5-402.21 1140

PROJECT SPECIFIC PLAN FOR PRE-DESIGN INVESTIGATION OF TECHNETIUM-99 IN SOIL IN THE SEWAGE TREATMENT PLANT AREA

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

SEPTEMBER 1997

U.S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE

55200-PSP-0002
~~(55200-PSP-0001)~~
REV. 0

000001

VARIANCE / FIELD CHANGE NOTICE

V/F No. 50.03.59.02-1

WBS NO.: 50.03.59.02 55200-PSP-0002

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PROJECT TITLE: A1P11 Pre-Design Investigation for Tc-99 at STP Area (Rev. 0)

Date:9/17/97

VARIANCE / FIELD CHANGE NOTICE (Include justification):

The following changes to the PSP are necessary due to the lack of on-site laboratory capacity:

- All soil samples collected for Tc-99 will be analyzed at an offsite contract laboratory at ASL D using TAL 50.03.59.02-B. This includes the duplicate samples.
- The duplicate sample ID analyzed off-site will contain the "D" QC indicator per Appendix B table of the PSP.
- Rinsates for Tc-99 will be analyzed at the on-site laboratory at ASL B (TAL A).

The sample identifiers in Appendix B of the PSP are missing the "R" analyte code. The "R" code will be included after the depth interval code of the existing sample IDs (Example: A1P2Tc-11-7-R and A1P2Tc-11-1-R-D).

Justification:

This change is necessary due to lack of onsite lab capacity. The sample ID change is necessary for consistency.

REQUESTED BY: Mike Frank MF Date: September 19, 1997

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE		X	PROJECT MANAGER	9/19/97
	DATA QUALITY MANAGEMENT		X	SCEP SAMPLING & CHARACTERIZATION	9/19/97
X	ANALYTICAL CUSTOMER SUPPORT	9/19/97		OTHER	
	OTHER for WESTINGHOUSE			OTHER	

VARIANCE/FCN APPROVED [X]YES [ ]NO

REVISION REQUIRED: [ ]YES [x]NO

DISTRIBUTION

PROJECT MANAGER:	DOCUMENT CONTROL: Michelle Tudor	OTHER:
QUALITY ASSURANCE:	OTHER:	OTHER:
FIELD MANAGER:	OTHER:	OTHER:

ORIGINAL

VARIANCE / FIELD CHANGE NOTICE

V/F No. 60.03.59.02-2

PROJECT TITLE: A1PII Pre-Design of Tc-99 in Soil in the Sewage TP Area (Rev. 0)

Date: 9/29/97

/ARIANCE / FIELD CHANGE NOTICE (Include justification): 55200-PSP-0002

This variance documents the relocation of several sample locations due to the presence of underground utilities. The changes are as follows:

Location	Original Coord.s Northing/Easting	Revised Coord.s Northing/Easting	Approximate Distance Moved
Tc-19	479897.5/1351514.4	479891.2/1351499.6	2 ft. W
Tc-21	479947.5/1351495.2	479951.2/1351489.1	2 ft. NW
Tc-2	479969.7/1351502.4	479964.5/1351494.6	8 ft. SW
Tc-6	479922.6/1351500.4	479922.0/1351499.2	2 ft. W
Tc-8	479932.6/1351502.7	479932.8/1351497.0	6 ft. W
Tc-9	479920.3/1351509.6	479920.2/1351516.8	7 ft. W
Tc-16	479987.8/1351499.7	479985.3/1351491.7	8 ft. W

Justification:

Underground utilities and site procedures for penetration permits would not permit soil borings at the original planned coordinates.

This variance also documents a change in the target depth for Location A1P2Tc-6. Sample A1P2Tc-6-7 (depth interval 36-42") could not be collected due to refusal (rock) at a depth of 31 inches.

Justification:

Collection of this interval is not necessary at this location unless the Tc-99 analytical results are above the FRL. If necessary, an adjacent boring will be performed later to recover this depth interval.

ORIGINAL

REQUESTED BY: Mike Frank MF Date: October 14, 1997

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE	10-14-97	X	PROJECT MANAGER ARL for STL	10/14/97
	DATA QUALITY MANAGEMENT		X	SCEP SAMPLING & CHARACTERIZATION	10/14/97
for JMW 10/14/97	ANALYTICAL CUSTOMER SUPPORT		X	OTHER Char. Lead	10/14/97
	OTHER			OTHER	

VARIANCE/FCN APPROVED [X]YES [ ]NO

REVISION REQUIRED: [ ]YES [x]NO

DISTRIBUTION

PROJECT MANAGER:	DOCUMENT CONTROL: Michelle Tudor	OTHER:
QUALITY ASSURANCE:	OTHER:	OTHER:
FIELD MANAGER:	OTHER:	OTHER:

PROJECT SPECIFIC PLAN
FOR PRE-DESIGN INVESTIGATION OF TECHNETIUM-99 IN SOIL IN THE SEWAGE TREATMENT PLANT AREA

Project No. 50.03.59.02

Revision: 0

Date: September 9, 1997

Prepared by: Fluor Daniel Fernald

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

Under Contract DE-AC05-92OR21972

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Soil Characterization & Excavation Project

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Joan White, Soil Characterization and Sampling Manager — Date
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Reinhard Friske, Quality Assurance — Date
Soil Characterization Excavation Project

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LIST OF ACRONYMS AND ABBREVIATIONS

CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
DQO	data quality objective
FACTS	Fernald Analytical Customer Tracking System
FRL	final remediation level
g	gram
GIS	Graphical Information System
LAN	local area network
OSDF	On-Site Disposal Facility
OU5	Operable Unit 5
pCi	picocuries
PSHSM	Project Specific Health Safety Matrix
PSP	project specific plan
QA/QC	quality assurance/quality control
RI/FS	Remedial Investigation/Feasibility Study
SCEP	Sitewide Characterization Excavation Plan
SCQ	Sitewide CERCLA Quality Assurance Project Plan
SMMP	Soils and Miscellaneous Media Projects
STP	Sewage Treatment Plant
TAL	target analyte list
VR/FCN	Variance Request/Field Change Notice
WAC	waste acceptance criteria

1.0 INTRODUCTION

1.1 PURPOSE

The Operable Unit 5 (OU5) Remedial Investigation/Feasibility Study (RI/FS) determined that technetium-99 is a contaminant of concern (COC) in environmental media at the Fernald Environmental Management Project (FEMP). Final remediation levels (FRLs) for technetium-99 in soil has been established as 30 picocuries per gram (pCi/g). Additionally, a chemical specific waste acceptance criterion (WAC) for placement of technetium-99 contaminated soil into the On-Site Disposal Facility (OSDF) has been established as 29.1 pCi/g. Data gathered during the RI/FS process revealed exceedances of the WAC and FRL for technetium-99 within the Sewage Treatment Plant (STP) area. The purpose of this PSP is to reexamine the technetium-99 concentrations within the area for the following reasons:

