4764

PROJECT SPECIFIC PLAN
FOR AREA 9, PHASE II
PRECERTIFICATION REAL-TIME SCAN

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

OCTOBER 29, 2002

U.S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE

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FOR AREA 9, PHASE II
PRECERTIFICATION REAL-TIME SCAN

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FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

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LIST OF ACRONYMS AND ABBREVIATIONS

A1PI	Area 1, Phase I
A1PII	Area 1, Phase II
A9PII	Area 9, Phase II
ASCOC	area-specific constituent of concern
ASL	analytical support level
CDL	Certification Design Letter
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COC	constituent of concern
CU	certification unit
DOE	U.S. Department of Energy
DQO	Data Quality Objectives
EMS	Excavator Mounted System
EPA	U.S. Environmental Protection Agency
FACTS	Fernald Analytical Computerized Tracking System
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
PSP	Project Specific Plan
QA/QC	Quality Assurance/Quality Control
RA	Removal Action
RSS	Radiation Scanning system
RTIMP	Real-Time Instrumentation Measurement Program
RTRAK	Radiation Tracking System
SCQ	Sitewide CERCLA Quality Assurance Project Plan
SDFP	Soil and Disposal Facility Project
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

As described in the Sitewide Excavation Plan (SEP), the Fernald Environmental Management Project (FEMP) has been divided into ten areas for remediation of soil and at- and below-grade structures and debris as required under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

Soil constituent of concern (COC) data collected during the FEMP Remedial Investigation identified areas of soil contamination along the eastern portion of the site within Area 1, Phase I (A1PI) and Area 1, Phase II (A1PII). As a result of this contamination, as well as contamination that was found off site and excavated as part of Removal Action (RA) 14, the U.S. Department of Energy (DOE) plans to certify the portions of off-property soil adjacent to the FEMP's eastern boundary. In addition, a portion of off-property soil north of the FEMP will be completed due to the certification failure and excavation of Certification Unit (CU) O-20 in A1PI.

Area 9, Phase II (A9PII) consists of 12.6 acres which is located south of Area 9, Phase I and east of A1PII. The majority of the property directly adjacent to the FEMP has been used for crop production while the eastern part of the property is adjacent to a quarry operated by the property owner. A9PII also includes 0.88 acres that is located north of A1PI between the northern FEMP property fence line and State Route 126. Off-property certification is to take place after the adjacent portion of the FEMP property is remediated and certified as attaining final remediation levels (FRLs) for all area-specific COCs (ASCOCs). Certification of A1PI was completed in mid-1998, while A1PII was completed in early 2000. A9PII is identified on Figure 1-1.

Based on agreements with the U.S. Environmental Protection Agency (EPA) and Ohio Environmental Protection Agency (OEPA), the suite of ASCOCs to be analyzed for certification of off-property soil is identical to the adjacent FEMP soil remediation area. Therefore, the ASCOCs for A9PII adjacent to A1PII are identical to the suite of ASCOCs for A1PII, while the ASCOCs for A9PII adjacent to A1PI are identical for the suite of ASCOCs for A1PI. All ASCOCs will be certified to the more stringent off-property soil FRLs identified in the Operable Unit 5 Record of Decision. The certification strategy for this area will follow SEP Approach E, which addresses off-property soils. The portion of A9PII that

has been excavated as part of RA 14 is identified on Figure 1-2. As a result, real-time scanning will be conducted to ensure there is no radiological contamination above off-property FRLs. Additionally, real-time scanning will be performed on the portion of A9PII located north of A1PI. Other details of the certification strategy will be presented in the A9PII Certification Design Letter (CDL). In addition to providing information to help establish CU boundaries, precertification data will be used to identify any residual patterns of soil contamination. Above-FRL soil that could result in a CU failing certification will be excavated and removed before certification activities begin.

1.2 PURPOSE

The purposes of precertification scanning activities detailed in this Project Specific Plan (PSP) are to: 1) provide information to help establish CU boundaries, 2) evaluate any patterns of residual surface soil contamination, and 3) determine if soil excavation is necessary for the CU to pass certification. Phase 1 and Phase 2 of precertification real-time scanning will serve these purposes:

1) Precertification Phase 1 scanning with mobile sodium iodide (NaI) detectors will provide as close as possible to 100 percent coverage of A9PII. Data obtained from this scan will be used to determine patterns of total gamma counts and potential hot spots [i.e., three times (3x) the FRL] for total uranium, radium-226 or thorium-232. High-purity germanium (HPGe) detector measurements will be obtained in areas that are inaccessible to the mobile NaI detectors. Based on this information, and other relevant factors discussed in Section 3.3.3.2 of the SEP, CU boundaries will be established in A9PII according to the criteria for off-property CUs.

