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DEC 12 1997
DOE-0236-98

Mr. James A. Saric
U.S. Environmental Protection Agency
Region V-5HSF-5J
77 West Jackson Boulevard
Chicago, IL 60604-3590

Mr. Tom Schneider, Project Manager
Ohio Environmental Protection Agency
401 East 5th Street
Dayton, Ohio 45402-2911

Dear Mr. Saric and Mr. Schneider:

SUBMITTAL OF THE PROJECT SPECIFIC PLAN FOR THE SAMPLING OF AREA 1, PHASE 1 WEST IMPACTED SOIL STOCKPILE FOR WASTE ACCEPTANCE CRITERIA ATTAINMENT

This letter serves to transmit for your review and comment, the project specific plan (PSP) for sampling the West Impacted Soil Pile to determine waste acceptance criteria (WAC) attainment. A date for the sampling will be determined to accommodate your schedule if you choose to split samples. Due to the use of hand augers to collect some of the samples, sampling cannot occur after a hard freeze; therefore, sampling will need to either occur within the next month, or be delayed until early spring. At this point, there does not appear to be any detriment if the sampling is delayed until early spring.

If you have any questions or comments regarding the sampling of the West Soil Stockpile, please contact Kathleen Nickel at (513) 648-3166.

Sincerely,

Johnny Reising

Johnny W. Reising
Fernald Remedial Action
Project Manager

FEMP:Nickel

Enclosure: As Stated

000001

cc w/enc:

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PROJECT SPECIFIC PLAN

SAMPLING OF AREA 1, PHASE I WEST IMPACTED SOIL STOCKPILE FOR WAC ATTAINMENT

Project Number: 50.03.40.10

Revision: 1

Date: December 5, 1997

Prepared by: Fluor Daniel Fernald

Prepared for: U.S. Department of Energy
Fernald Field Office

Under Contract DE-AC05-92OR21972

APPROVAL:

12-8-97

J.D. Chiou, Project Manager — Date
Soils Characterization & Excavation Project

12-8-97

Reinhard Friske, Quality Assurance — Date
Soils Characterization & Excavation Project

12-8-97

Mark Cherry, Project Manager — Date
Environmental Monitoring Project

20701-PSP-0002
Revision 1

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1.0 INTRODUCTION

1.1 PURPOSE

This project specific plan (PSP) has been developed to provide a supplemental data set to further characterize the soils contained in the West Impacted Soil Stockpile (referred to hereafter as the west stockpile) to demonstrate compliance with the Waste Acceptance Criteria (WAC) for the On-site Disposal Facility (OSDF). This data will be used to supplement the existing WAC attainment data for soils that comprise the west stockpile. The existing WAC attainment data includes a combination of pre-excavation physical sampling results, RI/FS data, real-time measurements (utilizing sodium iodine detectors and/or high purity germanium(HPGe) detectors) and process knowledge. The existing data set, as presented in the Waste Acceptance Criteria Attainment Report Area 1 Phase I (A1PI) Western Portion, includes more than 140 physical sample results, 270 HPGe measurements and extensive measurements utilizing a tractor mounted sodium iodine detector system (RTRAK). This data indicates that no soil exceeding the WAC for total uranium (1030 mg/kg) was placed in the west stockpile. This position is consistent with the process knowledge and historical data associated with the A1PI and associated areas which were excavated and deposited on the west stockpile. However, uncertainties associated with the existing WAC attainment data set exist and, therefore, DOE believes additional data characterizing total uranium concentrations in the stockpile are necessary to fully support a final determination of WAC attainment.

In addition, on two occasions suspect soils from areas outside the A1PI boundary and not previously characterized for WAC attainment were temporarily placed on the stockpile and later removed. In each case, the origin of the suspect soil and the area of the stockpile potentially affected by the soil were well documented. This information was considered in the development of this PSP and is reflected in a biased sampling component of the overall sampling strategy presented in this plan. The biased sampling component directs the collection of additional WAC attainment data in select areas of the stockpile where suspect soils were known to have been temporarily placed. These areas will be sampled for total uranium with select samples analyzed for technetium-99 based on the origin of the suspect soil.

The data collected under the sampling program described in this PSP will be used in conjunction with the existing WAC attainment data as the basis for a final determination that soils contained in the west stockpile do not exceed the WAC for total uranium and technetium-99 and therefore may be placed in the OSDF.

1.2 SCOPE

This PSP presents an integrated sampling strategy for collecting supplemental WAC attainment data from the west stockpile. The integrated strategy is comprised of the following two components:

1) A systematic/random sampling approach has been used to select 60 sampling points within the stockpile to further characterize the total uranium concentration in the stockpiled soils.

2) A biased sampling approach has been used to select a total of 28 sampling points in the two areas potentially affected by suspect or uncharacterized soil. All biased samples will be analyzed for total uranium with selected samples analyzed for technetium-99.

This integrated sampling strategy provides a reasonable approach for ensuring that the data collected is sufficient to characterize total uranium concentrations in the stockpile and ensures the areas potentially affected by the temporary placement of suspect soils are adequately characterized for WAC attainment.

Sample collection will be accomplished utilizing Geoprobe® core sampling and manual sampling methods. All samples will be analyzed for total uranium with selected samples also analysed for technetium-99. Samples will be analyzed at an analytical support level (ASL) B by the on-site FEMP laboratory or pre-qualified off-site private laboratory. Selected samples will be split with the Ohio Environmental Protection Agency to support the agencies oversight role at the FEMP. All sampling and analysis activities performed by DOE shall be consistent with the requirements of the Sitewide CERCLA Quality Assurance Project Plan (SCQ). The overall sampling strategy is described in detail beginning in Section 2.2.

This plan has been developed in consideration of the existing data and process knowledge available for the soils which comprise the west stockpile. As such, the sampling strategy and technical approach described herein has been designed to address this unique circumstance. In the future, the data requirements associated with the disposition of soils and stockpiles will be defined through the Sitewide Excavation Plan or Waste Acceptance Criteria (WAC) Attainment Plan as appropriate. Revised versions of these plans will be submitted to the agencies for approval in the near future.

1.3 KEY PROJECT PERSONNEL

The personnel listed in Table 1-1, are key personnel to the performance of this project.

TABLE 1-1

KEY PROJECT PERSONNEL

TITLE	PRIMARY	ALTERNATE
Project Lead	Mark Cherry	Mike Frank
Field Sampling Lead	Mike Frank	Tom Buhrlage
Quality Assurance Contact	Reinhard Friske	Harold Swiger
Data Management Contact	Susan Marsh	Kym Lockard
Analytical Lead	Bill Westerman	Grace Ruesink
Surveying Lead	Jim Schwing	John Deho
Waste Management	Sue Lorenz	Ken Belgrave
Health and Safety	Kevin Tschaenn	Lew Wiedeman

2.0 SAMPLING PROGRAM

2.1 STOCKPILE DESCRIPTION

The stockpile is located southwest of A1PI and west of the former North Access Road. The stockpile consists of soils excavated from certification units located west of the north access road associated with A1PI and OSDF support areas. In addition, a portion of soils excavated during construction of the new rail yard were deposited in the stockpile. A more detailed description of the origin of the soils which comprise the stockpile and associated characterization data can be found in the, "Waste Acceptance Criteria Attainment Report Area 1 Phase I (A1PI) Western Portion."

