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PROJECT SPECIFIC PLAN FOR AREA 8, PHASE III-SOUTH PRECERTIFICATION REAL-TIME SCAN

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

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U.S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE

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PROJECT SPECIFIC PLAN FOR AREA 8, PHASE III-SOUTH PRECERTIFICATION REAL-TIME SCAN

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APPROVAL:

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Soil and Disposal Facility Project

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LIST OF ACRONYMS AND ABBREVIATIONS

A8PI	Area 8, Phase I
A8PIII	Area 8, Phase III
A8PIII-N	Area 8, Phase III-north (northern portion)
A8PIII-S	Area 8, Phase III-south (southern portion)
ASL	analytical support level
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CG&E	Cincinnati Gas & Electric Company
COC	constituent of concern
CU	certification unit
DQO	Data Quality Objectives
EPA	U.S. Environmental Protection Agency
FEMP	Fernald Environmental Management Project
FRL	final remediation level
GIS	Geographic Information System
GPS	global positioning system
HPGe	high-purity germanium detector
LAN	Local Area Network
mg/kg	milligrams per kilogram
NaI	sodium iodide
OEPA	Ohio Environmental Protection Agency
pCi/g	picoCuries per gram
ppm	parts per million
PSP	Project Specific Plan
PWID	Project Waste Identification Document
QA	Quality Assurance
RSS	Radiation Scanning System
RTIMP	Real-Time Instrumentation Management Program
RTRAK	Radiation Tracking System
SCQ	Sitewide CERCLA Quality Assurance Project Plan
SED	Sitewide Environmental Database
SEP	Sitewide Excavation Plan
TAL	Target Analyte List
V/FCN	Variance/Field Change Notice
WAO	Waste Acceptance Organization

1.0 INTRODUCTION

1.1 BACKGROUND

Remediation Area 8, Phase III (A8PIII) is located west of Paddys Run, and is divided geographically into two sections. The section of A8PIII between Willey Road and Area 8, Phase I (A8PI) will be known as A8PIII-south (A8PIII-S), while the section between A8PI and the railroad trestle will be known as A8PIII-north (A8PIII-N, see Figure 1-1). A8PIII-S is approximately 29.6 acres in size, while A8PIII-N is 51.1 acres in size. Both of these areas are very similar to the other parts of Area 8 in land use, terrain and surface. The topography and surface features of A8PIII-S are shown in Figure 1-2. Funding has recently been approved to accelerate the certification process for A8PIII-S only into Fiscal Year 1999 and 2000.

Cincinnati Gas & Electric Company (CG&E) owns a small lot east of and adjacent to Paddys Run Road at approximately the mid-point of A8PIII-S, as shown on Figure 1-2. This lot is irregular in shape, as the border extends 133 feet on the west (along Paddys Run Road), 110 feet on the south, 79.76 feet on the east, and 122.2 feet on the north. The FEMP property boundary fence excludes this area from the rest of A8PIII-S, though a small portion of FEMP property is contained outside of the property fence, on the northeast corner of the CG&E property, as also shown on Figure 1-2.

Since the CG&E lot is not owned by DOE and is not part of the FEMP site, it will be treated as off-property (Area 9) soil, and will not be included in this certification effort. Per Section 3.4.2.4 of the Sitewide Excavation Plan (SEP), it will only be certified in the event that above-FRL contamination (i.e., a certification failure) occurs in adjacent on-property soil. However, the small piece of FEMP property enclosed by the fence around the CG&E lot will be included in precertification and certification.

1.2 PURPOSE

The objectives of precertification scanning activities detailed in this project specific plan (PSP) are to: 1) provide information to aid in establishing A8PIII-S certification unit (CU) boundaries, 2) evaluate any patterns of residual surface soil contamination in A8PIII-S, and 3) determine if soil excavation is necessary for A8PIII-S to pass certification. These objectives will be accomplished through two separate phases of precertification, as described in Section 2.0. As a whole, precertification data will

be used to determine if A8PIII-S is ready for certification sampling to begin. If data indicate primary radiological contaminants of concern (COC) concentrations are low enough to likely pass certification statistical analysis, then certification sampling will be initiated under a separate PSP. If not, soil impacted above the final remediation level (FRL) will be delineated for removal prior to the initiation of certification activities.

1.3 SCOPE

The scope of this PSP covers precertification scanning activities within A8PIII-S only, which excludes the CG&E lot discussed in Section 1.1. Precertification scanning activities include surface scanning, confirmation measurements, and if necessary, hot-spot delineation. All precertification scanning activities will be consistent with Sections 3.3.3 and 4.5 (Approach E) of the SEP. Details of the real-time scanning approach are consistent with the User Guidelines, Measurement Strategies, and Operational Factors for Deployment of In-Situ Gamma Spectrometry at the Fernald Site (User's Manual). Field activities must be consistent with the Sitewide Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Quality Assurance Project Plan (SCQ), and Data Quality Objectives (DQO) SL-054, Rev. 0 (Appendix A). All scanning will be conducted using Ohio Environmental Protection Agency (OEPA) and U.S. Environmental Protection Agency (EPA) approved real-time gamma sensitive detectors.

1.4 KEY PERSONNEL

Key personnel responsible for performance of the project are listed in Table 1-1.

TABLE 1-1
KEY PERSONNEL

Title	Primary	Alternate
DOE Contact	Kathi Nickel	Rob Janke
Project Manager	Eric Woods	Eric Kroger
Characterization Lead	Eric Kroger	John Homer
Real-Time Program Lead	Joan White	Dave Allen
Real-Time Field Lead	Darren Wessel	Brian McDaniel
Surveying Lead	Jim Schwing	Jim Capannari
Data Management Contact	Jeff Maple	Susan Marsh
Waste Acceptance Organization (WAO) Contact	Linda Barlow	To Be Determined
Quality Assurance	Reinhard Friske	Mary Eleton
Health and Safety	Debbie Grant	Lewis Wiedeman

