55200-PSP-0003

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

AREA 1, PHASE II PROJECT SPECIFIC PLAN FOR PERCHED WATER SAMPLING AT THE SEWAGE TREATMENT PLANT

ORIGINAL

SEPTEMBER 1997

U.S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE

REV. 0

VARIANCE / FIELD CHANGE NOTICE

V/F 50.03.59.03-1

WBS NO.: 50.03.59.03

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PROJECT TITLE: Perched Water Sampling at the Sewage Treatment Plant 55200-PSP-003

Date: 9/24/97

VARIANCE / FIELD CHANGE NOTICE (Include justification):

Field Change Notice:

This variance documents a change in the location of the Boring 12118, and the addition of a new boring, Number12120. The following table summarizes the changes to the proposed locations as stated in Section 2.0, Table 2.1 of the PSP.

	Original		Revised		
Boring ID	Easting	Northing	Easting	Northing	Comments
12118	1351508	480425	1351670	480025	Changed Location
12119	1351641	480106	1351641	480106	No Change
12120	N/A	N/A	1351725	480115	New Boring

Justification:

The revised locations were determined by reviewing a new kriging model based on recent borings placed in the Sewage Treatment Plant area under PSP A1P2 PreDesign Investigation For Total Uranium in the Sewage Treatment Plant Area, Rev. 0, Dated 8/97, WBS# 50.03.59.05, EDC# 55200-PSP-0001.

ORIGINAL

REQUESTED BY: Joan White Date: ~~3/3/97~~ 9/24/97

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE	9-25-97	X	PROJECT MANAGER	9/25/97
	DATA QUALITY MANAGEMENT		X	Characterization Lead	9/25/97
	ANALYTICAL CUSTOMER SUPPORT		X	Characterization and Sampling Mgr	9/24/97
	OTHER			OTHER	

VARIANCE/FCN APPROVED [X]YES [ ]NO

REVISION REQUIRED: [ ]YES [x]NO

DISTRIBUTION

PROJECT MANAGER:	DOCUMENT CONTROL: Esther Dittmer	OTHER:
QUALITY ASSURANCE:	OTHER:	OTHER:
FIELD MANAGER:	OTHER:	OTHER:

