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SOIL CHARACTERIZATION AND EXCAVATION PROJECT

PROJECT SPECIFIC PLAN FOR EXCAVATION CHARACTERIZATION FOR THE INACTIVE FLYASH PILE AND SOIL STOCKPILE 5 (SP5)

INFORMATION ONLY

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

JUNE 1998

U. S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE

20300-PSP-0004
REVISION 1

000001

PROJECT SPECIFIC PLAN FOR EXCAVATION CHARACTERIZATION FOR THE INACTIVE FLYASH PILE AND SOIL STOCKPILE 5 (SP5)

Project Number: 20300-PSP-0004
Revision: 1
Prepared by: Fluor Daniel Fernald
Prepared for: U.S. Department of Energy

Fernald Field Office
Contract DE-AC05-92OR21972

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Soil Characterization and Excavation Project

FERNALD ENVIRONMENTAL MONITORING PROJECT

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TABLE OF CONTENTS

000003

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS AND ABBREVIATIONS

A2PI	Area 2, Phase I
ASL	Analytical Support Level
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Constituent of Concern
DQO	Data Quality Objective
FACT	Fernald Analytical Customer Tracking System
FDF	Fluor Daniel Fernald
FEMP	Fernald Environmental Monitoring Plan
FRLs	final remediation levels
GPS	Global Positioning System
HPGe	High Purity Germanium detector
IRDP	Integrated Remedial Design Package
NaI	sodium iodide
OSDF	On-Site Disposal Facility
PPE	personal protective equipment
ppm	parts per million
PSP	Project Specific Plan
QA/QC	quality assurance/quality control
QA	Quality Assurance
RCTs	Radiological Control Technicians
RTIMP	Real-Time Instrumentation Measurement Program
RTRAK	Real-Time Radiation Tracking System
RWP	Radiological Work Permit
SCEP	Soil Characterization and Excavation Project
SCQ	Sitewide CERCLA Quality Assurance Project Plan
SEP	Sitewide Excavation Plan
SP5	Stockpile 5
Tc-99	Technetium 99
VR/FCN	Variance Request/Field Change Notice
WAC	Waste Acceptance Criteria
WAO	Waste Acceptance Organization

1.0 INTRODUCTION

This project-specific plan (PSP) describes the data collection activities during excavation of the Inactive Flyash Pile (including Interceptor Ditch #1) and Stockpile 5 (SP5) at the Fernald Environmental Management Project (FEMP) as outlined in the Area 2, Phase I (A2PI) Integrated Remedial Design Package (IRDP, April 1998) and subsequent IRDP Addendum (June 1998). The data collected under this plan will be used to determine whether soil and soil-like material excavated from the area meets the waste acceptance criteria (WAC) as defined in the Sitewide Excavation Plan (SEP), the Waste Acceptance Criteria Attainment Plan for the On-Site Disposal Facility (OSDF), and the Impacted Materials Placement Plan (see references in Section 6.0).

All excavation characterization data collection activities will conform to the requirements of the documents listed below and in Section 6.0.

- Sitewide Excavation Plan (1998)
- Waste Acceptance Criteria Attainment Plan for the On-Site Disposal Facility (1998)
- Impacted Materials Placement Plan (1997)
- User Guidelines, Measurement Strategies, and Operational Factors for Deployment of In-situ Gamma Spectrometry at the Fernald Site (User's Manual), 20701-RP-0006, Revision A (1998).
- Data Quality Objective (DQO) SL-051
- Sitewide Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Quality Assurance Project Plan (SCQ)
- In-Situ Gamma Spectrometry Addendum to the Sitewide CERCLA Quality Assurance Project Plan, FD-1000 (1998)

1.1 OBJECTIVES

The objective of this excavation characterization plan is to provide data to determine if soil and soil-like material outside of the previously defined above-WAC areas meet the total uranium WAC for the OSDF. As described in the technical specifications of the Area 2, Phase I (A2PI) IRDP, the excavation contractor will excavate and remediate the Inactive Flyash Pile (including Interceptor Ditch #1) and SP5 in horizontal lifts (3 ± 1 foot). Excavation characterization data will supplement historical

data, predesign investigation data, and visual observation/inspection of the material being excavated. These data are used by Soil Characterization and Excavation Project (SCEP) with Waste Acceptance Organization (WAO) concurrence to demonstrate whether the soil or soil-like material meets total uranium WAC for the OSDF.

1.2 SCOPE

The scope of this PSP is to characterize material to be excavated from the Inactive Flyash Pile (including Interceptor Ditch #1) and SP5 to determine appropriate disposition. This PSP does not cover precertification or certification measurements/sampling and analysis efforts for final remediation levels (FRLs). The shaded section of the flowchart in Figure 1 depicts the work processes addressed in this plan. The necessary procedures and guiding documents to perform the work are linked to the appropriate functions in the flowchart in Figure 2.

This excavation characterization plan addresses the acquisition of survey data and real-time in situ gamma spectrometry data, data deliverables and documents generated from these measurements, field quality assurance/quality control (QA/QC), and management of generated data. Total uranium is the only WAC constituent of concern (COC) in the entire A2PI area. Total uranium and technetium-99 (Tc-99) are the WAC COCs in SP5; however, only total uranium can be detected using in situ gamma spectrometry instruments, and is therefore the only WAC COC addressed in this PSP.

Three zones will be established for the A2PI excavation activities:

- Zone 1
- Zone 2
- Zone 3.

Changing conditions will cause re-evaluation and re-establishment of zones.

Zone 1 will encompass an area within 50 feet of active loading or dumping operations or potential airborne generating activities. The personal protective equipment (PPE) for this zone includes full anti-contamination (anti-Cs) dressout and a full-face respirator [additional requirements will be listed on the Radiological Work Permit (RWP)]. Primary personnel in this zone include representatives from

000007

the Waste Acceptance Organization (WAO), subcontractor equipment operators, and Radiological Control Technicians (RCTs).

Zone 2 will cover the entire A2PI contamination area except designated Zone 1 areas. The PPE for this zone includes full anti-Cs (additional requirements will be listed on the RWP). Primary personnel in this area will include representatives from WAO, subcontractor, Industrial Hygiene, Health and Safety, real-time characterization, construction management, and any regulatory agency with required training.

Zone 3 is any area within A2PI outside the contamination area (i.e., field trailers, mapping van, subcontractor equipment area). The PPE for this zone is Level D (i.e., safety glasses, construction vest, hard hat, steel-toed shoes); additional requirements will be listed on the RWP.

Personnel performing activities described in this PSP within the designated soil contamination areas (Zones 1 and 2) require RAD Worker II and Asbestos Awareness training and, if applicable, training for the procedures listed in Section 6.0. In-situ gamma spectrometry measurements will be conducted in Zone 2 [current requirements include full anti-contaminant (anti-Cs) dressout]; the mapping van, where generation of data maps will take place, will be located in Zone 3 [current requirements are Level D (steel-toed shoes, construction vest, safety glasses)].

1.3 ORGANIZATION

Personnel responsible for conducting work in accordance with this PSP include team members from the WAO and SCEP organizations, specifically Characterization, Surveying, Real-Time Instrumentation Measurement Program (RTIMP), Construction, Safety and Health, and Quality Assurance personnel. Project personnel are listed in Table 1.

