3081 040602 0009

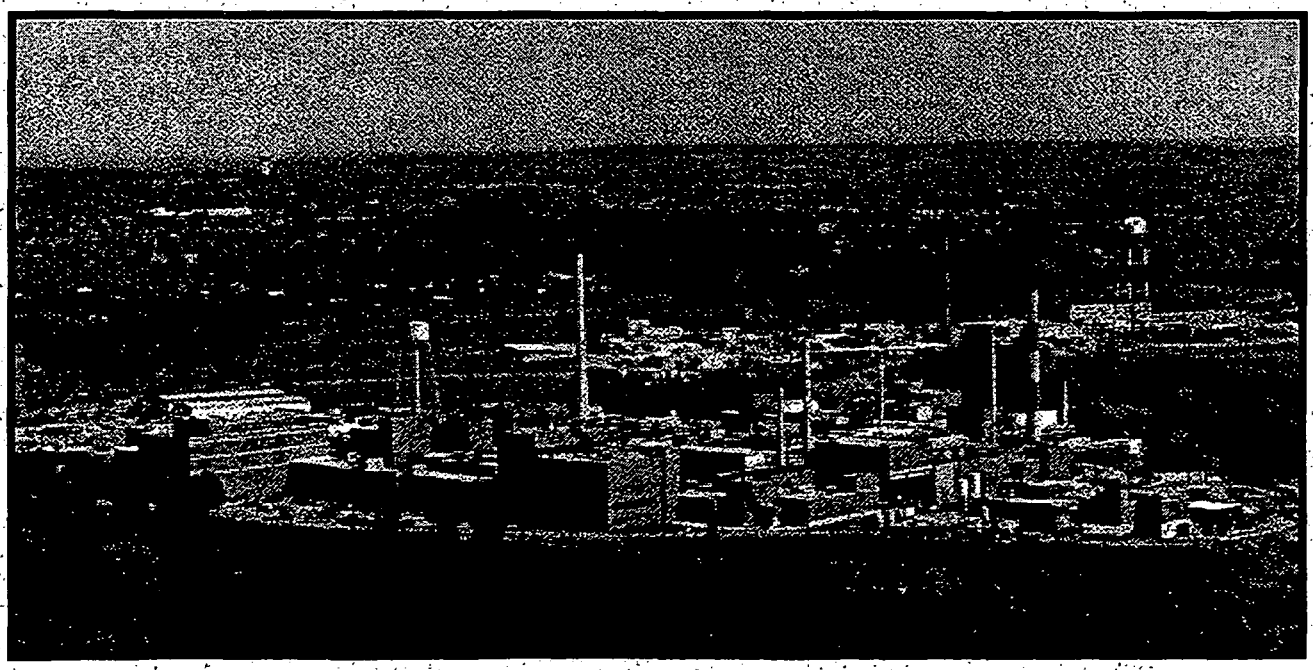
MOUND

Environmental
Restoration
Program

Miamisburg Closure Project
Potential Release Site Package

PRS 87

Public Review Draft
September 2003



MIAMISBURG CLOSURE PROJECT

POTENTIAL RELEASE SITE PACKAGE

Notice of Public Review

The following document is available for public review in the CERCLA Public Reading Room, 305 E. Central Ave., Miamisburg, Ohio. Public comment on this document will be accepted September 3, 2003 through October 3, 2003.

PRS 87: Building 49 Solvent Shed

Questions can be referred to Danny Punch at (937) 847-8350 extension 301.

U.S. Department of Energy
U.S. Environmental Protection Agency
Ohio Environmental Protection Agency

PRS 87 Package Tracking Sheet

REVISION	DESCRIPTION	DATE
Working Draft (to DOE)		
Draft (to Core Team)		
Draft Proposed Final	Binned RA on11 December 2002. Addendum 1 submitted to CT. No USEPA comments. OEPA comments included. Added Addendum 1 to original package.	**June 2003**
Public Review Draft	Public review period: September 3, 2003 through October 3, 2003	**September 2003**
Final		

ADDENDUM 1

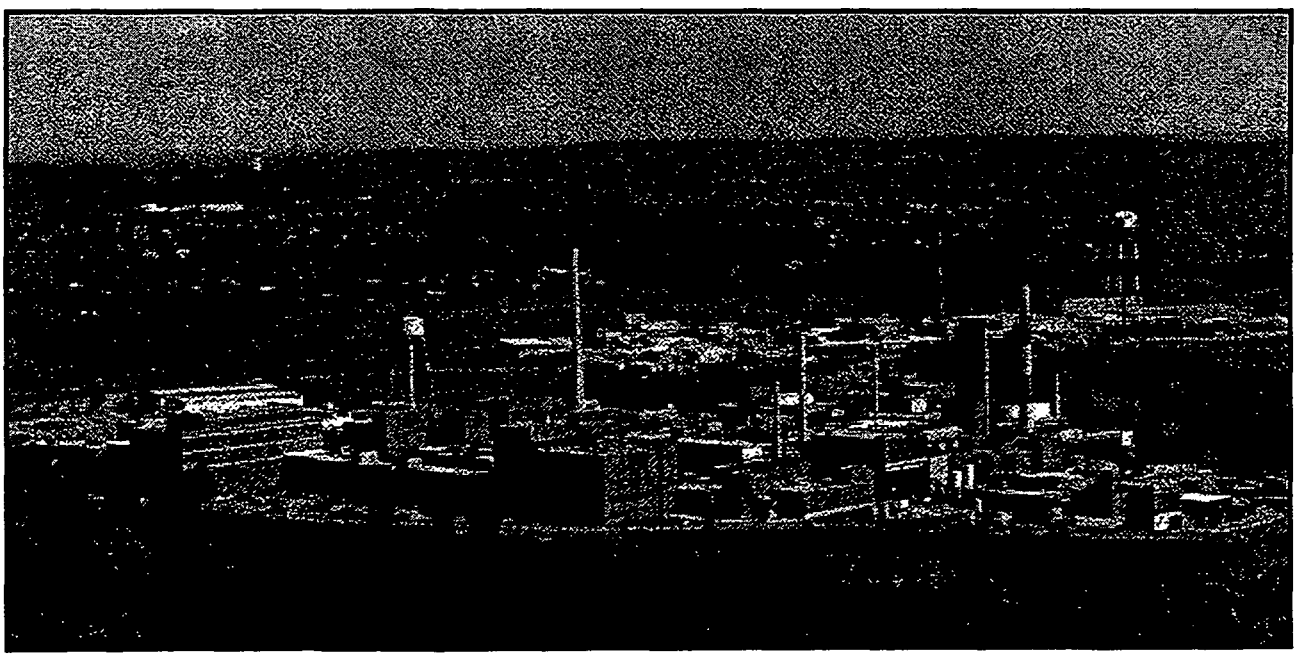
SUPPORTING RA RECOMMENDATION

MOUND

Environmental
Restoration
Program

Miamisburg Closure Project
Potential Release Site Package
PRS 87
Addendum 1

Public Review Draft
September 2003



PRS HISTORY:

Potential Release Site (PRS) 87 is located in the central portion of the site as shown on Figure 1. PRS 87 refers to two solvent storage sheds associated with the cleaning operations historically performed in Building 49. Shed #1 was removed when Building 49 was enlarged by constructing an addition onto the north side of the existing structure. The shed's former footprint (approximately 10 ft. by 10 ft.) lies within the northern portion (the addition) of Building 49. Shed #2 was constructed to replace Shed #1. Its footprint (approximately 10 ft by 12 ft.) lies approximately 75 ft. east-northeast (Figure 2) of Building 49. Process history indicated that the potential contaminants of concern for PRS 87 are trichloroethene (TCE), FREON 113 (also known under trade name FREON TF or chemical name 1,1,2-trichloro-1,2,2-trifluoroethane), and hexane. An historic elevated sample result (SGC061) of 43,000 ug/kg of TCE, near the east wall of Building 49 (Figure 2), was consistent with the process history. There is no historic or current data indicating contamination at unacceptable levels at Shed #2. PRS 87 was binned Further Assessment (FA) by the Core Team in November 1996.

FURTHER ASSESSMENT ACTIVITY:

FA sampling consisted of 4 sampling events. The first event (Event 1) was the FA sampling for the Test Fire Valley area (PRSs 72, 73, and 87), completed in July of 2001 per the Core Team-approved Sampling and Analysis Plan[1] (SAP). Samples collected to further assess PRS 87 (TF73 - TF92) were analyzed for volatile organic compounds (VOCs) to determine if TCE or its degradation products are present. The results for PRS 87 samples are reported in the PRS 72/73/87 FA Data Report[2] and the sample locations are shown on Figure 2. Based on results from the first sampling event, PRSs 72 and 73 were binned No Further Assessment (NFA) by the Core Team.

SOIL. The results of the first sampling event indicated that there are no VOCs present in the region of Shed #2, but that VOCs were detected at a sample location at the northern corner of the Building 49 foundation, suggesting the potential for the presence of residual VOCs beneath the Building 49 concrete slab floor. This prompted three additional sampling events using the sampling protocols and analysis requirements of the original SAP between April and November 2002: (1) additional Building 49 perimeter sample borings (Event 2, TF50 – TF61), (2) sample borings inside the building (Event 3, TF093 – TF106), and (3) sampling in nearby utility trenches (Event 4, UT01 – UT19). Figure 2 indicates the PRS 87 sample locations from all 4 sampling events and the PRS 87 FA Data Report[3] details the sampling and analysis results. Table 1 summarizes the VOCs detected in soil, which are consistent with process history. The detected compounds included known historical cleaning solvents: TCE, FREON 113, acetone, and 2-butanone; and degradation products of TCE: 1,2-dichloroethene, 1,1-dichloroethene, and vinyl chloride. Toluene and carbon disulfide are not known to have been cleaning solvents used at the site, however they were detected at very low concentrations and will be removed with the other contaminants. All compounds detected except TCE were at concentrations below applicable screening levels (more restrictive of 10^{-6} Risk-Based Guideline Value (RBGV) or Hazard Index of one) shown in Table 1. TCE beneath Building 49 exceeds the screening level (TF099). Building 49 and Shed #2 were demolished in March/April 2003.

LEACHING POTENTIAL. To address the potential for VOCs to leach from soil to groundwater, soil screening levels (SSLs) are generated and compared to the maximum concentrations detected (supporting calculations are presented in Appendix A to Addendum 1). This comparison is shown in Table 1. Based on results reported in the PRS 87 Data Report[3] and summarized in Table 1, TCE, vinyl chloride, and 1,2-dichloroethene were found to have the potential to leach from soil to groundwater at unacceptable levels.