2) During Precertification Phase 2, a minimum of one HPGe reading will be obtained for each batch of NaI spectra to confirm the Phase I highest reading for total gamma counts or the highest reading for uranium, thorium, and radium hot spots. If the HPGe results show concentrations to be above 2x the FRL of any primary radiological COCs, the hot spot will be delineated and a remediation plan will be submitted for EPA approval.

As a whole, precertification data will be used to determine if A9PII is ready for certification activities. If NaI and HPGe data indicate the activity of primary radiological COCs are below three and two times the FRL, respectively, then certification physical sampling will be initiated under a separate PSP. If not, an excavation plan will be developed to delineate and excavate the hot spots prior to the initiation of certification activities. The excavation plan will be submitted to the EPA for approval.

1.3 SCOPE

The scope of this PSP is limited to A9PII precertification surface scanning activities, including confirmation measurements, and if necessary, hot spot delineation. Physical sampling, if necessary, will be documented in a Variance/Field Change Notice (V/FCN) and submitted to EPA for approval. All precertification scanning activities will be consistent with Sections 3.3.3 and 4.5 (Approach E) of the SEP, while taking into account the concerns of the property owners. The real-time scanning approach will be consistent with the User Guidelines, Measurement Strategies, and Operational Factors for Deployment of In-Situ Gamma Spectrometry at the Fernald Site (also known as the User's Manual), Real Time Instrumentation Measurement Program (RTIMP) Protocols and the RTIMP Administration and Field Manuals (RTIMP-M-001 and RTIMP-M-002). Field activities must be consistent with the Sitewide CERCLA Quality Assurance Project Plan (SCQ), Data Quality Objectives (DQO) SL-054, Revision 0 (Appendix A).

Based upon the results of precertification real-time monitoring of A9PII that is located north of A1PI under this PSP, it may be necessary to further extend activities across State Route 126. This will be documented in a V/FCN and submitted to the EPA for approval.

The boundary of A9PII which is located east of A1PII has be redefined since it was first outlined in the draft PSP for A9PII Precertification Real-Time Scan submitted to the EPA in November 2000. Refer to Figure 1-3 for original boundary of A9PII. The eastern boundary of A9PII has been redesigned to run parallel to the natural gas line, thus eliminating the eastern section of A9PII as seen on Figure 1-2. This redefinition is due to the excavation activities performed by the property owner on the eastern portion of A9PII as well as the steep slope that runs between the excavated area and the natural gas line.