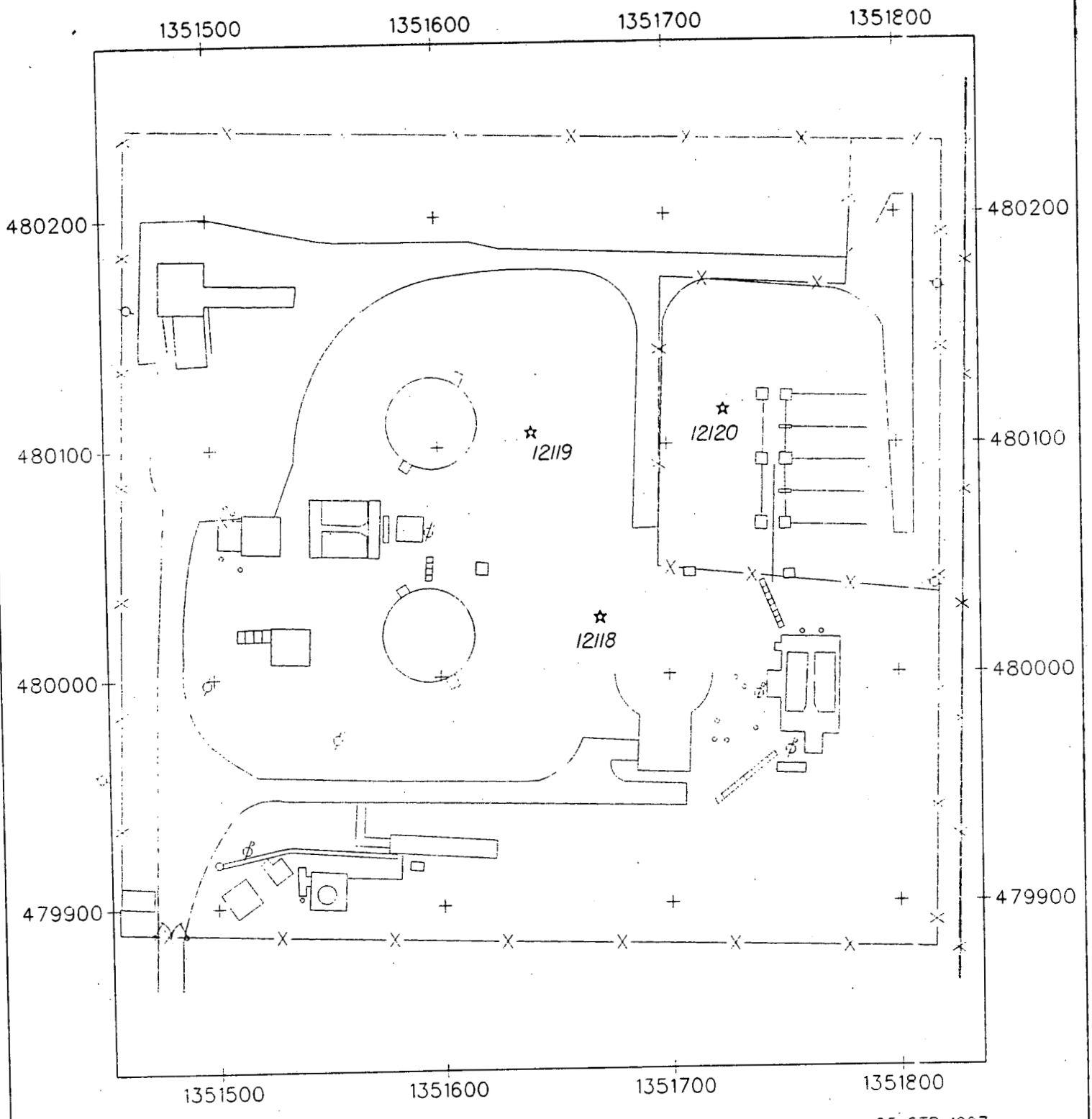

FIGURE 1. PROPOSED BOREHOLE LOCATIONS
Perched Water Sampling STP - PSP 50.03, 59.03

1138

VARIANCE / FIELD CHANGE NOTICE

V/F No. 50.03.59.03-1

WBS NO.: 50.03.59.03

Page 1 of 1

PROJECT TITLE: Perched Water Sampling at the Sewage Treatment Plant

Date: 10/1/97

VARIANCE / FIELD CHANGE NOTICE (Include justification):

1) This variance is to have the water collected to be analyzed for total uranium in addition to VOAs. The TAL will be TAL 50.03.59.03-B for Total Uranium by ICP/MS or Bromopadap with at Highest Allowable Minimum Detectable Concentration of 10 ppm. ~~AT~~ ASL B.

Justification
If the water needs to be pretreated the total uranium concentration needs to be known.

REQUESTED BY: Alex Duarte Date: October 1, 1997

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE	10-2-97	X	PROJECT MANAGER ARD FR STG	10/2/97
	DATA QUALITY MANAGEMENT		X	SCEP SAMPLING & CHARACTERIZ. MGR	10/2/97
	ANALYTICAL CUSTOMER SUPPORT			QA ARD	10/2/97
	OTHER			OTHER	10/2/97

VARIANCE/FCN APPROVED [X] YES [ ] NO

REVISION REQUIRED: [ ] YES [x] NO

DISTRIBUTION

PROJECT MANAGER:	DOCUMENT CONTROL: Melinda Sisler	OTHER:
QUALITY ASSURANCE:	OTHER:	OTHER:
FIELD MANAGER:	OTHER:	OTHER:

ORIGINAL

00000-4

PROJECT SPECIFIC PLAN

AREA 1, PHASE II
PERCHED WATER SAMPLING AT THE SEWAGE TREATMENT PLANT

Project Number: 50.03.59.03

Revision: 0

Date: September 19, 1997

Prepared by: Fluor Daniel Fernald (FDF)

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

Under Contract DE-AC05-92OR21972

APPROVAL:

Steve Garland 9/19/97

Steve Garland, Area 1, Phase II Project Manager — Date
Soils Characterization & Excavation Project

AR Duarte 9/19/97

Alex Duarte, Characterization Manager — Date
Soils Characterization and Excavation Project