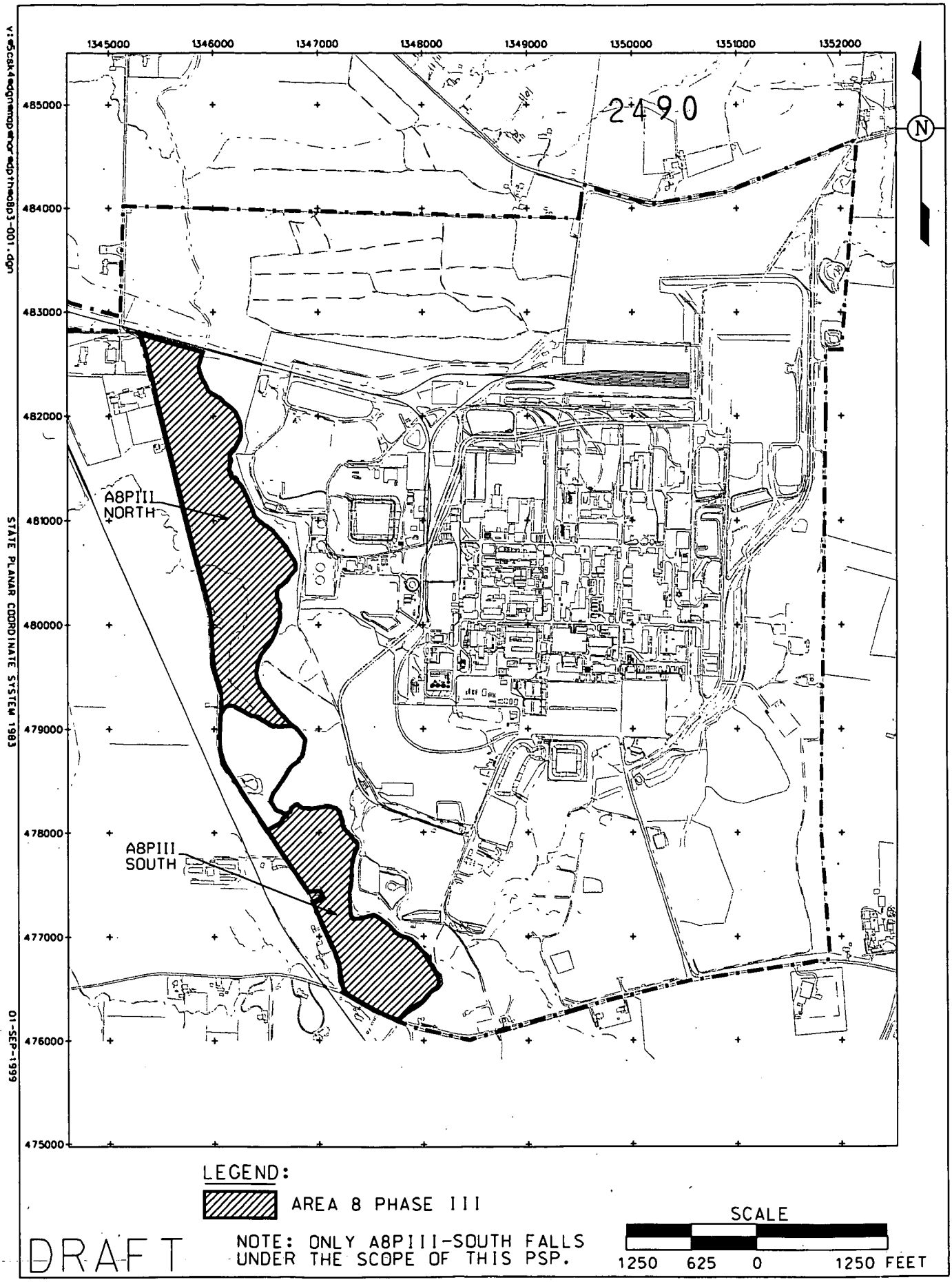

FIGURE 1-1. AREA 8, PHASE III LOCATION MAP

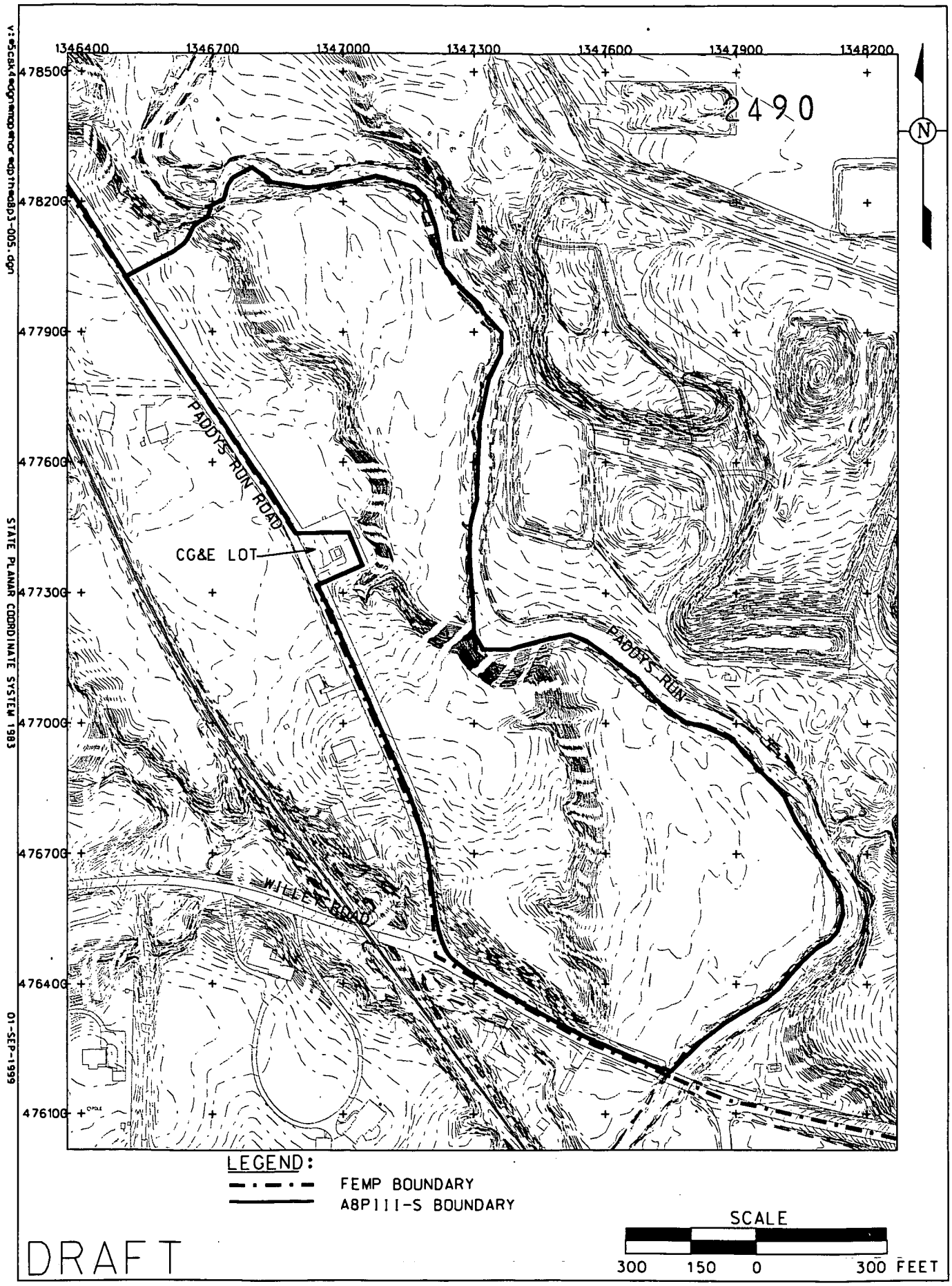

FIGURE 1-2. A8PIII-SOUTH TOPOGRAPHY AND SURFACE FEATURES

2.0 PRECERTIFICATION SCANNING PROGRAM

The real-time precertification scanning of A8PIII-S will take place in two phases. During Precertification Phase 1, the Radiation Tracking System (RTRAK), Radiation Scanning System (RSS), and the Gator (if approved by OEPA and EPA) will be used to provide as close as possible to 100 percent coverage of the area to determine patterns of total gamma activity, as discussed in Section 2.1. Operation of these real-time mobile sodium iodide (NaI) detectors will be consistent with EQT-41, Radiation Measurement Systems. In areas that are physically inaccessible to the mobile NaI detectors, the high-purity germanium detector (HPGe) will be used to scan surface soil. HPGe detector operation will be consistent with procedure EQT-23, Operation of High Purity Germanium Detectors. Information obtained through the Precertification Phase 1 scan will be considered when establishing CU boundaries within A8PIII-S.

During Precertification Phase 2, HPGe detectors will be used to evaluate areas (minimum one per CU) of highest gamma activity identified during Phase 1. In addition, the HPGe will be used to confirm any mobile NaI "hot spots," as defined in Section 3.3 of the User's Manual and discussed further in Section 2.2 of this PSP. If a hot spot is confirmed, hot spot delineation will take place as another phase of precertification under this PSP. The real-time equipment and corresponding equipment configurations used during each phase of precertification are summarized in Table 2-1. Soil moisture measurements and background radon monitoring will also take place in support of mobile NaI and HPGe measurements, as discussed in Sections 2.5 and 2.6 respectively.