TABLE 1

PROJECT PERSONNEL

TITLE	PRIMARY	ALTERNATE
A2PI Area Project Manager	Tony Klimek	Vicky Zimmerman
Characterization Lead	Vicky Zimmerman	Mike Rolfes
RTIMP Manager	Joan White	Dale Seiller
RTIMP Field Lead	Dale Seiller	Dave Allen
Survey Lead	Jim Schwing	Jim Capannari
Field Data Management Lead	Mike Rolfes	Deanna McDonald
SWU Construction	Marshall Linton	Lee McDaniel
Safety and Health Contact	Debra Grant	Lewis Wiedeman
Quality Assurance Contact	Reinhard Friske	Mary Eleton
WAO Contact	Dave Lockerd	Linda Barlow

2.0 EXCAVATION CHARACTERIZATION PROGRAM

As identified in Figures 1 and 2, data collection during excavation characterization involves the following processes:

- Surveying the excavation lift area
- Determining the appropriate real-time monitoring equipment [Real-Time Radiation Tracking System (RTRAK), and/or High Purity Germanium Detector (HPGe)]
- Scanning the excavation lift areas with the RTRAK and/or HPGe (Detection Phase)
- Mapping and/or displaying the collected real-time data
- Determining the need for additional HPGe measurements (confirmation and/or delineation) and marking above-WAC areas, if found
- Tracking and managing the characterization data.

These activities will be completed within two consecutive dry working days following lift excavation in each designated lift area, about 100 feet by 200 feet (approximately 0.5 acre).

2.1 EXCAVATION LIFT AREA SURVEYING

Fluor Daniel Fernald (FDF) Construction personnel will inform the Characterization Lead or designee when excavation of a lift area is complete and ready for in-situ gamma spectrometry measurements. The Characterization Lead will then coordinate with the Surveying Lead to conduct surveying in the excavation lift areas prior to deployment of the RTRAK and/or HPGe. The boundary of the lift area will be defined and surveyed. Northing (Y), Easting (X), and elevation (Z) coordinate values (Ohio South Zone, #3402) will be determined using standard survey practices and standard positioning instrumentation [electronic total stations and Global Positioning System (GPS) receivers]. An average elevation also will be generated for the excavation lift area. Field locations (i.e., lift area boundaries, measurement locations, grid points, above-WAC delineation if necessary) will be marked in a manner easily identifiable by all field personnel using survey stakes, flags, and/or water-based paint. Survey information (coordinate data) will be downloaded at the completion of each survey job and transferred electronically to the Survey Lead. This information will be forwarded to the RTIMP and Characterization Leads or designees.

2.2 IN-SITU GAMMA SPECTROMETRY EQUIPMENT DETERMINATION

The excavation lift area will be characterized using in-situ gamma spectrometry equipment (RTRAK and/or HPGe), consistent with DQO SL-051 and the User's Manual. This evaluation involves the use of the RTRAK to initially scan the excavation face of a lift, followed by confirmation and delineation of elevated RTRAK total uranium measurements with the HPGe, if needed. The HPGe will always be used if the confirmation and delineation process is deemed necessary (see Section 2.5). The overall use of in situ gamma spectrometry for excavation characterization is described in detail in Sections 2.1, 2.3, 3.4, and 3.5 of the User's Manual.

In areas where the RTRAK cannot gain access due to topography (narrow ditches and deep excavations), excessive moisture, or other limiting conditions, the HPGe shall be used for initial screening. The decision to use any of these evaluation techniques will be made by the Characterization Lead or designee in consultation with the RTIMP Field Lead or designee.

2.3 REAL-TIME IN-SITU GAMMA SPECTROMETRY OF THE EXCAVATION LIFT AREA

The RTRAK and/or HPGe detection systems will be used to scan as close to 100 percent of each excavation lift area as possible. A mapping van station outside the contamination area will receive, process, and generate maps of collected measurement data. The scanning and collection of measurement data will be conducted according to the applicable procedures and documents listed in Figure 2 and in Section 5.0. The following subsections summarize relevant information from these procedures and documents. Sections 3.1, 3.2, 4.1, 4.2, 4.3, and 5.7 of the User's Manual provide information and guidance relative to HPGe and RTRAK measurement.

2.3.1 RTRAK Data Acquisition

The sodium iodide (NaI) detection system (RTRAK) will be used to provide as close to 100 percent coverage as possible of the accessible excavation lift area. The acquisition time will be 4 seconds with data collected at a maximum speed of 1 mile per hour as assisted by the on-board GPS. The RTRAK passes will be in a back and forth pattern, if possible. The RTRAK overlapping passes are achieved by placing the innermost RTRAK tires in the former outermost RTRAK tire track from the previous RTRAK pass, achieving an approximate 0.4 m overlap. Stakes or other markers may be used to stay on track. The RTRAK trigger level (Section 4.5 of the User's Manual) potentially requiring confirmation and delineation by the HPGe for total uranium will be 721 parts per million (ppm). If

initial RTRAK scans indicate all total uranium data is below 721 ppm, no further confirmation or delineation with the HPGe is necessary.

The RTRAK measurements will be accompanied by GPS Northing and Easting coordinates and by the average elevation coordinate designated to represent each lift. GPS operations are described in Section 5.8 of the User's Manual.

2.3.2 HPGe Data Acquisition

As discussed in Section 2.2 of this plan, the HPGe shall be used for the initial scanning of a excavation lift area if RTRAK is not used. If the HPGe is used without prior scanning by the RTRAK, a triangular grid will be established with minimal overlap of measurement areas to achieve approximately 99.1 percent coverage (see Section 4.10 and Figure 4.10-1 of the User's Manual). A detector height of 1 meter and an acquisition time of 5 minutes will be used; the HPGe trigger level requiring potential confirmation and delineation for 1 meter HPGe measurements is 400 ppm for total uranium. If this initial HPGe scan indicates all data is below 400 ppm for total uranium, then no further confirmation or delineation with the HPGe is necessary. A trigger level of 400 ppm allows detection of total uranium WAC exceedances with a 1.5 m radius (Section 4.6 of the User's Manual).

HPGe measurements will be accompanied by GPS Northing and Easting coordinates and by the average elevation coordinate designated to represent each lift. One duplicate HPGe measurement will be collected for every 20 HPGe measurements performed or a minimum of one duplicate per excavation lift. The duplicate will be collected immediately after the measurement being collected and at the same read time and detector height.

2.3.3 Surface Moisture Measurements

Surface moisture readings (used to correct data prior to mapping) will be collected with a direct moisture measurement tool (i.e., Troxler) prior to collection of in-situ gamma spectrometry. Field moisture measurements and moisture-corrected data are discussed in detail in Sections 3.8 and 5.2 of the User's Manual.

When using the RTRAK, one surface moisture measurement will be collected for each excavation lift. More than one moisture measurement can be collected for each lift if the surface moisture of soil appears visibly different. If more than one moisture reading is obtained, the average of the readings will be used as the moisture measurement for the lift and used to correct the real-time data. If a large difference in readings is noted, the data will be re-evaluated.

When the HPGe is being used, one surface moisture measurement will be collected and recorded at each HPGe measurement location.

Moisture readings must be collected within 8 hours of the gamma readings or more frequently if moisture conditions change or are expected to change. Field conditions (such as weather) will be noted on the applicable electronic worksheet.

If conditions prevent the use of the surface moisture gauge, a soil moisture core will be collected from 0 - 6 inches using a plastic or stainless steel liner and submitted to the FEMP on-site laboratory for percent moisture analysis only (no density). Liner ends will be capped and sealed immediately after moisture core collection. The percent moisture information will be used to correct both HPGe and RTRAK data in order to report data on a dry weight basis. Moisture analysis turn-around time must meet the real-time measurement construction schedule.

2.4 DATA MAPPING

As the measurements are acquired by the Survey and RTIMP Teams, the data will be electronically loaded into mapping software through manual transmission or Ethernet. Maps will be generated depicting the following:

- Real-time total uranium concentrations and RTRAK and HPGe locations
- RTRAK coverage plot for the excavation lift area
- Total uranium individual measurements and locations.