Information describing the approximate physical dimensions of the stockpile are provided in Figure 2-1 and summarized below.

- Approximate state planar coordinates for the base of the west stockpile are as follows:

  Northwest corner: North 481,700; East 1,350,671
  Northeast corner: North 481,637; East 1,350,811

  Southwest corner: North 481,388; East 1,350,674
  Southeast corner: North 481,386; East 1,350,795

- Height measurements:

  North end on Centerline -12 ft..
  South end on Centerline - 15 ft.

- Volume:

  Approximately 25,000 yd^3

The stockpile is roughly rectangular in shape with all sides steeply sloped (approximately 24°). In addition, these faces support a sparse vegetative cover. The northeast face is graded to provide an access ramp to the top of the stockpile which is generally level.

2.2 SAMPLING STRATEGY

2.2.1 Systematic/Random Sampling Approach

The first component of the overall sampling strategy involves the collection of total uranium samples from the stockpiled soils to provide additional data for demonstrating WAC attainment. A systematic approach was used to establish a sample grid over the stockpile surface. The grid pattern consists of 3 blocks x 6 blocks for a total of 18 grid blocks of approximately equal size. A random sample location (northing and easting coordinate) was selected within each block as shown on Figure 2-2. At each of the 18 randomly selected sampling locations, three depth intervals were randomly selected for sampling (3 x 18 = 54 samples). In addition, six of the 18 sample locations were randomly selected and a fourth randomly selected depth interval was chosen for sampling. Thus, the number of random samples to be collected equals 60 (18 surface locations x 3 depth intervals at each location + 6 additional depth intervals = 60 samples). The random sample depth intervals are presented in TableB.1 of Appendix B and are expressed as a fraction of the total pile depth at each sample location. Due to the stockpile's uneven terrain, the final sample location may be positioned within a four-foot radius of