Of note, cattle will likely be present in A8PIII-S during real-time scanning and measurement activities. If this is the case, sampling technicians should take precautions to keep cattle away from the equipment. This includes attending to the HPGe detector and other equipment at all times, and removing all equipment and supplies from the field at the end of the sampling day. Also, the gate must closed each time after entering or exiting the area to keep the cows confined.

As discussed in Section 1.1, the fenced area along Paddys Run Road is CG&E property. This area will not be included in this precertification, though an access agreement must be obtained before crossing this property to scan the small section of FEMP property that is separated from A8PIII-S by the property fence.

2.1 PRECERTIFICATION PHASE 1

Precertification Phase 1 scanning will consist of maximum possible coverage of A8PIII-S using real-time gamma sensitive NaI detector systems to evaluate residual soil contamination patterns. To facilitate this scan, A8PIII-S will be divided into approximately 1-acre sections, as shown on Figure 2-1.

Real-time NaI detector system coverage will be limited to the surface soil and will be as extensive as possible without jeopardizing worker safety or destroying root systems of trees and shrubs. The mobile NaI detectors' acquisition time will be set to four seconds, and data will be collected at a speed of 1.0 mile per hour. Adjacent passes will be conducted with a 0.4-meter overlap, which corresponds to a separation of the centerline of the passes by 2 meters. RTRAK will be the primary tool used to collect surface soil total gamma activity data. The other mobile NaI detectors (i.e., the RSS and Gator, if approved by the Agencies) will be used in areas that the RTRAK cannot access. The detector system configuration and performance of these detectors will be equivalent to the RTRAK. The onboard Global Positioning System (GPS) will be used to obtain positioning information for each detector measurement.

There are an estimated 3.0 acres of A8PIII-S which will be inaccessible to mobile NaI detectors due to dense vegetation and/or steep terrain (see Figure 2-2). Where this is the case, the HPGe detectors will be used for surface scanning, and readings will be obtained at a detector height of 1 meter and a count time of 900 seconds (15 minutes). The no overlap (i.e., 90.6 percent) coverage option (see Section 4.10 of the Real-Time User's Manual), will be employed to scan the required area. If the HPGe identifies a total uranium concentration greater than the FRL when set at the 1-meter height, another reading will be obtained at that location with a detector height of 31 cm and a count time of 15 minutes. An additional 1.5 acres of A8PIII-S (primarily the steep banks shown on Figure 2-1) are likely to be inaccessible to mobile NaI detectors, as well as the HPGe. These areas will not be included in the precertification scanning, though they will be visibly inspected for potential contamination. Note that only the RSS or HPGe can be used in the FEMP property outside the fence on the northeast corner of the CG&E lot.

The data obtained from the Precertification Phase 1 scan will be used to determine patterns of total gamma activity, and a two-point moving average of consecutive mobile NaI measurements will be

mapped to determine if total uranium, radium-226 and/or thorium-232 hot spots (concentrations greater than 3x FRL) are present. These data, along with other information as discussed in Section 3.3.3.2 of the SEP, will be considered when determining CU boundaries in A8PIII-S. After reviewing the mapped data, the Characterization Lead is responsible for defining CU boundaries and documenting this decision in the Certification Design Letter for A8PIII-S.

2.2 PRECERTIFICATION PHASE 2

All Precertification Phase 2 "confirmation" readings will be obtained using the HPGe detectors. These readings will be obtained at a minimum of one location per identified CU to evaluate the areas of highest activity identified during Phase 1. In addition, Phase 2 readings will be obtained to confirm any mobile NaI potential hot spots (i.e., two-point moving average results above 3x FRL) identified during Phase 1. The Characterization Lead is responsible for evaluating the mapped mobile NaI data and determining the number and location of Phase 2 HPGe measurements while considering the consequences of decision errors identified in DQO SL-054.

Per guidelines established in Section 3.3.2 of the User's Manual, all Precertification Phase 2 readings will be obtained at two different detector heights: 31 cm (1 foot) and 1 meter. The HPGe detector system acquisition time will be set to 15 minutes for both readings. All HPGe measurement locations will be surveyed and marked with the measurement location, as identified according to Section 2.4. One duplicate HPGe reading will also be collected per 20 Phase 2 [i.e., analytical support level (ASL) B] measurements at locations selected by the Real-Time Field Lead. The Precertification Phase 2 HPGe Target Analyte List (TAL) is shown in Table 2-2. A hot spot is confirmed if a HPGe measurement at either detector height exceeds 2x FRL for any resolvable area-specific constituent of concern.

2.3 HOT SPOT DELINEATION

If a hot spot is confirmed (i.e., a Phase 2 HPGe result above 2x FRL at either detector height), time must be allowed to prepare for removal. The delineation approach will be determined by project management after considering all surrounding real-time results; however, the strategy must be consistent with guidelines documented in Section 3.3.3 of the User's Manual (detector height of 15 cm, count time of 15 minutes). Details of the hot-spot delineation, if necessary, will be documented in a Variance/Field Change Notice (V/FCN).

2.4 REAL-TIME MEASUREMENT IDENTIFICATION

All mobile NaI detector data files will be assigned a unique sample identifier, which will include the area/phase and acre where collected in the numbers in the file names. Supplemental HPGe readings obtained during Precertification Phase 1 (those collected in areas inaccessible to the mobile NaI detectors) will be identified as *A8P3S-P1-acre-reading # QC-G*, where:

A8P3S = the remediation area in which the reading was collected. For data management purposes a numerical "3" is used in place of the roman numeral "III"
P1 = Phase 1 of Precertification
acre = numbered acre in which the reading was collected
reading # = sequential reading number within that acre, if a second reading (detector height = 31 cm) is necessary at that same location, the reading number will include the letter "A"
QC = "D" for Duplicate reading, if applicable. No dash will separate the reading # and the "D"
G = Gamma reading

For example, A8P3S-P1-2-4-G is the fourth HPGe reading obtained in the second identified acre of A8PIII-S. Note that the surveyed acres will be documented in a V/FCN to aid real-time technicians in the field.

Precertification Phase 2 will be identified as *A8P3S-P2-detector height-CU-reading# QC-G*, where:

A8P3S = the remediation area in which the reading was collected (again, a numerical "3" is used in place of the roman numeral "III" for data management purposes).
P2 = Phase 2 of Precertification
detector height = a "2" indicates a height of 31 cm, and a "3" indicates a height of 1 meter. Though not used for confirmation, a "1" indicates a height of 15 cm.
CU = designated CU within A8PIII-S, numbered 01 through x,
reading # = sequential reading number within that CU, if a second reading (detector height = 31 cm) is necessary at that same location, the reading number will include the letter "A"
QC = "D" for Duplicate reading, if applicable. No dash will separate the reading # and the "D"
G = Gamma reading

For example, A8P3S-P2-3-04-1-G is the first HPGe reading obtained in the fourth identified CU of A8PIII-south, collected at a detector height of 1 meter. A8P3S-P2-3-04-1D-G would be the duplicate reading collected at the same location.

If HPGe readings are necessary for hot spot delineation, the sample identification scheme will be the same as that for Precertification Phase 2; however, the purpose will be identified as "HS" (for hot spot delineation) instead of "P2." Also, the detector height identifier will be dropped, since all readings would be collected at a height of 15 cm. For example, the fourth hot spot delineation reading in A8PIII-south CU-03 would be identified as A8P3S-HS-03-4-G.

