation of survey packages and plans as received from the LT/FSS Specialists and to ensure that all DQOs are achieved.
- Coordination of area turnover and survey area preparation.
- Maintaining access controls over completed survey areas to maintain the final configuration and ensure data integrity.
- Coordinating and scheduling LT/FSS Technicians and craft personnel needed to support the scheduled survey activities.
- Ensuring all necessary instrumentation and other equipment is available to support survey activities.

3.3.8 Omaha Public Power District (OPPD) Radiation Protection Manager (RPM) is responsible for:

- Maintaining the program for the calibration, set-up and repair of the on-site radiological instrumentation and analytical equipment used to support measurements and samples taken for characterization, FSS and other radiological surveys performed in support of decommissioning.

- Supporting the review and selection of instrumentation utilized for the Characterization and FSS Programs.
- Review and approval of all Characterization and FSS Program procedures and applicable documents (e.g., technical support documents).
- Advising the LT/FSS Manager and providing support for project sampling activities, including sample collection, preparation, handling, storage, and shipment and ensuring that all requisite instrument QC and Minimum Detectable Concentration (MDC) criteria are met.

3.3.9 LT/FSS Technicians are responsible for:

- Understanding the requirements included in the LTP, Characterization Plan, all applicable implementation procedures, and this QAPP.
- Acquisition and documentation of survey data and collection of samples. Data and samples will be obtained in accordance with the requirements and instructions provided in survey unit specific survey packages, plans, instructions and guidance provided by LT/FSS Specialist.
- Through compliance with survey instructions and all applicable program and instrumentation procedures, LT/FSS Technicians implement the requirements contained in this QAPP to assure appropriate quality is used in the collection of characterization and FSS data.

3.4 Precautions, Limitations and Prerequisites

3.4.1 Precautions
None

3.4.2 Limitations
None

3.4.3 Prerequisites
None

3.5 Records

None

4 REQUIREMENTS AND GUIDANCE

4.1 Training and Qualifications

Note: The LT/FSS Manager has discretion for determining the most appropriate training mechanism (e.g., classroom training, task performance evaluation, etc.) for the staff under this charge.

4.1.1 Proper training and qualifications are essential to ensuring effective and consistent performance to make certain that quality data will be acquired during characterization and FSS activities and that the error attributed to human performance is minimized. Sufficient management and technical resources will be applied to the performance of characterization and FSS activities to ensure project objectives are achieved.

4.1.2 General and specific training requirements applicable for each individual within the LT/FSS Group will be defined, tracked, and periodically updated as project activities progress and responsibilities change. The LT/FSS Manager and the group's designated Training Coordinator will work with the OPPD Manager of Training, Document Control and Administrative Support to utilize the FCS Training Management System and other training, evaluation and documentation processes, as applicable, to support the implementation of a training program for characterization and FSS operations.

4.1.3 Individuals performing field survey and sampling activities and reviewing collected data from field measurements or laboratory data reports will be trained in the use of instruments, devices, and procedures, as applicable to the tasks they will be performing. The training ensures that the personnel assigned to perform characterization and FSS activities will have sufficient knowledge to perform the work in accordance with the requirements of the LTP and the implementing procedures. Training will be in the form of attendance at formal classroom training; field observations and guidance provided by LT/FSS Supervision as LT/FSS Technicians start implementing procedures; completion of appropriate On-the-Job Training (OJT) programs; and/or through reading of certain required procedures. Completion of each type of training will be documented and records will be coordinated with and maintained within the FCS Training Department.

4.1.4 At a minimum, personnel assigned to acquire characterization and FSS data will be trained on the following:

- Initial set-up and pre-use response checks with selected instrumentation and associated detectors.
- Proficiency with operating a data-logger instrument and associated detectors.
- Downloading of survey data from a data-logger instrument.
- Performance of obtaining direct static measurements.
- Performance of scanning structural surfaces and open land areas.
- Performance of volumetric material sampling.

4.1.5 Supervisory and technical support personnel will have sufficient education, experience, training, and certification to appropriately qualify personnel in the performance of their assigned characterization and FSS tasks. Additional advanced training or experience in MARSSIM implementation is desired for technical personnel developing, reviewing or approving survey unit classifications, characterization and FSS plans, and reports.

4.2 Documents and Records

Each characterization and FSS measurement will be identified by date, instrument, location, type of measurement, and mode of operation. Generation, handling, and storage of the original characterization and FSS design and data packages will be controlled. All completed characterization and FSS records will be designated as quality documents, and as such, will be maintained in accordance with the relevant processes and procedures discussed later in this section.

