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MOUND

Environmental
Restoration
Program

OhioEPA

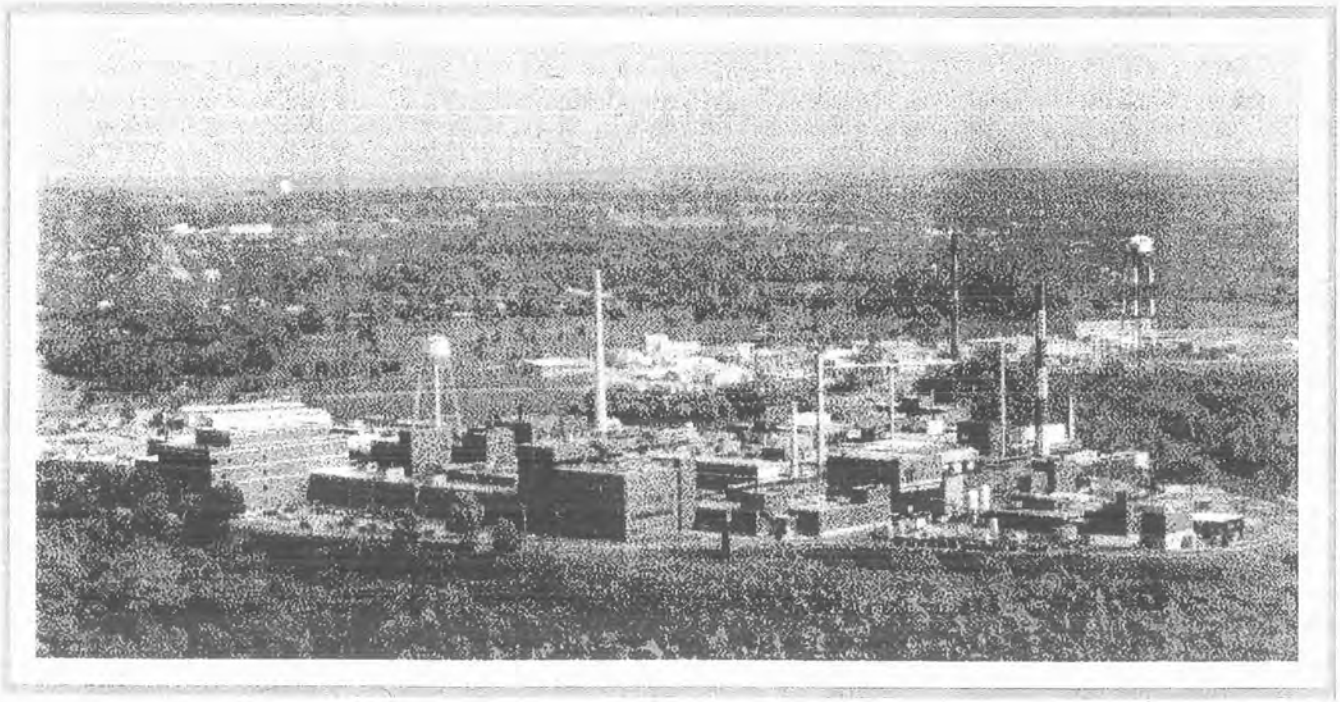
MOUND PLANT

Potential Release Site Package

PRS #72

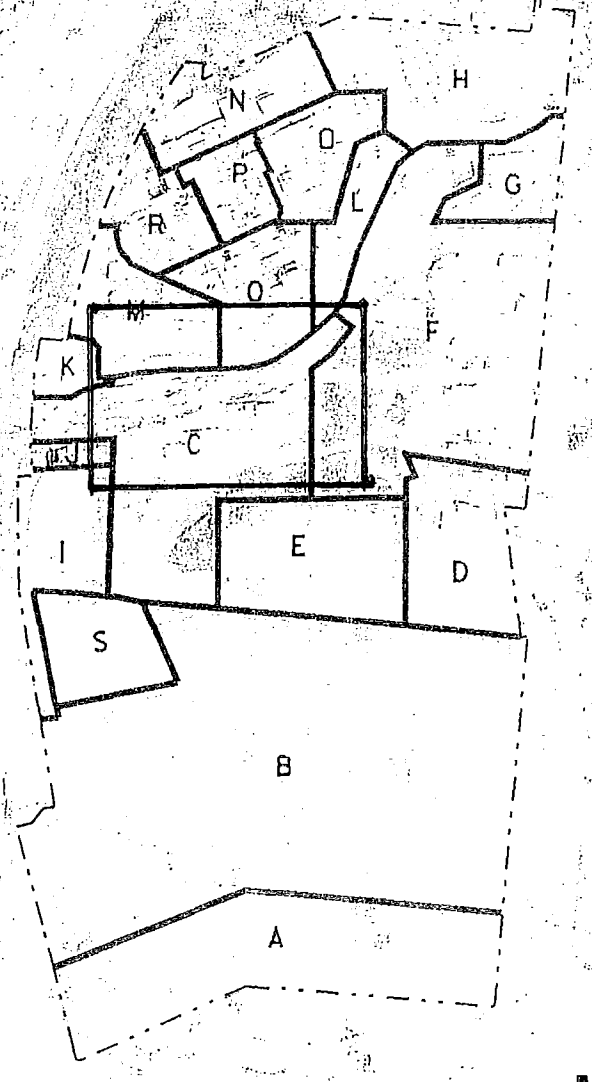
Final

JUNE 2002



PRS 72 Package Tracking Sheet

REVISION	DESCRIPTION	DATE
ORIGINAL PACKAGE	Binned Further Assessment (FA) on 10 July 1997. Addendum 1 summarizes results of FA sampling. Binned NFA on 16 January 2002. Signed recommendation page included in Addendum 1. Original package remains unchanged.	**March 1997**
PUBLIC REVIEW DRAFT	Contains previous package material and Addendum 1. No public comments were received during the public review period of 1 April – 1 May 2002.	**March 2002**
FINAL		**June 2002**

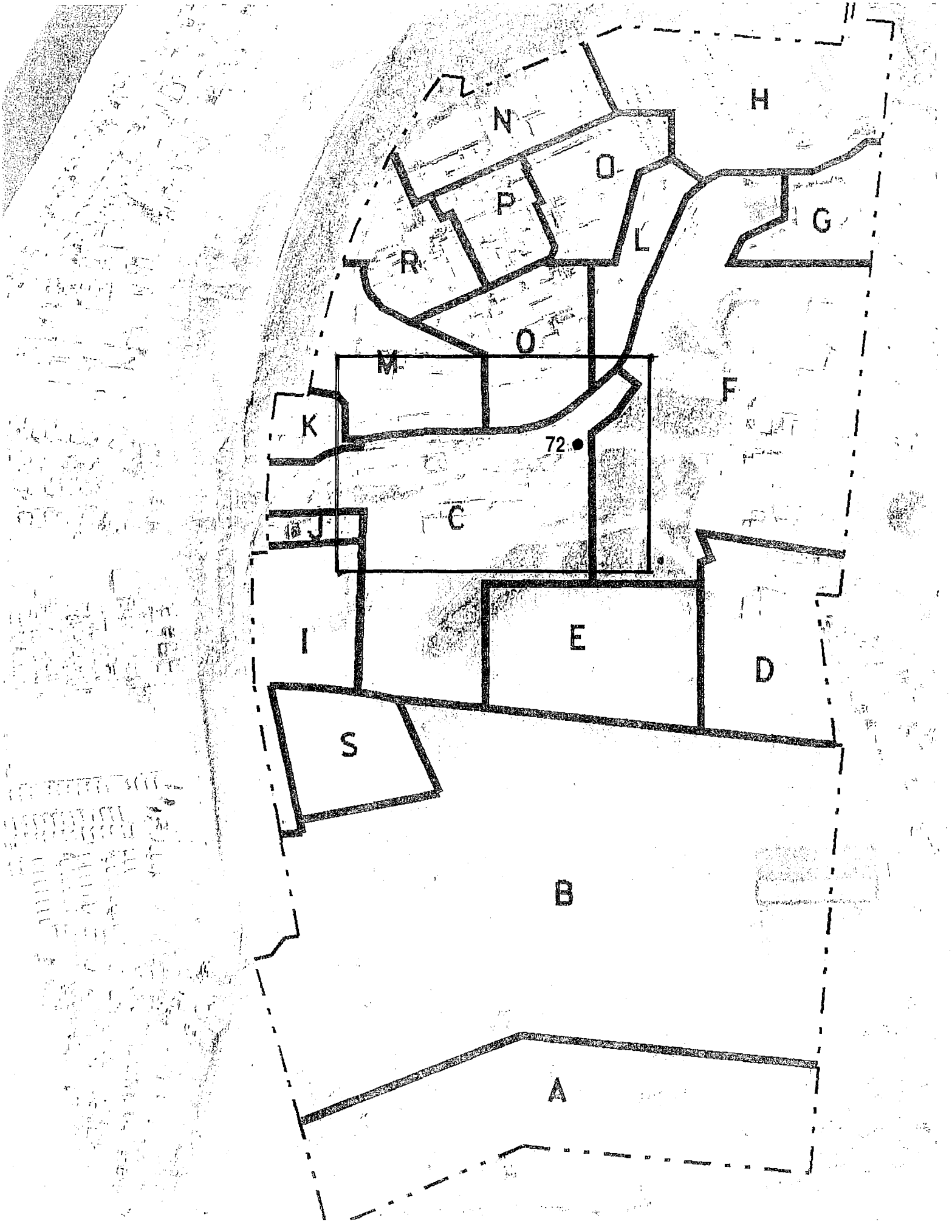


MOUND PLANT

Release Block C

Potential Release Site

PRS 72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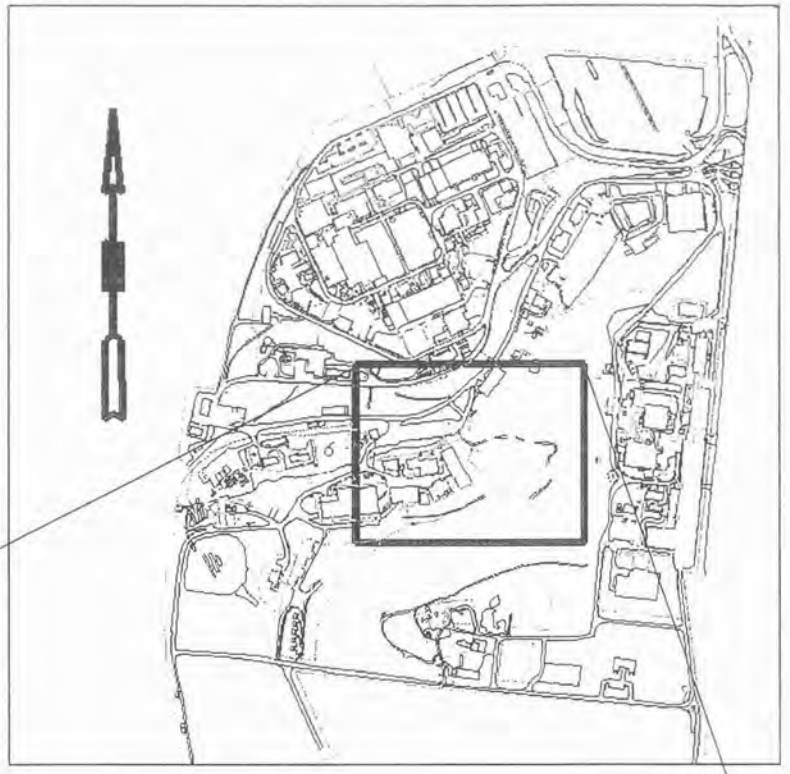
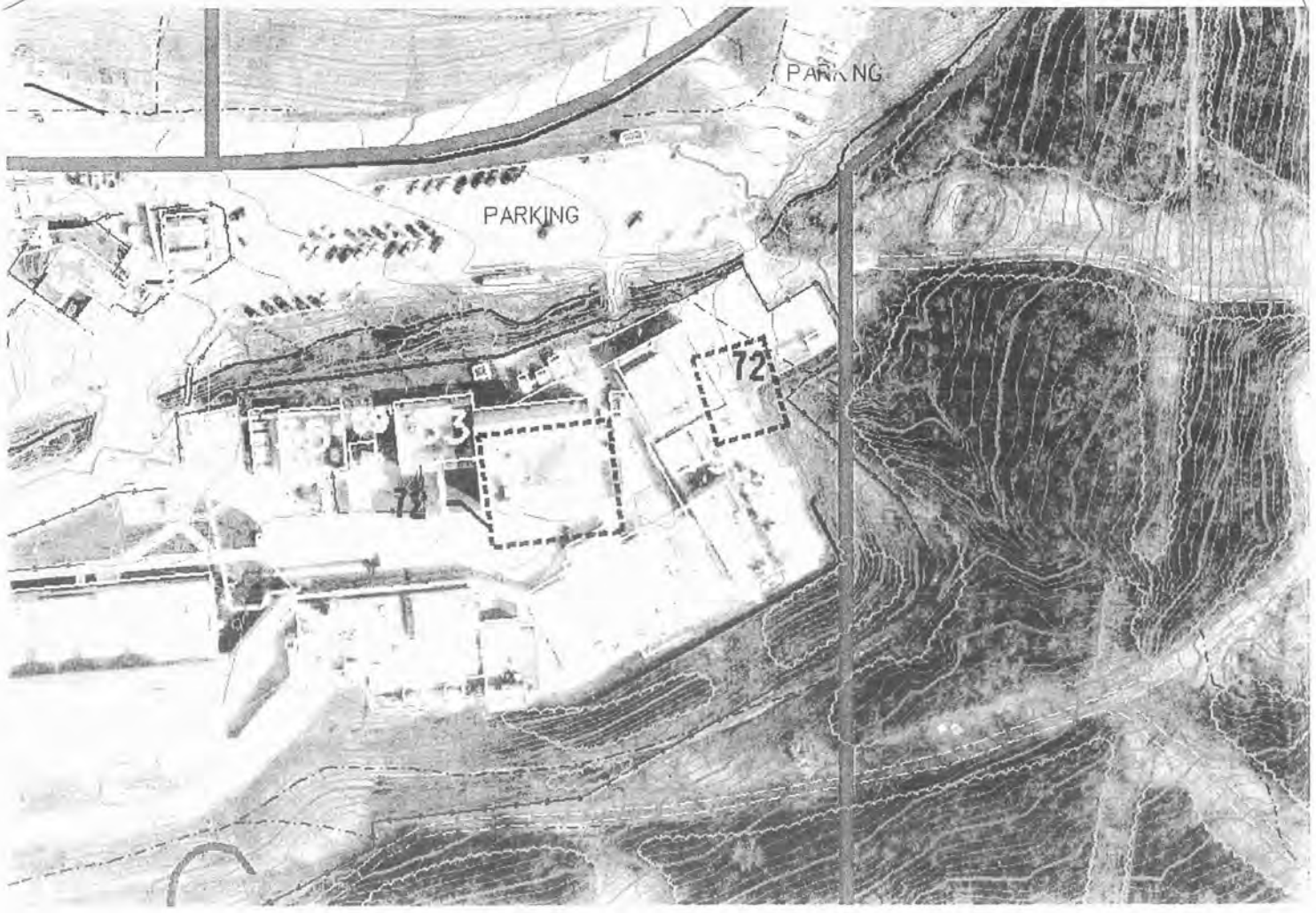
Mound Plant

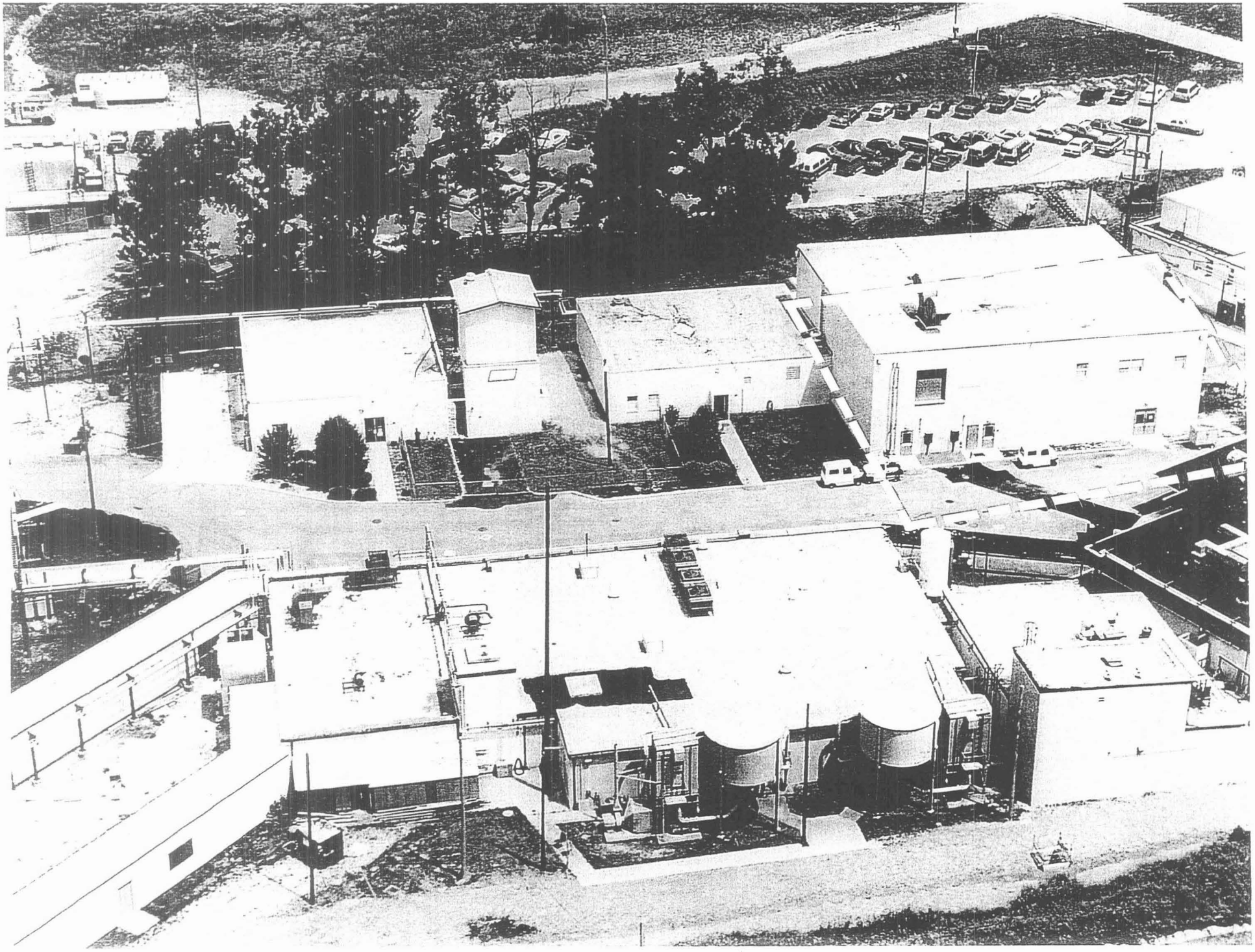
Release Block C

Potential Release Site

PRS 72







PRS 72

PRS HISTORY:

Potential Release Site (PRS) 72 is identified as that area which was used in the early 1950s for the storage of materials contaminated with polonium-210. It is also known as Area 13. In 1949, wood, equipment, and other materials were brought to Mound from the former Dayton operations and staged in and around Area 13. Materials were monitored for alpha contamination associated with the polonium-210. In 1955, wood and lumber that was too contaminated to be removed from the plant site was soaked with fuel oil and burned in Area 13. Residual materials were subsequently buried in the historic landfill (now known as PRS 10).

The actual location of Area 13 was disputed in the Operable Unit 9, Site Scoping Report: Volume 3 - Radiological Site Survey.[2] In that report, it was noted that the modern physical layout of the test fire area renders an exact location of Area 13 difficult to interpret.

Plate I of the Rad Survey[2] shows two possible locations. Most references place Area 13 northeast of Building 49, a plot approximately 100-feet by 100-feet, just south of the plant drainage ditch in what is now known as the test fire area. Most of the applicable data describe that area, and are herein referred to, as the Area 13 data.

However, an alternate site is identified on Plate I of the Rad Survey[2] lying just west of Building 49, partially covered by Building 63. The associated data are herein called the Building 63 data. Both are presented because radiation caused the PRS concern and it is not certain just where the storage/burning site was placed.

CONTAMINATION:

Polonium-210 (Po-210) was known to be the contaminant of concern. Po-210 has a short half-life (138 days) and would have completely decayed in four years time.

Radiological contamination, reported as part of the Site Survey Project,[2] conducted in the mid-1980s indicated plutonium-238 concentrations in the range of 0.28 to 5.74 pCi/g, in Area 13.

In the Building 63 area, plutonium concentrations were measured from 0.08 to 0.54 pCi/g. These plutonium concentrations are below the Mound ALARA (as low as reasonably achievable) guideline of 25 pCi/g. Three surface samples from each area were analyzed for the above results, and thorium was less than 2 pCi/g (compared with the regulatory guideline of 5 pCi/g).[9]

Field investigations of Area 13, conducted in 1994,[6] found no organic compounds to exceed the guideline criteria. However, a 1994 PETREX soil gas investigation,[4, 5] that took thirty-six PETREX samples from a grid covering Area 13, found relatively moderate to high readings for aromatic, semivolatile, petroleum and halogenated hydrocarbons.

Due to the PETREX soil gas results, a follow-on investigation was conducted. The 1996 Soil Gas Confirmation Investigation sampled six soil locations (Nos. SGC A13 000056 through 000061). Four samples reached three feet in depth, No. 000056 could reach only 18 inches and 000060 could reach only 12 inches. All of the samples were within the borders of Area 13. A quantitative analysis was performed on each sample for volatiles, semivolatiles, PCBs, metals, pesticides, radionuclides and explosives.

Results showed that in all of the samples, all of the analyte concentrations were less than the applicable guideline criteria, with the following exception. Sample No. 000061 measured 43000 ppb of trichloroethene where as the 10^{-6} Risk Based Guideline is 41000 ppb.[8]

In 1995, a PETREX soil survey [10] sampled two sites just east and west of the Building 63 area. These samples showed somewhat elevated readings for aromatic and petroleum hydrocarbons.

The follow-on gas confirmation sampling [7] took two specimens from 100 to 200 feet respectively, north and east of the Building 63 area. Quantitative analyses were made for volatiles, semivolatiles, PCBs, metals, radionuclides and explosives. Neither site showed any analyte concentration to be above the applicable guideline criteria.

READING ROOM REFERENCES:

1) OU9, Site Scoping Report: Volume 12 - Site Summary Report, Final, 1994. (pages 5-6.1)
2) OU9, Site Scoping Report: Volume 3 - Radiological Site Survey, Final, 1993. (pages 7-13)
3) OU9, Site Scoping Report: Volume 7 - Waste Management, Draft Final, 1992. (pages 14-18)
4) OU5, Operational Area Phase I Investigation, Area 13 Field Report: Volume I, Final, 1995. (pages 19-43)
5) OU5, Operational Area Phase I Investigation, Area 13 Field Report: Volume II, Final, 1995. (pages 44-52)
6) OU9, Hydrogeologic Investigation: Soil Chemistry Report, Technical Memorandum, 1994. (pages 53-57)
7) Soil Gas Confirmation Sampling, May 1996. (pages 58-70)
8) Risk Based Guideline Criteria, Final, Revision 0, 1995.
10) OU5, Operational Area Phase I Investigation Non-AOC Field Report: Volume II, Appendices A-G, Final, June 1995. (pages 71-82)

OTHER REFERENCES:

9) Code of Federal Regulations, 40 CFR 192.41 and 40 CFR 192.12.