Total uranium maps will be used in conjunction with the coverage plot to provide the Characterization Lead or designee with information to determine if additional scanning, confirmation, or delineation measurements are required.

2.5 DETERMINING NEED FOR ADDITIONAL HPGe MEASUREMENTS

Confirmation and delineation of RTRAK scans or 1 meter detector height HPGe measurements shall be required if trigger level concentrations are encountered as referenced in Section 2.3. This confirmation and delineation process is documented in the User's Manual (Section 3.4). The circumscribed boundary of the RTRAK or 1-meter HPGe measurement above trigger limits will be located and marked (with paint, flags, and/or stakes) in the excavation lift area by the Survey Lead or designee. The location of the maximum activity will be identified in the field using a hand-held frisker or equivalent instrument. Confirmation measurements shall be made using detector heights of 31 cm and/or 15 cm (depending on required field of view) and an acquisition time of 5 minutes at the suspect above-WAC location to reliably determine above-WAC boundaries. If either confirmation measurement exceeds an HPGe trigger level of 928 ppm, then the area of the above-trigger level (above-WAC) contamination shall be further delineated with the HPGe. The boundary of a confirmed above-WAC area shall be refined (delineated) using a detector height of 15 cm with an acquisition time of 5 minutes on a 2 meter triangular grid covering the entire area indicated by the detection and confirmation measurements. The excavation of WAC flunkers will be bounded by HPGe measurement that are lower than the HPGe WAC trigger levels.

Confirming and delineating the extent of contamination with 31 cm and 15 cm HPGe measurements is at the discretion of the Characterization Lead or designee. Conditions may arise which warrant a different decision process for defining the extent of contamination (i.e., obvious discoloration in the soil, brown/clear glass, process residue or other special materials).

Duplicate measurements will be performed in the same manner described in Section 2.3.2: one per 20 measurements taken or a minimum of one duplicate per excavation lift.

2.6 TRACKING/MANAGING DATA COLLECTION

All RTRAK and HPGe measurements will be assigned a unique identification for data tracking purposes. There are three essential components in the numbering scheme regardless of which measurement technique is used:

- Excavation area
- Lift area within the excavation area
- Lift sequence in lift area.

These three components, combined with additional designators and differentiated by their location (Northing, Easting, and elevation) and time, will allow for unique identification.

All RTRAK and HPGe measurements will contain some or all of the following designators.

1. Excavation area: Denotes major excavation area: Inactive Flyash Pile (IFP) and SP5.

2. Lift area: Denotes location of lift within the excavation area. These lift areas are designated as follows:

   A = Northern Section Inactive Flyash Pile
   B = Central Section Inactive Flyash Pile
   C = Southern Section Inactive Flyash Pile
   D = Interceptor Ditch 1 Inactive Flyash Pile
   N = Northern Section SP5
   S = Southern Section SP5

   The IFP lift area designation grid can be found in Figure 3; the SP5 lift area can be found in Figure 4.

3. Lift sequence: Designates the lift sequence with the surface lift starting as 1 and all subsequent lifts following sequentially (2, 3, 4, etc.)

4. HPGe Measurement Number (if applicable): Designates the sequential numbering of HPGe measurements from a particular lift. The first measurement taken from a lift is 1 and any subsequent measurements are numbered sequentially (2, 3, 4, etc.).

5. Measurement designator: G = gamma measurements and associated moisture measurement

6. Quality control designators (as necessary): D = duplicate measurement

Using these guidelines, the unique identification scheme for each measurement technique is as follows:

000014

RTRAK Measurement Identification: use 1, 2, 3 designators above.
Example: IFP-A-2 where IFP = Area 2, Phase I Inactive Flyash Pile excavation area
A = Northern Section Inactive Flyash Pile
2 = second lift in area A, below ground surface.

HPGe Measurement Identification: use 1, 2, 3, 4, 5, and possibly 6 designators above.
Example: IFP-A-1-2-G-D where IFP= Area 2, Phase Inactive Flyash Pile excavation area
A = Northern Section Inactive Flyash Pile
2 = second lift below ground surface
1 = first measurement in the lift
G = gamma measurement
D = duplicate

Northing (Y) and Easting (X) coordinates will be associated for each data point mapped from the RTRAK and HPGe in a lift area. An average elevation (Z) coordinate will be associated with each lift area and, therefore, each RTRAK batch and each HPGe measurement.

The maps generated from the real-time monitoring of the excavation lift area will be attached to the Excavation Monitoring Form (Figure 5). This form contains relevant information pertaining to the data collection, Characterization review of the data, and WAO review of the data. The use of this form is referenced in Procedure EW-1022, On-Site Tracking and Manifesting of Bulk Excavated Material. The RTIMP Lead, Characterization Lead, and WAO representative or designees will complete this form for each lift area. As previously stated, the original forms will be placed in the WAO project files as part of the reports section.

3.0 QUALITY ASSURANCE REQUIREMENTS

Real-time data collection will be performed in accordance with the requirements in the latest revision of the SCQ and SCQ Addendum. The DQO for real-time excavation characterization under this plan is identified in DQO SL-051 (attached as Appendix A).

3.1 SURVEILLANCE

Project management has the ultimate responsibility for the quality of the work processes and the results of the monitoring activities covered by this plan. The Soil and Water Division Quality Assurance (QA) representative will conduct independent assessments of the work process and operations by conducting surveillances. The assessments will encompass technical and procedural requirements of this plan and the SCQ. Surveillances will be implemented by monitoring/observing ongoing project activities and work areas to verify conformance to specified requirements. Surveillances will be planned and documented according to the SCQ. The QA representative will be apprized of the monitoring schedule.

3.2 IMPLEMENTATION OF FIELD CHANGES

If field conditions require changes or variances, verbal approval must be obtained from the Characterization Lead, Real-Time Monitoring Manager, and QA Representative before the changes can be implemented (electronic mail is acceptable). Changes to the PSP will be noted in the applicable field activity logs and on a Variance Request/Field Change Notice Form (VR/FCN). QA must receive the completed VR/FCN (which include the signatures of the Characterization Lead, Real-Time Monitoring Manager, and the QA Representative) within seven working days of the granting of the verbal approval.

4.0 HEALTH AND SAFETY

Technicians will conform to precautionary surveys by FEMP personnel representing the Utility Engineer, Industrial Hygiene, Occupational Safety, and Radiological Control.

All work performed on this project will be performed in accordance to applicable Environmental Monitoring project procedures, RM-0020 (Radiological Control Requirements Manual), RM-0021 (Safety Performance Requirements Manual), FDF work permit, radiological work permit (RWP), penetration permits, and other applicable permits. Concurrence with all applicable safety permits is required by all personnel in the performance of their assigned duties.

All personnel performing measurements related to this project will be briefed on the Contractor Safe Work Plan for the A2PI specific work area and the briefing will be documented. Personnel who do not receive a briefing on these requirements will not participate in the execution of excavation activities related to the completion of assigned project responsibilities.

All emergencies shall be reported immediately to the Site Communications Center at 648-6511 or radio "CONTROL".

5.0 DATA MANAGEMENT

All data will be generated electronically for real-time WAC determination; data will receive internal quality control evaluation prior to reporting. The RTRAK data will be collected at Analytical Support Level (ASL) A and HPGe data can be collected at ASL A or ASL B (ASL B data requires 10 percent validation). For duplicate data, the highest value will be considered in WAC evaluation for reporting. Electronic field data will be downloaded at a minimum of once daily to the appropriate database (e.g., real-time archive files, Sitewide Environmental Database, Integrated Information Management System).

The Characterization Lead or designee will be informed by the RTIMP Lead or designee when RTRAK or HPGe measurements do not meet data quality control checklist criteria. The Characterization Lead or designee will determine whether additional scanning, confirmation, or delineation measurements are required.