Radon measurements will be identified as follows:

A8P3S-RADON-detector height-reading #, where:

A8P3S	=	the remediation area in which the reading was collected (again, a numerical "3" is used in place of the roman numeral "III" for data management purposes)
RADON	=	Radon measurement
detector height	=	a "1" indicates a height of 15 cm; a "2" indicates a height of 31cm; and a "3" indicates a height of 1 meter
reading #	=	sequential reading number

2.5 SURFACE SOIL MOISTURE GAUGE MEASUREMENTS

The Troxler® Moisture/Density Gauge or the Zeltex® Infrared Moisture Meter will be used to obtain soil moisture content measurements according to Procedures EQT-32 and EQT-39, respectively. These measurements will be used to correct the real-time data so the readings are representative of environmental conditions. Surface moisture measurements will be obtained at a minimum of two per acre where the mobile NaI detectors were used for the Precertification Phase 1 scan. When the HPGe is used during Precertification, one surface moisture measurement will be obtained per HPGe reading. All surface moisture gauge measurements will be conducted within eight hours of collecting the real-time measurements if environmental conditions are not expected to change. Technicians cannot collect Troxler® measurements simultaneously with the mobile NaI or HPGe measurements because internal radioactive sources contained in the Troxler® moisture gauge can cause interference with these measurements; however, the Zeltex® Infrared Moisture Meter can be used along side these detectors.

2.6 BACKGROUND RADON MONITORING

A background radon monitor will be utilized during the collection of mobile NaI and HPGe measurements to obtain background radon information from the time that data collection begins until after the final measurement is completed. The monitor will be placed in one location for the day where

it will be set at the same height as the detector being used to collect the soil radiation measurements (mobile NaI detector height = 31 cm). The background radon data will be used per Section 5.3 of the User's Manual to correct the Radium-226 data.

2.7 PHYSICAL SAMPLES

No physical soil samples are planned for collection under this PSP. If physical samples are needed to verify the HPGe readings at the request of the Characterization Lead, the locations, depths, sample numbers, collection methods, analytical requirements and QC requirements will be identified on a V/FCN. If collected, physical samples will follow data quality objectives identified in DQO SL-048.

2.8 WASTE DISPOSITION

Because no wastes are anticipated to be generated during the real-time scan, a Project Waste Identification Document (PWID) will not be prepared to support field activities under this PSP.

TABLE 2-1
REAL-TIME EQUIPMENT AND DETECTOR CONFIGURATIONS USED DURING EACH PHASE OF PRECERTIFICATION

Precertification Phase	Equipment Used	ASL	Detector Configuration
Phase 1 - Scanning	RTRAK/RSS	A	Speed = 1 mph, Acquisition Time = 4 seconds
	Gator[a]	A	Speed = 1 mph, Acquisition Time = 4 seconds
	HPGe[b]	A	Height = 1 m and possibly 31 cm[c], Acquisition Time = 15 minutes
Phase 2 - Confirmation	HPGe	B	Height = 1 m and 31 cm, Acquisition Time = 15 minutes
Hot Spot Delineation	HPGe	B	Height = 15 cm, Acquisition Time = 15 minutes

[a] If approved by the OEPA and EPA
[b] The HPGe will only be used during Phase 1 if areas are inaccessible to the mobile NaI detectors.
[c] If used during Phase 1, a second HPGe reading will be taken at 31 cm only if the reading obtained at 1-meter shows a total uranium result above the FRL (82 ppm).

TABLE 2-2
TARGET ANALYTE LIST FOR PRECERTIFICATION HPGe SCANNING OF A8PIII

TAL A8P3-PRECERT-A

HPGe Detector		
1	ASL B*	Total Uranium (FRL = 82 mg/kg)
2	ASL B*	Thorium-228 (FRL = 1.7 pCi/g)
3	ASL B*	Thorium-232 (FRL = 1.5 pCi/g)
4	ASL B*	Radium-226 (FRL = 1.7 pCi/g)
5	ASL B*	Radium-228 (FRL = 1.8 pCi/g)

* The ASL applies only to Precertification Phase 2 and hot spot delineation readings. All HPGe and Mobile NaI readings obtained during Precertification Phase 1 will be classified as ASL A.

