3115

PROJECT SPECIFIC PLAN FOR SUPPLEMENTAL BACKGROUND SOIL STUDY

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

JULY 20, 2000

U.S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE

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PROJECT SPECIFIC PLAN FOR SUPPLEMENTAL BACKGROUND SOIL STUDY

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LIST OF ACRONYMS AND ABBREVIATIONS

ASL	Analytical Support Level
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COC	constituent of concern
DOE	Department of Energy
DQO	Data Quality Objectives
FACTS	Fernald Analytical Customer Tracking System
FAL	Field Activity Log
FEMP	Fernald Environmental Management Project
FRL	final remediation level
FGAA	graphite-furnace atomic absorption spectrometry
GPS	Global Positioning System
HAMDC	highest allowable gamma spectroscopy
ICP	inductively coupled plasma
LAN	Local Area Network
mg/kg	milligrams per kilogram
ml	milliliter
pCi/g	picoCuries per gram
PSP	Project Specific Plan
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
RWP	Radiological Work Permit
SCQ	Sitewide CERCLA Quality Assurance Project Plan
SED	Sitewide Environmental Database
SEP	Sitewide Excavation Plan
SPL	Sample Processing Laboratory
TAL	Target Analyte List
V/FCN	Variance/Field Change Notice
WAO	Waste Acceptance Organization

1.0 INTRODUCTION

1.1 BACKGROUND

The Area 9, Phase I (A9PI) soil precertification and predesign field sampling, performed January through July 2000, indicated arsenic, beryllium and radium-226 concentrations above background concentrations established through the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)/Resource Conservation and Recovery Act (RCRA) Background Soil Study. The Area 9 sampling program targeted the constituents of concern (COCs) (uranium, thorium, radium, arsenic, beryllium and lead) in the surface to 36-inch depth interval due to the soil blending that has occurred during cultivation and crop farming. The CERCLA/RCRA Background Soil Study characterized potential contaminants in depth intervals of 0 to 6, 36 to 42 and 48 to 54 inches in a large area 3 miles northwest of the Fernald Environmental Management Project (FEMP). Therefore, the background concentrations established during the 1992 background study were based on soil samples collected from depth intervals above and below the soil layer (12 to 36 inches) found to contain the elevated concentrations of COCs in A9PI. While the premise of the 1992 background study was appropriate for determining the natural soil weathering impacts through various soil zones and anthropogenic influences on surface soils (e.g., fallout from nuclear weapons testing, application of pesticides, lead emissions from automobile exhaust), the A9PI data indicate that the previous background results may not sufficiently characterize the inorganic and radium-226 levels 12 to 36 inches below the ground surface.

This finding necessitates an evaluation of the background concentrations of arsenic, beryllium and radium-226 in the 12 to 36-inch interval on lands with a history of agricultural crop cultivation similar to the off-site A9PI property. Figure 1-1 illustrates the off-site A9PI area in relation to the FEMP property. This property has been used for agricultural purposes since at least the 1930 era, including crop production and plowing. The limitation in using the 1992 background concentrations as a comparison to the A9PI data is centered on the lack of background data from the 6 to 36-inch depth interval and the unknown effect that crop cultivation may have on the distribution of arsenic and beryllium, regardless of the source (natural composition of the glacial till/loess or due to some agricultural practice). Although the background data likewise did not include the 6 to 12-inch interval, the A9PI data has generally indicated no levels above the background concentrations established for 0 to 6 inches and therefore will not be collected under this supplemental program.

It is therefore necessary to develop a supplemental background sampling plan to investigate soil concentrations including the 6 to 36-inch depth interval in areas not affected by the FEMP that have been used for agricultural purposes, specifically crop production. The complete background condition can then be used to support remediation decision in A9PI and other similar areas. The following sections detail the approach to the sampling and analysis program.

1.2 PURPOSE

The objective of the supplemental background sampling plan is to assess metal and radium-226 concentrations in the top 3 feet of soil in an area uninfluenced by past Fernald emissions for comparison to A9PI soil concentrations in potentially impacted areas. The same background area defined under the 1992 background study will be sampled under this supplemental program. This sampling is designed to assess the concentration of the selected COCs in farm fields having similar soil characteristics and past land use. This is necessary to distinguish Fernald-related contamination from naturally occurring or other anthropogenic sources on crop-producing lands such as A9PI.

The new background data will be evaluated using several standard statistical analyses that will provide summary information and allow for a subjective evaluation of the data similar to that conducted for the original background study. The entire data set for the COCs will be evaluated both collectively as a pooled data set and by discrete depth intervals. The analytical data and statistical analyses will be used as a basis for revised representative background conditions if necessary. The results of the supplemental background sampling and statistical analyses will be reported in the addendum to the CERCLA/RCRA Background Study Report.

1.3 SCOPE

The scope of this project specific plan (PSP) includes the collection, analysis and validation of supplemental background soil samples from the general area defined by the CERCLA/RCRA Background Study. This PSP covers all sample location selection methods and methods for performing soil collection and the required quality control samples. Additional follow-up sampling, as necessary, as well as any changes to the PSP following the approval of the plan will be documented as a Variance/Field Change Notice (V/FCN) to this PSP with appropriate approvals. All sampling and analytical activities will be consistent with the Sitewide CERCLA Quality Assurance Project Plan (SCQ) and Data Quality Objectivs (DQO) SL-058 (Appendix A).

The data collected under this sampling program has the potential to supplement the 1992 background data dependent on the analytical data and outcome of statistical analyses. Therefore, it is imperative that the background results produced through this study have a data quality level at least as rigorous and comparable to the original background study conducted in 1992. Several components of the field, analytical and validation processes for this PSP have been incorporated based on the 1992 study including the type and frequency of field quality control samples, careful selection of sampling equipment to avoid cross-contamination, increased level of field oversight from quality assurance personnel, verification of the same or lower analytical detection limits and the highest level of data validation on all sample results. The same methods utilized for radium-226 analysis during the 1992 study (gamma spectroscopy) will be applied to the current analytical program. Additionally, all isotopes that are typically analyzed during the gamma spectroscopy analysis will be reported by the laboratory. For metals, the methods for nearly all of the COCs are equivalent to the 1992 study, particularly for the COCs. A few metals will be performed by an alternate method (mercury, lead, potassium, selenium) but analytical results are expected to be comparable.

The scope of sampling outlined in this plan included an extensive review of the CERCLA/RCRA Background Soil Study to identify locations having similarity of soil type and land use characteristics with A9PI land. Eleven sampling areas were identified in the 1992 study with soil types analogous to the Area 9 property which is classified by the U.S. Soil Conservation Service as a combination of Fincastle and Xenia classes. As of 1992, these 11 off-site areas were either in use as crop land or had been used for crops in the recent past. Currently, nearly all of the properties contain either soybean or corn crops.

The background area selected for the 1992 background sampling, located approximately 3 miles northwest of the FEMP, was based on three principle factors. The area to the northwest has the least variation between sample results for isotopes of uranium [collected prior to the remedial investigation/feasibility study (RI/FS) data] suggesting that the uranium is naturally occurring. Geologically, the upper portion of the Paddys Run drainage area is the source area for the glacial overburden deposited at the FEMP. Finally, the prevailing wind directions indicate that the northwest area is least likely to have been impacted by the FEMP. This defined background area is illustrated in Figure 1-2.

Under this background sampling PSP, the eleven private properties will be revisited to perform additional sampling. Four soil borings will be conducted to collect 6-inch soil sample intervals from the ground surface to 36 inches. One of the four borings on each property will be positioned as close as possible to the original location sampled in 1992. The three other locations on each property will be selected by the field sampling team using a systematic grid method which will be representative of the crop land or field as described in Section 2.1. One of the four borings on each property will be collected for archive purposes.