Table 1: Results Summary (ug/kg)

Analyte	Maximum Result	Location/ Depth	Screening Level*	SSL
TCE	23,000 D	TF099/8.0 ft.	5,000	40
vinyl chloride	400 JD	TF099/12.0 ft.	NC	10
1,2-dichloroethene	11,000	TF099/8.0 ft.	2,100,000	250
1,1-dichloroethene	53	TF099/8.0 ft.	120	70
carbon disulfide	37	TF099/8.0 ft.	1,160,000	NC
FREON 113	21	TF099/8.0 ft.	2,500,000	NC
acetone	180	TF104/29.0 ft.	21,000,000	1090
2-butanone	24	TF54/4.0 ft.	21,800,000	NC
toluene	32	TF099/8.0 ft.	2,000,000	10,470

D: compound identified in an analysis at a secondary dilution factor
J: estimated value
NC: not calculated
* more restrictive of 10^{-6} RBGV or Hazard Index of One

LEACHING AT PHASE I BOUNDARY. While leaching calculations described above and presented in Appendix A indicate the potential for groundwater leaching, soil and groundwater sampling was performed at locations TFV-SANT1 and TFV-F/DW1 (Figure 1) down gradient from Building 49 and at the proposed Phase I Parcel Transfer Boundary to confirm that contamination from PRS 87 did not extend to the boundary of property slated for transition from DOE ownership. The analytical results presented in Appendix G of the PRS 87 FA Data Report[3] indicate that there is no detectable groundwater leaching of VOCs to the Phase I Boundary region.

FIGURES:

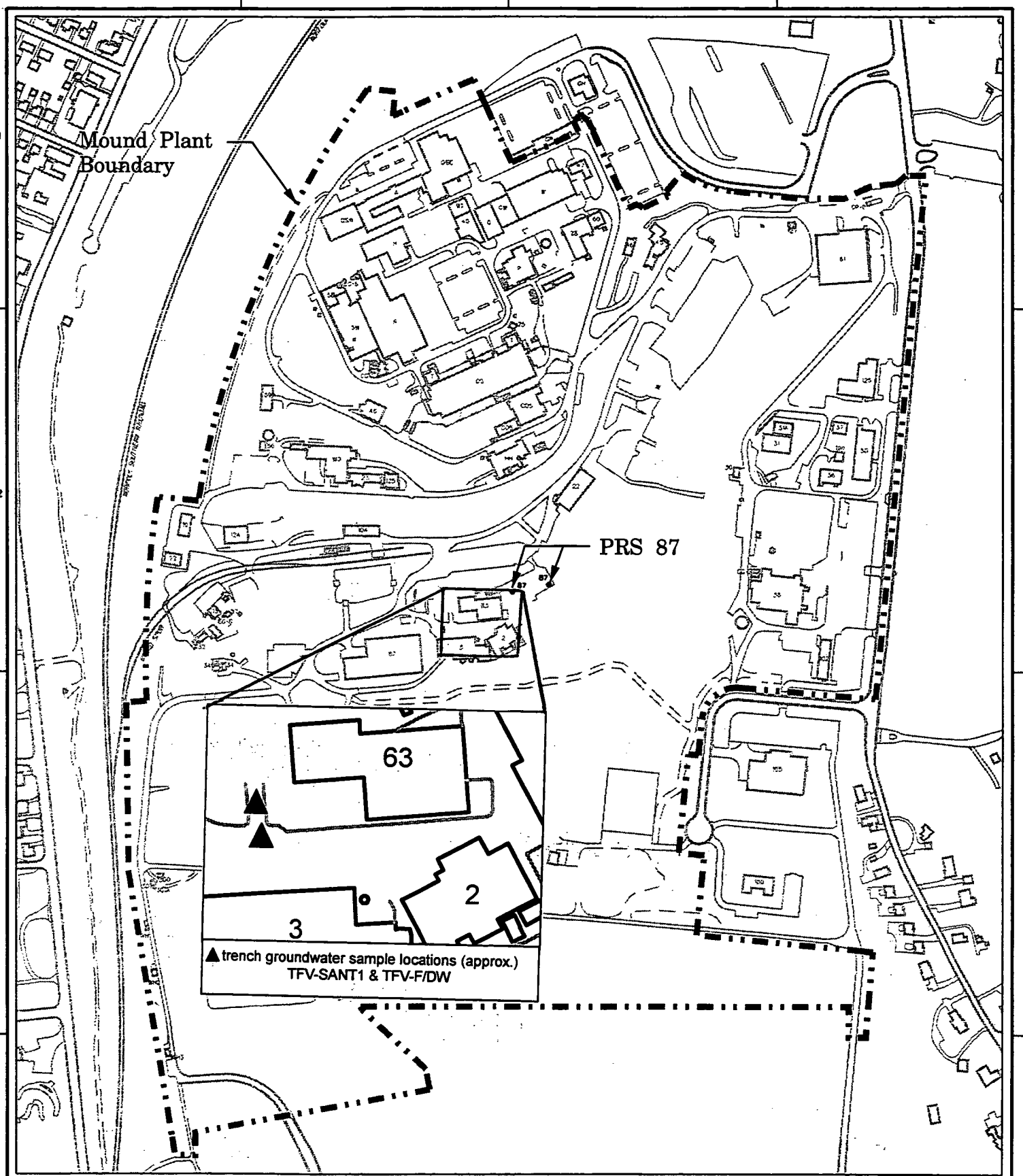
Figure 1: Location of PRS 87
Figure 2: PRS 87 Sample Locations

REFERENCES:

1) PRS 72/73/87 Test Fire Valley Sampling and Analysis Plan, Final, January 2002
2) PRS 72/73/87 Test Fire Valley FA Data Report, Final Rev. 2, March 2002
3) PRS 87 Further Assessment Data Report, Rev. 0, June 2003

PREPARED BY:

Gary Miller, CH2MHill, ER Technical Staff
Dennis Gault, CH2MHill, ER Project Engineer
Karen M. Arthur, CH2MHill, ER QA



Legend

Structures
Paved roadway
Unpaved roadway
Mound Plant boundary
Railroad

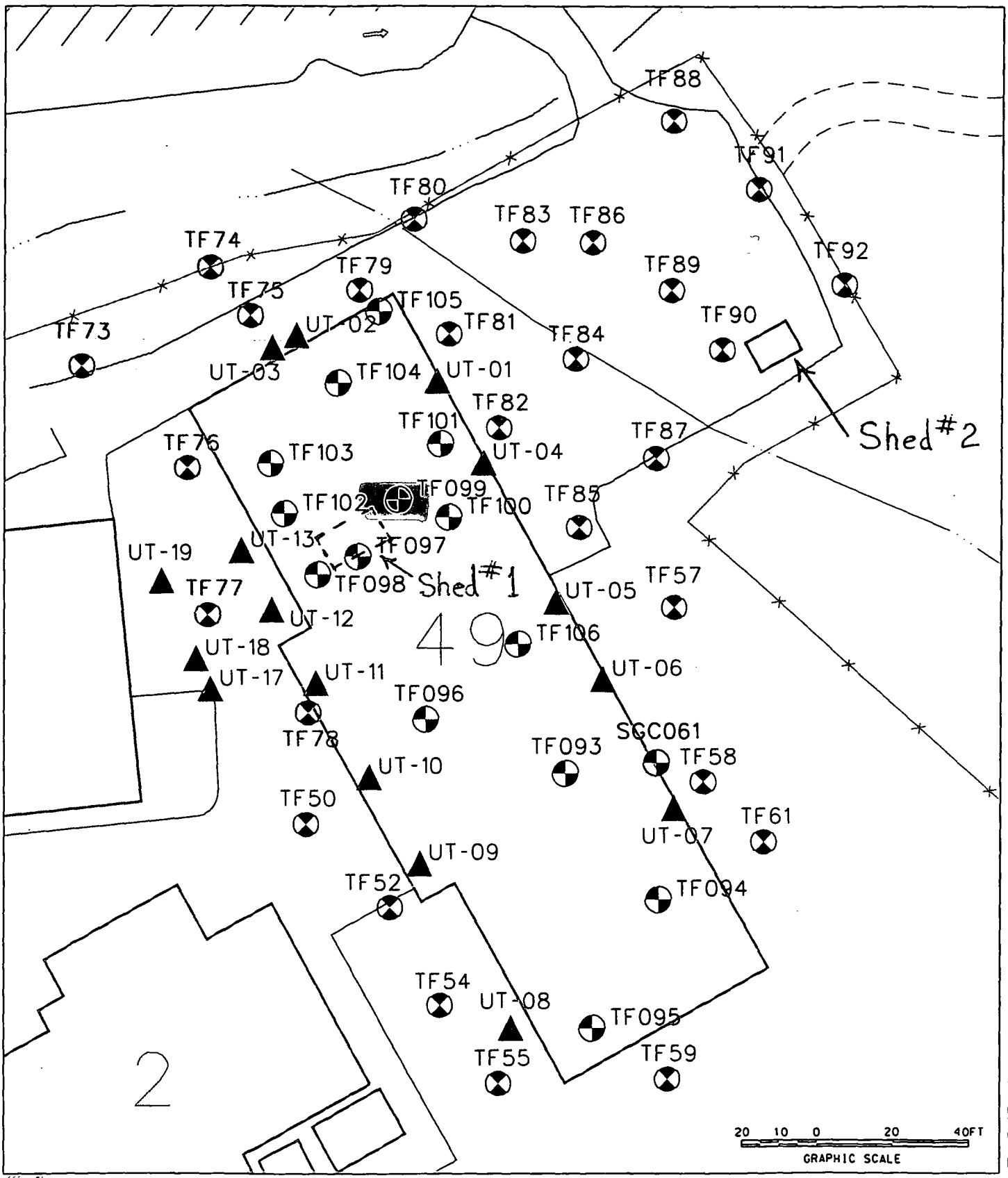
0 100 200 400 600 800 1000
Scale in Feet

MOUND
Environmental Restoration Geographic Information System

Figure 1
Location of PRS 87

ISS	DATE	REVISION	BY	CHKR	DWG	LPREC	APVD	B
	04/22/03		SSP					

DRAWING CLASSIFICATION: UNCLASSIFIED
SIZE
DRAWING NUMBER: gen_site_plan.dgn
JOB NUMBER
DWG TYPE: STE
PRNG: ER-GIS
CADEC
SCALE
SHEET 1 OF
STATUS: MD-REL-##/##/##
ORIGIN: MSTATION / J



COC detected at > SL

MOUND
Environmental Restoration Geographic Information System

Figure 2: PRS 87 Sample Locations

ISS	DATE	REVISION	BY	CHKR	ENG	LPREC	APVD	B
	02/05/03		SSP					

UNCLASSIFIED
prs87 samp.dgn
STE ER-GIS
STATUS MD-REL-02/05/03 ORIGIN MSTATION / J
SHEET 1 OF 1

5 of 6

MIAMISBURG CLOSURE PROJECT
PRS 87

RECOMMENDATION:

Potential Release Site (PRS) 87 is located in the central portion of the site. PRS 87 refers to two solvent storage sheds associated with the cleaning operations historically performed in Building 49. Shed #1 was removed when Building 49 was enlarged by constructing an addition onto the north side of the existing structure. Its former footprint (approximately 10 ft. by 10 ft.) lies within the northern portion (the addition) of Building 49. Shed #2 was constructed to replace Shed #1. Its footprint (approximately 10 ft by 12 ft.) lies approximately 75 ft. east-northeast of Building 49. Process history indicated that the potential contaminants of concern for PRS 87 are trichloroethene (TCE), FREON 113, and hexane. An historic elevated sample result of 43,000 ug/kg of TCE, near the east wall of Building 49, was consistent with the process history. PRS 87 was binned Further Assessment (FA) by the Core Team in November 1996.

