Environmental Restoration Program

OPERABLE UNIT 5
OPERATIONAL AREA PHASE I INVESTIGATION
AREA 13 FIELD REPORT

MOUND PLANT
MIAMISBURG, OHIO

VOLUME I - TEXT

June 1995

Final (Revision 1)

U.S. Department of Energy
Ohio Field Office

EG&G Mound Applied Technologies

CONTENTS

FIGURES

TABLES

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ACRONYMS

AOC	Area of Concern
CC	contamination criteria
DOE	U.S. Department of Energy
DQO	data quality objective
FIDLER	field instrument for the detection of low-energy radiation
Freon-11	trichlorofluoromethane
Freon-113	trichlorotrifluoethane
FSP	Field Sampling Plan
NERI	Northeast Research Institute LLC
OU	Operable Unit
PCE	tetrachloroethene
pCi/g	picocuries per gram
Pu-238	plutonium-238
QA	quality assurance
QAPjP	Quality Assurance Project Plan
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
SOP	Standard Operating Procedures
TCA	trichloroethane
TCE	trichloroethene
Th-232	thorium-232

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1. INTRODUCTION

Area 13 has been identified as a potential area of concern (AOC) within the Operational Area of Operable Unit (OU) 5 (see Figure 1.1). The purpose of the Area 13 Field Report is to present the results of the radiological and soil gas surveys conducted in Area 13 as part of a larger Phase 1 Investigation of OU5 and identify potential areas of radiological and chemical contamination within Area 13.

The data gathered during the Phase 1 investigation is not Remedial Investigation (RI) quality. However, as summarized in this report, the data provide a qualitative screen that can be used to determine a strategy for directing possible Phase 2 and Phase 3 investigations. A Phase 2 investigation will be conducted to gather RI quality data from locations with probable contamination, as found during the Phase 1 reconnaissance investigation. This information will be used to refine the data quality objectives (DQOs) to determine if an additional round of sampling (Phase 3) is necessary. The phased approach to data gathering is part of an overall strategy to conduct a remedial investigation/feasibility study (RI/FS) for OU5.

The following sections briefly describe the scope of the Area 13 Field Report, provide a site description and site land use history, and present the organization of the remainder of the report.

1.1. SCOPE

The scope of the Area 13 Field Report is to present the results of the field work performed and the data collected at Area 13 during the Phase 1 investigation conducted during July through September, 1994. This work was conducted according to the OU5, South Property, Remedial Investigation/Feasibility Study Work Plan (DOE 1993a) and associated OU5 Field Sampling Plan (FSP) (DOE 1993b). In addition, relevant data available from previous studies are also integrated into this report.

1.2. SITE DESCRIPTION AND HISTORY

The areal extent of Area 13 was determined as the result of the evaluation of historic information and previous reports (DOE 1993a and DOE 1993b). Area 13 is approximately 100 feet by 110 feet (11,000 ft^2) in size and is located northeast of Building 49 and next to the Mound Plant Drainage Ditch (see Figure