PREPARED BY:

Dean A. Buckner, Member of EG&G Technical Staff

REFERENCE MATERIAL
PRS 72

Document Control No. _____

Environmental Restoration Program

OPERABLE UNIT 9 SITE SCOPING REPORT: VOLUME 12 – SITE SUMMARY REPORT

MOUND PLANT
MIAMISBURG, OHIO

December 1994

Final

U.S. Department of Energy
Ohio Field Office

EG&G Mound Applied Technologies

Description of History and Nature of Waste Handling						Hazardous Conditions and Incidents			Environmental Data		
No.	Site Name	Location	Status	Potential Hazardous Substances	Ref	Releases	Media	Ref	Analytes[a]	Results	Ref
72	Area 13, Polonium-Contaminated Wood from Dayton Unit IV	H-7	Historical	Polonium-210	1, 4, 5	None Suspected	S	6	14	Tables B.1 and B.9	6
73	Evaporator Storage Area (AKA Lower storage area)	H-7	Historical	Actinium-227, Cesium-137, Radium-226	4				14, 15, 16	Table B.9 RSS[c] Locations S0692 and S0697 (Appendix E in Ref. 6)	6
74	Quonset Hut (former)	H-7	Historical	Polonium-210, cobalt-60, bismuth					14	Table B.9 RSS[c] Locations S0684, S0685, and S0689 (Appendix E in Ref. 6)	6
75	Railroad Siding	G-6 G-7	Inactive	Thorium and daughters	4	Suspected thorium	S	4	14	Table B.1	6
76	Warehouse 9	G-7	Historical	Thorium-232	4	Suspected thorium	S	4	No Data		
77	Warehouse 10	G-9	Historical	Polonium-210	4	None suspected			No Data		
78	Warehouse 13	G-9	Historical	Reactor waste including Strontium-90, Cesium-137, and Nickel-63	4	Cesium 137	S	4	No Data		
79	Warehouse 15	E-8	Historical	Radioactive waste Plutonium-238 wastes and sludge Thorium sludge constituents (c)	4	Suspected	S	4	See Area 7 (No. 66)	Table B.9	6
80	Warehouse 15A	F-8	Historical	Plutonium-238, thorium	4						
81	Drilling Mud Drum Storage Areas (3 locations)	H-5 I-4	Historical	Barium	4, 5, 18	None Suspected			No Data		
	ilding 57 Diesel Fuel rage Tank (Tank 118)	H-5	In service	Diesel fuel	3				No Data		
	ing 2 Propane Storage Tank (Tank 122)	H-7	Inactive	Propane	3				No Data		
	ilding 56 Diesel Fuel rage Tank (Tank 223)	F-5	Historical	Diesel fuel	3	Tank Removed			No Data		

1 - Soil Gas Survey - Freon 11, Freon 113, Trans-1,2-Dichloroethylene, Cis-1,2-Dichloroethylene, 1,1,1-Trichloroethane, Perchloroethylene, Trichloroethylene, Toluene
2 - Gamma Spectroscopy - Thorium-228, -230, Cobalt-60, Cesium-137, Radium-224, -226, -228, Americium-241, Actinium-227, Bismuth-207, Bismuth-210m, Potassium-40
3 - Target Analyte List
4 - Target Compound List (VOC)
5 - Target Compound List (SVOC)
6 - Target Compound List (Pesticides/Polychlorinated Biphenyl)
7 - Dioxins/Furans
8 - Extractable Petroleum Hydrocarbons (EPH)/Total Petroleum Hydrocarbons (TPH)
9 - Lithium
10 - Nitrate/Nitrite
11 - Chloride
12 - Explosives
13 - Plutonium-238
14 - Plutonium-238, Thorium-232
15 - Cobalt-60, Cesium-137, Radium-226, Americium-241
16 - Tritium

Reference List

1. DOE 1986 "Phase I Installation Assessment Mound (DRAFT)."
2. DOE 1992a "Remedial Investigation/Feasibility Study, Operable Unit 9, Site-Wide Work Plan (Final)."
3. DOE 1992c "Mound Plant Underground Storage Tank Program Plan & Regulatory Status Review (Final)."
4. DOE 1993a "Site Scoping Report: Volume 7 - Waste Management (Final)."
5. EPA 1988a "Preliminary Review/Visual Site Inspection for RCRA Facility Assessment of Mound Plant."
6. DOE 1993d "Operable Unit 9, Site Scoping Report: Volume 3 - Radiological Site Survey (Final)."
7. DOE 1993c "Operable Unit 3, Miscellaneous Sites Limited Field Investigation Report."
8. DOE 1992d "Reconnaissance Sampling Report Decontamination & Decommissioning Areas, OU6, (Final)."
9. Fentiman 1990 "Characterization of Mound's Hazardous, Radioactive and Mixed Wastes."
10. DOE 1992f "Operable Unit 9, Site Scoping Report: Volume 11 - Spills and Response Actions (Final)."
11. Styron and Meyer 1981 "Potable Water Standards Project: Final Report."
12. DOE 1993b "Reconnaissance Sampling Report - Soil Gas Survey & Geophysical Investigations, Mound Plant Main Hill and SM/PP Hill (Final)."
13. DOE 1993d "Operable Unit 9, Site Scoping Report: Volume 3 - Radiological Site Survey (Final)."
14. DOE 1991b "Main Hill Seeps, Operable Unit 2, On-Scene Coordinator Report for CERCLA Section 104 Remedial Action, West Powerhouse PCB Site."
15. Halford 1990 "Results of South Pond Sampling."
16. DOE 1993e "Operable Unit 4, Special Canal Sampling Report, Miami Erie Canal."
17. DOE 1990 "Preliminary Results of Reconnaissance Magnetic Survey of Mound Plant Areas 2, 6, 7, and C."
18. DOE 1992a "Remedial Investigation/Feasibility Study, Operable Unit 9, Site-Wide Work Plan (Final)."
19. Rogers 1975 "Mound Laboratory Environmental Plutonium Study, 1974."
20. DOE 1992h "Ground Water and Seep Water Quality Data Report Through First Quarter, FY92."
21. Dames and Moore 1976 a, b "Potable Water Standards Project Mound Laboratory" and "Evaluation of the Buried Valley Aquifer Adjacent to Mound Laboratory."
22. DOE 1992i "Closure Report, Building 34 - Aviation Fuel Storage Tank."
23. DOE 1992j "Closure Report, Building 51 - Waste Storage Tank."
24. DOE 1994 "Operable Unit 1, Remedial Investigation Report."
25. EG&G 1994 "Active Underground Storage Tank Plan."

ENVIRONMENTAL RESTORATION PROGRAM

OPERABLE UNIT 9, SITE SCOPING REPORT: VOLUME 3 - RADIOLOGICAL SITE SURVEY

MOUND PLANT
MIAMISBURG, OHIO

June 1993

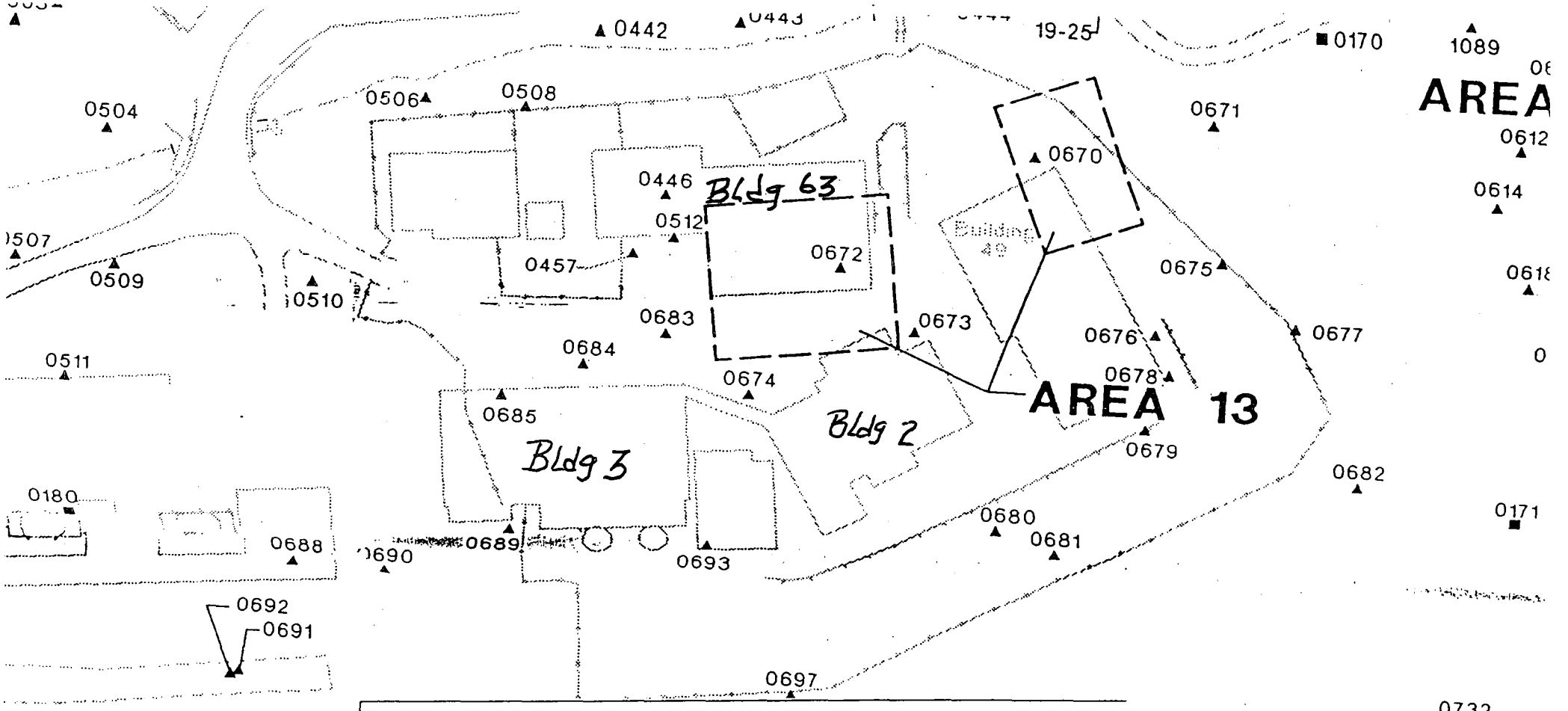
DEPARTMENT OF ENERGY
ALBUQUERQUE FIELD OFFICE

ENVIRONMENTAL RESTORATION PROGRAM
EG&G MOUND APPLIED TECHNOLOGIES

FINAL

Table XI.1. Maximum Radioactivity Concentrations in Soil Samples from Major Areas

Site	Plutonium-238 (pCi/g)	Thorium (pCi/g)	Tritium (pCi/mL)	Cobalt-60 (pCi/g)	Cesium-137 (pCi/g)	Radium-226 (pCi/g)	Americium-241 (pCi/g)	Actinium-227 (pCi/g)	Bismuth-207 (pCi/g)	Bismuth-210m (pCi/g)
Area 1	34,000	924.2	1.67	LDL	0.6	1.1	LDL	--	--	--
Area 2	17.10	3.31	--	--	--	--	--	--	--	--
Area 3	1,235	63	--	--	--	--	--	--	--	--
Area 4/4a	355.00	<2	--	LDL	LDL	1.2	1.0	--	--	--
Area 5	0.35[b]	<2[b]	--	250	1.6	0.8	LDL	--	--	--
Area 6	--	--	--	LDL	LDL	0.9	LDL	--	--	--
Area 7	7.40[j]	20.52	5.23	LDL	1.2	2.0	LDL	1,400	--	--
Area 8	24.40	254.30	1.12	LDL	LDL	3.3	LDL	--	--	--
Area 9	8.15	150	--	--	--	--	--	--	--	--
Area 10	99	<2	--	--	--	--	--	--	--	--
Area 11	100,000	89	--	--	--	--	--	--	--	--
Area 12	313.00	169.90	--	LDL	LDL	1.1	LDL	--	--	--
Area 13	5.74	<2	--	--	--	--	--	--	--	--
Area 14	29[l]	2.24	--	LDL	LDL	1.2	LDL	--	--	--
Area 15[e]	--	--	--	--	--	--	--	--	--	--
Area 16	8,000	3.46	0.35	LDL	LDL	1.2	LDL	--	--	--
Area 17	3,300	1,000	--	LDL	LDL	0.9	LDL	--	--	--
Area 18	3.71	<2	--	--	--	--	--	--	--	--
Area 19[d]	185[m]	1.2	--	--	--	--	--	--	--	--
Area 20	1.90[b]	4.02[b]		800	200	0.9	LDL	--	70	400
Area 21	1.12	<2	0.77	LDL	31	1.2	LDL	--	--	--
Area 22	1.67	<2	0.99	143	7.0	0.7	LDL	--	--	--
Area 23	--	6,000[k]	--	--	--	--	--	--	--	--
Area D	0.98	<2	--	--	--	--	--	--	--	--
Area J	147	30.42	6.84	3.0	LDL	1.0	LDL	--	--	--
Spoils Disposal	8.30	<2	1.90	LDL	LDL	0.94	LDL	--	--	--



ER PROGRAM

MOUND PLANT

Miamisburg, Ohio

PLATE 1
(1 of 2)

Site Survey Project Sampling Locations

Prepared for
Site Scoping Report: Volume 3,
Radiological Site Survey

Map Location[a]	Coordinates South	West	MRC ID No.	Mo-Yr	Depth (inch)	Pu-238 (pCi/g)	Thorium[b] (pCi/g)	Tritium (pCi/mL)	Co-60 (pCi/g)	Cs-137 (pCi/g)	Ra-226 (pCi/g)	Am-241 (pCi/g)
C0169	3575	2720	2473	08-83	18	0.07	b					
			2474	08-83	36	0.03	b					
			2475	08-83	54	0.21	b					
S0667	3575	2770	5830	07-84	0	0.38	b					
S0668	3575	2870	5831	07-84	0	0.02	b					
			2837	10-83	0	0.02	b					
C0170	2700	3000	8264	10-84	72	0.24	b					
			8264	10-84	162	0.03	b					
(The same MRC ID was given for both depths.)												
S0670	2705	3175	4029	10-83	0	0.34	b					
S0671	2725	3075	4118	10-83	0	5.74	b					
S0672	2725	3300	4027	10-83	0	0.43	b					
S0673	2775	3275	4043	10-83	0	0.08	b	0.15				
S0674	2775	3375	4028	10-83	0	0.54	b					
S0675	2800	3100	7196	09-84	0	0.28	b					
S0676	2825	3150	7193	09-84	0	0.09	b					
S0677	2850	3075	7197	09-84	0	0.11	b					
S0678	2850	3151	4030	10-83	0	0.21	b	0.98				
S0679	2875	3175	7194	09-83	0	0.05	b					
S0680	2900	3275	7195	09-84	0	0.34	b					
S0681	2925	3250	4031	10-83	0	0.28	b					

Table III.7. Mound Site Survey Project - Area 13

Plate 1 Location[a]	Coordinates South	Coordinates West	MRC ID No.	Mo-Yr	Depth (inch)	Plutonium-238 (pCi/g)	Thorium[b] (pCi/g)
S0670	2705	3175	4029	10-83	0	0.34	b
S0671	2725	3075	4118	10-83	0	5.74	b
S0672	2725	3300	4027	10-83	0	0.43	b
S0673	2775	3275	4043	10-83	0	0.08	b
S0674	2775	3375	4028	10-83	0	0.54	b

[a]Map locations are given using a "C" to designate core locations and an "S" to designate surface locations.
[b]A "b" indicates that the total thorium concentration was less than the background level of 2.0 pCi/g, using FIDLER screening. Therefore, radiochemical analysis was not performed.
FIDLER - field instrument for the detection of low-energy radiation
MRC ID - Monsanto Research Corporation Identification
pCi/g - picocuries per gram

pCi/g and 5.23 nCi/l, respectively. Seven coreholes and four surface samples (C0008, C0009, C0020, C0015, C0024, C0025, C0032 and S0276, S0278, S0299 and S0316, respectively; Table III.5) were analyzed for cobalt-60. All analyses indicate that nothing above the LDL was encountered.

The core locations in Area 7 were drilled and sampled to maximum depths of 96 to 234 inches (8 to 19.5 ft). Mound Plant drawing #FSE16472, reproduced in the Site Scoping Report: Volume 2 Addendum (DOE 1992f) indicates the depth to bedrock in this area is 9 to 15 ft at the north end of the area, and to 65 ft at the southern end near Building 51. Because a boring log is available for only one of the Area 7 locations, it is not known if bedrock was encountered during the drilling; however, it appears that the majority of the core sampling did not penetrate fill and reach the original disposal area.

3.7. AREA 10

Area 10 is located on the slope of the SM/PP Hill, adjacent to Area 12 (Plate 1). Area 10 contains concrete and debris contaminated with polonium-210 from the 1949 and 1950 demolition of the old Dayton operations (DOE 1992g). The debris was covered over with a layer of dirt. With a half-life of 138.4 days, the polonium-210 is no longer present due to radioactive decay. The actual size of the area affected by the debris disposal is unknown so the area depicted on Plate 1 should be viewed as schematic.

One surface sample was collected in Area 10 during the Site Survey Project, sample S0604 (Plate 1; Table III.6). This sample contained 11.8 pCi/g of plutonium-238, and less than 2 pCi/g of thorium. It is not known where this sample was collected in relation to the debris. No analyses are known for gamma spectroscopy that would have detected cobalt-60 or perhaps bismuth-207.

Because of its location on the slope of the SM/PP Hill, Area 10 is in a position to receive surface water runoff from areas upgradient, such as the adjacent Area 12. Since there are no other known contaminants associated with the concrete, it is believed that the plutonium-238 detected in the surface sample is the result of deposition from surface water runoff. The original Site Survey Project Report notes that more recent D&D Program core sampling in Area 10 indicated one sample with a plutonium-238 concentration between 10 and 99 pCi/g.

3.8. AREA 13

Area 13 is located near Building 49 in the valley between the Main and SM/PP Hills at Mound Plant. In 1950, wood contaminated with polonium-210 from the demolition of the Dayton operations was stored in this area along with equipment stored in tents. The wood, tents and other debris was burned in Area 13 in 1955 (DOE 1992g). Metal and other residual materials that survived the fire were subsequently buried in the historic landfill (Area 2). With a half-life of 138.4 days, the polonium-210

is no longer present due to radioactive decay. The exact location of Area 13 is not exactly known. The locations depicted on Plate 1 indicate the general locations and display the different variations published in various documents. The map of Hot Waste Burial Sites, reproduced in the Site Scoping Report: Volume 7 - Waste Management (DOE 1992g) depicted Area 13 to the far east of Building 49. The Site Survey Project Report (Stought et al. 1988) depicted Area 13 slightly farther west and overlapping Building 49. Evaluation of the historic relationships of the Quonset hut and other historic buildings in the area indicate the actual location was even farther west as shown by the dashed square on Plate 1. The Quonset hut was also moved from the Dayton units to the lower part of the plant valley and is described in the companion reactor waste decontamination subsection 9.3 of this report.

Two surface samples were taken in or near the reported location of Area 13 during the Site Survey Project. These locations are S0670 and S0671 (Plate 1; Table III.7). Plutonium-238 was detected at 0.34 and 5.74 pCi/g, respectively (Table III.7). No thorium was detected above 2 pCi/g in these samples. Area 13, like Area 10, is in a position to receive surface water runoff from areas upgradient on the SM/PP Hill, including Area 12, which contains plutonium contamination (subsection 3.1.12). It is believed that the plutonium present in the samples taken in Area 13 may be the result of surface water runoff and not the result of the polonium-contaminated wood placed in the area. No analyses for gamma spectroscopy are known for Area 13.

3.9 AREA 20

Area 20 is located on the southern slope of the Main Hill, just west of the HH Building (Plate 1). In the 1950s, an underground radioactive waste line in this area is reported to have ruptured, releasing polonium-210 and cobalt-60 to the soils in the area. At least two separate incidents are known (DOE 1992c). The aerial survey conducted in 1976 indicated gamma exposure levels of 4.5 to 7.5 μR/hr in Area 20 (EG&G 1978). During construction activities in 1985, radioactively contaminated soils from Area 20 were reportedly excavated and moved to Area 22. The old wasteline remains in place today.

Table III.8 presents the results of the Site Survey Project sampling in Area 20. The sampling locations are shown in Plate 1. No plutonium-238 or thorium results were given for the core locations sampled. Cesium-137 was detected at 1 pCi/g in the surface sample collected from core location 0070 (C0070 on Table III.8). Radium-226 was the only other radionuclide detected in the samples collected from the other core locations.

The samples from the surface locations in Area 20 were analyzed for plutonium-238 and thorium. The maximum concentrations detected were 1.9 and 4.02 pCi/g for plutonium-238 and thorium, respectively. Both of these concentrations were detected in samples collected from surface location 0406 (S0406, Table III.8).

Document Control No. D6e

Environmental Restoration Program

OPERABLE UNIT 9, SITE SCOPING REPORT: VOLUME 7 - WASTE MANAGEMENT

MOUND PLANT
MIAMISBURG, OHIO

July 1992

DRAFT FINAL

(Revision 0)

Department of Energy
Albuquerque Field Office

Environmental Restoration Program
Technical Support Office
Los Alamos National Laboratory

FOR

volumes and locations of contaminated soil, and the costs of stabilizing or removing the contaminated soils (Stought et al. 1988). The project was the culmination of about 10 years of effort on the part of Mound to obtain funding for the study.

Two areas of contaminated soils were identified by the Site Survey Project as the priority areas for D&D removal, both associated with the WTS pipeline from the SM Building and Building 38 to the WD Building. One area was below the WD Building where the high-risk waste line had ruptured in 1969 and the other was the entire WTS pipeline itself. These areas are now referred to as Areas 14 and 19, respectively, and are described along with the other areas in the Site Scoping Report: Volume 3 - Radiological Survey Report (DOE 1991c). The Site Scoping Report provides a full tabulation of the Site Survey Project data (Stought et al. 1988) and reviews other data handling and analysis procedures within the context of the CERCLA requirements.

The current program started in 1978 after the plutonium-238 processing operations declined through the mid- to late-1970s. The 10-year plan included the complete removal of the SM Building and the entire WTS that ran from the SM Building to the WD Building, among other smaller projects (MRC 1978b). As described above, these areas were contaminated with plutonium-238 from the processing and recovery operations. The SM Building consists of offices, the plutonium processing areas, laboratories, maintenance shops, and building services. The WTS comprised about 2,650 linear feet of two 1-1/2-inch steel pipes at 6 to 25 ft below grade, an associated storage and pumping facility (Building 41), and associated soils. The D&D activities typically have been two-phased: (1) cleaning equipment, removing it from affected areas, and packaging it in approved containers for shipment off-plant; and (2) performing extensive structural decontamination on the affected areas to remove or seal contamination.

3.8.1. Waste Generation

The wastes generated by the D&D Program generally reflect the contaminants from the processes used in the facility being decontaminated as well as the waste produced by the work itself. Radioactive wastes from the D&D Program at Mound have generally been alpha- and tritium-bearing.

The D&D of the older Dayton facilities included the complete removal of Dayton Unit IV and removal of the smaller buildings at Unit III. Contaminated buildings, debris, and equipment were brought to Mound, because the short-lived polonium-210 isotope with a 138-day half-life would soon decay. Five "tropical huts" and the Quonset hut were moved from Unit III to Mound for the storage of contaminated materials (Bradley 1949). These huts were reassembled in the plant valley near where Building 3 stands today (see subsection 5.1). Records of the projects indicate that 100 truckloads of

contaminated scrape from Unit III (Halbach 1949) and 160 truckloads from Unit IV (Halbach 1950) were moved to Mound. It is unknown how much of this material was contaminated equipment and how much was just debris. Concrete and structural steel were disposed of on the west slope of the SM/PP hillside, now known as Area 10 (see subsection 6.1.1.5). Contaminated equipment was stored in warehouse 10 and in the tropical huts. Scrap wood and metal were stored in the open area behind the huts. The stored materials were periodically checked for contamination levels (Bradley 1952b).