- Based on process knowledge, it is unlikely that technetium-99 contamination would be widespread the FEMP, especially in the STP area.
- During the RI/FS, Batch Recovery Proportional Counting was the primary analytical method used to determine technetium-99 concentrations for soil and sediment samples. Since this method allowed beta emitting uranium-daughter products to be counted as technetium-99, it caused problems which potentially contributed to false positives. This method was declared obsolete in mid-1995 by FEMP radiochemists and data validation scientists. A newer, more accurate method of technetium-99 analysis is now in use at the FEMP, which is not effected by uranium daughters.. It is also a proportional counting method; however, it incorporates a sample-specific chemical recovery metastable tracer to improve accuracy.
- A mechanistic argument casts doubt on the reliability of technetium-99 concentrations measured during the RI/FS. Technetium-99 is extremely mobile in soil (K_d=0.118), and elevated activities are unlikely to be found in surface soils.

1.2 PREVIOUS INVESTIGATIONS

This Project Specific Plan (PSP) presents a sampling strategy to re-evaluate technetium-99 soil concentrations in the Sewage Treatment Plant area where previous investigations identified technetium-99 concentrations above the WAC or FRL limits. As shown in Figure 1, Existing Technetium-99 Sample Locations in the STP Area, three locations (Boring 1441, Zone 1-80, and Manhole 175) have results exceeding the WAC and FRL limits. Figure 1 shows these locations, the depths, and the associated results in pCi/g. Also shown in Figure 1 is the kriging model of technetium-99 above WAC/FRL and the location of other samples, which are below the WAC/FRL limit. Based on this

data, the technetium-99 contaminated soil, which has concentrations above the WAC/FRL limit and excavated during remedial activities could not be placed in the OSDF.

1.3 SCOPE

The scope of this PSP is to confirm the results of the previous investigations and to further delineate technetium-99 in the STP area. In order to meet this objective, this PSP will be executed in two phases. Phase 1 will be to collect samples at the original locations of results above the WAC and FRL limits, and at four additional locations in a symmetrical pattern around each of the original points. The sampling locations are shown in Figure 2, Proposed Sampling Locations in the STP Area. At each location samples will be collected at the 0 - 0.5, 1.0 -1.5, 2.0 -2.5 and 3.0 -3.5 foot intervals and submitted to the laboratory for technetium-99 analysis. Even though historical data indicates that the contamination is primarily on the surface, given the mobility of technetium-99 collecting samples at these intervals will provide additional confidence in the kriging model. If any of the results from Phase 1 sampling shows results exceeding the FRL or WAC limits then additional samples from the contingency locations designated as Phase 2 will be collected.

All sampling and analysis activities shall be consistent with the Sitewide Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Quality Assurance Project Plan (SCQ), and Data Quality Objectives (DQO) SL-036, Revision 0 (Appendix A).

1.4 KEY PERSONNEL

Key personnel, from the DOE, FEMP Soil Characterization and Excavation Project (SCEP), and other FEMP support organizations are listed in Table 1-1 below.

TABLE 1-1 KEY PERSONNEL

TITLE	PRIMARY	ALTERNATE
DOE Contact	Kathi Nickel	Rob Janke
A1PII Manager	Steve Garland	Cliff Blanchard
A1PII Characterization Lead	Alex Duarte	Joan White
Characterization and Sampling Manager	Joan White	Jim Schwing
Field Sampling Lead	Mike Frank	Tom Buhrlage
Quality Assurance Contact	Reinhard Friske	Harold Swiger
Data Management Contact	Alex Duarte	Susan Marsh
Waste Disposition Contact	Sue Lorenz	Ken Belgrave
Analytical Lead	Bill Westerman	Al Bacon
Health and Safety	Jack Patrick	Kevin Tschaenn