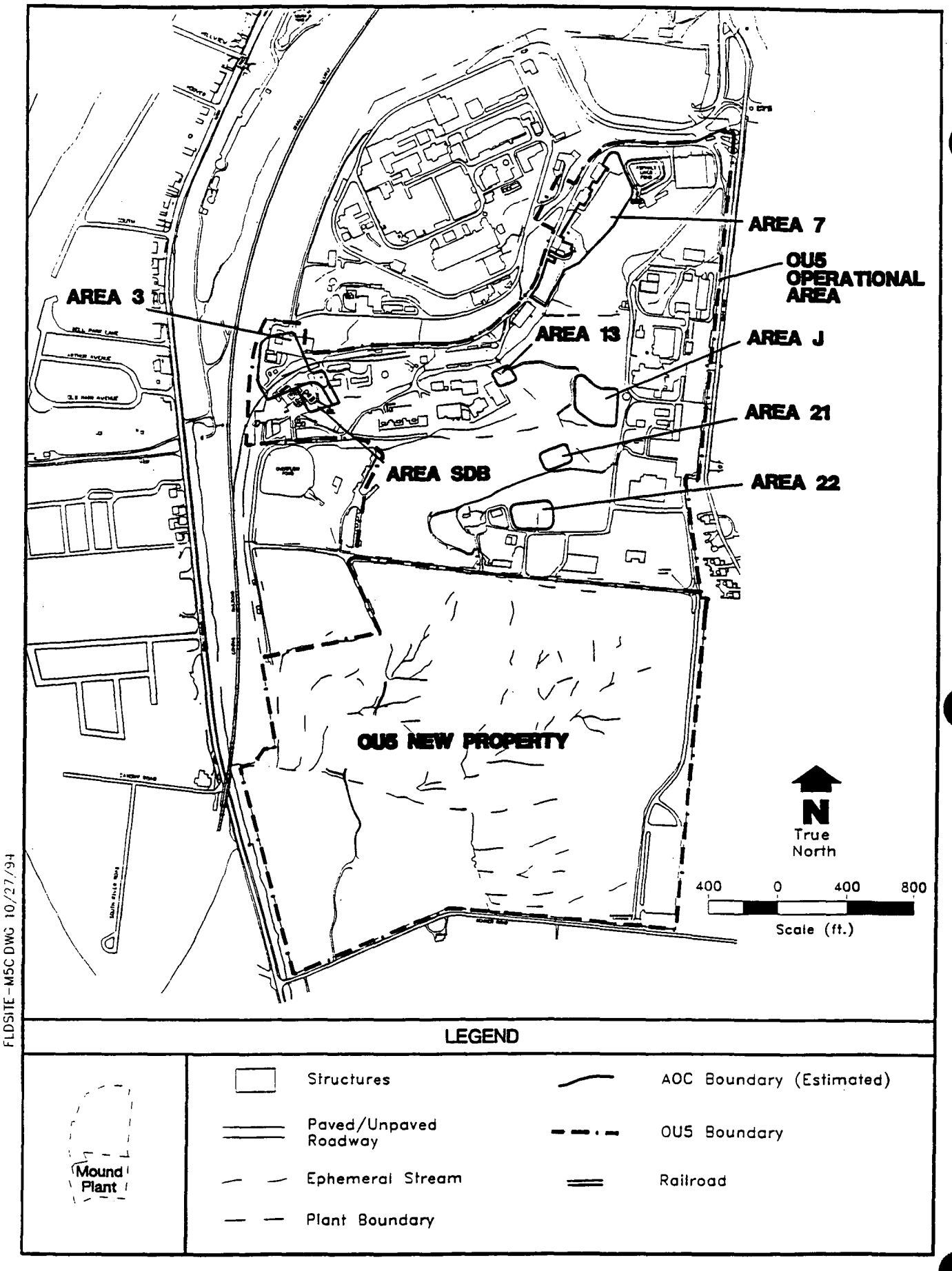

Figure 1.1. Site Map of Operable Unit 5 Areas of Concern

1.2). The Area is relatively flat and is partially located in a secured area. An ephemeral tributary of the Mound Plant Drainage ditch runs through Area 13.

In 1950, Area 13 was used to store wood materials generated from demolition of the Dayton operations. These materials were known to be contaminated with polonium-210. Subsequent activities conducted in Area 13 were to remove these materials. Uncontaminated wood structures (i.e., walls) were sold for salvage. The remaining wood structures (i.e., flooring and other combustible materials) were burned in Area 13. Metals and other non-combustible materials were saturated with fuel oil and burned (DOE 1993a).

In 1955, a radiological survey was conducted in Area 13 which indicated beta and gamma contamination in the remaining residual material. Subsequently, the residual material was removed and buried in the southern part of the Historic Landfill (DOE 1993a).

Soil samples taken in or near Area 13 during the Mound Site Survey Project (Stought et al. 1988) detected low levels of Plutonium-238 (Pu-238) in the area. It is believed the low concentrations of Pu-238 detected in the soil samples originated from surface water run-off from another contaminated area rather than radioactivity associated with polonium-210 contaminated wood placed in Area 13. Polonium-210 has a half-life of 138.4 days and in all probability is no longer present in detectable quantities (DOE 1993a).

During the OU9 Hydrogeological Investigation (DOE 1994) subsurface soil samples were taken at monitoring well 0345 located 150 feet northeast of Building 49. The soil analyses indicated the presence of carbon disulfide and toluene in Area 13. Additionally, groundwater samples were collected from monitoring well 0345 under the Groundwater Sweeps Program. However, the results of this investigation are currently unvalidated and unpublished and therefore not included in this report.

1.3. REPORT ORGANIZATION

The remainder of this report presents the results of the Area 13 Phase 1 investigation. Section 2 summarizes field activities performed and data collected during the radiological survey and the soil gas survey. It also compares relevant data from previous investigations with Phase 1 investigation data.