Further Assessment was completed and results indicate that TCE levels beneath Building 49 exceed applicable screening levels and that TCE, vinyl chloride, and 1,2-dichloroethene are present at concentrations that could potentially leach from soil to groundwater at unacceptable levels.

Therefore, the Core Team recommends a **Removal Action** for PRS 87.

This Removal Action will be performed under an Action Memorandum. Successful completion of the Removal Action will be documented via an On-Scene Coordinator (OSC) Report signed by the Core Team, which will be placed in the Public Reading Room.

CONCURRENCE:

DOE/MCP: for 8/20/03
Paul Lucas, Remedial Project Manager (date)

USEPA: 8/20/03
David P. Seely, Remedial Project Manager (date)

OEPA: 8/27/03
Brian K. Nickel, Project Manager (date)

PRS 87 PACKAGE APPENDIX A

SOIL SCREENING LEVEL CALCULATIONS

Discussion of Soil Screening Level Calculations for PRS 87 Area

Soil sampling in the PRS 87 area showed Volatile Organic Compounds at depth in the soil at borehole TF79. Vinyl chloride and 1-2 dichloroethene were detected in the soils throughout the 36 foot borehole. The maximum concentration of 1-2 dichloroethene is 3,100 ppb and is located in the 8 – 12 foot composite soil sample while the maximum concentration of vinyl chloride is 220 ppb and is located in the 12 – 16 foot composite soil sample.

Soil Screening Levels (SSLs)were calculated to determine the potential for these soils to impact the underlying groundwater system. These soils lie within the tributary valley which is an extension of the Buried Valley Aquifer (BVA) system. Input parameters were selected based on site specific hydrogeologic conditions at the PRS 87 area. SSLs were calculated for two different scenarios; scenario 1 does not allow for any contaminant transport (i.e. horizontal distance to receptor = 0 meters), while scenario 2 allows for dilution due to transport of the contaminant in the aquifer (i.e. horizontal distance to receptor = 50 meters).

Results for Scenario1 show that the SSLs for cis-1,2 Dichloroethene and vinyl chloride are 150 ppb and 10 ppb respectively.

Results for Scenario 2 show that SSL for cis-1,2 Dichloroethene and vinyl chloride are 250 ppb and 10 ppb respectively.

The calculated SSLs for both scenarios are lower than actual soil concentrations seen at sample location TF 79.

PRS 87 SOIL SCREENING LEVEL CALCULATION

Site Specific Variables:

- **Source length parallel to groundwater flow = 20 meters based on conservative assessment of source size bounded by borehole spacing**

- **aquifer thickness = 8 meters based on geologic log information from wells 0346, 0345 and 0119.**

- **Hydraulic conductivity = 300 m/y based on estimate from typical ranges seen in similar types of aquifer materials.**

- **hydraulic gradient at source = 0.005 based on actual water level measurements at wells 0345 and 0119.**

- **Horizontal distance to receptor (1)**

(1) **The soil screening level was evaluated at two different values of horizontal distance to receptor. Scenario 1 allowed for no horizontal distance to receptor while scenario 2 allowed for a horizontal distance to receptor of 50 meters.**

SCENARIO 1

Horizontal Distance to Receptor = 0 meters

Parameters for soil leaching calculation:			
Definition	**Parameter**	**Main Hilltop soil**	**Units**
source length parallel to ground water flow	**L**	**20**	**m**
aquifer thickness (DOE 1994)	da	8	m
hydraulic conductivity (DOE 1994)	K	300	m/y
hydraulic gradient at the source	**i**	**0.005**	**m/m**
horizontal distance to receptor	**xr**	**0**	**m**
infiltration rate (Schairbaum & Frost 1988)	in	0.15	m/y
soil-water partition coefficient (Koc * foc for organic chemicals)	Kd	chemical specific	L/kg
saturated porosity	Ow	0.15	
air filled porosity	Oa	0.28	
Henry's Law constant * 41 (0 for metals and radionuclides)	H	chemical specific	
dry soil bulk density	B	1.6	kg/L
soil organic carbon/water partition coefficient	Koc	chemical specific	L/kg
fraction organic carbon in soil (DOE Mound Plant Data Base)	foc	0.02	
mixing zone depth	d	3.886194784	m
dilution factor (used to multiply the target concentration)	df=	2.94	

CHEMICAL NAME	H	Koc	foc	Kd	MCL	10-6 GV	Acceptable	Cw	SSL
		L/kg		L/kg	mg/L	mg/L	Concentration	mg/L	mg/kg
Acenapthene	7.54E-03	5846	0.02	116.92			0	0.00	---
Acetone	1.18E-03	0.46	0.02	0.0092		3.6	3.6	10.60	**1.09**
Aldrin	4.22E-03	94623	0.02	1892.46			0	0.00	---
Anthracene	4.55E-03	18162	0.02	363.24	0.007		0.007	0.02	**7.49**
Arochlor 1016		147410	0.02	2948.2			0	0.00	---
Arochlor 1254		892520	0.02	17850.4		0.00073	0.00073	0.00	**38.35**
Arochlor 1260		4425557	0.02	88511.14		0.000011	0.000011	0.00	**2.87**
Benzene	2.24E-01	66	0.02	1.32	0.005		0.005	0.01	**0.02**
Benzo(a)anthracene	1.48E-04	272847	0.02	5456.94	0.007		0.007	0.02	**112.42**
Benzo(b)flouranthene	2.53E-04	882588	0.02	17651.76	0.007		0.007	0.02	**363.66**
Benzoic Acid	1.37E-05		0.02			140	140	412.03	**38.63**
Benzo(a)pyrene	3.43E-05	749569	0.02	14991.38	0.0002		0.0002	0.00	**8.82**
Bis(2-chlorethyl)ether	8.77E-04	76	0.02	1.52			0	0.00	---
Bis(2-ethylhexyl)phthalate	3.43E-04	94361	0.02	1887.22			0	0.00	---
Bomodichloromethane	1.30E-01	54	0.02	1.08	0.08		0.08	0.24	**0.28**
Bromoform	2.52E-02	97	0.02	1.94	0.08		0.08	0.24	**0.48**
Butanol	3.50E-04	5	0.02	0.1			0	0.00	---
Butyl benzyl phthalate	7.83E-05	15975	0.02	319.5		7.3	7.3	21.48	**6866.35**
Carbazole	8.12E-05	2441	0.02	48.82			0	0.00	---
Carbon disulfide	5.21E-01	52	0.02	1.04		0.033	0.033	0.10	**0.12**
Carbon tetrachloride	1.18E+00	187	0.02	3.74	0.005		0.005	0.01	**0.06**
Chlordane	2.73E-03	61155	0.02	1223.1	0.002		0.002	0.01	**7.20**
p-Chloroaniline	4.80E-05	41	0.02	0.82			0	0.00	---
Chlorobenzene	1.79E-01	213	0.02	4.26			0	0.00	---
Chlorodibromomethane	1.02E-01	72	0.02	1.44	0.08		0.08	0.24	**0.37**
Chloroform	1.65E-01	47	0.02	0.94	0.08		0.08	0.24	**0.25**
2-Chlorphenol	6.81E-04		0.02				0	0.00	---
Chyrsene	4.96E-05	312425	0.02	6248.5		0.0046	0.0046	0.01	**84.60**
DDD	2.03E-04	84937	0.02	1698.74			0	0.00	---
DDE	5.08E-03	108469	0.02	2169.38		0.00017	0.00017	0.00	**1.09**
DDT	2.20E-03	77577	0.02	1551.54		0.001	0.001	0.00	**4.57**
Dibenzo(a,h)anthracene	4.59E-07	1914389	0.02	38287.78				0.00	---
Di-n-butyl phthalate	5.86E-05	16851	0.02	337.02		3	3	8.83	**2976.48**
1,2-Dichlorobenzene (o)	8.61E-02	693	0.02	13.86	0.6		0.6	1.77	**24.67**
1,2-Dichlorobenzene (p)	1.15E-01	653	0.02	13.06	0.075		0.075	0.22	**2.91**

CHEMICAL NAME	H	Koc	foc	Kd	MCL	10-6 GV	Acceptable	Cw	SSL
3,3-Dichlorobenzidene	8.53E-07	2441	0.02	48.82			0	0.00	---
1,1-Dichloroethane	2.36E-01	35	0.02	0.7		1.1	1.1	3.24	**2.70**
1,2-Dichloroethane	5.25E-02	20	0.02	0.4	0.005		0.005	0.01	**0.01**
1,1-Dichloroethylene	1.04E+01	64	0.02	1.28	0.007		0.007	0.02	**0.07**
cis-1,2 Dichloroethylene	1.85E-01	29	0.02	0.58	0.07		0.07	0.21	**0.15**
trans-1,2-Dichloroethylene	2.29E-01	50	0.02	1	0.1		0.1	0.29	**0.33**
1,2-Dichloropropane	1.15E-01	59	0.02	1.18	0.005		0.005	0.01	**0.02**
1,3-Dichloropropene	1.21E-01	33	0.02	0.66			0	0.00	---
2.4-Dichlorophenol	9.76E-06		0.02				0	0.00	---
Dieldrin	1.09E-04	18388	0.02	367.76		0.0018	0.0018	0.01	**1.95**
Diethyl phthalate	2.24E-05	152	0.02	3.04			0	0.00	---
2,4-Dimethylphenol	1.33E-04		0.02				0	0.00	---
Dimethyl phthalate	2.37E-05	32	0.02	0.64			0	0.00	---
2,4-Dinitrophenol	1.98E-07		0.02				0	0.00	---
2,4-Dinotrotolulene	6.03E-06	51	0.02	1.02			0	0.00	---
2,6-Dinotrotolulene	5.33E-06	42	0.02	0.84			0	0.00	---
Di-n-octyl phthalate	3.14E-05	9.8E+08	0.02	19601631		0.73	0.73	2.15	**42113341.01**
Endosulfan	9.47E-04	738	0.02	14.76			0	0.00	---
Endrin	4.88E-05	9335	0.02	186.7	0.002		0.002	0.01	**1.10**
Ethylbenzene	3.18E-01	388	0.02	7.76	0.7		0.7	2.06	**16.29**
Fluoranthene	3.83E-04	72025	0.02	1440.5		0.87	0.87	2.56	**3688.63**
Fluorene	2.99E-03	9226	0.02	184.52			0	0.00	---
Heptachlor	2.41E-02	11651	0.02	233.02	0.0004		0.0004	0.00	**0.27**
Heptachlor epoxide	3.40E-04	7236	0.02	144.72	0.0002		0.0002	0.00	**0.09**
Hexachlorobenzene	2.19E-02	27996	0.02	559.92	0.001		0.001	0.00	**1.65**
Hexachloro-1,3-butadiene	9.80E-01	6992	0.02	139.84			0	0.00	---
alpha-HCH (alpha-BHC)	2.78E-04	1310	0.02	26.2			0	0.00	---
beta-HCH (beta-BHC)	1.42E-05	1392	0.02	27.84		0.000047	0.000047	0.00	**0.00**
gamma-HCH (lindane)	1.39E-04	1085	0.02	21.7	0.0002		0.0002	0.00	**0.01**
Hexachlorocyclopentadiene	7.05E-01	9589	0.02	191.78	0.05		0.05	0.15	**28.25**
Hexachloroethane	1.48E-01	1829	0.02	36.58			0	0.00	---
Indeno(1,2,3-c,d)pyrene	1.99E-07	4364700	0.02	87294		0.000026	0.000026	0.00	**6.68**
Isophorone	2.54E-04	30	0.02	0.6		7.2	7.2	21.19	**14.70**
Methoxychlor	2.60E-04	77936	0.02	1558.72	0.04		0.04	0.12	**183.51**
Methyl bromide	5.82E-01	11	0.02	0.22			0	0.00	---
Methyl chloride	1.85E+00	7	0.02	0.14			0	0.00	---