By April 1953, the contamination level of equipment stored in warehouse 10 had sufficiently decayed to allow recovery. Wood and other combustible materials were destroyed in July 1955 by burning in the area adjacent to where they had been stored, now known as Area 13 (see subsection 4.18). Scrap metal was covered with fuel oil and also burned (Meyer 1955d). The tropical huts may have also been destroyed by burning at this time. What was left was buried in the historic landfill (Meyer 1955a), now known as Area B (see subsection 4.15). The disposal of all contaminated equipment and building materials from Units III and IV was completed by October 1955 (Meyer 1955f).

From 1953 to 1959, the radium-actinium processing facilities in the SW and R buildings were decommissioned and decontaminated. The R Building cleanup included removal of glove boxes and general decontamination of some of the actinium facilities. At least 18 boxes, size unknown, were filled with demolished equipment and furniture and shipped to ORNL for burial (Bradley 1953i). The high-risk drain trenches in rooms 121, 144, 146, and 148 were filled with vermiculite and covered with concrete (MCC 1953-1957). The entire concrete floor of R-160 was removed and repoured (Meyer 1955b). These facilities included the hot cell or "old cave" where the radium-actinium processing took place. The materials and equipment in the cave in SW Building were packaged for burial off-plant in boxes staged just south of the building. Some equipment was too large to send offsite. The crane and track mechanisms that had been used to move heavy containers within the cave were laid down on the concrete floor with the dismantled shielding from the cave itself and covered or entombed with several inches of concrete (Meyer 1955d; 1958d). This area is now known as Area 15 (DOE 1991c). Equipment continued to be shipped from the D&D of the radium-actinium areas until 1960 (Creamer 1964).

The tanks and evaporator units that had treated the wastes from the separation process were dismantled and stored out in the open behind Building 2 in the lower valley area of the plant until 1960, when they were shipped to ORNL for burial. During the Site Survey Project (Stought et al. 1988), the surface was screened for radioactivity and none was detected. However, the area is not discussed or mentioned in any detail (DOE 1991c).

4.16. AREA 13, POLONIUM-CONTAMINATED WOOD FROM DAYTON UNIT IV (HISTORICAL)

Area 13 is northeast of Building 49 in the Test Fire Area, in the south-central portion of Mound (Figure 4.1). In 1950, wood contaminated with polonium-210 from Dayton Unit IV was deposited in Area 13. Wood from the walls was not contaminated and was sold for salvage. The flooring, however, was too contaminated to remove from the plant. In July 1955, the wood flooring and other combustible materials were burned. Metal and other non-combustible materials were saturated with fuel oil and burned (Meyer 1955a, 1955d, 1956b). Residue was surveyed for radioactivity in August 1955. No alpha activity was detected, but some beta or gamma contamination was detected (Garner 1991). The residual material was moved and buried in the southern part of the Historic Landfill (Meyer 1955a,e). The 1982 to 1985 radiological site survey of Area 13 detected low levels of plutonium-238 in soils, but no thorium activity.

4.17. SOLID RADIOACTIVE WASTE COMPACTORS

Two solid radioactive waste compactors were located in Building 38 (Figure 4.1). The first compactor became operational in July 1974. Its purpose was to compact radioactive wastes containing less than 10 nCi/g of TRU radionuclides. The second compactor became operational in December 1974. This unit was used to compact solid wastes containing greater than 10 nCi/g of TRU radionuclides. The second compactor was enclosed in a specially designed room that allowed containment of any radioactivity released from the compaction process. The room was also designed with special features to allow simplified decontamination in the event of a radioactive release. The compacted waste was either shipped for off-plant burial or sent to INEL for 20-year retrievable storage (McClain 1975). These compactors were removed from service and dismantled in 1987 (Geichman 1991).

Compactors currently operating are in the T Building and the SW/R Building. Compatible LSA beta wastes are placed in plastic bags, inserted into 55-gallon drums, and reduced in volume through compaction. Another compactor is installed in the WD Building for the compaction of alpha wastes (MRC 1987).

4.18. HH BUILDING

The HH Building has served as a general purpose building over the life of the plant, having served originally as a waste treatment facility and more recently as a process facility. The building was constructed in 1948 to treat the concentrated solutions from the polonium operations. Design of the building, equipment, sumps, and piping was determined early during plant design and was based on experience in operating the Dayton units (Mead 1947). From 1949 to 19€

map of the hot waste burial areas (Hebb 1972), dated February 15, 1972. A copy of the "hot waste burial sites" map (Drawing No. SK-2281) is provided in Appendix A. The areas identified included only those areas with radiologic contamination, which were assigned numbers. These numbered area designations (e.g., Area 2, Area 10) are retained for use in the ER Program (DOE 1992g) and this report. Fifteen areas were first identified in 1972, and an additional eight areas have been identified since (DOE 1991c). The initial identification of the radiologically contaminated areas was followed by the need to sample and confirm the levels of contamination. Ten years passed from the time the contaminated areas were identified until the sampling was funded and performed. In 1982, the Site Survey Project (Stought et al. 1988) began a three-year effort to conduct radiological surveys and sample analyses of the identified areas of contamination. The results of the Site Survey Project are referred to in this report and detailed in the Site Scoping Report: Volume III - Radiological Survey Report (DOE 1991c).

In 1984, the ER Program, then called the CEARP, conducted an installation assessment under contract to the DOE, Albuquerque Operations Office. Under the CEARP installation assessment, 10 areas that had potentially released contaminants to the environment were identified. These areas were designated by letters (e.g., Area B, Area J). These area designations are also retained in the ER Program (DOE 1992g) and are used in this report.

6.1.1.1. Area 2, Thorium- and Polonium-Contaminated Wastes (Historical)

Area 2 is south of the overflow pond along the west-central border of the plant (Figure 6.1). The area forms part of the historic landfill, but was distinguished in the 1972 map of hot waste burial areas (Hebb 1972). The area received several different lots of residual materials in the 1950s and 1960s. In 1955, wood ash and debris from a fire that had consumed the polonium-contaminated flooring from the Dayton units (Area 13) was buried along the southern margin of the historic landfill. The burial occurred in an irregular trench, 12 to 14 ft deep, which was covered by a few feet of soil (Thomas 1990). Between 1955 and 1964, some 2,000 to 5,000 crushed 55-gallon drums were also buried. These drums were the remains of the thorium repackaging operations that occurred in Areas 1, 3, and 9. The drums were empty, but probably contained residual thorium sludge materials. In 1965, sandblasting sand from the cleaning operations within the WD Building were buried in the southern parts of the historic landfill. The sandblasting operations were part of the cleaning of the large clariflocculator tanks used for processing wastes from polonium production (Garner 1991).

Area 2 is believed to occupy about 15,000 ft^2 and is at least partially covered by the site sanitary landfill constructed in 1977. Results of a magnetic survey conducted in Area 2 in 1990 indicated that some of the burials may lie under the present position of the road in

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

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

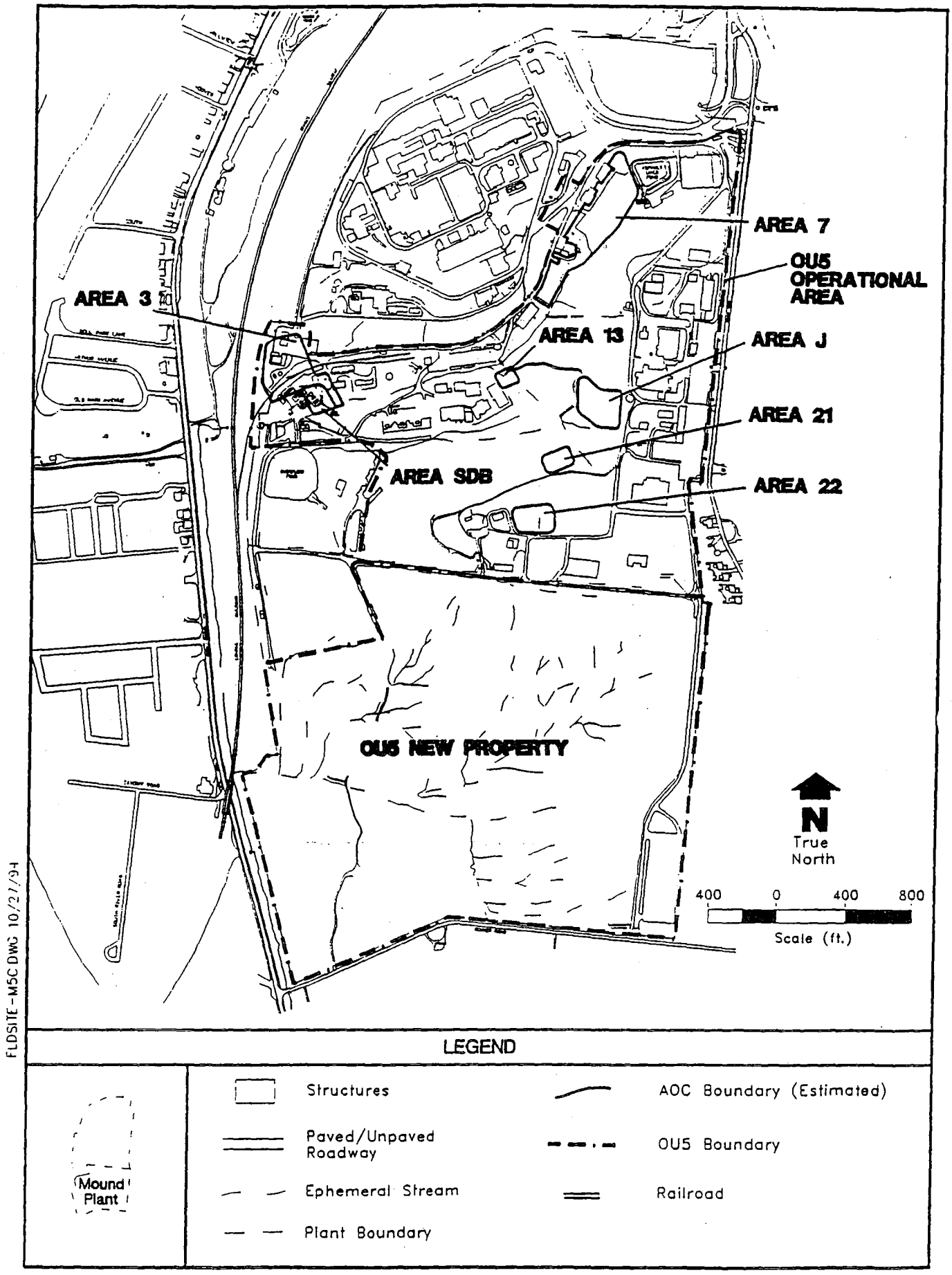


Figure 1.1. Site Map of Operable Unit 5 Areas of Concern

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.

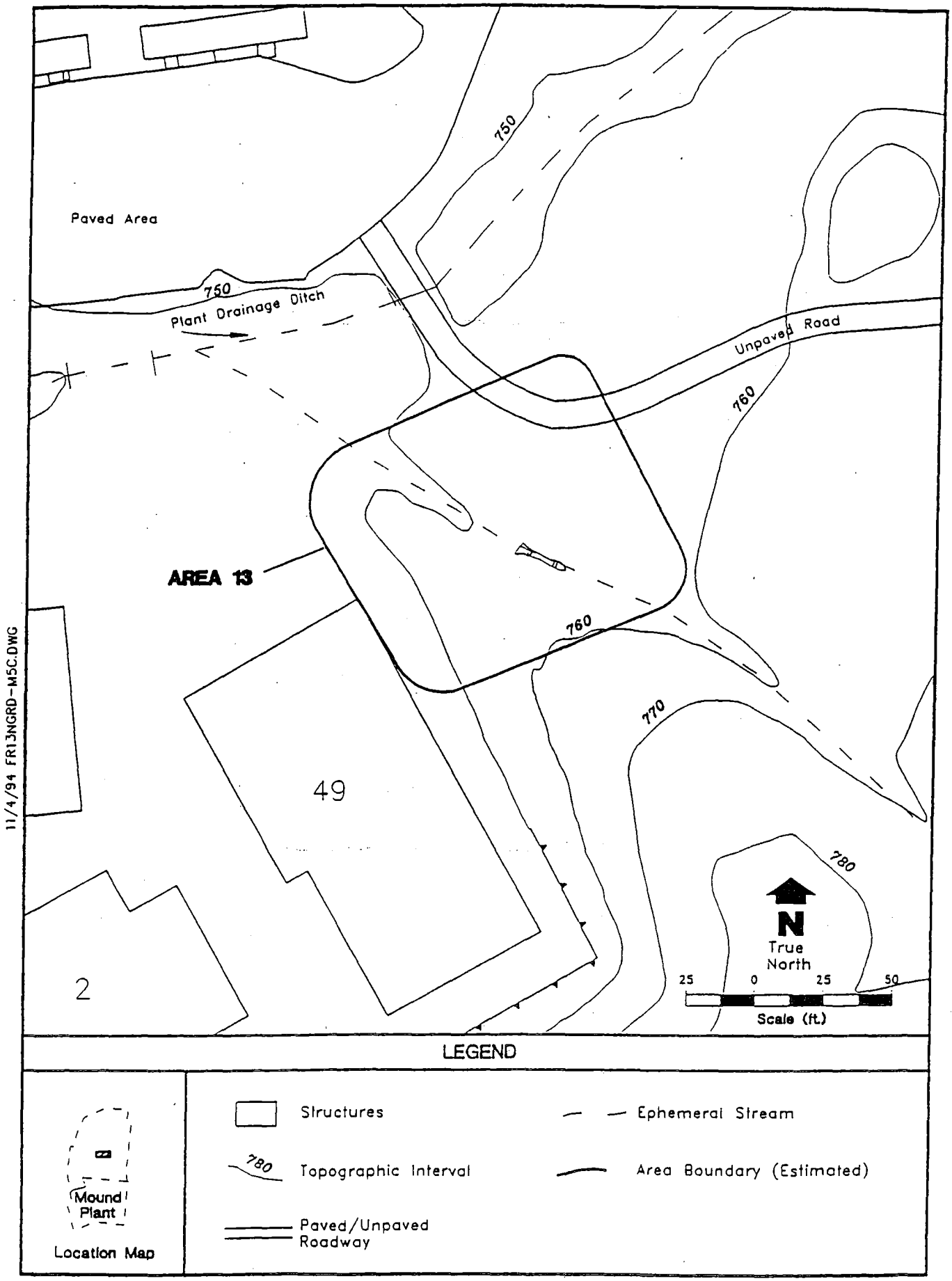


Figure 1.2. Estimated Boundary of Area 13

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.

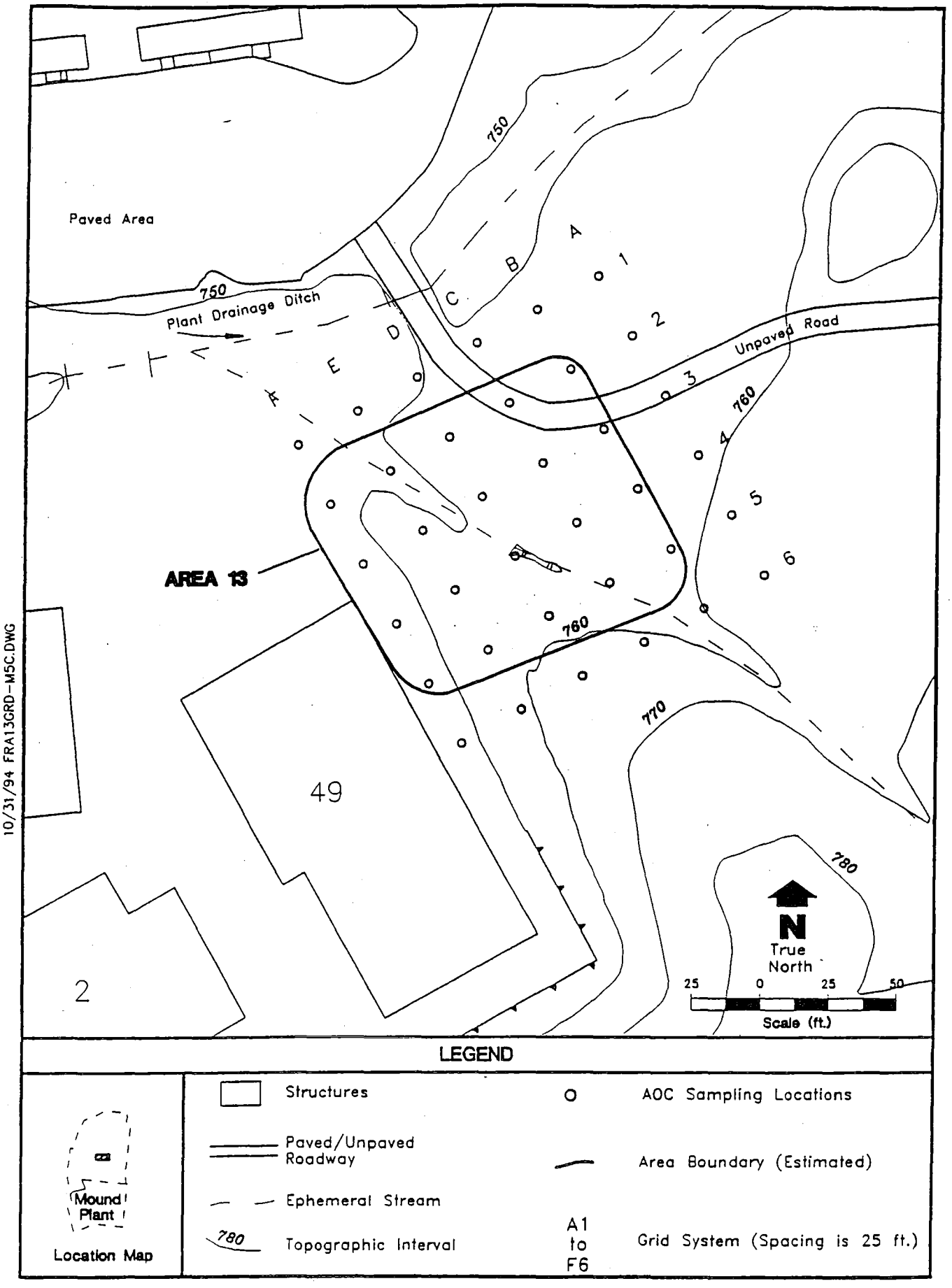


Figure 2.1. Estimated Boundary and Grid System of Area 13

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

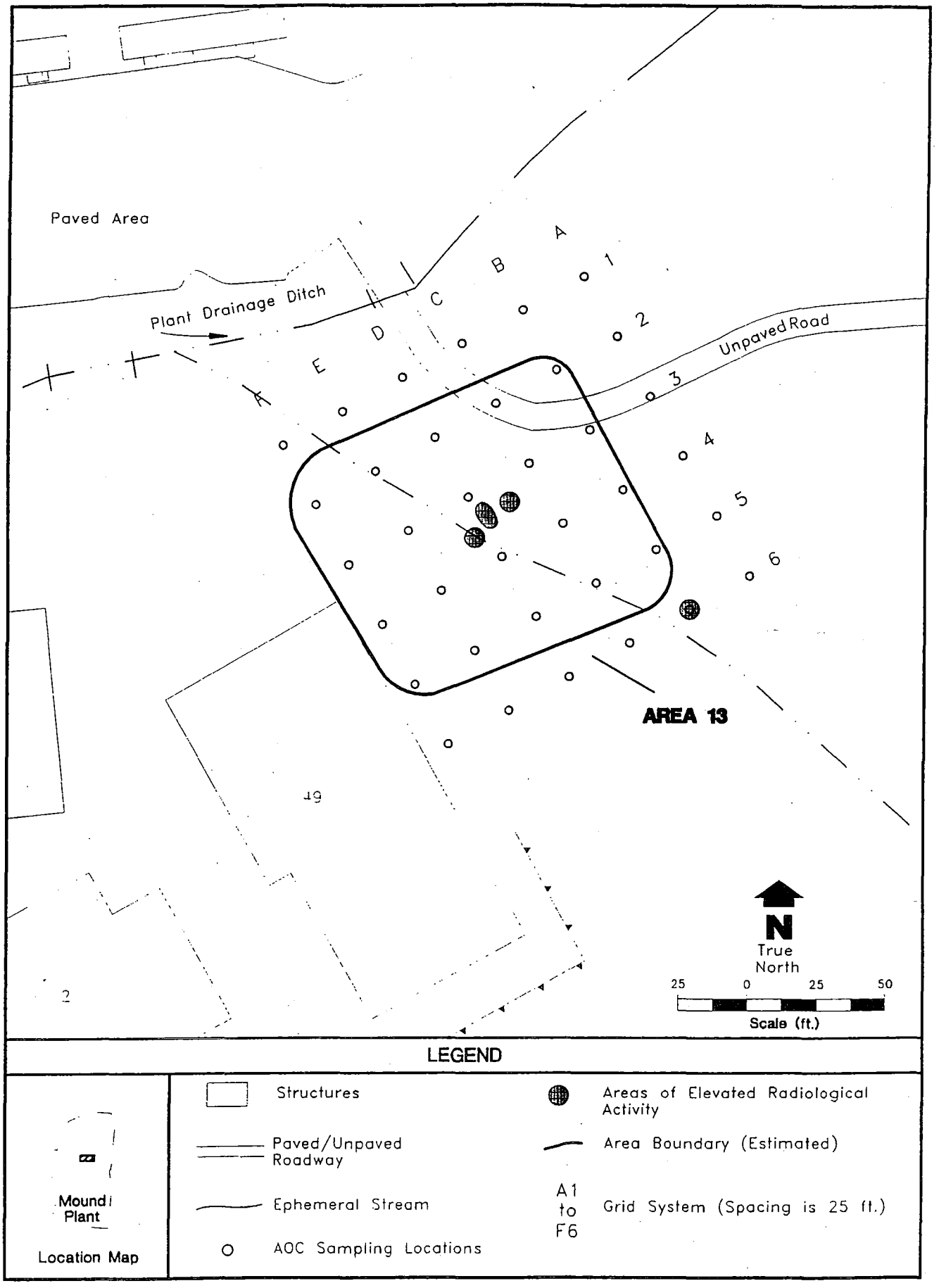


Figure 2.2. Areas of Elevated Surface Radiological Activity (FIDLER Survey)

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)

4. REFERENCES

DOE 1993a. "Operable Unit 5 South Property Remedial Investigation/Feasibility Study Work Plan, [FINAL, Revision 0]," U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, New Mexico. December 1993.

DOE 1993b. "Operable Unit 5 South Property Remedial Investigation/Feasibility Study, Sampling and Analysis Plan, [FINAL, Revision 0]," U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, New Mexico. December 1993.

DOE 1993c. "Operable Unit 5 South Property Remedial Investigation/Feasibility Study, Health and Safety Plan, [FINAL, Revision 0]," U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, New Mexico. December 1993.

DOE 1993d. Operable Unit 9, Site Scoping Report: Volume 3, Radiological Site Survey [DRAFT FINAL], U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, New Mexico. March 1993.

DOE 1994. "Operable Unit 9 Hydrogeologic Investigation: Soil Chemistry Report". Technical Memorandum Revision 1. U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, New Mexico. September 1994.