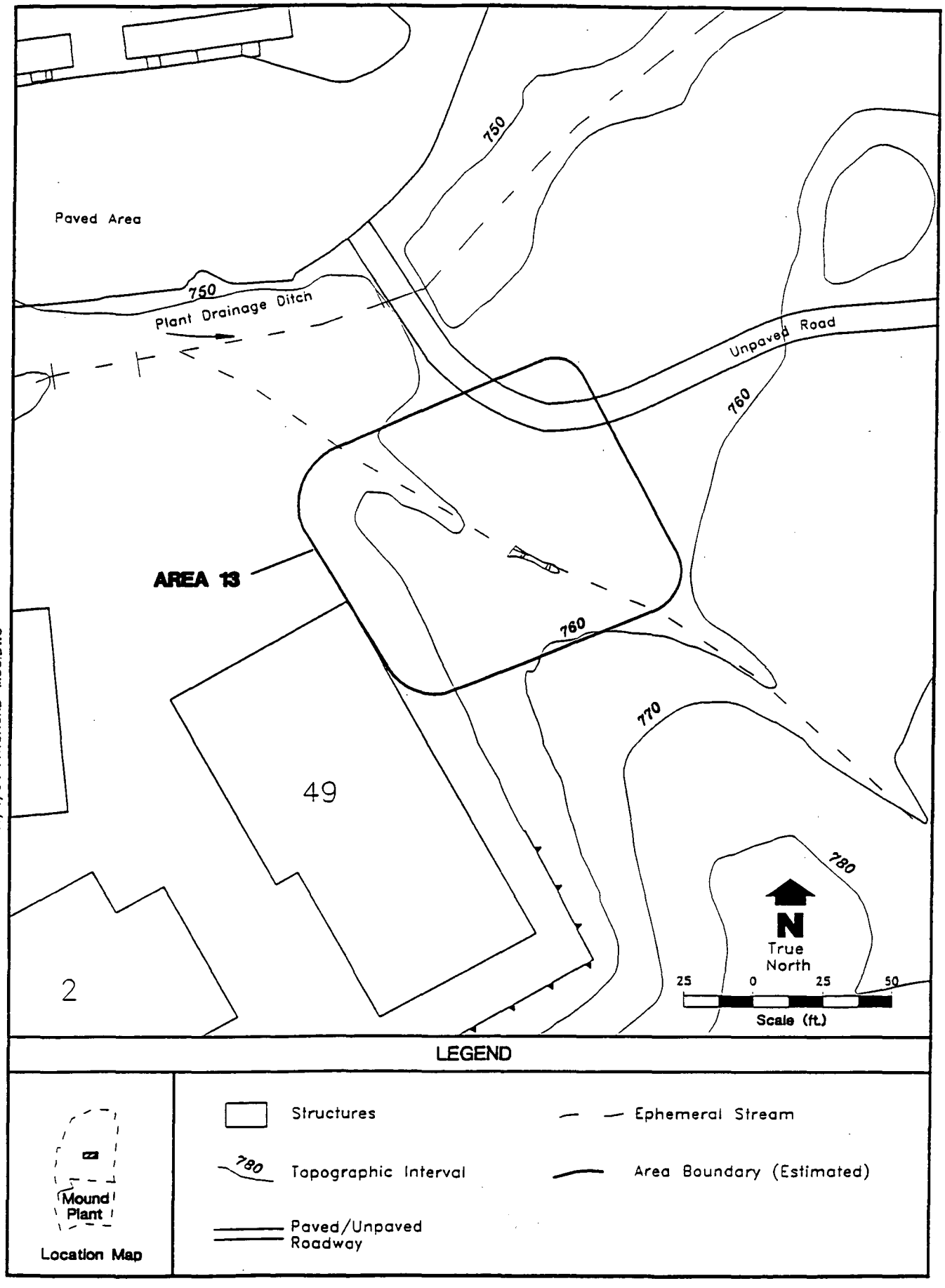

Figure 1.2. Estimated Boundary of Area 13

Section 3 summarizes the results of the radiological and chemical surveys and Section 4 lists the references used to prepare this report. Field logbooks, survey maps, radiological data, and soil gas data are included in Appendices A, B, C, and D, respectively, contained in Volume II of this report.

2. FIELD ACTIVITIES AND DATA SUMMARY

The Area 13 Phase 1 field activities were conducted to screen this AOC for potential areas of contamination. Reconnaissance activities in Area 13 consisted of:

- screening with a field instrument for the detection of low-energy radiation (FIDLER) (a multi-channel analyzer) survey;
- surface soil sample analyses conducted at the Mound Plant Soil Screening Facility to detect possible surface radiological contamination; and
- a soil gas survey to detect subsurface volatile and semi-volatile organic chemical contamination.

As specified in the OU5 FSP (DOE 1993b), the radiological screening was conducted to detect the presence of Pu-238 and thorium-232 (Th-232) in Area 13. These two radionuclides are the most prevalent radiological contaminants at the Mound Plant. The soil gas survey was conducted to detect total aromatic hydrocarbons (including diesel fuels and light-weight fuel oils), total semi-volatile hydrocarbons, total C_5 to C_{11} petroleum hydrocarbons, and total halogenated hydrocarbons.

Data collection points for the FIDLER survey, the soil screening activities, and the soil gas survey were established over a 25 foot grid system within the estimated Area 13 boundary (see Figure 2.1 or Plate 1, Appendix A). The land survey map of Area 13 (Appendix B) shows the points located by a registered surveyor that were used to establish the grid system in the AOC. Before sampling, all transverse lines of the grid system were marked with wooden stakes or paint.

The following sections describe the field activities and analyses performed, the results of the Phase 1 investigation, and a comparison of the results with historical data.

2.1. RADIOLOGICAL (FIDLER) SURVEY

A FIDLER survey was performed over Area 13 on July 21, and July 25, 1994, per the Mound Standard Operating Procedure (SOP) 6.7, Near Surface and Soil Screening for Low-Energy Gamma Radiation Using the FIDLER.