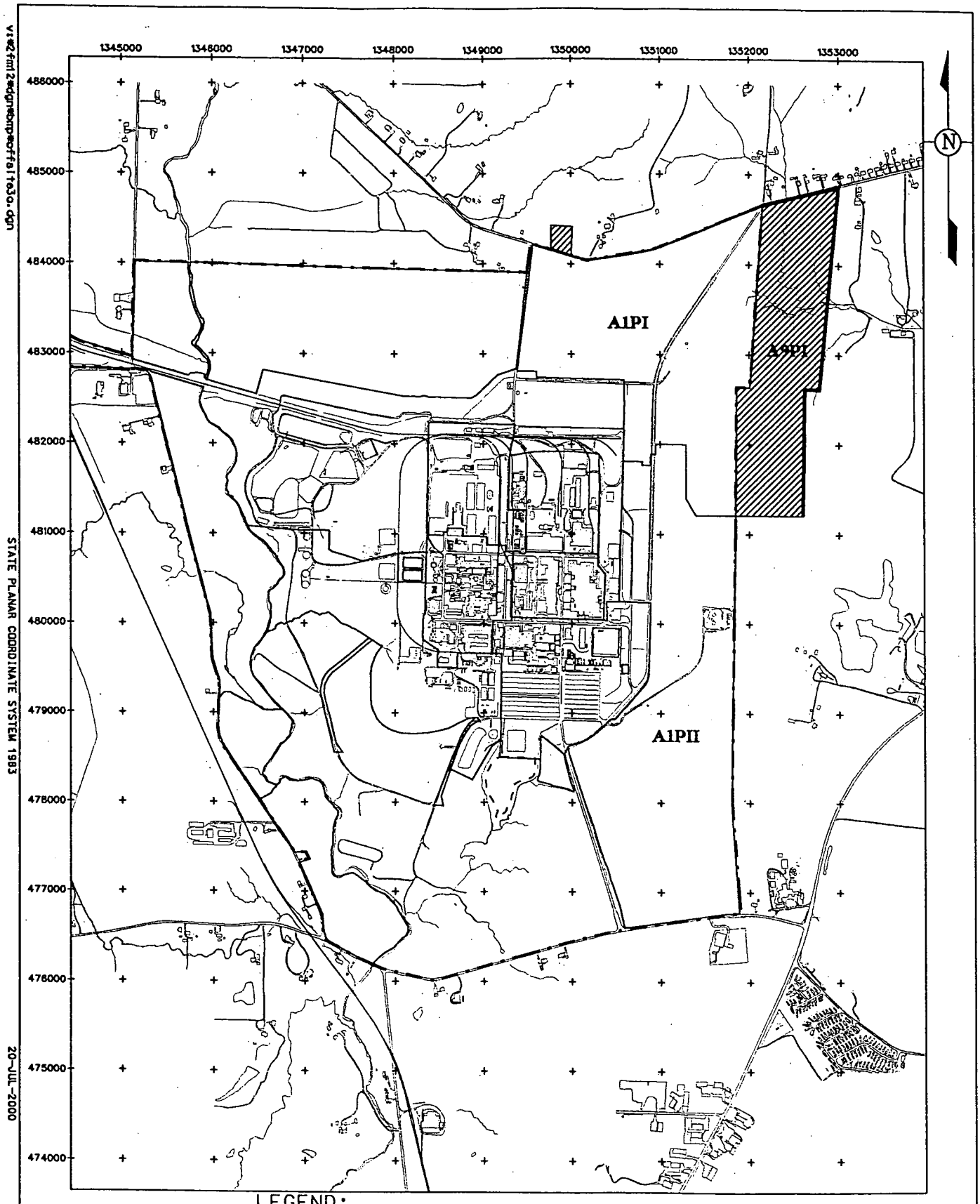
The sampling size for this supplemental study was based on the CERCLA/RCRA Background Study, which involved the collection of 81 soil samples from 30 boring locations on approximately 20 properties. Given the common soil type and land use history selected for the supplemental background sampling, the sample size of 165 samples (33 samples per depth interval) will be more than adequate to meet the plan's objective. This sample size provides the assurance of a sufficient number of samples in case the variability within discrete depths is higher than expected, or in the event some samples cannot be collected using manual methods or if some data are not usable following validation due to unanticipated analytical problems.

1.4 KEY PERSONNEL

Key personnel for this soil sampling project are listed in Table 1-1.

TABLE 1-1
KEY PERSONNEL

Title	Primary	Alternate
DOE Contact	Robert Janke	Kathi Nickel
Project Manager	Jyh-Dong Chiou	Eric Woods
Characterization Lead	Mike Frank	Jenny Vance
Field Sampling Lead	Tom Buhrlage	Jim Hey
Surveying Lead	Jim Schwing	Jim Capannari
Waste Acceptance Organization Contact	Linda Barlow	Sue Lorenz
FEMP Laboratory Contact	Audrey Hannum	Chuck White
Field Validation Contact	Jenine Rogers	Vicky Zimmerman
Data Validation Contact	Jim Chambers	Jim Cross
Data Management Contact	Cindy Tabor	Susan Marsh
FACTS/SED Data Management Contact	Sue Schaefer	Krista Blades
Quality Assurance Contact	Reinhard Friske	Frank Thompson
Health and Safety Contact	Keith Lanning	Andy Cleeter



LEGEND:

NOTE: ONLY THE PORTION OF A9PI LOCATED EAST OF THE FEMP WILL BE PRECERTIFIED.

— · — · — FEMP BOUNDARY

AREA 9, PHASE I BOUNDARY

SCALE

1500 750 0 1500 FEET

FIGURE 1-1. AREA 9, PHASE I SOIL REMEDIATION AREA

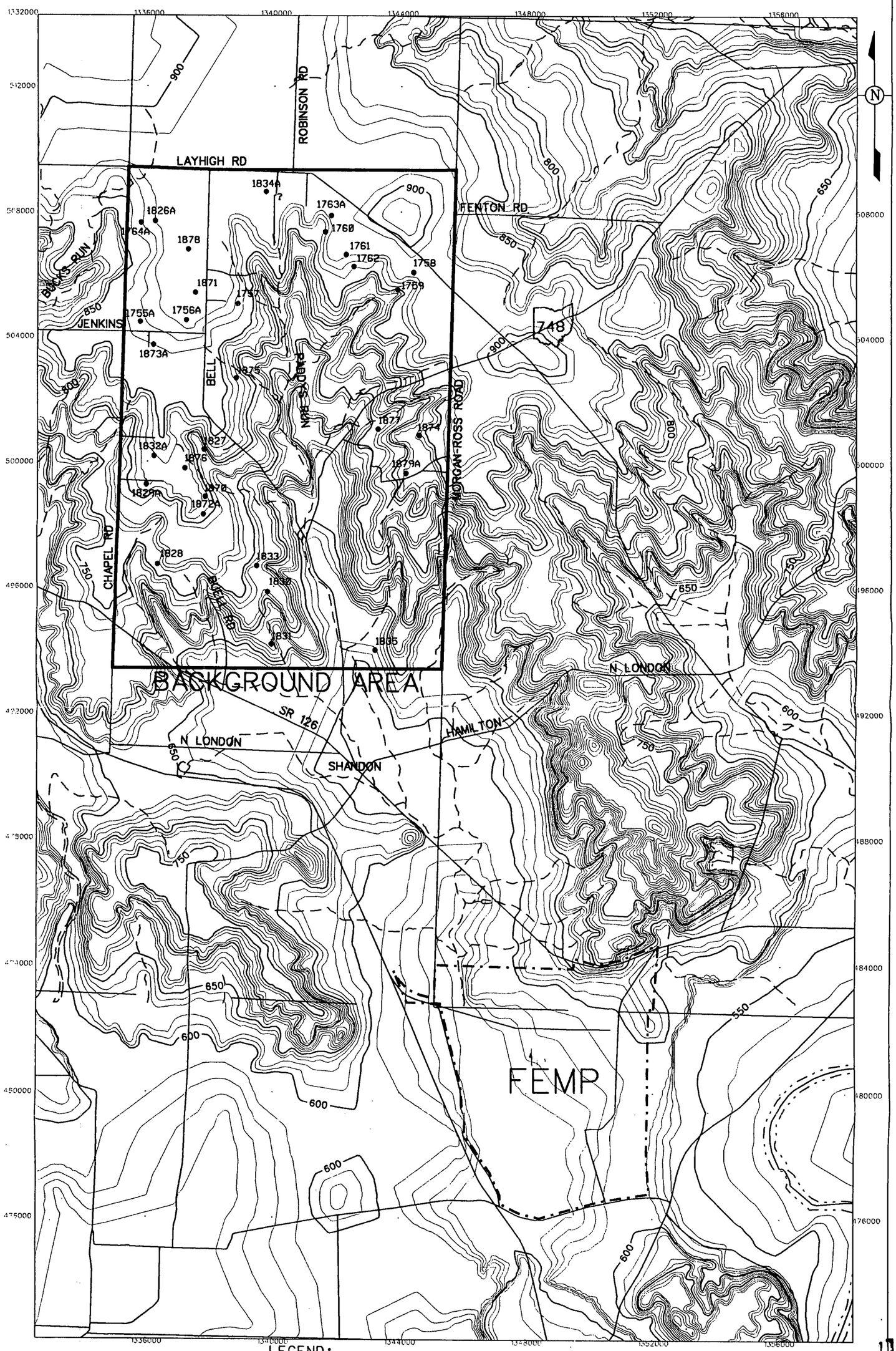


FIGURE 1-2. SOIL BACKGROUND STUDY AREA

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STATE PLANAR COORDINATE SYSTEM 1983
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2.0 SAMPLING PROGRAM

The supplemental background soil sampling involves the collection of 264 soil samples (165 for analysis and 99 for archival) from 44 borings located on 11 private properties (four borings on each property) in the same background area defined under the original background study conducted in 1992. Each of the 11 properties represent areas that were sampled during the 1992 study and have soil types and land use history similar to the A9PI property. A summary of the number of samples and borings is provided in Section 2.2 below.

