PROJECT SPECIFIC PLAN FOR CERTIFICATION SAMPLING OF AREA 1, PHASE III PART TWO

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 CERTIFICATION SAMPLING OF AREA 1, PHASE III PART TWO

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FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

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LIST OF ACRONYMS AND ABBREVIATIONS

A1PI	Area 1, Phase I
A1PIII	Area 1, Phase III
APM	Area Project Manager
ASCOC	area-specific constituent of concern
ASL	analytical support level
BTV	benchmark toxicity value
CDL	Certification Design Letter
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CLP	Contract Laboratory Program
CU	certification unit
DQO	Data Quality Objectives
FACTS	Fernald Analytical Customer Tracking System
FAL	Field Activity Log
FEMP	Fernald Environmental Management Project
FRL	final remediation level
FTF	Fire Training Facility
GC/MS	gas chromatograph/mass spectrograph
GIS	Geographical Information System
GPS	Global Positioning System
HAMDC	highest allowable minimum detection concentration
ICP-AES	inductively coupled plasma/atomic emission spectroscopy
LAN	Local Area Network
MDC	minimum detection concentration
mg/kg	milligrams per kilogram
ml	milliliter
OSDf	On-Site Disposal Facility
PAH	polyaromatic hydrocarbon
PCB	polychlorinated biphenyl
pCi/g	picoCuries per gram
PSP	Project Specific Plan
QA/QC	Quality Assurance/Quality Control
RWP	Radiological Work Permit
SCQ	Sitewide CERCLA Quality Assurance Project Plan
SED	Sitewide Environmental Database
SEP	Sitewide Excavation Plan
SPL	Sample Processing Laboratory
TAL	Target Analyte List
V/FCN	Variance/Field Change Notice
WAO	Waste Acceptance Operations

1.0 INTRODUCTION

1.1 PURPOSE

This Project Specific Plan (PSP) describes the certification sampling and analysis necessary to certify Area 1, Phase III (A1PIII) Part Two. Certification demonstrates that risk-based, area-specific constituents of concern (ASCOCs) meet final remediation levels (FRLs).

A1PIII Part Two consists of approximately 6 acres bordered by Area 1, Phase I (A1PI) to the north and east and by the north rail yard and the Fire Training Facility (FTF) to the south and west. The area consists mostly of a flat section excavated in 1996 to provide material during the construction of the rail yard. The area also includes a roadway to the north that goes from the FTF to the On-Site Disposal Facility (OSDF) and a ditch along the roadway on the southern boundary of A1PI. A small, wooded area approximately 100 feet by 250 feet north of the FTF is also included in A1PIII Part Two.

1.2 SCOPE

This PSP covers all physical sampling associated with A1PIII Part Two certification. The certification design is consistent with the Certification Design Letter (CDL) for A1PIII Part Two. All sampling and analysis activities will be as consistent with the Sitewide Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Quality Assurance Project Plan (SCQ), Section 3.4 of the Sitewide Excavation Plan (SEP), and Data Quality Objectives (DQO) SL-052, Revision 3. DQO SL-052 is included as Appendix A of this PSP.

1.3 KEY PERSONNEL

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

1
2
3

TABLE 1-1
KEY PERSONNEL

Title	Primary	Alternate
DOE Contact	Robert Janke	Kathi Nickel
Area Project Manager	Tom Crawford	Jyh-Dong Chiou
Characterization Lead	Mike Rolfes	Jenny Vance
Field Sampling Lead	Tom Buhrlage	Jim Hey
Surveying Lead	Jim Schwing	Jim Capannari
Waste Acceptance Operations (WAO) Contact	Linda Barlow	Lawrence Love
Laboratory Contact	Audrey Hannum	Chuck White
Data Validation Contact	Jim Chambers	Jim Cross
Data Management Contact	Jenny Vance	Deanna Diallo
Quality Assurance Contact	Reinhard Friske	Mary Eleton
FACTS/SED Database Management Contact	Cara Sue Schaefer	Krista Blades
Health and Safety Contact	Debra Grant	Jeff Middaugh/ Phillip Thomas

2.0 CERTIFICATION SAMPLING PROGRAM

2.1 CERTIFICATION DESIGN

Details and logic of the certification design for the A1PIII Part Two are described in the A1PIII Part Two CDL. The certification design and sampling strategy follows Section 3.4 of the SEP. Two Group 1 CUs (which can be as large as 62,500 square feet) and one Group 2 CU (which can be as large as 250,000 square feet) are identified and depicted in Figure 2-1. The A1PIII Part Two CDL certification units (CUs) consist of the following:

- One CU for the areas adjacent to the FTF including a wooded area and a section of road to the north and an excavated area to the east (A1P3P2-C-01)
- One CU for the remainder of the roadway and the ditch at the boundary with A1PI (A1P3P2-C-02)
- One CU for the area excavated during rail yard construction (A1P3P2-C-03).

2.2 CU SAMPLING

Certification sampling consists of the collection of randomly selected physical soil samples within each CU per Section 3.4.2.1 in the SEP. In order to determine which samples to analyze while still providing sufficient area coverage, each CU is divided into quadrants, with each quadrant containing four sample locations. Three of the four locations from each quadrant are then randomly selected for collection and analysis, resulting in a total of 12 locations analyzed per CU. The 12 locations to be sampled for each CU are identified in Appendix B.

Appendix B includes a list of archive samples. The archive sample locations will be placed in the field, but samples will not be collected unless analysis is needed. If archived samples are to be collected and analyzed, a Variance/Field Change Notice (V/FCN) will be generated to document the request. Figure 2-2 and Appendix B list all the samples per CU including coordinates and analytical disposition. See Table 3-1 for Target Analyte List (TAL) parameters.

2.3 SURVEYING

The NAD83 State Planar coordinates have been determined for each sample location listed in Appendix B. Before collection, sample locations will be identified and flagged using standard land surveying methods. The elevation of the sample surface will be collected during placement of the

sample flag. If surface features prevent collection of soil samples at the planned location, the sample location may be field adjusted to accommodate safe and reasonable sample locations but may not cross CU boundaries. Any sample location moved more than 3 feet from the planned location must be approved by the regulatory agencies and documented in a V/FCN.

2.4 PHYSICAL SOIL SAMPLE COLLECTION

All soil samples will be collected using a 3-inch by 6-inch long diameter plastic or stainless steel liner and will be sealed using plastic end caps, as identified in procedure SMPL-01. A variety of sampling equipment and methods may be utilized for sampling locations depending on the surface conditions. More specifically, the surface soil sampling locations in areas covered by grass will be sampled using a 3-inch diameter plastic or stainless steel liner or hand auger. For surface soil sample locations in any gravel areas, either a Geoprobe® core sampler (Macro-core tool) or hand auger will be used to penetrate the gravel to reach the original surface soil. At the discretion of the Field Sampling Lead, samples may be collected using other methods with concurrence from the Characterization Lead as specified in SMPL-01.