CHEMICAL NAME	H	Koc	foc	Kd	MCL	10-6 GV	Acceptable	Cw	SSL
Methylene chloride	9.72E-02	13	0.02	0.26			0	0.00	---
2-Methylphenol	6.72E-05		0.02				0	0.00	---
Napthalene	1.98E-02	1549	0.02	30.98			0	0.00	---
Nitrobenzene	8.45E-04		0.02				0	0.00	---
N-Nitrosodiphenylamine	2.86E-02	327	0.02	6.54			0	0.00	---
N-Nitrosodi-n-proplyamine	1.70E-03	17	0.02	0.34			0	0.00	---
Pentachlorobenzene		13274	0.02	265.48			0	0.00	---
Pentachlorophenol	5.82E-04		0.02		0.001		0.001	0.00	**0.00**
Phenol	2.44E-05		0.02			22	22	64.75	**6.07**
Pyrene	3.39E-04	59865	0.02	1197.3		0.68	0.68	2.00	**2396.35**
Styrene	1.37E-01	573	0.02	11.46	0.1		0.1	0.29	**3.41**
1;1,2,2-Tetrachloroethane	1.53E-02	104	0.02	2.08			0	0.00	---
Tetrachloroethylene	7.09E-01	139	0.02	2.78	0.005		0.005	0.01	**0.04**
Toluene	2.52E-01	171	0.02	3.42	1		1	2.94	**10.47**
Toxaphene	1.38E-04	501	0.02	10.02	0.003		0.003	0.01	**0.09**
1,2,4-Trichlorobenzene	1.07E-01	1840	0.02	36.8	0.07		0.07	0.21	**7.60**
1,1,1-Trichloroethane	7.63E-01	110	0.02	2.2	0.2		0.2	0.59	**1.43**
1,1,2-Trichloroethane	4.10E-02	61	0.02	1.22	0.005		0.005	0.01	**0.02**
Trichloroethylene	4.35E-01	112	0.02	2.24	0.005		0.005	0.01	**0.04**
2,4,5-Trichlorophenol	1.80E-04		0.02				0	0.00	---
2,4,6-Trichlorophenol	1.66E-04		0.02				0	0.00	---
Vinyl acetate	2.26E-02	5	0.02	0.1			0	0.00	---
Vinyl chloride	3.45E+00	11	0.02	0.22	0.002		0.002	0.01	**0.01**
Xylenes (total)	2.48E-01	381	0.02	7.62	10		10	29.43	**228.30**
Inorganics									
Antimony			0.02	45	0.006		0.006	0.02	**0.80**
Arsenic			0.02	29	0.05		0.05	0.15	**4.28**
Barium			0.02	41	2		2	5.89	**241.89**
Beryllium			0.02	23	0.004		0.004	0.01	**0.27**
Bromate			0.02		0.01		0.01	0.03	**0.00**
Cadmium			0.02	75	0.005		0.005	0.01	**1.11**
Chloramine			0.02		4		4	11.77	**1.10**
Chlorine			0.02		4		4	11.77	**1.10**
Chlorine Dioxide			0.02		0.8		0.8	2.35	**0.22**
Chromium (total)			0.02	19	0.1		0.1	0.29	**5.62**
Copper			0.02	10000					

SCENARIO 2

Horizontal Distance to Receptor = 50 meters

Parameters for soil leaching calculation:			
Definition	**Parameter**	**Main Hilltop soil**	**Units**
source length parallel to ground water flow	**L**	**20**	**m**
aquifer thickness (DOE 1994)	da	8	m
hydraulic conductivity (DOE 1994)	K	300	m/y
hydraulic gradient at the source	**I**	**0.005**	**m/m**
horizontal distance to receptor	**xr**	**50**	**m**
infiltration rate (Schairbaum & Frost 1988)	in	0.15	m/y
soil-water partition coefficient (Koc * foc for organic chemicals)	Kd	chemical specific	L/kg
saturated porosity	Ow	0.15	
air filled porosity	Oa	0.28	
Henry's Law constant * 41 (0 for metals and radionuclides)	H	chemical specific	
dry soil bulk density	B	1.6	kg/L
soil organic carbon/water partition coefficient	Koc	chemical specific	L/kg
fraction organic carbon in soil (DOE Mound Plant Data Base)	foc	0.02	
mixing zone depth	d	8	m
dilution factor (used to multiply the target concentration)	df=	5.00	

CHEMICAL NAME	H	Koc	foc	Kd	MCL	10-6 GV	Acceptable	Cw	SSL
		L/kg		L/kg	mg/L	mg/L	Concentration	mg/L	mg/kg
Acenapthene	7.54E-03	5846	0.02	116.92			0	0.00	---
Acetone	1.18E-03	0.46	0.02	0.0092		3.6	3.6	18.00	**1.86**
Aldrin	4.22E-03	94623	0.02	1892.46			0	0.00	---
Anthracene	4.55E-03	18162	0.02	363.24	0.007		0.007	0.04	**12.72**
Arochlor 1016		147410	0.02	2948.2			0	0.00	---
Arochlor 1254		892520	0.02	17850.4		0.00073	0.00073	0.00	**65.15**
Arochlor 1260		4425557	0.02	88511.14		0.000011	0.000011	0.00	**4.87**
Benzene	2.24E-01	66	0.02	1.32	0.005		0.005	0.03	**0.04**
Benzo(a)anthracene	1.48E-04	272847	0.02	5456.94	0.007		0.007	0.04	**191.00**
Benzo(b)flouranthene	2.53E-04	882588	0.02	17651.76	0.007		0.007	0.04	**617.81**
Benzoic Acid	1.37E-05		0.02			140	140	700.00	**65.63**
Benzo(a)pyrene	3.43E-05	749569	0.02	14991.38	0.0002		0.0002	0.00	**14.99**
Bis(2-chlorethyl)ether	8.77E-04	76	0.02	1.52			0	0.00	---
Bis(2-ethylhexyl)phthalate	3.43E-04	94361	0.02	1887.22			0	0.00	---
Bomodichloromethane	1.30E-01	54	0.02	1.08	0.08		0.08	0.40	**0.48**
Bromoform	2.52E-02	97	0.02	1.94	0.08		0.08	0.40	**0.82**
Butanol	3.50E-04	5	0.02	0.1			0	0.00	---
Butyl benzyl phthalate	7.83E-05	15975	0.02	319.5		7.3	7.3	36.50	**11665.17**
Carbazole	8.12E-05	2441	0.02	48.82			0	0.00	---
Carbon disulfide	5.21E-01	52	0.02	1.04		0.033	0.033	0.17	**0.20**
Carbon tetrachloride	1.18E+00	187	0.02	3.74	0.005		0.005	0.03	**0.10**
Chlordane	2.73E-03	61155	0.02	1223.1	0.002		0.002	0.01	**12.23**
p-Chloroaniline	4.80E-05	41	0.02	0.82			0	0.00	---
Chlorobenzene	1.79E-01	213	0.02	4.26			0	0.00	---
Chlorodibromomethane	1.02E-01	72	0.02	1.44	0.08		0.08	0.40	**0.62**
Chloroform	1.65E-01	47	0.02	0.94	0.08		0.08	0.40	**0.43**
2-Chlorphenol	6.81E-04		0.02				0	0.00	---
Chyrsene	4.96E-05	312425	0.02	6248.5		0.0046	0.0046	0.02	**143.72**
DDD	2.03E-04	84937	0.02	1698.74			0	0.00	---
DDE	5.08E-03	108469	0.02	2169.38		0.00017	0.00017	0.00	**1.84**
DDT	2.20E-03	77577	0.02	1551.54		0.001	0.001	0.01	**7.76**
Dibenzo(a,h)anthracene	4.59E-07	1914389	0.02	38287.78				0.00	---
Di-n-butyl phthalate	5.86E-05	16851	0.02	337.02		3	3	15.00	**5056.71**
1,2-Dichlorobenzene (o)	8.61E-02	693	0.02	13.86	0.6		0.6	3.00	**41.91**
1,2-Dichlorobenzene (p)	1.15E-01	653	0.02	13.06	0.075		0.075	0.38	**4.94**