4.2.1 Data Base Control

A. Data obtained during the performance of characterization and FSS may be analyzed and processed by Excel spreadsheets or more complicated computer data base programs. Access to any established data bases will be controlled and limited to personnel authorized by the LT/FSS Manager. Use of database programs supporting characterization and FSS operations will be in accordance with an approved procedure.

B. Any computer software used for data reduction, storage or evaluation, including standardized commercial software packages and platforms that are ubiquitously utilized (e.g., Microsoft Excel, Microsoft Access, etc.) will be procured, utilized and controlled in accordance with NCM-1, “Software Classification and Procurement” (Reference 2.2.3) and NCM-2, “Control of Software for Nuclear-Related Activities” (Reference 2.2.4). In addition, appropriate verification and validation performance tests, as necessary, will be performed prior to use of the data base for characterization and FSS data processing. The software will be tested prior to use by an appropriate test data set.

4.2.2 Quality Assurance (QA) Records

A. Documents that detail the design and performance of characterization and FSS, contain characterization and FSS or measurement data, detail custody of samples, or contain other information affecting performance or completion of characterization and FSS are considered QA records when completed. Characterization and FSS records that contain or affect characterization and FSS quality will be maintained current on the OPPD/FCS Intraweb for project use.

B. In addition:

- Direct access to these records will be limited to personnel authorized by the LT/FSS Manager.

- A signature file will be maintained of all personnel authorized direct access to these records.
- Characterization and FSS records will be signed out (by signature or initials) when they are removed from their storage location (e.g. file cabinet and/or room) where they are maintained.
- Positive control is required of characterization and FSS records when they are not secured in the approved storage location. Positive control is defined as being in the physical possession of an approved individual or placed in a secure locked location where access is controlled to only approved individuals.

4.2.3 Document Control

A. 10 CFR 20.2103(a) requires that records showing the results of surveys and calibrations required by 10 CFR 20.1501 be maintained. These records and other documents that affect characterization and FSS quality will be transmitted to OPPD Document Control for processing and retention in accordance with OPPD procedure RM-FC-101, "Record Management Program" (Reference 2.2.5).

B. Document Control for the FCS programs and procedures to be used by ES and FCS staff for the project will be performed in accordance with OPPD procedure RM-FC-102, "Control of Documents" (Reference 2.2.6)

4.2.4 Procurement Quality

A. The procurement of materials, equipment, and services for LTP development, site characterization and FSS will be performed in a controlled manner which will ensure compliance with applicable regulatory requirements, procedures, quality assurance standards, and regulations. Service requests will be reviewed for technical adequacy, and in order to assure confidence with services provided. Instrument calibration and laboratory analysis services for LT/FSS purposes will be procured by Energy*Solutions* as QL-II level services using the applicable implementing procedures of the QAIP.

B. Supplier qualification for QL-II services may be based on NEI 14-05 guidance with two exceptions:

1. The service is not considered a Basic Component, so the Commercial Grade Dedication process is not applicable.
2. Supplier qualification to the National Environmental Laboratory Accreditation Program (NELAP) is also acceptable,

C. Additionally, regular vendor performance reviews, audits, and/or surveillances of these contractors may be performed to provide an adequate level of assurance that the quality activities are being effectively performed.

4.2.5 Procedures, Technical Support Documents, Instructions and Drawings

The performance of characterization and FSS will require procedures and Calculations and Position Papers (CPP), as necessary, for personnel training, survey design, survey and sampling implementation, data collection, data review, data reporting, chain of custody, instrument calibration and maintenance, data verification and record storage. These documents will be developed to ensure compliance with characterization and FSS procedures and/or the LTP and will meet applicable quality requirements, including a standardized process for their development, review, approval, and revision.

4.3 Data Generation and Acquisition

4.3.1 The characterization and FSS process provides data to demonstrate that all radiological parameters satisfy the established guideline values and conditions. The characterization and FSS process consists of four principal elements: planning, design, implementation, and assessment.

4.3.2 Survey planning is addressed through the implementation of the DQO process. Each survey package will be generated through the development of DQOs specific to the survey area or survey unit that will undergo assessment. Specific decisions will be used to establish the necessary inputs that will be considered for survey design. The following are examples of decisions that may be addressed through the DQO process:

- Provide the basis for a non-impacted classification.
- Provide the basis for initial classification of impacted areas (e.g. MARSSIM-based Class 1, 2 or 3).
- Provide the basis for identification and distribution of Radionuclides of Concern (ROC).
- Provide the basis for a surrogate relationship for Hard-to-Detect (HTD) ROCs.
- Evaluate variability of existing residual radioactivity to support FSS design.
- Evaluate the residual radioactivity on concrete that is intended for beneficial reuse as backfill material.
- Demonstrate compliance with the dose-based unrestricted release criteria.