Before collecting the soil cores, the field sampling technician will remove all surface vegetation within a 6-inch radius of the points to be sampled using a blue nitrile glove or stainless steel trowel, taking care not to remove any of the surface soil. Regardless of the sample collection apparatus, the surface soil samples will be collected from the 0 to 6-inch interval at each location.

Sample points 6, 7, and 8 in CU A1P3P2-C-01and 3, 4, 5A, 6, 8, 10, 11A, 14 AND 15D in CU A1P3P2-C-02 are located within the footprint of a gravel road. At these locations, a 4-foot boring will be collected. The entire length of the core will be surveyed, in 6-inch intervals, using a beta/gamma (Geiger-Mueller) frisker. All beta/gamma frisker measurements will be recorded on the Field Activity Log (FAL). If no intervals exhibit greater than background beta/gamma measurements, the certification sample will be collected from the top 6-inch interval of the undisturbed, native soil below the gravel/asphalt base. If an interval of soil exhibits greater than background beta/gamma measurements, that particular interval will supersede the original certification sample interval. A geologist will determine where the undisturbed, native soil layer begins.

For duplicate samples to meet the quality control requirements, twice the sample volume will be collected at those sample locations (identified in Appendix B). These duplicate soil samples will be collocated within a 1-foot radius and not composited. All samples, including duplicates, will be assigned a unique sample identification number as identified in Section 2.3.2 and Appendix B.

If surface or subsurface obstacles prevent sample collection at any of the original locations identified in Appendix B, the location may be moved up to 3 feet in radius from the original location. The distance and direction moved will be noted on the FAL. If any certification sampling location is moved, it must remain within the boundary of the same sub-CU. Customer sample numbers and Fernald Analytical Customer Tracking System (FACTS) identification numbers will be assigned to all samples collected. The sample labels will be completed with sample collection information, and technicians will complete a FAL, Sample Collection Log, and Chain of Custody/Request for Analysis; this documentation is to be completed in the field prior to submitting the samples.

All samples collected from one CU (including duplicate samples) will be batched and submitted to the Sample Processing Laboratory (SPL) on one Chain of Custody form as one analytical release. Water Quality Control (QC) samples will be listed on a separate Chain of Custody. If collected, archive samples (see Appendix B) will be kept under the Chain of Custody of the field crew and will not be submitted to the SPL unless directed in a V/FCN. Upon completion of sample collection, boreholes will be collapsed.

2.4.1 Equipment Decontamination

Decontamination is performed to protect worker health and safety and to prevent the introduction of contaminants from sampling equipment to subsequent soil samples. Field technicians will ensure that sampling equipment has been decontaminated prior to transport to the field sampling site. Decontamination is only necessary in the field when sampling equipment is reused. Push tubes and core tube end caps require decontamination prior to use. If an alternate sampling method is used, equipment will be decontaminated between collection of sample intervals and again after the sampling performed under this PSP is completed. Equipment that comes into contact with the sample will be decontaminated at Level II (Section K.11 of the SCQ) in the field. Clean disposable wipes may be used to replace air drying of the equipment.

2.4.2 Certification Physical Sample Identification

Each certification soil sample will be assigned a unique sample identification code, as follows:

A1P3P2-C-CU-Location-Suite-QC, where:

A1P3P2	=	Sample collected from A1PIII, Part Two (Note that the number "3" is used in place of the roman numeral "III" in the ID number for data management purposes)
C	=	Certification Sample
CU	=	Certification unit
Location	=	Sample location number within each CU (1 through 16)
Suite	=	"R" for radiological "M" for metals "RM" for radiological and metals "L" for volatiles "P" for polychlorinated biphenyls (PCBs) "S" for polyaromatic hydrocarbons (PAHs) "PS" for PCBs and PAHs "V" for archive
QC	=	Quality control sample, if applicable. A "D" indicates a duplicate sample, "X" indicates a rinsate, "Y" indicates a container blank sample.

Therefore, a duplicate sample taken from the 15th sample location from within CU-01 and analyzed for metals and radiological constituents would be identified as A1P3P2-C-01-15-RM-D.