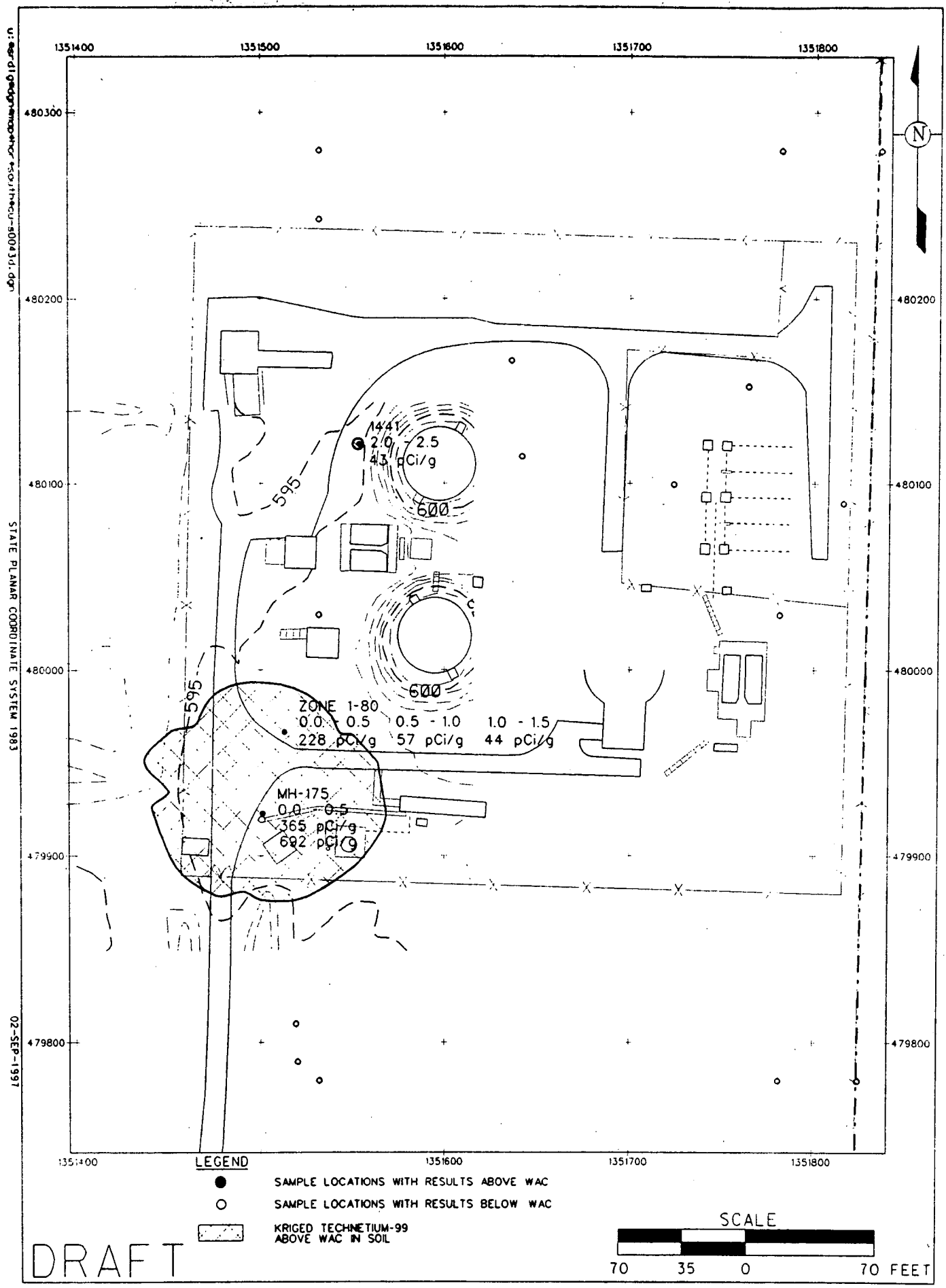

FIGURE 1. EXISTING TECHNETIUM-99 SAMPLE LOCATIONS IN THE STP AREA

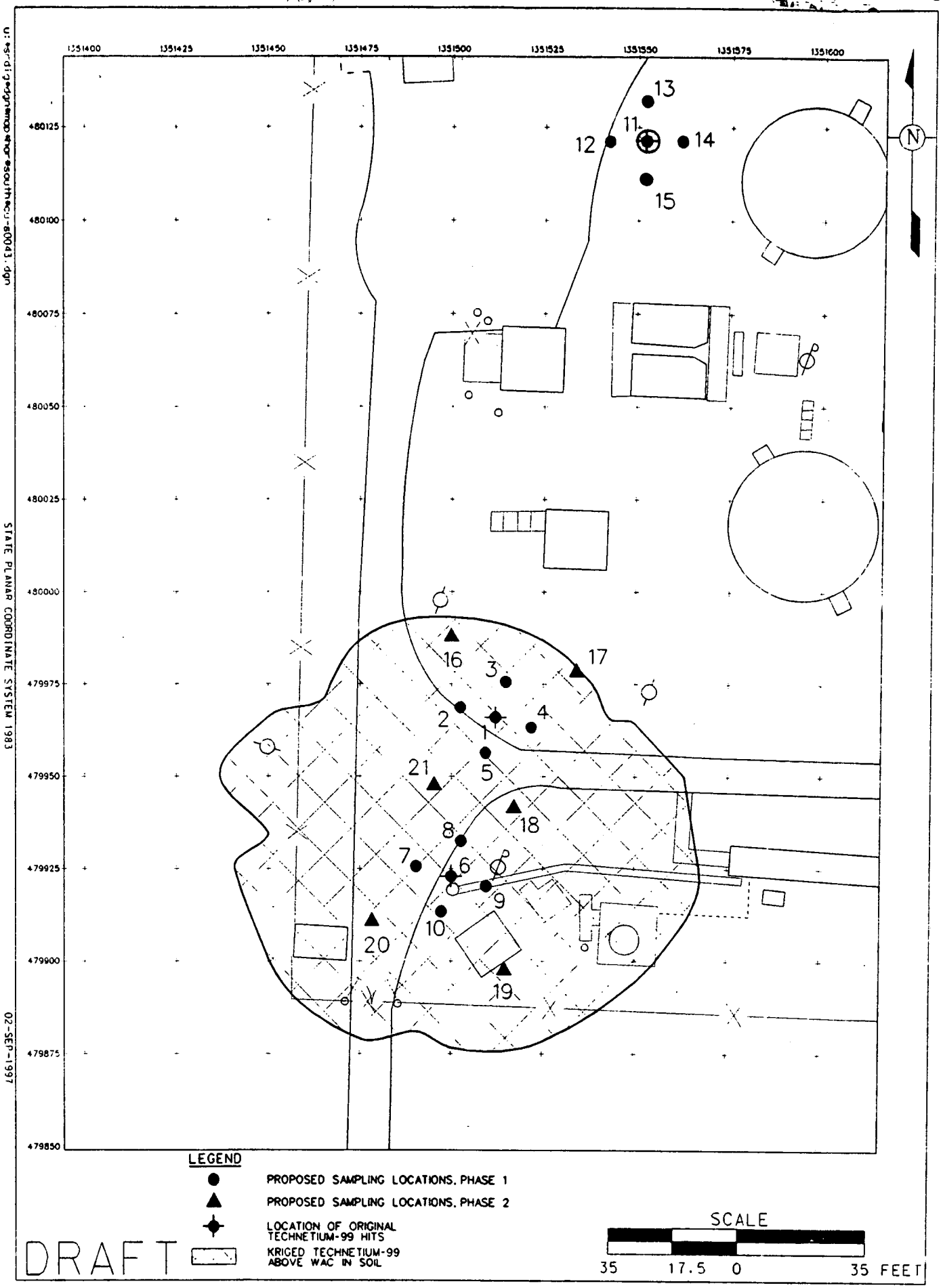

FIGURE 2. PROPOSED WAC SAMPLING LOCATIONS IN THE STP AREA

2.0 FIELD ACTIVITY PROGRAM

2.1 SAMPLE LOCATIONS

2.1.1 Sample Location Strategy

Sample locations were biased using historical data where data indicated hits above the WAC or FRL limit. The sampling will be conducted in two phases. Phase 1 consists of sampling at original locations of the WAC / FRL exceedances, and at four additional locations in a symmetrical pattern around each of the original technetium-99 hits. In Figure 2, sample points 1 (Zone 1-80), 6 (Manhole 175), and 11 (Boring 1441) are at the locations of original hits. The four sample locations surrounding the original hits are at a distance of 10 feet. The 10 foot interval was selected based on the distance that would best increase the confidence in the kriging model. Sample points 2, 3, 4, and 5 surround the Zone 1-80 location; 7, 8, 9, 10 surround Manhole 175; and 12, 13, 14, 15 surround Boring 1441.

The Phase II contingency locations were selected based on refining the kriging model as shown in Figure 2. These samples will only be collected if the results from the Phase I analyses exceed the FRL /WAC limit. These contingency locations were based on needing additional data around the Zone 1-80 and Manhole 175 hits to better define the limit of excavation. The Phase II locations were selected by placing a 25 foot circle around the original two points, and sampling points were selected where the two circles intersected (sample points 18 and 21) and at four more locations around the periphery of the area (sample points 16, 17, 19, and 20). Based on the current model, additional data at these distances and depths will increase the confidence limit in the model. Since the current kriging model indicated a very limited amount of contamination around Boring 1441, no Phase II samples are necessary to refine the kriging model. Upon review of the Phase I data, the Characterization Lead reserves the right to change the contingency locations. These changes will be executed in compliance to Section 4.4 of this PSP.