2.1 SELECTION OF BORING LOCATIONS

One of the four soil borings within each crop field will be positioned within one foot of the original 1992 soil boring to allow for a statistical comparison of the new data. The FEMP boring numbers for these 11 borings will be assigned prior to the land survey. These borings are illustrated in Figure 2-1.

In addition to the 1992 boring location being resampled, the sampling team will select three soil boring locations on each of the eleven properties using a field-located approach based on systematic grid sampling. Due to the logistics involved with obtaining access agreements from the landowners, determining property boundaries and performing land surveys, the most pragmatic approach is to determine the sample locations at the time of field sampling. A random generation of sample points is not practical for this study due to the lack of or uncertainty of property boundaries and the possibility of unknown obstructions or land-use conditions (e.g., ditches, uncultivated land, etc.). The assumption that any natural or man-made COCs are randomly distributed or uniformly distributed throughout the crop field also supports this approach.

The sampling team will be responsible for selecting the three boring locations (on each property) by dividing the field into four quadrants or sections, dependent on the shape of the property, of roughly equal size and dimensions using crude field approximations. The 1992 study boring location being resampled will fall into one of the four quadrants/sections. The other three boring locations will be positioned in the approximate center (field estimation) of each of the remaining quadrants using professional judgement. The placement of these field-located borings will not require tape measurements or surveying to approximate the center. An accuracy of 50 to 100 feet (dependent on the size of the property) is acceptable given the assumed distribution of COCs. The sampling team will rely

on property boundary plat maps, which include boundary measurements, to estimate the center area within each of the quadrants/sections. The sampling team will assign the FEMP boring numbers (Appendix B) to these field-located borings as sampling progresses. The sampling team will also place a stake at the sample point (marked with the boring number) for follow-up surveying as discussed below.

In the event that access to any of the properties is denied by the landowner, alternate locations will be pursued in an attempt to maintain sampling on 11 separate properties. If separate properties/crop fields cannot be accessed, the number of borings on each accessible property may be increased but will be minimized to the extent possible. The alternate locations will have the same soil type (Xenia or Fincastle classes) and history of land use. Any alternate locations will be approved and documented through the V/FCN process. The final properties selected for sampling will be summarized in the report presenting the background data.

The eleven original 1992 boring locations will require land surveying to locate the boring using the record of coordinates using the Global Positioning System (GPS) survey instrument. The remaining borings will be surveyed following sample collection using a GPS survey instrument.

2.2 SOIL SAMPLE COLLECTION

The following bullets summarize the number of borings, analytical samples and archive samples. This information is presented for each boring in Appendix B.

- A total of 44 borings are planned as follows:
  - 11 boring locations at former 1992 boring locations
  - 33 borings to be field-located to be representative of each crop field (refer to Section 2.1)
- Of the 44 borings, 11 borings will be collected for archive sample purposes
- Of the 44 borings, 33 borings will be collected laboratory analyses
- At each boring, the depth intervals to be collected are: 0 to 6, 6 to 12, 12 to 18, 18 to 24, 24 to 30 and 30 to 36 inches
- Total number of planned samples is 264 (165 samples for analysis and 99 for archive).

Soil samples are to be collected according to Procedure SMPL-01, Solids Sampling, using manual methods including the Macro-core sampler (direct-push type sampler with expendable plastic liner) or stainless steel hand auger. If dual borings are necessary to obtain the required field sample weight of 300 grams for a single location and depth interval, then the borings should be within approximately 6 inches of each other. Prior to sample collection, the field sampling technician will remove all surface vegetation (if applicable) within a 6-inch radius of the points to be sampled using a stainless steel trowel or a gloved hand. Borings will be taken to a depth of 3 feet and the cores will be laid on clean plastic, then inspected by a field geologist. Since control of the soil depth intervals is crucial to this sampling program, the geologist will determine how much compaction, if any, has occurred and alter the sampling method, if necessary, to maintain a high level of confidence in correctly identifying the depth intervals. The surface sample (0 to 6 inches), in particular, may be susceptible to compaction and must be closely observed to ensure it is representative. The geologist will direct the field team on reducing the drive intervals as necessary to facilitate correctly identifying the depth intervals. All slough will be closely monitored and will be removed from the sample. If any steel devices are used to break through rocks or cobble, then at least an inch of soil below the rock interval shall be discarded to avoid contamination from the steel. Additionally, any loose surface soil surrounding the borehole should be removed to prevent it from falling into the borehole and possibly cross-contaminating the lower intervals.

The geologist will complete a visual soil classification log for each soil boring and submit it as part of the sampling field data package. Each core will then be divided into 6-inch intervals. The 0 to 6-inch, 6 to 12-inch (to be archived), 12 to 18-inch, 18 to 24-inch, 24 to 30-inch, and 30 to 36-inch intervals will be placed into individual 500-milliliter (ml) sample containers and assigned a unique sample identification number (Section 2.5). The geologist will also make a determination of the depth extent of the plowed or disturbed zone during soil classification and record this information on the soil classification log.

If surface or subsurface obstacles prevent sample collection at any of the original locations identified in Appendix B, then the sample point may be moved up to 3 feet in radius from the original boring location. The other three additional borings on each property may be moved up to 10 feet in radius. The distance and direction moved will be noted on the Field Activity Log (FAL), and the new coordinates will be entered into the Sitewide Environmental Database (SED) with the associated results. If the new location

is greater than the specified distance mentioned above, then the change will be documented on a V/FCN form.

Sample identifiers and Fernald Analytical Customer Tracking System (FACTS) identification numbers will be assigned to all samples collected. Sample container labels will be completed with sample collection information. Technicians will complete a FAL, Sample Collection Log, Chain of Custody/ Request for Analysis, and Plugging and Abandonment Record in the field. All borings will be identified using a unique FEMP boring number (e.g., 12489) to manage the location and analytical information in the SED.

After processing the samples as specified above, all samples will be taken to the clean side of the Sample Processing Laboratory (SPL) where custody will be transferred and they will be logged into the on-site laboratory for analysis.

2.3 EQUIPMENT DECONTAMINATION

Decontamination is performed to prevent the introduction of contaminants from sampling equipment to subsequent soil samples. Field technicians will ensure that sampling equipment has been decontaminated before transporting to the sampling location. Equipment that comes into contact with the sample will be decontaminated at Level II in the field between sample collection intervals in accordance with Procedure SMPL-01, Solids Sampling. Clean disposable wipes may be used instead of air drying the equipment. Decontamination of the sample liners (plastic core tubes) is not necessary if the liners are maintained in the manufacturer's packaging (or equivalent). Other sampling tools that do not come into contact with sample media (i.e., Macro-core sampler body, etc.) will be wiped down using clean disposable towels until visibly clean.

2.4 BOREHOLE ABANDONMENT

Each borehole will be backfilled with the unused portion of the soil core and/or surrounding soil, as determined by the field sampling lead. The field team is to complete a Plugging and Abandonment Record, FS-F-3275, per Procedure DRL-01.