Stought, R.L., D.A. Edlin, and D.G. Draper, 1988. "The Mound Site Survey Project for the Characterization of Radioactive Materials in Soils," Monsanto Research Corporation for the U.S. Department of Energy, Mound Plant, Miamisburg, Ohio. May 1988.

Environmental Restoration Program

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

MOUND PLANT
MIAMISBURG, OHIO

VOLUME II - APPENDICES A-D

June 1995

Final (Revision 1)

U.S. Department of Energy
Ohio Field Office

EG&G Mound Applied Technologies

Table 1: AOC-13 Petrex Soil Gas Survey Results

NERI Project: 2114-9E
Site: Operable Unit -5, USDOE Mound Facility
Analysis: Thermal Desorption - Mass Spectrometry
Date of Analysis: 10/7/94
Units: Ion Counts

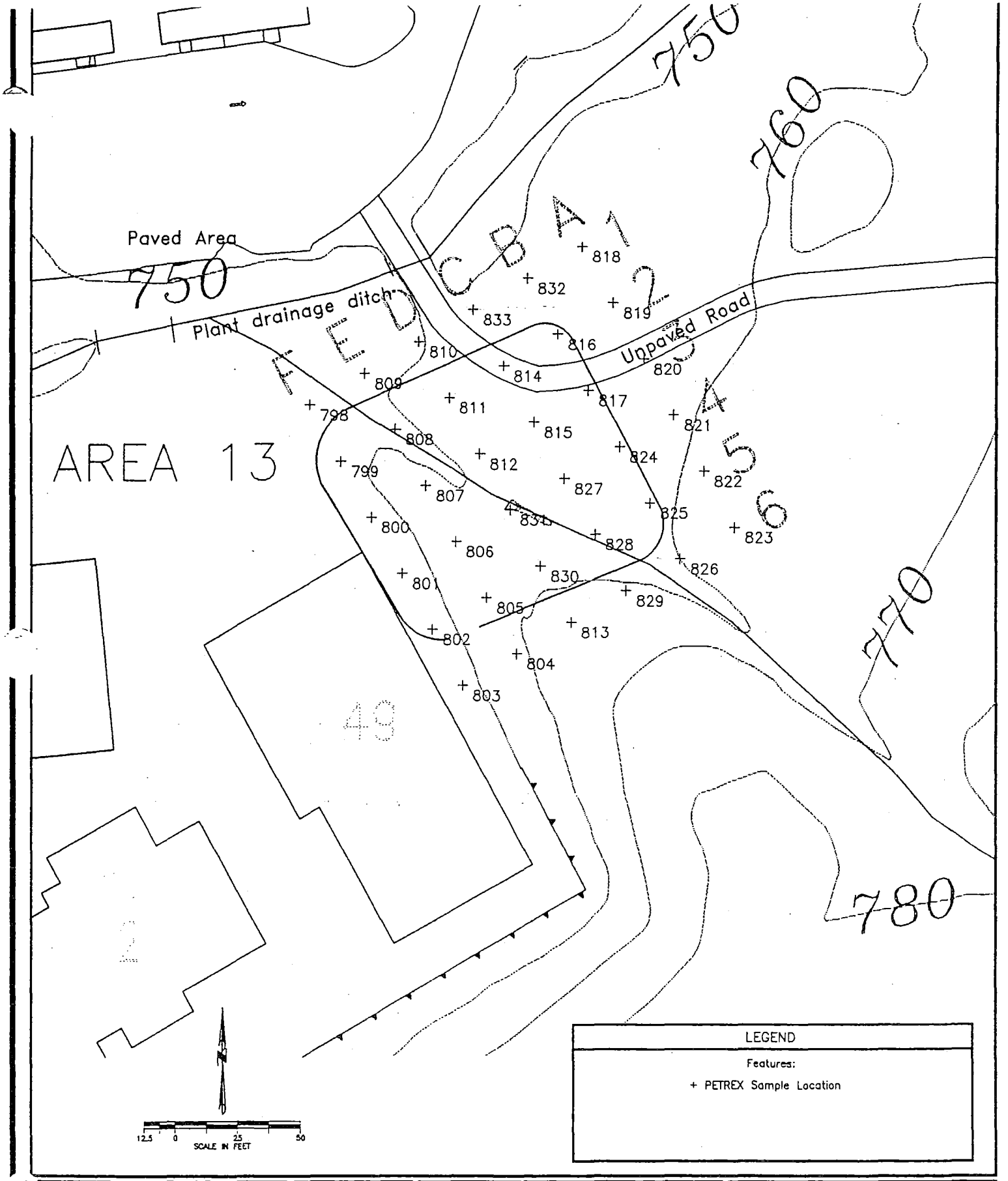
Sample #	Total Aromatic Hydrocarbons (a)	Total Semivolatile Hydrocarbons (b)	Total C5 to C11 Petroleum Hydrocarbons (c)	Total Halogenated Hydrocarbons (d)
798	5,049,373	148,638	11,736,665	403,807
799 (f)	43,194	ND	144,631	875,428
800	16,481	788	27,030	46,793
2800 (e)	24,125	1,072	42,196	60,028
801	6,262,476	190,343	15,056,938	124,292
802	2,241,578	45,881	5,323,359	425,095
803 (f)	1,021,570	11,964	4,175,025	2,883,809
804	857,713	25,086	2,806,255	113,660
805	576,806	1,150	837,259	ND
806	1,094,363	23,561	1,331,928	90,767
807	1,316,211	20,838	3,683,164	247,220
808	3,086,374	193,004	10,937,559	159,590
809	3,151,090	131,046	10,058,992	1,104,830
2809 (e)	1,772,509	59,515	4,453,498	710,555
810	2,195,770	31,289	4,966,376	19,615
811	147,430	ND	394,326	ND
812	3,257,891	107,865	7,037,308	ND
2812 (e)	2,788,853	67,290	6,405,967	ND
813	2,441,123	27,528	4,432,160	ND
814	1,036,038	24,689	2,106,544	ND
815	1,475,121	52,323	3,562,239	9,478
816	843,538	9,439	2,057,277	6,528
817	2,591,759	50,394	4,655,535	ND

Table 1 (cont'd)

Sample #	Total Aromatic Hydrocarbons (a)	Total Semivolatile Hydrocarbons (b)	Total C5 to C11 Petroleum Hydrocarbons (c)	Total Halogenated Hydrocarbons (d)
818	1,274,406	41,910	4,935,688	20,527
819	914,388	13,330	2,295,413	15,927
820	335,977	ND	661,898	9,132
821	966,116	4,689	2,152,944	7,629
822	69,752	ND	90,468	21,487
823	122,367	ND	218,403	ND
824	877,553	6,071	2,012,293	44,412
825	13,830	ND	25,051	ND
826	24,065	ND	45,266	ND
827	1,220,581	16,165	2,804,326	808,681
828 (f)	1,399,477	22,453	3,817,904	12,778
829	449,916	3,907	977,331	4,201
830	1,385,354	12,564	2,797,133	ND
831	169,924	ND	366,143	ND
2831 (e)	92,706	ND	194,877	ND
832	1,245,232	4,404	1,724,207	115,083
833	5,941,344	45,463	12,148,810	ND
2833 (e)	4,341,237	35,775	8,830,530	ND
834 *	ND	ND	ND	ND
835 *	ND	ND	ND	ND

Key: (a) Intensity of response to ions of atomic masses 78, 92, 106, 120, 134, 148, 162, 176, 190, and 204.
(b) Intensity of response to ions of atomic masses 128, 142, 153, 156, 178, 184, 198, 202, and 212.
(c) Intensity of response to ions of atomic masses 70, 72, 78, 84, 86, 92, 98, 100, 106, 110, 112, 114, 120, 124, 126, 128 134, 138, 140, 142, 148, 152, 154, and 156.
(d) Intensity of response to ions of atomic masses 101, 130, 151, and 164.
(e) Duplicate of preceding sample.
(f) Sample exhibits potential to contain a low level of dichloroethene.
ND Target compounds were not detected in this sample.
* Travel Blank

APPENDIX E
PLATES 1 THROUGH 5



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Drawn By: JCS	Project #: 2114E
Checked By:	Date: October 10, 1994
Project Manager: PCB	File Name: 13-1.dwg

AOC-13/Operable Unit-5

USDOE Mound Facility
Miamisburg, Ohio

Sample Locations

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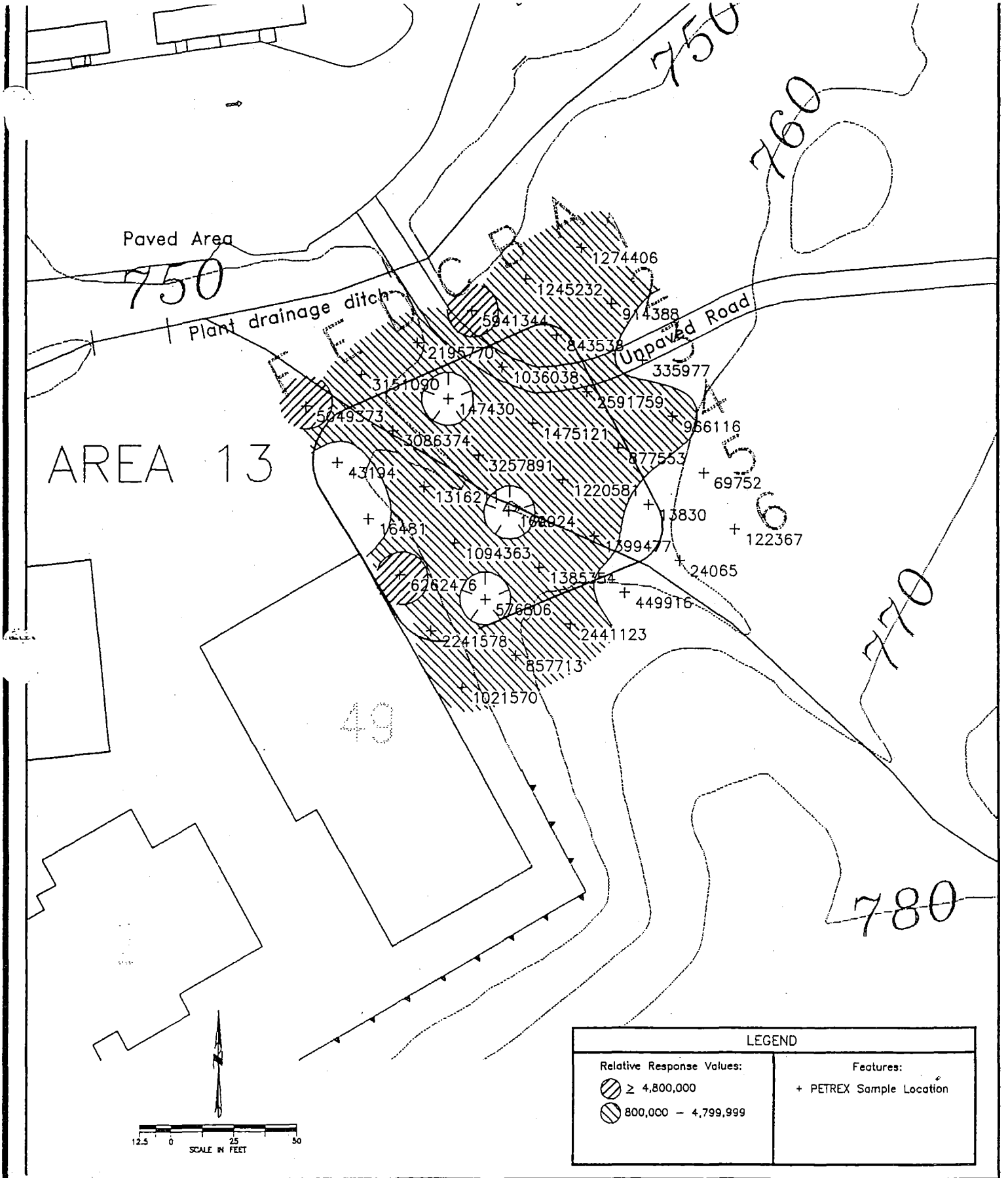

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JCS	2114E
Checked By:	Date:
	October 10, 1994
Project Manager:	File Name:
PCB	13-2.dwg

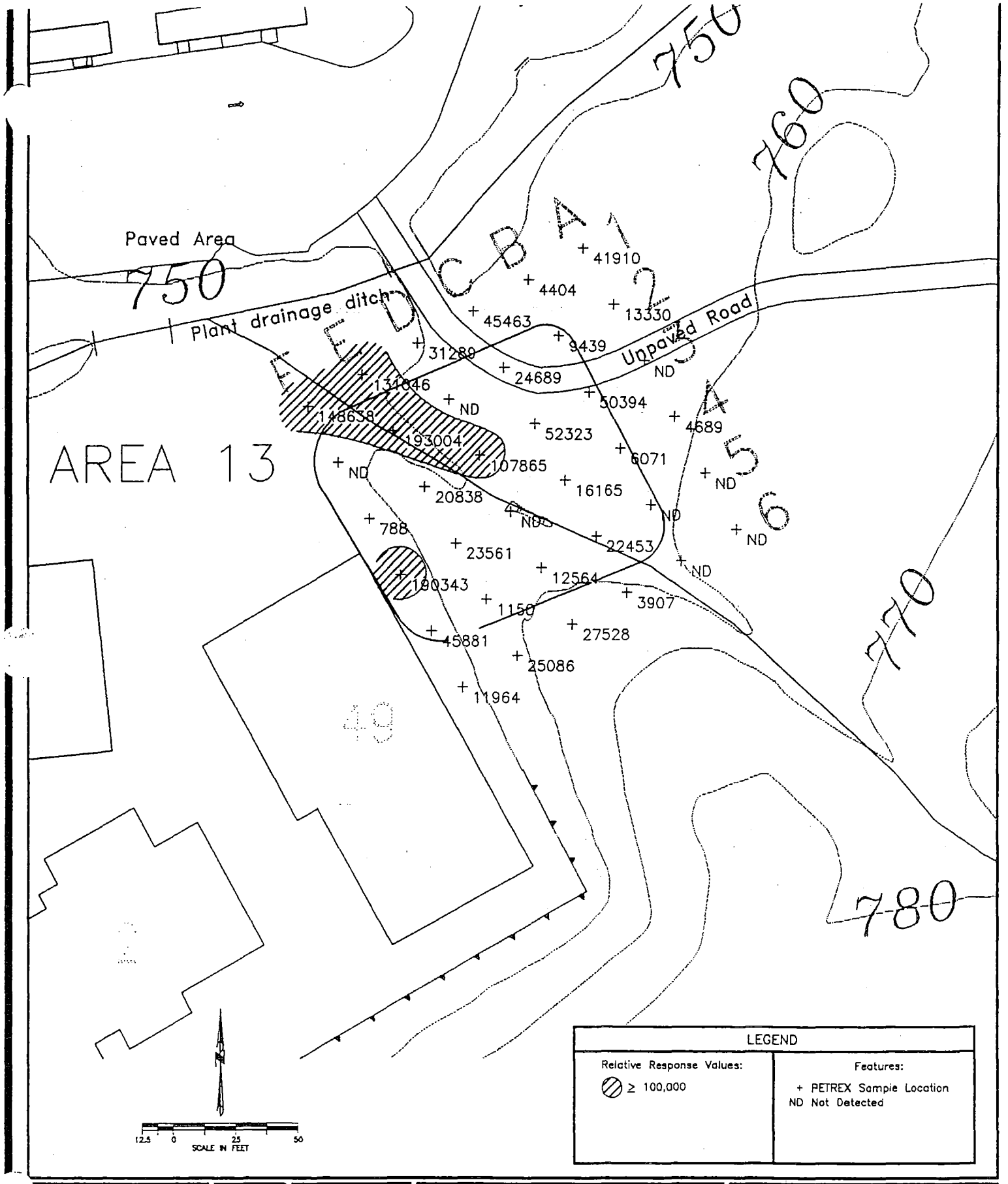
AOC-13/Operable Unit-5

USDOE Mound Facility
Miamisburg, Ohio

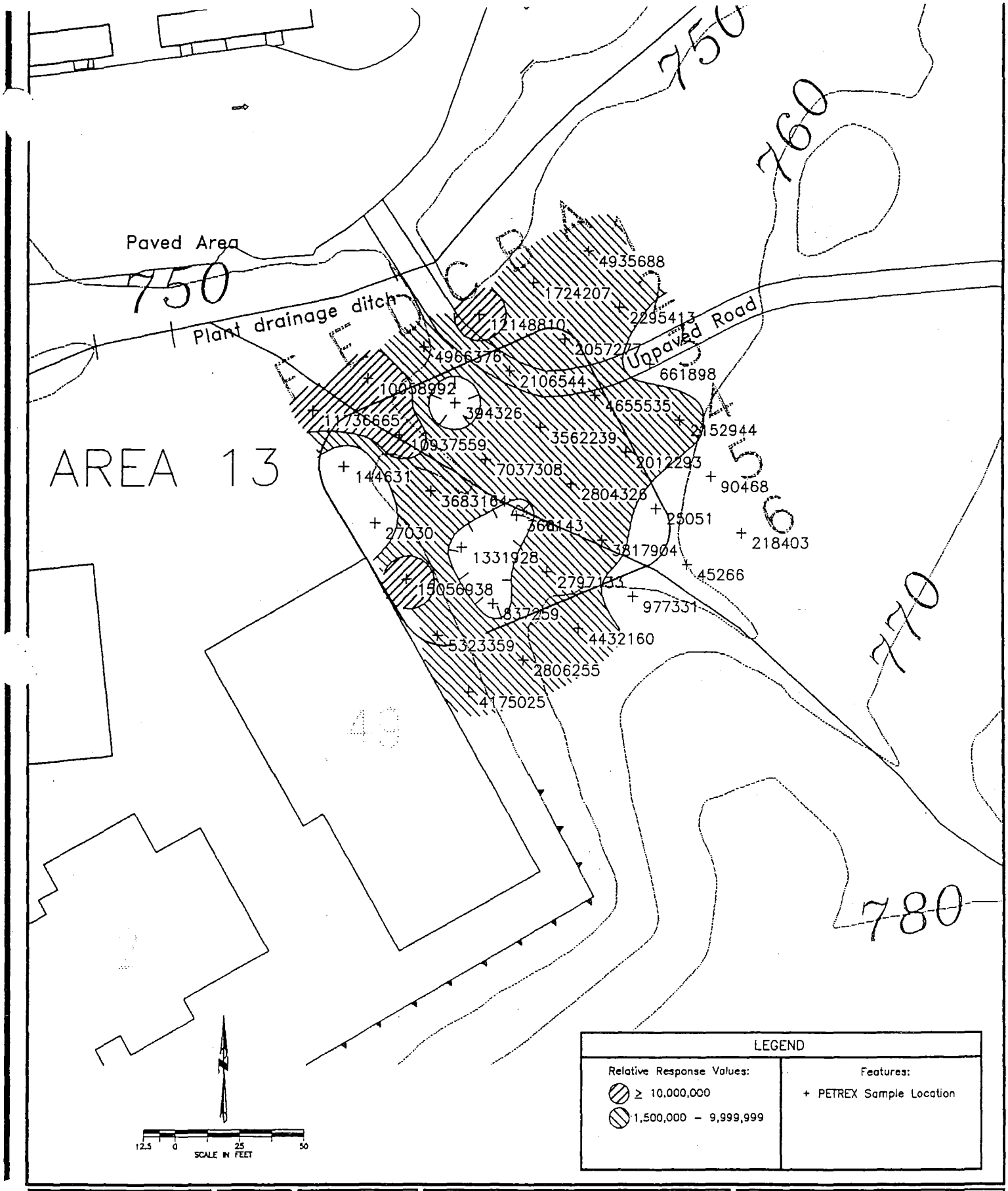
PETREX FINGERPRINT TECHNOLOGY®

Relative Response

TOTAL AROMATIC HYDROCARBONS



Prepared by: Northeast Research Institute LLC, 605 Parfet Street, Suite 100, Lakewood, Colorado 80215, (303) 238-0090	Drawn By: JCS	Project #: 2114E	AOC-13/Operable Unit-5	Relative Response
	Checked By:	Date: October 10, 1994	USDOE Mound Facility, Miamisburg, Ohio	TOTAL SEMIVOLATILE HYDROCARBONS
	Project Manager: PCB	File Name: 13-3.dwg	PETREX FINGERPRINT TECHNOLOGY®	



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Drawn By:	Project #:
JCS	2114E
Checked By:	Date:
	October 10, 1994
Project Manager:	File Name:
PCB	13-4.dwg

AOC-13/Operable Unit-5

USDOE Mound Facility
Miamisburg, Ohio

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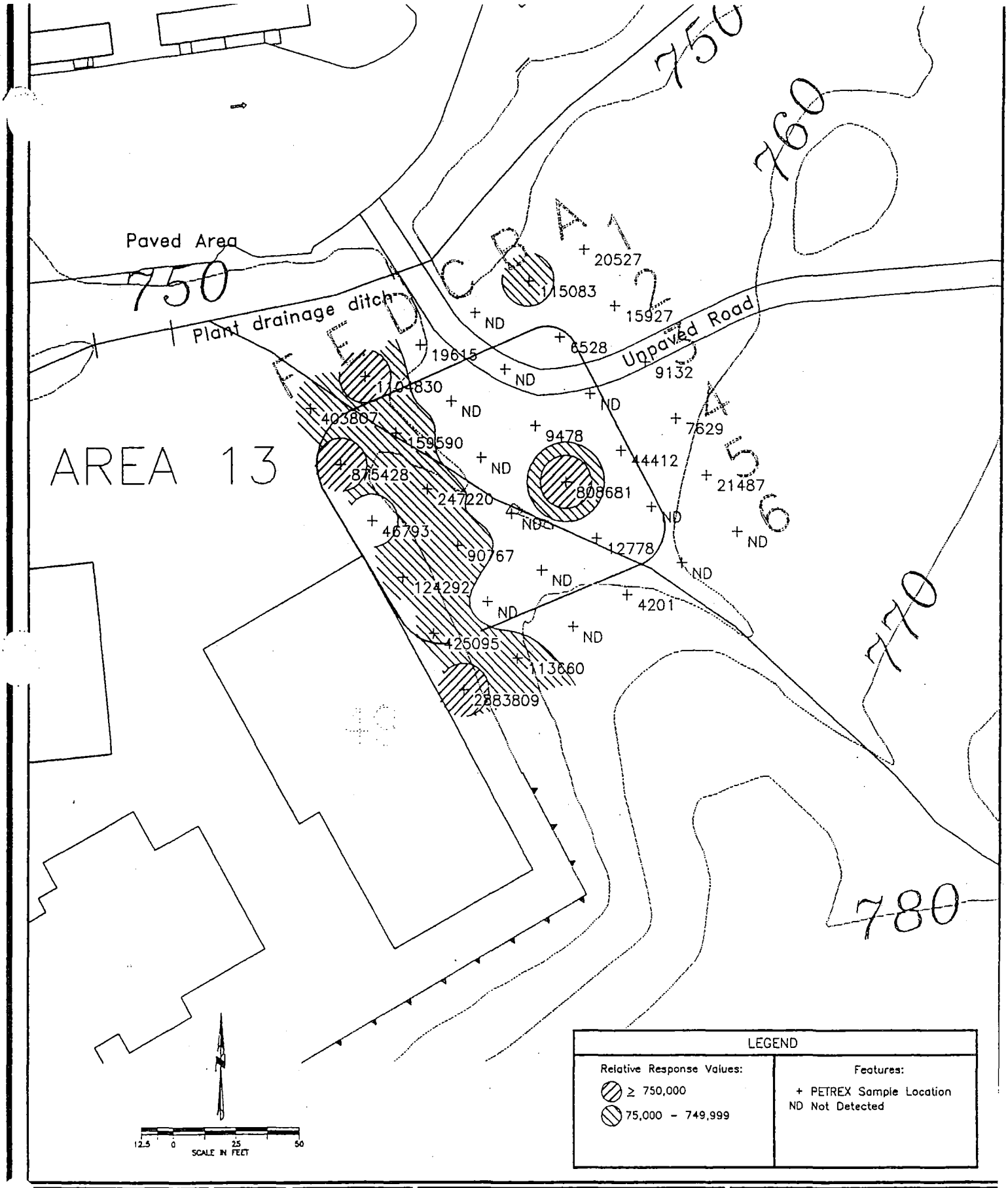
Relative Response

TOTAL C5-C11 PETROLEUM HYDROCARBONS



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Drawn By: JCS	Project #: 2114E
Checked By:	Date: October 10, 1994
Project Manager: PCB	File Name: 13-5.dwg

AOC-13/Operable Unit-5

USDOE Mound Facility
Miamisburg, Ohio

PETREX FINGERPRINT TECHNOLOGY®

Relative Response

TOTAL HALOGENATED HYDROCARBONS

Document Control No. _____

Environmental Restoration Program

OPERABLE UNIT 9 HYDROGEOLOGIC INVESTIGATION: SOIL CHEMISTRY REPORT

MOUND PLANT
MIAMISBURG, OHIO

January 1994

Technical Memorandum
(Revision 0)

U. S. Department of Energy
Albuquerque Operations Office

Environmental Restoration Program
EG&G Mound Applied Technologies

Comparisons of the analytical results to the PALs indicate the following:

- No positive detections were reported for any VOC above the associated PAL. (Proposed Action Level).
- Positive results greater than the PAL are apparent for three SVOCs: benzo(a)pyrene, dibenzo(a,h)anthracene, and indeno(1,2,3-CD)pyrene. The method detection limit is greater than the PAL for benzo(a)pyrene and dibenzo(a,h)anthracene; therefore, the comparisons are inconclusive. The method detection limit is just above the PAL for indeno(1,2,3-CD)pyrene.
- No pesticide or PCB compounds are reported above the PAL.
- No positive results are reported for explosives.
- Positive results exceeded the PAL for radium-226 and potassium-40. Two detections for radium-226 (11 and 12 pCi/g) are reported 60 to 75 feet deep in boring 0395. Fifty values for potassium-40 are above the PAL; it is considered a naturally occurring radioisotope, present in all potassium-bearing rocks and soils.
- Metals analysis indicates no results above the PAL for aluminum, chromium, cobalt, copper, iron, lead, molybdenum, and tin. Results for arsenic, bismuth, calcium, lithium, magnesium, manganese, mercury, nickel, potassium, vanadium and zinc are above the PAL. Background calculations yield very low results for antimony, mercury, selenium, silver, and thallium due to many nondetects. Comparisons for the latter group are inconclusive.