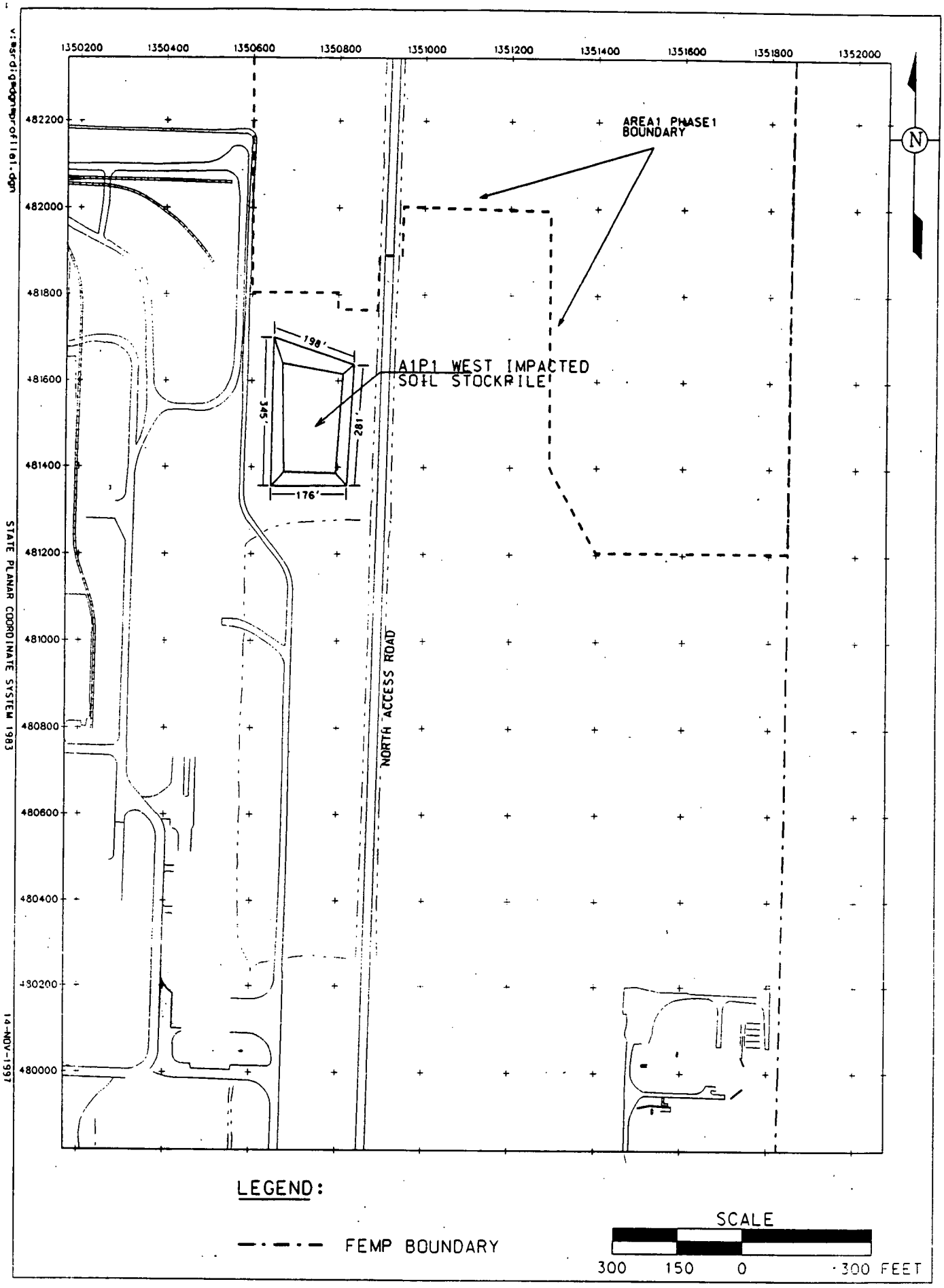

FIGURE 2-1. A1P1 WEST IMPACTED SOIL STOCKPILE

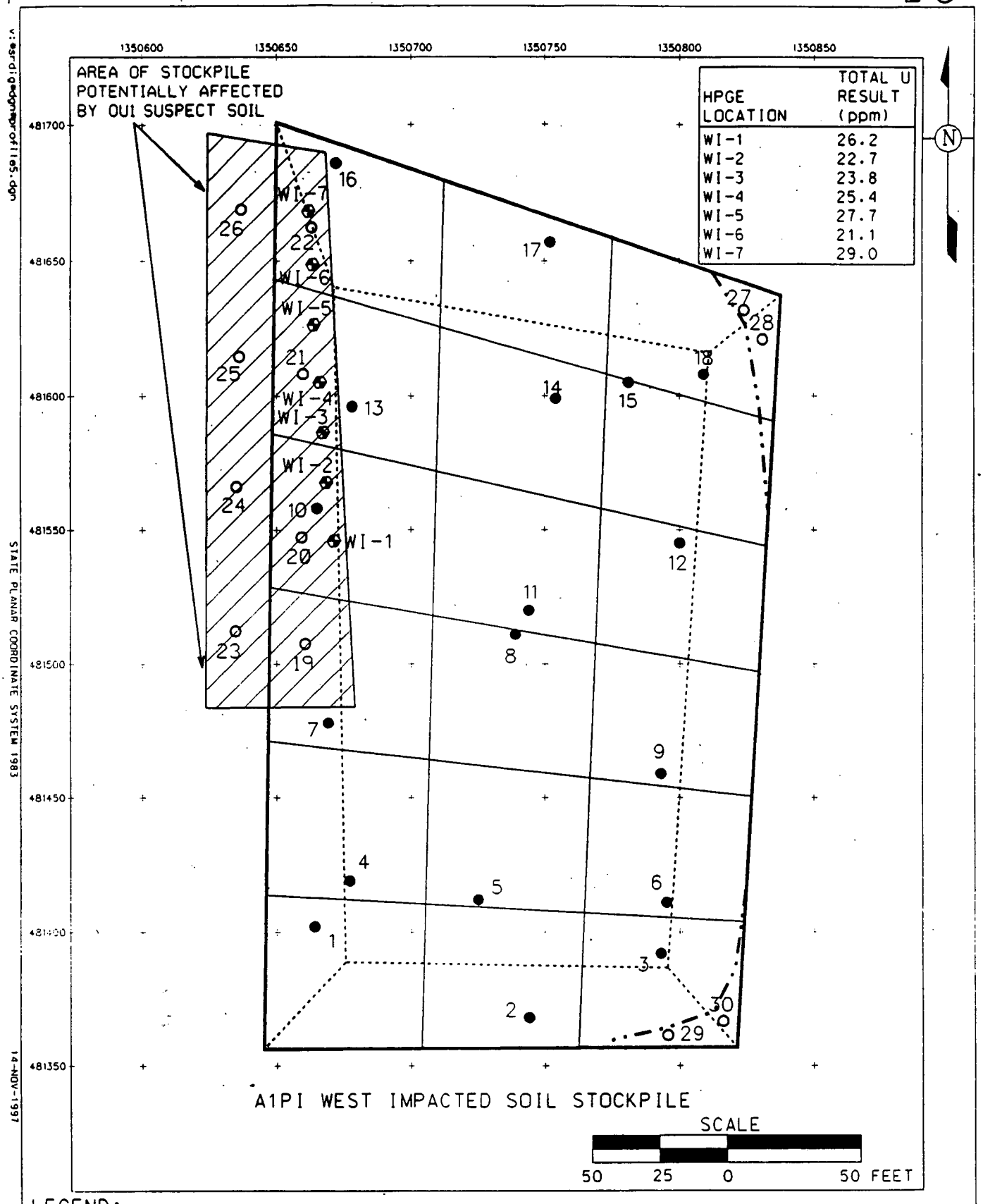

FIGURE 2-2. A1PI WEST IMPACTED SOIL STOCKPILE SAMPLING LOCATIONS

he sample locations included in Table B.1. The final locations will be re-surveyed to document the final coordinates. Samples collected will be analyzed for total uranium.

2.2.2 Biased Sampling Approach in Suspect Areas

Two cases exist where suspect soils were temporarily placed on the west stockpile. In each case, detailed information is available to delineate the area of the stockpile potentially affected by these soils (Figure 2-2). This information has been used to develop a biased sampling approach for each area.

2.2.2.1 OU1 Suspect Soil Footprint

During construction activities for the OU1 Site Improvement Plan and North Railyard Upgrades, soil was stripped (top six inches of soil) from between two storm water ponds and inadvertently placed on the west stockpile. The suspect soil was removed from the stockpile one day following its placement and a radiological survey of the affected area of the stockpile was conducted utilizing a high purity germanium detector (HPGe). The HPGe results showed total uranium levels below 30 ppm across the affected area of the stockpile indicating that any potentially above WAC soil had been removed (refer to Figure 2-2 for HPGe results).

Biased sampling locations were selected based on the footprint of the OU1 soil removed from the west stockpile. The footprint measures approximately 220 feet X 50 feet. Due to the movement and compaction of soils during construction of the stockpile, the boundary of the stockpile was originally 25 feet west of the current stockpile boundary. Therefore, the biased sampling locations extend beyond the current boundary of the stockpile to fully encompass the suspect area.

Eight boring locations were selected in this suspect area to provide a total of 24 additional samples as illustrated in Figure 2-2. Four of the eight biased boring locations fall outside the current stockpile boundary but within the suspect area temporarily occupied by the OU1 soils. These locations will be sampled at the 0-6 inch and 6-12 inch interval since the current elevation in this area is close to the original elevation following removal of the OU1 suspect soils. This will yield a total of eight samples.

The remaining four sample locations fall on the west side slope of the west stockpile. One location was selected within each of the four grid blocks encompassing the OU1 suspect soil area. The sample depths at these locations will target two 12-inch intervals immediately above and below the elevation easured during the survey which followed the removal of the OU1 soil (the original elevation where the OU1

soil was placed) to ensure the affected area is sufficiently bounded vertically by sampling. This will yield four samples per location for a total of 16 samples. All samples collected from this suspect soil footprint will be analyzed for total uranium and technetium-99. This includes any random sample points that fall into this footprint.

2.2.2.2 Uncharacterized Soil Footprint from OSDF Leachate Piping Excavation

In September, 1997 trenching operations supporting the installation of the OSDF leachate conveyance piping were conducted along the southern, eastern and northern edge of the of the west stockpile. During trenching operations excavated soils were temporarily placed on portions of the northeast and southeast slopes of the stockpile prior to backfilling the trench. Since WAC attainment sampling had not been conducted in the CU that encompasses the area of the excavation, the excavated soils are considered suspect and as such biased sampling will be conducted in the affected areas of the stockpile to confirm that above WAC soil is not present.

Four sampling locations were selected in these suspect areas on the northeast and southeast corner of the stockpile. Since the interface between the suspect soil and the existing West stockpile is clearly evident, sampling will target the 0-6 inch interval at each sampling location for a total of four samples. Samples collected from this area will be analyzed for total uranium only.

2.3 SAMPLE COLLECTION METHODS

Samples will be collected using the Geoprobe® Model 5400 in accordance with procedure EQT-06, *Geoprobe® Model 5400-Operation and Maintenance* or using manual methods as specified in procedure SMPL-01, *Solids Sampling*. The Geoprobe® sampling system will be used for sample locations that will support the safe operation of the Geoprobe® vehicle (primarily on the top of the stockpile). Hand augering or direct-push liner sampling will be conducted in all other areas (e.g., side slopes and at base of pile). At each sampling location, the surface vegetation within a 6-inch radius of the sample point will be removed using a stainless steel trowel or by hand with clean nitrile gloves while taking care to minimize the removal of any soil.