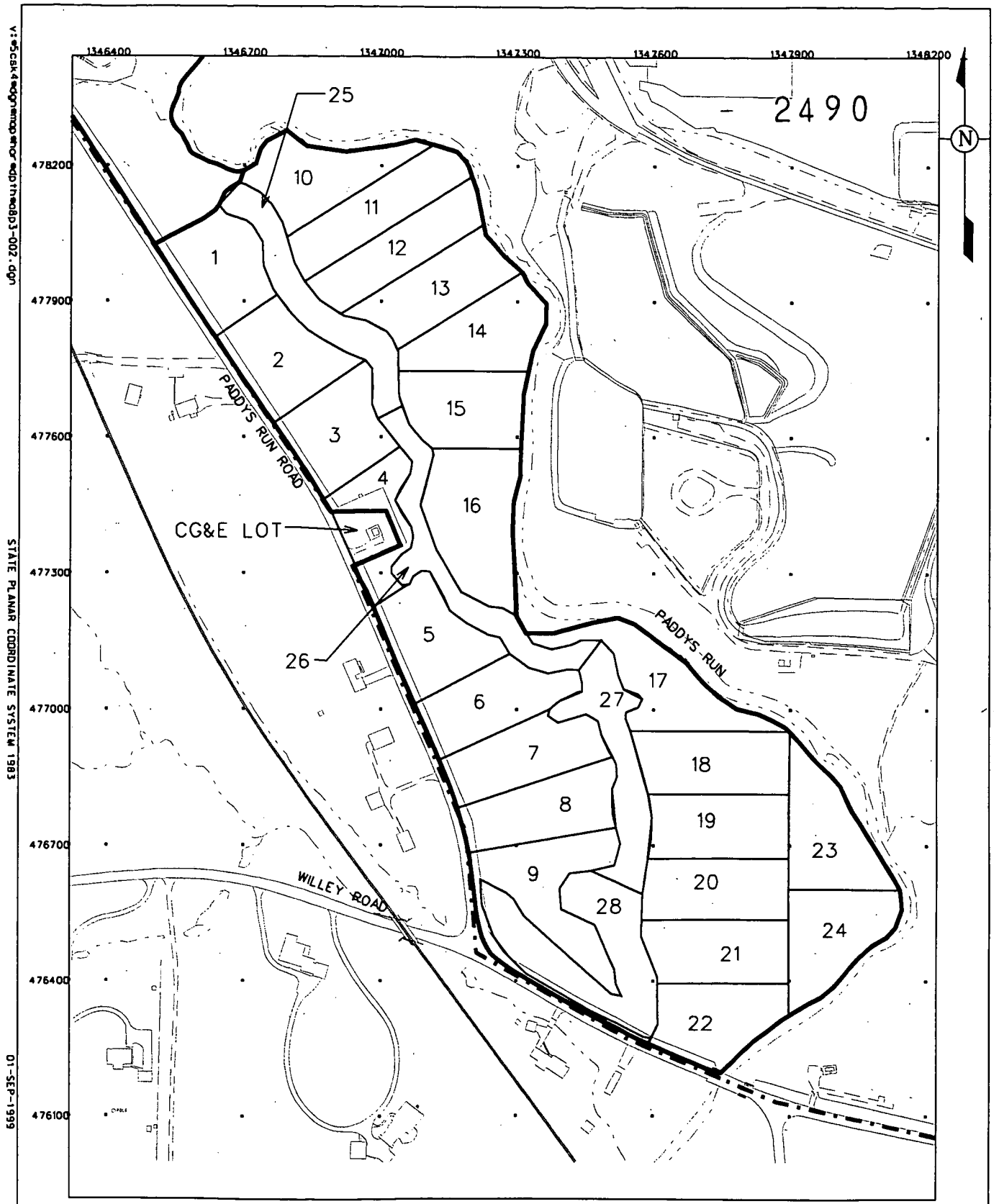

FIGURE 2-1. ACRES SURVEYED WITHIN A8P3-S TO SUPPORT THE PHASE I SCAN

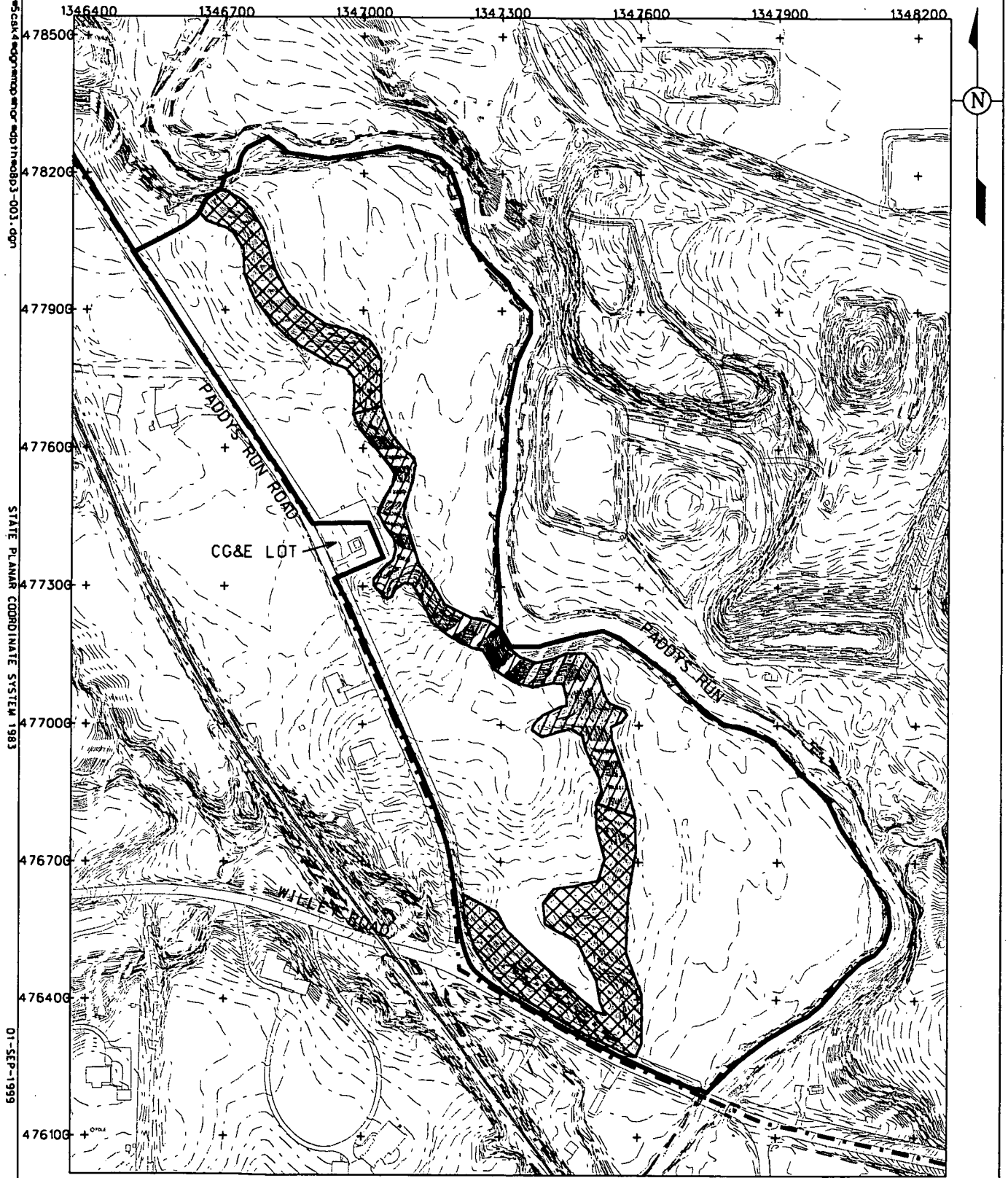

FIGURE 2-2. PORTIONS OF A8PIII-S EXPECTED TO BE INACCESSIBLE TO REAL-TIME DETECTORS

3.0 QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

3.1 QUALITY CONTROL MEASUREMENTS

In accordance with DQO SL-054, Rev. 0 (Appendix A), all Precertification Phase 1 real-time measurements will be classified as ASL A. Precertification Phase 2 HPGe measurements will be classified as ASL B, per the User's Manual. Duplicate readings will be taken at a frequency of one for every 20 ASL B measurements.

3.2 PROJECT REQUIREMENTS FOR SURVEILLANCES

Project management has ultimate responsibility for the quality of the work processes and the results of the scanning activities covered by this PSP. The FEMP Quality Assurance (QA) organization may conduct independent assessments of the work process and operations to assure the quality of performance. The assessment encompasses technical and procedural requirements of this PSP and the SCQ. Independent assessment may be performed by conducting surveillances.

3.3 FIELD CHANGES TO THE PSP

If field conditions require changes or variances, written approval must be obtained from the Project Lead and QA before the changes may be implemented (electronic mail is acceptable). Changes to the PSP will be noted in the applicable Field Activity Logs and on a V/FCN. QA must receive the completed V/FCN, with the signatures of the Project Manager, Characterization Lead and the QA Representative, within seven working days of granting approval.

3.4 APPLICABLE DOCUMENTS, MANUALS, AND PROCEDURES

Work performed under this PSP will be conducted in accordance with the following procedures:

- ADM-02, Field Project Prerequisites
- ADM-17, In-Situ Gamma Spectroscopy Data Management
- ADM-19, In-Situ Gamma Spectroscopy Field Prerequisites
- EQT-05, Geodimeter® 4000 Surveying System - Operation, Maintenance, and Calibration
- EQT-22, High Purity Germanium Detector In-Situ Efficiency Calibration

- EQT-23, Operation High Purity Germanium Detectors
- EQT-32, Troxler® 3440 Series Surface Moisture/Density Gauge-Calibration, Operation, and Maintenance
- EQT-33, Real-time Differential Global Positioning System Operation
- EQT-39, Operation of the Zeltex® Infrared Moisture Meter
- EQT-41, Radiation Measurement Systems
- RM-0020, Radiological Control Requirements Manual
- RM-0021, Safety Performance Requirements Manual
- User Guidelines, Measurement Strategies, and Operational Factors for Deployment of In-Situ Gamma Spectrometry at the Fernald Site (User's Manual)
- Sitewide Excavation Plan (SEP)

4.0 HEALTH AND SAFETY

Technicians will conform to precautionary surveys performed by personnel representing Industrial Hygiene and Radiological Control as applicable. All work on this project will be performed according to applicable Environmental Monitoring procedures, RM-0020 (Radiological Control Requirements Manual), RM-0021 (Safety Performance Requirements Manual), Fluor Daniel Fernald work permit, Radiological Work Permit, and other applicable permits. Concurrence with applicable safety permits is required by each technician in the performance of their assigned duties. A safety briefing will be conducted prior to the initiation of field activities.

All emergencies shall be reported immediately on extension 911, or to the Site Communications Center at 648-6511 (if using a cellular phone), or using a radio and contacting "CONTROL" on Channel 11.

5.0 DATA MANAGEMENT

A data management process will be implemented so information collected during the investigation will be properly managed after completion of field activities. As specified in Section 5.1 of the SCQ, daily activities will be recorded on the Real-Time Instrumentation Management Program (RTIMP) Field Continuation Sheet with sufficient detail to enable a situation to be reconstructed. At least weekly, a copy of all field logs will be sent to the Characterization Lead.