At each location samples will be collected at the 0 - 0.5, 1.0 -1.5, 2.0 -2.5 and 3.0 -3.5 ft intervals and submitted to the laboratory for technetium-99 analysis. Also, the proposed sample locations were examined to determine if underground utilities existed in the area. As a result, sample point #19 was relocated to the location as shown in Figure 2.

2.1.2 Surveying

The NAD83 State Planar coordinates and elevation will be determined for each sample location. Prior to sample collection, sample locations will be identified and flagged using the Geodimeter survey instrumentation following procedure EQT-05, *Geodimeter® 4000 Survey System - Operation, Maintenance, and Calibration.*

2.2 PHYSICAL SAMPLE COLLECTION

Samples will be collected by either using a Geoprobe® or using a hand-operated auger or core barrel sampler, depending on field conditions. Samples collected using the Geoprobe® Model 5400 will be done in accordance with Procedure EQT-06, *Geoprobe Model 5400-Operation and Maintenance.* The sampling technicians will remove all existing surface vegetation using a stainless steel trowel or clean nitrile gloves within a six-inch radius of the sample point, taking care to minimize the removal of any soil. At each sampling location one push will be performed to a depth of 42 inches using the Macro-Core sampler with a plastic liner insert. The Geoprobe® drill bit will be used to drill through any pavement and/or the cement/rock subsurface. Each sample core will be divided into six-inch sample increments. The 0 - 6", 12" -18", 24" - 30", and 36"- 42" increments will be submitted for technetium-99 analysis using the sample identification numbers in Appendix B. The sampling interval begins at the soil below the surface. For example, if the sample location is below a concrete pad, the sample interval begins below the pad.

If Geoprobe access is impossible, the technicians will retrieve the samples using a hand-operated auger or core barrel sampler according to SMPL-01, *Solids Sampling*. The technician will remove any surface vegetation using a stainless steel trowel or clean nitrile glove within a ten-inch radius of the sample point, taking care to minimize the removal of any soil. Samples will be collected using either a hand auger or a one- to two-inch butyrate liner with a split or solid barrel sampler (as soil conditions require) to collect a soil core to a depth of 42 inches.

Duplicate samples will be collected at a frequency of 1 in 10. Duplicates will be collected by making two adjacent pushes (side by side within a 6" radius), and throughly compositing and mixing the increments. The locations and depths for the duplicate samples are identified in Appendix B. Samples chosen for duplicate analyses will be homogenized and split in the field. One split will be submitted to the on-site laboratory for technetium-99 analysis and reported at ASL D. The other split will be submitted to an offsite laboratory for technetium-99 analysis and reported at ASL D. (Note: The samples going on-site get a "D" code on the sample identification.) The remainder of the samples (90

percent) samples will be sent to the on-site laboratory for technetium-99 at Analytical Support Level (ASL) B.

In addition, one rinsate sample will be collected from the split-spoon or cutting shoe (dependent on boring method) at a frequency of 1 in 20 spoons or shoes that are decontaminated. A rinsate will be collected prior to sample collection and associated (on the Sample Collection Log) with the subsequently collected soil samples until the next rinsate is collected. Rinsates will be analyzed on-site to ASL D.

All field measurements and sample collection information shall be recorded on the Sample Collection Log, the Field Activity Log and the Chain of Custody/Request for Analysis form as required. All samples will be assigned a unique sample number supplied by the Field Sampling Lead. This unique sample number shall appear on the Chain of Custody/Request for Analysis form and used to identify the sample during analysis, data entry, and data management. The sample locations, associated sample numbers, and field duplicates are listed in Appendix B.

Drill cuttings will be containerized and disposed of according to direction from the Waste Disposition Contact. Boreholes will be backfilled with bentonite pellets and hydrated. Table 3-1 lists the sampling analytical requirements including volume. A borehole abandonment log will be completed.

2.3 SAMPLE IDENTIFICATION

All physical soil samples collected for laboratory analysis will be assigned a unique sample identifier as follows: A1P2Tc-*sample location - Depth - QC,* where:

A1P2 = Area I, Phase II
Tc = Investigation Sample Activity for technetium-99
Sample Location = Location as shown in Figure 2
Depth = 0" - 6" interval = 1
12" - 18" interval = 3
24" - 30" interval = 5
36" - 42" interval = 7
This is based on a six inch interval nomenclature
QC = "D" indicates duplicate, "X" indicates rinsate.
Note: Rinsates will be identified as A1P2Tc-X-1, A1P2Tc-X-2, A1P2Tc-X-3, and so on.

Appendix B provides a list of all the samples associated with this PSP, including sample ID and locations.

2.4 EQUIPMENT DECONTAMINATION

Sampling equipment will be decontaminated before transport to the sample area, after each sample collection, and after all sampling is completed to limit the introduction of contaminants from equipment to sampled media and to protect worker safety and health. Level II decontamination will be applied to equipment that comes into contact with the sample (i.e., the core cutting shoe, if used), as referenced in Section K.11 of the SCQ. Clean disposable wipes may be used instead of air drying. The core barrel portion of the sampler will be wiped down between sample intervals (Level I decontamination) 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.

Level II Decontamination shall be applied to all equipment, as referenced in Section K.11 of the SCQ and as described in SMPL-01, *Solids Sampling*.

2.5 SAMPLE HANDLING, SHIPPING, ARCHIVAL

2.5.1 Sample Handling

All samples will be collected in a standard sample container. The technician will ensure that the external surfaces, including the threads, are free of visible debris (a disposable towel will be used for exterior container cleaning). After careful placement of the sample into the container, the technician will place the lid securely on and encircle it with custody tape. The technician will initial and date the taped lid. After collection, the technician will affix a Fernald Analytical Customer Tracking System (FACTS)-generated label to each sample liner/container.

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. 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. The appropriate TAL identifier as noted in Table 3-1 and Appendix C will be listed on each Chain of Custody/Request for Analysis form.

2.5.2 Sample Shipping

All samples will be transported from the field to Room 158 in the on-site laboratory (non-production side) in an adequately constructed container for handling. Samples to be analyzed at the on-site laboratory will require no special sample shipping instructions.