2.3.1 Geoprobe® Methods

A Geoprobe® open-tube core sampler will be advanced in approximately 36-42 inch increments down to the target depth intervals for the soil samples specified in Appendix B. Multiple cores may be collected at each sampling location (not to exceed one foot apart) to obtain sufficient sample volume for analysis

if complete sample recovery is not obtained. Borehole collapse will be monitored during core sampling to ensure minor sidewall slough is accounted for during coring and sample collection. If significant borehole collapse occurs, a closed tube piston-type core sampler will be employed which is closed during advancement to the sample interval, then opened to collect the discrete interval of interest. Both core sampling methods will utilize an expendable plastic liner insert in which the soil core is recovered.

2.3.2 Manual Sampling Methods

If Geoprobe® accessibility is not possible (e.g., side slopes), soil samples will be collected using a hand auger in accordance with SMPL-01, *Solids Sampling*. The hand auger will be advanced in approximately six-inch increments down to the target depth intervals for the soil samples specified in Appendix B. As with core sampling, multiple holes at one sampling location (not to exceed one foot apart) may have to be augered to obtain sufficient volume for laboratory analyses, particularly for split sampling intervals. Borehole collapse will be monitored during core sampling to ensure sidewall slough is accounted for during augering and sample collection. The borehole will be manually collapsed following sample collection to eliminate the possibility of injury to workers. For surface samples, a direct-push liner (six-inch length) may used to collect the sample.

2.3.3 Soil Sample Processing and Analysis

The Geoprobe® soil core(s) will be laid on clean plastic and the appropriate 12-inch sample increments, as defined in Appendix B, will be separated from the core to obtain the necessary samples. If one core provides the volume of soil necessary for the on-site laboratory analysis, the sample will be placed directly into a sample container and sealed. For manual sampling locations, the soil cuttings collected from the target sample interval will be placed in a clean tray prior to transfer to the sample container. Sample volume and analysis information is summarized in Table 2-1.

If the sample is selected to be split with the OEPA, then the soil core(s) or cuttings will be homogenized and split according to Section 6.6 of SMPL-21, *Collection of Field Quality Control Samples*, one portion for on-site analysis, the other for OEPA analysis.

TABLE 2-1

SAMPLING AND ANALYTICAL REQUIREMENTS

Analyte	Sample Matrix	Sample Type	Preservative	Lab	ASL	Holding Time	Container
Total Uranium[a]	Solid	Grab	None	On-site	B	6 Months	250 mL glass or plastic container
Total Uranium & Technetium-99[b]	Solid	Grab	None	On-site	B	6 Months	250 mL glass or plastic container

[a] Bromopadap, ICP-MS, or Alpha Spectrometry
[b] Gas Proportional Method

Note: Additional sample volume will be required at select locations to provide split samples for the OEPA. Screening samples (120 mL container half full) for alpha/beta analysis will be required for each OEPA sample interval collected.

2.4 SAMPLE IDENTIFICATION

All physical soil samples collected for laboratory analysis will be assigned a unique sample identifier (customer number), as listed in Appendix B. The field team will record the sample identifiers used by the EPA and correlate them to the split sample submitted to the onsite laboratory. Fernald Analytical Customer Tracking System (FACTS) identification numbers will be utilized by the laboratory to track the sample through the analytical and data review process.

All FEMP soil samples collected for laboratory analysis will be assigned a unique sample identifier, as follows:

A1PIWISS-x-y-R

Where:

A1PIWISS = Sample collected from the Area 1, Phase I West Impacted Soil Stockpile

x = Location of sample in the stockpile (e.g., 1, 2, 3, etc.)(see Figure 2-2)

y = Depth of sample collected. A "1" represents the first random interval, "2" represents the second interval, and so on.

R = Radiological Analyte

Therefore, sample identification number A1PIWISS-12-4-R is from sample location 12 on the A1PI West Impacted Soil Stockpile, collected at the fourth random depth interval and will be analyzed for radiological constituents. All sample identification numbers are shown in Appendix B, Table B.1.

2.5 EQUIPMENT DECONTAMINATION

Sampling equipment will be decontaminated before transport to the sampling site. Additionally, equipment that comes into contact with sample media at the target sample interval must be decontaminated. The decontamination of equipment that comes into contact with the sample will include the core sampler cutting shoe, hand auger buckets, and other sample collection tools. All decontamination will be a Level II decontamination as specified in SMPL-01, *Solids Sampling*. The core barrel portion of the core sampler will be wiped down between sample intervals and locations to remove visible soil or material. Decontamination of the core barrel will not be necessary because the core barrel will not come into contact with the sample when using a liner insert.

2.6 SAMPLE HANDLING AND SHIPPING

Samples will be processed in accordance with SMPL-01, *Solids Sampling*, for ensuring that samples are documented properly and custody and sample integrity are maintained. All samples will be transported from the field to the sample processing laboratory within the on-site laboratory.

3.0 LABORATORY SAMPLE PREPARATION

Physical samples collected for laboratory analysis will be prepared in a consistent manner. For the radiological analysis, the on-site laboratory will, at a minimum, meet the following guidelines for sample preparation:

1) All sample material (including any organic matter) will be removed from the sample container, weighed, and recorded. The analyst performing this step will describe the appearance of the sample.

2) All sample material will be dried at 105° to 112° C for a minimum of 8 hours to constant weight.

3) The percent moisture content of the sample will be calculated and recorded.

4) The entire sample will then be ground until all the material passes through a 1 millimeter sieve.

5) The sample will then be mixed by hand or machine.

6) The necessary aliquot will be removed for analysis and the remaining sampled material archived.

4.0 QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

Sampling events will follow Quality Assurance/Quality Control (QA/QC) protocol as established in Section 4 of the SCQ.

4.1 DATA QUALITY OBJECTIVES

The following DQO has been identified as applicable to this project, SL-048, Rev. 1, "Delineating the Extent of Constituents of Concern in Pre-Design Investigations and Remediation Sampling (WAC)." An uncontrolled copy of the supporting DQO is located in Appendix A.