Reinhard J. Friske 9-19-97

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

Joan H White 9/19/97

Joan White, Characterization & Sampling Mgr. — Date
Soils Characterization & Excavation Project

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LIST OF ACRONYMS AND ABBREVIATIONS

ASL	analytical support level
AWWT	Advanced Wastewater Treatment Facility
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
cpm	counts per minute
FACTS	Fernald Analytical Customer Tracking System
FDF	Fluor Daniel Fernald
ft	foot
GIS	Graphical Information System
MS	Microsoft
PSP	project specific plan
PWID	Project Waste Identification Document
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
SCQ	Sitewide CERCLA Quality Assurance Project Plan
STP	Sewage Treatment Plant
VOC	volatile organic compound
VR/FCN	Variance Request/Field Change Notice
WDSS	Waste Disposition Support Services

1.0 INTRODUCTION

This Project Specific Plan (PSP) has been developed to obtain perched water quality data necessary to support the design of the excavation strategy for the Sewage Treatment Plant (STP) area.

1.1 PURPOSE

The data resulting from this investigation, in conjunction with the existing data collected during the Remedial Investigation (RI), will be used to assess the nature and extent of volatile organic compound (VOC) contamination in perched water underlying the STP. This information is necessary to evaluate and select the appropriate perched water handling and treatment systems to be utilized during soil excavation activities.

Previous studies conducted under the RI have identified the sludge drying beds, located in the northeastern corner of the STP area, as the source of perched water VOC contamination in the area. During the production years, sludges from STP processes and sludges that accumulated in various facility sumps were deposited on the sludge drying beds for dewatering. In particular, sludges from the laundry operation sump which contained VOC contaminants [including the Resource Conservation and Recovery Act (RCRA)-listed waste], tetrachloroethylene and were periodically placed on the beds. As a result of this practice, the sludge drying beds have been designated Hazardous Waste Management Unit #41. Perched water samples collected in 1990 and 1993 from a series of six monitoring wells (installed during the RI and subsequently plugged and abandoned) confirmed a localized plume of VOC contamination, including tetrachloroethylene, that originated at the sludge drying beds and migrated west through a series of discontinuous sand lenses within the glacial overburden. This investigation will focus on collecting perched water samples to develop a current snapshot of perched water conditions and to further delineate the extent of VOC contamination to support completion of the remedial design for the STP area.

1.2 AREA DESCRIPTION

The STP area (Figure 1-1) is located along the eastern perimeter of the Fernald Environmental Management Project (FEMP) boundary within remediation Area 1, Phase II. The STP, associated facilities, and an abandoned solid waste incinerator are contained within an area on the FEMP property surrounded by a 6 feet high chain-link fence to restrict access. The STP became operational in 1952 for treatment of the FEMP sanitary wastewater. The system was later reconstructed to receive both sanitary and process-related wastewater. The use of the STP to treat process-related wastewater was discontinued with the installation and start-up of the bio-denitrification effluent treatment system.

1.3 SCOPE

Continuous soil cores will be collected to a depth of 25 feet at two locations using the Geoprobe (Figure 1); the cores will be described by a geologist. Soil cores will not be archived or analyzed but will be disposed in accordance with Section 5.0. A perched water sample from each saturated sand lens greater than one foot thick will be collected through the probe rods using a bailer. Double casing will be completed in borings in which two or more waterbearing zones are encountered to avoid cross-contamination. Field quality control samples will include a duplicate, a rinsate, and a trip blank. The duplicate water sample will be collected from the shallowest perched water zone at Location 12119 (the location of the highest VOC contamination based on historical data). All water samples will be analyzed for VOCs (SW-846, Method 8240) at Analytical Support Level (ASL) B at an offsite laboratory. Sampling and analysis activities will be consistent with the Sitewide Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Quality Assurance Project Plan (SCQ) and the Data Quality Objectives SL-036, Revision 3 (Appendix A).

1.4 KEY PERSONNEL

Key personnel performing work on this PSP are listed in Table 1-1.