6 to 8.5 ft and 25 to 30 ft, respectively. The deepest concentration (1 J µg/kg) is at a depth of 40 to 45 ft at 0395.

Trichloromethane is detected only at 0322 in one sample that occurred at a depth of 5 to 10 ft, 3 J µg/kg.

Hexane is detected in two of the six locations on the Main Hill: 0322 and 0395. The highest and the deepest concentration is in 0395. The highest concentration (40 µg/kg) is at a depth of 50 to 55 ft. The deepest concentration (2 J µg/kg) is at a depth of 85 to 90 ft.

Toluene is detected at all locations on the Main Hill. The minimum concentration is at 1 J µg/kg at 0347 (20 to 25, 30 to 35, and 35 to 40 ft). The highest concentration (7 µg/kg) is at 0323 at a depth of 16 to 17 ft. The deepest concentration (4 J µg/kg) is reported at a depth of 85 to 90 ft at 0395.

Tetrachloroethene is detected only at 0347 in one sample that occurred at a depth of 5 to 10 ft, 2 J µg/kg.

Total xylenes is detected only at 0395 in one sample that occurred at a depth of 25 to 30 ft, 9 µg/kg.

In summary, the largest number of VOCs detected on the Main Hill are at location 0322. These volatiles are 2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone, acetonitrile, acrylonitrile, carbon disulfide, trichloromethane, hexane, and toluene. VOCs are detected at an average depth of 10 to 15 ft at 0322. The deepest VOC detected at 0322 is toluene, which is reported at a depth of 35 to 40 ft, 2 J µg/kg. Location 0395, which is adjacent to 0384, has the overall deepest concentration of VOCs for the Main Hill, with toluene detected at a depth of 85 to 90 ft, 4 J µg/kg. Overall, toluene is the deepest VOC detected on the Main Hill and is present at all locations except 0332 and 0349. Acetone is the highest VOC concentration on the Main Hill at 200 J µg/kg at 0322. No VOCs are detected at 0332, which is the northernmost location on the Main Hill, and at 0349.

5.2.2. SM/PP Hill

Borehole soil samples were collected at six locations on and adjacent to the SM/PP Hill for VOCs. These locations are 0326, 0345, 0346, 0353, 0354, and 0355. VOCs are detected at all locations except 0353 and 0354; therefore, the discussion to follow will incorporate only locations 0326, 0345, 0346, and 0355 for the SM/PP Hill.

Four contaminants of concern for VOCs are detected on the SM/PP Hill. These contaminants are acetone, carbon disulfide, toluene, and dichloromethane.

Acetone is detected only at 0326. The highest and deepest concentration (89 µg/kg) is at a depth of 10 to 15 ft.

Carbon disulfide is detected only at 0345 in one sample at a depth of 17 to 19 ft, 1 J µg/kg.

Dichloromethane is detected only at 0355 at a depth of 10 to 15 ft, 140 J µg/kg.

Toluene is detected at locations 0345, 0346, and 0355. Toluene concentrations range from 1 J µg/kg at 0345 (17 to 19 ft) to 5 J µg/kg at 0346 (29 to 30 ft). The deepest concentration (5 J µg/kg) is at a depth of 29 to 30 ft at 0346.

In summary, the SM/PP Hill detected less VOCs than the Main Hill. The VOCs on the SM/PP Hill were detected at a shallower depth (0 to 30 ft) than the Main Hill (0 to 90 ft). Only four locations (0326, 0345, 0346, and 0355) detected four VOCs: toluene, carbon disulfide, dichloromethane, and acetone. The deepest VOC detected on the SM/PP Hill is toluene. Toluene is reported at a depth of 29 to 30 ft at 0346. The highest VOC concentration detected on the SM/PP Hill is dichloromethane. Dichloromethane is detected at 0355 at a concentration of 140 J µg/kg. No VOCs are detected at locations 0353 and 0354, which are located at the southern end of the SM/PP Hill.

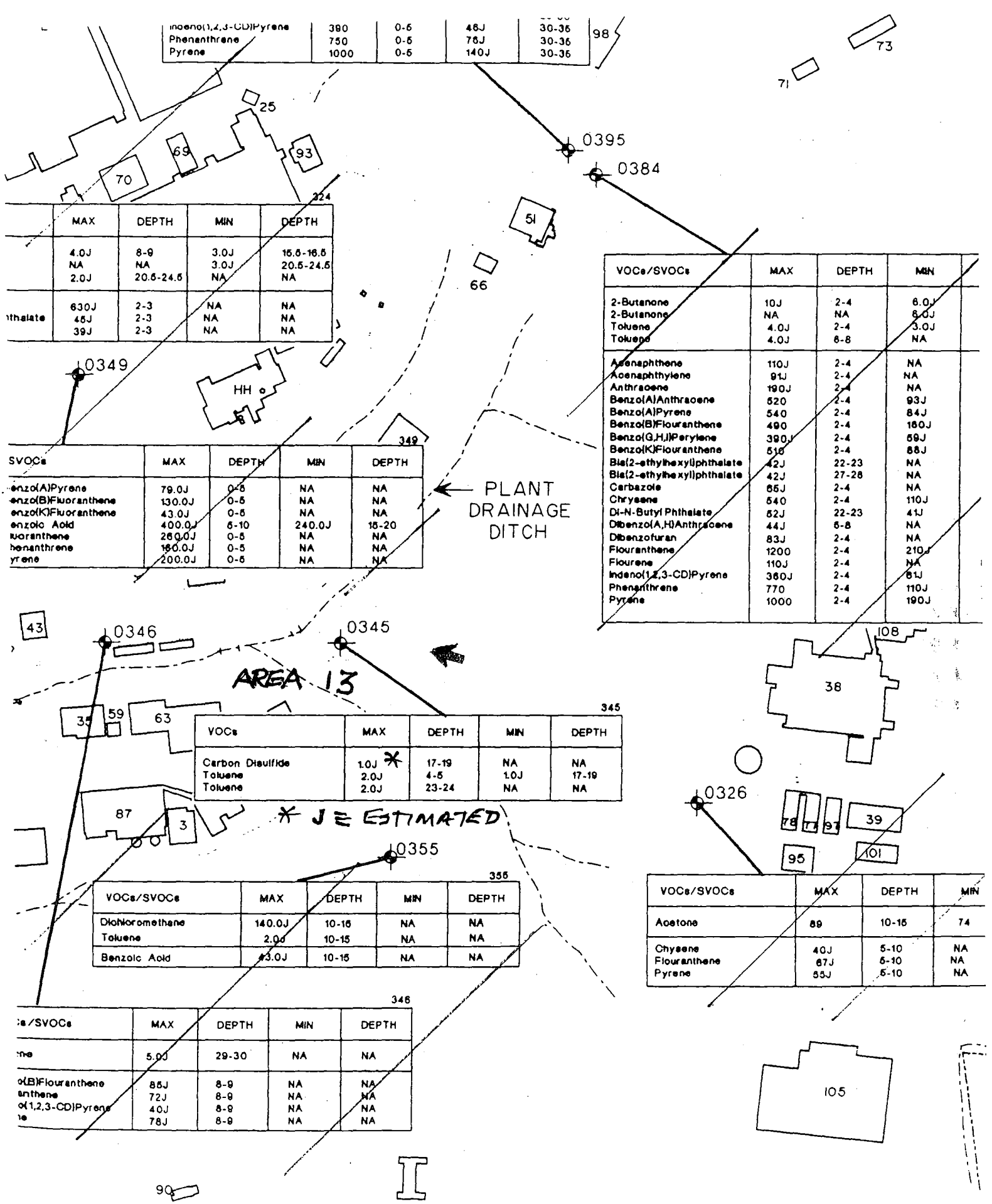
5.2.3. West of the Mound Plant

Borehole soil samples were collected west of the Mound Plant for VOC analysis at locations P025, P032, P038, 0341, 0342, 0343, 0344, 0356, 0385, 0386, 0387, and 0388. VOCs were detected at only five locations: 0343, 0385, 0388, P032, and P038. Four VOCs are detected west of the Mound Plant. These compounds are 2-butanone, acrylonitrile, dichloromethane, and toluene.

2-Butanone is detected only at location 0343 at a depth of 82 ft, 4 J µg/kg.

Acrylonitrile is detected only at location P032 at a depth of 25 to 30 ft, 2 J µg/kg.

Dichloromethane is detected west of the Mound Plant at 0343, 0388, and P038. Each location had one sample that detected methylene chloride. Methylene chloride is detected at 4 J µg/kg at 0343, 0388, and P038 at depths of 82, 3 to 5, and 67 ft, respectively.


Indeno(1,2,3-CD)Pyrene 380 0-5 46J 30-36
Phenanthrene 750 0-5 76J 30-36
Pyrene 1000 0-5 140J 30-36
98
73
71
25
69
70
93
0395
0384
324
MAX DEPTH MIN DEPTH
4.0J 8-9 3.0J 15.5-16.5
NA NA 3.0J 20.5-24.5
2.0J 20.5-24.5 NA NA
630J 2-3 NA NA
45J 2-3 NA NA
39J 2-3 NA NA
51
66
0349
HH
349
SVOCs MAX DEPTH MIN DEPTH
enzo(A)Pyrene 79.0J 0-5 NA NA
enzo(B)Fluoranthene 130.0J 0-5 NA NA
enzo(K)Fluoranthene 43.0J 0-5 NA NA
enzoic Acid 400.0J 5-10 240.0J 15-20
luoranthene 260.0J 0-5 NA NA
henanthrene 150.0J 0-5 NA NA
yrene 200.0J 0-5 NA NA
PLANT DRAINAGE DITCH
VOCs/SVOCs MAX DEPTH MIN
2-Butanone 10J 2-4 6.0J
2-Butanone NA NA 6.0J
Toluene 4.0J 2-4 3.0J
Toluene 4.0J 6-8 NA
Acenaphthene 110J 2-4 NA
Acenaphthylene 91J 2-4 NA
Anthracene 190J 2-4 NA
Benzo(A)Anthracene 520 2-4 93J
Benzo(A)Pyrene 540 2-4 84J
Benzo(B)Fluoranthene 490 2-4 160J
Benzo(G,H,I)Perylene 390J 2-4 59J
Benzo(K)Fluoranthene 510 2-4 88J
Bis(2-ethylhexyl)phthalate 42J 22-23 NA
Bis(2-ethylhexyl)phthalate 42J 27-28 NA
Carbazole 65J 2-4 NA
Chrysene 540 2-4 110J
Di-N-Butyl Phthalate 52J 22-23 41J
Dibenzo(A,H)Anthracene 44J 6-8 NA
Dibenzofuran 83J 2-4 NA
Fluoranthene 1200 2-4 210J
Fluorene 110J 2-4 NA
Indeno(1,2,3-CD)Pyrene 360J 2-4 61J
Phenanthrene 770 2-4 110J
Pyrene 1000 2-4 190J
43
0346
0345
AREA 13
108
38
35
59
63
345
VOCs MAX DEPTH MIN DEPTH
Carbon Disulfide 1.0J * 17-19 NA NA
Toluene 2.0J 4-5 1.0J 17-19
Toluene 2.0J 23-24 NA NA
87
3
* J = ESTIMATED
0326
78
79
97
39
95
101
0355
356
VOCs/SVOCs MAX DEPTH MIN DEPTH
Dichloromethane 140.0J 10-15 NA NA
Toluene 2.0J 10-15 NA NA
Benzoic Acid 43.0J 10-15 NA NA
VOCs/SVOCs MAX DEPTH MIN
Acetone 89 10-15 74
Chrysene 40J 5-10 NA
Fluoranthene 67J 5-10 NA
Pyrene 55J 5-10 NA
346
/SVOCs MAX DEPTH MIN DEPTH
ne 5.0J 29-30 NA NA
o(B)Fluoranthene 85J 8-9 NA NA
anthene 72J 8-9 NA NA
o(1,2,3-CD)Pyrene 40J 8-9 NA NA
e 78J 8-9 NA NA
105
90
I

MOUND

Environmental
Restoration
Program

Further Assessment

Soil Gas Confirmation Sampling

Mound Plant
Miamisburg, Ohio

May 1996

Revision 0

Department of Energy

EG&G Mound Applied Technologies

Table I.1 Soil Analyte List

Volatile Organic Compounds

Acetone	Dibromochloromethane	4-Methyl-2-Pentanone
Benzene	1,1-Dichloroethane	Styrene
Bromodichloromethane	1,2-Dichloroethane	1,1,2,2-Tetrachloroethane
Bromoform	1,1-Dichloroethene	Tetrachloroethene
Bromomethane	1,2-Dichloroethene (total)	1,1,1-Trichloroethane
2-Butanone	1,2-Dichloropropane	1,1,2-Trichloroethane-
Carbon Disulfide	cis-1,3-Dichloropropene	Trichloroethene
Carbon Tetrachloride	trans-1,3-Dichloropropene	Toluene
Chlorobenzene	Ethylbenzene	Vinyl Acetate
Chloroethane	2-Hexanone	Vinyl Chloride
Chloroform	Methylene Chloride	Xylenes (total)
Chloromethane		

Semivolatile Organic Compounds

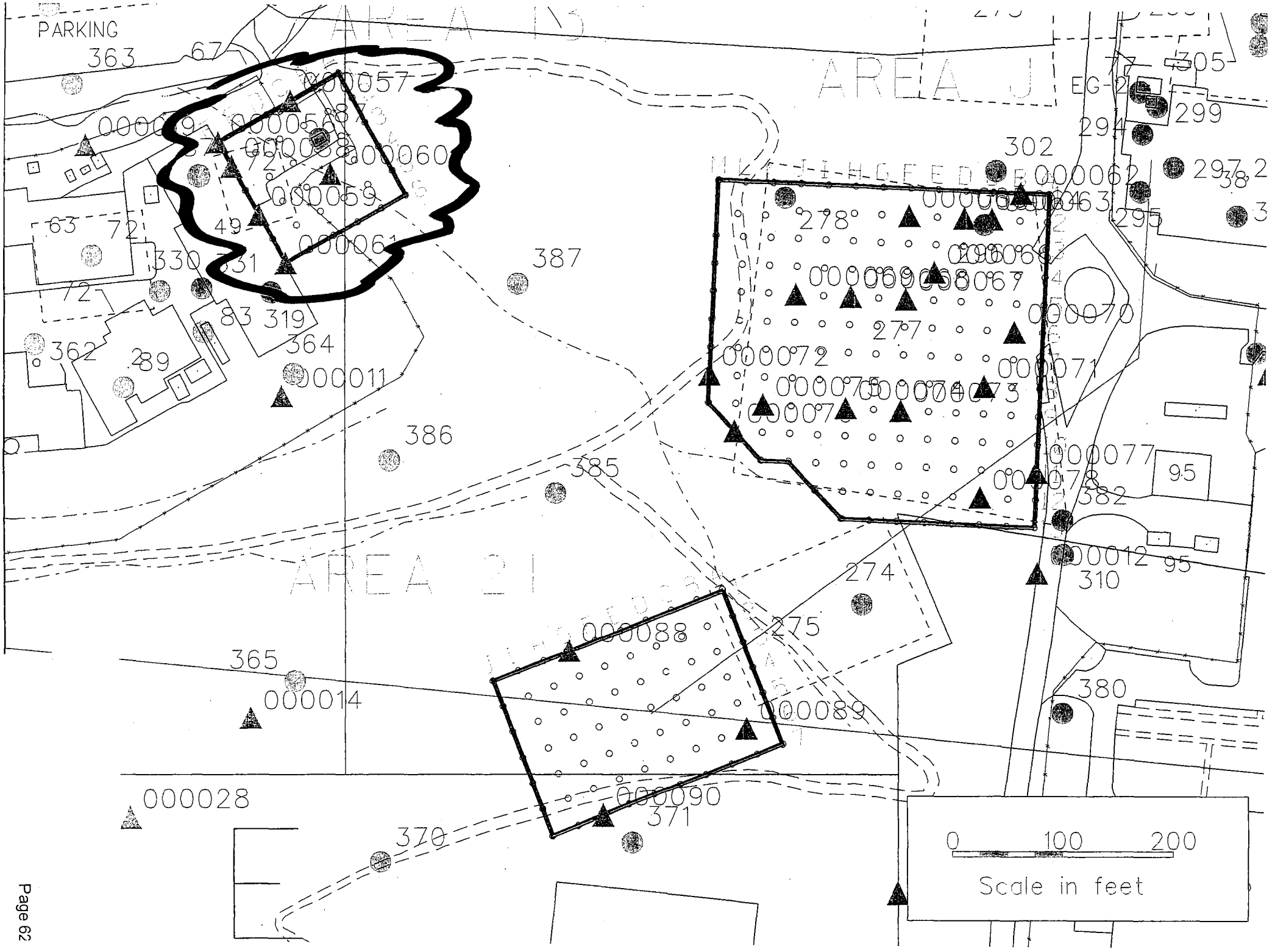
Acenaphthene	Chrysene	Hexachlorobenzene
Acenaphthylene	Dibenz(a,h)anthracene	Hexachlorobutadiene
Anthracene	Dibenzofuran	Hexachlorocyclopentadiene
Benzo(a)anthracene	1,2-Dichlorobenzene	Hexachloroethane
Benzo(a)pyrene	1,3-Dichlorobenzene	Indeno(1,2,3-cd)pyrene
Benzo(b)fluoranthene	1,4-Dichlorobenzene	Isophorone
Benzo(g,h,i)perylene	3,3-Dichlorobenzidine	2-Methylnaphthalene
Benzo(k)fluoranthene	2,4-Dichlorophenol	2-Methylphenol
bis(2-Chloroethoxy)methane	Diethylphthalate	4-Methylphenol
bis(2-Chloroethyl)ether	2,4-Dimethylphenol	Naphthalene
bis(2-Ethylhexyl)phthalate	Dimethyphthalate	2-Nitroaniline
4-Bromophenyl-phenylether	Di-n-butylphthalate	3-Nitroaniline
Butylbenzylphthalate	Di-n-octylphthalate	4-Nitroaniline
Carbazole	4,6-Dinitro-2-methylphenol	Nitrobenzene
4-Chloroaniline	2,4-Dinitrophenol	2-Nitrophenol
4-Chloro-3-methylphenol	2,4-Dinitrotoluene	4-Nitrophenol
2-Chloronaphthalene	2,6-Dinitrotoluene	N-Nitroso-di-n-propylamine
2-Chlorophenol	Fluoranthene	N-Nitroso-diphenylamine
4-Chlorophenyl-phenylether	Fluorene	2,2-oxybis(1-Chloropropane)
Pentachlorophenol	Pyrene	2,4,5-Trichlorobenzene
Phenanthrene	1,2,4-Trichlorobenzene	2,4,6-Trichlorobenzene
Phenol		

Table I.1 Soil Analyte List (Continued)

Pesticides/PCB's		
Aroclor-1016	Delta-BHC	Endosulfan II
Aroclor-1221	Gamma-BHC	Endosulfan sulfate
Aroclor-1232	alpha-Chlordane	Endrin
Aroclor-1242	gamma-Chlordane	Endrin aldehyde
Aroclor-1248	4,4'-DDD	Endrin ketone
Aroclor-1254	4,4'-DDE	Heptachlor
Aroclor-1260	4,4'-DDT	Heptachlor epoxide
Aldrin	Dieldrin	Methoxychlor
Alpha-BHC	Endosulfan I	Toxaphene
Beta-BHC		
Inorganics		
Aluminum	Copper	Potassium
Antimony	Cyanide	Selenium
Arsenic	Iron	Silver
Barium	Lead	Sodium
Beryllium	Lithium	Thallium
Bismuth	Magnesium	Tin
Cadmium	Manganese	Vanadium
Calcium	Mercury	Zinc
Chromium	Molybdenum	Nitrate/Nitrite
Cobalt	Nickel	Explosives (USATHAMA,PETN)
Radionuclides		
Americium-241	Plutonium-238	Thorium-230
Bismuth-207	Plutonium-239/240	Thorium-232
Bismuth-210	Potassium-40	Uranium-234
Cesium-137	Radium-226	Uranium-235
Cobalt-60	Thorium-228	Uranium-238

Table I.2. Variance From 3-Foot Sampling Depth Specification

Location	Description of Variance
SGC-NAC-000001	Core sampler hit refusal at 2 feet.
SGC-NAC-000002	Relocated due to utilities.
SGC-NAC-000003	Core sampler hit refusal at 2 feet.
SGC-NAC-000004	Core sampler hit refusal at 18 inches.
SGC-NAC-000005	Drilled to 1 foot, hand-augered rest due to utilities.
SGC-NAC-000006	Drilled to 1 foot, hand-augered rest due to utilities.
SGC-NAC-000007	Core sampler hit refusal at 18 inches.
SGC-NAC-000008	Drilled to 2 feet due to utilities.
SGC-NAC-000010	Drilled to 1 foot; hand-augered rest due to utilities; flag against building, so sample taken 6 feet from flag.
SGC-NAC-000012	Drilled to 2 feet due to utilities.
SGC-SAN-000018	Core sampler hit refusal at 2 feet; relocated from inside clarifier.
SGC-NAC-000029	Core sampler hit refusal at 18 inches.
SGC-A61-000043	Sampled 1 foot from flag.
SGC-A61-000047	Drilled to 2 feet due to utilities.
SGC-A61-000048	Drilled to 2 feet due to utilities.
SGC-A61-000049	Relocated due to utilities.
SGC-A61-000051	Core sampler hit refusal at 18 inches.
SGC-A61-000052	Relocated due to utilities; core sampler hit refusal at 18 inches.
SGC-A61-000053	Core sampler hit refusal at 2 feet.
SGC-A13-000056	Core sampler hit refusal at 18 inches
SGC-A13-000058	Drilled to 1 foot, hand-augered rest due to utilities.
SGC-A13-000060	Core sampler hit refusal at 1 foot.
SGC-AOJ-000064	Core sampler hit refusal at 2 - 3 inches.
SGC-AOJ-000066	Core sampler hit refusal at 4 inches.
SGC-AOJ-000067	Core sampler hit refusal at 6 inches.
SGC-AOJ-000069	Core sampler hit refusal at 2 feet.
SGC-A03-000080	Core sampler hit refusal at 20 inches
SGC-A03-000081	Drilled to 2 feet due to utilities.
SGC-A03-000082	Drilled to 1 foot, hand-augered rest due to utilities.
SGC-A03-000083	Sampled 25 feet from original location due to storm sewer; core sampler hit refusal at 18 inches.
SGC-A03-000087	Core sampler hit refusal at 2 feet.
SGC-A21-000088	Core sampler hit refusal at 18 inches.
SGC-A21-000090	Core sampler hit refusal at 20 inches.
SGC-SDB-000097	Relocated due to utilities.
SGC-SDB-000098	Relocated from inside a building.
SGC-SDB-000101	Relocation of SGC-SDB-000099; first location surveyed incorrectly.
SGC-SDB-000102	Relocation of SGC-SDB-000100; first location surveyed incorrectly.