4.2 PROJECT-SPECIFIC PROCEDURES AND MANUALS

To assure consistency and data integrity, field activities in support of the PSP will follow the requirements and responsibilities outlined in controlled procedures and manufacturers' operational manuals. Applicable procedures and manuals include:

SMPL-01, *Solids Sampling*
SMPL-21, *Collection of Field Quality Control* 766-S-1000
EQT-06, *Geoprobe® Model 5400 - Operation, Maintenance, and Calibration*
EQT-05, *Geodimeter® 4000 Survey System - Operation, Maintenance, and Calibration.*
Sitewide CERCLA Quality Assurance Plan (SCQ)

4.3 PROJECT REQUIREMENTS FOR INDEPENDENT ASSESSMENTS

Project management has ultimate responsibility for the quality of the work processes and the results of the sampling activities covered by this PSP. The FEMP QA organization will conduct independent assessments of the work process and operations to assure the quality of performance. Assessment will encompass technical and procedural requirements of this PSP and the SCQ. Independent assessment will be performed by conducting surveillance. As a minimum, one surveillance will be conducted during implementation of this PSP, consisting of monitoring/observing on-going project activity and

work areas to verify conformance to specified requirements. Surveillance will be planned and documented according to Section 12.3 of the SCQ.

4.4 IMPLEMENTATION OF FIELD CHANGES

If field conditions require changes or variances, the Field Sampling Lead must obtain written approval (electronic mail is acceptable) from the Project Lead and QA before the changes may be implemented. Changes to the PSP will be noted in the applicable field activity logs and on a Variance Request/Field Change Notice Form (VR/FCN). QA must receive the completed VR/FCN, which includes the signatures of the Project Sampling Lead, Project Lead, and the QA Representative, within 7 working days of the granting of the verbal approval.

5.0 DISPOSITION OF WASTES

During completion of sampling activities, technicians will generate contact and decontamination waste. Following completion of sampling, the technicians will place contact wastes into properly labeled bags and dispose of it according to appropriate FEMP waste management policies. Excess soil and debris generated from the soil pile will be placed back into the borehole it originated from. Decontamination water will be discharged to the Stormwater Retention Basin following completion of the FEMP Wastewater Discharge Request Form.

6.0 HEALTH AND SAFETY

A detailed health and safety review was performed on the west stockpile by a health and safety professional and the Field Sampling Lead. Observations include the following:

- When operating on the top planar surface of the stockpile, the Geoprobe® vehicle and personnel will not be positioned within three feet of the edge of the east, south and west slopes.
- During sampling operations, a warning rope or chain will be posted at least 3 feet from the edges of the east, south and west facing slopes at a height of approximately 36 inches.
- During sampling on the side slopes, the health and safety lead will determine if fall protection is necessary during field implementation. If necessary, fall protection equipment (harness and rope) will be utilized and tied off to a secure post at the top.

Technicians will conform to precautionary surveys performed by personnel representing the Radiological Control, Safety, and Industrial Hygiene organizations. Concurrence with applicable safety permits (indicated by the signature of each field team member assigned to this project) is expected by each team member in the performance of their assigned duties.

The Field Sampling Lead will ensure that each technician performing sampling related to this project has read the related Project-Specific Health Safety Matrix (PSHSM) or the applicable project specific health and safety matrix for the west stockpile work area. Technicians who do not sign these documents will not participate in the execution of sampling activities related to the completion of assigned project responsibilities. A copy of applicable safety permits/surveys issued for worker safety and health will be posted at each sample location area.

7.0 DATA MANAGEMENT

A data management process will be implemented so information collected during the investigation will be properly managed following completion of the field activities. As specified in Section 5.1 of the SCQ, sampling teams will describe daily activities on the Field Activity Log sufficient for the sampling team to reconstruct a particular situation without reliance on memory. Sample Collection Logs will be completed according to instructions specified in Appendix B of the SCQ.

All field measurements, observations, and sample collection information will be recorded as applicable on the Sample Collection Log, the Field Activity Log, and the Chain of Custody/Request for Analysis Form as required. The method of sample collection will be specified in the Field Activity Log. Samples will be assigned a unique sample identifier, as listed in Appendix B. Refer to Section 2.5 for a description of the sample identifiers to be used. This unique sample identifier will appear on the Chain of Custody/Request for Analysis and will be used to identify the sample during analysis, data entry, and data management.

Technicians will review all field data for completeness and accuracy and then forward the data package to the Data Quality organization for final review. The field data package will be filed in the records of the Environmental Monitoring project under project number 50.03.40.10.

The Data Management organization will perform data entry into the Site-wide Environmental Database. Field logs will maintained in loose-leaf form during the field recording activities. Analytical data from the on-site laboratory will be reviewed by the Project Lead prior to entry or transfer of the data into the SED from the FACTS database. Data packages will be validated to the requirements specified in the DQO.

APPENDIX A

DATA QUALITY OBJECTIVE

SL-048

Note: The attached DQOs are for informational purposes only.

Refer to controlled copies for most current revision.

1150

Control Number ~~DQO-0067~~

Fernald Environmental Management Project

Data Quality Objectives

Title: Delineating the Extent of Constituents of Concern in Pre-design Investigation and Remediation Sampling

Number: SL-048

Revision: 1

Final Draft: October 3, 1997

Contact Name: Eric Kroger

UNCONTROLLED COPY

Approval: William D. Kelley **Date:** 10-3-97
William D. Kelley
DQO Coordinator

Approval: _____ **Date:** 10/03/97
for Joan White
Project Lead

Rev. #	0	1	2	3	4	5	6
Effective Date:	9/19/97						

DATA QUALITY OBJECTIVES
Delineating the Extent of Constituents of Concern in Pre-design Investigation and Remediation Sampling

Members of Data Quality Objectives (DQO) Scoping Team
The members of the DQO team include a project lead, a project engineer, a field lead, a statistician, a lead chemist, a sampling supervisor, and a data management lead.

Conceptual Model of the Site
Media is considered contaminated if the concentration of a constituent of concern (COC) exceeds the final remediation levels (FRLs). The extent of specific media contamination was estimated and published in the Operable Unit 5 Feasibility Study (FS). These estimates were based on kriging analysis of available data for media collected during the Remedial Investigation (RI) effort and other FEMP environmental characterization studies. Maps outlining contaminated media boundaries were generated for the Operable Unit 5 FS by overlaying the results of the kriging analysis data with isoconcentration maps of the other constituents of concern (COCs), as presented in the Operable Unit 5 RI report, and further modified by spatial analysis of maps reflecting the most current media characterization data. A sequential remediation plan has been presented that subdivides the FEMP into seven construction areas. During the course of remediation, areas of specific media may require additional characterization so remediation can be carried out as thoroughly and efficiently as possible. As a result, additional sampling may be necessary to accurately delineate a volume of specific media as exceeding a target level, such as the FRL or the Waste Attainment Criterion (WAC). Each individual Project-Specific Plan (PSP) will identify and describe the particular media to be sampled.

1.0 Statement of Problem

If the extent (depth and/or area) of the media COC contamination is unknown, then it must be defined with respect to the appropriate target level (FRL, WAC, or other specified media concentration).

2.0 Identify the Decision

Delineate the horizontal and/or vertical extent of media COC contamination in an area with respect to the appropriate target level.

3.0 Inputs That Affect the Decision

Informational Inputs - Historical data, process history knowledge, the modeled extent of COC contamination, and the origins of contamination will be required to establish a sampling plan to delineate the extent of COC contamination. The desired precision of the delineation must be weighed against the cost of collecting and analyzing additional samples in order to determine the optimal sampling density. The project-

specific plan will identify the optimal sampling density.