TABLE 1-1
KEY PROJECT PERSONNEL

Title	Name	Alternative
DOE Contact	Kathi Nickel	Rob Janke
Area 1, Phase II Project Manager	Steve Garland	Clifton Blanchard
Characterization and Sampling Manager	Joan White	Mike Frank
Area 1, Phase II Characterization Lead	Alex Duarte	Joan White
Sampling Field Manager	Mike Frank	Tom Buhrlage
Surveying Lead	Jim Schwing	TBD
Data Management Lead	Susan Marsh	Alex Duarte
Laboratory Contact	Al Bacon	Bill Westerman
Waste Disposition Contact	Sue Lorenz	Ken Belgrave
Health and Safety	Jack Patrick	Kevin Tschaenn
Quality Assurance Contact	Reinhard Friske	Harold Swiger
PSP Technical Writer	Karen Voisard	Clifton Blanchard

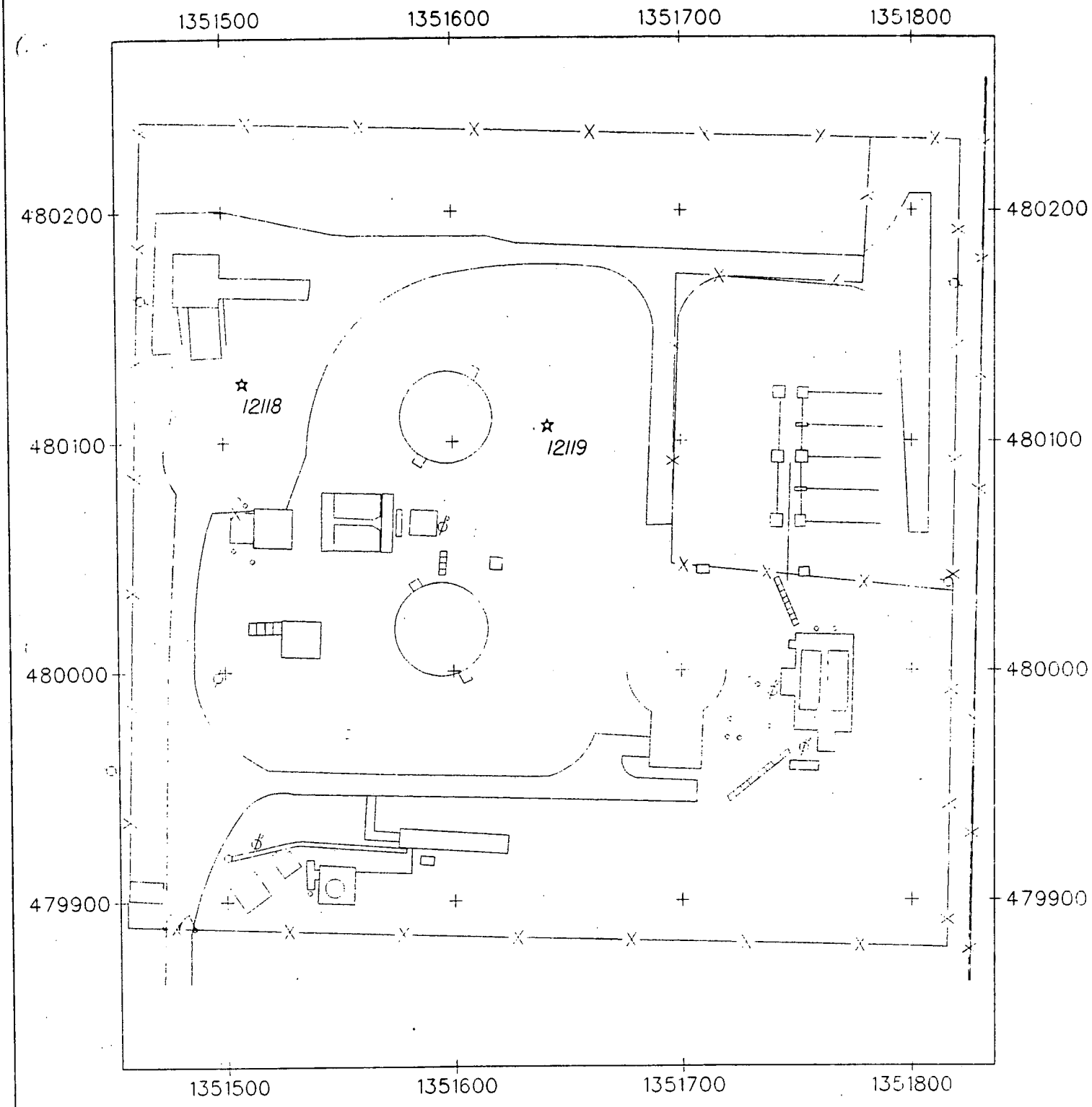

FIGURE 1. PROPOSED BOREHOLE LOCATIONS

2.0 FIELD ACTIVITY

2.1 GENERAL

Two boring locations were selected for this investigation based on historical perched water data and lithologic conditions in the study area. One location (12119) was chosen to coincide with the detected highest VOC contamination so that the current concentration of VOCs can be assessed. The remaining location (12118) is downgradient of the highest VOC contamination in the thickest sand lens encountered during previous investigations.

2.2 NUMBERING SYSTEM

Perched water samples will be assigned a unique sample identifier, as listed in Appendix B. Fernald Analytical Customer Tracking System (FACTS) identification numbers will also be utilized by the laboratory to track the sample through the analytical and data review process.

The unique sample identifier will have 20 characters or less and is divided into five parts as follows:

A1P2STP - Sample Location - Depth - Suite - QC

Where:

A1P2STP = sample collected for the Area 1, Phase II Sewage Treatment Plant.

Sample Location = boring number (seeTable 2-1).

Sample Depth ID =Top of sample interval.

Suite = Analytical suite. "L" =volatiles.

QC = Quality control sample, where applicable. "D"= duplicate, "X" = rinsate, "T" = trip blank

For example, sample identification number A1P2STP-12119-15.5-L-D is a duplicate sample collected in Area 1, Phase 2, at location 12119 collected from 15.5 feet; the sample is to be analyzed for VOCs. The sample identification number for a trip blank associated with the above sample will be A1P2STP-12119-L-X.

TABLE 2-1
PROPOSED BORING LOCATIONS AND DEPTHS

Boring ID	Easting	Northing	Depth (ft)
12118	1351508.00	480125.00	25
12119	1351641.00	480106.00	25

2.3 SURVEYING