4.3.3 Survey Design

A. Survey design for Characterization, FSS and other radiological surveys performed in support of license termination is performed in accordance with the following procedures:

- FCSD-RA-LT-201, "Characterization Survey Package Development" (Reference 2.2.7)
- FCSD-RA-LT-302, "Final Status Survey Package Development" (Reference 2.2.8)
- FCSD-RA-LT-306, "Radiological Assessments and Remedial Action Support Surveys" (Reference 2.2.9)
- FCSD-RA-LT-307, "Unconditional Release Surveys of Structures and Miscellaneous Materials and Equipment" (Reference 2.2.10)

B. During the generation of a characterization or a FSS survey package, specific survey and sampling processes will be designed and established for each survey unit. Survey design is the element in the process that determines the data and/or information inputs that are necessary to address the decisions for the survey. The survey design will include information relevant to the decision, including (but not limited to) the size of area to be scanned, the number and location of samples, smears and static measurements, and the type(s) of instruments and sampling devices to be used, including required sensitivities or detection levels. Examples of additional types of inputs that may be considered during survey design are:

- Survey unit classification and the basis for the classification, performed in accordance with FCSD-RA-LT-301, "Survey Unit Classification" (Reference 2.2.11)
- Historical incidents or accidents involving radioactive material
- Evidence of previous radioactive material storage or the burial of radioactive material
- The anticipated ROC
- Types of media to be sampled
- Action levels or release criteria
- Sample frequency, size, and types of measurements (systematic, random and/or biased)
- Instrumentation and required sensitivity (MDC)
- Analytical requirements for physical samples (gamma spectroscopy, HTD, etc.)
- QC Samples

C. Alternate actions based on the decision rule will also be included in the survey design during FSS. Survey designs will identify any check or hold points in the process necessary to ensure the quality of samples or data collected in the field is maintained. Changes to the survey design will be subject to the same review and approval processes as the original survey design.

4.3.4 Survey Implementation

A. Characterization and FSS packages and plans, as well as survey plans written for URS, RA and RASS, will be implemented in accordance with written, approved procedures and plans that will ensure effective, technically correct and safe operations and data quality.

B. Characterization and FSS procedures and sample plans will describe the methods and techniques used for the collection of direct measurement data (static and scan) and media samples.

C. Isolation and Control measures will be initiated and maintained as appropriate in accordance with FCSD-RA-LT-303, "Final Status Survey Isolation and Control Measures" (Reference 2.2.12) to maintain the final configuration of a survey unit or area and to ensure data integrity.

D. Methods for Direct Measurements and Radiological Sample Analysis

The type and frequency of direct survey measurements or media samples for analysis are determined by the DQOs in the survey plan. Measurements and/or media samples taken for Characterization, FSS, RA, RASS and URS include surface scans, direct static surface measurements, loose surface contamination samples and gamma spectroscopy of volumetric materials, as appropriate. Table 4-1 presents a brief summary of the types of instrumentation that may be used to obtain these measurements.

Table 4-1 Examples of Survey Measurements and Instrumentation

Measurement	Instrument Type
Scanning:	
Alpha	Gas proportional, Zinc Sulfide Scintillation
Beta	Gas proportional, Geiger-Mueller, Plastic scintillation Na-I (Tl) scintillation, Cs-I Scintillation
Gamma	In Situ Object Counting System (ISOCS)
Direct (Gross) Activity:	
Alpha	Gas proportional, Zinc Sulfide Scintillation
Beta	Gas proportional, Geiger-Mueller, Plastic scintillation
Radionuclide-specific:	
Alpha	Radiochemical separation and alpha spectroscopy
Beta	Liquid Scintillation
Gamma	HPGe* detector based gamma spectrometer, NaI (Tl) scintillation In Situ Object Counting System (ISOCS)

*HPGe – High Purity Germanium.

E. The on-site radiological laboratory will normally be used for gamma spectroscopy, gas proportional counting, and liquid scintillation analysis in accordance with approved procedures.

F. The LT/FSS Group will also review the quality programs of any off-site vendor laboratories that are used for the receipt, preparation and analysis of characterization or FSS samples to ensure that the same level of quality is provided. In all cases, analytical methods will be established to ensure that required MDC values are achieved. All analytical data will be carefully reviewed prior to its use and incorporation into a characterization or FSS report. Off-site laboratory analyses will be procured by Energy*Solutions* as a QL-II procurement.