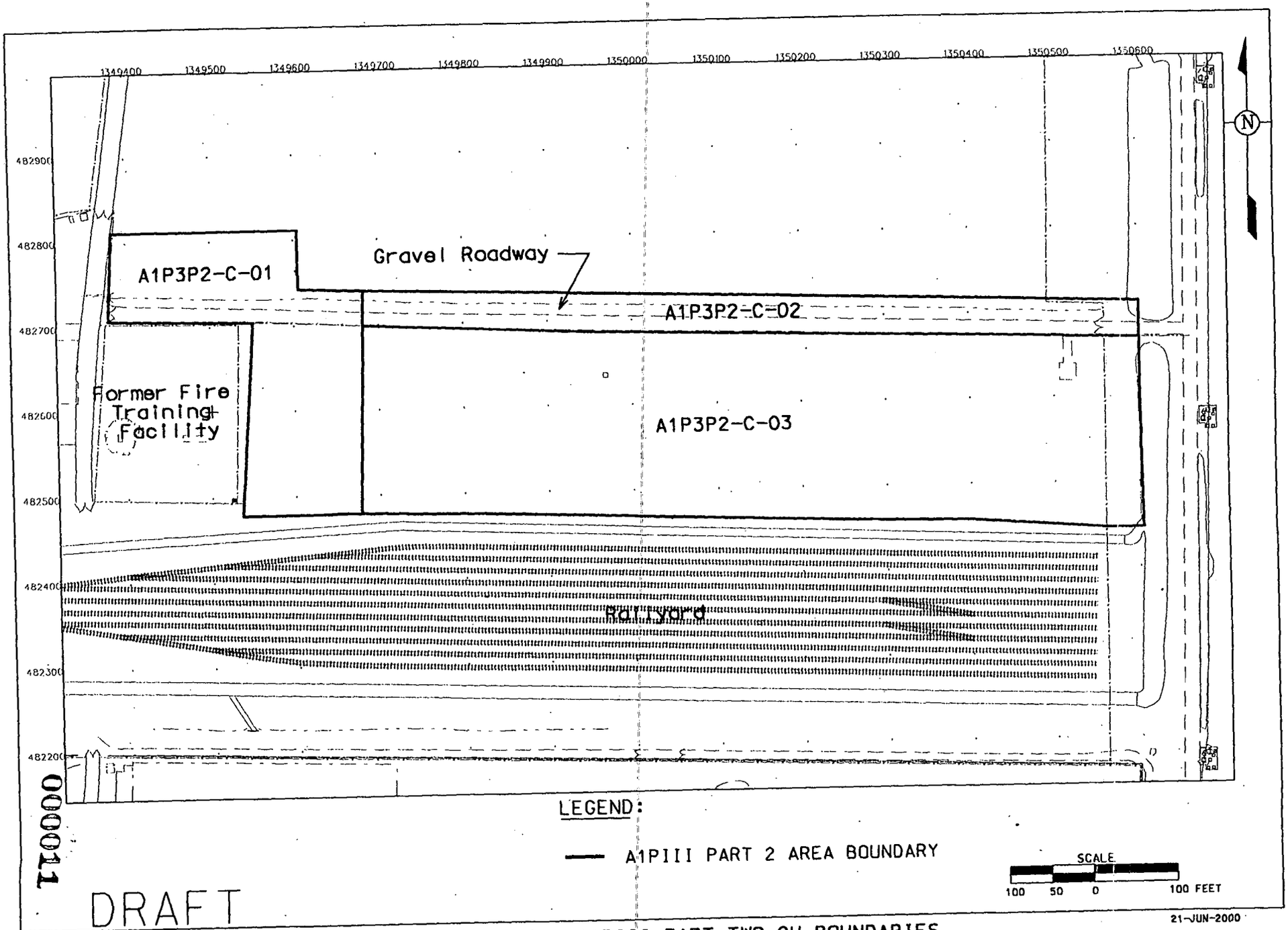
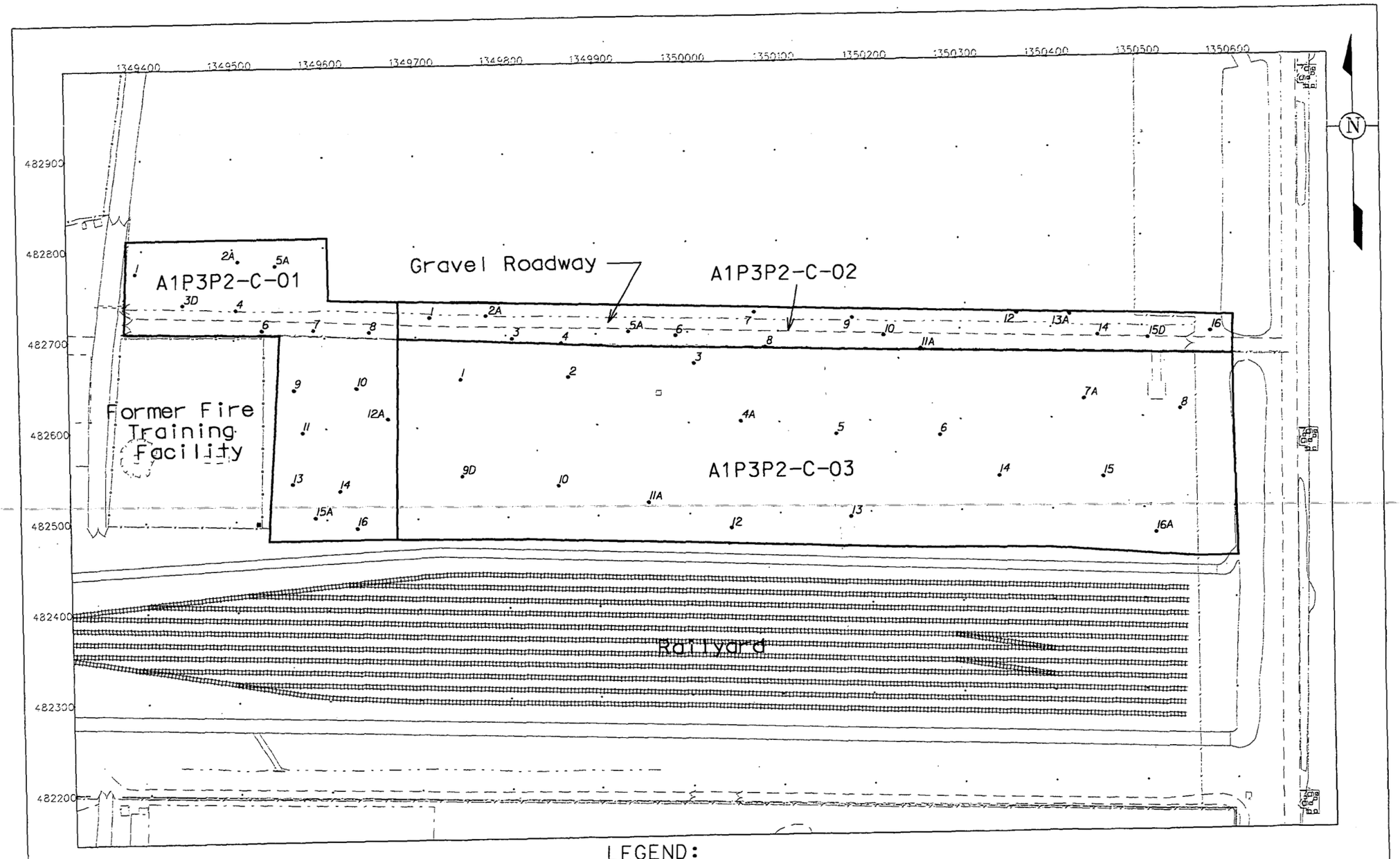


FIGURE 2-1. A1PIII PART TWO CU BOUNDARIES



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STATE PLANAR COORDINATE SYSTEM 1983

FIGURE 2-2. A1PIII PART TWO SAMPLE LOCATIONS

3.0 CERTIFICATION SAMPLE ANALYSIS

The necessary volume of all samples collected will be prepared for the appropriate analytical method per requirements of the SCQ. Sampling and analytical requirements are listed in Table 3-1. The TAL is shown in Table 3-2. All three CU samples will be analyzed for the primary radionuclides (TAL A). Samples for CU A1P3P2-C-01 will be analyzed for the primary radionuclides, along with aroclor-1254, aroclor-1260, arsenic, beryllium, and PAHs (TAL B) due to its proximity to the FTF. Analysis for gross alpha and gross beta will also be performed for samples from CU A1P3P2-C-01 for shipping purposes only.

If the Area Project Manager (APM) decides to analyze samples subject to methods not described in the SCQ, the APM shall ensure that:

- A variance is issued to include references confirming that the new method is sufficient to support data needs
- Variations from the SCQ methodology are documented in the PSP, or
- The APM may request data validation for affected samples or communicate to the lab that Data Qualifier Codes of J and R be attached to detected and non-detected constituents of concern, respectively.