The east and north coordinates and surface elevation of each location will be surveyed using the Geodimeter Survey instruments or a global positioning unit. A location can be moved up to three feet due to utility restructions or Geoprobe accessibility without completion of a Variance Request/Field Change Notice (VR/FCN) provided the direction and distance moved are documented in the Field Activity Log. Boring locations which are moved more than three feet will require completion of a VR/FCN. Borings requiring relocation will be resurveyed. The coordinates of the proposed borings are listed in Table 2-1.

2.4 PHYSICAL SAMPLING

2.4.1 Exploratory Boreholes

At each location, soil cores will be collected from a lithologic borehole to identify zones of perched groundwater. The soil cores will be collected using the Geoprobe® Model 5400 in accordance with procedure EQT-06, *Geoprobe® Model 5400-Operation and Maintenance*. Continuous soil cores will be collected in 36 inch intervals from 0 to 25 feet below the surface using the dual tube sampler equipped with a plastic liner insert. The soil cores will be screened using a photoionization detector in accordance with EQT-04, *Photoionization Detector--Calibration, Operation, and Maintenance*. The soil cores collected for lithologic description will be disposed of as described in Section 4.0.

Following completion of the lithologic log by the geologist, the Area Project Manager will determine the depth of perched water samples based on the presence and thickness of the saturated sand lenses. Perched water samples will be collected from saturated sand lenses that are greater than one foot thick.

2.4.2 Perched Water Sampling

For each waterbearing zone identified by the Area Project Manager for perched water sampling, an additional borehole will be installed to the top of each perched water zone (e.g., at locations where two perched water zones are identified, three boreholes will be installed: one boring for lithologic description purposes and two borings for groundwater sample collection). These boreholes will be installed adjacent to the initial lithologic borehole and will be within a five foot radius of the lithologic borehole. A temporary screen point (screen point 15) sampler will then be deployed per procedure EQT-06, *Geoprobe® Model 5400-Operation and Maintenance*. The bottom depth of the screen point will be determined by the Area Project Manager and geologist based on the results of the lithologic borehole. A perched water sample will then be collected using either teflon tubing fitted with a stainless steel check valve or a stainless steel mini bailer. The water sample will be collected to minimize agitation and will be carefully poured from the bailer directly into the sample container identified in Table 2-2.