PARKING
AREA N
AREA J
AREA 21
363
67
000057
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387
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Scale in feet

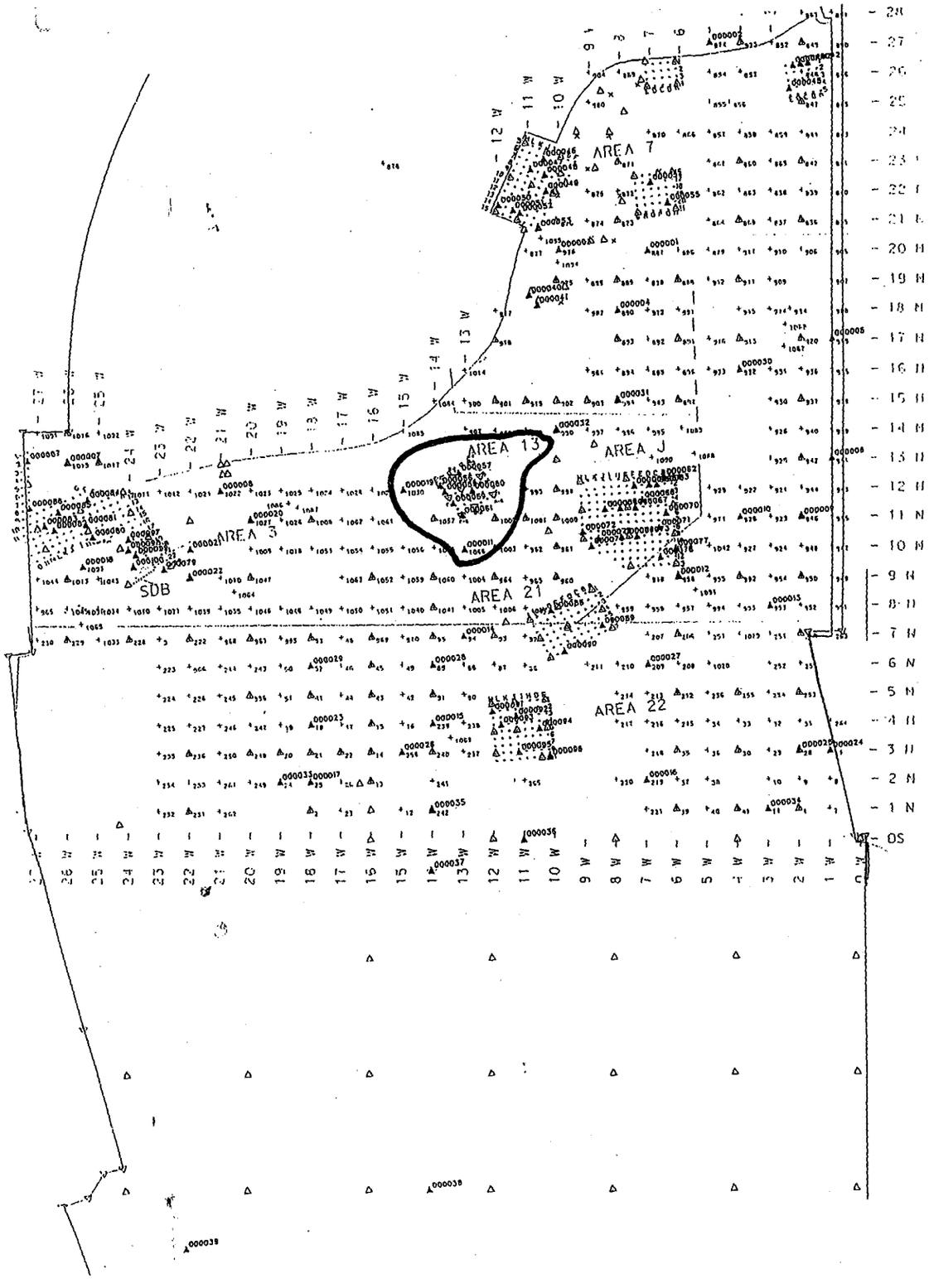

Figure 1.1. Locations of soil sampling sites.

Table A.1

Detected Volatile Organic Compounds (µg/kg)

ANALYTE	Background Value	Industrial Scenario Guideline Criteria	SGC-NAC-000007	SGC-NAC-000010	SGC-NAC-000011	SGC-NAC-000012	SGC-NAC-000013
PETREX Sample Area			WEST	EAST	WEST	EAST	EAST
Acetone	NA	21000000					
1,2-Dichloroethene (total)	NA	43000000					
2-Butanone	NA	93000000				8 J	10 J
Benzene	NA	8.90E+03					
Carbon Disulfide	NA	280000					4 J
Chloroform	NA	3100					
Chloromethane	NA	NA		4 J			
Ethylbenzene	NA	480					
Methylene Chloride	NA	3.95E+05		8			
Tetrachloroethene	NA	21000000					
Toluene	NA	250000			2 J		
Trichloroethene	NA	41000	7				
Xylene (total)	NA	430000000					

No entry - not detected
J - Numerical value is an estimated quantity
C - Identification confirmed by GC/MS
mg/kg - micrograms per kilogram
Red = above Guideline Criteria (GC)
Green = above GC and below Background
Magenta = above Background and Below GC
Blue = above Background (no GC)

Table A.1

Detected Volatile Organic Compounds (μg/kg)

ANALYTE	Background Value	Industrial Scenario Guideline Criteria	SGC-NAC-000019	SGC-NAC-000020	SGC-NAC-000022	SGC-NAC-000023	SGC-NAC-000025
PETREX Sample Area			WEST	WEST	WEST	SOUTH	SOUTH
Acetone	NA	21000000		36			
1,2-Dichloroethene (total)	NA	43000000					
2-Butanone	NA	93000000		6 J			
Benzene	NA	8.90E+03					
Carbon Disulfide	NA	280000					
Chloroform	NA	3100					
Chloromethane	NA	NA					
Ethylbenzene	NA	480					
Methylene Chloride	NA	3.95E+05		17	10		
Tetrachloroethene	NA	21000000					
Toluene	NA	250000	1 J	2 J		4 J	2 J
Trichloroethene	NA	41000	7				
Xylene (total)	NA	430000000					

No entry - not detected

J - Numerical value is an estimated quantity

C - Identification confirmed by GC/MS

mg/kg - micrograms per kilogram

Red = above Guideline Criteria (GC)

Green = above GC and below Background

Magenta = above Background and Below GC

Blue = above Background (no GC)

Table A.1

Detected Volatile Organic Compounds (µg/kg)

ANALYTE	Background Value	Industrial Scenario Guideline Criteria	SGC-A61-000054	SGC-A61-000055	SGC-A13-000057	SGC-A13-000058	SGC-A13-000059
PETREX Sample Area			AREA 7	AREA 7	AREA 13	AREA 13	AREA 13
Acetone	NA	21000000					
1,2-Dichloroethene (total)	NA	43000000					
2-Butanone	NA	93000000					
Benzene	NA	8.90E+03					
Carbon Disulfide	NA	280000					
Chloroform	NA	3100					
Chloromethane	NA	NA					
Ethylbenzene	NA	480					
Methylene Chloride	NA	3.95E+05				7	
Tetrachloroethene	NA	21000000					
Toluene	NA	250000		1 J			3 J
Trichloroethene	NA	41000			3 J		
Xylene (total)	NA	430000000					1 J

No entry - not detected
J - Numerical value is an estimated quantity
C - Identification confirmed by GC/MS
mg/kg - micrograms per kilogram
Red = above Guideline Criteria (GC)
Green = above GC and below Background
Magenta = above Background and Below GC
Blue = above Background (no GC)

Table A.1

Detected Volatile Organic Compounds (µg/kg)

ANALYTE	Background Value	Industrial Scenario Guideline Criteria	SGC-A13-000061	SGC-AOJ-000063	SGC-AOJ-000065	SGC-AOJ-000072	SGC-AOJ-000073
PETREX Sample Area			AREA 13	AREA J	AREA J	AREA J	AREA J
Acetone	NA	21000000					
1,2-Dichloroethene (total)	NA	43000000	36				
2-Butanone	NA	93000000					0
Benzene	NA	8.90E+03					
Carbon Disulfide	NA	280000					
Chloroform	NA	3100					
Chloromethane	NA	NA					
Ethylbenzene	NA	480					
Methylene Chloride	NA	3.95E+05			5	1	
Tetrachloroethene	NA	21000000	1 J				
Toluene	NA	250000		1 J		2 J	
Trichloroethene	NA	41000	**43000** D				
Xylene (total)	NA	430000000					

No entry - not detected
J - Numerical value is an estimated quantity
C - Identification confirmed by GC/MS
mg/kg - micrograms per kilogram
Red = above Guideline Criteria (GC)
Green = above GC and below Background
Magenta = above Background and Below GC
Blue = above Background (no GC)

Table A.2.

Detected Semivolatile Organic Compounds (µg/kg)

ANALYTE	Background Value	Industrial Scenario Guideline Criteria	SGC-NAC-000009	SGC-NAC-000010	SGC-NAC-000011	SGC-NAC-000012	SGC-NAC-000015	SGC-NAC-000016
PETREX Sample Area			EAST	EAST	WEST	EAST	SOUTH	SOUTH
Acenaphthene	NA	NA						
Acenaphthylene	NA	NA						
Anthracene	NA	64000000						
Benzo(a)anthracene	NA	4.10E+03 J				18 J		47 J
Benzo(a)pyrene	NA	410 J				21 J		42 J
Benzo(b)fluoranthene	NA	4100 J				22 J		89 J
Benzo(g,h,i)perylene	NA	NA J						33 J
Benzo(k)fluoranthene	NA	41000 J				17 J		46 J
Bis(2-ethylhexyl)phthalate	NA	2.15E+05	71 J		36 J	35 J		100 J
Butylbenzylphthalate	NA	43000000						
Carbazole	NA	NA						
Chrysene	NA	410000 J		20 J		22 J		51 J
Di-n-butyl phthalate	NA	21000000						
Di-n-octyl phthalate	NA	4300000						
Dibenz(a,h)anthracene	NA	410						
Dibenzofuran	NA	NA						
Diethyl phthalate	NA	NA						
Fluoranthene	NA	8500000 J		31 J		38 J		100 J
Fluorene	NA	NA						
Indeno(1,2,3-cd)pyrene	NA	4.10E+03 J						27 J
2-Methylnaphthalene	NA	NA						
Naphthalene	NA	NA					61 J	
Phenanthrene	NA	NA J						63 J
Phenol	NA	130000000						
Pyrene	NA	6400000 J		31 J	20 J	37 J		85 J

No entry - not detected
J - Value is an est. quantity
D - Sample was diluted
NA - Value not available
H - Analyzed outside holding time
* - Unconfirmed due to interference
mg/kg - micrograms per kilogram

ND on 000019

Table A.2.

Detected Semivolatile Organic Compounds (µg/kg)

ANALYTE	Background Value	Industrial Scenario Guideline Criteria	SGC-NAC-000017	SGC-NAC-000018	SGC-NAC-000020	SGC-NAC-000021	SGC-NAC-000024	SGC-NAC-000027	SGC-NAC-000028
PETREX Sample Area			SOUTH	WEST	WEST	WEST	SOUTH	SOUTH	SOUTH
Acenaphthene	NA	NA			2 J				
Acenaphthylene	NA	NA							
Anthracene	NA	64000000				44 J			
Benzo(a)anthracene	NA	4.10E+03		48 J	130 J	180 J			
Benzo(a)pyrene	NA	410		68 J	150 J	110 J			
Benzo(b)fluoranthene	NA	4100		59 J	67 J	140 J			
Benzo(g,h,i)perylene	NA	NA		49 J	100 J	88 J			
Benzo(k)fluoranthene	NA	41000		62 J	37 J	140 J			
Bis(2-ethylhexyl)phthalate	NA	2.15E+05		1000			26 J	24 J	26
Butylbenzylphthalate	NA	43000000							
Carbazole	NA	NA				21 J			
Chrysene	NA	410000		54 J	220	170 J			
Di-n-butyl phthalate	NA	21000000							
Di-n-octyl phthalate	NA	4300000					29 J		
Dibenz(a,h)anthracene	NA	410		20 J	24 J	28 J			
Dibenzofuran	NA	NA							
Diethyl phthalate	NA	NA							
Fluoranthene	NA	8500000	28 J	84 J	180 J	320 J			
Fluorene	NA	NA				26 J			
Indeno(1,2,3-cd)pyrene	NA	4.10E+03		58 J	46 J	73 J			
2-Methylnaphthalene	NA	NA							
Naphthalene	NA	NA							
Phenanthrene	NA	NA		21 J		220 J			
Phenol	NA	130000000							
Pyrene	NA	6400000	26 J	91 J	1400	310 J			

No entry - not detected
J - Value is an est. quantity
D - Sample was diluted
NA - Value not available
H - Analyzed outside holding time
* - Unconfirmed due to interference
mg/kg - micrograms per kilogram

Table A.2.

Detected Semivolatile Organic Compounds (µg/kg)

ANALYTE	Background Value	Industrial Scenario Guideline Criteria	SGC-A61-000050	SGC-A61-000051	SGC-A61-000052	SGC-A61-000053	SGC-A13-000056	SGC-A13-000057
PETREX Sample Area			AREA 7	AREA 7	AREA 7	AREA 7	AREA 13	AREA 13
Acenaphthene	NA	NA J						
Acenaphthylene	NA	NA						
Anthracene	NA	64000000 J	26 J			79 J		
Benzo(a)anthracene	NA	4.10E+03 J	130 J		20 J	200 J		
Benzo(a)pyrene	NA	410 J	130 J		20 J	180 J		
Benzo(b)fluoranthene	NA	4100 J	110 J		22 J	150 J		
Benzo(g,h,i)perylene	NA	NA J	96 J			120 J		
Benzo(k)fluoranthene	NA	41000 J	130 J		19 J	150 J		
Bis(2-ethylhexyl)phthalate	NA	2.15E+05 J					27 J	28 J
Butylbenzylphthalate	NA	43000000						
Carbazole	NA	NA				24 J		
Chrysene	NA	410000 J	150 J		26 J	210 J		
Di-n-butyl phthalate	NA	21000000						
Di-n-octyl phthalate	NA	4300000						
Dibenz(a,h)anthracene	NA	410 J	29 J			35 J		
Dibenzofuran	NA	NA						
Diethyl phthalate	NA	NA						
Fluoranthene	NA	8500000 J	290 J	30 J	47 J	480	22 J	
Fluorene	NA	NA J						
Indeno(1,2,3-cd)pyrene	NA	4.10E+03 J	79			100 J		
2-Methylnaphthalene	NA	NA						
Naphthalene	NA	NA						
Phenanthrene	NA	NA J	140		31 J	290 J		
Phenol	NA	130000000						
Pyrene	NA	6400000 J	260	26 J	45 J	390	18 J	

No entry - not detected
J - Value is an est. quantity
D - Sample was diluted
NA - Value not available
H - Analyzed outside holding time
* - Unconfirmed due to interference
mg/kg - micrograms per kilogram

Table A.2.

Detected Semivolatile Organic Compounds (µg/kg)

ANALYTE	Background Value	Industrial Scenario Guideline Criteria	SGC-A13-000058	SGC-A13-000060	SGC-A13-000061	SGC-AOJ-000062	SGC-AOJ-000063	SGC-AOJ-000064	SGC-AOJ-000065
PETREX Sample Area			AREA 13	AREA 13	AREA 13	AREA J	AREA J	AREA J	AREA J
Acenaphthene	NA	NA							
Acenaphthylene	NA	NA				31 J			
Anthracene	NA	64000000		30 J		25 J			
Benzo(a)anthracene	NA	4.10E+03	29 J	71 J		60 J	66 J	65 J	
Benzo(a)pyrene	NA	410	28 J	67 J		20 J	71 J	71 J	
Benzo(b)fluoranthene	NA	4100	17 J	55 J		90 J	75 J	72 J	
Benzo(g,h,i)perylene	NA	NA	13 J	60 J		60 J	49 J	56 J	
Benzo(k)fluoranthene	NA	41000	22 J	63 J		00 J	75 J	65 J	
Bis(2-ethylhexyl)phthalate	NA	2.15E+05		36 J	28 J	53 J	31 J	21 J	
Butylbenzylphthalate	NA	43000000							
Carbazole	NA	NA							
Chrysene	NA	410000	32 J	81 J		70 J	82 J	79 J	
Di-n-butyl phthalate	NA	21000000							
Di-n-octyl phthalate	NA	4300000							
Dibenz(a,h)anthracene	NA	410				44 J			
Dibenzofuran	NA	NA							
Diethyl phthalate	NA	NA							22
Fluoranthene	NA	8500000	65 J	190 J		270 J	140 J	180 J	22
Fluorene	NA	NA							
Indeno(1,2,3-cd)pyrene	NA	4.10E+03	17 J	48 J		40 J	50 J	45 J	
2-Methylnaphthalene	NA	NA							
Naphthalene	NA	NA							
Phenanthrene	NA	NA	35 J	140 J		79 J	59 J	91 J	
Phenol	NA	130000000							
Pyrene	NA	6400000	57 J	140 J		160 J	130 J	140 J	19

No entry - not detected
J - Value is an est. quantity
D - Sample was diluted
NA - Value not available
H - Analyzed outside holding time
* - Unconfirmed due to interference
mg/kg - micrograms per kilogram

ND on 000011 & 000019

Table A.3.

Detected Pesticides/PCB's (µg/kg)

ANALYTE	Background Value	Industrial Scenario Guideline Criteria	SGC-NAC-000008	SGC-NAC-000010	SGC-NAC-000031	SGC-A66-000041	SGC-A61-000044
PETREX Sample Area			WEST	EAST	NORTH	NORTH	AREA 61
Aroclor-1248	ND	380	48			110	98
Aroclor-1254	ND	4300	43				55
Alpha-Chlordane	ND	NA					
Gamma-Chlordane	ND	NA					
4,4'-DDT	9000	13000					
Dieldrin	ND	185		4.4	5 *		
Endosulfan I	ND	NA				3.4 *	2.4
Endosulfan II	NA	NA					
Endrin	ND	NA			11 *		
Heptachlor	ND	NA					

No entry - not detected

* - Unconfirmed due to interference

NA - Value not available

ND - No detections in background samples

mg/kg - micrograms per kilogram

Red = above Guideline Criteria (GC)

Green = above GC and below Background

Magenta = above Background and Below GC

Blue = above Background (no GC)

Table A.3.

Detected Pesticides/PCB's (µg/kg)

ANALYTE	Background Value	Industrial Scenario Guideline Criteria	SGC-A13-000060	SGC-AOJ-000067	SGC-AOJ-000071	SGC-A03-000081
PETREX Sample Area			AREA 13	AREA J	AREA J	AREA 3
Aroclor-1248	ND	380				
Aroclor-1254	ND	4300		52	44	
Alpha-Chlordane	ND	NA			14 *	
Gamma-Chlordane	ND	NA	3.7		12 *	
4,4'-DDT	9000	13000				3.7
Dieldrin	ND	185				
Endosulfan I	ND	NA *				
Endosulfan II	NA	NA				4.4
Endrin	ND	NA				
Heptachlor	ND	NA	2.9			

No entry - not detected

* - Unconfirmed due to interference

NA - Value not available

ND - No detections in background samples

mg/kg - micrograms per kilogram

Red = above Guideline Criteria (GC)

Green = above GC and below Background

Magenta = above Background and Below GC

Blue = above Background (no GC)

Table A.4.
Detected TAL Inorganics (mg/kg)

ANALYTE	Background Value	Industrial Scenario Guideline Criteria	SGC-NAC-000011	SGC-NAC-000012	SGC-NAC-000013	SGC-NAC-000014	SGC-NAC-000015	SGC-NAC-000016	SGC-NAC-000017	SGC-NAC-000018	SGC-NAC-000019	SGC-NAC-000020
PETREX Sample Area			WEST	EAST	EAST	SOUTH	SOUTH	SOUTH	SOUTH	WEST	WEST	WEST
TAL INORGANICS (mg/kg)												
Aluminum	19000	NA	10300	13100	8480	17700	7370	14100	20000	5130	7820	3400
Antimony	NA	85	1.2 B									
Arsenic	8.6	64	2.2 B	1.9 B	2 B	2.7	3.6	3.4	2 B	4.1	6.8	3
Barium	180	1.50E+04	13.5 B	78.4	53.4	110	51.3 B	88.7	119	21.4 B	56.1	17.9 B
Beryllium	1.3	0.7	0.36 B	0.44	0.2 B	0.68	0.24 B	0.46	0.96	0.28	0.22 B	0.77
Bismuth	NA	NA	0.99 B					0.82 B	1.2 B			
Cadmium	2.1	210	5.2	6	4.6	7.7	3.7	5.7	8.6		3.4	
Calcium	310000	NA	90800	27000	222000	94100	342000	133690	23800	157000	76400	64000
Chromium	20	1.10E+05	11.9	17.3	10.8	22.3	9.1	17.7	24.5	9.3	8.9	8.6
Cobalt	19	NA	13.7	12.7	7.5 B	13.9	5.8 B	11.6 B	18.5	5.5 B	8.4 B	2.9
Copper	28	NA	16.6	21.3	13.5	22.4	12.2	19.3	26.9	11.6	14.2	7.3
Cyanide	ND	4300				1.8		1				
Iron	35000	NA	25600	17900	21100	36300	16300	28600	40000	13600	16000	25600
Lead	48	NA	5.7	9.3	29.4	12.9	11.3	14.1	27.5	8.2	14.2	5.3
Lithium	28	NA	27.3	25.3	17.8 B	30.7	15 B	25.1	34.1	18.1 B	9.7 B	9.5
Magnesium	40000	NA	12300	9900	7250	8190	4760	14600	6250	47700	29800	16800
Manganese	1400	27000	908	658	543	939	689	641	1360	381	539	505
Mercury	ND	64							0.07 B			
Molybdenum	27	NA	0.58 B	1.3 B	0.81 B	1.3 B	0.51 B	1.3 B	0.76 B	0.82 B	2.2 B	
Nickel	32	4.30E+03	21.6	26.4	17.6	31.4	13.8	23.9	34.4	13.5	13.3	27.3
Potassium	1900	NA	2210 B	1630	1100 B	2250 B	1010 B	2090 B	3680	1040 B	1090 B	3190
Selenium	NA	NA	0.31 B									
Silver	1.7	1100								0.41 B		
Sodium	240	NA	288 B	2490	332 B	142 B	248 B	398 B	268 B	398 B	155 B	183 B
Thallium	0.46	NA										
Tin	20	NA		1.6 B	1.1 B	0.98 B		1.7 B	3.3 B		1.3 B	1.6 B
Vanadium	25	1500	15.8	22.4	12.9	29.4	10.7	23.8	30.2	10.3	17.5	17.7
Zinc	140	64000	59.9	68.5	44.9	92.5	67.7	70.5	103	41.2	56.1	84.9
OTHER INORGANICS												
% Solids (%)	NA	NA	90.1	84.7	81.7	80.9	74	85.3	72.8	90.2	85.3	87.1
Nitrate/Nitrite (mg-N/kg)	NA	NA	5.3	1.8	2.1	4.9	3	2.4	6.4	13.8	6.5	2.1

No entry - not detected
mg/kg - milligrams/kilogram
NA - Value not available
NC - Background not comp
ND - No detections in background samples
mg-N/kg - milligrams per kilogram, reported as nitrogen
J - Numerical value is an estimated quantity
B - Analyte detected in blanks associated with this sample
Red = above Guideline Criteria (GC)
Green = above GC and below Background
Magenta = above Background and Below GC
Blue = above Background (no GC)

Table A.4.