3.0 LABORATORY ANALYSIS AND VALIDATION

3.1 ANALYTICAL REQUIREMENTS

Physical samples submitted for laboratory analysis will be sent to both on-site and off-site laboratories. As identified in Appendix B, in Phase I, 60 samples are planned to be submitted to the on-site laboratory for analysis, and 6 (i.e. 10 percent duplicate) are planned to be sent off-site. The Characterization Lead in coordination with Analytical Lead reserves the right to send more samples off-site if the on-site laboratory is unable to meet the project required turnaround time or project requirements. The samples submitted to the on-site laboratory will analyzed by procedure CIO AC97-0033, Radiometric Determination of Technetium-99 in Various Matrices. Samples will be analyzed and reported to ASL B, except the samples identified in Appendix B as being analyzed and reported at ASL D. The samples will not be dried, but not ground. The results will be reported on a dry weight basis. All samples sent off-site will be reported at ASL D, and analyzed per the task order specific requirements. A technetium-99 standard will accompany the samples shipped off-site. All laboratories must comply to the requirement that the highest allowable minimum detection limit is 2.0 pCi/g, which is well below the WAC or FRL limit. Turnaround time for all samples is seven days. Table 3-1 summarizes the sampling and analytical requirements.

Table 3-1
Sampling and Analytical Requirements

Analyte / TAL	Sample Matrix	Sample Type	Preser-vative	Lab	ASL	Holding Time	Container
Tc-99 / 50.03.59.02-A	Solid	Grab	None	On-site	B	6 Months	Capped plastic liner or 500 ml glass or plastic container
Tc-99 / 50.03.59.02-B	Solid	Duplicate / Grab	None	On-site	D	6 Months	Capped plastic liner or 500 ml glass or plastic container
Tc99 / 50.03.59.02-B	Solid	Duplicate / Grab	None	Off-site	D	6 Months	Capped plastic liner or 500 ml glass or plastic container
Tc99 / 50.03.59.02-B	D.I. Water	Rinsate	None	On-site	D	6 Months	1 liter polyethylene

Physical samples collected will be assigned one of the Target Analyte Lists in Appendix C.

All ASL D from both the on-site and off-site laboratories will be subject to level D data validation. None of the ASL B data will be validated.

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 OBJECTIVE

DQO SL-036, Rev. 2 was used for this PSP. An uncontrolled copy of this 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*
EQT-06, *Geoprobe® Model 5400 - Operation, Maintenance, and Calibration*
EQT-05, *Geodimeter® 4000 Survey System - Operation, Maintenance, and Calibration*
CIO AC97-0033, *Radiometric Determination of Technetium-99 in Various Matrices*
SMPL-21, *Collection of Quality Control Samples*

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 surveillances. At least 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. Surveillances will be planned and documented according to Section 12.3 of the SCQ.

4.4 IMPLEMENTATION OF FIELD CHANGES

If field conditions require changes to or variances from the PSP, the Field Sampling Lead must obtain verbal or 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, Characterization Lead, Sampling and Characterization Manager, and the QA Representative, within seven working days after verbal approval is granted.

4.5 QUALITY CONTROL

Quality control procedures required for samples collected in support of this PSP are as follows:

1. Duplicate samples will be collected at a frequency of 1 in 10. The duplicate samples are identified in Appendix B.
2. Nine of ten samples will be sent to the on-site laboratory for technetium-99 at Analytical Support Level (ASL) B.
3. Samples chosen for duplicate analyses will be homogenized and split in the field.
4. One split will be submitted to the on-site laboratory for technetium-99 analysis and reported at ASL D. (Note: The samples going off-site get a "D" code on the sample identification.)
5. The other split will be submitted to an offsite laboratory for technetium-99 analysis and reported at ASL D.
6. All ASL D data will receive D validation.
7. Rinsates will be analyzed on-site to ASL D.

In addition, one rinsate sample will be collected from the split-spoon or cutting shoe (dependent on boring method) at a frequency of 1 in 20 spoons or shoes that are decontaminated. The highest allowable minimum detectable concentration for this project is 2.0 pCi/gram. Analytical requirements are shown in Table 2-3 and the Target Analyte List is presented in Table 2-4.

5.0 DISPOSITION OF WASTES

During completion of sampling activities, EM personnel may generate small amounts of soils, waters, and contact waste. Management of these waste streams will be coordinated with SCEP Waste Disposition Support Services (WDSS), through the Project Waste Identification Document (PWID) process. Soils will be evaluated for disposition during the PWID process. Generation of decontamination waters will be minimized in the field; whenever 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 sample media, and by using only those disposable materials as are necessary. This waste stream will be evaluated against dumpster criteria during the PWID process. If it does not meet these criteria, an alternative disposition will be identified. WDSS should be contacted by the Area Project Manager prior (one week) to start of field activities to initiate the PWID process. If there is not sufficient time for a PWID to be generated, the materials will be managed as follows:

Excess soil (including archived soil cores) believed to be below WAC based on existing data, pre-design data, and the data obtained through this PSP, or which the field radiological survey was < 100 cpm and the area is not one of the seven suspect RCRA areas - return excess soil to the surface at the sampling location. Any real time monitoring must be completed at the sampling location prior to any material being placed on the surface to ensure the excess soil does not interfere with the readings. If real time monitoring is to follow sampling, the excess soil must be containerized and marked with the boring number, date and the rad survey information and left in the vicinity of the boring for disposition to an RvA 17 stockpile by WDSS.

Excess soil (including archived soil cores) believed to be above WAC based on existing data, pre-design data, and the data obtained through this PSP, or which the field radiological survey was > 100 cpm and the area is not one of the seven suspect RCRA areas - OU1 stockpile or if the material can not be moved by the sampling team, containerize and mark with the boring number, date and the rad survey information and leave in the vicinity of the boring for disposition to OU1 by WDSS.

Decontamination water - containerize and mark with the date, boring number and radiological survey information and disposition through the AWWT.

Contact waste - collect in plastic bags, label with content information and take to nearest dumpster. If the material does not meet dumpster criteria, contact WDSS for an alternate disposition.

6.0 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.

7.0 DATA MANAGEMENT

A data management process will be implemented during the PSP to properly manage collected information upon completion of the field activities 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 in sufficient detail to allow 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.

Field documentation, such as the FAL, SCL, and Borehole Abandonment Record, will undergo and internal quality assurance / quality control review by SMMP Sample Technicians. A second review will be performed by FEMP QA personnel. Copies will then be generated and delivered to data entry personnel for input into the Sitewide Environmental Database (SED).

Electronically recorded data from the Geodimeter unit will be downloaded to disks on a weekly basis or as the project requires. Technicians will review the data for completeness and accuracy and then download it onto the FEMP Local Area Network (LAN). Once on the LAN, the Data Management Contact within the SCEP will evaluate the data and then send it to the loader, where it will be loaded onto the Oracle system and an error log will be generated. The data will then be made available to users through both the Graphical Information System (GIS) and Microsoft (MS) Access Software.