TABLE 2-2
SAMPLING AND ANALYTICAL REQUIREMENTS[1]

Analyte	Sample Matrix	Sample Type	Preser-vative	Lab	ASL	Holding Time	Container
Volatile Organic Compounds	Liquid	Grab	HCl, pH < 2, Cool 4°C	Off-site	B	14 days	3-40ml amber glass vials

[1] Requirements apply to both normal and field quality control samples.

The technician will ensure that no air bubbles are present in the sample container after placing the lid securely on the sample container. The lid will be encircled with custody tape and the technician will date and initial the taped lid. After collection, the technician will affix a Fernald Analytical Customer Tracking System (FACTS)-generated label to each sample liner/container. The sample will be submitted to the Sample Processing Laboratory for shipment to an off-site contract laboratory for the analysis of VOCs listed in Appendix B (TAL 50.03.59.03-A).

All field measurements, observations, and sample collection information will be recorded as applicable on the Sample Collection Log, the Field Activity Log, Lithologic Log, and a Chain of Custody/Request for Analysis Form. The 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.

2.5 EQUIPMENT DECONTAMINATION

Decontamination will be required to limit the introduction of contaminants from equipment to sampled media and to protect worker safety and health. Sampling equipment will be decontaminated before transport to the sampling area, between sampling intervals, and after all sampling is completed. Because soil cores are to be collected for lithological descriptions only, the soil sampler and components will be wiped down between core intervals and locations to remove visible soil or material. The decontamination of equipment that comes into contact with the perched water sample (i.e., screen point) will be a Level II decontamination prior to installation, as referenced in Section 6.11 of the procedure SMPL-01, *Solids Sampling*. The use of clean disposable wipes can be used in place of air drying for both Level I and Level II decontamination.

2.6 FIELD QUALITY CONTROL REQUIREMENTS

Quality assurance samples will consist of one duplicate perched water sample collected from Location 12119 from the shallowest sand lens, a trip blank, and a rinsate. The duplicate sample will consist of two times the required volume (three-40 ml vials each for the normal sample and the duplicate sample) of a normal sample and will be collected as specified in procedure SMPL-21, *Collection of Field Quality Control Samples.* A trip blank will also be collected per SMPL-21 and will accompany the samples from the field to the laboratory.

2.7 BOREHOLE ABANDONMENT

Boreholes will be abandoned using expansive cement slurry tremied through the probe rods per procedure EQT-06, *Geoprobe® Model 5400-Operation and Maintenance*. Expansive cement slurry shall be maintained within the probe rods as the rods are removed from the borehole during abandonment. Bentonite pellets (with hydration in two-foot intervals) may be used to abandon boreholes that do not collapse when the casing or sampler is removed. All borehole abandonment activities will be completed in accordance with Section 5 and Appendix J of the SCQ. Borehole abandonment will be documented on a borehole abandonment log.

3.0 QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

3.1 PROCEDURES AND MANUALS

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

ADM-02, Field Project Prerequisites

EQT-04, Photoionization Detector--Calibration, Operation, and Maintenance.

EQT-05, Geodimeter 4000 Surveying System - Operation, Maintenance, and Calibration

EQT-06, Geoprobe Model 5400 - Operation and Maintenance

SC-GWM-FO-201, Groundwater Sampling Activities

SMPL-01, Solids Sampling

SMPL-21, Collection of Field Quality Control Samples

SDP 766-S-1000, Shipping Samples to offsite Laboratories

Trimble Pathfinder Pro-XL GPS Operation Manaual

Sidewide CERCLA Quality Assurance Plan (SCQ)

3.2 INDEPENDENT ASSESSMENT

Independent assessment will be performed by the FEMP Quality Assurance (QA) organization by conducting a surveillance. At a minimum, one surveillance will be conducted, consisting of monitoring/observing on-going project activity and work areas to verify conformance to specified requirements. Surveillance will be planned and documented in accordance with Section 12.3 of the SCQ.