2.5 SAMPLE IDENTIFICATION

Each sample will be assigned a unique sample identification number, as follows:

SBS-Location ID-Boring number-Depth

where:

SBS	=	Sample collected from the Supplemental Background Study.
Property ID	=	Identifier for property (1 through 11) where sample is taken.
Boring ID	=	The boring number (1 through 4) taken at each location.
Depth	=	The 0 to 6-inch sample = "1", the 6 to 12-inch sample = "2", and so on. (e.g., SBS-10-2-1 would indicate location (property) 10, boring 2, and 0 to 6-inch depth).
Archives	=	Use "V" to indicate archive. (e.g., SBS-3-4-3V would be the identifier for archive sample for location 3, boring 4, and depth of 12 to 18 inches).
QC	=	Quality control sample. "D" indicates a duplicate sample. "S" indicates a split sample (if necessary). "X" followed by a sequential number indicates a rinsate sample. (e.g., SBS-7-1-5-X3 would be the identifier for the third rinsate taken for this project at location 7, boring 1, and the 18 to 24-inch interval)

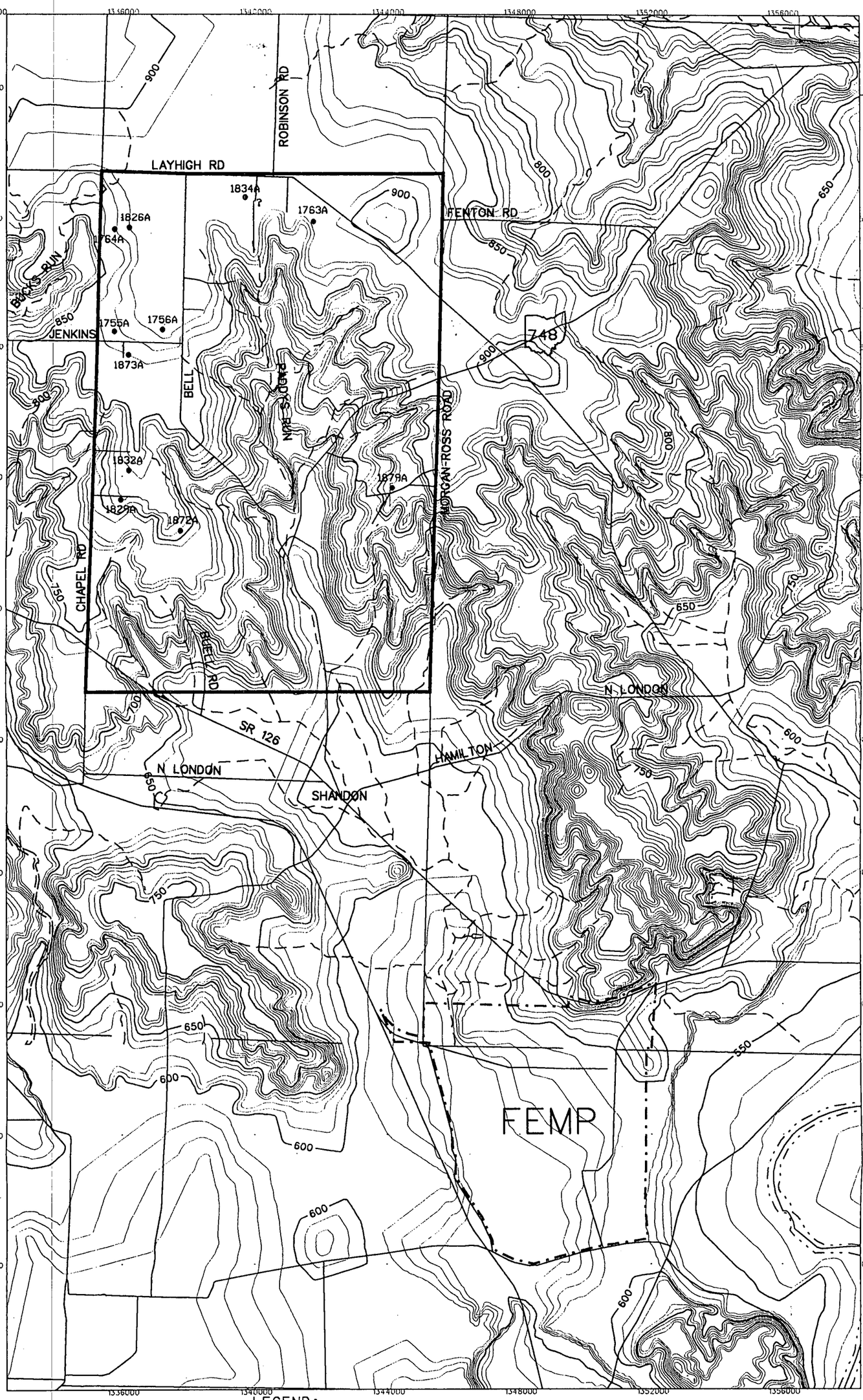

FIGURE 2-1. SUPPLEMENTAL BACKGROUND SAMPLING LOCATIONS

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STATE PLANAR COORDINATE SYSTEM 1983

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3.0 SAMPLE ANALYSIS

The selected analytical methods are sufficient to resolve all target metals and radionuclides at concentrations well below the expected lower range of background concentrations. All metals analyses will be performed by the inductively-coupled plasma (ICP) method or graphite furnace atomic absorption method as summarized in Appendix C and reported at Analytical Support Level (ASL) D. Radium-226 and other gamma emitting radionuclides will be analyzed by gamma spectroscopy to ASL E specifications including the data package. The ASL E criteria are identical to ASL D except for the lower highest allowable minimum detectable count rate (HAMDC). The 1992 soil background study also utilized gamma spectroscopy for radium-226. Field sample collection information and associated ASL levels are listed in Table 3-1. The Target Analyte Lists (TALs) are included as Appendix C.

TABLE 3-1
SAMPLING AND ANALYTICAL REQUIREMENTS

Target Analytes	Sample Matrix	Sample Volume	Lab	ASL	Preservation	Holding Time	Container/ Weight
Metals (TAL A) and Radionuclides (TAL B)	Soil	300 grams minimum	On-site	D (metals) / E (rad.)	Cool to 4°C	6 months	500 ml Plastic
Metals (TAL A) and Radionuclides (TAL B)	Liquid (rinsates)	8 liters	On-site	D (metals) / E (rad.)	HNO_3 to pH<2 Cool to 4°c	6 Months	(2) 4-liter Polyethylene

4.0 QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

4.1 QUALITY CONTROL SAMPLES AND DATA VALIDATION

The project analytical and quality requirements for field samples, analyses and data validation, as described in DQO SL-058, are as follows:

- Duplicate samples will be collected at the rate of one per property as defined in Appendix B, which will amount to a total of 11 duplicates. The duplicate sample is to be co-located within 1 foot of the boring it is representing. The duplicates are to be submitted as separate samples, therefore, no homogenization of soil is required

- Rinsate samples will be collected at the rate of one per sampling team per day. If the macro-core sampler is used, then one rinsate per team per day, will be taken of the cutting shoes following the level II decontamination. In the event that a team uses more than 20 cutting shoes per day, then a second rinsate will also be required to represent the additional cutting shoes used. The Macro-core sampler's design involves soil contact with only the cutting shoe. If a hand auger is used, then one rinsate per 20 samples will be required. Rinsates will be identified with the suffix "X", followed by the sequential number of rinsates.

All field data and analytical data will be validated to ASL D criteria. ASL D data packages will be provided by the on-site laboratory for all analyses. The remediation data quality organization will independently validate each analyte to ASL D in accordance with standard validation procedures. Note that the radiological analyses via gamma spectroscopy will be performed at ASL E due to the lower HAMDC but the data package is considered ASL D.

4.2 PROJECT REQUIREMENTS FOR SURVEILLANCES OR ASSESSMENTS

Project management has ultimate responsibility for the quality of the work processes and the results of the sampling activities under this PSP. The FEMP Quality Assurance (QA) organization will conduct independent assessments of work processes and operations. These assessments will evaluate technical and procedural requirements of this PSP and the SCQ. A minimum of three independent assessments will be performed during implementation of this PSP and will involve 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.

4.3 FIELD CHANGES TO THE PSP

Additional phases of the Supplemental Background Soil Study, or any other changes to this PSP, will be documented in a V/FCN. Before implementation, these changes require written approval from the affected persons or projects (e.g., Area Project Manager, Characterization Lead, QA) before the changes can be implemented (electronic mail is acceptable). Changes to the PSP will also be noted on the applicable FALs. QA must receive the completed V/FCN, with signatures of the Area Project Manager, Characterization Lead, and the QA Representative, along with the Field Sampling Lead and Analytical Contact, as necessary, within seven working days of granting approval.