Detected TAL Inorganics (mg/kg)

ANALYTE	Background Value	Industrial Scenario Guideline Criteria	SGC-A61-000051	SGC-A61-000052	SGC-A61-000053	SGC-A61-000054	SGC-A61-000055	SGC-A13-000056	SGC-A13-000057	SGC-A13-000058	SGC-A13-000059	SGC-A13-000060
PETREX Sample Area			AREA 7	AREA 7	AREA 7	AREA 7	AREA 7	AREA 13	AREA 13	AREA 13	AREA 13	AREA 13
TAL INORGANICS (mg/kg)												
Aluminum	19000	NA	9810	6900	3990	16200	11100	1610	5660	1260	4400	4700
Antimony	NA	85			0.23 B			0.61 B	0.79 B			0.84 B
Arsenic	8.6	64	5	3.2	3	1.2 B	2.7	3.5 B	4.3 B	3.1	4.7	5
Barium	180	1.50E+04	52.4	26.8 B	30.2 BJ	39.5 B	76.4	14.7 B	44.8 B	13.3 B	65.1	40.7 B
Beryllium	1.3	0.7	0.53	0.12 B		0.06	1.8		0.09 B			
Bismuth	NA	NA	1.3 B									
Cadmium	2.1	210	0.2 B	0.2 B				1.1	2.6	0.16 B	2.4	2.6
Calcium	310000	NA	9810	26400	18100	205000	155000	149000	174000	157000	137000	139000
Chromium	20	1.10E+05	16.8		7.1 J	12.9	13.5	2.4	5.8	4.2	5	5
Cobalt	19	NA	9.1 B	7.1 B	4.3 B	10.5 B	8.3	1.9 B	5.6 B	1.7 B	4.8 B	5.7 B
Copper	26	NA	25.1	12.1	13.6 J	13.7	13.5	9.2	7.7	11	11.5	12.4
Cyanide	ND	4300										
Iron	35000	NA	21900	16500	11400 J	20600	24000	5180	12300	4560	11200	11700
Lead	48	NA	16.7	12.1	11.2 J	14	22.1	6.3	9.9	4.4	6	9.4
Lithium	26	NA	24.5	19.6 B	14 B	20.8 B	16.5 B	3.6 B	7.5 B	4.6 B	8.9 B	7.3 B
Magnesium	40000	NA	18400	11600	47900 J	52900	42020	64200	45500	79100	65100	33700
Manganese	1400	27000	684	726	471 J	898	833	233	885	199	215	574
Mercury	ND	64			0.06 B							
Molybdenum	27	NA	1.9 B	0.62 B	0.96 B		1.1 B	1.3 B	1.1 B	1.2 B	2.5 B	1.8 B
Nickel	32	4.30E+03	20.8	14.1	10.5	19.1	19.1	4.4 B	9.9	4.3 B	10.7	9.6
Potassium	1900	NA	1710	1010 B	585 B	1700	1650	374 B	904 B	250 B	985 B	776 B
Selenium	NA	NA										
Silver	1.7	1100	0.3 B		0.19 B							
Sodium	240	NA	875 B	199 B	911 BJ	268 B	4.8 B	227 B	265 B	220 B	248 B	268 B
Thallium	0.46	NA										
Tin	20	NA	1.5 B		0.9 B				1.2 B		1.2 B	0.9 B
Vanadium	25	1500	17.1	9.6	8.6 J	19.1	11.6	5.7 B	12.4	5.4	10.1 B	11.8
Zinc	140	64000	130	66.1	73 J	130	84.6	21.5	29.3	37.7	35.7	39
OTHER INORGANICS												
% Solids (%)	NA	NA	82.5	83	85.3	84.8	71.3	95.3	88.9	93.7	92.8	91
Nitrate/Nitrite (mg-N/kg)	NA	NA	1.6	4.6	2.3	2.6	2.1	1.9	3.8	1.9	3.3	2.4

No entry - not detected
mg/kg - milligrams/kilogram
NA - Value not available
NC - Background not comp
ND - No detections in background samples
mg-N/kg - milligrams per kilogram, reported as nitrogen
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B - Analyte detected in blanks associated with this sample
Red = above Guideline Criteria (GC)
Green = above GC and below Background
Magenta = above Background and Below GC
Blue = above Background (no GC)

Table A.4.

Detected TAL Inorganics (mg/kg)

ANALYTE	Background Value	Industrial Scenario Guideline Criteria	SGC-A13-000061	SGC-AOJ-000062	SGC-AOJ-000063	SGC-AOJ-000064	SGC-AOJ-000065	SGC-AOJ-000066	SGC-AOJ-000067	SGC-AOJ-000068	SGC-AOJ-000069	SGC-AOJ-000070
PETREX Sample Area			AREA 13	AREA J	AREA J	AREA J	AREA J	AREA J	AREA J	AREA J	AREA J	AREA J
TAL INORGANICS (mg/kg)												
Aluminum	19000	NA	5670	9880	7380	890	5690	2910	6510	10500	14300	10100
Antimony	NA	85		0.55 B	0.67 B			0.55 B	0.94 B			
Arsenic	8.6	64	5.4	4.2 B	3.6 B	2 B	2.9	3.7 B	6.2	3.5	2.4 B	4.4
Barium	180	1.50E+04	49.3	68.7	43.1	6.[illegible] B	44.9 B	19.5 B	44.2 B	32.9 B	86.8	70.1
Beryllium	1.3	0.7	0.1 B	0.25 B	0.14 B		0.38		0.13 B	0.49	0.81	0.33
Bismuth	NA	NA										
Cadmium	2.1	210	2.9	3.9	3.2	0.49 B		1.4	2.8			4.7
Calcium	310000	NA	138000	93800	98600	231000	116000	171000	91500	132000	36100	128000
Chromium	20	1.10E+05	6.3	9.6	8	1.3 B	9	2.4	8.6	57.8	18.1	14
Cobalt	19	NA	6.4 B	7.1 B	6.4 B	0.85 B	6 B	2.6 B	5.5 B	9.7 B	12.8	8.6 B
Copper	26	NA	14.3	13.2	12.9	1.8 B	12.5	10.5	21.2	21.6	17.3	31.9
Cyanide	ND	4300										
Iron	35000	NA	13800	18100	15300	2330	13500	6330	12900	21600	28900	21300
Lead	48	NA	7.6	10.3	28.7	4	10	9.4	19.6	10.6	14.1	17.2
Lithium	26	NA	14.6 B	11.5 B	12.2 B	1.9 B	13.3 B	7.9 B	8.9 B	28.3	17.7 B	16.5 B
Magnesium	40000	NA	51800	23700	23000	146000	48800	85800	26800	12700	5000	31100
Manganese	1400	27000	328	419	399	163	345	240	441	794	976	483
Mercury	ND	64							0.06 B			
Molybdenum	27	NA	3.2 B	1.5 B	1.2 B	0.42 B	2.2 B	0.59 B	1.5 B	0.73 B	1 B	1.7 B
Nickel	32	4.30E+03	13.8	14.2	12.9	1.4 B	14.3	4.8 B	11.6	21	25.7	19.9
Potassium	1900	NA	1380	1450	628 B	423 B	1400	666 B	1120 B	2670	1860	1340 B
Selenium	NA	NA										
Silver	1.7	1100							0.45 B			
Sodium	240	NA	245 B	833 B	406 B	483 B	186 B	287 B	142 B	192 B	177 B	352 B
Thallium	0.46	NA										
Tin	20	NA	1 B	1.4 B	1.5 B	0.96 B	0.98 B	0.64 B	1.4 B		1.4 B	1.6 B
Vanadium	25	1500	12.2	17.8	13.5	3.4 B	12.6	7.9 B	13.8	14.6	23	20.5
Zinc	140	64000	43.9	46	48.6	8.6	44	21.9	57.2	59.1	63.6	53.2
OTHER INORGANICS												
% Solids (%)	NA	NA	90.5	86.6	94.9	91.2	85.5	86.5	80.7	84	82	88.2
Nitrate/Nitrite (mg-N/kg)	NA	NA	2.2	6.2	2.2	1.2	4.2	3.4	9.3	1.7	3.2	2

No entry - not detected
mg/kg - milligrams/kilogram
NA - Value not available
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ND - No detections in background samples
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J - Numerical value is an estimated quantity
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Blue = above Background (no GC)

Table A.5.

Detected Radionuclides (pCi/g)

ANALYTE	Background Value	Industrial Scenario Guideline Criteria	SGC-NAC-000011	SGC-NAC-000012	SGC-NAC-000013	SGC-NAC-000014	SGC-NAC-000015
PETREX Sample Area			WEST	EAST	EAST	SOUTH	SOUTH
Americium-241	ND	4.95					
Bismuth-207	ND	0.175					
Bismuth-210	ND	NA					
Cesium-137	0.42	4.60E-01				**0.826**	
Cobalt-60	NC	0.1					
Plutonium-238	0.13	5.5	0.0718	0.101	0.0107	**0.671**	0.0118
Plutonium-239/240	0.18	5.5		0.00164		0.0206	
Potassium-40	37	NA	17.8	15.5	4.65	22.5	19.2
Radium-226+D	2	1.40E-01	**0.778**	**0.592**	**0.263**	**1.11**	**1.4**
Thorium-228+D	1.5	0.85	**0.913**	0.697	0.247	**1.18**	**1.37**
Thorium-230	1.9	44	0.902	0.803	0.359	1.09	1.48
Thorium-232	1.4	50	0.83	0.769	0.321	1.08	1.43
Uranium-234	1.1	37.5	0.882	0.693	0.378	0.866	1.01
Uranium-235+D	0.11	3.35		0.0231	0.0183	0.0546	0.0927
Uranium-238+D	1.2	11	0.871	0.681	0.424	1.01	0.955

No entry - not detected
ND -No detections in background samples
NA - Data not available
NC - Background value not computed
pCi/g - picocuries per gram
Red = above Guideline Criteria (GC)
Green = above GC and below Background
Magenta = above Background and Below GC
Blue = above Background (no GC)

Table A.5.

Detected Radionuclides (pCi/g)

ANALYTE	Background Value	Industrial Scenario Guideline Criteria	SGC-NAC-000016	SGC-NAC-000017	SGC-NAC-000018	SGC-NAC-000019	SGC-NAC-000020
PETREX Sample Area			SOUTH	SOUTH	WEST	WEST	WEST
Americium-241	ND	4.95					
Bismuth-207	ND	0.175					
Bismuth-210	ND	NA					
Cesium-137	0.42	4.60E-01		0.582			
Cobalt-60	NC	0.1					
Plutonium-238	0.13	5.5	0.263	0.2	0.684	0.121	0.721
Plutonium-239/240	0.18	5.5	0.00413	0.0166	0.00487		
Potassium-40	37	NA	15.2	29.1	10.1	7.9	24.7
Radium-226+D	2	1.40E-01	0.934	0.96	0.677	0.528	0.841
Thorium-228+D	1.5	0.85	1.04	1.1	0.465	0.378	0.892
Thorium-230	1.9	44	1.36	1.01	0.582	0.749	1.08
Thorium-232	1.4	50	0.894	1.26	0.508	0.375	0.843
Uranium-234	1.1	37.5	0.765	0.698	0.523	0.44	0.751
Uranium-235+D	0.11	3.35	0.0394	0.0403			0.0362
Uranium-238+D	1.2	11	0.993	0.852	0.496	0.691	0.825

No entry - not detected
ND -No detections in background samples
NA - Data not available
NC - Background value not computed
pCi/g - picocuries per gram
Red = above Guideline Criteria (GC)
Green = above GC and below Background
Magenta = above Background and Below GC
Blue = above Background (no GC)

Table A.5.

Detected Radionuclides (pCi/g)

ANALYTE	Background Value	Industrial Scenario Guideline Criteria	SGC-A13-000056	SGC-A13-000057	SGC-A13-000058	SGC-A13-000059	SGC-A13-000060
PETREX Sample Area			AREA 13	AREA 13	AREA 13	AREA 13	AREA 13
Americium-241	ND	4.95					
Bismuth-207	ND	0.175					
Bismuth-210	ND	NA					
Cesium-137	0.42	4.60E-01		0.169			
Cobalt-60	NC	0.1					
Plutonium-238	0.13	5.5	0.0451	1.79	0.102	0.0392	0.37
Plutonium-239/240	0.18	5.5		0.0388			
Potassium-40	37	NA	9.27	18.1	6.93	12.6	9.18
Radium-226+D	2	1.40E-01		**0.695**	**0.6**	**0.982**	**0.649**
Thorium-228+D	1.5	0.85	0.283	**0.983**	0.26	0.667	0.494
Thorium-230	1.9	44	0.606	0.982	0.735	0.984	0.698
Thorium-232	1.4	50	0.384	0.755	0.151	0.663	0.529
Uranium-234	1.1	37.5	0.374	0.771	0.619	0.723	0.493
Uranium-235+D	0.11	3.35		0.0422			
Uranium-238+D	1.2	11	0.576	0.772	0.737	0.784	0.649

No entry - not detected
ND -No detections in background samples
NA - Data not available
NC - Background value not computed
pCi/g - picocuries per gram
Red = above Guideline Criteria (GC)
Green = above GC and below Background
Magenta = above Background and Below GC
Blue = above Background (no GC)

Table A.5.

Detected Radionuclides (pCi/g)

ANALYTE	Background Value	Industrial Scenario Guideline Criteria	SGC-A13-000061	SGC-AOJ-000062	SGC-AOJ-000063	SGC-AOJ-000064	SGC-AOJ-000065
PETREX Sample Area			AREA 13	AREA J	AREA J	AREA J	AREA J
Americium-241	ND	4.95					
Bismuth-207	ND	0.175					
Bismuth-210	ND	NA					
Cesium-137	0.42	4.60E-01					
Cobalt-60	NC	0.1					
Plutonium-238	0.13	5.5	0.0845	0.258	1.33	0.0526	2.06
Plutonium-239/240	0.18	5.5		0.00226	0.0208		0.0057
Potassium-40	37	NA	7.99	7.38	5.18	2.65	17.7
Radium-226+D	2	1.40E-01	0.584	0.492	0.574		0.852
Thorium-228+D	1.5	0.85	0.332	0.25	0.44	0.0957	0.703
Thorium-230	1.9	44	0.758	0.618	0.525	0.194	0.921
Thorium-232	1.4	50	0.347	0.316	0.417	0.104	0.667
Uranium-234	1.1	37.5	0.461	0.64	0.612	0.222	0.882
Uranium-235+D	0.11	3.35					
Uranium-238+D	1.2	11	0.564	0.623	0.713	0.253	0.787

No entry - not detected
ND -No detections in background samples
NA - Data not available
NC - Background value not computed
pCi/g - picocuries per gram
Red = above Guideline Criteria (GC)
Green = above GC and below Background
Magenta = above Background and Below GC
Blue = above Background (no GC)

Table B.1. Comparison Table for Mound Screening Laboratory Results, Quanterra Analytical Laboratory Results Mound Wet Chemistry Laboratory Results (cont.)

Sample No.	Isotope	Quanterra Results pCi/g	Mound Wet Chemistry Lab Results pCi/g	Mound Screening Laboratory Results pCi/g
SGC-NAC-000035	Pu-238	0.0569	0.066	16 (Q); 20 (M)
	Th-228	1.07	1.054	---
	Th-230	0.881	1.057	---
	Th-232	1.03	1.153	1.0 (Q); 1.2 (M)
SGC-NAC-000036	Pu-238	0.195	0.208	14 (Q); 23 (M)
	Th-228	1.50	1.417	---
	Th-230	1.27	1.236	---
	Th-232	1.50	1.314	1.0 (Q); 1.0 (M)
SGC-NAC-000037	Pu-238	1.53	1.428	21 (Q); 26 (M)
	Th-228	1.08	1.250	---
	Th-230	1.12	1.421	---
	Th-232	1.06	1.150	0.9 (Q); 0.9 (M)
SGC-NAC-000038	Pu-238	0.0754	0.107	18 (Q); 14 (M)
	Th-228	1.05	1.203	---
	Th-230	1.23	1.343	---
	Th-232	1.01	1.160	1.0 (Q); 0.7 (M)
SGC-NAC-000039	Pu-238	0.144	0.176	28 (Q); 28 (M)
	Th-228	0.987	1.067	---
	Th-230	1.24	1.325	---
	Th-232	1.08	1.034	1.2 (Q); 1.2 (M)
SGC-A61-000042	Pu-238	0.937	1.267	5 (Q); 7 (M)
	Th-228	1.01	1.103	---
	Th-230	0.578	0.665	---
	Th-232	1.11	1.054	0.9 (Q); 1.0 (M)
SGC-A61-000045	Pu-238	0.0344	0.002	7 (Q); 3 (M)
	Th-228	0.196	0.258	---
	Th-230	0.689	0.808	---
	[illegible]	0.287	0.219	0.5 (Q); 0.4 (M)
SGC-A13-000057	Pu-238	1.79	1.021	14 (Q); 18 (M)
	Th-228	0.983	0.835	---
	Th-230	0.982	1.000	---
	Th-232	0.755	0.775	1.0 (Q); 0.9 (M)
SGC-AOJ-000063	[illegible]	1.33	1.319	[illegible]
	Th-228	0.440	0.381	---
	Th-230	0.525	0.539	---
	Th-232	0.437	0.397	0.5 (Q); 0.4 (M)

Environmental Restoration Program

OPERABLE UNIT 5
OPERATIONAL AREA PHASE I INVESTIGATIOI
NON-AOC FIELD REPORT

MOUND PLANT
MIAMISBURG, OHIO

VOLUME II - APPENDICES A-G

June 1995

Final (Revision 0)

U.S. Department of Energy
Ohio Field Office

EG&G Mound Applied Technologies

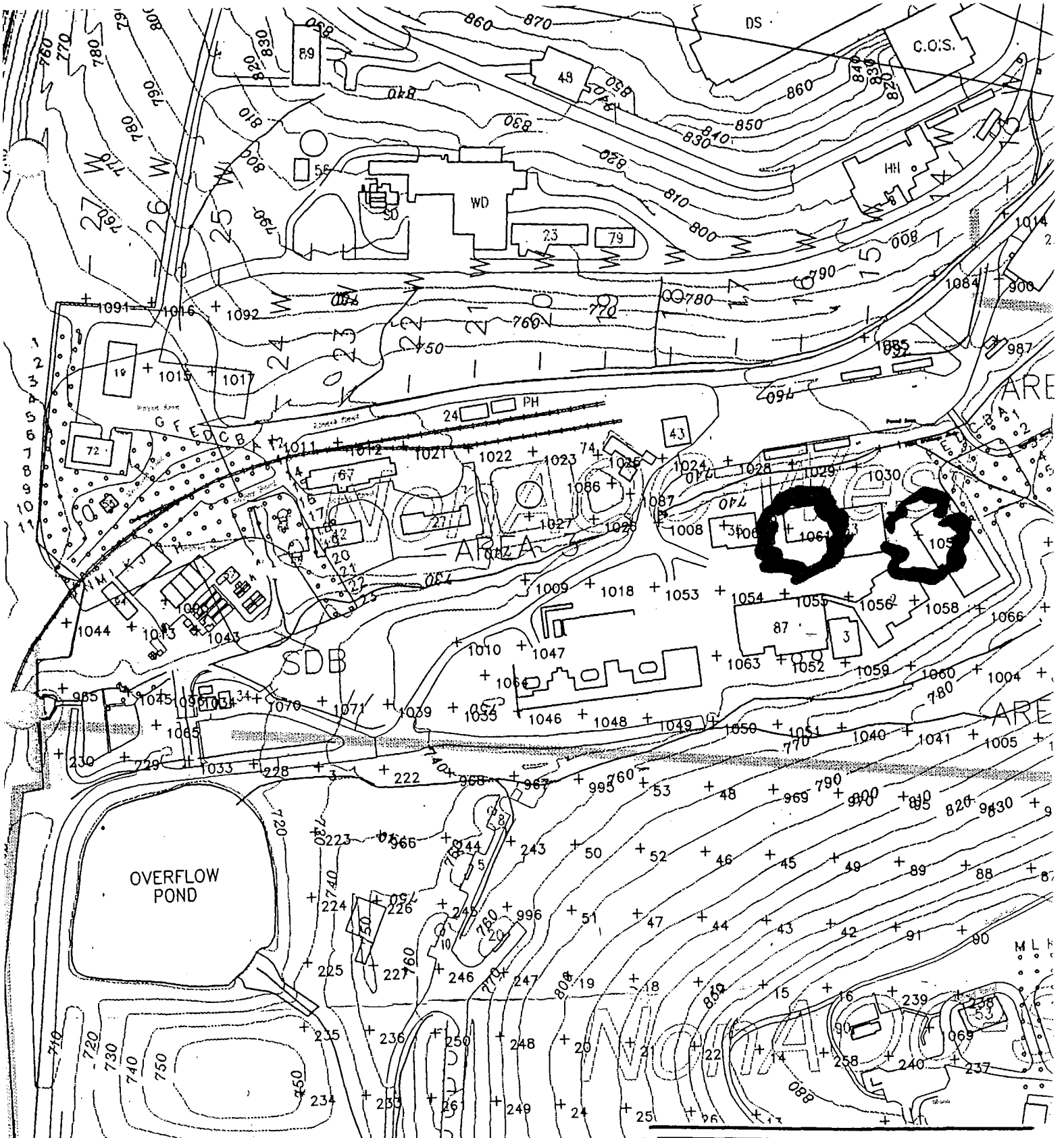

OVERFLOW POND
UNPAVED ROAD
DS
C.O.S.
WD
PH
SDB
AREA 3
Sample Locations
Plate 1

Table 2 (cont'd)

Sample #	Total Aromatic Hydrocarbons (a)	Total Semivolatile Hydrocarbons (b)	Total C5 to C11 Petroleum Hydrocarbons (c)	Total Halogenated Hydrocarbons (d)
1035	2,087,712	208,961	4,036,897	H
1039	546,090	9,996	741,506	ND
3039 (e)	516,065	21,227	733,093	ND
1040	169,260	960	370,073	3,677
1041	161,457	27,579	414,156	ND
1043	13,388,803	35,887	22,611,601	37,483
1044	107,749	ND	197,715	ND
1045	285,417	ND	566,535	4,393
1046	1,405,580	4,890	1,861,211	ND
1047	12,522	ND	25,068	ND
1048	2,994,722	617	3,566,067	ND
1049	148,446	ND	261,085	ND
1050	435,979	ND	1,290,385	ND
1051	66,445	2,646	107,123	ND
3051 (e)	64,919	752	112,256	ND
1052	351,489	ND	934,775	ND
1053	8,013	1,173	23,389	ND
1054	291,951	ND	669,428	ND
1055	678,469	ND	1,033,700	ND
1056	12,436,663	10,089	20,643,468	6,304
3056 (e)	12,445,999	13,823	21,137,796	8,479
1057	143,302	ND	278,241	9,994
1058	64,010	715	203,391	658,498
1059	1,374,524	ND	1,653,721	ND
1060	96,253	ND	538,094	3,146
1061	1,149,777	29,835	1,849,738	ND
1062	2,936,682	29,676	4,166,768	ND
1063	64,232	ND	147,109	ND
1064	444,736	645	916,632	ND
1065	862,915	9,049	1,900,950	7,322

MOUND

Environmental
Restoration
Program

Further Assessment

Soil Gas Confirmation Sampling

Mound Plant
Miamisburg, Ohio

May 1996

Revision 0

Department of Energy

EG&G Mound Applied Technologies

Table A.1. Soil Gas Confirmation Detected Volatile Organic Compounds (cont.)