3.3 IMPLEMENTATION OF CHANGES

Before the implementation of changes, the Characterization and Sampling Manager will be informed of the proposed changes. Once the Characterization and Sampling Manager has obtained written or verbal approval (electronic mail is acceptable) from the Area Project Manager and QA 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 Variance Request/Field Change Notice Form (VR/FCN). QA must receive the completed VR/FCN, which includes the signatures of the Characterization and Sampling Manager, Area Project Manager, and QA within 7 days of implementation of the change.

4.0 HEALTH AND SAFETY

All work will be performed in accordance with applicable Environmental Monitoring Project Procedures. RM-0021, Safety Performance Requirements Manual, FDF Work Permit, Radiation Work Permit, Penetration Permit, and other applicable permits. Concurrence with applicable safety permits by each team member assigned to this project and will be indicated by signing the briefing record.

All FDF and subcontract personnel working on any portion of the project that utilizes a subcontractor drilling company will be briefed on and comply with the Project Specific Health and Safety Matrix.

The Field Safety Contact will ensure that each team member performing sampling related to this project has been briefed on the applicable permits and the Project Specific Health and Safety Matrix, as applicable. Additionally, team members must be trained to applicable procedures listed in Section 3.1. Personnel who do not sign the Health and Safety documents or who are not trained to the applicable procedures will not participate in the execution of sampling activities related to the completion of assigned project responsibilities. A copy of the applicable safety permits/surveys issued for worker safety and health will be available at each sample location area.

All emergencies shall be reported immediately to the site communication center at 648-6511 or contact "control" on the radio.

5.0 DISPOSITION OF WASTES

During sampling activities, the field sampling team may generate contact waste and decontamination waste. These waste streams will be managed in accordance with the Soils Characterization and Excavation Project's Waste Disposition Support Services (WDSS) through the Project Waste Identification Document (PWID) process. Waste will be managed in accordance with PWID No. 458. Excess soils that meet the On-site Disposal Facility (OSDF) Waste Acceptance Criteria (WAC) based on historical data will be consolidated and dispositioned in Removal Action 17 stockpile SP-3. Soils that exceed the OSDF WAC will be consolidated and dispositioned either to the Operable Unit 1 stockpile (non-RCRA) or transferred to Waste Programs Management for off-site shipment. Soils shall be placed in container labeled with the boring number, date, media, sample plan number. The containers will be left in the area for pickup by Waste Materials Management. Water will be dispositioned to the Plant 8 treatment system.

Generation of decontamination waters will be minimized in the field; wherever possible, equipment will be decontaminated at a facility that discharges to the AWWT, either directly or indirectly through the stormwater collection system. Contact waste generation will be minimized by limiting contact with the sample media, and by using only necessary disposable materials. This waste stream will be evaluated against dumpster criteria using the PWID process. If the materials do not meet dumpster criteria, an alternative disposal option will be identified. The Waste Disposition Contact will be contacted by the Area Project Manager prior (one week if possible) to the start of boring activities to intiate the PWID process.

6.0 DATA MANAGEMENT

A data management process will be implemented during the PSP to properly manage collected information upon completion of the field activities and to supplement existing information that will be used for remedial design and remedial action. As specified in Section 5.1 of the SCQ, sampling teams will describe daily activities on the Field Activity Log (FAL) in sufficient detail so that the sampling team may reconstruct a particular situation without reliance on memory. Sample Collection Logs, Lithologic Logs, and Borehole Abandonment Records will be completed according to instructions specified in Appendix B of the SCQ and applicable procedures.

Electronically recorded data (e.g. Geodimeter) will be downloaded to disks as soon as schedules permit. Team members will review the data for completeness and accuracy, and then download the data to the FEMP local area network (LAN). When the data are on the LAN, the Data Management Lead will perform an evaluation of the data and produce an error file and a compressed archive data file. Once complete, the data will be sent to a loader where it will be loaded out on the Oracle system and an error log will be generated. The data will be made available to users through both the Graphical Information System (GIS) and Microsoft Access software.

Field documentation, such as the FAL, will undergo an internal QA/QC review by field team members. Copies will be delivered to the Data Management Contact, who will evaluate the data and create the appropriate links between electronic and paper data. The paper data will then be sent to data entry personnel who will input it into the Oracle system. Field packages will be validated by the QA validation team.