4.4 PROJECT-SPECIFIC PROCEDURES, MANUALS AND DOCUMENTS

Work performed under this PSP will be conducted in accordance with the following departmental procedures and site-wide documents:

- ADM-02, Field Project Prerequisites
- EQT-06, Geoprobe® Model 5400 - Operation and Maintenance
- SMPL-01, Solids Sampling
- SMPL-21, Collection of Field Quality Control Samples
- DRL-01, Plugging and Abandonment
- Sitewide Excavation Plan (SEP)
- Sitewide CERCLA Quality Assurance Project Plan (SCQ)
- CERCLA/RCRA Background Soil Study

5.0 HEALTH AND SAFETY

All work performed on this project will be performed in accordance to applicable Environmental Monitoring project procedures, RM-0021 (Safety Performance Requirements Manual), Fluor Fernald work permit, and other applicable permits. Each technician must concur with all safety permits applicable to performance of their assigned duties, and a safety briefing will be conducted prior to the initiation of field activities.

All health or injury-related emergencies shall be reported immediately by calling 911.

Health and safety considerations specific to the land included in the supplemental background metals sampling include steep terrain in the unplowed areas and uneven footing where plowed. Any additional safety hazards identified on the safety walk down will be documented on the Penetration Permit (Form FS-F-3959). The field supervisor shall call "OHIO, CALL BEFORE YOU DIG" – 1-800-362-2764 for the locations of any underground utilities that may create a hazard if breached. Penetration Permit must be completed for each boring in accordance with Procedure SH-0018, Penetration Permitting Program. Field Technicians and their supervisor should walk down the area prior to sampling. Appropriate safety precautions should be taken by following applicable Safety Performance Requirements in RM-0021 and Fluor Fernald work permits.

6.0 DISPOSITION OF WASTES

During sampling activities, field personnel may generate small amounts of soil, water, and contact waste. Excess soil generated during sample collection will be replaced in the borehole. Contact waste generation will be minimized by limiting contact with sample media, and by only using disposable materials that are necessary. Contact waste will be bagged and brought back to site for disposal in an uncontrolled area dumpster. Generation of decontamination waters will be minimized in the field. Decontamination water that is generated will be contained in a polypropylene tank and returned to site for disposal. All decontamination activities will be conducted at the off-site sampling location.

The unused soil samples from the laboratory will be disposed of by sampling personnel. Depending on the lab analysis from each sample, Waste Acceptance Organization (WAO) will make the determination on disposing the unused soil to its original location, a certified area, or a stockpile based on availability.

7.0 DATA MANAGEMENT

A data management process will be implemented so information collected during the investigation will be properly managed following completion of the field activities. As specified in Section 5.1 of the SCQ, daily activities will be recorded on the FAL and other sampling documentation, with sufficient detail to be able to reconstruct a particular event. Sample Collection Logs will be completed according to Procedure ADM-02, Field Prerequisites. Field records will include the PSP number and other pertinent information for project records management.

Electronically recorded data from the GPS will be downloaded to disks or to the Local Area Network (LAN) using the Ethernet connection. Field documentation, such as the FAL, the Sample Collection Log, and the Sample Request/Sample Analysis Chain of Custody Log will undergo an internal QA/QC review by the field team members. All field data packages will be validated by the Remediation Data Quality organization. The field data will be sent to data entry personnel for input into the SED. Field logs may be completed in the field and maintained in loose-leaf form with each page uniquely identified.

The Laboratory Contact will report all analytical data from on-site laboratory in preliminary form to the Characterization Lead as soon as the data are available in the FACTS database. All field data and analytical data will be validated to ASL D criteria. ASL D data packages will be provided by the on-site laboratory for all analyses. The Remediation Data Quality organization will independently validate each analyte to ASL D in accordance with standard validation procedures. Note that the radiological analyses via gamma spectroscopy will be performed at ASL E due to the lower HAMDC but the data package is considered ASL D. All analytical data will be transferred from the FACTS to the SED, including data validation qualifiers in accordance with FEMP standard data processing routines and procedures. Data used for the final evaluation and final statistical analyses will be reported from the SED following the completion of validation.

After validation, all data including validation and lab qualifiers will be entered into the SED. All final results from this sampling effort will be pulled from the SED and reported to the Characterization Lead in the final data report format.

APPENDIX A

DATA QUALITY OBJECTIVES SL-058, Rev. 0

Control Number _____

Fernald Environmental Management Project

Data Quality Objectives

Title: Supplemental Background Soil Sampling

Number: SL-058

Revision: 0

Effective Date: July 20, 2000

Contact Name: Mike Frank

Approval: _____ Date: 7/20/00
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Rev. #	0	1	2	3	4	5
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DATA QUALITY OBJECTIVES

Supplemental Background Soil Study

1.0 Statement of Problem

Problem Statement: Background soil concentrations for constituents of concern (COCs) at a depth of 12 to 36 inches below ground surface must be determined for potentially impacted off-property areas (e.g., Area 9/Phase I). The surface to 12-inch interval in off-property soil has not indicated any COCs being above the background concentrations. Additionally, other data collection activities may be necessary during future remedial actions at the FEMP that involve background concentrations based on historical land use or natural phenomena that may affect remediation and certification decisions. Other analytes that are incidentally reported from the laboratory instrumentation will also be requested.

2.0 Identify the Decision

Background concentrations were previously established for metals and radiological constituents as presented in the CERCLA/RCRA Background Soil Study, March 1993.

The initial background study consisted of collecting soil samples from a 6-square mile area northwest of the FEMP far removed from the impact of Fernald production emissions based on distance and prevailing wind direction. Samples were collected from 0 to 6 inches to represent the weathered soil interval from 0 to 36 inches, 36 to 42 inches to represent the lower extent of weathering, and 48 to 54 inches to represent the depth below significant weathering.

Based on data collected during pre-certification efforts, the decision that must be determined is whether the assumption that COC concentrations from the 0 to 6-inch interval is representative of the entire interval from 0 to 36 inches. Additional analytical data from the background area and the uncharacterized depth interval (12-36 inches) will be used to determine if remediation is necessary in the affected FEMP properties (e.g., Area 9 soil remediation area). In order to evaluate comparability to the background study data set, the 0-6 inch interval will be collected during the supplemental sampling program.

3.0 Inputs That Affect the Decision

Background establishment is required for constituents for which Final Remediation Levels have been established in the Operable Unit 5 Record of Decision. The PSP will identify the optimal sampling density.

4.0 Define the Boundaries of the Study

Temporal Boundary: Analytical data must be available in time to be incorporated into

the implementation plans or integrated remedial design packages (IRDP) for individual remediation areas.

Physical Boundary: The study area will be based upon the perimeter of the original background study and those locations with similar land use history or similar soil classifications may be targeted.

Scale of Decision Making: The decision involves the remedial design and ultimately the extent of soil excavation, if any, in off-site properties such as Area 9/Phase I. This decision is influenced by the analytical results from supplemental background sampling in the depth interval for which background soil data is non-existent.

Parameters of Interest: The parameters of interest are the metal and radionuclide COCs for offsite properties such as Area 9. Other analytes that are incidentally reported from the laboratory instrumentation will also be requested.

5.0 Decision Rule

If data are sufficient to establish background concentrations for the constituents of concern, then the study is successful. The new background data will be evaluated using several standard statistical methods similar to the original background study conducted in 1992. The various statistical tests will depend on the distribution of the data (e.g., normal, log normal, etc.). The statistical assessment of the data sets, including the pooled data set and discrete depth data, will also depend on the comparison of the new surface soil sample set to the original background data set (1992). The combined evaluation of the data will provide summary information and allow for an objective evaluation of the data. The entire data set for each COC will be evaluated both collectively as a pooled data set and by discrete depth intervals. The analytical data and statistical analyses will be used as a basis for the remediation and certification decisions for the COCs, the extent of excavation and/or the target certification depth within Area 9/Phase 1 and other areas as applicable.

6.0 Limits on Uncertainty

Samples will be collected from 0 to 36 inches (except the 6-12 inch interval) to determine the applicability of the original background study's assumption that the 0 to 6 inch interval was adequate to characterize the 0 to 36 inch soil horizon in areas of similar land use.

A false negative error would occur if constituent concentrations were determined to be lower than actually present in the soil. A false negative data error may result in remediating soil that may not necessarily require remediation resulting in added cost and schedule with little to no human health or environmental benefit.