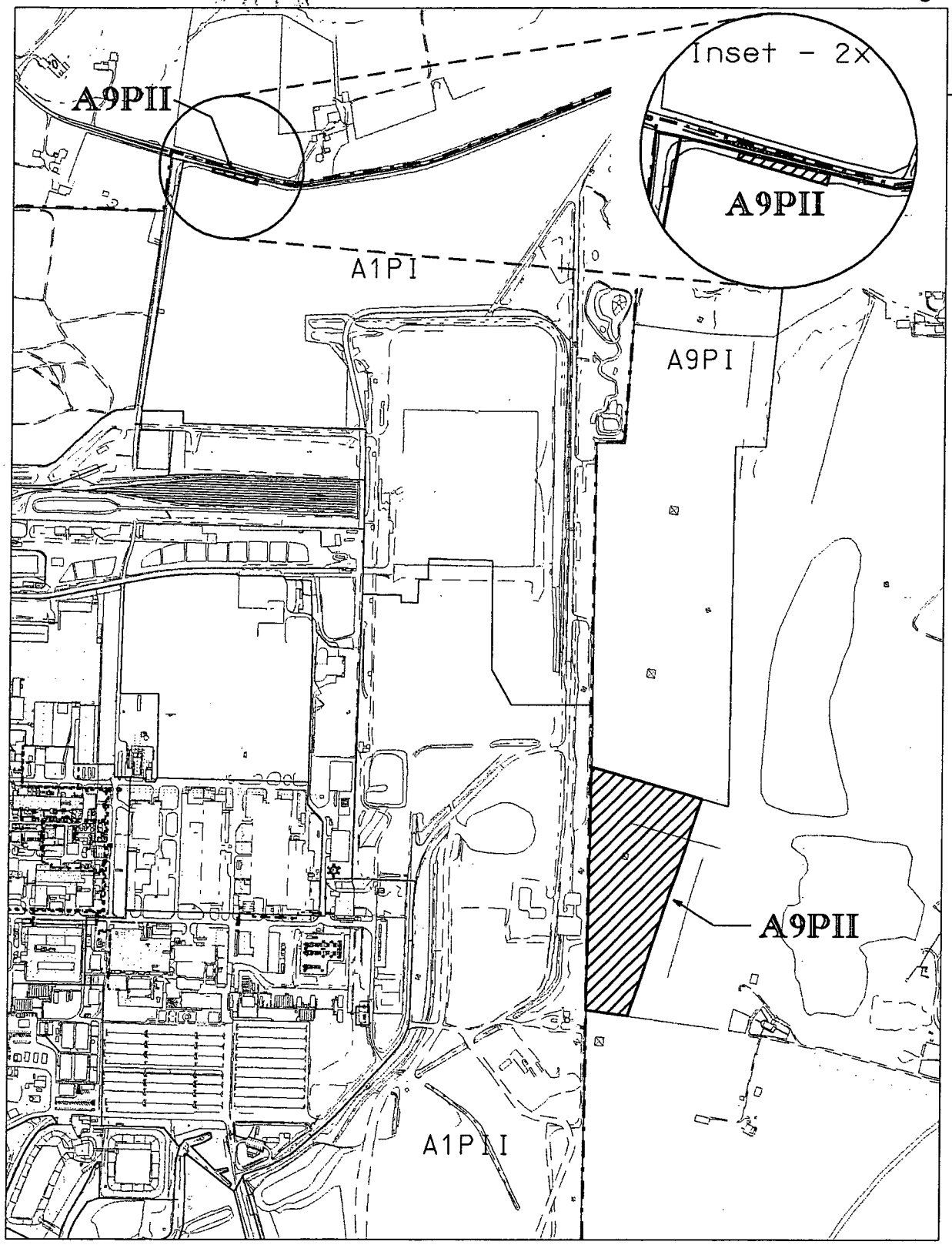
1.4 KEY PERSONNEL

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

TABLE 1-1
KEY PERSONNEL

Title	Primary	Alternate
DOE Contact	Robert Janke	Kathi Nickel
SDFP Management	Jyh-Dong Chiou	Tom Beasley
Characterization Manager	Frank Miller	Denise Arico
RTIMP Manager	Rich Abitz	Dale Seiller
RTIMP Field Lead	Brian McDaniel	Jerry Smith
Surveying Manager	Jim Schwing	Andy Clinton
Field Sampling Manager	Tom Buhrlage	Jim Hey
Laboratory Contact	Heather Medley	Amy Meyer
Data Management Contact	Denise Arico	Krista Blades
Data Validation Contact	James Chambers	Andy Sandfoss
Field Data Validation Contact	Dee Dee Early	Andy Sandfoss
FACTS/SED Database Contact	Cara Sue Schaefer	Susan Marsh
WAO Contact	Linda Barlow	June Love
QA/QC Contact	Reinhard Friske	Mike Godber
Safety and Health Contact	Gregg Johnson	Pete Bolig/ Jeff Middaugh

FACTS - Fernald Analytical Computerized Tracking System
QA/QC – Quality Assurance/Quality Control
SDFP – Soil and Disposal Facility Project
SED - Sitewide Environmental Database
WAO - Waste Acceptance Organization



LEGEND:

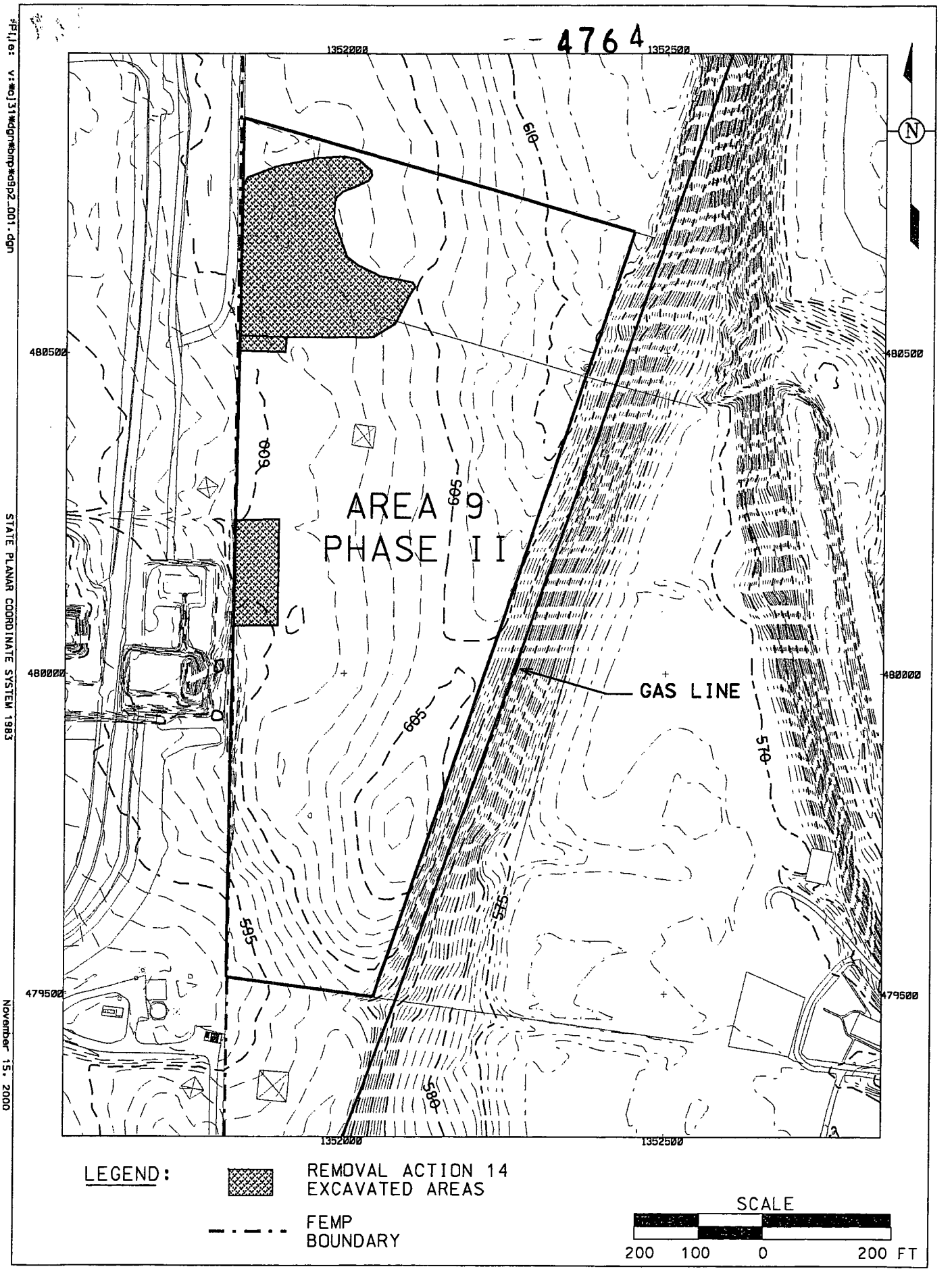
AREA 9, PHASE II CERTIFICATION BOUNDARIES