CHEMICAL NAME	H	Koc	foc	Kd	MCL	10-6 GV	Acceptable	Cw	SSL
3,3-Dichlorobenzidene	8.53E-07	2441	0.02	48.82			0	0.00	---
1,1-Dichloroethane	2.36E-01	35	0.02	0.7		1.1	1.1	5.50	**4.59**
1,2-Dichloroethane	5.25E-02	20	0.02	0.4	0.005		0.005	0.03	**0.01**
1,1-Dichloroethylene	1.04E+01	64	0.02	1.28	0.007		0.007	0.04	**0.11**
cis-1,2 Dichloroethylene	1.85E-01	29	0.02	0.58	0.07		0.07	0.35	**0.25**
trans-1,2-Dichloroethylene	2.29E-01	50	0.02	1	0.1		0.1	0.50	**0.57**
1,2-Dichloropropane	1.15E-01	59	0.02	1.18	0.005		0.005	0.03	**0.03**
1,3-Dichloropropene	1.21E-01	33	0.02	0.66			0	0.00	---
2.4-Dichlorophenol	9.76E-06		0.02				0	0.00	---
Dieldrin	1.09E-04	18388	0.02	367.76		0.0018	0.0018	0.01	**3.31**
Diethyl phthalate	2.24E-05	152	0.02	3.04			0	0.00	---
2,4-Dimethylphenol	1.33E-04		0.02				0	0.00	---
Dimethyl phthalate	2.37E-05	32	0.02	0.64			0	0.00	---
2,4-Dinitrophenol	1.98E-07		0.02				0	0.00	---
2,4-Dinotrotolulene	6.03E-06	51	0.02	1.02			0	0.00	---
2,6-Dinotrotolulene	5.33E-06	42	0.02	0.84			0	0.00	---
Di-n-octyl phthalate	3.14E-05	9.8E+08	0.02	19601631		0.73	0.73	3.65	**71545952.11**
Endosulfan	9.47E-04	738	0.02	14.76			0	0.00	---
Endrin	4.88E-05	9335	0.02	186.7	0.002		0.002	0.01	**1.87**
Ethylbenzene	3.18E-01	388	0.02	7.76	0.7		0.7	3.50	**27.68**
Fluoranthene	3.83E-04	72025	0.02	1440.5		0.87	0.87	4.35	**6266.58**
Fluorene	2.99E-03	9226	0.02	184.52			0	0.00	---
Heptachlor	2.41E-02	11651	0.02	233.02	0.0004		0.0004	0.00	**0.47**
Heptachlor epoxide	3.40E-04	7236	0.02	144.72	0.0002		0.0002	0.00	**0.14**
Hexachlorobenzene	2.19E-02	27996	0.02	559.92	0.001		0.001	0.01	**2.80**
Hexachloro-1,3-butadiene	9.80E-01	6992	0.02	139.84			0	0.00	---
alpha-HCH (alpha-BHC)	2.78E-04	1310	0.02	26.2			0	0.00	---
beta-HCH (beta-BHC)	1.42E-05	1392	0.02	27.84		0.000047	0.000047	0.00	**0.01**
gamma-HCH (lindane)	1.39E-04	1085	0.02	21.7	0.0002		0.0002	0.00	**0.02**
Hexachlorocyclopentadiene	7.05E-01	9589	0.02	191.78	0.05		0.05	0.25	**48.00**
Hexachloroethane	1.48E-01	1829	0.02	36.58			0	0.00	---
Indeno(1,2,3-c,d)pyrene	1.99E-07	4364700	0.02	87294		0.000026	0.000026	0.00	**11.35**
Isophorone	2.54E-04	30	0.02	0.6		7.2	7.2	36.00	**24.98**
Methoxychlor	2.60E-04	77936	0.02	1558.72	0.04		0.04	0.20	**311.76**
Methyl bromide	5.82E-01	11	0.02	0.22			0	0.00	---
Methyl chloride	1.85E+00	7	0.02	0.14			0	0.00	---

CHEMICAL NAME	H	Koc	foc	Kd	MCL	10-6 GV	Acceptable	Cw	SSL
Methylene chloride	9.72E-02	13	0.02	0.26			0	0.00	---
2-Methylphenol	6.72E-05		0.02				0	0.00	---
Napthalene	1.98E-02	1549	0.02	30.98			0	0.00	---
Nitrobenzene	8.45E-04		0.02				0	0.00	---
N-Nitrosodiphenylamine	2.86E-02	327	0.02	6.54			0	0.00	---
N-Nitrosodi-n-proplyamine	1.70E-03	17	0.02	0.34			0	0.00	---
Pentachlorobenzene		13274	0.02	265.48			0	0.00	---
Pentachlorophenol	5.82E-04		0.02		0.001		0.001	0.01	**0.00**
Phenol	2.44E-05		0.02			22	22	110.00	**10.31**
Pyrene	3.39E-04	59865	0.02	1197.3		0.68	0.68	3.40	**4071.14**
Styrene	1.37E-01	573	0.02	11.46	0.1		0.1	0.50	**5.79**
1;1,2,2-Tetrachloroethane	1.53E-02	104	0.02	2.08			0	0.00	---
Tetrachloroethylene	7.09E-01	139	0.02	2.78	0.005		0.005	0.03	**0.07**
Toluene	2.52E-01	171	0.02	3.42	1		1	5.00	**17.79**
Toxaphene	1.38E-04	501	0.02	10.02	0.003		0.003	0.02	**0.15**
1,2,4-Trichlorobenzene	1.07E-01	1840	0.02	36.8	0.07		0.07	0.35	**12.92**
1,1,1-Trichloroethane	7.63E-01	110	0.02	2.2	0.2		0.2	1.00	**2.43**
1,1,2-Trichloroethane	4.10E-02	61	0.02	1.22	0.005		0.005	0.03	**0.03**
Trichloroethylene	4.35E-01	112	0.02	2.24	0.005		0.005	0.03	**0.06**
2,4,5-Trichlorophenol	1.80E-04		0.02				0	0.00	---
2,4,6-Trichlorophenol	1.66E-04		0.02				0	0.00	---
Vinyl acetate	2.26E-02	5	0.02	0.1			0	0.00	---
Vinyl chloride	3.45E+00	11	0.02	0.22	0.002		0.002	0.01	**0.01**
Xylenes (total)	2.48E-01	381	0.02	7.62	10		10	50.00	**387.86**
Inorganics									
Antimony			0.02	45	0.006		0.006	0.03	**1.35**
Arsenic			0.02	29	0.05		0.05	0.25	**7.27**
Barium			0.02	41	2		2	10.00	**410.94**
Beryllium			0.02	23	0.004		0.004	0.02	**0.46**
Bromate			0.02		0.01		0.01	0.05	**0.00**
Cadmium			0.02	75	0.005		0.005	0.03	**1.88**
Chloramine			0.02		4		4	20.00	**1.88**
Chlorine			0.02		4		4	20.00	**1.88**
Chlorine Dioxide			0.02		0.8		0.8	4.00	**0.38**
Chromium (total)			0.02	19	0.1		0.1	0.50	**9.55**
Copper			0.02	10000					

ORIGINAL DOCUMENT

SUPPORTING FURTHER ASSESSMENT

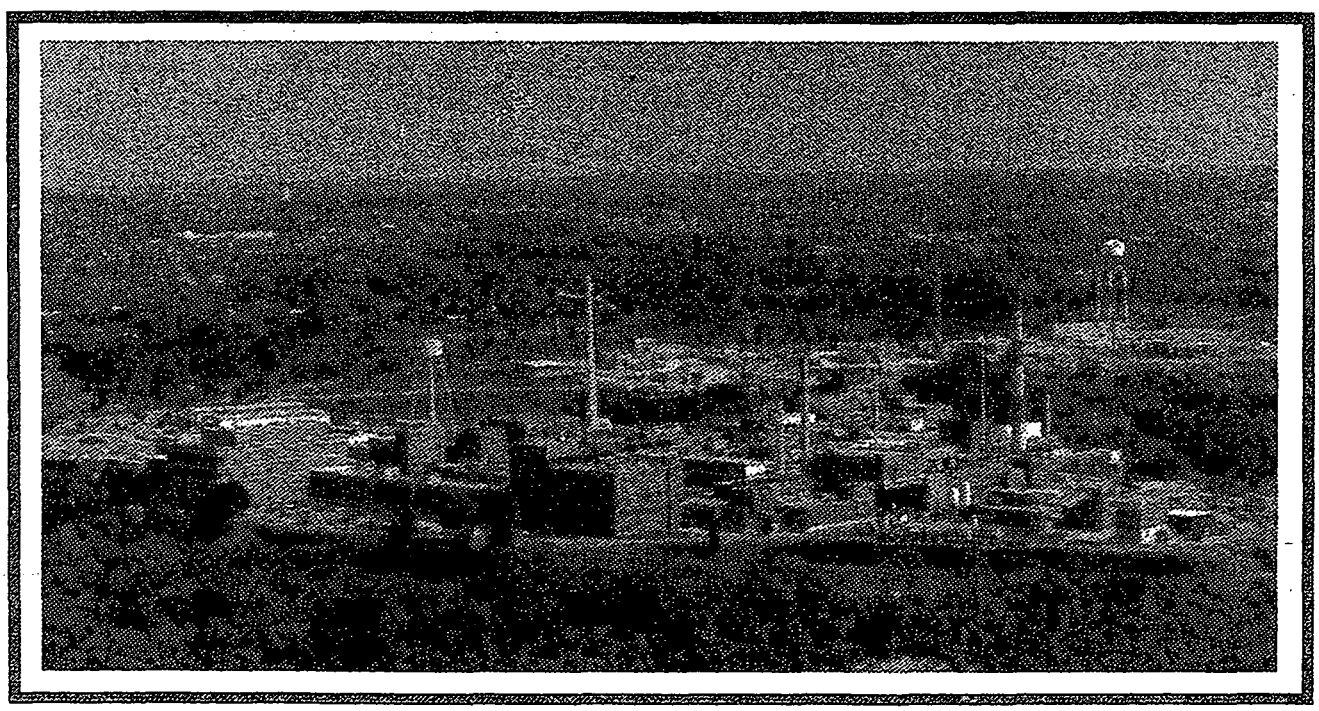
MOUND

Environmental
Restoration
Program

MOUND PLANT

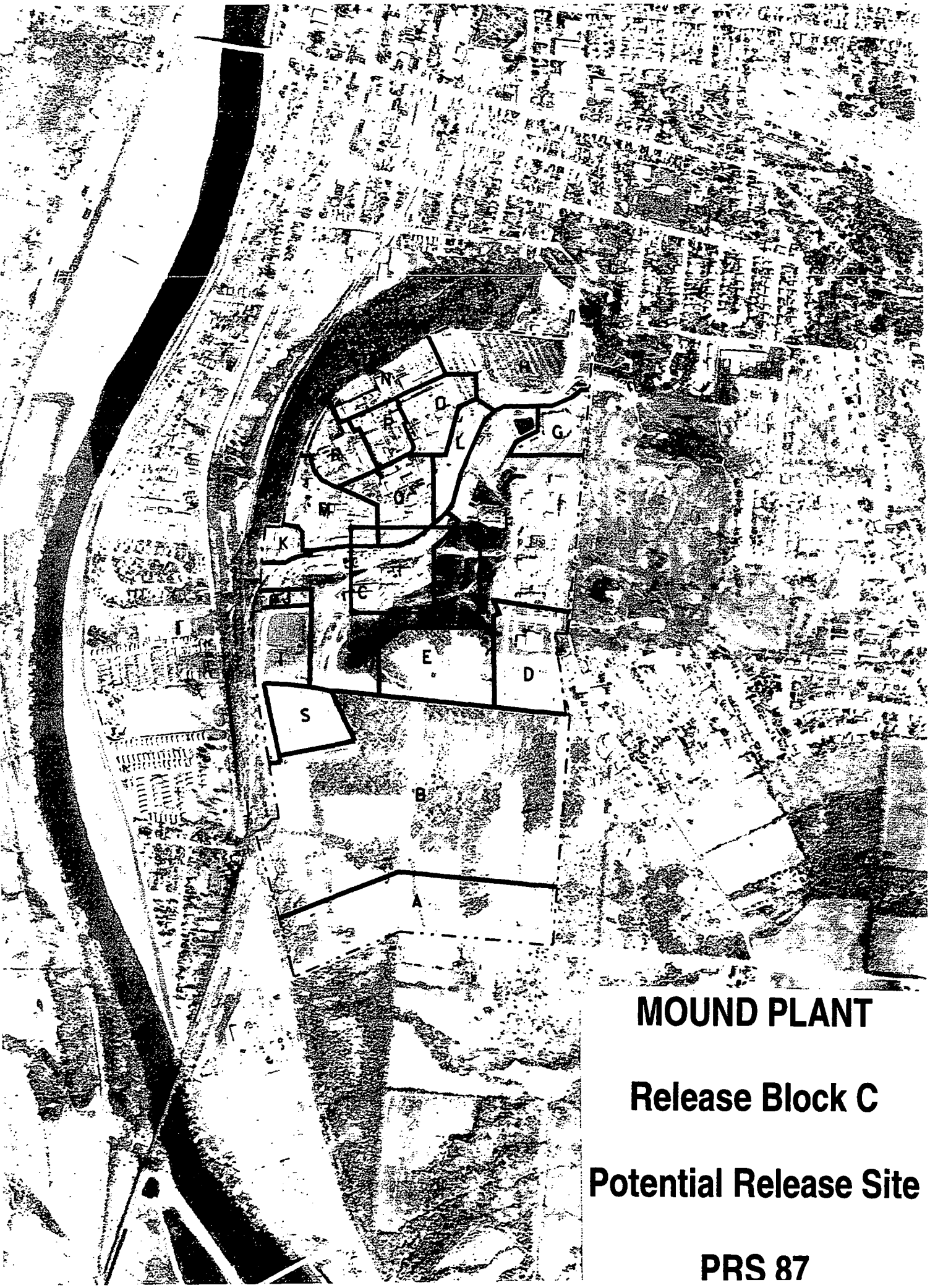
Potential Release Site Package

PRS # 87



PRS 87 (FILE)