4.3.5 Sampling Methods and Types of Media Sampled

A. Sample media collection will be performed in accordance with NCM-1, "Software Classification and Performance"

B. NCM-2, "Control of Software for Nuclear-Related Activities"

4.3.6 RM-FC-101, "Record Management Program"

A. (Reference 5). Sample preparation will be performed in accordance with RM-FC-101, "Records Management Program". A wide range of media may be sampled and analyzed for characterization and FSS. The types of different media that may be sampled include, but are not limited to the following:

- Surface Soil

- Subsurface Soil
- Sediment
- Volumetric Concrete
- Water
- Asphalt
- Grease/Oil
- Roofing Material
- Metal
- Paint Scrapings
- Surface Wipes

B. There are two methods for the acquisition of volumetric media samples, grab samples and composite samples. Both are defined below. The appropriate sample collection technique will be determined based on the survey package and its DQOs.

1. Grab Sample

An individual sample collected from a single location at a specific time or period of time.

2. Composite Samples

A sample collected over a temporal or spatial range that typically consists of a series of discrete, equal samples (or aliquots) which are combined or composited. There are four types of composite samples:

i. *Time Composite (TC)* - a sample comprised of a varying number of discrete samples (aliquots) collected at equal time intervals during the compositing period. The TC sample is typically used to sample wastewater or streams.

ii. *Flow Proportioned Composite (FPC)* - a sample collected proportional to the flow during the compositing period by either a time-varying/constant volume (TVCV) or time-constant/varying volume (TCVV) method. The TVCV method is typically used with automatic samplers that are paced by a flow meter. The TCVV method is a manual method that individually proportions a series of discretely collected aliquots. The FPC is typically used when sampling wastewater.

iii. *Areal Composite* - a sample composited from individual, equal aliquots collected on an areal or horizontal cross-sectional basis. Each aliquot is collected in an identical manner. Examples include sediment composites from quarter-point sampling of streams and soil samples from within grids.

iv. *Vertical Composite* - a sample composited from individual, equal aliquots collected from a vertical cross section. Each aliquot is collected in an identical manner. Examples include vertical profiles of soil/sediment columns, lakes, and estuaries.

4.3.7 Sample Handling and Custody

A. Responsibility for custody of samples from the point of collection through the determination of the sample analytical results is established by implementing procedures for Sample Identification and Chain-of-Custody (COC) that will ensure that sample custody is maintained and the validity and control of material samples are intact. Samples (soil, smears, scrapings, etc.) that require measurement or counting (i.e. not a field measurement) shall, at all times, be positively controlled, or have controlled custody by sample log or in accordance with FCSD-RA-LT-205 "Chain-Of-Custody Protocol for Site Characterization and Final Status Survey" (Reference 2.2.15). If the procedure is used, a COC form should be filled out for all such samples. The person that acquired the sample is responsible for the care and custody of the sample until it is transferred, or properly dispatched, or the sample has been placed in secured storage. As few people as possible should handle the sample.

B. Samples will be labeled with a unique identification number and the date, location, and time of collection. This number will be used for the COC and for the reporting of counting/measurement data. How samples will be identified will be designated in the survey package or sample plan.

C. Prior to leaving the positive control of the person taking the sample, samples will be accompanied by a properly completed COC form or documented in a sample log. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the COC form or in a sample tracking log. The COC form or the log will document transfer of custody of the sample(s) from the sampler to another person, to the on-site radiological laboratory, to an off-site vendor laboratory, or to/from a secure storage area. Secure storage will be provided for archived samples.

D. Samples sent to an off-site laboratory will be properly packaged for shipment, with a signed COC form enclosed in each sample box or cooler. Shipping containers will be secured with appropriate custody seals for shipment to the laboratory. The original COC form will accompany the shipment, and a copy will be retained for the project

file. Commercial carriers are not required to sign off on the custody form as long as the COC forms are sealed inside the sample container and the custody seals remain intact.

4.3.8 Analytical Methods for Radiological Contaminants

A. Samples will be analyzed for radiological contaminants by the on-site radiological laboratory or in some cases, by a qualified off-site radiological laboratory. The analysis of radiological contaminants will use standard approved and generally accepted methodologies or other comparable methodologies.

B. For radiochemical analyses, the MDC is determined based on normal factors and conditions which influence measurement. The MDC is used to evaluate the capability of a method relative to the required detection limit. Sample size, count duration, tracer recovery, detector background and detector efficiency all contribute to determining the sample MDC. The MDC for a radionuclide by radiochemical measurement is determined from the blank/background variability associated with the appropriate detector, the detector efficiency, sample aliquot size and chemical yield. The background variability is proportional to the sample count time.