Copies of real-time maps and the Field Excavation Monitoring Form will be forwarded to WAO for their concurrence; originals will be placed in the WAO project files. Copies of these maps and form, along with associated RTIMP field paperwork, will be forwarded to the Field Data Management Lead. RTIMP will maintain all the real-time electronic files; survey data will be maintained by the Survey Lead or designee. The Field Data Management Lead will verify that qualified field measurement data has been entered into the Sitewide Environmental Database.

6.0 APPLICABLE DOCUMENTS, METHODS, AND STANDARDS

Excavation characterization activities described in this plan shall follow the requirements outlined in the following documents, procedures, and standard methods:

- Sitewide Excavation Plan (SEP)
- Waste Acceptance Criteria Attainment Plan
- Impacted Materials Placement Plan
- Area 2, Phase I South Waste Units Implementation Plan for Operable Unit 2 (IRDP) and Addendum
- Sitewide CERCLA Quality Assurance Project Plan (SCQ) and Addendum
- User Guidelines, Measurement Strategies, and Operational Factors for Deployment of In-Situ Gamma Spectrometry at the Fernald Site (User's Manual), 20701-RP-0006, Revision A (1998)
- ADM-02 Field Project Prerequisites
- ADM-16 In situ Gamma Spectrometry Quality Control Measurement
- ADM-17 In situ Gamma Spectrometry Data Review and Reporting
- EQT-04 Photoionization Detector
- EQT-05 Geodimeter 4000 Surveying System- Operation, Maintenance, and Calibration
- EQT-22 High Purity Germanium Detector In situ Efficiency Calibration
- EQT-23 Operation of ADAM Series Analyzers with Gamma Sensitive Detectors
- EQT-30 Operation of Radiation Tracking Vehicle Sodium Iodide Detection System
- EQT-32 Troxler 3440 Series Surface Moisture/Density Gauge - Calibration, Operation, and Maintenance
- EQT-33 Real-Time Differential Global Positioning System Operation
- 20300-PL-002 Real-Time Instrumentation Measurement Program Quality Assurance Plan
- EW-1022 On-Site Tracking and Manifesting of Bulk Excavated Material