The list of planned sample points in Appendix B will be entered into the SOILS MASTER LIST by the Data Manager. This table serves as the starting point for tracking sample data. As sample points are surveyed, actual northing and eastings will be transmitted via electronic file to be entered into the SED.

Analytical data from the on-site laboratory will be reported in preliminary form to the Characterization Lead by the Laboratory Contact when the data are available in the FACTS database. After the data are validated for each sample release, the data for that release will be reported to the Characterization Lead in the final data report format.

APPENDIX A

DATA QUALITY OBJECTIVE

SL-036

Note: The attached DQO is for informational purposes only.

Refer to controlled copy for most current revision.

Control Number _____

Fernald Environmental Management Project

Data Quality Objectives

Title: Delineating the Extent of Soil Constituents of Concern

Number: SL-036

Revision: 2

Final Draft: August , 1997

Contact Name: Eric Kroger / John Centers

Approval: DS MacEwen for WD Kelley **Date:** 8/19/97
William D. Kelley
DQO Coordinator

Approval: Steve Garland **Date:** 8/19/97
Steve Garland
Project Lead

Rev. #	0	1	2				
Effective Date:	05/05/97	07/29/97	8/19/97				

DATA QUALITY OBJECTIVES
Delineating the Extent of Soil Constituents of Concern

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
Soil is considered contaminated if the concentration of a constituent of concern (COC) exceeds the final remediation levels (FRLs). The extent of soil contamination was estimated and published in the Operable Unit 5 Feasibility Study (FS). These estimates were based on kriging analysis of available uranium data for soil collected during the Remedial Investigation (RI) effort and other FEMP environmental characterization studies. Maps outlining contaminated soil boundaries were generated for the Operable Unit 5 FS by overlaying the results of the kriging analysis of uranium 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 soil characterization data. A sequential remediation plan has been presented that subdivides the FEMP into seven construction areas. During the course of remediation, areas of soil may require additional characterization so soil 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 soil as exceeding a target level, such as the FRL or WAC.

1.0 Statement of Problem

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

2.0 Identify the Decision

Delineate the horizontal and/or vertical extent of soil 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 soil FRLs and OSDF WAC concentrations. Soil FRLs are established in the OU2 and OU5 RODs, and the WAC concentrations are published in the OU5 ROD. Soil COCs may also require delineation with respect to other action levels that act as remediation drivers, such as BTVs and ALARA levels.

4.0 The Boundaries of the Situation

Temporal Boundaries - Sampling must be completed within a time frame sufficient to meet the soil 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 soil COC contamination at or above the appropriate action level. This delineation will result in soil contaminant concentration information being incorporated into engineering design, and the attainment of established remediation goals.

Parameters of Interest - The parameters of interest are the desired action levels of soil COCs that have been determined to require additional delineation before soil 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 in additional soil concentration 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 soil 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 soil 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 soil contaminated with COC(s) above the action level(s). This could result in the re-mobilization of excavation equipment and delays in the soil

remediation schedule. Also, this could result in soil 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 soil 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 soil 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 soil 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 soil 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. The Geoprobe® technique or an alternate method identified in SMPL-01, *Solids Sampling,* will be used to obtain soil samples at required depth. The PSP will 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 soil 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 FRL(s).

7.2 COC Delineation

The soil COC delineation will utilize all data collected under the PSP, and if deemed appropriate by the Project Lead, may also include existing soil concentration 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 soil 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. Laboratory quality control measures include a soil 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. All field QC samples will be analyzed at ASL D. 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). 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). Field blanks are not necessary for metals TAL analysis as it is unlikely in ambient field conditions to have metals cross contamination, however, the probability of cross contamination with semi-volatile organic compounds is much higher therefore for 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.

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 soil COC's.

7.6 Applicable Plans/Procedures

Sample collection under the PSP shall follow the requirements outlined within these existing site plans/procedures:

- 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 Soil 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-036, Rev. 2 DQO Reference No.: SL-043

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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 soil 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	☐	2. Uranium	☒ *	3. BTX	☐
Temperature	☐	Full Radiological	☒ *	TPH	☐
Specific Conductance	☐	Metals	☒ *	Oil/Grease	☐
Dissolved Oxygen	☐	Cyanide	☐		
Technetium-99	☒ *	Silica	☐		

4. Cations	☐	5. VOA	☒ *	6. Other (specify)
Anions	☐	BNA	☒ *	
TOC	☐	Pesticides	☒ *	
TCLP	☒ *	PCB	☒ *	
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	☒	Composite	☐	Environmental	☒	Grab	☒	Grid	☒
Intrusive	☒	Non-Intrusive	☐	Phased	☐	Source	☐		