TABLE 3-1
SAMPLING AND ANALYTICAL REQUIREMENTS

Analyte	Method	Sample Matrix	Lab	ASL	Preserve	Holding Time	Container	Sample Mass
Total Uranium, Radium-226, Radium-228, Thorium-228, Thorium-232	Gamma Spectroscopy	Solid	On-site	E[a]	None	12 months	Plastic or stainless steel core liner or glass or polyethylene sample container[b]	250 grams
Gross Alpha/ Gross Beta	Alpha/Beta Scan	Solid	On-site	E[a]	None	12 months	Plastic or stainless steel core liner or glass or polyethylene sample container[b]	50 grams
Arsenic, Beryllium	ICP or ICP/MS	Solid	On-site	D	Cool, 4°C	6 months	Plastic core liner or glass or polyethylene sample container[b]	50 grams
PCBs	GC	Solid	Off-site	D	Cool, 4°C	14 days	500 glass with teflon lined cap[d]	100 g
PAHs	GC	Solid	Off-site	D	Cool, 4°C	14 days	500 glass with teflon lined cap[d]	100 g
Total Uranium, Radium-226, Radium-228, Thorium-228, Thorium-232	Alpha or Gamma Spectroscopy	Liquid (rinsate/ container blank)	On-site	E[a]	HNO_3 to pH<2	6 months	1 liter polyethylene	8 liters
Arsenic, Beryllium	ICP or ICP/MS	Liquid	On-site	D	Cool 4°C HNO_3 to pH<2	6 months	500 ml polyethylene[c]	500 ml
PCBs	GC	Liquid	Off-site	D	Cool, 4°C	7 days	2 x 1 liter amber glass with teflon-lined cap	1 liter
PAHs	GC/MS	Liquid	Off-site	D	Cool, 4°C	7 days	2 x 1 liter amber glass with teflon-lined cap	1 liter

[a] The SCQ highest allowable minimum detectable concentration (HAMDC) for total uranium, thorium-228, and thorium-232 by gamma spectroscopy at Analytical Support Level (ASL) D is more stringent the minimum detectable concentration (MDC) needed for this certification. The MDC needed for this certification event is 10 percent of the FRL. Thus, the data deliverable for total uranium, thorium-228, and thorium-232 analysis by gamma spectroscopy will be identical in specifications for ASL D except for the HAMDC. As a result, the total uranium, thorium-228, and thorium-232 gamma spectroscopy data are considered ASL E.

[b] Radiological and metals samples may be combined and submitted in the same container, however, soil samples for metals analysis can not be submitted in stainless steel liners. The SCQ specifies glass containers with teflon lined caps; however, polyethylene containers may also be used as allowed by Contract Laboratory Program (CLP) procedure ILMO4.0.

[c] The SCQ specifies collection of 1-liter samples for metals analysis; however, this volume is adequate for field QC since laboratory QC is not required.

[d] PAH and PCB samples may be submitted in the same container, provided that the minimum sample mass is achieved for each analysis.

TABLE 3-2
A1PIII PART TWO CERTIFICATION SAMPLING
TARGET ANALYTE LIST

TAL 20720-PSP-0002-A
Gamma Spectroscopy Method
(ASL D, E*)

Analyte	FRL Limit	MDC
Total Uranium	82 mg/kg	8 mg/kg
Thorium-228	1.7 pCi/g	.17 pCi/g
Thorium-232	1.5 pCi/g	.15 pCi/g
Radium-226	1.7pCi/g	.17 pCi/g
Radium-228	1.8 pCi/g	.18 pCi/g

MDC – minimum detection concentration

TAL 20720-PSP-0002-B
ICP-AES
(ASL D)

Analyte	FRL Limit	MDC
Arsenic	12 mg/kg	3.44 mg/kg
Beryllium	1.5 mg/kg	0.15 mg/kg

ICP-AES – inductively coupled plasma-atomic emission spectroscopy

TAL 20720-PSP-0002-C
GC/MS
(ASL D)

Analyte	BTV LIMIT	MDC
Benzo(a)pyrene	1 mg/kg	0.1 mg/kg
Benzo(b)fluoranthene	1 mg/kg	0.1 mg/kg
Benzo(a)anthracene	1 mg/kg	0.1 mg/kg
Benzo(g,h,i)perylene	1 mg/kg	0.1 mg/kg
Benzo(k)fluoranthene	1 mg/kg	0.1 mg/kg
Fluoranthene	10 mg/kg	1.0 mg/kg
Phenanthrene	5 mg/kg	0.5 mg/kg
Dibenzo(a,h)anthracene	0.088 mg/kg	0.009 mg/kg
Indeno(1,2,3-cd)pyrene	1 mg/kg	0.1 mg/kg
Pyrene	10 mg/kg	1.0 mg/kg
Chrysene	1 mg/kg	0.1 mg/kg

GC – gas chromatograph

TAL 20720-PSP-0002-D
GC
(ASL D)

Analyte	FRL Limit	MDC
Aroclor-1254	0.13 mg/kg	0.033 mg/kg
Aroclor-1260	0.13 mg/kg	0.033 mg/kg

TAL 20720-PSP-0002-E
Alpha/Beta Scan
(ASL D)

Analyte	MDC
Gross Alpha	NA
Gross Beta	NA

BTV – Benchmark Toxicity Value

* The SCQ HAMDC for total uranium, thorium-228, and thorium-232 by gamma spectroscopy at ASL D is more stringent the MDC needed for this certification. The MDC needed for this certification event is 10 percent of the FRL. Thus, the data deliverable for total uranium, thorium-228, and thorium-232 analysis by gamma spectroscopy will be identical in specifications for ASL D except for the HAMDC. As a result, the total uranium, thorium-228, and thorium-232 gamma spectroscopy data are considered ASL E.

4.0 QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

4.1 FIELD QUALITY CONTROL SAMPLES, ANALYTICAL REQUIREMENTS AND DATA VALIDATION

The field quality control, analytical, and data validation requirements are as follows:

- Field quality control requirements include one duplicate for each CU, as noted in Appendix B and further described in Section 2.4. Two container blanks will be collected - one before sample collection begins and one at the conclusion of sample collection - for the push tubes and end caps. If an alternate sample collection method is used, one rinsate sample will be collected at a minimum frequency of one per 20 certification samples where reusable equipment (e.g., hand augers) is used for collection. Container blanks will be analyzed per TALs A and B. Duplicate field QC samples will be analyzed per the TALs listed in Appendix B. Rinsates will be analyzed for the TALs requested for the associated borings.

- All analyses will be performed at ASL D except for total uranium, thorium-228 and thorium-232. The analytical package for total uranium, thorium-228 and thorium-232 analysis by gamma spectroscopy will be identical in specifications for ASL D except for the HAMDC. As a result, the total uranium, thorium-228 and thorium-232 gamma spectroscopy data are considered ASL E.

- All field data will be validated. An ASL D analytical package will be provided for ten percent of the samples at a minimum and an ASL B package for 90 percent or less of the samples. At a minimum, 10 percent of the analytical data will be validated to ASL D and ninety percent to ASL B. This will be obtained by validating CU A1P3P2-C-01 to ASL D. If any result is rejected, all data from the laboratory with the rejected result will then be validated to determine the integrity of the results from that laboratory. This change will be documented in a variance to this PSP.

Once all data are validated as required, results will be entered into the Sitewide Environmental Database (SED) and a statistical analysis will be performed to evaluate the pass/fail criteria for the each CU. The statistical approach is discussed in Section 3.4.3 and Appendix G of the SEP. This work is being performed per the requirements as stated in DQO SL-052 (Appendix A).

4.2 PROJECT-SPECIFIC PROCEDURES, DOCUMENTS AND MANUALS

To ensure consistency and data integrity, field activities in support of the PSP will follow the requirements and responsibilities outlined in the procedures and guidance documents referenced below.