Per Section 5.4 of the User's Manual and ADM-17, all electronically recorded data will have the Checklist for Verification of Quality Control and the Data Review Elements for Real-Time Measurements, which are to be completed after each data collection event. The most recent version of these checklists can be found on the standard forms directory, forms FS-F-5508 (for the mobile NaI detectors) and FS-F-5509 (for the HPGe).

Electronically recorded data from the GPS, HPGe, and mobile NaI systems will be downloaded on a daily basis to disks, or to the Local Area Network (LAN) using the ethernet connection. Technicians or the Surveying Lead will review electronic data for completeness and accuracy before downloading it onto the LAN. Once on the LAN, the Data Management Contact within the Soils Characterization and Excavation Project will perform an evaluation, then transfer the data into useable format with the EGAS software. Once complete, the data will be sent to the loader where it will be loaded onto the Sitewide Environmental Database (SED) and an error log will be generated. The data will then be made available to users through both the Geographic Information System (GIS) and Microsoft Access Software. RTIMP will archive all downloaded data for future reference.

Field documentation, such as the Field Activity Log, Gamma Spectrometry Field Worksheet, Survey Files and the Nuclear Field Density/Moisture Worksheet will undergo an internal QA review by the technicians. Copies will then be generated and delivered to the Data Management Contact, who will perform an evaluation of the data and create the appropriate links between the electronically-recorded data and the paper-generated data within the Sitewide Environmental Database. Field logs may be completed in the field and maintained in loose-leaf form. Loose-leaf pages will be numbered, and all recordings will be in ink. All Mobile NaI data and the Phase 1 HPGe data will be considered ASL A.

The Phase 2 HPGe data will be considered ASL B, therefore, ten percent of the entire data set will be validated to Level B per project requirements.

The RTIMP group will provide maps displaying the precertification results to the Characterization Lead. These maps include the plotted mobile NaI total activity, with HPGe readings included to show coverage. In addition, separate maps of the Phase 1 mobile NaI and HPGe data will be created to display total uranium results, radium-226 results, and thorium-232 results. Finally, Phase 2 HPGe results will be mapped to display location and coverage with the sample ID number posted next to the result. The data file of these results will be forwarded electronically to the Characterization Lead for inclusion in the Certification Design Letter.

APPENDIX A

DATA QUALITY OBJECTIVES SL-054, Rev. 0

- 2490

Control Number _____

Fernald Environmental Management Project

Data Quality Objectives

Title: Real Time Precertification Monitoring

Number: SL-054

Revision: 0

Effective Date: 6/03/99

Contact Name: Joan White

Approval: _____ **Date:** 6/3/99

James Chambers
DQO Coordinator

Approval: Joan H. White **Date:** 6/3/99

Joan White
Real-Time Instrumentation Measurement
Program Manager

Rev. #	0						
Effective Date:	6/03/99						

Data Quality Objectives
Real Time Precertification Monitoring

1.0 Statement of Problem

Conceptual Model of the Site

The general soil remediation process at the Fernald Environmental Management Project (FEMP) includes real-time *in-situ* gamma spectrometry (real-time) measurements and physical sampling during different phases of the remediation process. Initially, pre-design investigations define excavation boundaries. During excavation, real-time measurements and/or sampling for waste disposition issues occurs. After planned excavations are complete, real-time measurements and/or physical sampling precertification activities are carried out to verify that residual contamination is low enough to pass certification. Finally, certification physical sampling is performed to verify that clean up goals (i.e., Final Remediation Levels, [FRLs]) have been achieved, and therefore, remediation is complete in that portion of the FEMP.

This DQO describes the real-time in-situ gamma spectrometry methods used during precertification. Any physical soil samples collected during precertification will be collected under a separate DQO. Real-time precertification measurements involves field surveys of the surface soil using mobile and stationary gamma-discernable real-time equipment. Real-time precertification measurements take place within a soil remediation area when the expected concentrations of primary radiological constituents of concern (COCs) are expected to be below the respective final remediation levels (FRLs). This may occur over an excavated surface or on an unexcavated surface where no above-FRL contamination is anticipated.

Precertification scanning activities must follow the guidelines established in the *Sitewide Excavation Plan* (SEP) and the most current version of the document *User Guidelines, Measurement Strategies, and Operational Factors for Deployment of In-Situ Gamma Spectrometry at the Fernald Site* (hereinafter referred to as the Real Time Users Manual). As discussed in these documents, precertification measurements are conducted in two separate activities:

- Precertification Phase I includes a mobile sodium iodide (NaI) detector scan of as much of the area as accessible. If parts of the area of interest are inaccessible to the mobile NaI detectors, then the stationary High Purity Germanium (HPGe) detector will be used to obtain measurements in those areas. Target parameters for Precertification Phase I NaI measurements are gross gamma activity and 3-times the FRL (3x FRL) values of total uranium, radium-226 and/or thorium-232, as calculated by a moving two-point average of consecutive measurements, or as indicated by 3x FRL in single measurements using the HPGe detectors.

- Precertification Phase II includes stationary HPGe detector measurements to verify the highest values obtained by the mobile NaI detector. It also includes stationary HPGe "hot spot evaluation" measurements at Phase I locations where the two-point average of total uranium, radium-226 and/or thorium-232 has identified resolvable ASCOC concentrations greater than 3-times the FRL (3x FRL) using the RMS systems, or where single HPGe measurement from Phase I are greater than 3x FRL. Target parameters for Precertification Phase II are all resolvable radiological ASCOCs.

Available Resources

Time: Precertification of remediation areas or phased areas must be accomplished by the field team of real-time instrumentation operators (and samplers if necessary), to provide required information in time to support the soil certification effort.

Project Constraints: FEMP remediation activities are being performed in support of the Accelerated Remediation Plan, and soil remediation activities must be consistent with the SEP. Precertification scanning, and if necessary, sampling and analytical testing, must be performed with existing manpower and instrumentation, considering instrument availability, to support the remediation and certification schedule. The results of Precertification Phase I will determine Phase II HPGe measurement number and location, which, if necessary, will determine physical sample number and location. Certification and regrading of the site to meet final land use commitments is dependent on successful completion of this work.

Instrumentation: Real-time monitoring includes 2 mobile sodium iodide (NaI) systems referred to as the Radiation Measurement Systems (RMS). They are the RTRAK (mounted on a tractor) and the RSS (mounted on a small pushcart). In addition, the stationary germanium detectors mounted on a tripod (the HPGe), are also used. These instruments can significantly accelerate the pace of necessary characterization by detecting soil contaminated with resolvable radiological Area Specific Contaminants of Concern (ASCOCs) in a rapid and non-intrusive manner.

2.0 Identify the Decision

Decision

Precertification real-time measurements support two decisions:

Decision 1: Precertification Phase I measurements will be the basis of a decision for the location(s) and number of Precertification Phase II HPGe measurements to collect within an area potentially exceeding 3x FRL, and for Phase II measurements to confirm the highest mobile NaI systems total activity locations.

Decision 2: Precertification Phase II measurements will be the basis of a decision to either:

1) excavate residual contaminated soil, conduct additional real-time measurements, or conduct physical sampling to evaluate potential residual contamination. The decision to excavate would be made if residual contamination could possibly cause certification failure; or,
2) make the assumption that an area is likely to pass certification, and therefore, is ready for certification to begin.

Possible Results of Decision 1

The location and number of Phase II HPGe measurements to be obtained will be established based on Precertification Phase I NaI and HPGe measurements, and the target level specified in the PSP. Two-point averaging of the Phase I NaI measurements, and/or single HPGe measurements will determine ASCOC concentrations or activities with regard to 3x FRL, and this data will be mapped for review. This data will also be considered when establishing Certification Units (CUs).

If the area potentially exceeding 3x FRL exhibits a visible contamination boundary, the Project may determine that Phase II measurements may not need to be collected. In this event, the area of interest may be excavated, and Phase II HPGe measurements will be obtained on the newly excavated surface to ensure the area is now below 3x FRL.