Action Levels - COCs must be delineated with respect to a specific action level, such as FRLs and On-Site Disposal Facility (OSDF) WAC concentrations. Specific media FRLs are established in the OU2 and OU5 RODs, and the WAC concentrations are published in the OU5 ROD. Media COCs may also require delineation with respect to other action levels that act as remediation drivers, such as Benchmark Toxicity Values (BTVs) and As Low As Reasonably Achievable (ALARA) levels.

4.0 The Boundaries of the Situation

Temporal Boundaries - Sampling must be completed within a time frame sufficient to meet the remediation schedule. Time frames must allow for the scheduling of sampling and analytical activities, the collection of samples, analysis of samples and the processing of analytical data when received.

Scale of Decision Making - The decision made based upon the data collected in this investigation will be the extent of COC contamination at or above the appropriate action level. This delineation will result in media contaminant concentration information being incorporated into engineering design, and the attainment of established remediation goals.

Parameters of Interest - The parameters of interest are the COCs that have been determined to require additional delineation before remediation design can be finalized with the optimal degree of accuracy.

5.0 Decision Rule

If existing data provide an unacceptable level of uncertainty in the COC delineation model, then additional sampling will take place to decrease the model uncertainty. When deciding what additional data is needed, the costs of additional sampling and analysis must be weighed against the benefit of reduced uncertainty in the delineation model, which will eventually be used for assigning excavation, or for other purposes.

6.0 Limits on Decision Errors

In order to be useful, data must be collected with sufficient areal and depth coverage, and at sufficient density to ensure an accurate delineation of COC concentrations. Analytical sensitivity and reproducibility must be sufficient to differentiate the COC concentrations below their respective target levels.

Types of Decision Errors and Consequences

Decision Error 1 - This decision error occurs when the decision maker determines that the extent of media contaminated with COCs above action levels is not as

extensive as it actually is. This error can result in a remediation design that fails to incorporate media contaminated with COC(s) above the action level(s). This could result in the re-mobilization of excavation equipment and delays in the remediation schedule. Also, this could result in media contaminated above action levels remaining after remediation is considered complete, posing a potential threat to human health and the environment.

Decision Error 2 - This decision error occurs when the decision maker determines that the extent of media contaminated above COC action levels is more extensive than it actually is. This error could result in more excavation than necessary, and this excess volume of materials being transferred to the OSDF, or an off-site disposal facility if contamination levels exceed the OSDF WAC.

True State of Nature for the Decision Errors - The true state of nature for Decision Error 1 is that the maximum extent of contamination above the FRL is more extensive than was determined. The true state of nature for Decision Error 2 is that the maximum extent of contamination above the FRL is not as extensive as was determined. Decision Error 1 is the more severe error.

7.0 Optimizing Design for Useable Data

7.1 Sample Collection

A sampling and analytical testing program will delineate the extent of COC contamination in a given area with respect to the action level of interest. Existing data, process knowledge, modeled concentration data, and the origins of contamination will be considered when determining the lateral and vertical extent of sample collection. The cost of collecting and analyzing additional samples, will be weighed against the benefit of reduced uncertainty in the delineation model. This will determine the sampling density. Individual PSPs will identify the locations and depths to be sampled, the sampling density necessary to obtain the desired accuracy of the delineation, and if samples will be analyzed by the on-site or off-site laboratory. The PSP will also identify the sampling increments to be selectively analyzed for concentrations of the COC(s) of interest, along with field work requirements. Analytical requirements will be listed in the PSP. The chosen analytical methodologies are able to achieve a detection limit capable of resolving the COC action level. For real-time methodologies, the field data will be used to bias the physical sampling necessary for COC delineation.

7.2 COC Delineation

The media COC delineation will use all data collected under the PSP, and if deemed appropriate by the Project Lead, may also include existing data obtained from physical samples, and if applicable, information obtained through real-time screening. The delineation may be accomplished through modeling (e.g. kriging) of the COC concentration data with a confidence limit specific to project needs that will reduce

the potential for Decision Error 1. A very conservative approach to delineation may be utilized, where the boundaries of the contaminated media are extended to the first known vertical and horizontal sample locations that reveal concentrations below the desired action level.

7.3 QC Considerations

Laboratory work will follow the requirements specified in the SCQ. If analysis is to be carried out by an off-site laboratory, it will be a Fluor Daniel Fernald approved full service laboratory. Laboratory quality control measures include a media prep blank, a laboratory control sample (LCS), matrix duplicates and matrix spike.

Typical Field QC samples are not required for ASL B analysis. However the PSPs may specify appropriate field QC samples for the media type with respect to the ASL in accordance with the SCQ, such as field blanks, trip blanks, and container blanks. All field QC samples will be analyzed at the associated field sample ASL. The frequency of field QC sampling is as follows: Duplicate samples will be taken at a minimum of one per 20 samples. Rinsates will be performed at a minimum of one per 20 on all field equipment that is re-used. Trip blanks will be taken at a minimum of one per shipping container when analyzing for volatile organic compounds (VOCs). For VOCs, container blanks will be taken at a minimum of one per Area and Phase per container type (i.e. stainless steel core liner/plastic core liner/Geoprobe tube) when using uncertified containers. Field blanks are not necessary for soil metal analysis, as it is unlikely in ambient field conditions to have metals cross contamination, however, the probability of cross contamination with liquid samples and semi-volatile organic compounds is much higher, therefore for liquid samples and samples that will be analyzed for semi-volatile organic compounds (SVOCs) field blanks will be taken at a minimum of one per 20 samples. ASL and validation requirements are as follows:

- Real-time data will be analyzed to ASL A, and no field QC samples are required.
- If physical samples are analyzed for Pre-design Investigations and/or Pre-certification delineations, 100% of the data will be analyzed per ASL B requirements. 90% of the data will require only a Certificate of Analysis, the other 10% will require the Certificate of Analysis and all associated QA/QC results, and will be validated to ASL B.
- If samples are analyzed for WAC Attainment and/or RCRA Characteristic Areas Delineation, 100% of the data will be analyzed and reported to ASL B. The ASL B package will include a Certificate of Analysis along with all associated QA/QC results. In addition, 10% of the data will be validated to ASL B.
- If delineation data are also to be used for Certification, all data will be analyzed and reported to ASL D, and 10% will be validated to ASL D. In addition, the data must meet the data quality objectives specified in the Certification DQO.

All data will undergo an evaluation by the Project Team, including a comparison for consistency with historical data. Deviations from QC considerations resulting from evaluating inputs to the decision from Section 3, must be justified in the PSP such that the objectives of the decision rule in Section 5 are met.