000019

- RM-0020 Radiological Control Requirements Manual
- SMPL-01 Solids Sampling

000020

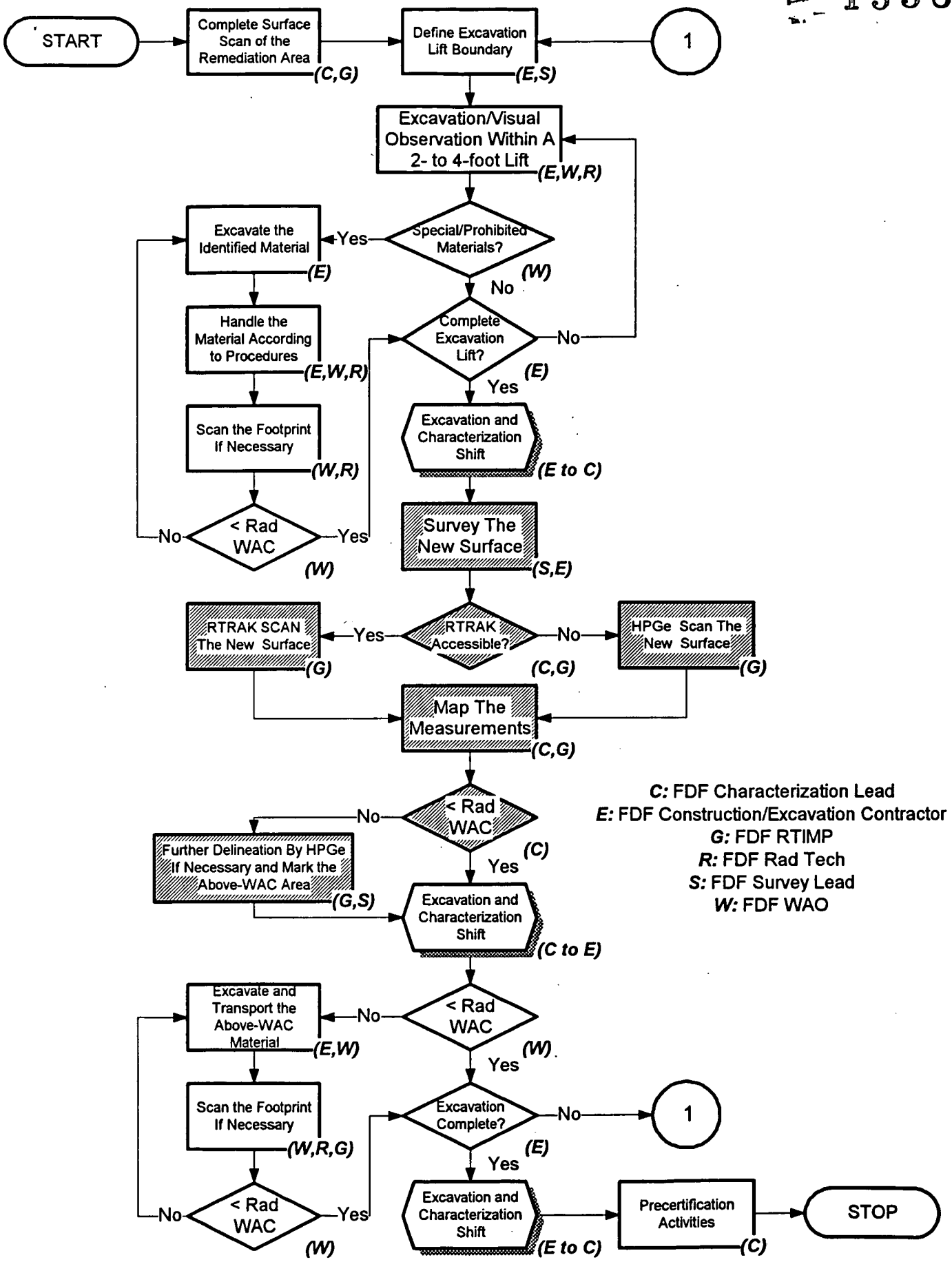


FIGURE 1 IFP AND SP5 EXCAVATION AND CHARACTERIZATION CONTROL PROCESS

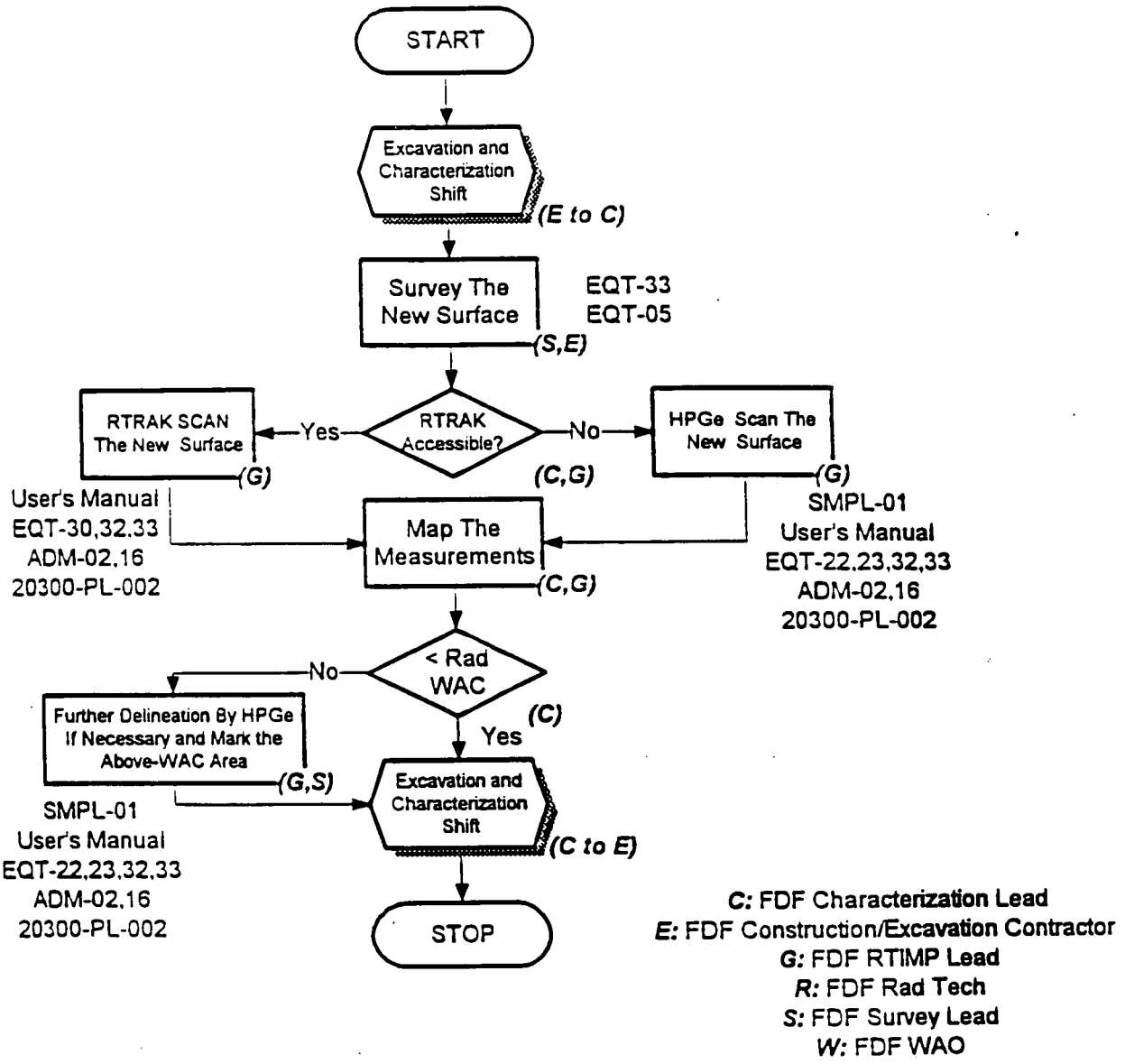


FIGURE 2 APPLICABLE OPERATING PROCEDURES AND GUIDING DOCUMENTS

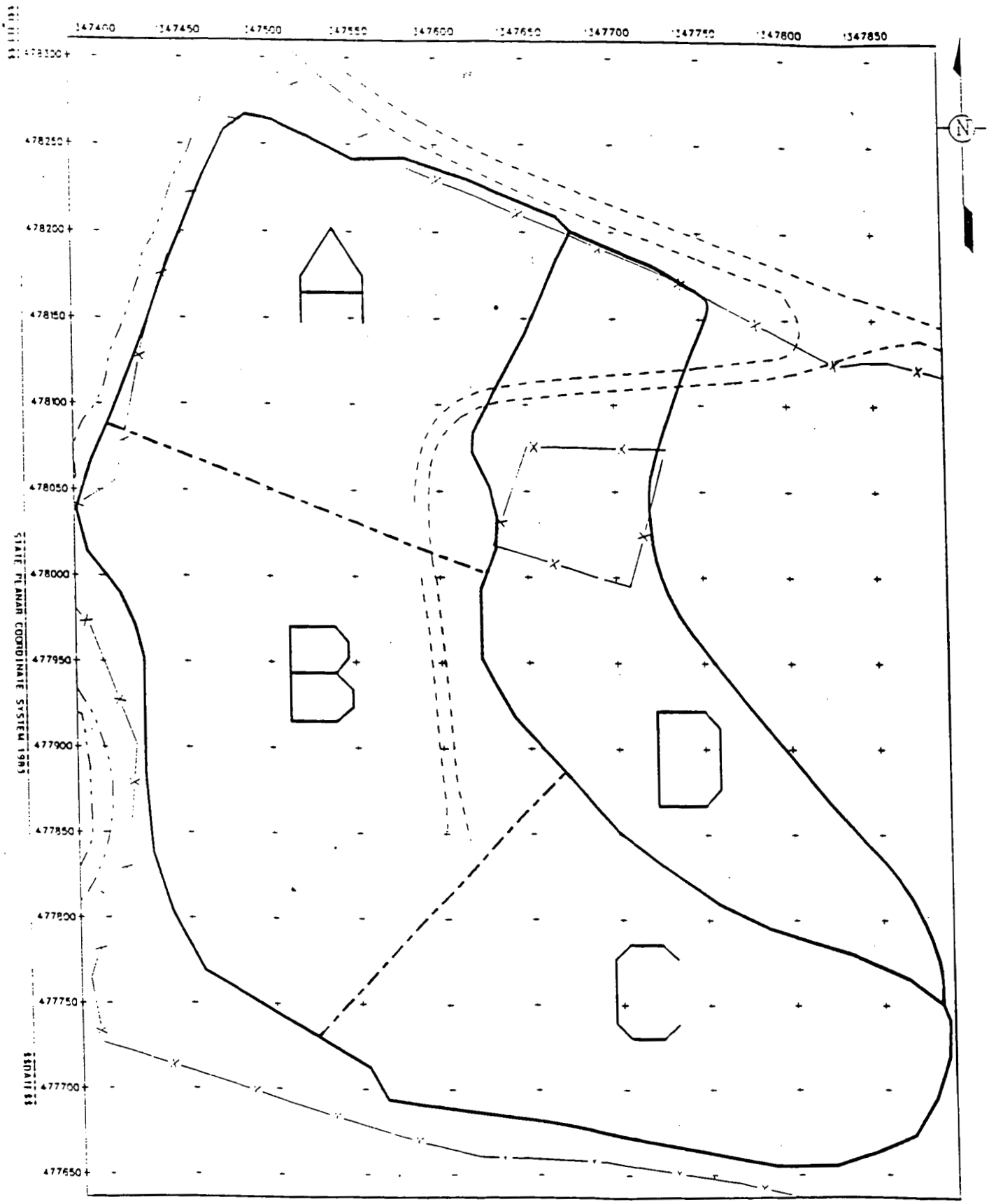
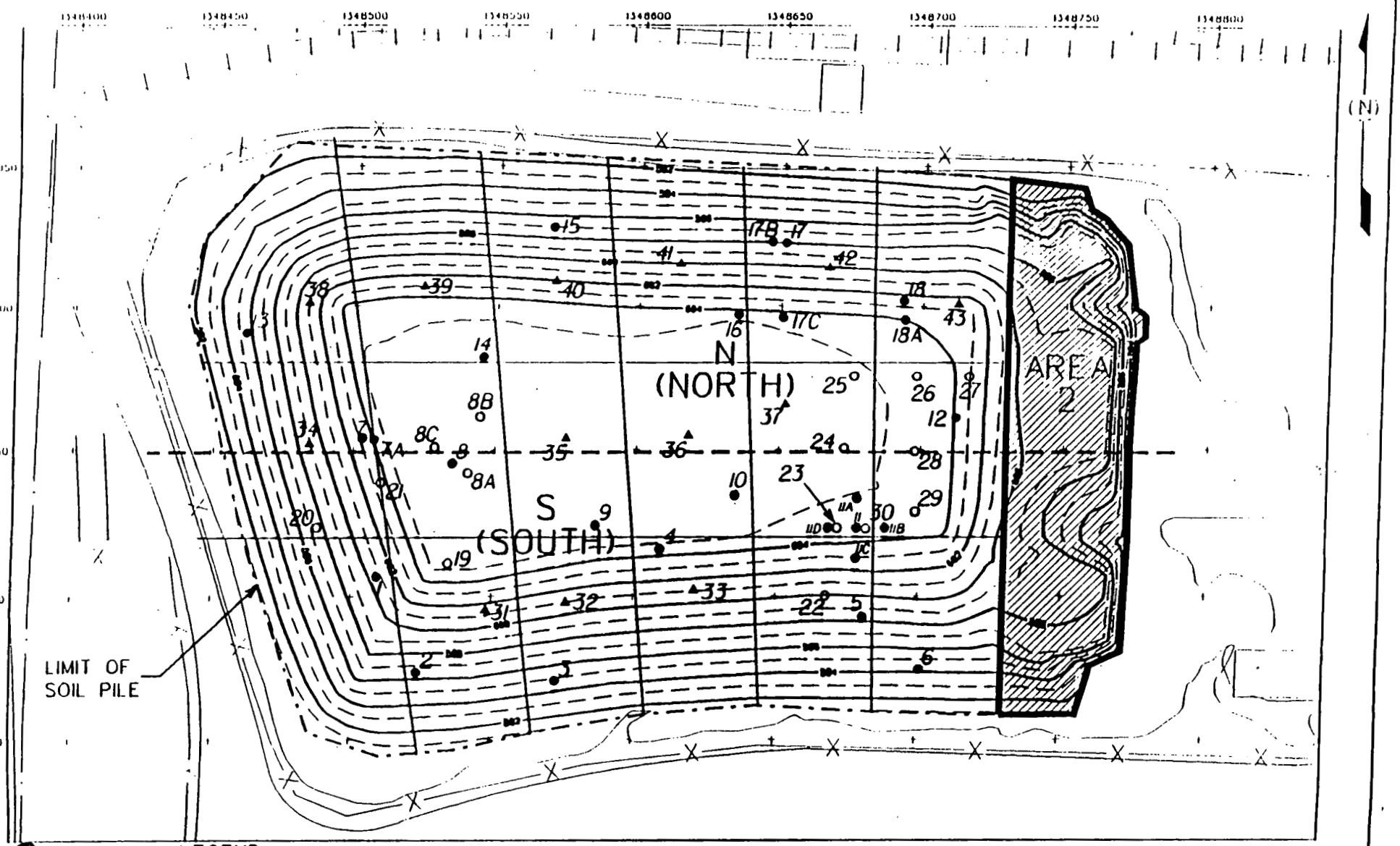