FEMP BOUNDARY

SCALE

800 400 0 800 FEET

FIGURE 1-1. AREA 9, PHASE II LOCATION MAP



File: v:\oj31\dgn\bmp\a9p2_001.dgn

STATE PLANAR COORDINATE SYSTEM 1983

November 15, 2000

FIGURE 1-2. A9PII REDEFINED BOUNDARY

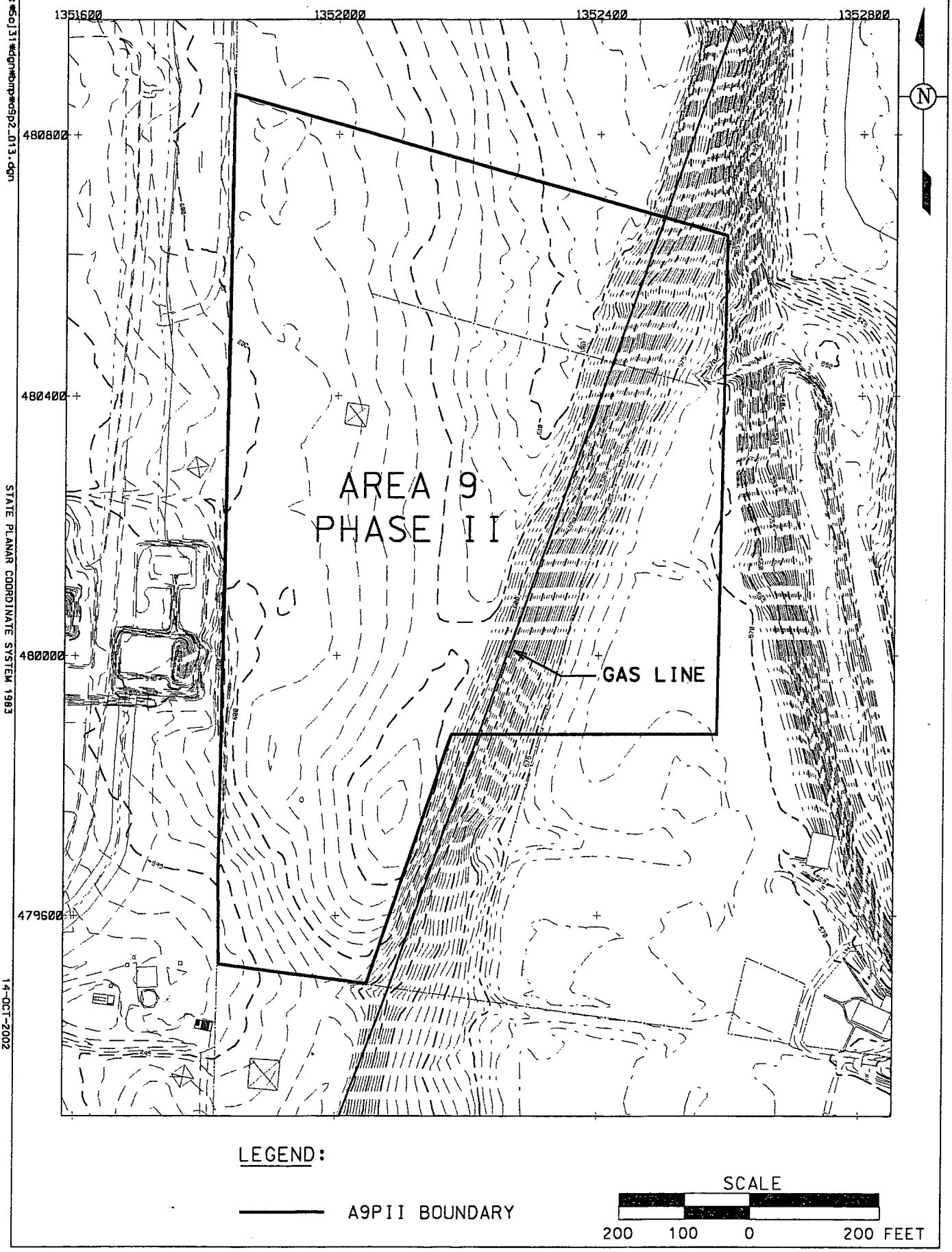


FIGURE 1-3. A9PII ORIGINAL BOUNDARY DESIGN

2.0 PRECERTIFICATION SAMPLING PROGRAM

Before any precertification activities can be conducted on private property, an access agreement must be obtained from the property owners (Section 2.5.12 of the SEP). One access agreement will be obtained for both the physical sampling and real-time scanning activities.

Routine radiological scanning of A9PII will take place in two phases. During Precertification Phase 1, the Radiation Tracking System (RTRAK), Radiation Scanning System (RSS), and/or the Gator 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 real-time equipment will be consistent with the User's Manual, RTIMP Protocols and the RTIMP Field Manual. In areas that are physically inaccessible to the mobile NaI detectors, the HPGe detector will be used to scan surface soil.

During Precertification Phase 2, HPGe detectors will be used to evaluate areas of highest gamma activity identified during Phase 1. In addition, the HPGe will be used to confirm any hot spots, as defined in the User's Manual and discussed further in Section 2.2 of this PSP. If a hot spot is confirmed, delineation will take place as another phase (Phase 3) 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 be collected to support mobile NaI and HPGe measurements, as discussed in Sections 2.5 and 2.6 respectively.

No physical samples are planned under this PSP but may be collected, if necessary, to verify HPGe readings and/or to confirm or delineate anomalies identified by RTIMP. Physical sample collection will be identified by the Characterization Manager or designee and documented with a V/FCN. The V/FCN will be submitted to the EPA for approval.

2.1 PRECERTIFICATION PHASE 1

Precertification Phase 1 scanning will consist of maximum possible coverage of A9PII using real-time, gamma-sensitive NaI detector systems to evaluate residual soil contamination patterns. 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 the root systems of trees and shrubs. The mobile NaI detectors' acquisition time will be set to four seconds with a detector height of 31 cm and a nominal speed of

1.0 mile per hour. Adjacent passes will be conducted to approximate a 0.4-meter overlap, which corresponds to a 2-meter separation of the centerlines of the passes. The RSS or Gator will be the primary tool used to collect total gamma, uranium-238, thorium-232 and radium-226 activity data for surface soil. An onboard Global Positioning System (GPS) will be used to obtain positioning information for each detector measurement.

In A9PII there are areas that may be inaccessible to mobile NaI detectors due to dense vegetation and/or steep terrain (shown on Figure 2-1). In these instances, 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 300 seconds (5 minutes) using an equilateral triangular grid with 11-meter nodes (approximately 95 percent coverage). If the HPGe identifies a total uranium, thorium-232, or radium-226 concentration greater than 2x FRL, Phase 2 measurements will be obtained at that location with a detector height of 31 cm to confirm and delineate the hot spot, as necessary. If areas of A9PII still prove to be inaccessible to HPGe or physical samplers, then these areas will not be included in precertification activities. These areas will be visibly inspected for potential contamination and, if suspect staining or materials are found, will be scanned with hand-held friskers to assess nuclide activity. If necessary, the Excavator Mounted System (EMS) may be mobilized to scan these areas.