7.4 Independent Assessment

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

7.5 Data Management

Upon receipt from the laboratory, all results will be entered into the SED as qualified data using standard data entry protocol. The required ASL B data will undergo analytical validation by the FEMP validation team. A minimum of ten percent (10%) of field data will be validated by the FEMP QA validation team. The Project Manager will be responsible to determine data usability as it pertains to supporting the DQO decision of determining delineation of media COC's.

7.6 Applicable Procedures

Sample collection will be described in the PSP with a listing of applicable procedures. Typical related plans and procedures are the following:

- Sitewide Excavation Plan (SEP)
- Sitewide CERCLA Quality Assurance Project Plan (SCQ).
- SMPL-01, *Solids Sampling*
- SMPL-21, *Collection of Field Quality Control Samples*
- EQT-06, *Geoprobe® Model 5400 Operation and Maintenance*
- EQT-23, *Operation of ADCAM Series Analyzers with Gamma Sensitive Detectors*
- EQT-30, *Operation of Radiation Tracking Vehicle Sodium Iodide Detection System*

Data Quality Objectives
Delineating the Extent of Media Constituents of Concern

1A. Task/Description: Delineating the extent of contamination above the FRLs

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

RI ☐ FS ☐ RD ☒ RA ☐ R,A ☐ OTHER ☐

1.C. DQO No.: SL-048, Rev. 1 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 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 A ☒ B ☒ C ☐ D ☒ E ☐	Other A ☐ B ☐ C ☐ D ☐ E ☐

4.A. Drivers: Remedial Action Work Plans, Applicable or Relevant and Appropriate Requirements (ARARs) and the OU2 and/or OU5 Record of Decision (ROD).

4.B. Objective: Delineate the extent of media contaminated with a COC (or COCs) with respect to the action level(s) of interest.

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5. Site Information (Description):

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	[X] *	2. Uranium	[X] *	3. BTX	[ ]
Temperature	[X] *	Full Radiological	[X] *	TPH	[ ]
Specific Conductance	[X] *	Metals	[X] *	Oil/Grease	[ ]
Dissolved Oxygen	[X] *	Cyanide	[ ]		
Technetium-99	[X] *	Silica	[ ]		

4. Cations	[ ]	5. VOA	[X] *	6. Other (specify)
Anions	[ ]	BNA	[X] *	
TOC	[ ]	Pesticides	[X] *	
TCLP	[X] *	PCB	[X] *	
CEC	[ ]	COD	[ ]	

*If constituent is identified for delineation in the individual PSP.

6.B. Equipment Selection and SCQ Reference:

Equipment Selection	Refer to SCQ Section
ASL A X, RTRAK / HPGe / XRF	SCQ Section: Not Applicable
ASL B X	SCQ Section: App. G Tables G-1&G-3
ASL C	SCQ Section:
ASL D X	SCQ Section: App. G Tables G-1&G-3
ASL E	SCQ Section:

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

Biased	[X]	Composite	[ ]	Environmental	[X]	Grab	[X]	Grid	[X]
Intrusive	[X]	Non-Intrusive	[ ]	Phased	[ ]	Source	[ ]		

DQO Number: SL-048, Rev. 1

7.B. Sample Work Plan Reference: This DQO is being written prior to the PSPs.

Background samples: OU5 RI

7.C. Sample Collection Reference:

Sample Collection Reference: SMPL-01, EQT-06

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

8.A. Field Quality Control Samples:

Trip Blanks	[X]*	Container Blanks	[X]++
Field Blanks	[X]+	Duplicate Samples	[X]
Equipment Rinsate Samples	[X]	Split Samples	[X]**
Preservative Blanks	[ ]	Performance Evaluation Samples	[ ]
Other (specify)			

*For volatile organics only
** Split samples will be collected where required by EPA or OEPA.
+ Taken at the discretion of the Project Manager (if warranted by field conditions)
++ One per Area and Phase per container type (i.e. stainless steel core liner/ plastic core liner/Geoprobe tube).

8.B. Laboratory Quality Control Samples:

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

Other (specify) Per SCQ

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

APPENDIX B

SAMPLE LOCATIONS AND IDENTIFICATION NUMBERS

TABLE B.1

SAMPLE LOCATIONS AND IDENTIFIERS

Sample Identifier	Easting Coordinate	Northing Coordinate	Relative Fraction for Sample Depth[a]	Discrete Sample Interval[b]	Target Analytes
A1PIWISS-1-1-R	1350663.0	481402.0	0.13	n/a	Total U
A1PIWISS-1-2-R	1350663.0	481402.0	0.39	n/a	Total U
A1PIWISS-1-3-R	1350663.0	481402.0	0.65	n/a	Total U
A1PIWISS-2-1-R	1350743.0	481368.0	0.32	n/a	Total U
A1PIWISS-2-2-R	1350743.0	481368.0	0.53	n/a	Total U
A1PIWISS-2-3-R	1350743.0	481368.0	0.81	n/a	Total U
A1PIWISS-3-1-R	1350792.0	481392.0	0.31	n/a	Total U
A1PIWISS-3-2-R	1350792.0	481392.0	0.48	n/a	Total U
A1PIWISS-3-3-R	1350792.0	481392.0	0.68	n/a	Total U
A1PIWISS-3-4-R	1350792.0	481392.0	0.93	n/a	Total U
A1PIWISS-4-1-R	1350676.0	481419.0	0.17	n/a	Total U
A1PIWISS-4-2-R	1350676.0	481419.0	0.39	n/a	Total U
A1PIWISS-4-3-R	1350676.0	481419.0	0.8	n/a	Total U
A1PIWISS-5-1-R	1350724.0	481412.0	0.02	n/a	Total U
A1PIWISS-5-2-R	1350724.0	481412.0	0.24	n/a	Total U
A1PIWISS-5-3-R	1350724.0	481412.0	0.8	n/a	Total U
A1PIWISS-6-1-R	1350794.0	481411.0	0.18	n/a	Total U
A1PIWISS-6-2-R	1350794.0	481411.0	0.43	n/a	Total U
A1PIWISS-6-3-R	1350794.0	481411.0	0.86	n/a	Total U
A1PIWISS-7-1-R	1350668.0	481478.0	0.07	n/a	Total U
A1PIWISS-7-2-R	1350668.0	481478.0	0.36	n/a	Total U
A1PIWISS-7-3-R	1350668.0	481478.0	0.52	n/a	Total U
A1PIWISS-7-4-R	1350668.0	481478.0	0.96	n/a	Total U
A1PIWISS-8-1-R	1350738.0	481511.0	0.03	n/a	Total U
A1PIWISS-8-2-R	1350738.0	481511.0	0.14	n/a	Total U
A1PIWISS-8-3-R	1350738.0	481511.0	0.29	n/a	Total U
A1PIWISS-8-4-R	1350738.0	481511.0	0.73	n/a	Total U
A1PIWISS-9-1-R	1350818.0	481485.0	0.15	n/a	Total U
A1PIWISS-9-2-R	1350818.0	481485.0	0.63	n/a	Total U
A1PIWISS-9-3-R	1350818.0	481485.0	0.82	n/a	Total U
A1PIWISS-10-1-R	1350664.0	481558.0	0.04	n/a	Total U / Tc-99
A1PIWISS-10-2-R	1350664.0	481558.0	0.45	n/a	Total U / Tc-99
A1PIWISS-10-3-R	1350664.0	481558.0	0.74	n/a	Total U / Tc-99
A1PIWISS-11-1-R	1350743.0	481520.0	0.04	n/a	Total U
A1PIWISS-11-2-R	1350743.0	481520.0	0.43	n/a	Total U