FIGURE 3. CHARACTERIZATION DESIGNATION GRID



000024

1538

FIGURE 4. SOIL STOCKPILE 5 GRID DESIGNATION

FIGURE 5
EXCAVATION MONITORING FORM

Area Description: _____ Area ID: _____

Lift Identifier: _____ PWID #: _____

Section 1 - Data Collection

Equipment Used ☐ RTRAK ☐ RSS ☐ HPGe Unit No: _____

Calibration Acceptable ☐ Yes Date: _____

Note: If not in calibration, do not use equipment until calibration is acceptable

RTRAK / RSS	HPGe
Map attached? ☐ Yes ☐ No	Data Report and Map attached? ☐ Yes ☐ No
List of Batch #s: Coverage Sufficient? ☐ Yes ☐ No If "No": ☐ Equipment Malfunction ☐ Rough Terrain ☐ Weather ☐ Standing Water ☐ Other	List of Data Points: Data Verification Checklist attached? ☐ Yes ☐ No

This signature indicates the data generated for this excavation lift by this equipment on this day is correct and valid within the confines of equipment performance and as defined in PSP #: _____

_____ _____
(Signature) (Signature Date)

Section 2 - Characterization

Review real-time data

Sufficient real-time coverage? ☐ Yes ☐ No

Further action required: _____

All data points < total uranium WAC? ☐ Yes ☐ No
If no, define > WAC area(s) and extent with HPGe if applicable (see attached real-time map) as defined in PSP #: _____

The signature indicates this excavation lift has been characterized using the real-time data generated in Section 1 above and in accordance with PSP #: _____

_____ _____
(Signature) (Signature Date)

Section 3 - WAO

Review attached documentation ☐ Yes

This signature indicates this lift can be excavated and dispositioned in accordance with the characterization provided in Section 2 above.

_____ _____
(Signature) (Signature Date)

Assigned Data Group for HPGe from WAO System Controls: _____

000025

APPENDIX A

DATA QUALITY OBJECTIVES SL-051

Control Number _____

Fernald Environmental Management Project

Data Quality Objectives

Title: Excavation Monitoring For Total Uranium Waste Acceptance Criteria (WAC)

Number: SL-051

Revision: 1

Final Draft: 6/15/98

Contact Name: Keith Nelson

Approval: William D. Kelley Date: 6-15-98
William D. Kelley
DQO Coordinator

Approval: Alan D. Thiokan for Date: 6-15-98
Alan D. Thiokan for J. D. Chiou
SCEP Project Director

Rev. #	0	1					
Effective Date:	6/09/98						

DATA QUALITY OBJECTIVES
Excavation Monitoring for Total Uranium Waste Acceptance Criteria (WAC)

Members of Data Quality Objectives (DQO) Scoping Team

The members of the scoping team included individuals with expertise in QA, analytical methods, field construction, statistics, laboratory analytical techniques, waste management, waste acceptance, data management, and excavation monitoring.

Conceptual Model of the Site

Fernald Environmental Management Project (FEMP) remediation includes the construction of an on-site disposal facility (OSDF) to be used for the safe permanent disposal of materials at or above the site final remediation levels (FRLs), but below the waste acceptance criteria (WAC) for constituents of concern (WAC COCs). The WAC concentrations for several constituents, including total uranium, were developed using fate and transport modeling, and were established to prevent a breakthrough of unacceptable levels of contamination (greater than a specified Maximum Contaminant Level to the underlying Great Miami Aquifer) over a 1000-year period of OSDF performance. The WAC for total uranium and other area-specific WAC COCs as referenced in the Operable Unit 5 (OU5) and Operable Unit 2 (OU2) Records Of Decision (RODs), the Waste Acceptance Plan for the On-Site Disposal Facility (WAC Plan), and the OSDF Impacted Materials Placement Plan (IMPP), must be achieved for all soil and soil-like materials that have been identified for disposal in the OSDF.

The extent of soil contamination requiring remediation was estimated and published in both the Operable Unit 5 and Operable Unit 2 Feasibility Studies (FS). These estimates were based on modeling analysis of available uranium data from soil samples collected during the Remedial Investigation (RI) efforts and from other environmental studies conducted at the FEMP. Maps outlining boundaries of soil contamination were generated for both the Operable Unit 5 and Operable Unit 2 FS documents by overlaying the results of the modeling analysis of uranium data with isoconcentration maps of other COCs. The soil contamination maps were further modified by conducting spatial analysis on the most current soil characterization data.

A sequential remediation plan has been presented which subdivides the FEMP into ten (10) independent remediation areas. Extensive historical sampling has demonstrated that in each of these 10 areas potentially above-WAC concentrations may not be present, may be limited to one WAC COC, or consist of a subset of WAC COCs. According to the Sitewide Excavation Plan (SEP) only WAC COCs

with a demonstrated or likely presence in an area will be evaluated during remedial design and implementation. This DQO will be used to define the WAC decision-making process using excavation monitoring instrumentation in areas where soil and soil-like material is being excavated and total uranium is a WAC COC.

1.0 Statement of Problem

Adequate information must be available to demonstrate excavated soils are acceptable or unacceptable for disposal in the OSDF, based on the total uranium WAC.