REV	DESCRIPTION	DATE
DRAFT	ADDED: - PRS 79 to map page. - Risk Based Guideline Value reference for TCE. - Soil Gas Confirmation Sampling results. CHANGED: - Corrected the contaminant identified as being in excess of guideline criteria from thorium to TCE. - Wording describing how the rad samples were selected for the OU5 Operational Area Investigation.	**May 17, 1996**
REGULATOR RELEASE **A**	CHANGED: - "has" to "have". ADDED: - Guideline criteria for Pu-238 and Th-232 in narrative. DELETED: - Pages 67, 68, and 71; then re-page numbered.	**Aug. 8, 1996**
REVISIONS MADE AT BINNING SESSION **A1**	CHANGED: - On page 4, under the heading <u>REFERENCES</u> both Soil Screening Level Calculations and Risk Based Soil Guidelines were listed as reference #7. The Soil Screening Level Calculations were changed to be reference #8. ADDED: - In the table on page 4, added Soil Screening Level of 0.43 mg/kg (reference #8) to the Guideline criteria	**Nov 20, 96**



MOUND PLANT

Release Block C

Potential Release Site

PRS 87

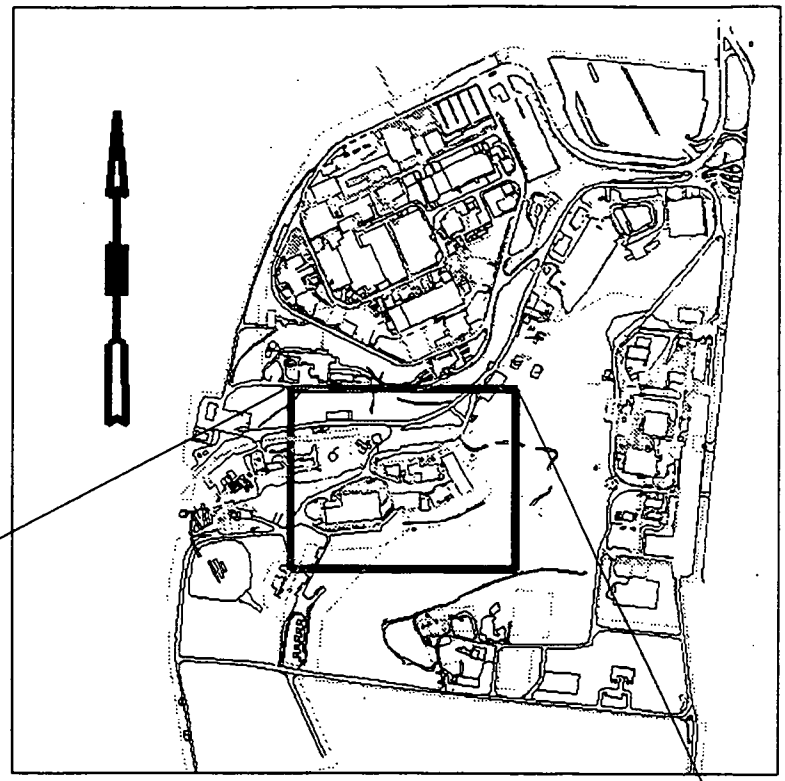
H
N
Q
R
L
G
A
O
M
K
87
C
E
D
S
B

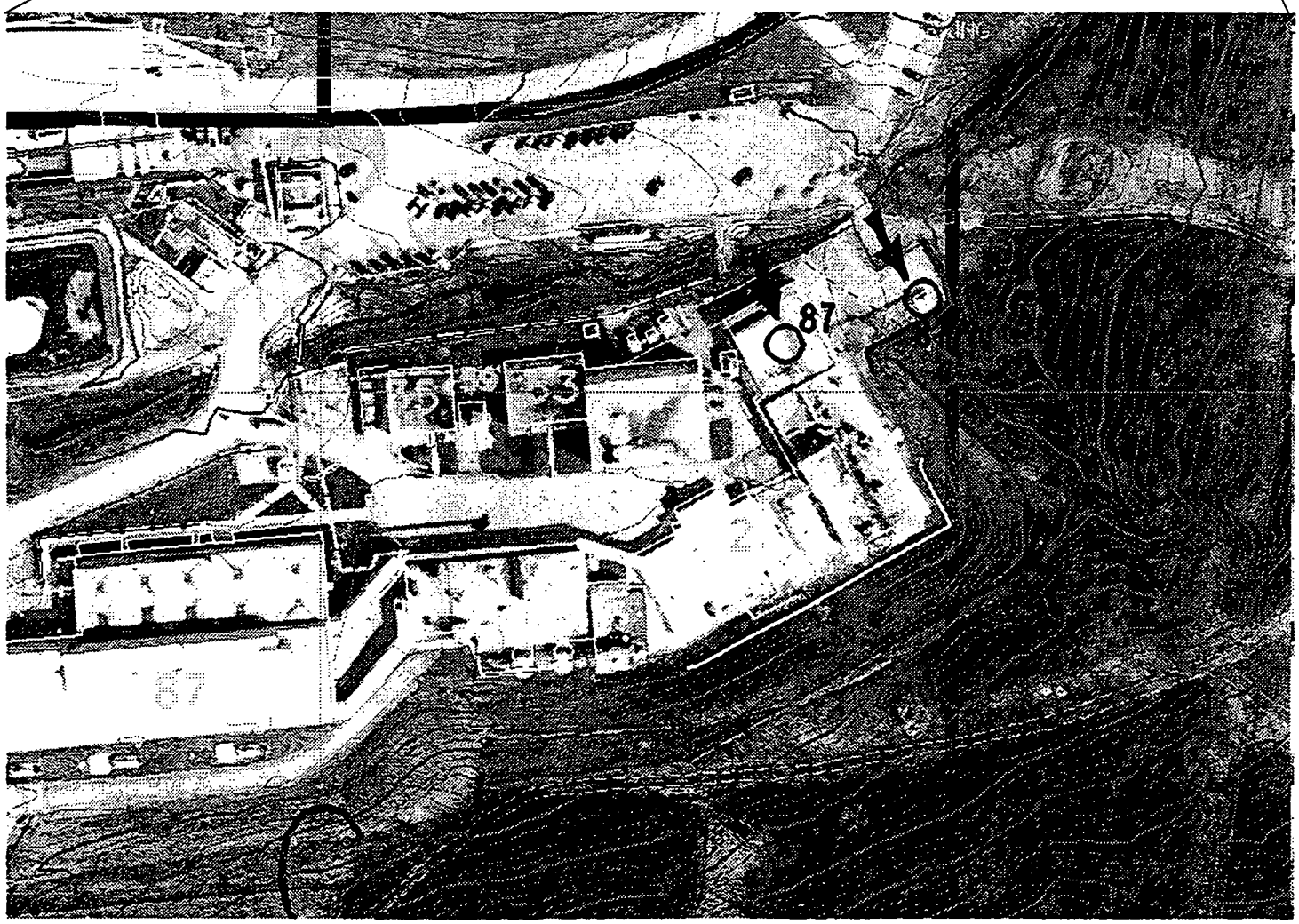
Mound Plant

Release Block C

Potential Release Site

PRS 87





B7

PRS 87

PRS HISTORY:

Potential Release Site (PRS) 87 refers to the storage sheds that supplied solvents to the cleaning operations performed in Building 49.[2] The Building 49 operations have used two storage sheds. The first shed was built in 1968 and was operated until 1986. This shed, located on the north side of Building 49, was demolished in 1986 to provide space for the construction of the Building 49 addition. Another shed was built and is located approximately 100 feet east of the Building 49 addition. This shed is a small metal structure with dimensions of 8x12x10 feet. It was operational from 1986 to the early 1990s. Trichloroethene (TCE), isopropyl alcohol, ethyl alcohol, Freon TF, and hexane were stored in these sheds. There is no record of a solvent spill or leak from the storage sheds. The Building 49 Solvent Sheds did not involve radiological operations. Building 49 and the Solvent Shed have been leased to a commercial company, EG&G Star City.

CONTAMINATION:

1) The ***Radiological Site Survey***[4] investigated Mound soils for radionuclides. Seven surface samples were collected in 1983-84 from the vicinity of PRS 87 and were analyzed for plutonium-238 and thorium-232. Both Pu-238 and Th-232 were below guideline criteria of 25 pCi/g and 5 pCi/g, respectively. These measurements are summarized below:

Contaminant	Maximum Concentration Detected	Guideline Criteria
Plutonium-238	5.74 pCi/g (surface soil)	25 pCi/g (Mound ALARA)
Thorium-232	Less than 2 pCi/g (surface soil)	5 pCi/g[5] (surface soil)

NOTE: pCi/g = picocuries per gram, ALARA = As Low As Reasonably Achievable

2) In 1994, the ***OU5, Operational Area Phase 1 Investigation Area 13 Field Sampling***[3] performed radionuclide analyses of soil from Area 13 (PRS 72) which is adjacent to Building 49 and the solvent shed (PRS 87). Soil samples were analyzed for plutonium-238 and thorium-232 by Mound's Soil Screening facility. Both Pu-238 and Th-232 were below guideline criteria of 25 pCi/g and 5 pCi/g, respectively. These measurements are summarized below:

Contaminant	Maximum Concentration Detected	Guideline Criteria
Plutonium-238	24 pCi/g (surface soil)	25 pCi/g (Mound ALARA)
Thorium-232	1.1 pCi/g (surface soil)	5 pCi/g[5] (surface soil)

The OU5 investigation also measured the concentration of organic chemicals that are gaseous vapors entrained in the soil. The measurements, known as PETREX soil gas analyses, are qualitative screening. In summary, these PETREX soil measurements showed relatively high readings of aromatic, semivolatile, petroleum, and halogenated hydrocarbons. Sample ID #803, next to Building 49, contained the highest relative levels of tetrachloroethene and trichloroethene.