Possible Results of Decision 2

Possible results are as follows:
1) The Phase II HPGe results for all gamma discernable target parameters indicate that the CU is likely to pass certification for widespread contamination and the hot-spot criteria. If this is the case, the area of interest is ready for certification.
2) The Phase II HPGe results for all gamma discernable target parameters indicate that the CU is not likely to pass certification for widespread contamination and/or the hot-spot criteria. If this is the case, additional real-time measurements and/or physical samples may be collected to delineate the contaminated soil for remedial excavation.

3.0 Identify Inputs That Affect the Decision

Required Informational Input

An area will not be subjected to precertification if above-FRL contamination is known to be present. Real-time precertification measurements will be used to estimate the surface soil contamination and the variation in surface soil contamination in areas scheduled for certification. In addition, physical samples

may be collected and/or a review of existing physical sample data, process knowledge, or visible observation may be performed.

Sources of Informational Input

Precertification measurements for discernible radiological COCs will involve measurements from mobile and stationary in-situ gamma spectrometry equipment. Physical samples may be collected to verify real-time measurements, or to precertify for non-gamma resolvable ASCOCs.

Action Levels

FRLs established in the OU2 and OU5 Records of Decision are specific for radiological COC, and in some cases, vary between remediation areas. The FRLs were developed to account for health risks, cross media impact, background concentrations, and applicable or relevant and appropriate requirements (ARARs) and represent not-to-be exceeded contaminant-specific average soil concentrations. Real-time HPGe measurements may also be taken to support excavation to ALARA requirements. Physical samples may be used to verify HPGe readings and to precertify for non-gamma resolvable ASCOCs.

The 3x FRL concentrations/activities obtained through two-point averaging of mobile NaI measurements have been developed based on the ability of the instrumentation to resolve these levels. Refer to the Real-Time User's Manual for additional details.

Methods of Data Collection

Precertification Phase I measurements will be utilized to obtain as close to complete coverage of the areas of concern. Hot spot confirmation and delineation measurements will be obtained during Precertification Phase II by strategically placed stationary HPGe measurements. Analysis and data management for Precertification Phase I data will be conducted at ASL A. Precertification Phase II data may be conducted at either ASL A or ASL B, at the discretion of the Project. The decision to collect Phase II data at ASL A, or ASL B will depend on the Project's need for validated data. Only ASL B data is subject to validation. Real-time data collection for Phase II ASL A and ASL B measurements are identical. All measurements will be performed in compliance with operating procedures, the Real-Time User's Manual, and the SEP.

The Precertification Phase I data will be utilized to establish general radiological concentration patterns and detect areas of elevated total gamma activity, as well as provide isotopic information for resolvable ASCOCs. The Precertification Phase II HPGe gamma detectors will be used to confirm and delineate Phase I potential hot spot measurements, as needed. All real-time Phase I and Phase II

measurements will be collected in accordance with the procedures identified in Section 7.C of this DQO.

Surface physical samples may be collected to verify HPGe measurements and to precertify for non-gamma resolvable ASCOCs. If physical sampling is needed, it will be identified in precertification PSPs. The data quality of these samples will be consistent with the latest sampling DQO.

4.0 The Boundaries of the Situation

Spatial Boundaries

Domain of the Decision: Boundaries are limited to surface soils of areas planned for certification, and adjacent areas, as defined in the individual work plans.

Population of Soils: The soils affected are surface soils (to a nominal depth of 6 inches), which include recently excavated surfaces and undisturbed soils associated with excavation areas as designated in the individual work plans.

Temporal Boundaries

Time Constraints on Real-Time Measurements: The scheduling of precertification scanning is closely associated with the excavation schedule. Precertification real-time scanning must be conducted after excavation, if any, and before certification activities begin. The scanning data must be returned and processed into useable format in time for the information to be useful within the current remediation schedule.

Practical Considerations: In-situ gamma spectrometry measurements cannot be made during snow coverage or standing water conditions or during precipitation. Field analytical methods should also be limited to unsaturated soils. Most areas undergoing scanning are flat, open terrain, and are readily accessible to the equipment. Some areas may require preparation, such as cutting of grass or removal of undergrowth, fencing and other obstacles. In situ measurements will require coordination with appropriate maintenance personnel for site preparation. Physical and environmental parameters will be recorded and assessed during data collection. Refer to the Real-Time User's Manual for additional details.

5.0 Develop a Logic Statement

Parameters of Interest

For Precertification Phase I, parameters of interest are gross gamma activity and 3-times the FRL values of total uranium, radium-226 and thorium-232, as calculated by a moving two-point average of consecutive readings. For Precertification Phase II, parameters of interest are all HPGe-discernable radiological ASCOCs.

Precertification Target Levels

For Precertification Phase I, target levels are the highest gross gamma activity readings, and 3x FRL for total uranium, radium-226 and thorium-232. For Precertification Phase II, target levels are the FRLs of all discernable radiological ASCOCs.

Decision Rules

Following Precertification Phase I, any Phase I NaI areas exhibiting patterns of high gross gamma activity will be measured with the HPGe. Also, any Phase I HPGe measurements greater than 3x FRL will be scanned with the HPGe for hot spot evaluation per section 3.3 of the Real-Time User's Manual.

Following precertification Phase II, if HPGe results indicate a CU could fail certification, the soil may be evaluated further with additional HPGe measurements or physical samples, or undergo remedial excavations. If remedial excavations are performed, the excavated area will be measured with post-excavation HPGe measurements to ensure removal of the contamination. Once the remediation is confirmed completed by the HPGe, the area will be considered ready for certification. Certification readiness means there i is no indication of wide-spread contamination, or localized contamination (i.e., hot-spot).

6.0 Establish Constraints on the Uncertainty of the Decision

Range of Parameter Limits

The range of soil concentrations anticipated will be from background (natural concentrations) to greater than the maximum subsurface value indicated in the RI database. It is anticipated that the concentrations will be below the FRL prior to the onset of precertification sampling.

Types of Decision Errors and Consequences

Decision Error 1: This decision error occurs when the decision maker decides an area is ready for certification when the average soil concentration in an area is above the FRL, or the soil contains ASCOC concentrations above two-times the FRL (the hot-spot criteria). This decision error would lead to the area failing certification for average radiological COC concentrations above the FRL or for hot spot criteria. If an area fails certification sampling and analytical testing, remobilization and further excavation, precertification, and certification sampling would be necessary.

Decision Error 2: This decision error occurs when the decision maker decides that additional HPGe and/or physical samples are necessary based on precertification Phase II results; or the decision maker directs the excavation (or additional excavation) of soils, when they actually have average radiological COC concentrations below the FRLs and no ASCOC hot spots (i.e., concentrations above two-times the FRL). This would result in added sampling and analytical costs and/or added costs due to the excavation of clean soils and an increased volume in the OSDF. This is not as severe as Decision Error 1. The addition of clean soil to the OSDF would result in further reduction, although minimally, to human health risk in the remediated areas.

True State of Nature for the Decision Errors

The true state of nature for Decision Error 1 is that the actual concentrations of radiological ASCOCs are greater than their FRLs and/or the hot spot criteria. The true state of nature for Decision Error 2 is that the true concentrations of COCs are below their FRLs and/or hot spot criteria. Decision Error 1 would be the more severe error.

7.0 Optimize a Design for Obtaining Quality Data

As discussed in Section 3.3.3 of the SEP, precertification scanning consists of two separate activities. Refer to Section 1.0 of this DQO for a general overview of Precertification Phase I and Precertification Phase II activities.