4.4 Quality Control Surveys and Samples

4.4.1 Quality Control (QC) surveys and samples are performed primarily as verification that the original characterization or FSS results are valid. QC surveys may include replicate surveys, field blanks and spiked samples, split samples, third party analysis and sample recounts. Replicate surveys apply to scan and static direct measurements. Field blanks and sample recounts apply to loose surface and material sampling surveys. Spiked samples and split samples apply to material sampling surveys. Third party analysis applies to material samples counted by a different laboratory than normally used. QC survey results are evaluated and compared to the original FSS results in accordance with the appropriate acceptance criteria.

4.4.2 Replicate Measurements and Surveys

A. A replicate measurement is an independent direct measurement performed by a qualified technician, other than the one who obtained the original characterization or FSS measurement, using a separate but similar instrument. In cases where the instrumentation used is highly specialized or of limited quantity, the same instrument may be used with the approval of the LT/FSS Manager. The original technicians may perform the replicate measurement with the approval of the responsible LT/FSS Manager in cases where specialized training is required in measurement acquisition or in operation of the instrument. The results of the replicate measurement are directly compared to the result of the original measurement.

B. The QC replicate surveys only apply to FSS. It entails a repeat survey of the original designed survey in its entirety. QC replicate surveys are designed and modeled in the same manner as the original FSS. Any design deviations from the original survey must be approved by the responsible LT/FSS Manager. The replicate survey package will be an addendum to the original survey package.

C. Frequency

1. Replicate measurements will be performed on a specified percentage (typically 5%) of the static and scan locations in each characterization and FSS package in locations chosen at random. QC replicate surveys, conducted during the FSS phase, will be performed when directed by the LT/FSS Manager.
2. These frequencies may be increased or decrease as directed by the LT/FSS Manager.
3. Generally, QC replicate surveys will be performed on randomly selected survey units from the known population of survey units. Some circumstances, such as when the survey of a unit may require burdensome support activities or use of specialty equipment, may dictate selecting an alternate survey unit for the QC replicate survey. The LT/FSS Specialist may also select additional or substitute survey units based on professional judgment.

D. Acceptance Criteria

1. Replicate static and scan measurement results will be compared to the original measurement results to determine if the acceptance criteria are met. The acceptance criteria for static measurements and scan surveys, based on the professional judgment of the LT/FSS Specialist, is that the same conclusion is reached for each measurement location and no other locations, greater than the scan investigation level for the area classification, are found. If the same conclusion is not reached or any exceptions are reported that were not reported in the original survey, further evaluations will be performed.
2. The acceptance criteria for QC replicate surveys is that both data sets either passes or fails the appropriate statistical test (e.g., Sign Test) for that survey unit. Agreement is ultimately determined that the same conclusion is reached for each data set. If the same conclusion is not reached or any exceptions are reported that were not reported in the original survey, further evaluations will be performed.

4.4.3 Duplicate and Split Samples

A. The collection of duplicate samples or split samples will be the primary means of assessing survey precision and accuracy when collecting volumetric and/or material samples for characterization and FSS. A duplicate sample is a second complete sample taken at the same location and same time as the original. A split sample is when the original sample aliquot is separated into two aliquots and analyzed as separate samples.

B. Frequency

1. For the characterization and FSS of surface and subsurface soils, asphalt, and sediment, a split sample analysis will be performed on a percentage (minimum of 5%) of the soil samples taken in a survey unit with the locations selected at random. For all other materials such a volumetric concrete, oils or liquids, the frequency will be determined by the responsible LT/FSS Manager.
2. Duplicate samples will be acquired in accordance with the direction in the specific survey package or sample plan or as directed by the responsible LT/FSS Specialist.

3. During the performance of FSS, a percentage (typically 5%) of the total number of split samples taken will be sent for analysis by a qualified off-site laboratory. If analysis by an off-site laboratory is prohibitive, another option that is acceptable for performing split sample analysis is for the on-site laboratory to analyze the spilt sample using a separate detector. In both cases, this process is performed in order to evaluate the accuracy of the on-site laboratory techniques. The two split samples aliquots may be divided between the on-site laboratory and off-site laboratory, or both aliquots may be analyzed by both laboratories.

C. Acceptance Criteria

1. NRC Inspection Procedure, No. 84750, "Radioactive Waste Treatment, and Effluent and Environmental Monitoring" (Reference 2.1.7) is used to determine the acceptability of split and duplicate sample analyses. The sample results will be compared to determine accuracy and precision as follows:
2. Divide each sample result by its associated uncertainty to obtain the resolution. [Note: the uncertainty is defined as the relative standard deviation (σ)].
3. Divide each sample result by the corresponding split or duplicate result to obtain the ratio.
4. The split or duplicate sample results are in agreement if the value of the ratio falls within the limits shown in Table 4-1 for the corresponding resolution.