A false positive error would indicate that constituent concentrations are higher than are actually present in the soil. A false positive data error may result in failure to

remediate areas that require excavation, leaving contaminated soil which would pose a potential threat to human health and the environment. A false positive error is the more severe error.

7.0 Optimize Design

Laboratory work will follow the requirements specified in the SCQ. Laboratory quality control measures include a media preparation blank, a laboratory control sample (LCS), matrix duplicates and matrix spikes. Field QC samples will include one duplicate sample per property or crop field and one rinsate per team per day of sampling.

Analytical and field data will be validated per ASL D requirements. The minimum detection level (MDL) for these analyses will be approximately 10 percent of the background concentrations obtained from the 1992 background data set. Some COCs may have higher (than 10% of background data) detection limits due to laboratory instrumentation limitations. However, these COCs are not critical to off-property areas and the detection limits, which will be below the background concentration, should suffice for the supplemental study. Also, the MDL for the metal and radiological analytes which are not site COCs, and therefore have no necessary cleanup goal, will be set as low as practical given the analytical method. If the MDL is different than the SCQ-specified MDL, the ASL will default to ASL E, though other requirements (e.g., reporting, validation, etc.) will remain as specified for ASL D.

Independent assessments 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.

Upon receipt from the laboratory, all results will be entered in to the Site-wide Environmental Database as qualified data using data entry personnel. Analytical and field data will undergo analytical validation by the FEMP validation team. The Project Manager will be responsible to determine data usability as it pertains to supporting the DQO decision.

Applicable procedure to achieve data quality objectives include:

SMPL-01 *Solids Sampling*
SMPL-21 *Collection of Field Quality Control Samples*
EW-0002 *Chain of Custody/Request for Analysis*
EW-0010 *FEMP Data Validation Procedure*

Data Quality Objectives
Supplemental Background Soil Sampling

1A. Task Description: Background soil concentrations for constituents of concern (COCs) at a depth of 12 to 36 inches below ground surface must be determined.

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

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

1C. DQO No.: SL-058 DQO Reference No.: NA

2. Media Characterization: (Put an X in the appropriate selection.)

Air☐ Biological☐ Groundwater☐ Sediment☐ Soil☒
Waste☐ Wastewater☐ Surface Water☐ Other (specify) _____

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	Risk Assessment
A☐ B☐ C☐ D x E x	☐ B☐ C☐ D☐ E☐
Evaluation of Alternatives	Engineering Design
A☐ B☐ C☐ D x E x	A☐ B☐ C☐ D x E x
Monitoring During Remediation	Other:
A☐ B☐ C☐ D☐ E☐	A ☐ B☐ C☐ D☐ E☐

4A. Drivers: OU 5 Record of Decision

4B. Objective: Determine background soil concentrations for various constituents at depth intervals not previously sampled during the initial background study conducted in 1992 in order to direct remediation and certification decisions for off-property areas.

5. Site Information (Description):

Background study area is an area northwest of the FEMP that encompasses six square miles.

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

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

6.B. Equipment Selection and SCQ Reference:

Equipment Selection		Refer to SCQ Section
ASL A		SCQ Section
ASL B	x	SCQ Section
ASL C		SCQ Section
ASL D	x	SCQ Section App. G, Table G-1 & G-3
ASL E	x	SCQ Section App. G, Table G-1 & G-3

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

Biased☐ Composite☐ Grab☒ Environmental☐ Grid☐x
IntrusiveX Non-Intrusive☒ Phased☐ Source☐ Random☒

7B. Sample Work Plan Reference: 21120-PSP-0002

7C. Sample Collection Reference: SMPL-01

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

8A. Field Quality Control Samples:

Trip Blanks	☐	Container Blanks	☐
Field Blanks	☐	Duplicate Samples	x

Equipment Rinsate Blanks	x	Split Samples *	x
Preservative Blanks	☐	Performance Evaluation Samples	☐
Other (specify) _____			

* Split samples to be collected if regulatory agency requests.

8B. Laboratory Quality Control Samples:

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

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

APPENDIX B

SAMPLE COLLECTION FIELD SUMMARY

APPENDIX B

Supplemental Background Soil Sampling Project Number 21120-PSP-0002

Location ID	Depth	Sample ID	Northing	Easting	Analysis
1755A	0"-6"	SBS-1-1-1RM	504442	1367233	TAL A, B
	6"-12"	SBS-1-1-2V			NONE
	12"-18"	SBS-1-1-3RM			TAL A, B
	18"-24"	SBS-1-1-4RM			TAL A, B
	24"-30"	SBS-1-1-5RM			TAL A, B
	30"-36"	SBS-1-1-6RM			TAL A, B
12770	0"-6"	SBS-1-2-1RM	TBD	TBD	TAL A, B
	6"-12"	SBS-1-2-2V			NONE
	12"-18"	SBS-1-2-3RM			TAL A, B
	18"-24"	SBS-1-2-4RM			TAL A, B
	24"-30"	SBS-1-2-5RM			TAL A, B
	30"-36"	SBS-1-2-6RM			TAL A, B
12771	0"-6"	SBS-1-3-1RM	TBD	TBD	TAL A, B
	6"-12"	SBS-1-3-2V			NONE
	12"-18"	SBS-1-3-3RM			TAL A, B
	18"-24"	SBS-1-3-4RM			TAL A, B
	24"-30"	SBS-1-3-5RM			TAL A, B
	30"-36"	SBS-1-3-6RM			TAL A, B
12772 Duplicate	0"-6"	SBS-1-3-1RM-D	TBD	TBD	TAL A, B
12773	0"-6"	SBS-1-4-1V	TBD	TBD	NONE
	6"-12"	SBS-1-4-2V			NONE
	12"-18"	SBS-1-4-3V			NONE
	18"-24"	SBS-1-4-4V			NONE
	24"-30"	SBS-1-4-5V			NONE
	30"-36"	SBS-1-4-6V			NONE

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Location ID	Depth	Sample ID	Northing	Easting	Analysis
1756A	0"-6"	SBS-2-1-1RM	504501	1368679	TAL A, B
	6"-12"	SBS-2-1-2V			NONE
	12"-18"	SBS-2-1-3RM			TAL A, B
	18"-24"	SBS-2-1-4RM			TAL A, B
	24"-30"	SBS-2-1-5RM			TAL A, B
	30"-36"	SBS-2-1-6RM			TAL A, B
12774	0"-6"	SBS-2-2-1RM	TBD	TBD	TAL A, B
	6"-12"	SBS-2-2-2V			NONE
	12"-18"	SBS-2-2-3RM			TAL A, B
	18"-24"	SBS-2-2-4RM			TAL A, B
	24"-30"	SBS-2-2-5RM			TAL A, B
	30"-36"	SBS-2-2-6RM			TAL A, B
12775	0"-6"	SBS-2-3-1RM	TBD	TBD	TAL A, B
	6"-12"	SBS-2-3-2V			NONE
	12"-18"	SBS-2-3-3RM			TAL A, B
	18"-24"	SBS-2-3-4RM			TAL A, B
	24"-30"	SBS-2-3-5RM			TAL A, B
	30"-36"	SBS-2-3-6RM			TAL A, B
12776 Duplicate	18"-24"	SBS-2-3-4RM-D	TBD	TBD	TAL A, B
12777	0"-6"	SBS-2-4-1V	TBD	TBD	NONE
	6"-12"	SBS-2-4-2V			NONE
	12"-18"	SBS-2-4-3V			NONE
	18"-24"	SBS-2-4-4V			NONE
	24"-30"	SBS-2-4-5V			NONE
	30"-36"	SBS-2-4-6V			NONE