The data obtained from the Precertification Phase 1 scan will be used to determine contamination patterns. A two-point moving average of consecutive 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. HPGe results will be plotted to determine if total uranium, radium-226 and/or thorium-232 hot spots (2x FRL) are present. These data, along with other information as discussed in Section 3.3.3.2 of the SEP, will be considered when establishing CU boundaries in A9PII. After reviewing the mapped data, the Characterization Manager is responsible for documenting the CU boundaries in the A9PII CDL.

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 NaI batch file to evaluate the areas of highest activity identified during Phase 1. In addition, Phase 2 readings will be obtained to confirm Phase 1 hot spots (i.e., two-point moving average results for NaI above 3x FRL and HPGe results above 2xFRL). The Characterization Manager or designee is responsible for evaluating the mapped 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.

Precertification Phase 2 readings will be obtained as specified in the RTIMP Protocols (31 cm detector height; 5-minute acquisition time). 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 be collected daily or one per 20 measurements, whichever is more frequent, at locations selected by the RTIMP 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 uranium-238, thorium-232 or radium-226.

2.3 PRECERTIFICATION PHASE 3

If a hot spot is confirmed (i.e., a Phase 2 HPGe result above 2x FRL), project management will determine the delineation approach after considering all surrounding real-time results; however, the strategy must be consistent with RTIMP Protocols. Details of the hot spot delineation will be documented in a V/FCN, and any removal action will be documented in an excavation plan and submitted to the EPA for approval. After the hot spot is removed, Precertification Phase 3 measurements will be obtained to verify all delineated contamination has been removed. NaI and HPGe detectors will be used in accordance with RTIMP protocols.

2.4 REAL-TIME MEASUREMENT IDENTIFICATION

All data files collected while using the NaI detectors will be assigned a unique sample identifier, which includes the batch file number, area/phase and acre where measurements are collected. Supplemental HPGe readings obtained during Precertification Phase 1 (those collected in areas inaccessible to the mobile NaI detectors) will be identified as *A9P2-P1-reading #QC-G*, where:

A9P2	=	The remediation area in which the reading was collected. For data management purposes a numerical "2" is used in place of the Roman numeral II
P1	=	Phase 1 of Precertification
reading #	=	Reading number; 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, A9P2-P1-4-G is the fourth HPGe reading obtained A9PII during Phase 1 of precertification. 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 *A9P2-P2-reading# QC-G*, where:

A9P2	=	the remediation area in which the reading was collected (again, a numerical "2" is used in place of the Roman numeral II for data management purposes).
P2	=	Phase 2 of Precertification
reading #	=	sequential reading number; 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, A9P2-P2-1-G is the first HPGe reading obtained in A9PII, collected at a detector height of 31 cm, during Phase 2 of precertification. A9P2-P2-1D-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, "HS" (for hot spot delineation) will be used instead of "P2." For example, the fourth hot spot delineation reading in A9PII would be identified as A9P2-HS-4-G.

Radon measurements will be identified as *A9P2-RADON-reading #*, where:

A9P2	=	The remediation area in which the reading was collected (again, a numerical "2" is used in place of the roman numeral "II" for data management purposes)
RADON	=	Radon measurement
reading #	=	Sequential reading number

2.5 SURFACE SOIL MOISTURE GAUGE MEASUREMENTS

The Zeltex® Infrared Moisture Meter will be used to obtain soil moisture content measurements. Instrument operation is explained in the equipment manuals. These measurements will be used to correct the real-time data so the readings are representative of environmental conditions. At least two surface moisture measurements per acre will be obtained where the mobile NaI detectors are used. When the HPGe is used, a surface moisture measurement will be obtained for each HPGe reading. All surface

moisture measurements will be collected the same day as collecting the real-time measurements, but before environmental conditions change (e.g., rain).

2.6 BACKGROUND RADON MONITORING

A background radon monitor will be used during the collection of Phase 2 HPGe measurements if radium-226 hot spots are being evaluated. The monitor will be operated during the entire time period of Phase 2 measurements, and it will be set at the same height as the HPGe detector used to collect the radium-226 measurements. The background radon data will be used to correct the radium-226 data per the User's Manual.