Available Resources

Time: WAC decision-making information of sufficient quality must be made available to the Project Manager (or designee), characterization representative, and Waste Acceptance Operations representative (decision makers) prior to excavation and disposition of soil and soil-like materials.

Project Constraints: WAC decision-making information must be collected and assimilated with existing manpower and instrumentation to support the remediation schedule. Successful remediation of applicable areas, including excavation and placement of soil and soil-like material in the OSDF, is dependent on the performance of this work.

Summary of the Problem

Excavated soil must be classified as either of the following:

1. Having concentrations of total uranium at or above the WAC, and therefore, unacceptable for disposal in the OSDF, or

2. Having concentrations of total uranium below the WAC, and therefore, acceptable for disposal in the OSDF.

2.0 Identify the Decision

Decision

The WAC decision-making process will result in the classification of defined soil volumes as either meeting or exceeding the 1,030 ppm total uranium WAC.

Possible Results

1. A defined volume of soil has concentrations of total uranium at or above the WAC. This material is classified as unacceptable for placement in the OSDF, and will be identified, excavated, and segregated pending off-site disposition.

2. A defined volume of soil has concentrations of total uranium below the total uranium WAC. This soil is classified as acceptable for placement in the OSDF and is transported directly from the excavation to the OSDF for placement.

3.0 Identify Inputs That Affect the Decision

Required Information

The total uranium WAC published in the Waste Acceptance Criteria Attainment Plan for the OSDF, historical data, pre-design investigation data, and in-situ monitoring information collected prior to and during excavation are required to determine whether a specified volume of soil meets or exceeds the total uranium WAC.

Source of Informational Input

The list of sitewide OSDF WAC COCs identified in the OU2 and OU5 RODs and the WAC Plan will be referenced. Historical area specific data from the Sitewide Environmental Database (SED) will also be retrieved and evaluated for both radiological and chemical WAC constituents. This information will be utilized to determine area specific WAC COCs.

Non-invasive excavation monitoring in areas where total uranium is a WAC concern will involve measurements collected with mobile and/or stationary in-situ equipment such as the RTRAK and HPGe systems. These measurements will be collected from the surface of each excavation lift prior to excavation. Information compiled from this real-time monitoring will be assimilated and reviewed by decision makers to classify lifts or sections of lifts as either acceptable or unacceptable for placement in the OSDF.

Methods of Analysis

The most practical measurement methods with the required resolution will be employed to determine total uranium levels in the evaluated material in relation to the not-to-exceed (NTE) total uranium WAC in applicable areas.

4.0 The Boundaries of the Situation

Spatial Boundaries

Domain of the Decision: The boundaries where excavation monitoring for total uranium will be used is limited to soils and/or soil-like materials in remediation areas where total uranium is a WAC COC, excavation is planned, and material is designated for disposition in the OSDF.

Population of Soils:

Includes all at-and below-grade material (soils and soil-like materials) impacted with total uranium potentially exceeding the WAC and planned for disposition in the OSDF.

Scale of Decision Making

Areas designated for excavation will be evaluated as to whether the soil or soil-like material is below or above the OSDF WAC for total uranium. Excavation monitoring will be conducted on each excavation lift. Based on the information obtained as a result of reviewing and modeling existing data coupled with newly acquired excavation monitoring information, a decision will be made whether an individual excavation lift, or portion of a lift, meets or exceeds the OSDF WAC for total uranium.

Temporal Boundaries

Time frame: Real-time excavation monitoring information must be acquired and processed in time for review and use in decision making prior to excavation and disposition of excavated material.

Time Constraints on Monitoring: The scheduling of WAC excavation monitoring is directly tied to the excavation schedule. WAC excavation monitoring will be performed and a disposition decision made prior to excavation of each designated lift. Acquired information must be processed and reviewed by the project decision-makers prior to disposition of the lift being monitored. Time limits to complete measurements are specified in the excavation subcontracts.

Practical Considerations: Weather, moisture, field conditions, and unforseen events affect the ability to perform excavation monitoring and meet the schedule. To maintain safe working conditions, excavation and construction activities will comply with all FEMP and project specific health and safety protocols.

5.0 Develop a Logic Statement

Parameter(s) of Interest

The parameter of interest is the concentration of total uranium in soil or soil-like material designated for disposition in the OSDF.

Waste Acceptance Criteria Concentration

The OSDF WAC concentration is 1,030 ppm for total uranium in soil and soil-like materials. This concentration is considered a NTE level for OSDF WAC attainment, and no analytical data point or real-time measurement, as defined by the instrument-specific threshold values, can meet or exceed this level in material destined for the OSDF.

Decision Rules

If excavation monitoring results are below the total uranium WAC for a specified volume of soil, then that soil is considered acceptable for final disposition in the OSDF. If monitoring results reveal soil concentrations at or above the total uranium WAC, as indicated by exceeding the instrument-specific threshold level, then the unacceptable soil must be delineated, removed, and segregated pending off-site disposal.

6.0 Limits on Decision Errors

Range of Parameter Limits

The area-specific total uranium soil concentrations anticipated in excavation areas will range from background levels (naturally-occurring soil concentrations) to concentrations greater than the total uranium WAC levels.

Types of Decision Errors and Consequences

Decision Error 1: This decision error occurs when the decision makers decide a specified volume of soil is below the WAC for total uranium, when in fact the uranium concentration in that soil is at or above the WAC. This error would result in soil or soil like material with concentrations above the WAC for total uranium being placed into the OSDF. Since the WAC is a NTE level, this error is unacceptable.

Decision Error 2: This decision error occurs when a volume of soil or soil like material is identified as above WAC, excavated, and sent for off-site disposition when the material is actually below the WAC for total uranium. This error would result in added costs due to the unnecessary segregation and off-site disposition of material that is acceptable for disposal in the OSDF.

True State of Nature for the Decision Errors

The true state of nature for Decision Error 1 is that the actual concentration of total uranium in a volume of soil is greater than the WAC. The true state of nature for Decision Error 2 is that the actual concentration of total uranium in a volume of soil is below the WAC. Decision Error 1 is the more severe error.

7.0 Design for Obtaining Quality Data

7.1 WAC Attainment Excavation Monitoring

WAC decision-making will be based on real-time excavation monitoring using the RTRAK and HPGe systems. The sodium iodide system's threshold value (or trigger level) of 721 ppm for total uranium (70% of the 1,030 ppm WAC concentration for soil) is by agreement with the USEPA. Readings are obtained by RTRAK measurements using a spectral acquisition time of 4 seconds, and a detector speed of 1 mile per hour (mph) for each measurement. These parameters achieve the required sensitivity, and are the best compromise of practical considerations such as tractor speed and time in the field. (For more detailed information reference the *RTRAK Applicability Study, 20701-RP-0003, Revision 1, PCN1, May 15, 1998.*) Thorium can cause interferences with the total uranium. Uranium results associated with Thorium values greater than 500 net counts per second will be reevaluated.

The HPGe system confirmation and delineation threshold value of 928 ppm for total uranium with a spectral acquisition time of 5 minutes (300 seconds) and variable detector heights will be used in soil and soil-like material. Lower (more conservative) threshold values may be defined in the PSP. (For more detailed information reference the *User Guidelines, Measurement Strageties, and Operational Factors for Deployment of In-Situ Gamma Spectrometry at the Fernald Site, 20701-RP-0006, Revision A, May 8, 1998.*)

Real-time monitoring of each excavation lift will be accomplished using the RTRAK. In areas inaccessible to the RTRAK, HPGe detectors will be used. In the event the monitoring data exceeds either trigger level (see above), the entire vertical thickness (3 ± 1 foot) of the areal extent of above-WAC material will be removed and segregated pending off-site disposal. Confirmation measurements using HPGe detectors may be performed. If directed by the characterization lead, the HPGe detectors will be placed directly over the zone of maximum activity identified by the RTRAK and an additional 5 minute measurement will be taken. If the HPGe confirmation measurement exceeds 928 ppm for total uranium, then additional HPGe measurements may be required for further horizontal delineation (detector height may be adjusted to increase the field of view).