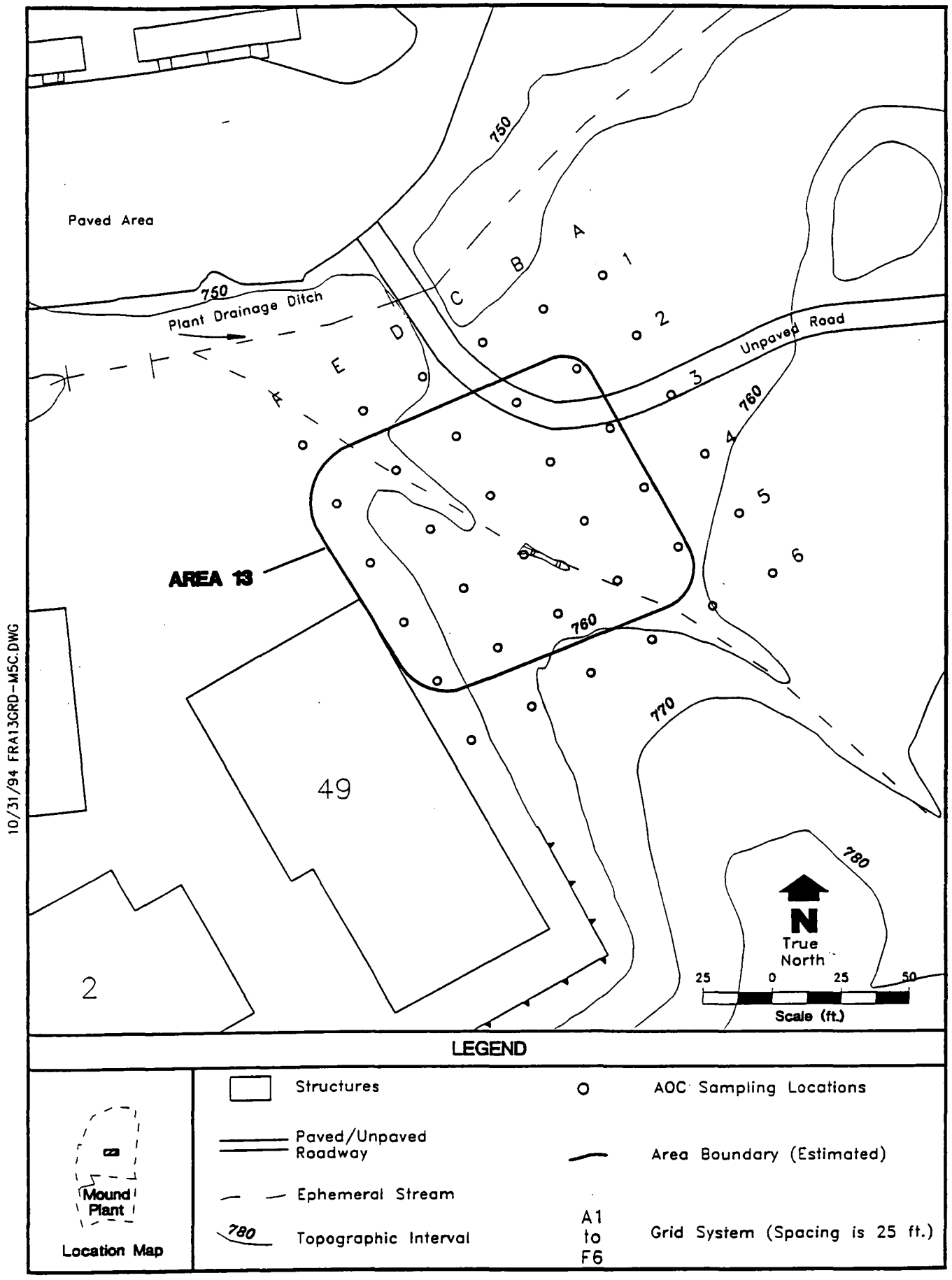

Figure 2.1. Estimated Boundary and Grid System of Area 13

2.1.1. Field Work Performed and Procedures

Prior to beginning the survey, the Bicron FIDLER was calibrated on July 21, 1994, and a background station, in accordance with SOP 6.7, was established near stake D3 in Area 13. On July 25, 1994, an area near stake C3 in Area 13 was established as the background station. Background and standard source checks for Pu-238 and Th-232 were performed on both days of the survey and readings were recorded on the card attached to the FIDLER and in the field logbook (Appendix A.2). The standard deviations and the contamination criteria (CC) were calculated for the Out Channel, Channel 1, and Channel 2 (see Appendix A.2).

Due to its ability to detect a wide range of isotopes, the Out Channel was selected for screening surface radiological contamination within Area 13. The Out Channel detects a range of low-energy x-rays and gamma rays, while Channel 1 discriminates for Pu-238, and Channel 2 discriminates for Th-232.

In areas with minimal obstructions, each 25 foot by 25 foot grid block was subdivided into 25, five foot by five foot sections. These sections were surveyed in a serpentine fashion at a rate of 20 feet per minute. An Out Channel reading was taken in each section and recorded in the field logbook (see Appendix A.2). If the readings exceeded the CC for the Out Channel, the section was divided into quadrants (northwest, northeast, southwest, and southeast). The FIDLER crew then located the point of highest activity in the area of elevated activity by identifying where the highest readings were detected in one of these quadrants. After one minute stabilization periods, Channel 1, Channel 2, and Out Channel readings were taken at the point of highest activity and recorded in the FIDLER logbook. The FIDLER was then slowly moved radially out from the point of highest activity until the Out Channel reading dropped below the CC, thereby defining the area of elevated activity.

Where grid blocks could not be surveyed in a serpentine fashion, Out Channel readings were recorded at each stake. The FIDLER operator then walked between stakes perpendicular to Row 1, (i.e. A1 to A6, B1 to B6, etc. as shown in Figure 2.1) at a rate of 20 feet per minute in the Out Channel mode. No readings were recorded between stakes, unless the CC for the Out Channel was exceeded.

2.1.2. Quality Assurance Summary Report

The field and data analysis quality assurance (QA) variances are summarized in the following subsections.

2.1.2.1. Field Variance Report

The FIDLER survey was completed with no variances from the OU5 Quality Assurance Project Plan (QAPjP) (DOE 1993b). Two minor QA variances from SOP 6.7 occurred involving check sources and scanning techniques.