Analytical data from on-site and off-site laboratories will be reported in preliminary form to the Project Characterization Lead by the laboratory contact as soon as the data are available in the FACTS database. Following validation of the data for each sample release, the data for that release will be reported to the Project Characterization Lead in the final data report format.

APPENDIX A

DATA QUALITY OBJECTIVE

Control Number _____

Fernald Environmental Management Project

Data Quality Objectives

Title: Delineating the Extent of Constituents of Concern in Predesign Investigation and Remediation Sampling

Number: SL-048

Revision: 0

Final Draft: September 19, 1997

Contact Name: John Centers

Approval: William D. Kelley **Date:** 9-19-97
William D. Kelley
DQO Coordinator

Approval: Joan White **Date:** 9-19-97
Joan White
Project Lead

Rev. #	0	1	2				
Effective Date:							

DATA QUALITY OBJECTIVES
Delineating the Extent of Constituents of Concern in Predesign 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 confidence limits for delineation boundaries will be specified in pre-design planning documents.

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 be carried out for the purpose of delineating 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, when weighed against the reduced uncertainty in the delineation model, will determine the sampling density. Individual PSPs will identify the locations and depths to be sampled, along with the sampling density necessary to obtain the desired accuracy of the delineation as well as where the samples will be analyzed (i.e. on-site, off-site, or both). 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. As a QC measure, one in ten (10%) of the samples collected will be split and submitted to both the on-site and approved off-site laboratories. The split portions analyzed on-site will serve as laboratory duplicate samples for QC purposes. Results obtained from these analyses will also be used as delineation data. 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. The RTRAK and HPGE data will be ASL A.

7.2 COC Delineation

The media COC delineation will utilize 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

Ninety percent (90%) of the samples collected will be submitted to the on-site laboratory and analyzed for the indicated contaminants at ASL B. Laboratory work will follow the requirements specified in the SCQ. The remaining ten percent (10%) of the samples collected will be split (as a QC duplicate) and analyzed both on-site and sent to an off-site qualified full service laboratory. The ten percent of the samples that are split will be analyzed both on-site and off-site at ASL D. Actual ratios of on/off-site analysis is dependent on onsite laboratory capacity. Laboratory quality control measures include a media prep blank, a laboratory control sample (LCS), matrix duplicates and matrix spike. Field quality control measures for ASL D samples include duplicate samples, equipment rinsates, field blanks, trip blanks, and container blanks. The PSPs will specify appropriate field QC samples for the media type the respective ASL in accordance with the SCQ. 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 10 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 (VOC's). 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 (SVOC's) field blanks will be taken at a minimum of one per 20 samples. 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. All of the ASL D 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 support 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*
- EQT-09, *Spectrace 9000 Field Portable X-Ray Fluorescence Spectrometer - Calibration, Operation, and Maintenance*

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. 0 DQO Reference No.: SL-036, REV. 2

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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: App. B Table 1
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. 0

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

Background samples: QU5 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

TARGET ANALYTE LIST

AREA 1, PHASE II REMEDIAL ACTION WORK PLAN SAMPLING
Project Number 50.03.59.03
TAL 50.03.59.03 - A

	ASL	Analyte
1	B	1,1-Dichloroethane
2	B	1,1-Dichloroethene
3	B	1,1,1-Trichloroethane
4	B	1,1,2-Trichloroethane
5	B	1,1,2,2-Tetrachloroethane
6	B	1,2-Dichloroethane
7	B	1,2-Dichloroethene (Total)
8	B	1,2-Dichloroethylene
9	B	1,2-Dichloropropane
10	B	2-Butanone
11	B	2-Hexanone
12	B	4-Methyl-2-Pentanone
13	B	Acetone
14	B	Benzene
15	B	Bromodichloromethane
16	B	Bromoform
17	B	Bromomethane
18	B	Carbon Disulfide
19	B	Carbon Tetrachloride
20	B	Chlorobenzene
21	B	Chloroethane
22	B	Chloroform
23	B	Chloromethane
24	B	cis-1,3-Dichloropropene
25	B	Dibromochloromethane
26	B	Ethylbenzene
27	B	Methylene chloride
28	B	Styrene
29	B	Tetrachloroethane
30	B	Toluene
31	B	Total Xylenes
32	B	trans-1,3-Dichloropropene
33	B	Trichloroethane
34	B	Vinyl Chloride