- ADM-02, Field Project Prerequisites
- EQT-33, Real Time Differential Global Positioning System Operation
- Sitewide CERCLA Quality Assurance Project Plan (SCQ)

- SMPL-01, Solids Sampling
- SMPL-21, Collection of Field Quality Control Samples
- S.P. 766-S-1000, Shipping Samples to Offsite Laboratories
- Trimble Pathfinder Pro-XL GPS Operation Manual
- Sitewide Excavation Plan (SEP)
- Certification Design Letter for Area 1, Phase III Part Two

4.3 INDEPENDENT ASSESSMENT

Independent assessment may be performed by the FEMP Quality Assurance (QA) organization by conducting a surveillance, consisting of monitoring/observing ongoing project activities and work areas to verify conformance to specified requirements. Surveillances will be planned and documented in accordance with Section 12.3 of the SCQ.

4.4 IMPLEMENTATION OF CHANGES

Before implementation changes, the Field Sampling Lead will be informed of the proposed changes. Once the Field Sampling Lead has obtained written or verbal approval (electronic mail is acceptable) from the APM, QA, and the Characterization Lead for the changes to the PSP, the changes may be implemented. Changes to the PSP will noted in the applicable field activity logs and on a V/FCN. QA must receive the completed V/FCN, which includes the signatures of the Characterization Lead, Sampling Manager, APM, and QA within seven working days of implementation of the change.

5.0 HEALTH AND SAFETY

Technicians will conform to precautionary surveys performed by personnel representing the Utility Engineer, Industrial Hygiene, and Radiological Control as applicable. All work performed on this project will be performed in accordance to applicable Environmental Monitoring project procedures, RM-0020 (Radiological Control Requirements Manual), RM-0021 (Safety Performance Requirements Manual), Fluor Fernald work permit, Radiological Work Permit (RWP), penetration permits, and other applicable permits. All personnel in the performance of their assigned duties require concurrence with applicable safety permits. 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.

6.0 DATA MANAGEMENT

A data management process will be implemented to collect and manage certification information collected during the investigation. As specified in Section 5.1 of the SCQ, daily activities will be recorded on the FAL, with sufficient detail to be able to reconstruct a particular situation without reliance on memory. Sample Collection Logs will be completed according to procedure ADM-02.

Electronically recorded data from the Geodimeter or Global Positioning System (GPS) will be downloaded to disks on a daily basis unless otherwise instructed. Survey team members will review the data for completeness and accuracy and then download it onto the Local Area Network (LAN). The Data Management Contact will perform an evaluation of the coordinate data to ensure completeness of the survey data. The data will then be made available to users through both the Geographical Information System (GIS) and the SED. Survey field team members will retain all downloaded data on disk for future reference and archive.

Field documentation, such as the FAL, Geodimeter Survey Files, the Sample Collection Log, and the Sample Request/Sample Analysis Chain of Custody Log will undergo an internal QA/QC review by the field team members. 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. The paper-generated data will be sent to data entry personnel for input into the SED. Field logs may be completed in the field and uniquely numbered and maintained in loose-leaf form. The QA validation team will validate field packages.

Analytical data from on-site and/or off-site laboratories will be reported in preliminary form to the Characterization Lead on at least a weekly basis. This will be done by the laboratory contact as soon as the data are available in the FACTS database. Following required validation of the data for each sample release, the data from that release will be reported to the Characterization Lead in a summary data report format. All analytical data will be entered into the SED with the appropriate qualifier.

All records associated with this PSP should reference the PSP number and eventually be forwarded to Engineering/Construction Document Control to be placed in the project file.

APPENDIX A

DATA QUALITY OBJECTIVES SL-052, REV. 3

Control Number _____

Fernald Environmental Management Project

Data Quality Objectives

Title: Sitewide Certification Sampling and Analysis

Number: SL-052

Revision: 3

Effective Date: March 13, 2000

Contact Name: Mike Rolfes

Approval: _____ Date: 3/13/00
James Chambers
DQO Coordinator

Approval: _____ Date: 3/13/00
J.D. Chiou
SCEP Project Director

Rev. #	0	1	2	3			
Effective Date:	4/28/99	6/10/99	2/3/00	3/13/00			

DATA QUALITY OBJECTIVES
Sitewide Certification Sampling and Analysis

Members of Data Quality Objectives (DQO) Scoping Team

The members of the scoping team included individuals with expertise in QA, analytical methods, field sampling, statistics, laboratory analytical methods and data management.

Conceptual Model of the Site

Soil sampling was conducted at the Fernald Environmental Management Project (FEMP) during the Operable Unit 5 (OU5) Remedial Investigation/Feasibility Study (RI/FS). Final Remediation Levels (FRLs) for constituents of concern (COCs), along with the extent of soil contaminated above the FRLs, were identified in the OU5 Record of Decision (ROD). Actual soil remediation activities now fall under the guidance of the final Sitewide Excavation Plan (SEP).

As outlined in the SEP, the FEMP has been divided into individual Remediation Areas (or phased areas within a Remediation Area) to sequentially carry out soil remedial activities. Under the strategy identified in the SEP, pre-design investigations are first conducted to better define the limits of soil excavation requirements. Following any necessary excavation, pre-certification real-time scanning activities are conducted to evaluate residual patterns of soil contamination. Pre-certification scan data should provide a level of assurance that the FRLs will be achieved. When pre-certification data indicate that remediation goals are likely to be met, they are used to define certification units (CUs) within the Remediation Area of interest. Table 2-9 of the final SEP identifies a list of area-specific COCs (ASCOCs) for each Remediation Area at the FEMP. Based on existing data and production knowledge, a subset of these ASCOCs are conservatively identified within each CU as potentially present in the CU. This suite of CU-specific COCs is the subset of the ASCOCs to be evaluated against the FRLs within that CU. At a minimum, the five primary radiological COCs (total uranium, radium-226, radium-228, thorium-228, thorium-232) will be retained as CU-specific COCs for certification of each CU.

Delineation and justification for the final CU boundaries, along with each corresponding suite of CU-specific ASCOCs is documented in a Certification Design Letter. Upon approval of the Certification Design Letter by the EPA, certification activities can begin. Section 3.4 of the final SEP presents the general certification strategy.

1.0 Statement of Problem

FEMP soil and potentially impacted adjacent off-property soil must be certified on a CU by CU basis for compliance with the FRLs of all CU-specific ASCOCs. The appropriate sampling, analytical and information management criteria must be developed to provide the required qualified data necessary to demonstrate attainment of certification statistical criteria. For every area undergoing certification, a sampling plan must be in place that will direct soil samples to be collected which are representative of the CU-specific COC concentrations within the framework of the certification approach identified in the final SEP. The appropriate analytical methodologies must be selected to provide the required data.