Table 4-2 Acceptance Criteria

Resolution	Acceptable Ratio
<4	0.4-2.5
4-7	0.5-2.0
8-15	0.6-1.66
16-50	0.75-1.33
51-200	0.80-1.25
>200	0.85-1.18

5. Agreement is ultimately determined when the same conclusion is reached for each compared result. If the split sample or duplicate sample results do not agree, then further evaluations will be performed.

4.5 Field Blanks and Spiked Samples

4.5.1 Field blanks are obtained by bringing an adequate volume of uncontaminated material, of the same media as the media being sampled, to the field. A sample will be collected from the uncontaminated material using the standard collection procedures. Field blank samples will be handled as a standard characterization or FSS sample through collection, preparation and analysis.

4.5.2 Spiked samples are procured from and prepared by a radioactive source vendor or laboratory. Spiked samples should be of the same media and same consistency as the on-site media that it is to emulate. The volumetric activity of the spiked sample will be as directed by the LT/FSS Manager.

4.5.3 Frequency

Field blanks and spiked samples will not be performed on a routine basis. Field blanks and spiked samples will only be performed when directed by the LT/FSS Manager.

4.5.4 Acceptance Criteria

A. The acceptance criteria for field blank samples are that no plant derived radionuclides are detected. If the analysis of the field blank shows the presence of plant derived radionuclides, then further evaluations will be performed.

B. Spiked sample results will be compared with the expected results to determine accuracy and precision in the same manner as duplicate or split samples. Agreement is ultimately determined that the same conclusion is reached for each compared result, based on professional judgment of the LT/FSS RE, on a case by case basis. If the spiked sample results do not agree with the expected results, further evaluations will be performed.

4.6 Instrument Quality

4.6.1 Radiation detection and measurement instrumentation for characterization and FSS is selected to provide both reliable operation and adequate sensitivity to detect the radionuclides identified at the site at levels sufficiently below the action levels or release criteria. Detector selection is based on detection sensitivity, operating characteristics and expected performance in the field. Energy*Solutions* will purchase instrumentation used for LT/FSS purposes using the QL-II procurement process, and OPPD will thereafter maintain the instrumentation.

A. Instrument Control

1. The receipt, inspection, issue, control and accountability of portable radiological instrumentation used for characterization and/or FSS will be performed in accordance with an approved procedure. All portable radiological instrumentation and/or detectors addressed by this procedure shall be tracked by means of a serialized inventory system and assigned a unique identification number. An instrument history file shall be established to contain data for each portable radiological instrument or detector that will be and has been used to acquire characterization and/or FSS data. The instrument history file will contain a log of the maintenance and use history of the instrument, a copy of all calibration certificates and data sheets and records of daily response checks and control charts.
2. Instrument accountability will be determined through a sign-out process for all portable instrumentation and/or detectors used for characterization and/or FSS.
3. Maintenance and repair to characterization and/or FSS portable radiological instrumentation may be performed onsite by qualified personnel with experience in the maintenance and repair of instrumentation or off-site by a qualified vendor. Minor repair is defined as any repair that will not affect the calibration or efficiency of the instrument. Instruments and detectors used for the acquisition of characterization and/or FSS data shall be re-calibrated prior to use in the field if any major maintenance or repairs are performed that could affect the efficiency of the instrument and/or detector.
4. Portable radiological instrumentation and/or detectors will remain in the custody of the assigned technician, and positive control will be maintained, until collected data has been downloaded and the instrument has been returned to inventory.
5. Log sheets and other forms used to record field data shall remain in the custody of the responsible individual, and positive control shall be maintained, until returned to secure storage.

4.6.2 Response Checks

A. Response checks shall be performed on all radiological instrumentation and/or detectors used for characterization and/or FSS prior to and are recommended following use. Response checks that may be performed include, but are not limited to, ensuring:

- The instrument is in good physical condition.
- A current and valid calibration label is affixed to the instrument.
- The instrument satisfactorily zero adjusts (if applicable).

- The instrument satisfactorily battery checks (if applicable).
- All detector parameters on the instrument display are correct for the detector in use.
- A satisfactory operational response within an acceptable range to a radioactive source of known activity.

B. If the instrument does not pass the response test, then the instrument will be removed from service. In cases where the failed response test was performed post-use, the LT/FSS Manager or designee will be notified. The data acquired by the instrument since the last response check will be considered as suspect and invalid unless proven otherwise.

4.6.3 Placing an Instrument Out-of-Service

A. Instruments tagged and removed from service for calibration, repair or failure of a response test shall be physically segregated from those instruments available for issue. All instruments removed from service shall be labeled by attaching a "DO NOT USE" or “OUT OF SERVICE” tag or equivalent.