7.2 Interpretation of Results

The results obtained from real-time monitoring for purposes of WAC attainment will be compared to the published OSDF WAC concentration for total uranium. If results are equal to or greater than the WAC concentration (as defined by exceeding the specific threshold value level), the decision makers may take one of the following actions:

- Determine that the entire unit volume or "lift" subjected to excavation monitoring is at or above WAC and requires segregation pending off-site disposal.

- Based on adequacy of existing information (including visual inspection), excavate and segregate the portion of the lift material that is at or above WAC pending off-site disposition.

- Perform additional real-time monitoring to more accurately delineate the areal extent of above-WAC contamination. Using this information, define the extent of removal efforts to be conducted.

7.3 QC Considerations

The following data management requirements will be met prior to evaluation of acquired WAC attainment information:

1) An excavation monitoring form will be completed and reviewed in the field.

2) WAC data and decision-making information will be assigned to respective soil profiles, so characterization and tracking information can be maintained and retrieved.

3) The mobile sodium iodide systems will generate ASL level A data. The HPGe detectors can provide either ASL level A or B data. In order for real time data to be

ASL B, it must meet the 10% data validation criterion in the SEP. Excavation monitoring data will be collected according to the applicable site procedures for the respective instrumentation.

4) When using the HPGe detectors, duplicate measurements will be taken at a frequency of one in twenty measurements or one per excavation lift, whichever is greater.

7.4 Independent Assessment

Independent assessment shall be performed by the FEMP QA organization by conducting surveillances. Surveillances shall be planned and documented in accordance with Section 12.3 of the SCQ.

7.5 Applicable Procedures

Real-time monitoring performed under the PSP shall follow the requirements outlined within the following procedures:

- ADM-16, In-Sutu Gamma Spectrometry Quality Control Measurements
- EQT-22, High Purity Germanium Detector In-Situ Efficiency Calibration
- EQT-23, Operation of ADCAM Series Analyzers with Gamma Sensitive Detectors
- EQT-30, Operation of Radiation Tracking Vehicle Sodium Iodide Detection System
- EQT-32, Troxler 3440 Series Surface Moisture/Density Gauge
- EQT-33, Real-Time Differential Global Positioning System Operation
- EQT-34, Radiation Scanning System
- 20300-PL-002, Real Time Instrumentation Measurement Program Quality Assurance Plan
- EW-1022, On-Site Tracking and Manifesting of Bulk Impacted Material

7.6 References

- Sitewide CERCLA Quality Assurance Project Plan (SCQ), FD-1000, May 10 1995

- Sitewide Excavation Plan, April 1998, 2500-WP-0028, Revision D Draft Final
- Waste Acceptance Criteria Attainment Plan for the On-Site Disposal Facility, January 1998, 20100-PL-0014, Rev. C Draft Final]
- Impacted Materials Placement Plan for the On-Site Disposal Facility, January 1998, 20100-PL-007, Revision 0
- Area 2, Phase 1 Southern Waste Units Implementation Plan for Operational Unit 2, October 1997, 2502-WP-0029, Revision C Draft
- RTRAK Applicability Study, May 1998, 20701-RP-0003, Revision 1
- User Guidelines, Measurement Strategies, and Operational Factors for Deployment of In-Situ Gamma Spectrometry at the Fernald Site, April 1998, 20701-RP-0006 Revision A

Data Quality Objectives
Excavation Monitoring for Total Uranium Waste Acceptance Criteria (WAC)

1A. Task/Description: Waste Acceptance Criteria Monitoring

1.B. Project Phase: (Put an X in the appropriate selection.)

RI ☐ FS ☐ RD ☐ RA ☒ R,A ☐ OTHER

1.C. DQO No.: SL-051 DQO Reference No.: N/A

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2. Media Characterization: (Put an X in the appropriate selection.)

Air ☐ Biological ☐ Groundwater ☐ Sediment ☐

Soil and Soil Like Material ☒

Waste ☐ Wastewater ☐ Surface water ☐ Other (specify) _____

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3. Data Use with Analytical Support Level (A-E): (Put an X in the appropriate Analytical Support Level selection(s) beside each applicable Data Use.)

Site Characterization A ☐ B ☐ C ☐ D ☐ E ☐	Risk Assessment A ☐ B ☐ C ☐ D ☐ E ☐
Evaluation of Alternatives A ☐ B ☐ C ☐ D ☐ E ☐	Engineering Design A ☐ B ☐ C ☐ D ☐ E ☐
Monitoring during remediation activities A ☐ B ☐ C ☐ D ☐ E ☐	Other Waste Acceptance Evaluation A ☒ B ☒ C ☐ D ☐ E ☐

4.A. Drivers: Specific construction work plans, Applicable or Relevant and Appropriate Requirements (ARARs) and Operable Unit 2 and Operable Unit 5 Records of Decision (ROD).

4.B. Objective: To provide data for identification of soils for compliance with Waste Acceptance Criteria.

5. Site Information (Description):

The RODs specify that FEMP soils will be below the WAC for disposal in the OSDF. WAC determination will be necessary for site soils that are scheduled for excavation and potential OSDF disposition.

6.A. Data Types with appropriate Analytical Support Level Equipment Selection and SCQ Reference: (Place an "X" to the right of the appropriate box or boxes selecting the type of analysis or analyses required. Then select the type of equipment to perform the analysis if appropriate. Please include a reference to the SCQ Section.)

1. pH	☐	2. Uranium	☒	3. BTX	☐
Temperature	☐	Full Radiological	☐	TPH	☐
Specific Conductance	☐	Metals	☐	Oil/Grease	☐
Dissolved Oxygen	☐	Cyanide	☐		
Technetium-99	☐	Silica	☐		
4. Cations	☐	5. VOA	☐	6. Other (specify)	☒
Anions	☐	BNA	☐	Thorium, Moisture	
TOC	☐	Pesticides	☐		
TCLP	☐	PCB	☐		
CEC	☐				
COD	☐				

6.B. Equipment Selection and SCQ Reference:

ASL A RTRAK, HPGe SCQ Section: Section 3

ASL B HPGe SCQ Section: Section 3

ASL C _____ SCQ Section: _____

ASL D _____ SCQ Section: _____

ASL E _____ SCQ Section: _____

7.A. Sampling Methods: (Put an X in the appropriate selection.)

Biased	☐	Composite	☐	Environmental	☐	Grab	☐	Grid	☐
Intrusive	☐	Non-Intrusive	☒	Phased	☐	Source	☐		

DQO Number: SL-051

7.B. Sample Work Plan Reference: The DQO is being established prior to completion of the PSP.

Background samples: SED

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8. Quality Control Samples: (Place an "X" in the appropriate selection box.)

8.A. Field Quality Control Samples:

Trip Blanks	☐	Container Blanks	☐
Field Blanks	☐	Duplicate Measurements	☒*
Equipment Rinsate Samples	☐	Split Samples	☐
Preservative Blanks	☐	Performance Evaluation Samples	☐

Other (specify) _____

*For the HPGe detectors, duplicate measurements will be made every 1 in 20 or one per lift, whichever is greater.

8.B. Laboratory Quality Control Samples:

Method Blank	☐	Matrix Duplicate/Replicate	☐
Matrix Spike	☐	Surrogate Spikes	☐

Other (specify) Per method

9. Other: Please provide any other germane information that may impact the data quality or gathering of this particular objective, task or data use.