The first minor variance was the use of Pu-238 and Th-232 sources for the daily source check as opposed to the americium-241 source specified in SOP 6.7. Plutonium and thorium sources were provided by the Mound Plant for the required daily check. The second variance from SOP 6.7 was the inability to screen the entire area in a serpentine fashion. In grid blocks where it was not possible to screen in a serpentine fashion due to obstructions, screening was conducted at and between grid points as discussed above (Section 2.1.1).

2.1.2.2. Data Analysis Variance Report

FIDLER survey data were not formally validated. However, all logbook entries were checked for accuracy, completeness, and format. An error was found in the calculations used to determine the FIDLER contamination criteria (CC). These values were recalculated and compared to the FIDLER survey data. After reviewing the data, several additional locations in Area 13 were identified as having elevated radiological activity when compared to the recalculated Out Channel CC. Because the corrections were made following the completion of the survey, no Channel 1 or Channel 2 readings were taken at these locations identified as having elevated Out Channel readings.

2.1.3. Health and Safety Summary Report

The FIDLER survey was conducted according to the OU5 South Property RI/FS Health and Safety Plan (DOE 1993c), and the Environmental Restoration Program Site-Specific Health and Safety Plan for OU5 Operational Area - Area 13. Health and safety issues were discussed and resolved during daily tailgate safety briefings conducted by the Site Health and Safety Officer and documented in the Site Manager Logbook (Appendix A.1).

No accidents or safety violations occurred during the FIDLER survey at Area 13. On August 23, 1994, a health and safety surveillance was conducted with no deviations being reported.

2.1.4. Presentation of Radiological Data

Appendix C contains all radiological data collected during the Phase 1 investigation of Area 13. It includes a summary of the data from the FIDLER survey and the analytical results of soil samples sent to the Mound Plant Soil Screening Facility.

The FIDLER survey located four areas of elevated surface activity as summarized in Table II.1 and shown in Figure 2.2. The radiological activity in these locations exceeded the Out Channel contamination criteria by 500 - 1,000 cpm. The potential for minor levels of radiological contamination may exist in these areas.

Table II.1. Summary of Elevated Surface Radiological Activity in Area 13 (FIDLER Survey)

Point of Highest Activity	Out Channel (kcpm)		Size
	CC	RDG	
C03-06, C03-15	11.0	11.5, 11.5	5' x 10'
C03-15	11.0	11.5	5' x 5'
D03-12	11.0	11.5	5' x 5'
B06	11.0	12.0	1' x 1'

CC contamination criteria
kcpm counts per minute x 1000
RDG FIDLER reading

Surface soils samples, collected as part of the soil gas survey (see Section 2.2.1.1), were analyzed for Pu-238 and Th-232. No samples exceeded the Mound Plant Soil Screening Facility detection limits of 25.0 pCi/g for Pu-238 and 2.0 pCi/g for Th-232 (see Appendix C).

2.1.5. Comparison with Historical Radiological Data

During the Mound Site Survey Project, two surface soil samples were collected in or near Area 13 (DOE 1993d). One of the samples (collected within the boundaries of Area 13) detected Pu-238 at a concentration of 0.34 pCi/g, while the other sample (collected near Area 13) detected Pu-238 at a concentration of 5.74 pCi/g (DOE 1993d). Neither sample showed levels above 25.0 pCi/g for Pu-238