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Location ID	Depth	Sample ID	Northing	Easting	Analysis
1763A	0"-6"	SBS-3-1-1RM	507846	1373308	TAL A, B
	6"-12"	SBS-3-1-2V			NONE
	12"-18"	SBS-3-1-3RM			TAL A, B
	18"-24"	SBS-3-1-4RM			TAL A, B
	24"-30"	SBS-3-1-5RM			TAL A, B
	30"-36"	SBS-3-1-6RM			TAL A, B
12778	0"-6"	SBS-3-2-1RM	TBD	TBD	TAL A, B
	6"-12"	SBS-3-2-2V			NONE
	12"-18"	SBS-3-2-3RM			TAL A, B
	18"-24"	SBS-3-2-4RM			TAL A, B
	24"-30"	SBS-3-2-5RM			TAL A, B
	30"-36"	SBS-3-2-6RM			TAL A, B
12779	0"-6"	SBS-3-3-1RM	TBD	TBD	TAL A, B
	6"-12"	SBS-3-3-2V			NONE
	12"-18"	SBS-3-3-3RM			TAL A, B
	18"-24"	SBS-3-3-4RM			TAL A, B
	24"-30"	SBS-3-3-5RM			TAL A, B
	30"-36"	SBS-3-3-6RM			TAL A, B
12780 Duplicate	0"-6"	SBS-3-3-1RM-D	TBD	TBD	TAL A, B
12781	0"-6"	SBS-3-4-1V	TBD	TBD	NONE
	6"-12"	SBS-3-4-2V			NONE
	12"-18"	SBS-3-4-3V			NONE
	18"-24"	SBS-3-4-4V			NONE
	24"-30"	SBS-3-4-5V			NONE
	30"-36"	SBS-3-4-6V			NONE

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Supplemental Background Soil Sampling Project Number 21120-PSP-0002

Location ID	Depth	Sample ID	Northing	Easting	Analysis
1764A	0"-6"	SBS-4-1-1RM	507622	1367255	TAL A, B
	6"-12"	SBS-4-1-2V			NONE
	12"-18"	SBS-4-1-3RM			TAL A, B
	18"-24"	SBS-4-1-4RM			TAL A, B
	24"-30"	SBS-4-1-5RM			TAL A, B
	30"-36"	SBS-4-1-6RM			TAL A, B
12782 Duplicate	18"-24"	SBS-4-1-4RM-D	TBD	TBD	TAL A, B
12783	0"-6"	SBS-4-2-1RM	TBD	TBD	TAL A, B
	6"-12"	SBS-4-2-2V			NONE
	12"-18"	SBS-4-2-3RM			TAL A, B
	18"-24"	SBS-4-2-4RM			TAL A, B
	24"-30"	SBS-4-2-5RM			TAL A, B
	30"-36"	SBS-4-2-6RM			TAL A, B
12784	0"-6"	SBS-4-3-1RM	TBD	TBD	TAL A, B
	6"-12"	SBS-4-3-2V			NONE
	12"-18"	SBS-4-3-3RM			TAL A, B
	18"-24"	SBS-4-3-4RM			TAL A, B
	24"-30"	SBS-4-3-5RM			TAL A, B
	30"-36"	SBS-4-3-6RM			TAL A, B
12785	0"-6"	SBS-4-4-1V	TBD	TBD	NONE
	6"-12"	SBS-4-4-2V			NONE
	12"-18"	SBS-4-4-3V			NONE
	18"-24"	SBS-4-4-4V			NONE
	24"-30"	SBS-4-4-5V			NONE
	30"-36"	SBS-4-4-6V			NONE

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Location ID	Depth	Sample ID	Northing	Easting	Analysis
1826A	0"-6"	SBS-5-1-1RM	507674	1367704	TAL A, B
	6"-12"	SBS-5-1-2V			NONE
	12"-18"	SBS-5-1-3RM			TAL A, B
	18"-24"	SBS-5-1-4RM			TAL A, B
	24"-30"	SBS-5-1-5RM			TAL A, B
	30"-36"	SBS-5-1-6RM			TAL A, B
12786 Duplicate	0"-6"	SBS-5-1-1RM-D	TBD	TBD	TAL A, B
12787	0"-6"	SBS-5-2-1RM	TBD	TBD	TAL A, B
	6"-12"	SBS-5-2-2V			NONE
	12"-18"	SBS-5-2-3RM			TAL A, B
	18"-24"	SBS-5-2-4RM			TAL A, B
	24"-30"	SBS-5-2-5RM			TAL A, B
	30"-36"	SBS-5-2-6RM			TAL A, B
12788	0"-6"	SBS-5-3-1RM	TBD	TBD	TAL A, B
	6"-12"	SBS-5-3-2V			NONE
	12"-18"	SBS-5-3-3RM			TAL A, B
	18"-24"	SBS-5-3-4RM			TAL A, B
	24"-30"	SBS-5-3-5RM			TAL A, B
	30"-36"	SBS-5-3-6RM			TAL A, B
12789	0"-6"	SBS-5-4-1V	TBD	TBD	NONE
	6"-12"	SBS-5-4-2V			NONE
	12"-18"	SBS-5-4-3V			NONE
	18"-24"	SBS-5-4-4V			NONE
	24"-30"	SBS-5-4-5V			NONE
	30"-36"	SBS-5-4-6V			NONE

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Location ID	Depth	Sample ID	Northing	Easting	Analysis
1829A	0"-6"	SBS-6-1-1RM	499260	1367428	TAL A, B
	6"-12"	SBS-6-1-2V			NONE
	12"-18"	SBS-6-1-3RM			TAL A, B
	18"-24"	SBS-6-1-4RM			TAL A, B
	24"-30"	SBS-6-1-5RM			TAL A, B
	30"-36"	SBS-6-1-6RM			TAL A, B
12790 Duplicate	30"-36"	SBS-6-1-6RM-D	TBD	TBD	TAL A, B
12791	0"-6"	SBS-6-2-1RM	TBD	TBD	TAL A, B
	6"-12"	SBS-6-2-2V			NONE
	12"-18"	SBS-6-2-3RM			TAL A, B
	18"-24"	SBS-6-2-4RM			TAL A, B
	24"-30"	SBS-6-2-5RM			TAL A, B
	30"-36"	SBS-6-2-6RM			TAL A, B
12792	0"-6"	SBS-6-3-1RM	TBD	TBD	TAL A, B
	6"-12"	SBS-6-3-2V			NONE
	12"-18"	SBS-6-3-3RM			TAL A, B
	18"-24"	SBS-6-3-4RM			TAL A, B
	24"-30"	SBS-6-3-5RM			TAL A, B
	30"-36"	SBS-6-3-6RM			TAL A, B
12793	0"-6"	SBS-6-4-1V	TBD	TBD	NONE
	6"-12"	SBS-6-4-2V			NONE
	12"-18"	SBS-6-4-3V			NONE
	18"-24"	SBS-6-4-4V			NONE
	24"-30"	SBS-6-4-5V			NONE
	30"-36"	SBS-6-4-6V			NONE

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Location ID	Depth	Sample ID	Northing	Easting	Analysis
1832A	0"-6"	SBS-7-1-1RM	500162	1367665	TAL A, B
	6"-12"	SBS-7-1-2V			NONE
	12"-18"	SBS-7-1-3RM			TAL A, B
	18"-24"	SBS-7-1-4RM			TAL A, B
	24"-30"	SBS-7-1-5RM			TAL A, B
	30"-36"	SBS-7-1-6RM			TAL A, B
12794	0"-6"	SBS-7-2-1RM	TBD	TBD	TAL A, B
	6"-12"	SBS-7-2-2V			NONE
	12"-18"	SBS-7-2-3RM			TAL A, B
	18"-24"	SBS-7-2-4RM			TAL A, B
	24"-30"	SBS-7-2-5RM			TAL A, B
	30"-36"	SBS-7-2-6RM			TAL A, B
12795	0"-6"	SBS-7-3-1RM	TBD	TBD	TAL A, B
	6"-12"	SBS-7-3-2V			NONE
	12"-18"	SBS-7-3-3RM			TAL A, B
	18"-24"	SBS-7-3-4RM			TAL A, B
	24"-30"	SBS-7-3-5RM			TAL A, B
	30"-36"	SBS-7-3-6RM			TAL A, B
12796 Duplicate	0"-6"	SBS-7-3-1RM-D	TBD	TBD	TAL A, B
12797	0"-6"	SBS-7-4-1V	TBD	TBD	NONE
	6"-12"	SBS-7-4-2V			NONE
	12"-18"	SBS-7-4-3V			NONE
	18"-24"	SBS-7-4-4V			NONE
	24"-30"	SBS-7-4-5V			NONE
	30"-36"	SBS-7-4-6V			NONE