3) In February 1996, the ***Soil Gas Confirmation Sampling***[6] project analyzed additional soil samples to supplement previous investigations performed at Mound. In summary, this investigation analyzed six samples, #000056 through #000061, for VOCs, semivolatile organic compounds, pesticides/PCBs, inorganics, explosives, and radionuclides. Analysis results which exceed Guideline Criteria are listed below:

Contaminant	Maximum Concentration Detected	Guideline Criteria
Trichloroethene	43 mg/kg (sample #61 in soil)	0.43 mg/kg[8], 41 mg/kg[7] (in soil)

READING ROOM REFERENCES:

1) OU9, Site Scoping Report: Volume 12 - Site Summary Report, December 1994. (pages 6-8)
2) OU9, Site Scoping Report: Volume 7 - Waste Management, February 1993. (pages 14-17)
3) OU5, Operational Area Phase I Investigation - Area 13 Field Report, Volume I & II Final, (Revision 1), June 1995. (pages 18-63)
4) OU9, Site Scoping Report: Volume 3 - Radiological Site Survey, 1993. (pages 9-13)
7) Risk-Based Soil Guidelines, Final, Revision 3, December 1995. (pages 76-77)

OTHER REFERENCES:

5) Code of Federal Regulations, 40 CFR 192.12 and 40 CFR 192.41.
6) Further Assessment, Soil Gas Confirmation Sampling, May 1996. (pages 64-75)
8) Soil Screening Level Calculations by Alec Bray (pages 78-84)

PREPARED BY:

John W. Nichols, Member of EG&G Technical Staff
W. David Gloekler, Member of EG&G Technical Staff

REFERENCE MATERIAL
PRS 87

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
85	Building 29 Solvent Storage Shed	E-8	Inactive	Acetone	4	Suspected	S	4	1 14	SGS[b] Table B.3 Location 2137 Table B.9 RSS Location S0275	12 6
86	Building 29 Septic Tank (Tank 224)	E-9	Historical	Actinium-227, Radon-222, Thorium-228, Radium-226	3, 4, 6	Suspected	S	4, 6	2	Table B.9 (See discussion for Area 7 in Ref. 6)	6
87	Building 49 Solvent Storage Shed	G-7	Inactive	Organic solvents (including trichloroethene, isopropanol, ethanol, freon-TF, hexane)	4 9	Suspected	S	4	No Data		
88	Tritium in Buried Valley Aquifer	H-4	Historical	Tritium	1 18	Tritium, historically remediated	GW	18	16	Table B.9	11 18
89	Test Fire Residual Storage Area	H-7	In service	Unexploded detonation devices	4, 5, 18	None Suspected		5	No Data		
90	Site Survey Project Potential Hot Spot Location S0425	G-8	Grounds	Thorium	6	Unknown			14	Table B.9 (Appendix E in Ref. 6)	6
91	Main Hill Seep 0601	F-5	NA	Tritium, VOCs	5, 18	Tritium, VOCs	SW	13	3, 4, 5, 10, 11, 16	Tables B.6, B.7, B.8, and B.9	18
92	Main Hill Seep 0602	G-7	NA	Tritium, VOCs	5, 18	Tritium, VOCs	SW	13	3, 4, 5, 10, 11, 16	Tables B.6, B.7, B.8, and B.9	18
93	Main Hill Seep 0603	D-8	NA	Tritium, VOCs	5, 18	Tritium, VOCs	SW	13	No Data		
94	Main Hill Seep 0604	D-6	NA	Tritium, VOCs	5, 18	Tritium, VOCs	SW	13	No Data		
95	Main Hill Seep 0605	D-6	NA	Tritium, VOCs	5, 18	Tritium, VOCs	SW	13	3, 4, 5, 10, 11, 16	Tables B.6, B.7, B.8, and B.9	18
96	Main Hill Seep 0606	C-7	NA	Tritium, VOCs	5, 18	Tritium, VOCs	SW	13	No Data		
97	Main Hill Seep 0607	C-7	NA	Tritium, VOCs	5, 18	Tritium, VOCs	SW	13	3, 4, 5, 10, 11, 16	Tables B.6, B.7, B.8, and B.9	18
98	Main Hill Seep 0608	D-6	NA	Tritium, VOCs	5, 18	Tritium, VOCs	SW	13	3, 4, 5, 10, 11, 16	Tables B.6, B.7, B.8, and B.9	18

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."

Document Control No.: DCC

Environmental Restoration Program

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

MOUND PLANT
MIAMISBURG, OHIO

June 1993

FINAL

Department of Energy
Albuquerque Field Office

Environmental Restoration Program
EG&G Mound Applied Technologies

Jim Rigano

Page 1

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.

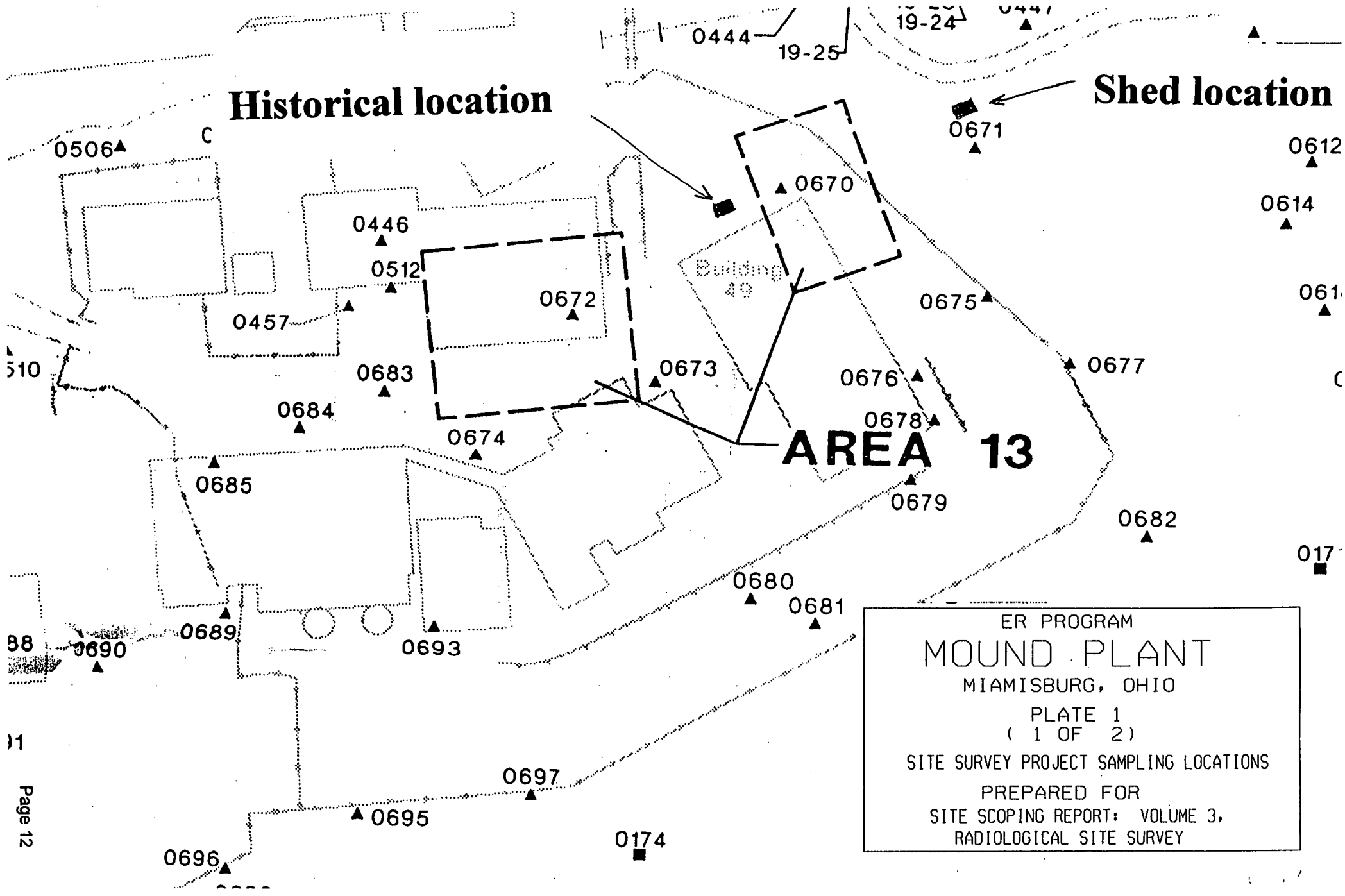
3.9. AREA 20

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).

PRS 87 - Building 49 Solvent Sheds



Map Location[a]	Coordinates South	Coordinates 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					

[a]C denotes core location and S denotes surface sample location on Plate 1.

ENVIRONMENTAL RESTORATION PROGRAM

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

MOUND PLANT
MIAMISBURG, OHIO

February 1993

DEPARTMENT OF ENERGY
ALBUQUERQUE FIELD OFFICE

ENVIRONMENTAL RESTORATION PROGRAM
EG&G MOUND APPLIED TECHNOLOGIES

FINAL

approximately 15 ft by 15 ft. Twenty-six sealed 55-gallon drums were stored in this area during the 1988 visual site inspection (EPA 1988). The area is an open concrete pad without curbing.

5.3.7. SW Building Drum Staging Area

The SW Building drum staging area is near the SW Building, on the Main Hill, in the northwest portion of Mound (Figure 5.1). The start-up date is unknown and the area is still in service. The area was intended for storage of asbestos material but is currently used for storage of hazardous wastes in sealed 55-gallon drums. The area is an uncurbed concrete pad sloping downhill and surrounded by metal grid sidewalls. Two sealed waste oil drums, one fiberpak drain, and one antifreeze drum were observed outside the walls of the staging area during a 1988 inspection. No releases were documented and no spills were observed during the inspection.

5.3.8. Building 49 Solvent Storage Shed (Inactive)

The Building 49 solvent storage shed is 120 ft north-northeast of Building 49, in the south-central portion of Mound (Figure 5.1). The shed is a metal structure constructed in 1985 and used as a solvent supply and storage facility until late 1990 (Hatfield 1991). The shed measures 8 ft by 12 ft with a 10-ft ceiling and is equipped with a ventilation fan and a metal-grid floor with an underlying catch basin (Brewer 1991). The solvent shed was taken out of service as a satellite solvent supply and storage facility in late 1990 (Hatfield 1991). This solvent storage shed was not described in the RFA (EPA 1988).