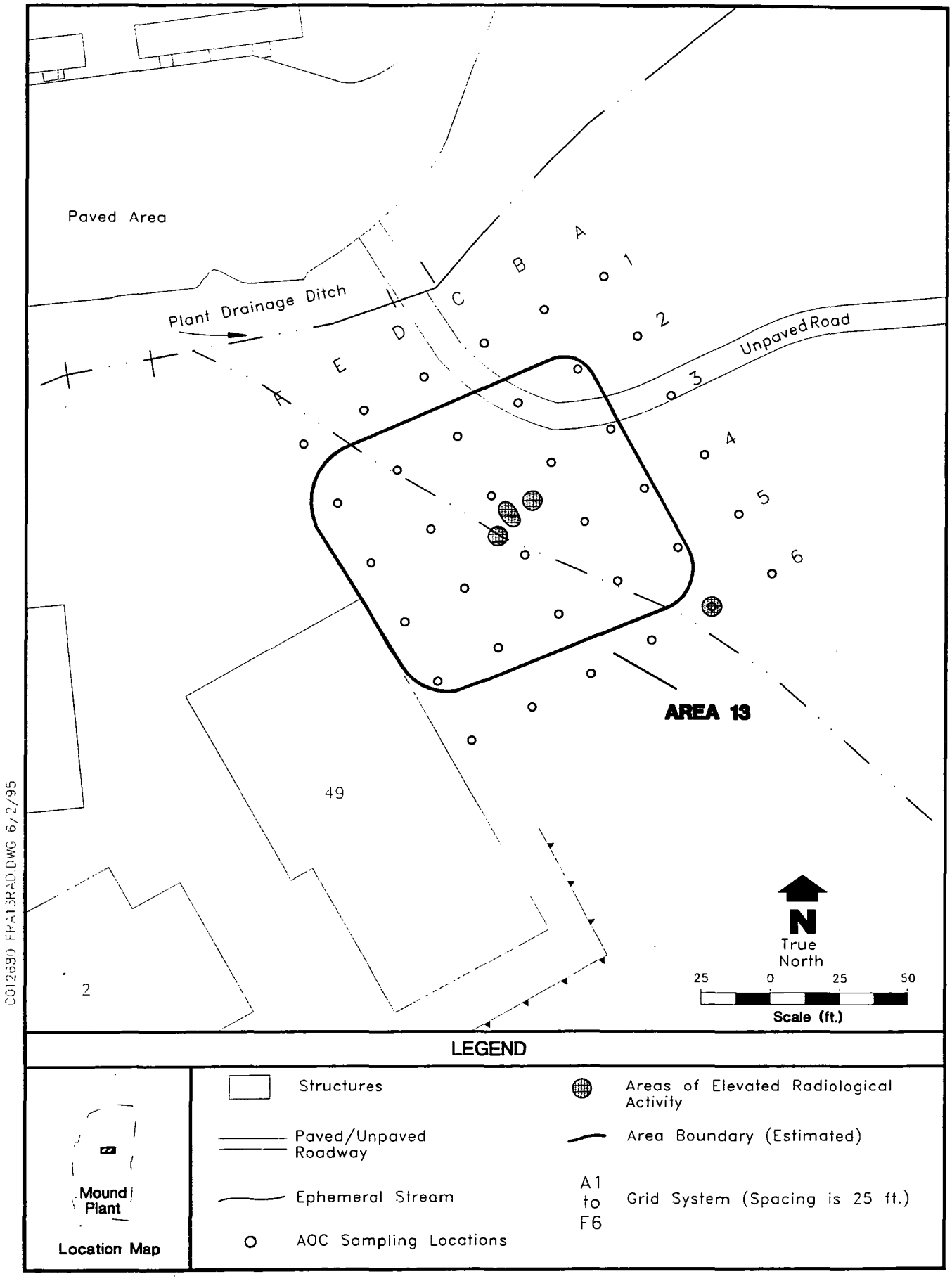

Figure 2.2. Areas of Elevated Surface Radiological Activity (FIDLER Survey)

or 2.0 pCi/g for Th-232. These results correspond to the findings of the Phase 1 radiological investigation conducted in Area 13.

2.2. SOIL GAS SURVEY

2.2.1. Field Work Performed and Procedures

A soil gas survey was performed at Area 13 from August 16 to September 7, 1994, per the OU5 QAPjP, Attachment 1, SOP for Petrex Environmental Surveys (DOE 1993b). The survey was completed over the grid system established for Area 13 (see Figure 2.1).

2.2.1.1. Soil Gas Sampler Installation

Two sets of time calibration samplers (timers) and 36 data samplers were installed on August 16, 1994. Locations of the timers (A3 and B6) and data samplers are shown in Appendix D, Plate 1. The samplers and timers were installed at depths between 8-18 inches using an electric hammer drill and a 18 x 1.5 inch steel/tungsten carbide-tipped drill bit. After each use, the drill bit was washed in a phosphate free detergent solution with a synthetic scrub brush, rinsed with deionized water, and allowed to air dry.

A FIDLER was used to monitor placement of all samplers and timers (see Appendix A.2). At that time soil samples were also collected from 13 of the 36 sample locations and analyzed for Pu-238 and Th-232 at the Mound Plant Soil Screening Facility. Soil samples could not be collected at the remaining locations due to rocky soil conditions. Results of the soil screening analyses are summarized in Section 2.1.4 and presented in their entirety in Appendix C.

2.2.1.2. Soil Gas Sampler Retrieval

On August 23, 1994, after one week of exposure, one timer from each of the two timer sets (samples #820 and #826, grid coordinates A3 and B6, respectively) was retrieved, wiped (checked for radiological contamination), and sent to Northeast Research Institute LLC (NERI) for analysis. The analysis of the first set of timers indicated low to moderate relative levels of C_4 to C_8 petroleum hydrocarbons and very low relative levels of the halogenated organic compounds tetrachloroethene (PCE) and trichloroethene (TCE).

Based on this information, NERI requested that the second set of timers be retrieved on August 29, 1994. These timers were similarly submitted after an exposure of 13 days. However, due to instrument malfunction at NERI, they were not successfully analyzed.

It was decided that, based on information from the first set of timers, the samplers in the field should be exposed for approximately three weeks. Thus, on September 7, 1994, after a total exposure of 22 days, all samplers were retrieved, wiped, and prepared for shipment. On September 8, 1994, the samplers were received in good condition and logged-in by NERI.

2.2.2. Quality Assurance Summary Report

The field and laboratory analysis QA variances are summarized in the following subsections.

2.2.2.1. Field Variance Report

The soil gas survey was completed with minor variances from the OU5 QAPjP SOP for Petrex Environmental Surveys [Attachment 1] and the FSP (DOE 1993b). These variances included decontamination procedures, the number of samplers and timers installed, and travel blanks.

One minor variance from the SOP was the elimination of the methanol rinse step from the decontamination process used for cleaning drill bits. This change was recommended by NERI.

Three minor variances from the FSP were noted. The first variance was a decrease in the number of samplers installed in Area 13. The FSP requires 46 samplers be used in the soil gas survey. When field work commenced, due to changes in the site configuration, only 36 samplers could be installed over the grid system established for Area 13.