TABLE B-1
(Continued)

Sample Identifier	Easting Coordinate	Northing Coordinate	Relative Fraction for Sample Depth[a]	Discrete Sample Interval[b]	Target Analytes
A1PIWISS-11-3-R	1350743.0	481520.0	0.66	n/a	Total U
A1PIWISS-11-4-R	1350743.0	481520.0	0.91	n/a	Total U
A1PIWISS-12-1-R	1350799.0	481545.0	0.24	n/a	Total U
A1PIWISS-12-2-R	1350799.0	481545.0	0.66	n/a	Total U
A1PIWISS-12-3-R	1350799.0	481545.0	0.79	n/a	Total U
A1PIWISS-13-1-R	1350677.0	481596.0	0.1	n/a	Total U
A1PIWISS-13-2-R	1350677.0	481596.0	0.26	n/a	Total U
A1PIWISS-13-3-R	1350677.0	481596.0	0.38	n/a	Total U
A1PIWISS-13-4-R	1350677.0	481596.0	0.87	n/a	Total U
A1PIWISS-14-1-R	1350753.0	481599.0	0.28	n/a	Total U
A1PIWISS-14-2-R	1350753.0	481599.0	0.48	n/a	Total U
A1PIWISS-14-3-R	1350753.0	481599.0	0.86	n/a	Total U
A1PIWISS-15-1-R	1350780.0	481605.0	0.03	n/a	Total U
A1PIWISS-15-2-R	1350780.0	481605.0	0.33	n/a	Total U
A1PIWISS-15-3-R	1350780.0	481605.0	0.63	n/a	Total U
A1PIWISS-15-4-R	1350780.0	481605.0	0.98	n/a	Total U
A1PIWISS-16-1-R	1350671.0	481686.0	0.16	n/a	Total U
A1PIWISS-16-2-R	1350671.0	481686.0	0.38	n/a	Total U
A1PIWISS-16-3-R	1350671.0	481686.0	0.98	n/a	Total U
A1PIWISS-17-1-R	1350751.0	481657.0	0.12	n/a	Total U
A1PIWISS-17-2-R	1350751.0	481657.0	0.59	n/a	Total U
A1PIWISS-17-3-R	1350751.0	481657.0	0.83	n/a	Total U
A1PIWISS-18-1-R	1350808.0	481608.0	0.08	n/a	Total U
A1PIWISS-18-2-R	1350808.0	481608.0	0.21	n/a	Total U
A1PIWISS-18-3-R	1350808.0	481608.0	0.94	n/a	Total U
A1PIWISS-19-1-R	1350660.9	481507.6	n/a	0-1 feet	Total U / Tc-99
A1PIWISS-19-2-R	1350660.9	481507.6	n/a	1-2 feet	Total U / Tc-99
A1PIWISS-19-3-R	1350660.9	481507.6	n/a	2-3 feet	Total U / Tc-99
A1PIWISS-19-4-R	1350660.9	481507.6	n/a	3-4 feet	Total U / Tc-99
A1PIWISS-20-1-R	1350659.4	481547.3	n/a	0.5-1.5 feet	Total U / Tc-99
A1PIWISS-20-2-R	1350659.4	481547.3	n/a	1.5-2.5 feet	Total U / Tc-99
A1PIWISS-20-3-R	1350659.4	481547.3	n/a	2.5-3.5 feet	Total U / Tc-99
A1PIWISS-20-4-R	1350659.4	481547.3	n/a	3.5-4.5 feet	Total U / Tc-99
A1PIWISS-21-1-R	1350659.7	481608.3	n/a	3-4 feet	Total U / Tc-99
A1PIWISS-21-2-R	1350659.7	481608.3	n/a	4-5 feet	Total U / Tc-99
A1PIWISS-21-3-R	1350659.7	481608.3	n/a	5-6 feet	Total U / Tc-99

TABLE B-1
(Continued)

Sample Identifier	Easting Coordinate	Northing Coordinate	Relative Fraction for Sample Depth[a]	Discrete Sample Interval[b]	Target Analytes
A1PIWISS-21-4-R	1350659.7	481608.3	n/a	6-7 feet	Total U / Tc-99
A1PIWISS-22-1-R	1350663.3	481662.3	n/a	2.5-3.5 feet	Total U / Tc-99
A1PIWISS-22-2-R	1350663.3	481662.3	n/a	3.5-4.5 feet	Total U / Tc-99
A1PIWISS-22-3-R	1350663.3	481662.3	n/a	4.5-5.5 feet	Total U / Tc-99
A1PIWISS-22-4-R	1350663.3	481662.3	n/a	5.5-6.5 feet	Total U / Tc-99
A1PIWISS-23-1-R	1350634.8	481512.4	n/a	0 - 0.5 feet	Total U / Tc-99
A1PIWISS-23-2-R	1350634.8	481512.4	n/a	0.5 - 1 feet	Total U / Tc-99
A1PIWISS-24-1-R	1350635.1	481566.1	n/a	0 - 0.5 feet	Total U / Tc-99
A1PIWISS-24-2-R	1350635.1	481566.1	n/a	0.5 - 1 feet	Total U / Tc-99
A1PIWISS-25-1-R	13510636.2	481614.8	n/a	0 - 0.5 feet	Total U / Tc-99
A1PIWISS-25-2-R	13510636.2	481614.8	n/a	0.5 - 1 feet	Total U / Tc-99
A1PIWISS-26-1-R	1350636.9	481669.2	n/a	0 - 0.5 feet	Total U / Tc-99
A1PIWISS-26-2-R	1350636.9	481669.2	n/a	0.5 - 1 feet	Total U / Tc-99
A1PIWISS-27-1-R	1350823.8	481631.8	n/a	0 - 0.5 feet	Total U
A1PIWISS-28-1-R	1350830.5	481621.1	n/a	0 - 0.5 feet	Total U
A1PIWISS-29-1-R	1350795.5	481361.6	n/a	0 - 0.5 feet	Total U
A1PIWISS-30-1-R	1350816.1	481366.7	n/a	0 - 0.5 feet	Total U

[a] The relative depth is expressed as a fraction of the total pile height at each sampling location. This depth represents the top of the 12-inch sample interval. The actual depth interval will be recorded in the field logs.

[b] The discrete depth interval column only applies to biased sampling locations where the target sampling depth is based on former locations of uncharacterized or suspect soil.