Exposure to Soil

The cleanup standards, or FRLs, were developed for a final site land use as an undeveloped park. Under this exposure scenario, receptors could be directly exposed to contaminated soil through dermal contact, external radiation, incidental ingestion, and/or inhalation of fugitive dust while visiting the park. Exposure to contaminated soil by the modeled receptor is expected to occur at random locations within the boundaries of the FEMP and would not be limited to any single area. Some soil FRLs were developed based on the modeled cross-media impact potential of soil contamination to the underlying aquifer. In these instances, potential exposure to contaminants would be indirect through the groundwater pathway, and not directly linked to soil exposure. Off-site soil FRLs were established at more conservative levels than the on-property soil FRLs, based on an agricultural receptor. Benchmark Toxicity Values (BTVs) are also being considered in the cleanup process by assessing habitat impact of individual BTVs under post-remedial conditions.

Available Resources

Time: Certification sampling will be accomplished by the field sampling team prior to interim or final regrading or release of soil for construction activities. The certification sampling schedule must allow sufficient time, in the event additional remediation is required, to demonstrate certification of FRLs prior to permanent construction or regrading. Certification sampling will have to be completed and analytical results validated and statistical analysis completed prior to submission of a Certification Report to the regulatory agencies.

Project Constraints: Certification sampling and analytical testing must be performed with existing manpower, materials and equipment to support the certification effort. Remediation areas are prioritized for certification sampling and analysis according to the date required for initiation of sequential construction activities in those areas. Fluor Daniel Fernald (FDF) and DOE must demonstrate post-remedial compliance with the CU-specific COC FRLs to release the designated Remediation Area for

planned interim grading, eventual restoration under the Natural Resources Restoration Plan (NRRP), and other final land use activities.

2.0 Identify the Decision

Decision

Demonstrate within each CU if all CU-specific COCs pass the certification criteria. These criteria are as follows: 1) The average concentration of each CU-specific COC is below the FRL and within the agreed upon confidence limits (95% for primary ASCOCs and 90% for secondary ASCOCs); and 2) the hot-spot criteria, that no result for any CU-specific COC is more than two times the associated soil FRL. The certification criteria are discussed in greater detail in Section 3.4.4 of the final SEP.

Possible Results

1. The average concentration of each CU-specific COC is demonstrated to be below the FRLs within the confidence level, with no single result for any CU-specific COC greater than two times the associated FRL. The CU can then be certified as attaining remediation goals.

2. The average concentration of at least one CU-specific COC is demonstrated to be above the FRL at the given confidence level. The CU will fail certification and require additional remedial action, per Section 3.4.5 of the final SEP.

3. If a result(s) of one or more CU-specific COC is demonstrated to be at or above two times the FRL, the CU will fail certification. The CU will fail certification and require additional remedial action per Section 3.4.5 of the final SEP. A combination of results 2 and 3 also constitutes certification failure.

3.0 Inputs That Affect the Decision

Required Information

Certification data will be obtained through physical soil sampling. Based on the certification analytical results, the average concentrations of each CU-specific COC with specified confidence levels will be calculated using the statistical methods identified in Appendix G of the final SEP.

Source of Information

Per the SEP, analysis of certification samples for each CU-specific COC will be conducted at analytical support level (ASL) D in accordance with methods and QA/QC standards in the FEMP Sitewide CERCLA Quality Assurance Project Plan [SCQ].

Contaminant-Specific Action Levels
The cleanup levels are the soil FRLs published in the OU5 and OU2 RODs. BTVs being considered in the remediation process are discussed for consideration during certification in Appendix C of the NRRP.

Methods of Sampling and Analysis
Physical soil samples will be collected in accordance with the applicable site sampling procedures. Per the SEP, laboratory analysis will be conducted at ASL D using QA/QC protocols specified in the SCQ. Full raw data deliverables will be required from the laboratory to allow for appropriate data validation. For FEMP-approved on- and off-site laboratories, the analytical method used will meet the required precision, accuracy and detection capabilities necessary to achieve FRL analyte ranges.

4.0 The Boundaries of the Situation

Spatial Boundaries
Domain of the Decision: The boundaries of this certification DQO extend to all surface, stockpile and fill soil in areas that are undergoing certification as part of FEMP remediation.

Population of Soil: Soil includes all excavated surfaces, undisturbed relatively unimpacted native soil, and sub-surface intervals (stockpile or fill areas only) in areas undergoing certification sampling and analysis.

Scale of Decision Making
Based on considerations of the final certification units and the COC evaluation process, the CU-specific COCs are determined. The area undergoing certification will be evaluated on a CU basis, based on physical sample results, as to whether it has passed or failed the criteria for attainment of certification (final SEP Section 3.4.4).

Temporal Boundaries
Time frame: Certification sampling must be performed in time to sequentially release certified areas for scheduled interim grading, restoration, and other final land use activities. Certification sampling data received from the laboratory will be validated and statistically evaluated. Certification results and findings will be documented in Certification Reports, which must be submitted to and approved by the regulatory agencies prior to release of the areas for scheduled interim grading, restoration, and other final land use activities.

Practical Considerations: Some areas undergoing remediation will not be accessible for certification sampling until decontamination/demolition and remedial excavation activities are complete. Other areas, such as wood lots, that are relatively uncontaminated and not planned for excavation, may require preparation, such as cutting of grass or removal of undergrowth prior to certification sampling, thus requiring coordination with FEMP Maintenance personnel.

5.0 Decision Rule

Successful certification of soil within the boundaries of a certification unit (CU) demonstrates that the certified soil (surface or subsurface) has concentrations of CU-specific COC(s) that meet the established criteria for attainment of Certification.

Parameters of Interest

The parameters of interest are the individual and average surface soil concentrations of CU-specific COCs and confidence limits on the calculated average within a CU. OU2 and OU5 ROD identify all applicable soil FRLs. The SEP identifies the ASCOCs, a subset of which will be used to establish CU-specific COCs within each Remediation Area undergoing certification sampling and analysis.

Action Levels

The applicable action levels are the on- and off-property soil FRLs published in the OU5 or OU2 ROD for each ASCOC.

Decision Rules

If the average concentration for each CU-specific COC is demonstrated to be below the FRLs within the agreed upon confidence level (95% for primary COCs; 90% for secondary COCs), and no analytical result exceeds two times the soil FRL, then the CU can be certified as complying with the cleanup criteria. If a CU does not meet the FRLs within the agreed upon confidence level for one or more CU-specific COCs, or one or more analytical results for one or more CU-specific COCs is greater than two times the associated soil FRL, then the CU fails certification and requires further assessment as per the SEP.

6.0 Limits on Decision Errors

Types of Decision Errors and Consequences

Definition

Decision Error 1: This decision error occurs when the decision maker decides that a CU has met the certification criteria, when in reality, the certification criteria have not been met. This situation could result in an increased risk to human health and the environment. In addition, this type of error could result in regulatory fees and penalties.

Decision Error 2: This decision error occurs when the decision maker decides a CU does not met the certification criteria, when actually, the certification criteria have been met. This error would result in unnecessary added costs due to the excavation of soil containing COC concentrations below their FRLs, and an increased volume of soil assigned to the OSDF. In addition, unnecessary delays in the remediation schedule may result.