DQO Number: SL-036, Rev. 2

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 IDENTIFICATION NUMBERS

APPENDIX B
SAMPLE LOCATIONS

Sample Location (Figure 2)	Easting Coordinate	Northing Coordinate	Sample Depth	Sample Identification Number	Laboratory & Analytical Support Level	Phase / Purpose of Sample
1	1351511.99	479966.41	0" - 6"	A1P2Tc-1-1	On-site - ASL D	Phase 1 - Location of Zone 1-80 Hit
1	1351511.99	479966.41	0" - 6"	A1P2Tc-1-1-D	Off-site - ASL D	Phase 1 - Field Duplicate
1	1351511.99	479966.41	12" - 18"	A1P2Tc-1-3	On-site - ASL B	Phase 1 - Location of Zone 1-80 Hit
1	1351511.99	479966.41	24" - 30"	A1P2Tc-1-5	On-site - ASL B	Phase 1 - Location of Zone 1-80 Hit
1	1351511.99	479966.41	36" - 42"	A1P2Tc-1-7	On-site - ASL B	Phase 1 - Location of Zone 1-80 Hit
2	1351502.39	479969.67	0" - 6"	A1P2Tc-2-1	On-site - ASL B	Phase 1 - Bound Zone 1-80 Hit
2	1351502.39	479969.67	12" - 18"	A1P2Tc-2-3	On-site - ASL B	Phase 1 - Bound Zone 1-80 Hit
2	1351502.39	479969.67	24" - 30"	A1P2Tc-2-5	On-site - ASL B	Phase 1 - Bound Zone 1-80 Hit
2	1351502.39	479969.67	36" - 42"	A1P2Tc-2-7	On-site - ASL B	Phase 1 - Bound Zone 1-80 Hit
3	1351514.69	479975.61	0" - 6"	A1P2Tc-3-1	On-site - ASL D	Phase 1 - Bound Zone 1-80 Hit
3	1351514.69	479975.61	0" - 6"	A1P2Tc-3-1-D	Off-site - ASL D	Phase 1 - Field Duplicate
3	1351514.69	479975.61	12" - 18"	A1P2Tc-3-3	On-site - ASL B	Phase 1 - Bound Zone 1-80 Hit
3	1351514.69	479975.61	24" - 30"	A1P2Tc-3-5	On-site - ASL B	Phase 1 - Bound Zone 1-80 Hit
3	1351514.69	479975.61	36" - 42"	A1P2Tc-3-7	On-site - ASL B	Phase 1 - Bound Zone 1-80 Hit
4	1351521.62	479963.3	0" - 6"	A1P2Tc-4-1	On-site - ASL B	Phase 1 - Bound Zone 1-80 Hit
4	1351521.62	479963.3	12" - 18"	A1P2Tc-4-3	On-site - ASL B	Phase 1 - Bound Zone 1-80 Hit
4	1351521.62	479963.3	24" - 30"	A1P2Tc-4-5	On-site - ASL B	Phase 1 - Bound Zone 1-80 Hit
4	1351521.62	479963.3	36" - 42"	A1P2Tc-4-7	On-site - ASL B	Phase 1 - Bound Zone 1-80 Hit
5	1351509.32	479956.36	0" - 6"	A1P2Tc-5-1	On-site - ASL B	Phase 1 - Bound Zone 1-80 Hit
5	1351509.32	479956.36	12" - 18"	A1P2Tc-5-3	On-site - ASL B	Phase 1 - Bound Zone 1-80 Hit
5	1351509.32	479956.36	24" - 30"	A1P2Tc-5-5	On-site - ASL B	Phase 1 - Bound Zone 1-80 Hit
5	1351509.32	479956.36	36" - 42"	A1P2Tc-5-7	On-site - ASL B	Phase 1 - Bound Zone 1-80 Hit
6	1351500.39	479922.61	0" - 6"	A1P2Tc-6-1	On-site - ASL B	Phase 1 - Location of MH -175 Hit
6	1351500.39	479922.61	0" - 6"	A1P2Tc-6-1-D	On-site - ASL D	Phase 1 - Field Duplicate
6	1351500.39	479922.61	12" - 18"	A1P2Tc-6-3	Off-site - ASL D	Phase 1 - Location of MH -175 Hit
6	1351500.39	479922.61	24" - 30"	A1P2Tc-6-5	On-site - ASL B	Phase 1 - Location of MH -175 Hit
6	1351500.39	479922.61	36" - 42"	A1P2Tc-6-7	On-site - ASL B	Phase 1 - Location of MH -175 Hit
7	1351490.39	479925.67	0" - 6"	A1P2Tc-7-1	On-site - ASL B	Phase 1 - Bound MH -175 Hit
7	1351490.39	479925.67	12" - 18"	A1P2Tc-7-3	On-site - ASL B	Phase 1 - Bound MH -175 Hit
7	1351490.39	479925.67	24" - 30"	A1P2Tc-7-5	On-site - ASL B	Phase 1 - Bound MH -175 Hit
7	1351490.39	479925.67	36" - 42"	A1P2Tc-7-7	On-site - ASL B	Phase 1 - Bound MH -175 Hit
8	1351502.69	479932.63	0" - 6"	A1P2Tc-8-1	On-site - ASL D	Phase 1 - Bound MH -175 Hit
8	1351502.69	479932.63	0" - 6"	A1P2Tc-8-1-D	Off-site - ASL D	Phase 1 - Field Duplicate
8	1351502.69	479932.63	12" - 18"	A1P2Tc-8-3	On-site - ASL B	Phase 1 - Bound MH -175 Hit
8	1351502.69	479932.63	24" - 30"	A1P2Tc-8-5	On-site - ASL B	Phase 1 - Bound MH -175 Hit
8	1351502.69	479932.63	36" - 42"	A1P2Tc-8-7	On-site - ASL B	Phase 1 - Bound MH -175 Hit
9	1351509.62	479920.32	0" - 6"	A1P2Tc-9-1	On-site - ASL B	Phase 1 - Bound MH -175 Hit
9	1351509.62	479920.32	12" - 18"	A1P2Tc-9-3	On-site - ASL B	Phase 1 - Bound MH -175 Hit
9	1351509.62	479920.32	24" - 30"	A1P2Tc-9-5	On-site - ASL B	Phase 1 - Bound MH -175 Hit
9	1351509.62	479920.32	36" - 42"	A1P2Tc-9-7	On-site - ASL B	Phase 1 - Bound MH -175 Hit
10	1351497.32	479913.36	0" - 6"	A1P2Tc-10-1	On-site - ASL B	Phase 1 - Bound MH -175 Hit
10	1351497.32	479913.36	12" - 18"	A1P2Tc-10-3	On-site - ASL B	Phase 1 - Bound MH -175 Hit
10	1351497.32	479913.36	24" - 30"	A1P2Tc-10-5	On-site - ASL B	Phase 1 - Bound MH -175 Hit
10	1351497.32	479913.36	36" - 42"	A1P2Tc-10-7	On-site - ASL B	Phase 1 - Bound MH -175 Hit
11	1351552.4	480121.4	0" - 6"	A1P2Tc-11-1	On-site - ASL D	Phase 1 - Location of Boring 1441 Hit
11	1351552.4	480121.4	0" - 6"	A1P2Tc-11-1-D	Off-site - ASL D	Phase 1 - Field Duplicate
11	1351552.4	480121.4	12" - 18"	A1P2Tc-11-3	On-site - ASL B	Phase 1 - Location of Boring 1441 Hit
11	1351552.4	480121.4	24" - 30"	A1P2Tc-11-5	On-site - ASL B	Phase 1 - Location of Boring 1441 Hit
11	1351552.4	480121.4	36" - 42"	A1P2Tc-11-7	On-site - ASL B	Phase 1 - Location of Boring 1441 Hit
12	1351542.4	480121.4	0" - 6"	A1P2Tc-12-1	On-site - ASL B	Phase 1 - Bound Boring 1441 Hit