Real-time measurements are generated by two methods: 1) the mobile sodium iodide (NaI) detection systems (RTRAK or RSS) which provide semi-quantitative radiological data, and 2) the stationary high purity germanium (HPGe) system that provides quantitative measurements of radiological COCs. If necessary, physical samples may also be collected for HPGe data verification, and to precertify for non-gamma resolvable ASCOCs.

Surface moisture readings are obtained in conjunction with Phase I and Phase II the NaI and HPGe system measurements using the Troxler nuclear moisture and density gauge or the Zeltex moisture meter, as specified in the PSP. If conditions do not permit the use of the moisture meters, a soil moisture sample may be collected and submitted to the on-site laboratory for percent moisture analysis, or a default moisture value of 20% may be used. The soil moisture data will be used as is discussed in Sections 3.8, 4.11 and 5.2 of the Real-Time User's Manual. The gamma data will be computer corrected for moisture by the Lab View software.

Background radon monitoring will also occur in conjunction with Phase I and Phase II NaI and HPGe system measurements, as specified in the PSP. Refer to the Section 5.3 of the Real-Time User's Manual for a discussion on radium-226 corrections.

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Sodium Iodide (NaI) System

The mobile NaI detector systems are collectively called the Radiation Measurement Systems (RMS). They are used to achieve as close to complete coverage of the area as possible, taking into consideration the topographic and vegetative constraints which limit access. The NaI systems currently are used to obtain measurements over an area specified in a PSP to detect radiological total activity patterns and elevated radiological activity. The NaI detector systems are used at speeds and count times specified in the PSP, and are consistent with the Real-time User's Manual. The 0.4 meter overlap option is used, as discussed in Section 4.3.1 of the Real-time User's Manual, unless directed differently in the PSP. If the total uranium FRL is 20 ppm or lower, the NaI systems should not be used for precertification; the HPGe system should be used.

The mobile NaI systems are electronically coupled with Satloc global positioning system (GPS) rover and base unit to record each reading location. Counting and positioning information is recorded continuously on a field personal computer (PC) and stored on disk or hard drive for future downloading on the site soil database and Graphical Information System (GIS) system, or transferred directly to the Local Area Network (LAN) by Ethernet.

Information from the NaI/GPS system is recorded on the PC and transferred to the Unix system through the local area network on a regular (at least daily) basis. The information is plotted on the FEMP GIS system, or in the field using Surfer software. With the output, patterns of elevated total activity, and locations of elevated concentrations can be identified.

Data reduction is an important aspect of NaI system data use. Individual total uranium, radium-226 and thorium-232 concentrations will undergo two-point averaging. The two-point averaged values will be mapped and evaluated with respect to 3x FRL.

NaI measurements may be used for precertification decision making if the measurements clearly indicate below FRL criteria have been met. They may also be used to determine the location and number of Precertification Phase II HPGe measurements, if required.

In-Situ HPGe Detectors

The HPGe detector is used during Precertification Phase I or Precertification Phase II, as follows:

- During Precertification Phase I, the HPGe is used in areas where topographic or vegetative constraints prevent mobile NaI detector access or if the NaI systems are out of service. The HPGe is used in a 99.1% coverage grid over the accessible area. Detector height and count times are specified in

the PSP and are consistent with the most current version of the Real-Time User's Manual.

- During Precertification Phase II, the HPGe detector is used at strategic locations established thorough the Precertification Phase I screening. These locations are where the highest readings of gross gamma activity were identified and/or where individual ASCOC concentrations were identified as hot spots. The HPGe is used to quantify radiological COC levels, which in turn provide information concerning the ability to pass certification.

Physical Soil Sampling

Physical samples may be collected and analyzed for target radiological COCs to verify the HPGe measurements and/or to precertify for non-gamma discernable ASCOCs. If physical samples are required, they will be collected in compliance with the applicable sampling DQO. Criteria for obtaining physical samples, such as sample density, will be specified in the Precertification PSP, if necessary. The minimum data quality acceptable for this purpose will be identified in the applicable sampling DQO. Field QC, ASL and Validation requirements will be consistent with the SCQ and the more stringent Soil Characterization and Excavation Project requirements.

Data Quality Objectives
Real Time Precertification Measurements

1A. Task/Description: Precertification real-time measurements.

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

RI ☐ FS ☐ RD ☐ RA ☒ R_vA ☐ OTHER ☐

1.C. DQO No.: SL-054, Rev. 0 DQO Reference No.: Current Sampling DQO

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

Air ☐ Biological ☐ Groundwater ☐ Sediment ☒ Soil ☒

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: Precertfication A ☒ B ☒ C ☐ D ☐ E ☐

4.A. Drivers: Applicable or Relevant and Appropriate Requiremnts (ARARs), Operable Unit 5 Record of Decision (ROD), the Real-Time User's Manual, the Sitewide Excavation Plan and the Pre-certification Project-Specific Plan (PSP).

4.B. Objective: To determine if the area of interest is likely to pass certification for all HPGe discernable radiological COCs

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5. Site Information (Description): The OU2 and OU5 RODs have identified areas at the FEMP that require remediation activities. The RODs specify that the soils in these areas will be clean and demonstrated to be below the FRLs. Pre-certification will be necessary for areas of the site with soils that are scheduled for certification.

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 Rad.	☒*	TPH	☐
	Spec.Conductance	☐		Metals	☐	Oil/Grease	☐
	Dissolved Oxygen	☐		Cyanide	☐		
	Technitium-99	☐		Silica	☐		
4.	Cations	☐	5.	VOA	☐	6. Other (specify)	
	Anions	☐		ABN	☐	Percent Moisture	
	TOC	☐		Pesticides	☐		
	TCLP	☐		PCB	☐		
	CEC	☐					
	COD	☐					

* If specified in the PSP

6.B. Equipment Selection and SCQ Reference:

Equipment Selection	Refer to SCQ Section
ASL A Mobile NaI, HPGe (Precert. Phase I) and HPGe (Precert. Phase II)*	SCQ Section: Not Applicable
ASL B HPGe (Precertification Phase II)*	SCQ Section: App. G , Table 1
ASL C _____	SCQ Section: _____
ASL D _____	SCQ Section: _____
ASL E _____	SCQ Section: _____

* Choosing the ASL level for Phase II precertification HPGe measurements is at the discretion of the project considering the project need for validated data.

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

Biased [X] Composite [ ] Environmental [ ] Grab [X] Grid [X]

Intrusive [ ] Non-Intrusive [X] Phased [ ] Source [ ]

7.B. Sample Work Plan Reference: The DQO is being established prior to completion of the Project-Specific Plans.
Background samples: OU5 RI/FS

7.C. Sample Collection Reference:
-EQT-22, *Characterization of Gamma Sensitive Detectors*
-EQT-23, *Operation of High Purity Germanium Detectors*
-EQT-32, *Troxler 3440 Series Surface Moisture Gauge*
-EQT-33, *Real Time Differential Global Positioning System*
-EQT-39, *Zeltex Infrared Moisture Meter*
-EQT-40, *Satloc Real-time Differential Global Positioning System*
-EQT-41, *Radiation Measurement Systems*
-ADM-16, *In-Situ Gamm Spectrometry Quality Control*
-User Guidelines, Measurement Strategies, and Operational Factors for Deployment of In-Situ Gamma Spectrometry at the Fernald Site, 20701-RP-0006

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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 Samples	[X] *
Equipment Rinsate Samples	[ ]	Split Samples	[ ]
Preservative Blanks	[ ]	PE Samples	[ ]

Other (specify) _____
* If specified in the PSP.

8.B. Laboratory Quality Control Samples:

Method Blank	[ ]	Matrix Duplicate/Replicate	[ ]
Matrix Spike	[ ]	Surrogate Spikes	[ ]

Other (specify) _____

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