True State of Nature for the Decision Errors

The true state of nature for Decision Error 1 is that the certification criteria are not met (average CU-specific COC concentrations not below the FRL within the specified confidence limits; or a single sample result above two times the FRL). The true state of nature for Decision Error 2 is that certification criteria are met (average CU-specific COC concentrations are below the FRL within the specified confidence limits, and no result is above two times the FRL). Decision Error 1 is the more severe error due to the potential threat this poses to human health and the environment.

Null Hypothesis

H_o: The average concentration of at least one CU-specific COC within a CU is equal to or greater than the associated FRL.

H_1: The average concentration of all CU-specific COCs within a CU is less than the action levels.

False Positive and False Negative Errors

A false positive is Decision Error 1: less than or equal to five percent ($p = .05$) is considered the acceptable decision error in determination of compliance with FRLs for primary ASCOCs, while ten percent ($p = .10$) is acceptable for secondary ASCOCs.

A false negative is Decision Error 2: less than or equal to 20 percent is considered the acceptable decision error. This decision error is controlled through the determination of sample sizes (see Section G.1.4.1 of the final SEP).

7.0 Design for Obtaining Quality Data

Section 3.4.2 of the final SEP presents the specifics of the certification sampling design. The following text describes the general certification sampling design.

Soil Sample Locations

In order to select certification sampling locations, each CU is divided into 16 approximately equal sub-CUs. Certification sample locations are then generated by randomly selecting an easting and northing coordinate within the boundaries of each cell. Additional alternative sample locations are also generated in case the original random sample location fails the minimum distance criterion. The minimum distance criterion is defined as the minimum distance allowed between random sample locations in order to eliminate the chance of random sample points clustering within a small area. This clustering would tend to over emphasize a small area and, conversely, under represent a large area in certification determination. By not allowing sample locations to be too closely arranged, the sample locations are spread out and provide a more uniform coverage, thus reducing the possibility of large unsampled areas. The equation for determining minimum distance criterion is presented in Section 3.4.2.1 of the SEP.

In the event that the original random sample location failed the minimum distance criterion, the first alternate location was selected and all the locations were retested. This process continued until all 16 random locations passed the minimum distance criteria.

Each CU is also divided into four quadrants, each of which contains 4 sub-CUs and 4 sample locations. Three of the four locations per quadrant (12 per CU) are then selected for sample collection and analysis. The other one per quadrant (4 per CU) are designated as "archives", and samples will not be collected and analyzed unless need arises due to analytical or validation problems warrant. Per Section 3.4.2 of the SEP, as few as 8 samples may be collected from Group 2 CUs for analysis of secondary COCs.

Physical Samples

Physical soil certification samples will be collected from the surface according to SMPL-01 at locations identified in the PSP (generally 12 of the 16 locations per CU).

If stockpiled soil is to be certified, two CUs will be established, on for the stockpile and one for the underlying soil (i.e., the "footprint"). To certify the stockpile, samples will be collected from predetermined random intervals from within the stockpiled soil at each certification sampling location identified in the PSP. To certify the footprint, the first 6-inches of native soil present at each sampling location will also be collected for certification. If fill soil is to be certified, the strategy (surface or sampling at depth) will be based on results from the precertification scan of the fill area(s), as discussed in the Certification Design Letter and the certification PSP.

Laboratory Analysis

As defined in the PSP, a minimum of 8 to 12 samples per CU will be submitted to the on-site laboratory or a FDF approved off-site laboratory for analysis. All certification analyses will meet ASL D requirements per the SCQ except for the HAMDC. Samples will be analyzed for all CU-specific ASCOCs, with minimum detection levels set according to the SCQ and applicable project guidelines.

Validation

All field data will be validated. Also, a minimum of 10 percent of the analytical data from each laboratory will be subject to analytical validation to ASL D requirements in the SCQ, and will require an ASL D package. The remaining analytical data will be validated to a minimum of ASL B, and will require an ASL B package.

8.0 Use of Data to Test Null Hypothesis

Appendix G of the final SEP discusses in detail, the statistical evaluations of certification data used to determine attainment of certification criteria.

Data Quality Objectives
Sitewide Certification Sampling and Analysis

1A. Task Description:

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

RI☐ FS☐ RD☐ RA☒ RvA☐ Other (specify) _____

1C. DQO No.: SL-052, Rev. 2 DQO Reference No.: _____

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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 Ananlytical Support Level (A-E): (Put an X in the appropriate Analytical Support Level selection(s) beside each applicable data use)

Site Characterization	Risk Assessment
A☐ B☐ C☐ D☐ E☐	A☐ B☐ C☐ D☐ E☐
Evaluation of Alternatives	Engineering Design
A☐ B☐ C☐ D☐ E☐	A☐ B☐ C☐ D☐ E☐
Monitoring During Remediation	Other
A☐ B☐ C☐ D☐ E☐	A☐ B☐ C☐ D☒ E☐

4A. Drivers: Remediation Area Remedial Action Work Plans, Applicable or Relevant and Appropriate Requirements (ARARs) and Operable Unit 2 and Operable Unit 5 Records of Decision (ROD), Sitewide Excavation Plan (SEP).

4B. Objective: Confirmation that remediation areas at the FEMP, or adjacent off-property areas, have met certification criteria on a CU by CU basis.

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5. Site Information (Description):

The OU2 and OU5 RODs have identified areas at the FEMP that require soil remediation activities. The RODs specify that the soil in these areas will be demonstrated to be below the FRLs. Certification is necessary for all FEMP soil and some adjacent off-property soil to demonstrate that the residual soil does not contain COC contamination exceeding the FRL at a specified confidence level.

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

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

* As identified in the area certification PSP

6.B. Equipment Selection and SCQ Reference:

	Equipment Selection	Refer to SCQ Section
ASL A	_____	SCQ Section _____
ASL B	_____	SCQ Section _____
ASL C	_____	SCQ Section _____
ASL D	Per SCQ and PSP	SCQ Section Appendix G, Tbls. 1&3
ASL E	Per PSP	SCQ Section Appendix H (final)

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

Biased☐ Composite☐ Grab☒ Environmental☐ Grid☐
Intrusive☒ Non-Intrusive☐ Phased☐ Source☐ Random☒*
*Systematic random samples, selected one per cell and meeting the minimum distance criterion

7B. Sample Work Plan Reference: Project Specific Plan for the associated Remediation area Remedial Action Work Plan

Background samples: OU5 RI

7C. Sample Collection Reference: Associated PSP(s), SMPL-01

8. Quality Control Samples: (Put an X in the appropriate selection.)

8A. Field Quality Control Samples:

Trip Blanks	⊠[1]	Container Blanks	⊠
Field Blanks	⊠[2]	Duplicate Samples	⊠
Equipment Rinsate Blanks	⊠	Split Samples	⊠[3]
Preservative Blanks	□	Performance Evaluation Samples	□

Other (specify) _____

1) Collected for volatile organic sampling
2) As noted in the PSP
3) Split samples will be taken where required by the EPA

8B. Laboratory Quality Control Samples:

Method Blank	⊠	Matrix Duplicate/Replicate	⊠
Matrix Spike	⊠	Surrogate Spikes	⊠
Tracer Spike	⊠	Other (specify) _____	

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

Sample density will be dependent upon the CU size (Group 1 [250'x250'] or Group 2 [500'x500']), as determined by historical and pre-certification scan data.