ANALYTE	SGC NAC 000010	SGC NAC 000011	SGC NAC 000012	SGC NAC 000013	SGC NAC 000014	SGC NAC 000015	Background	10^{-6} Construction Worker Guidelines
VOLATILES (µg/Kg)								
Acetone							NA	105000000
1,2-Dichloroethene (total)						96	NA	21500000
2-Butanone			8 J	10			NA	46500000
Benzene						2 J	NA	8900
Carbon Disulfide				4			NA	1400000
Chloroform							NA	NA
Chloromethane	4 J						NA	NA
Ethylbenzene						1 J	NA	480
Methylene Chloride	8						NA	NA
Tetrachloroethene							NA	10500000
Toluene		2 J					NA	1250000
Trichloroethene				7		3	NA	41000
Xylene (total)					1 J	4 J	NA	2150000000

Table A.1. Soil Gas Confirmation Detected Volatile Organic Compounds (cont.)

ANALYTE	SGC NAC 000016	SGC NAC 000017	SGC SAN 000018	SGC NAC 000019	SGC NAC 000020	SGC NAC 000022	Background	10^{-6} Construction Worker Guidelines
VOLATILES (µg/Kg)								
Acetone					36		NA	105000000
1,2-Dichloroethene (total)							NA	21500000
2-Butanone					J		NA	46500000
Benzene							NA	8900
Carbon Disulfide							NA	1400000
Chloroform							NA	NA
Chloromethane							NA	NA
Ethylbenzene							NA	480
Methylene Chloride	8		10		17		NA	NA
Tetrachloroethene							NA	10500000
Toluene		2 J		1 J	J		NA	1250000
Trichloroethene				7			NA	41000
Xylene (total)							NA	2150000000

Table A.2. Soil Gas Confirmation Detected Semivolatile Organic Compounds (cont.)

ANALYTE	SGC NAC 000008	SGC NAC 000009	SGC NAC 000010	SGC NAC 000011	SGC NAC 000012	SGC NAC 000015	Background	10^{-6} Construction Worker Guidelines
SEMIVOLATILES (µg/Kg)								
Acenaphthene							NA	NA
Acenaphthylene							NA	NA
Anthracene							NA	320000000
Benzo(a)anthracene	J				J		NA	4100
Benzo(a)pyrene	6 J				2 J		NA	410
Benzo(b)fluoranthene	67				22 J		NA	4100
Benzo(g,h,i)perylene	26						NA	NA
Benzo(k)fluoranthene	58				17		NA	41000
Bis(2-ethylhexyl)phthalate		1		36 J	35		NA	215000
Butylbenzylphthalate							NA	215000000
Carbazole							NA	NA
Chrysene	68 J		20 J		22 J		NA	410000
Di-n-butyl phthalate							NA	105000000
Di-n-octyl phthalate							NA	21500000
Dibenz(a,h)anthracene							NA	410
Dibenzofuran							NA	NA
Diethyl phthalate							NA	NA
Fluoranthene	110		31 J		38 J		NA	42500000
Fluorene							NA	NA
Indeno(1,2,3-cd)pyrene	36 J						NA	4100
2-Methylnaphthalene							NA	NA
Naphthalene						61	NA	NA
Phenanthrene	53 J						NA	NA
Phenol							NA	650000000
Pyrene	120 J		31 J	20 J	3 J		NA	32000000

Table A.4. Soil Gas Confirmation Detected TAL Inorganics (cont.)

ANALYTE	SGC NAC 000007	SGC NAC 000008	SGC NAC 000009	SGC NAC 000010	SGC NAC 000011	SGC NAC 000012	Background	10^{-6} Construction Worker Guidelines
INORGANICS (mg/kg)								
Aluminum	10200	2820	18700	7300	10300	13100	19000	NA
Antimony		0.27 B	0.91 B	0.21 B	1.2 B		NA	425
Arsenic	B	3.2	11.1	7.2	2.2 B	1.9 BJ	8.6	320
Barium	B	23.2 B	163	64.7	13.5 B	78	180	75000
Beryllium	0.2		0.9 B	0	0.36 B	0.44	1.3	0.7
Bismuth			0.85 B		0.99 B		NA	NA
Cadmium	0.33 B	22 B	6	0.62 B	5.2	6.0	2.1	1050
Calcium	83900	00	5940	41500	90800	12 0 J	310000	NA
Chromium	14.3		20.3	12	11.9		20	1050000
Cobalt	11 B	3 B	13	7.9 B	13.7	J	19	NA
Copper	16.2	13.9	19.2	17.4	16.6	21. J	26	NA
Cyanide							ND	21400
Iron	23000	7660	29 0	17300	25600	27	35000	NA
Lead	7.2	5.9	.2	16.5	5.7	J	48	NA
Lithium	3.2 B	8.2 B	.7 B	9.2 B	27.3	25.	26	NA
Magnesium	21600	47900		16700	12300	1990 J	40000	NA
Manganese	493	256	72	604	908	65	1400	135000
Mercury							NC	320
Molybdenum	0.63 B	1.4 B	1.8	2.3 B	0.58 B	1.3 B	27	NA
Nickel	22.6	8.1 B	24.5	16.5	21.6	26.4	32	21500
Potassium	1590	3 B	1420	794 B	2210 B	1630	1900	NA
Selenium					0.31 B		NA	NA
Silver							1700	5500000
Sodium	246 B	341 B	1010 B	B	288 B	2490		NA
Thallium							460	NA
Tin		4.5 B	1.5 B			1.6	20	NA
Vanadium	14.2	7.4	42.7	19	15.8	22.4	25	7500
Zinc	53.8	36.6	71.8	299	59.9	68.5	140	320000

Table A.4. Soil Gas Confirmation Detected TAL Inorganics (cont.)

ANALYTE	SGC NAC 000019	SGC NAC 000020	SGC NAC 000021	SGC NAC 000022	SGC NAC 000023	SGC NAC 000024	Background	10^{-6} Construction Worker Guidelines
INORGANICS (mg/kg)								
Aluminum	7820	13400	7720	8030	12200	5410	19000	NA
Antimony				0.66 B			NA	425
Arsenic	6.8		4.3	13.3	2.0 BJ	0.83 B	8.6	320
Barium	56.1	1[illegible] B	24.2 B	65.8 J	90.3	28.4	180	75000
Beryllium	0.22 B	0.77	0.19 B	0.49	0.91	0.29	1.3	0.7
Bismuth							NA	NA
Cadmium	3.4						2.1	1050
Calcium	76400	64400	58300	42200	35400 J	21000 J	310000	NA
Chromium	8.9	18.6	13.9	14.4 J	16.2	7.[illegible]	20	1050000
Cobalt	8.4 B	12.9	[illegible] B	11.5 B	13.1	[illegible]9 B	19	NA
Copper	14.2	17.3	2[illegible]	26.3 J	18.9	8.2	26	NA
Cyanide			0.65 B				ND	21400
Iron	16000	25500	20600	22300 J	29300	14600	35000	NA
Lead	14.2	5.3	14	14.9 J	16.4 J	5.2 J	48	NA
Lithium	9.7 B	39.5	25.8	15.3 B	18.[illegible] B	12.8 B	26	NA
Magnesium	29800	16300	15800	[illegible]000 J	[illegible]540	15700	40000	NA
Manganese	539	505	577	[illegible] J	1030 J	393 J	1400	135000
Mercury					0.07 BJ		NC	320
Molybdenum	2.2 B		0.53 B	5.7	0.87 B	0.63 B	27	NA
Nickel	13.3	27.3	21.3	2[illegible]4	42.3	12.3	32	21500
Potassium	1090 B	3590	1300	641 B	[illegible]60	874 B	1900	NA
Selenium							NA	NA
Silver			0.33 B				1700	5500000
Sodium	155 B	383 B	[illegible] B	101 BJ	174 [illegible]	172 BJ	240	NA
Thallium							460	NA
Tin	1.3 B	1.6 [illegible]	1.7 B	1 B	0.97 B		20	NA
Vanadium	17.5	17.[illegible]	12.6 B	22.4 J	18.0	7.3	25	7500
Zinc	56.1	[illegible].9	68.9	72.5 J	66.6	28.9	140	320000

Table A.5. Soil Gas Confirmation Detected Nitrate-Nitrite

ANALYTE	SGC NAC 000001	SGC NAC 000002	SGC NAC 000003	SGC NAC 000004	SGC NAC 000005	SGC NAC 000006	Background	10^{-6} Construction Worker Guidelines
GENERAL ANALYTES								
% Solids (%)	83.9	93.8	88.5	83.3	78.4	75.0	NA	NA
Nitrate/Nitrite (MG-N/KG)	2.0	1.8	1.2	2.1	7.2	4.8	26	NA

ANALYTE	SGC NAC 000007	SGC NAC 000008	SGC NAC 000009	SGC NAC 000010	SGC NAC 000011	SGC NAC 000012	Background	10^{-6} Construction Worker Guidelines
GENERAL ANALYTES								
% Solids (%)	83.9	95.0	78.9	83.[illegible]	90.1	[illegible]	NA	NA
Nitrate/Nitrite (MG-N/KG)	1.6	26.5	2.2	5.[illegible]	5.3		26	NA

ANALYTE	SGC NAC 000013	SGC NAC 000014	SGC NAC 000015	SGC NAC 000016	SGC NAC 000017	SGC SAN 000018	Background	10^{-6} Construction Worker Guidelines
GENERAL ANALYTES								
% Solids (%)	81.7	80.9	74.0	85.3	72.8	84.2	NA	NA
Nitrate/Nitrite (MG-N/KG)	2.1	4.9	3.0	2.4	6.4	13.7	26	NA

ANALYTE	SGC NAC 000019	SGC NAC 000020	SGC NAC 000021	SGC NAC 000022	SGC NAC 000023	SGC NAC 000024	Background	10^{-6} Construction Worker Guidelines
GENERAL ANALYTES								
% Solids (%)	85.3	[illegible]7.6	77.4	78.3	77.5	89.5	NA	NA
Nitrate/Nitrite (MG-N/KG)	6.5	[illegible]2.1	6.1	2.2	11.6	2.2	26	NA

Table A.6. Soil Gas Confirmation Detected Radionuclides (cont.)

ANALYTE	SGC NAC 000008	SGC NAC 000009	SGC NAC 000010	SGC NAC 000011	SGC NAC 000012	SGC NAC 000013	SGC NAC 000014	Background	10^{-6} Construction Worker Guidelines
RADIONUCLIDES (pCi/g)									
Americium-241					-0.238	0.0694		ND	4.95
Bismuth-207					0292	-0.0304		ND	0.175
Bismuth-210					0.[illegible]5	0.0297		ND	NA
Cesium-137					0.03[illegible]	0.0175	0.[illegible]6	0.42	0.46
Cobalt-60					0.0547[illegible]	-0.0280		NC	0.1
Plutonium-238	0.0826	[illegible]33	0.107	0.0718	0.101	0.0107	0.671	0.13	5.5
Plutonium-239/240					0.00154	-0.0001[illegible]	0.0206	0.18	5.5
Potassium-40	7.72		15.0	17.8	15.5	4.[illegible]5	22.5	37	NA
Radium-226	0.571	0.764	0.917	0.778	0.592	[illegible].263	1.10	2	0.14
Thorium-228	0.678	0.779	0.914	0.913	0.697	[illegible]47	1.18	1.5	0.85
Thorium-230	0.541	1.09	[illegible].27	0.902	0.803	0.[illegible]	1.09	1.9	44
Thorium-232	0.5[illegible]	0.838	[illegible]08	0.830	0.76[illegible]	0.21[illegible]	1.08	1.4	50
Uranium-234	0.[illegible]1	0.712	[illegible]	0.882	0.[illegible]3	0.378	0.866	1.1	37.5
Uranium-235	[illegible]		0.0[illegible]		[illegible]0231	0.0183	0.0548	0.11	3.35
Uranium-238	[illegible]0.414	0.774	1.0[illegible]	0.871	0.681	0.424	[illegible]01	1.2	11

Table A.6. Soil Gas Confirmation Detected Radionuclides (cont.)

ANALYTE	SGC NAC 000015	SGC NAC 000016	SGC NAC 000017	SGC SAN 000018	SGC NAC 000019	SGC NAC 000020	SGC NAC 000021	Background	10^{-6} Construction Worker Guidelines
RADIONUCLIDES (pCi/g)									
Americium-241		0.162						ND	4.95
Bismuth-207		0.0183						ND	0.175
Bismuth-210		-0.00477						ND	NA
Cesium-137		0.0763	0.582				193	0.42	0.46
Cobalt-60		142						NC	0.1
Plutonium-238	0.0118	0.	0.200	0.684	0.121	0.721	0.772	0.13	5.5
Plutonium-239/240		0.0041	0.01	0.00487			0.00579	0.18	5.5
Potassium-40	19.2	15.2	1	10.1	7.90	24.7	41.8	37	NA
Radium-226	1.40	0.934	60	0.677	0.528	0.841	1.03	2	0.14
Thorium-228	1.37	1.04	1.1	0.465	0.378	0.89	1.19	1.5	0.85
Thorium-230	1.48	1.36	1.01	0.582	0.749	1.	0.701	1.9	44
Thorium-232	1.43	0.	1.26	0.508	0.375	0 3	970	1.4	50
Uranium-234	1.01	0.765	0.698	3	0.440	51	61	1.1	37.5
Uranium-235	0.0927	0.0394	0.0403			0362	0.0 4	0.11	3.35
Uranium-238	0.95	0.993	0.852	0.496	0.691	0.825	0.82	1.2	11

J - Numerical value is an estimated quantity

B - Analyte detected CRDL but above instrument detection limit

ADDENDUM 1

MOUND

Environmental
Restoration
Program

OhioEPA

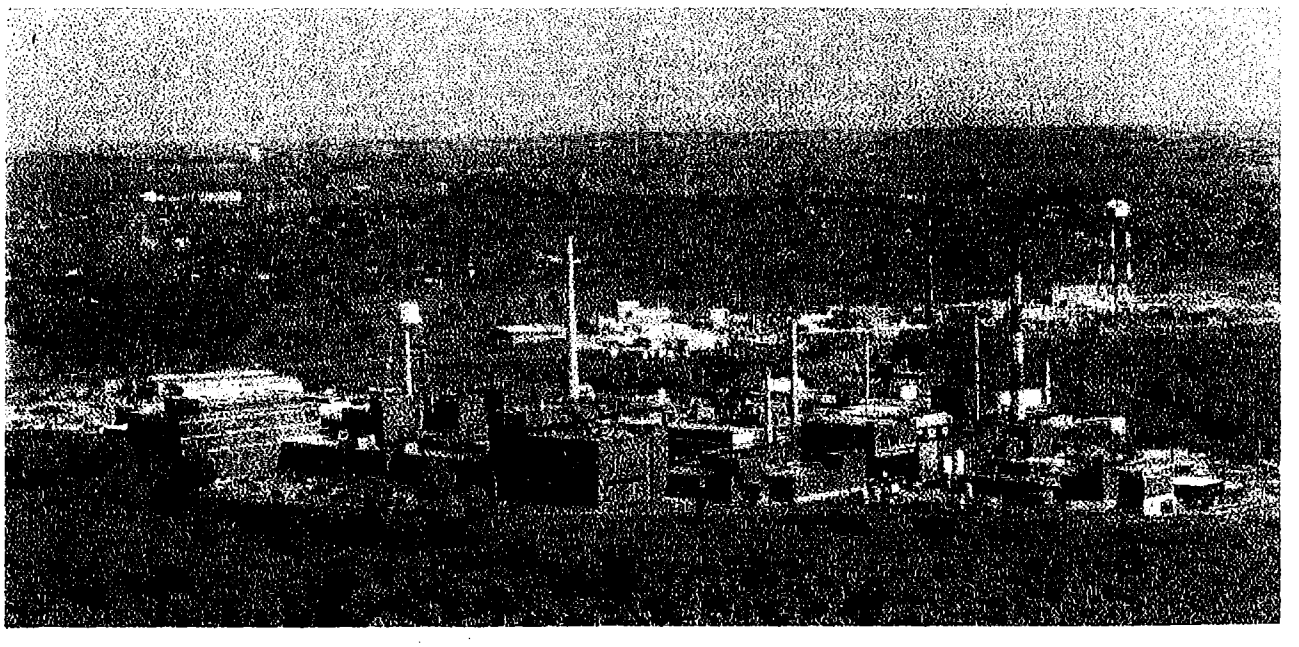
MOUND PLANT

Potential Release Site Package

PRS #72

Addendum 1

FINAL JUNE 2002



MOUND PLANT

PRS 72

Area 13
Polonium from Dayton Unit IV

RECOMMENDATION:

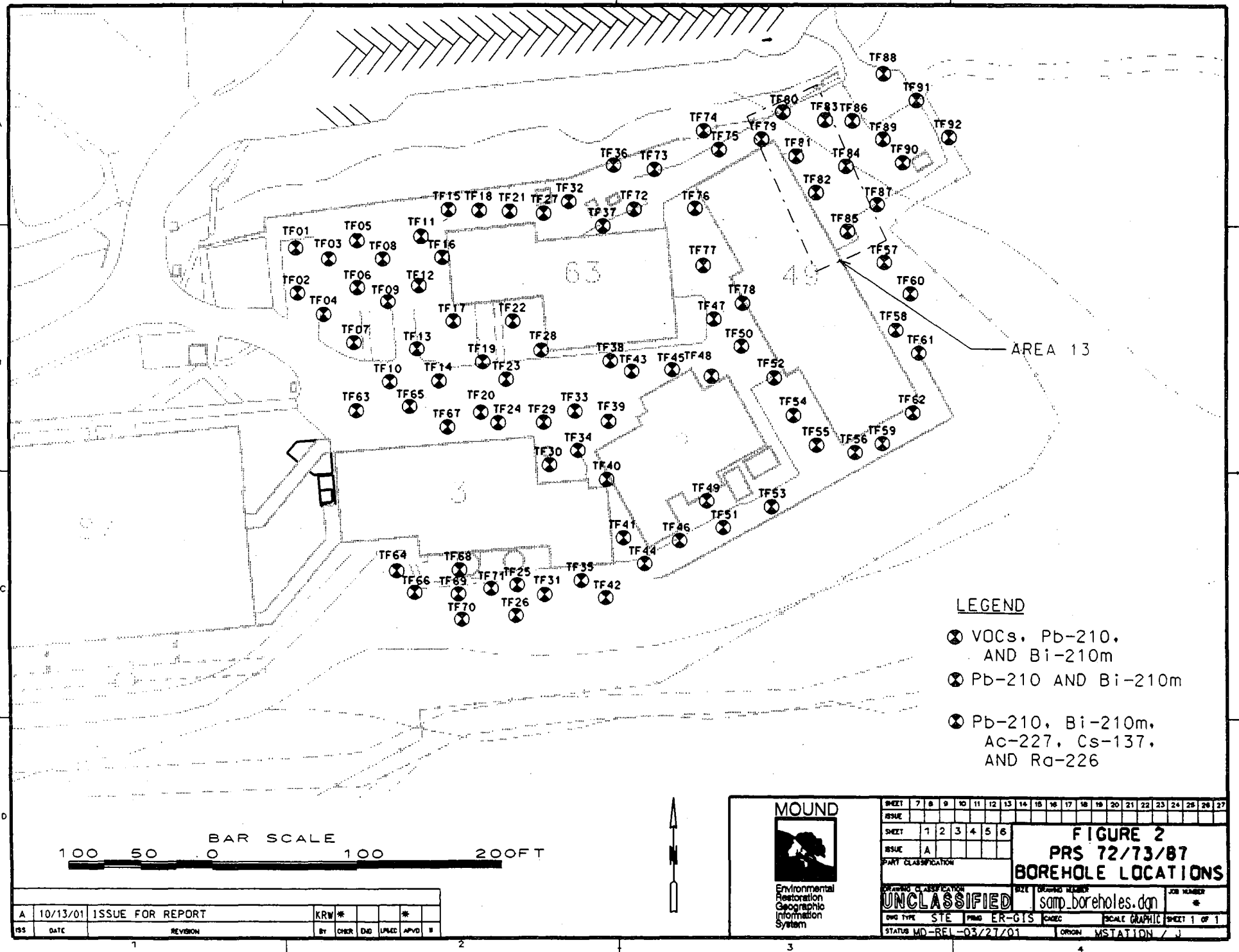
Potential Release Site (PRS) 72 was identified as the area used in the early 1950s for the storage of contaminated materials (i.e. wood, equipment and other material) brought to Mound from the former Dayton Unit operations. The material was staged in and around Area 13 located in the lower valley (Test Fire) area. PRS 72 was binned Further Assessment (FA) by the Core Team in April of 1996 and again in March 1997. Further Assessment sampling was completed in July of 2001 per the Sampling and Analysis Plan (SAP) approved by the Core Team. The additional sampling events conducted in July did not identify levels of concern.

Therefore, PRS 72 requires NO FURTHER ASSESSMENT.

DOE/MEMP: _____
Robert S. Rothman, Remedial Project Manager

USEPA: _____
Timothy J. Fischer, Remedial Project Manager

OEPA: _____
Brian K. Nickel, Project Manager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AREA 13
LEGEND
VOCs, Pb-210, AND Bi-210m
Pb-210 AND Bi-210m
Pb-210, Bi-210m, Ac-227, Cs-137, AND Ra-226
BAR SCALE
100 50 0 100 200FT
MOUND
Environmental Restoration Geographic Information System
FIGURE 2
PRS 72/73/87
BOREHOLE LOCATIONS
UNCLASSIFIED
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ER-GIS
MSTATION / J
A 10/13/01 ISSUE FOR REPORT KRW