The second FSP variance was a decrease in the number of timers installed in Area 13. The FSP requires five timer sets for an area this size, whereas NERI suggested that two timer sets were sufficient. The third FSP variance was the use of travel blanks. The FSP requires that travel blanks be returned with the timers and samplers, whereas NERI instructed that travel blanks be returned with the samplers only.

2.2.2.2. Laboratory Data Variance Report

Petrex analytical data were not formally validated since the data were qualitative. However, logbook entries (see Appendix A.3) were checked for accuracy, completeness and format. On October 20, 1994, a draft report was submitted by NERI. On October 24, 1994, review of the draft report was completed and changes submitted to NERI. A final report for Area 13 was received from NERI on October 28, 1994. Sample locations shown on Plate 1 of the NERI report (Appendix D, Plate 1) were checked against the field map to confirm that all sampling locations were correctly plotted; no errors were found. All ion count values (Appendix D, Table 1) were checked for plot accuracy on Plates 2 through 5, Appendix D; no errors were found.

A laboratory variance occurred when the second set of timers were not successfully analyzed due to temporary equipment malfunction at NERI. The analysis of the two timers indicated no contaminants were present. On the basis of the earlier exposure test results, it was decided that the samplers in the field should be retrieved after receiving an exposure on the order of three weeks.

2.2.3. Health and Safety Summary Report

The soil gas survey was conducted according to the OU5 South Property RI/FS Health and Safety Plan (DOE 1993c), and the Environmental Restoration Program Site-Specific Health and Safety Plan for OU5 Operational Area - Area 13. Soil gas locations were screened using a FIDLER to avoid digging in radiologically contaminated soil. All sampling locations were checked for underground utilities to avoid damaging or severing utility lines while digging. Health and safety issues were discussed and resolved during daily tailgate safety briefings conducted by the Site Health and Safety Officer and documented in the Site Manager Logbook (Appendix A.1).

No accidents or safety violations occurred during the soil gas survey. On August 23, 1994, a health and safety surveillance was conducted; no deviations were found.

2.2.4. Presentation of Chemical Data

The report of findings of the Petrex soil gas survey is presented in Appendix D. The report discusses the Petrex method, the scope of work, quality assurance/quality control methods, and results. Appendix D,

Plates 1 through 5, show sample locations and significant ion counts of targeted compounds. Ion count values are the unit of measure assigned by the mass spectrometer to the relative intensities associated with each compound. These intensity levels do not represent actual concentrations. Soil gas data are considered qualitative in that multiple sources in soil and/or groundwater cannot be differentiated.

Based on a review of historical information for Area 13 and the immediate vicinity, NERI provided analytical data for the following four general classes of compounds in order to assess the potential for the presence of these compounds below the surface:

- total aromatic hydrocarbons, including diesel fuels and light-weight fuel oils;
- total semi-volatile hydrocarbons;
- total C_5 to C_{11} petroleum hydrocarbons; and
- total halogenated hydrocarbons.

The following subsections describe the distribution of the compounds listed above.

2.2.4.1. Distribution of Total Aromatic Hydrocarbons

Total aromatic hydrocarbons are reported as the combined levels of C_6 to C_{15} aromatic (benzene based) hydrocarbon compounds detected in the soil gas samples.

The majority of the samples analyzed in the soil gas survey contained the light and medium weight aromatic hydrocarbons (e.g., benzene, toluene, ethylbenzene/xylene, C_9 and C_{10}). Few samples were observed to contain C_{11} and heavier aromatics (e.g., heavier cycloalkanes/alkenes and cycloalkenes/dienes).

The heavier hydrocarbons are components of heavy fuel-like products. Their absence suggests that the aromatics detected are primarily derived from light and medium weight fuels such as gasoline, diesel fuel, kerosene, and #1 and #2 heating oils. This finding is further supported by the presence of C_5 to C_{11} petroleum, hydrocarbons detected in the soil gas survey (see Section 2.2.4.3).

The soil gas survey indicates that total aromatic hydrocarbons are distributed over most of Area 13 (see Appendix D, Plate 2) with the highest relative levels of aromatics present on the northern and western border (F1, F4, and C1).

2.2.4.2. Distribution of Total Semi-Volatile Hydrocarbons

Total semi-volatile hydrocarbons are reported as the combined response to: 1) naphthalene; 2) C_{11} through C_{15} alkyl naphthalenes, and 3) C_{12}, C_{14}, and C_{16} polycyclic hydrocarbons (including acenaphthene, anthracene, and pyrene). These compounds are constituents of creosote, coal, tar, and other heavy, high boiling point fraction petroleum products. Naphthalene, and C_{11} and C_{12} alkyl naphthalene are also found in medium to heavy weight fuels and fuel oil-like products.

The distribution of total semi-volatile hydrocarbons is shown in Appendix D, Plate 3. The overall relative response is low which suggests that the hydrocarbons detected are derived mostly from medium weight fuels and not from products in which semi-volatiles are more abundant. This indicates that very few semi-volatile compounds over C_{11} molecular weight may be present in the soil gas, and that the majority of the relative responses are derived from low levels of naphthalenes.

The highest relative responses to semi-volatiles were yielded by samples #798, #801, #808, #809, and #812 (grid coordinates F1, F4, E2, E1, and D3, respectively). These samples were collected from the northern and western extremities of Area 13 and from the depression formed by the ephemeral stream ditch which originates near the center of the area and flows to the northwest corner.