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Location ID	Depth	Sample ID	Northing	Easting	Analysis
1834A	0"-6"	SBS-8-1-1RM	508614	1371242	TAL A, B
	6"-12"	SBS-8-1-2V			NONE
	12"-18"	SBS-8-1-3RM			TAL A, B
	18"-24"	SBS-8-1-4RM			TAL A, B
	24"-30"	SBS-8-1-5RM			TAL A, B
	30"-36"	SBS-8-1-6RM			TAL A, B
12798	0"-6"	SBS-8-2-1RM	TBD	TBD	TAL A, B
	6"-12"	SBS-8-2-2RM			NONE
	12"-18"	SBS-8-2-3RM			TAL A, B
	18"-24"	SBS-8-2-4RM			TAL A, B
	24"-30"	SBS-8-2-5RM			TAL A, B
	30"-36"	SBS-8-2-6RM			TAL A, B
12799	0"-6"	SBS-8-3-1RM	TBD	TBD	TAL A, B
	6"-12"	SBS-8-3-2RV			NONE
	12"-18"	SBS-8-3-3RM			TAL A, B
	18"-24"	SBS-8-3-4RM			TAL A, B
	24"-30"	SBS-8-3-5RM			TAL A, B
	30"-36"	SBS-8-3-6RM			TAL A, B
12800 Duplicate	24"-30"	SBS-8-3-5RM-D	TBD	TBD	TAL A, B
12801	0"-6"	SBS-8-4-1V	TBD	TBD	NONE
	6"-12"	SBS-8-4-2V			NONE
	12"-18"	SBS-8-4-3V			NONE
	18"-24"	SBS-8-4-4V			NONE
	24"-30"	SBS-8-4-5V			NONE
	30"-36"	SBS-8-4-6V			NONE

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Location ID	Depth	Sample ID	Northing	Easting	Analysis
1872A	0"-6"	SBS-9-1-1RM	498308	1369232	TAL A, B
	6"-12"	SBS-9-1-2V			NONE
	12"-18"	SBS-9-1-3RM			TAL A, B
	18"-24"	SBS-9-1-4RM			TAL A, B
	24"-30"	SBS-9-1-5RM			TAL A, B
	30"-36"	SBS-9-1-6RM			TAL A, B
12802	0"-6"	SBS-9-2-1RM	TBD	TBD	TAL A, B
	6"-12"	SBS-9-2-2V			NONE
	12"-18"	SBS-9-2-3RM			TAL A, B
	18"-24"	SBS-9-2-4RM			TAL A, B
	24"-30"	SBS-9-2-5RM			TAL A, B
	30"-36"	SBS-9-2-6RM			TAL A, B
12803 Duplicate	18"-24"	SBS-9-2-4RM-D	TBD	TBD	TAL A, B
12804	0"-6"	SBS-9-3-1RM	TBD	TBD	TAL A, B
	6"-12"	SBS-9-3-2V			NONE
	12"-18"	SBS-9-3-3RM			TAL A, B
	18"-24"	SBS-9-3-4RM			TAL A, B
	24"-30"	SBS-9-3-5RM			TAL A, B
	30"-36"	SBS-9-3-6RM			TAL A, B
12805	0"-6"	SBS-9-4-1V	TBD	TBD	NONE
	6"-12"	SBS-9-4-2V			NONE
	12"-18"	SBS-9-4-3V			NONE
	18"-24"	SBS-9-4-4V			NONE
	24"-30"	SBS-9-4-5V			NONE
	30"-36"	SBS-9-4-6V			NONE

APPENDIX B
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Location ID	Depth	Sample ID	Northing	Easting	Analysis
1873A	0"-6"	SBS-10-1-1RM	503703	1367648	TAL A, B
	6"-12"	SBS-10-1-2V			NONE
	12"-18"	SBS-10-1-3RM			TAL A, B
	18"-24"	SBS-10-1-4RM			TAL A, B
	24"-30"	SBS-10-1-5RM			TAL A, B
	30"-36"	SBS-10-1-6RM			TAL A, B
12806	0"-6"	SBS-10-2-1RM	TBD	TBD	TAL A, B
	6"-12"	SBS-10-2-2V			NONE
	12"-18"	SBS-10-2-3RM			TAL A, B
	18"-24"	SBS-10-2-4RM			TAL A, B
	24"-30"	SBS-10-2-5RM			TAL A, B
	30"-36"	SBS-10-2-6RM			TAL A, B
12807	0"-6"	SBS-10-3-1RM	TBD	TBD	TAL A, B
	6"-12"	SBS-10-3-2V			NONE
	12"-18"	SBS-10-3-3RM			TAL A, B
	18"-24"	SBS-10-3-4RM			TAL A, B
	24"-30"	SBS-10-3-5RM			TAL A, B
	30"-36"	SBS-10-3-6RM			TAL A, B
12808 Duplicate	18"-24"	SBS-10-3-4RM-D	TBD	TBD	TAL A, B
12809	0"-6"	SBS-10-4-1V	TBD	TBD	NONE
	6"-12"	SBS-10-4-2V			NONE
	12"-18"	SBS-10-4-3V			NONE
	18"-24"	SBS-10-4-4V			NONE
	24"-30"	SBS-10-4-5V			NONE
	30"-36"	SBS-10-4-6V			NONE

APPENDIX B

Supplemental Background Soil Sampling Project Number 21120-PSP-0002

Location ID	Depth	Sample ID	Northing	Easting	Analysis
1879A	0"-6"	SBS-11-1-1RM	499627	1375627	TAL A, B
	6"-12"	SBS-11-1-2V			NONE
	12"-18"	SBS-11-1-3RM			TAL A, B
	18"-24"	SBS-11-1-4RM			TAL A, B
	24"-30"	SBS-11-1-5RM			TAL A, B
	30"-36"	SBS-11-1-6RM			TAL A, B
12810	0"-6"	SBS-11-2-1RM	TBD	TBD	TAL A, B
	6"-12"	SBS-11-2-2V			NONE
	12"-18"	SBS-11-2-3RM			TAL A, B
	18"-24"	SBS-11-2-4RM			TAL A, B
	24"-30"	SBS-11-2-5RM			TAL A, B
	30"-36"	SBS-11-2-6RM			TAL A, B
12811	0"-6"	SBS-11-3-1RM	TBD	TBD	TAL A, B
	6"-12"	SBS-11-3-2V			NONE
	12"-18"	SBS-11-3-3RM			TAL A, B
	18"-24"	SBS-11-3-4RM			TAL A, B
	24"-30"	SBS-11-3-5RM			TAL A, B
	30"-36"	SBS-11-3-6RM			TAL A, B
12812 Duplicate	0"-6"	SBS-11-3-5RM-D	TBD	TBD	TAL A, B
12813	0"-6"	SBS-11-4-1V	TBD	TBD	NONE
	6"-12"	SBS-11-4-2V			
	12"-18"	SBS-11-4-3V			NONE
	18"-24"	SBS-11-4-4V			NONE
	24"-30"	SBS-11-4-5V			NONE
	30"-36"	SBS-11-4-6V			NONE

APPENDIX C

TARGET ANALYTE LISTS

APPENDIX C
TARGET ANALYTE LISTS

Supplemental Background Soil Sampling
Project Number 21120-PSP-0002

TAL A

Metals (ASL D)	Method	Minimum Detection Level (mg/kg)
Aluminum	ICP	1.23
Antimony	ICP	1.6
Arsenic	GFAA	0.32
Barium	ICP	0.03
Beryllium	ICP	0.025
Boron	ICP	1.24
Cadmium	ICP	0.13
Calcium	ICP	0.82
Chromium	ICP	0.14
Cobalt	ICP	0.16
Copper	ICP	0.13
Iron	ICP	0.38
Lead	ICP	0.58
Magnesium	ICP	1.64
Manganese	ICP	0.12
Mercury	ICP	0.02
Molybdenum	ICP	0.61
Nickel	ICP	0.23
Potassium	ICP	17.7
Selenium	GFAA	0.1
Silicon	ICP	2.6
Silver	ICP	0.22
Sodium	ICP	1.77
Thallium	GFAA	0.3
Vanadium	ICP	1.57
Zinc	ICP	0.36

TAL B

Supplemental Background Soil Sampling
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Radionuclides via Gamma Spectroscopy – ASL D	HAMDCs (pCi/g)*
Radium-226	0.2
Radium-228	0.2
Radium-224	1.0
Uranium-235	0.1
Uranium-238	1.0
Total U	N/A
Thorium-228	0.1
Thorium-232	0.1
Actinium-227	0.5
Cesium-137	0.17
Lead-210	0.2
Potassium-40	1.0
Protactinium-231	2.0
Ruthenium-106	0.5

* pCi/g – picoCuries per gram