APPENDIX B

A1PIII PART TWO CU SAMPLES/COORDINATES/IDENTIFICATION

APPENDIX B
SAMPLE IDENTIFIERS AND LOCATIONS

Certification Unit	Location	Sample Identification	TAL	Northing	Easting
A1P3P2-C-01	1	A1P3P2-C-01-01-PS	C, D	482775	1349391
A1P3P2-C-01	1	A1P3P2-C-01-01-RM	A, B, E		
A1P3P2-C-01	2	A1P3P2-C-01-02-V	Archive	482786	1349505
A1P3P2-C-01	3	A1P3P2-C-01-03-PS-D	C, D	482739	1349443
A1P3P2-C-01	3	A1P3P2-C-01-03-RM-D	A, B, E		
A1P3P2-C-01	3	A1P3P2-C-01-03-PS	C, D	482739	1349443
A1P3P2-C-01	3	A1P3P2-C-01-03-RM	A, B, E		
A1P3P2-C-01	4	A1P3P2-C-01-04-PS	C, D	482733	1349502
A1P3P2-C-01	4	A1P3P2-C-01-04-RM	A, B, E		
A1P3P2-C-01	5	A1P3P2-C-01-05-V	Archive	482781	1349545
A1P3P2-C-01	6	A1P3P2-C-01-06-PS	C, D	482709	1349530
A1P3P2-C-01	6	A1P3P2-C-01-06-RM	A, B, E		
A1P3P2-C-01	7	A1P3P2-C-01-07-PS	C, D	482709	1349586
A1P3P2-C-01	7	A1P3P2-C-01-07-RM	A, B, E		
A1P3P2-C-01	8	A1P3P2-C-01-08-PS	C, D	482706	1349648
A1P3P2-C-01	8	A1P3P2-C-01-08-RM	A, B, E		
A1P3P2-C-01	9	A1P3P2-C-01-09-PS	C, D	482643	1349564
A1P3P2-C-01	9	A1P3P2-C-01-09-RM	A, B, E		
A1P3P2-C-01	10	A1P3P2-C-01-10-PS	C, D	482645	1349633
A1P3P2-C-01	10	A1P3P2-C-01-10-RM	A, B, E		
A1P3P2-C-01	11	A1P3P2-C-01-11-PS	C, D	482596	1349573
A1P3P2-C-01	11	A1P3P2-C-01-11-RM	A, B, E		
A1P3P2-C-01	12	A1P3P2-C-01-12-V	Archive	482610	1349667
A1P3P2-C-01	13	A1P3P2-C-01-13-PS	C, D	482540	1349561
A1P3P2-C-01	13	A1P3P2-C-01-13-RM	A, B, E		
A1P3P2-C-01	14	A1P3P2-C-01-14-PS	C, D	482531	1349613
A1P3P2-C-01	14	A1P3P2-C-01-14-RM	A, B, E		
A1P3P2-C-01	15	A1P3P2-C-01-15-V	Archive	482502	1349586
A1P3P2-C-01	16	A1P3P2-C-01-16-PS	C, D	482490	1349632
A1P3P2-C-01	16	A1P3P2-C-01-16-RM	A, B, E		
A1P3P2-C-02	1	A1P3P2-C-02-01-R	A	482721	1349715
A1P3P2-C-02	2	A1P3P2-C-02-02-V	Archive	482722	1349777
A1P3P2-C-02	3	A1P3P2-C-02-03-R	A	482696	1349806
A1P3P2-C-02	4	A1P3P2-C-02-04-R	A	482691	1349861
A1P3P2-C-02	5	A1P3P2-C-02-05-V	Archive	482702	1349934
A1P3P2-C-02	6	A1P3P2-C-02-06-R	A	482697	1349986
A1P3P2-C-02	7	A1P3P2-C-02-07-R	A	482721	1350073
A1P3P2-C-02	8	A1P3P2-C-02-08-R	A	482683	1350084
A1P3P2-C-02	9	A1P3P2-C-02-09-R	A	482714	1350181
A1P3P2-C-02	10	A1P3P2-C-02-10-R	A	482694	1350216
A1P3P2-C-02	11	A1P3P2-C-02-11-V	Archive	482679	1350256
A1P3P2-C-02	12	A1P3P2-C-02-12-R	A	482716	1350362
A1P3P2-C-02	13	A1P3P2-C-02-13-V	Archive	482714	1350420
A1P3P2-C-02	14	A1P3P2-C-02-14-R	A	482691	1350450
A1P3P2-C-02	15	A1P3P2-C-02-15-R-D	A	482687	1350505
A1P3P2-C-02	15	A1P3P2-C-02-15-R	A	482687	1350505

APPENDIX B
SAMPLE IDENTIFIERS AND LOCATIONS

Certification Unit	Location	Sample Identification	TAL	Northing	Easting
A1P3P2-C-02	16	A1P3P2-C-02-16-R	A	482694	1350576
A1P3P2-C-03	1	A1P3P2-C-03-01-R	A	482652	1349748
A1P3P2-C-03	2	A1P3P2-C-03-02-R	A	482653	1349868
A1P3P2-C-03	3	A1P3P2-C-03-03-R	A	482666	1350006
A1P3P2-C-03	4	A1P3P2-C-03-04-V	Archive	482602	1350057
A1P3P2-C-03	5	A1P3P2-C-03-05-R	A	482587	1350162
A1P3P2-C-03	6	A1P3P2-C-03-06-R	A	482583	1350276
A1P3P2-C-03	7	A1P3P2-C-03-07-V	Archive	482621	1350434
A1P3P2-C-03	8	A1P3P2-C-03-08-R	A	482608	1350541
A1P3P2-C-03	9	A1P3P2-C-03-09-R	A	482546	1349748
A1P3P2-C-03	9	A1P3P2-C-03-09-R-D	A	482546	1349748
A1P3P2-C-03	10	A1P3P2-C-03-10-R	A	482534	1349855
A1P3P2-C-03	11	A1P3P2-C-03-11-V	Archive	482513	1349954
A1P3P2-C-03	12	A1P3P2-C-03-12-R	A	482484	1350045
A1P3P2-C-03	13	A1P3P2-C-03-13-R	A	482495	1350177
A1P3P2-C-03	14	A1P3P2-C-03-14-R	A	482537	1350341
A1P3P2-C-03	15	A1P3P2-C-03-15-R	A	482535	1350455
A1P3P2-C-03	16	A1P3P2-C-03-16-V	Archive	482473	1350512