4.7 Instrument/Equipment Calibration and Frequency

4.7.1 All portable radiological instruments used for characterization and/or FSS shall be calibrated prior to first use, following any major repair, maintenance, or modifications that could affect calibration, after failure of a performance test requiring adjustments or repairs (that could affect calibration) to correct the failure, and every twelve (12) months.

4.7.2 Instruments will be calibrated using sources traceable to the National Institute of Standards and Technology (NIST) in accordance with approved procedures and instructions. At a minimum, portable radiological instrumentation and/or detectors used for characterization and/or FSS shall be calibrated in accordance with ANSI N323A-1978 (Reference 2.1.8). This requirement shall be clearly marked on the purchase requisition if an off-site vendor is used for these services. Following calibration, all radiological instrumentation and/or detectors used for characterization and/or FSS shall have a label affixed to the instrument and/or detector indicating current calibration status.

Data Management

Survey data control from the time of collection through evaluation will be specified by procedure and survey package instructions. Manual data entries will be verified by a second individual.

4.8 Data Assessment, Validation and Usability

4.8.1 For characterization and FSS, survey data assessment is performed in accordance with FCSD-RA-LT-202, "Characterization Survey Data Assessment" (Reference 2.2.16), and "FCSD-RA-LT-304, Final Status Survey Data Assessment" (Reference 2.2.17).

4.8.2 Data validation is the systematic process of ensuring that the precision and accuracy of direct and analytical data are adequate for their intended use. One hundred percent (100%) of the data generated from all on-site and off-site analytical laboratories shall undergo independent peer review and evaluation. The data review will examine the possible effects on the data that could result from various QC failures. It does not determine data usability, nor does it include assignment of data qualifier flags.

4.8.3 The Data Quality Assessment (DQA) method is the approach used to perform this process.

A. Data Review, Verification and Validation

The DQA process is an evaluation method used during the assessment phase to ensure the validity of characterization and FSS results and demonstrate achievement of the survey objectives. The decision rule for characterization is the acquisition of the necessary quantity and quality of data to address the decision question. The use of DQA, like the DQO process, is a critical component in ensuring the acquisition of quality data that is accurate and reproducible.

i. Review the DQOs and Sampling Design

ii. Conduct a Preliminary Data Review

iii. Select the Statistical Test (for FSS only)

iv. Verify the Assumptions of the Statistical Test (for FSS only)

v. Draw Conclusions from the Data

B. Review of the DQOs and survey plan designs includes verification and validation of collected data to determine whether or not the quality of the data (accuracy, precision, and sensitivity) satisfies the survey objectives.

C. The DQA process is the primary evaluation tool to determine that data are of the right type, quality and quantity to demonstrate that the dose from residual radioactivity in each survey unit is less than the annual dose criterion for license termination.

4.8.4 Verification and Validation Methods

Data generated through characterization/FSS field activities or laboratory operations will be reduced and validated prior to reporting. Characterization/FSS analytical data should not be disseminated by the laboratory or considered final until it has been subjected to data validation in accordance with an approved procedure.

4.8.5 Data Reduction

A. The results of all direct measurements will be documented in the applicable specific characterization or FSS Package. All data will be legible. If errors are made, results will be legibly crossed out, initialed and dated by the responsible person(s), and corrected in a space adjacent to the original (erroneous) entry. For material samples, positive control of the sample from the time of acquisition to the time of analysis will be verified.

B. Typically, the greatest uncertainty in a measurement is often a result of the sampling process and inherent variability in the environmental media rather than the analytical measurement. Therefore, analytical data validation will be performed only to the level necessary to minimize the potential of using false positive or false negative results in the decision-making process.

C. All calculations will be verified by an independent review. Errors will be noted and corrections will be made, but the original notations will be crossed out legibly. Analytical results for soil samples should be calculated and reported as activity per unit weight (e.g., pCi/g).

D. Acceptable data will be entered into the applicable specific characterization or FSS package closure report. The closure report will also qualify any unacceptable data. Narratives will be prepared which will include information concerning data outside the acceptance limits, and any other anomalous conditions encountered during the analysis of the measurement or sample result. Quality control data (e.g. split samples) will be compared to the acceptance criteria.

4.8.6 Data Validation

A. Data validation procedures shall be performed for both field and laboratory operations.

B. Procedures to validate direct field measurement data primarily include checking for transcription errors and review of characterization/FSS Package instructions. For FSS, data validation will be performed in accordance with an approved procedure.