APPENDIX B
SAMPLE LOCATIONS

Sample Location (Figure 2)	Easting Coordinate	Northing Coordinate	Sample Depth	Sample Identification Number	Laboratory & Analytical Support Level	Phase / Purpose of Sample
12	1351542.4	480121.4	12" - 18"	A1P2Tc-12-3	On-site - ASL B	Phase 1 - Bound Boring 1441 Hit
12	1351542.4	480121.4	24" - 30"	A1P2Tc-12-5	On-site - ASL B	Phase 1 - Bound Boring 1441 Hit
12	1351542.4	480121.4	36" - 42"	A1P2Tc-12-7	On-site - ASL B	Phase 1 - Bound Boring 1441 Hit
13	1351552.4	480131.4	0" - 6"	A1P2Tc-13-1	On-site - ASL B	Phase 1 - Bound Boring 1441 Hit
13	1351552.4	480131.4	12" - 18"	A1P2Tc-13-3	On-site - ASL B	Phase 1 - Bound Boring 1441 Hit
13	1351552.4	480131.4	24" - 30"	A1P2Tc-13-5	On-site - ASL B	Phase 1 - Bound Boring 1441 Hit
13	1351552.4	480131.4	36" - 42"	A1P2Tc-13-7	On-site - ASL B	Phase 1 - Bound Boring 1441 Hit
14	1351562.4	480121.4	0" - 6"	A1P2Tc-14-1	On-site - ASL B	Phase 1 - Bound Boring 1441 Hit
14	1351562.4	480121.4	12" - 18"	A1P2Tc-14-3	On-site - ASL B	Phase 1 - Bound Boring 1441 Hit
14	1351562.4	480121.4	24" - 30"	A1P2Tc-14-5	On-site - ASL B	Phase 1 - Bound Boring 1441 Hit
14	1351562.4	480121.4	36" - 42"	A1P2Tc-14-7	On-site - ASL B	Phase 1 - Bound Boring 1441 Hit
15	1351552.4	480111.4	0" - 6"	A1P2Tc-15-1	On-site - ASL D	Phase 1 - Bound Boring 1441 Hit
15	1351552.4	480111.4	0" - 6"	A1P2Tc-15-1-D	Off-site - ASL D	Phase 1 - Field Duplicate
15	1351552.4	480111.4	12" - 18"	A1P2Tc-15-3	On-site - ASL B	Phase 1 - Bound Boring 1441 Hit
15	1351552.4	480111.4	24" - 30"	A1P2Tc-15-5	On-site - ASL B	Phase 1 - Bound Boring 1441 Hit
15	1351552.4	480111.4	36" - 42"	A1P2Tc-15-7	On-site - ASL B	Phase 1 - Bound Boring 1441 Hit
16	1351499.73	479987.78	0" - 6"	A1P2Tc-16-1	On-site - ASL B	Phase 2 - Bounding of Zone 1-80, MH - 175
16	1351499.73	479987.78	12" - 18"	A1P2Tc-16-3	On-site - ASL B	Phase 2 - Bounding of Zone 1-80, MH - 175
16	1351499.73	479987.78	24" - 30"	A1P2Tc-16-5	On-site - ASL B	Phase 2 - Bounding of Zone 1-80, MH - 175
16	1351499.73	479987.78	36" - 42"	A1P2Tc-16-7	On-site - ASL B	Phase 2 - Bounding of Zone 1-80, MH - 175
17	1351533.78	479978.26	0" - 6"	A1P2Tc-17-1	On-site - ASL B	Phase 2 - Bounding of Zone 1-80, MH - 175
17	1351533.78	479978.26	12" - 18"	A1P2Tc-17-3	On-site - ASL B	Phase 2 - Bounding of Zone 1-80, MH - 175
17	1351533.78	479978.26	24" - 30"	A1P2Tc-17-5	On-site - ASL B	Phase 2 - Bounding of Zone 1-80, MH - 175
17	1351533.78	479978.26	36" - 42"	A1P2Tc-17-7	On-site - ASL B	Phase 2 - Bounding of Zone 1-80, MH - 175
18	1351516.84	479941.47	0" - 6"	A1P2Tc-18-1	On-site - ASL B	Phase 2 - Bounding of Zone 1-80, MH - 175
18	1351516.84	479941.47	12" - 18"	A1P2Tc-18-3	On-site - ASL B	Phase 2 - Bounding of Zone 1-80, MH - 175
18	1351516.84	479941.47	24" - 30"	A1P2Tc-18-5	On-site - ASL B	Phase 2 - Bounding of Zone 1-80, MH - 175
18	1351516.84	479941.47	36" - 42"	A1P2Tc-18-7	On-site - ASL B	Phase 2 - Bounding of Zone 1-80, MH - 175
19	1351514.38	479897.45	0" - 6"	A1P2Tc-19-1	On-site - ASL B	Phase 2 - Bounding of Zone 1-80, MH - 175
19	1351514.38	479897.45	12" - 18"	A1P2Tc-19-3	On-site - ASL B	Phase 2 - Bounding of Zone 1-80, MH - 175
19	1351514.38	479897.45	24" - 30"	A1P2Tc-19-5	On-site - ASL B	Phase 2 - Bounding of Zone 1-80, MH - 175
19	1351514.38	479897.45	36" - 42"	A1P2Tc-19-7	On-site - ASL B	Phase 2 - Bounding of Zone 1-80, MH - 175
20	1351478.24	479910.68	0" - 6"	A1P2Tc-20-1	On-site - ASL B	Phase 2 - Bounding of Zone 1-80, MH - 175
20	1351478.24	479910.68	12" - 18"	A1P2Tc-20-3	On-site - ASL B	Phase 2 - Bounding of Zone 1-80, MH - 175
20	1351478.24	479910.68	24" - 30"	A1P2Tc-20-5	On-site - ASL B	Phase 2 - Bounding of Zone 1-80, MH - 175
20	1351478.24	479910.68	36" - 42"	A1P2Tc-20-7	On-site - ASL B	Phase 2 - Bounding of Zone 1-80, MH - 175
21	1351495.16	479947.53	0" - 6"	A1P2Tc-21-1	On-site - ASL B	Phase 2 - Bounding of Zone 1-80, MH - 175
21	1351495.16	479947.53	12" - 18"	A1P2Tc-21-3	On-site - ASL B	Phase 2 - Bounding of Zone 1-80, MH - 175
21	1351495.16	479947.53	24" - 30"	A1P2Tc-21-5	On-site - ASL B	Phase 2 - Bounding of Zone 1-80, MH - 175
21	1351495.16	479947.53	36" - 42"	A1P2Tc-21-7	On-site - ASL B	Phase 2 - Bounding of Zone 1-80, MH - 175

APPENDIX C

TARGET ANALYTE LISTS

TARGET ANALYTE LIST

AREA 1 PHASE II TECHNETIUM-99 SAMPLING IN THE STP AREA

Project Number 50.03.59.02

TAL 50.03.59.02 - A

Gas Proportional Counting Method		
1	ASL B	Technetium-99

TARGET ANALYTE LIST

AREA 1 PHASE II TECHNETIUM-99 SAMPLING IN THE STP AREA

Project Number 50.03.59.02

TAL 50.03.59.02 - B

Gas Proportional Counting Method		
1	ASL D	Technetium-99