2.7 PHYSICAL SAMPLES

No physical samples are planned under this PSP but may be collected, if necessary, to verify HPGe readings and/or to confirm or delineate anomalies identified by RTIMP. If physical samples are collected, the locations, depths, sample numbers, collection methods, analytical requirements and QC requirements will be identified by the Characterization Manager or designee and documented with a V/FCN. The V/FCN will be submitted to the EPA for approval. The collection of physical samples will follow the data quality objectives identified in DQO SL-048.

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

Precertification Phase	Equipment Used	ASL	Detector Configuration
Phase 1 – Scanning	RSS or Gator	A	Speed = 1 mph, Acquisition Time = 4 seconds
	HPGe[a]	A	Height = 1 m, Acquisition Time = 5 minutes
Phase 2 – Hot Spot Confirmation and Delineation	HPGe	B	Height = 31 cm, Acquisition Time = 5 minutes
Phase 3 (if necessary) – Verification of Hot Spot Removal	HPGe	B	Height = 31 cm, Acquisition Time = 5 minutes

ASL – analytical support level

[a] The HPGe will only be used during Phase 1 if areas are inaccessible to the mobile NaI detectors.

TABLE 2-2
TARGET ANALYTE LIST FOR
A9PII PRECERTIFICATION HPGe SCANNING
TAL A9P2-PRECERT-A

HPGe Detector		
1	ASL B*	Total Uranium (FRL = 50 mg/kg)
2	ASL B*	Thorium-228 (FRL = 1.5 pCi/g)**
3	ASL B*	Thorium-232 (FRL = 1.4 pCi/g)
4	ASL B*	Radium-226 (FRL = 1.5 pCi/g)
5	ASL B*	Radium-228 (FRL = 1.4 pCi/g)**

mg/kg – milligrams per kilogram
pCi/g – picoCuries per gram

* 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.

** Not measured directly; assumed to be in secular equilibrium with thorium-232

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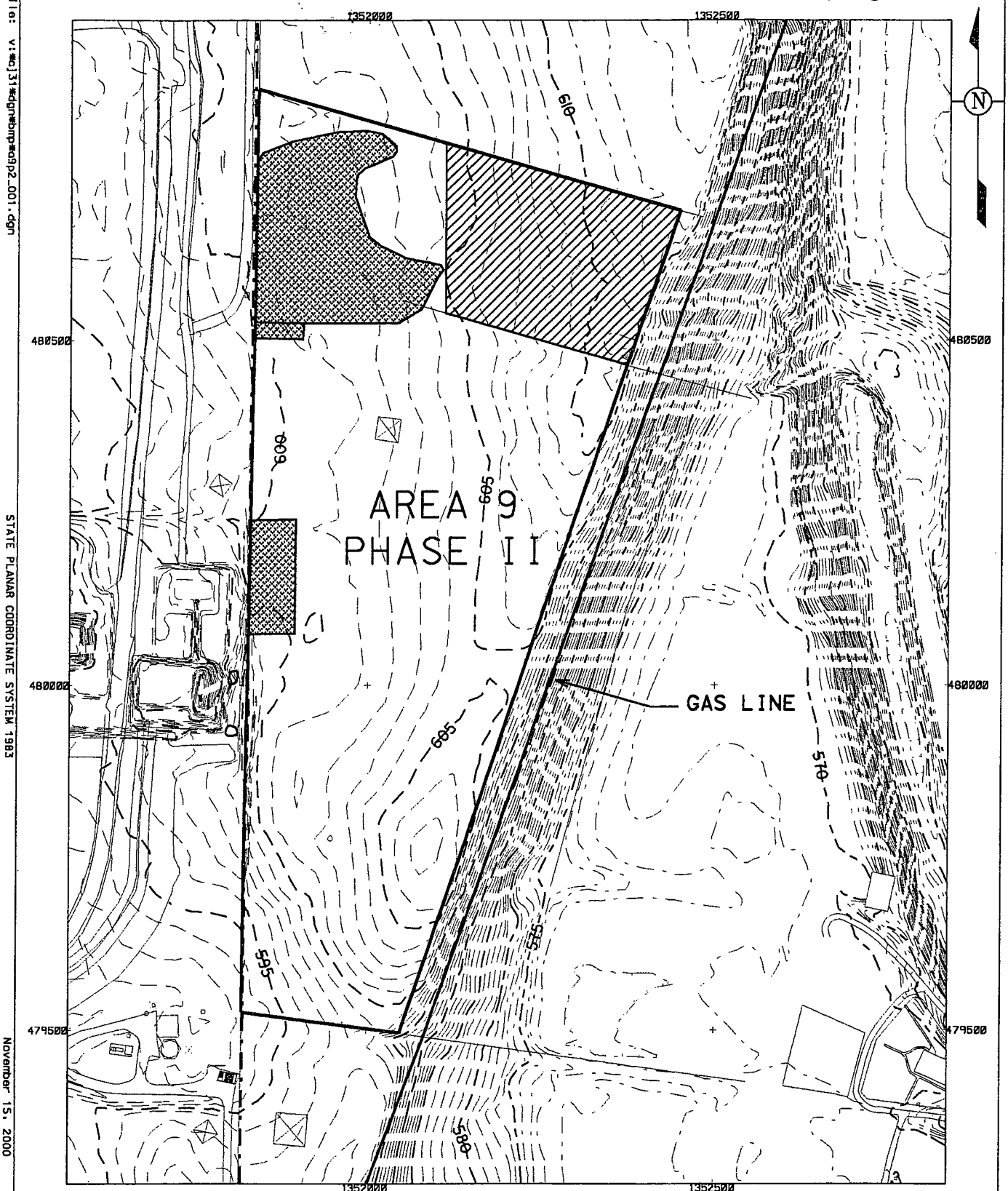