1. Processes Used to Validate Data

   i. Processes to validate direct field measurement data primarily include checking for transcription errors and a review of survey

package instructions. Upon receiving a survey record or analyses report of data intended for characterization or FSS, the responsible LT/FSS Specialist will perform a validation of the survey data to ensure that the data results are valid. Each specific sample or measurement result will be assessed individually. Data validation is accomplished through a review and assessment of the following:

- Verification that the unique sample identification number for each sample or measurement is consistent between the sample analysis report, the COC form (if applicable) and the survey package and/or sample plan instructions.
- Verification that the recorded sample date and time for each sample or measurement is consistent with the COC form and the survey record.
- Verification that the data is complete and that there are no missing results or supporting data, including but not limited to MDC, uncertainty, background, or methods of analysis.
- Verification that the MDC of the instrument used for analysis was adequate to detect all ROC or gross activity at the investigation levels specified in the survey package for that survey unit.
- Verification of the absence of anomalies in the sample or measurement results, or in the supporting data, including but not limited to MDC, uncertainty, deviation from established procedure or analysis flags.
- For data collected with a data logging instrument, verification that the data has been downloaded with a unique file name.
- Verification that survey data results are presented in units appropriate for comparison to the action level or release criteria. As applicable, convert the units for the reported data to the appropriate units by correcting for survey instrument background, efficiency, geometry, detector area, and/or measurement size.

ii. Once analysis or measurement results have been validated, they can be placed in the survey package for data evaluation. The individual performing the validation will indicate that the data is valid by documenting the validation process in the survey package.

4.8.7 Data Reporting

A. Field data reporting will be conducted principally through the execution and completion of survey packages and/or sample plans.

B. Radiological data from laboratory analysis is not considered official or reportable data until the validation activity has been concluded. The LT/FSS Manager will perform a final review of all report summaries and narratives to determine whether the data meets project requirements.

C. Characterization survey results will be presented in a report in the form of a CPP.

D. Documentation of the FSS will be contained in two types of reports in accordance with FCSD-RA-LT-305, "Final Status Survey Data Reporting" (Reference 2.2.18) and will be consistent with section 8.6 of MARSSIM.

1. An FSS Survey Unit Release Record will be prepared to provide a complete and unambiguous record of the as-left radiological status of an individual survey unit, relative to the specified release criteria. Survey Unit Release Records will be made available to the NRC for review as appendices to the appropriate FSS Final Report.

2. An FSS Final Report, which is a written report that is provided to the NRC for its review, will be prepared to provide a summary of the survey results and the overall conclusions which demonstrate that the site, or portions of the site, meets the radiological criteria for unrestricted use including ALARA.

4.9 Assessment and Oversight

4.9.1 Assessments and oversight will be performed by the QA Department on the characterization and FSS program to determine if the program is being implemented in accordance with the LTP, regulatory guidance, and approved procedures. In addition, periodic internal assessments will be performed by LT/FSS Project personnel assigned to specific areas of review within the characterization and FSS programs, in accordance with PL-FC-126, "Self-Assessment Program" (Reference 2.2.19). The LT/FSS RE, LT/FSS Specialist and LT/FSS Supervisor(s) will perform periodic surveillances and audits of field sampling activities. Aspects to be assessed include, but are not limited to, survey performance, data retrieval, data evaluation, quality control, and document control. All assessment results and any discrepancies found will be documented, tracked to resolution, and reported to project management. Any assessment results showing negative trends, equipment, or performance failures and discrepancies shall warrant a condition report in accordance with OPPD procedure PI-FC-125, "Decommissioning Corrective Action Program" (Reference 2.2.20). This program will be utilized to identify conditions adverse to quality and to support the development of corrective actions.

4.9.2 Corrective Actions

A. For ES activities at the FCS site, the FCS corrective action process will be used.

B. Corrective action is the process of identifying, recommending, approving and implementing measures to unacceptable procedures or out of quality control performance which can affect data quality. Corrective action can occur during field activities, laboratory analyses, data validation, and data assessment. Any nonconformance with the requirements of the LTP, this QAPP or approved procedures will be identified, corrected, and properly documented.

C. Corrective action in the field may be necessary when the sample population is changed (e.g. more/less samples, sampling locations other than those specified in the survey package), or when sampling procedures and/or field analytical procedures require modification due to unexpected conditions. Project personnel will be responsible for reporting all suspected technical or quality non-conformances or suspected deficiencies of any activity or issued document by reporting the situation to the responsible LT/FSS Specialist or LT/FSS Supervisor. These personnel will be responsible for assessing the suspected problems in consultation with the LT/FSS Manager on making a decision based on the potential for the situation to impact the quality of the data. If it is determined that the situation warrants corrective action, a condition report will be initiated in accordance with PI-FC-125, “Decommissioning Corrective Action Program”.

4.9.3 Reports to Management

The LT/FSS Manager will be responsible for all reports and deliverables associated with characterization and FSS.

5 ATTACHMENTS AND FORMS

None