2.2.4.3. Distribution of Total C_5 to C_{11} Petroleum Hydrocarbons

Total C_5 to C_{11} petroleum hydrocarbons reported include aromatics, alkanes, cycloalkanes, alkenes, cycloalkenes, dienes, naphthalene and alkyl naphthalenes. These compounds together make up the bulk of most petroleum fuels, oils, and lubricants.

The distribution of total C_5 to C_{11} petroleum hydrocarbons (see Appendix D, Plate 4) is nearly identical to that of total aromatics (see Section 2.2.4.1.). These results indicate that most of the samples from Area 13 which contain moderate to high relative levels of hydrocarbons were nearly the same in composition. This composition is best described as proportionately high relative levels of C_6 through C_{10} aromatics, C_5 to C_9 cycloalkanes/alkanes, and C_5 to C_8 alkanes and proportionately lower relative levels of cycloalkenes/dienes, naphthalene and methylnaphthalene. Vapor of this composition is typical of weathered fuel-like petroleum products.

2.2.4.4. Distribution of Total Halogenated Hydrocarbons

Total halogenated hydrocarbons are reported as the combined levels of PCE, TCE, trichloroethane (TCA), trichlorofluoromethane (Freon-11), and trichlorotrifluoroethane (Freon-113). These compounds are volatile liquids commonly used as solvents, cleaning agents, and refrigerants.

PCE and TCE were detected more frequently in the soil gas than the other halogenated hydrocarbons. Thus, most of the relative responses to total halogenated hydrocarbons principally reflect the presence of PCE and TCE in the soil gas.

Elevated relative levels of halogenated hydrocarbons occur in a zone along the entire western margin of Area 13 (see Appendix D, Plate 5). There is a single point roughly in the center of the site (sample #827 at grid coordinate C4) which also yielded an elevated relative response to halogenated hydrocarbons, principally TCE.

2.2.5. Comparison with Historical Chemical Data

Previous sampling investigations at Area 13 include the OU9 Hydrogeologic Investigation (DOE 1994) and the Fall 1993 and Spring 1994 Groundwater Sweeps Programs.

On February 5, 1993, monitoring well 0345 was installed about 150 feet northeast of Building 49 near grid coordinate A1 (Figure 2.1). Subsurface soil samples were collected from the well at five feet intervals for volatile organic compound and semi-volatile compound analysis. Low concentrations (estimated) of carbon disulfide (a liquid solvent) and toluene were found in the soil samples collected (DOE 1994). Carbon disulfide and toluene were detected at a depth of 17 to 19 feet (DOE 1994). Toluene was also detected at a depth of four to five feet and at 23 to 24 feet (DOE 1994).

Groundwater samples were collected from well 0345 during the Fall 1993 and Spring 1994 Groundwater Sweeps Programs. However, the data are currently unvalidated and unpublished and therefore are not used for comparison in this report.

Comparison of historical data (DOE 1994) with the Petrex soil gas survey indicates that light weight (C_7) aromatic hydrocarbon toluene was detected in both studies. Low estimated concentrations (1.0 to 2.0

micrograms per kilogram) were found in the soil samples from well 0345. As discussed in Section 2.2.4.1. of this report, toluene was found as an aromatic hydrocarbon component in many of the Petrex soil gas samples (see the Sample Mass Spectra, Appendix D).

3. SUMMARY

The results of the reconnaissance (radiological and chemical) surveys conducted in Area 13 are summarized in this section.

The results of the radiological surveys (FIDLER and soil screenings) are summarized below:

- The FIDLER survey identified four areas of elevated radiological activity in Area 13.

- Soil screening analysis of surface samples do not indicate the presence of Pu-238 or Th-232 above the Mound Plant detection limits of 25 pCi/g and 2 pCi/g, respectively. These results are consistent with the historical radiological data collected during the Mound Site Survey Project in Area 13.

The soil gas survey conducted in Area 13 indicates the following regarding chemical contaminants as summarized below:

- Elevated relative levels of total aromatic hydrocarbons (primarily C_6 - C_{15}) are potentially distributed over most of Area 13 with the highest relative levels on the northern and western border (see Appendix D, Plate 2).

- Elevated relative levels of semi-volatile hydrocarbons (primarily naphthalene, and lesser concentrations of C_{11} - C_{13} alkylnapthalenes, and C_{12}, C_{14}, and C_{16} polycyclic hydrocarbons) are potentially present in the northern and western extremities of Area 13 (see Appendix D, Plate 3).

- Elevated relative levels of C_5 to C_{11} petroleum hydrocarbons are potentially distributed over most of Area 13 with the highest relative levels present in the northern and western extremities of Area 13 (see Appendix D, Plate 4). The composition of these hydrocarbons in Area 13 is typical of weathered fuel-like petroleum products.

- Elevated relative levels of total halogenated hydrocarbons (primarily PCE and TCE and the less frequently detected compounds that included TCA, Freon-11, and Freon-113) are potentially present along the western margin of Area 13 (see Appendix D, Plate 5).

- Comparison of the results of the soil gas survey with historical data collected under the OU9 Hydrogeological Investigation indicates that toluene was detected in both studies.

The unvalidated and unpublished data collected under the Groundwater Sweeps Program needs to be examined when it is made available.

These results will be used to plan a Phase 2 investigation of Area 13 in accordance with the Operable Unit 5, Work Plan (DOE 1993a)

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