FIGURE 2-1. A9PII AREAS INACCESSIBLE TO NaI

3.0 QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

3.1 REAL-TIME QUALITY CONTROL MEASUREMENTS

In accordance with DQO SL-054, Revision 0 (Appendix A), all Precertification Phase 1 mobile NaI and HPGe 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 per day or one every 20 ASL B measurements, whichever is more frequent.

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 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 assessments 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/QC 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/QC must receive the completed V/FCN, with the signatures of the Project Manager, Characterization Manager and the QA/QC Representative, within seven working days of granting approval. Any field changes that may impact the safety of the field team will also be approved by Health and Safety.

3.4 APPLICABLE PROCEDURES, MANUALS AND DOCUMENTS

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

- RTIMP-M-001, Administrative Manual
- RTIMP-M-002, Field Manual
- RM-0020, Radiological Control Requirements Manual
- RM-0021, Safety Performance Requirements Manual
- SH-1006, Event Investigation and Reporting
- SMPL-01, Solids Sampling
- FD-1000, Sitewide CERCLA Quality Assurance Project Plan (SCQ)
- Sitewide Excavation Plan (SEP)
- User Guidelines, Measurement Strategies, and Operational Factors for Deployment of *In-Situ* Gamma Spectrometry at the Fernald Site (User's Manual)

4.0 HEALTH AND SAFETY

Technicians will schedule a project walk down with Health and Safety (Radiological Control, Industrial Hygiene, and Safety) and any other groups that may be working in the same or an adjacent area before the start of the project. Weekly walk downs will be conducted throughout the course of the project in accordance with SPR 1-10, Safety Walk-Throughs. All work on this project will be performed according to applicable Environmental Monitoring procedures, the documents identified in Section 3.4, Fluor Fernald work permit, Radiological Work Permit, and other applicable permits as determined by project management. Concurrence with applicable safety permits is required by each technician in the performance of their assigned duties. A job/safety briefing will be conducted before field activities begin each day; the project lead or designee will document the briefing on form FS-F-2955. Personnel will also be briefed on any health and safety documents (such as Travelers) that may apply to the project work scope.

Technicians will be provided with 2-way radios or cell phones for all remote locations. The Technician or designee will have direct radio communication with Fluor Fernald Communication. This communication will be provided by FEMP site radios or cell phones. This will ensure timely notification of site emergencies and severe weather.

- To report emergencies by site phone, dial 6511.
- To report by cellular phone, dial 648-6511 and ask for CONTROL.
- To report by Radio call "CONTROL".

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 RTIMP field worksheet with sufficient detail to enable a situation to be reconstructed without reliance on memory. Field worksheets will be kept on file for review by the Characterization Manager.

Per the User's Manual and the RTIMP Field Manual, 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 versions of these checklists can be found on 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. The RTIMP group will review electronic data for completeness and accuracy before downloading it onto the LAN. Once complete, the data will be sent to the loader where it will be loaded onto the 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. The RTIMP group will archive all downloaded data for future reference.

Field documentation, such as the field worksheets and moisture worksheet will undergo an internal QA/QC review by the RTIMP group. Field worksheets 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.

The RTIMP group will provide the Characterization Manager with maps displaying the precertification results for total activity, total uranium, radium-226, and thorium-232 HPGe readings. Maps will be produced for all Phase 1, 2 and 3 measurements. The data files for these results will be forwarded electronically to the Characterization Manager for inclusion in the CDL. All Mobile NaI data and the Phase 1 HPGe data will be considered ASL A. The Phase 2 and Phase 3 HPGe data will be considered ASL B.

APPENDIX A

DATA QUALITY OBJECTIVES SL-054, Rev. 0

4764

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.

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,A ☐ 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.