Timer assembly and inert transducer encapsulation operations, which were moved to Building 49 during the late-1960s and were conducted there until late-1990, formerly took place in Building E (Fentiman 1990; Hertenstein 1991). Operations in Building 49 included the degreasing of metal parts using solvents (trichloroethene, isopropyl alcohol, ethyl alcohol, Freon, and hexane) stored in the solvent shed. Trichloroethene, isopropyl alcohol, and ethyl alcohol were primarily used to clean parts and were stored inside the shed in 55-gallon drums (Fentiman 1990). These solvents were piped directly from the drums into Building 49. The spent solvents were poured into a drain, piped back to the solvent shed, and contained in a 55-gallon waste drum (Fentiman 1990; Brewer 1991). Freon and hexane were occasionally used for cleaning parts and were stored in the shed in 5-gallon cans. Waste Freon and hexane were put in separate 5-gallon cans and also stored in the solvent shed. All solvents were picked up by Mound waste management personnel and transferred to the hazardous waste storage area in Building 72 (Fentiman 1990). The major portion of parts cleaning operations was moved to the Building M plating shop in late 1990. Currently, operations at Building 49 include limited ultrasonic cleaning of parts using Freon TF; however, the solvent shed piping system is no longer used for

inflow and outflow of solvents. Supply Freon TF is pumped from a 55-gallon drum (located inside the shed) into a 5-gallon can and transported to Building 49 where it is stored for use. Both supply and waste Freon are stored in a fire-proof cabinet. Approximately 2.5 gallons of waste Freon are generated from the ultrasonic cleaning operations per year. The waste Freon was picked up by Mound waste management personnel as needed. Two sealed 55-gallon drums containing ethyl alcohol are currently staged in the solvent shed (Hatfield 1991).

5.3.9. Old Firing Range Drum Storage Area (Historical)

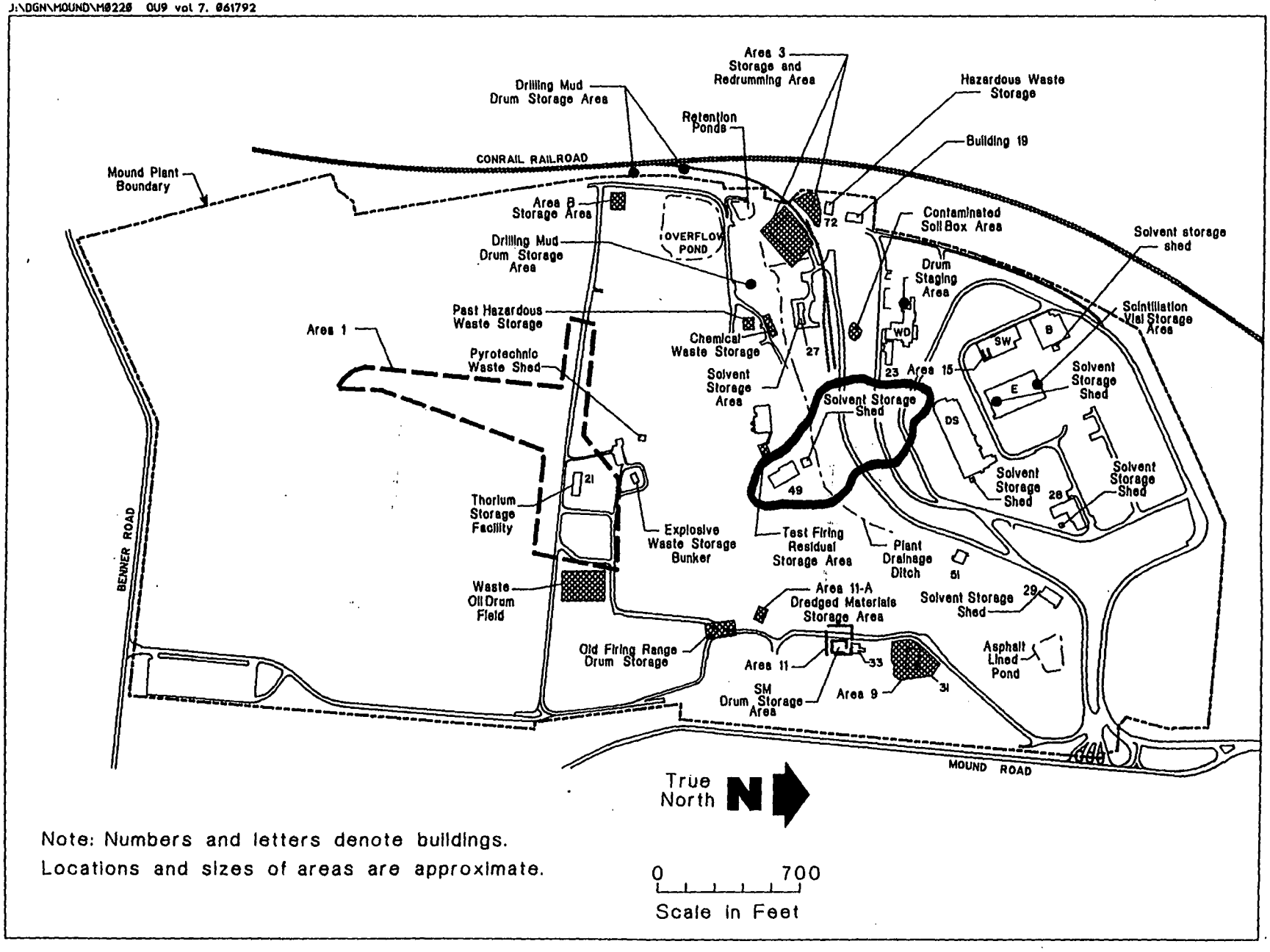
The old firing range drum storage area is just west of Building 105, in the southeastern portion of Mound (Figure 5.1) (DOE 1991a). The area was in operation from about 1970 to 1974. It was used for the collection and staging of liquid chemical wastes until they could be transported off-plant for disposal; it was the first staging and storage area used for such purposes when the historic landfill (Area B) was closed to open burning. Its operation was concurrent with the limited operation of the Building 51 waste incinerator. Most hazardous wastes generated during this time were collected weekly and consolidated at the old firing range drum storage area, although some waste solvents were incinerated. In September 1971, of the approximately 50 55-gallon drums of oil and solvent that had accumulated, 530 gallons were transferred to the incinerator for disposal (Russell 1971). Another test burn was conducted in January 1972, in which 80 gallons of waste oils and solvents were burned (Werner 1972a). The destruction of waste oils and solvents by incineration was generally not successful and is described in subsection 4.1.4. In 1974, the hazardous chemical staging activities moved back to the area of the historic landfill and the old firing range drum storage area was abandoned.

The area was approximately 100 ft by 100 ft, and photographs show that 100 to 500 drums were stored in the open on bare ground. Historic photographs reveal oil sheens of undetermined origins. No radiological contamination was detected during a 1988 Mound Site Survey (DOE 1992g). The area is sparsely vegetated and partially covered by the intersection of the new paved road and a dirt road.

5.3.10. Area B Drum Storage Area (Historical)

The Area B drum storage area was located at the site of the historic landfill (Figure 5.1). It was used in the mid-1970s to stage and temporarily store hazardous chemical wastes before they were shipped off-plant for disposal. The area replaced the old firing range drum storage area for this activity. The waste chemicals were typically picked up weekly by waste management personnel and transferred from small laboratory vessels to 55-gallon drums. The drums were placed in open-topped steel dumpsters that could be moved around to allow the solid waste landfill operations to conti

J:\DGN\MOUND\M0228 OU9 vol 7. 061792



Note: Numbers and letters denote buildings.
Locations and sizes of areas are approximate.

Figure 5.1 Waste storage areas.

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

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.

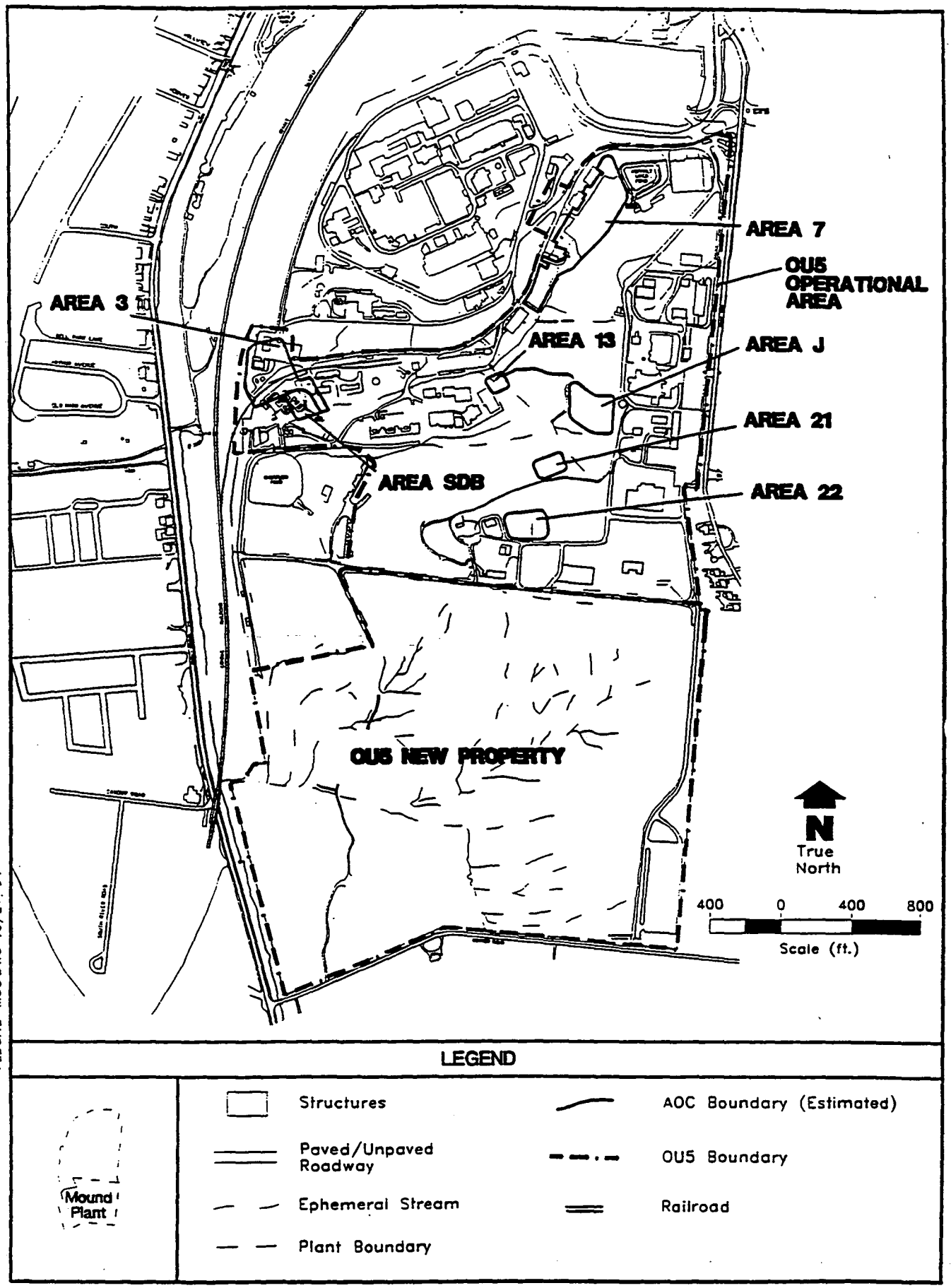
The following sections briefly describe the scope of the Area 13 Field Report, provide a site description and site land use history, and present the organization of the remainder of the report.

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



FLDSITE-M5C DWG 10/27/94

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.

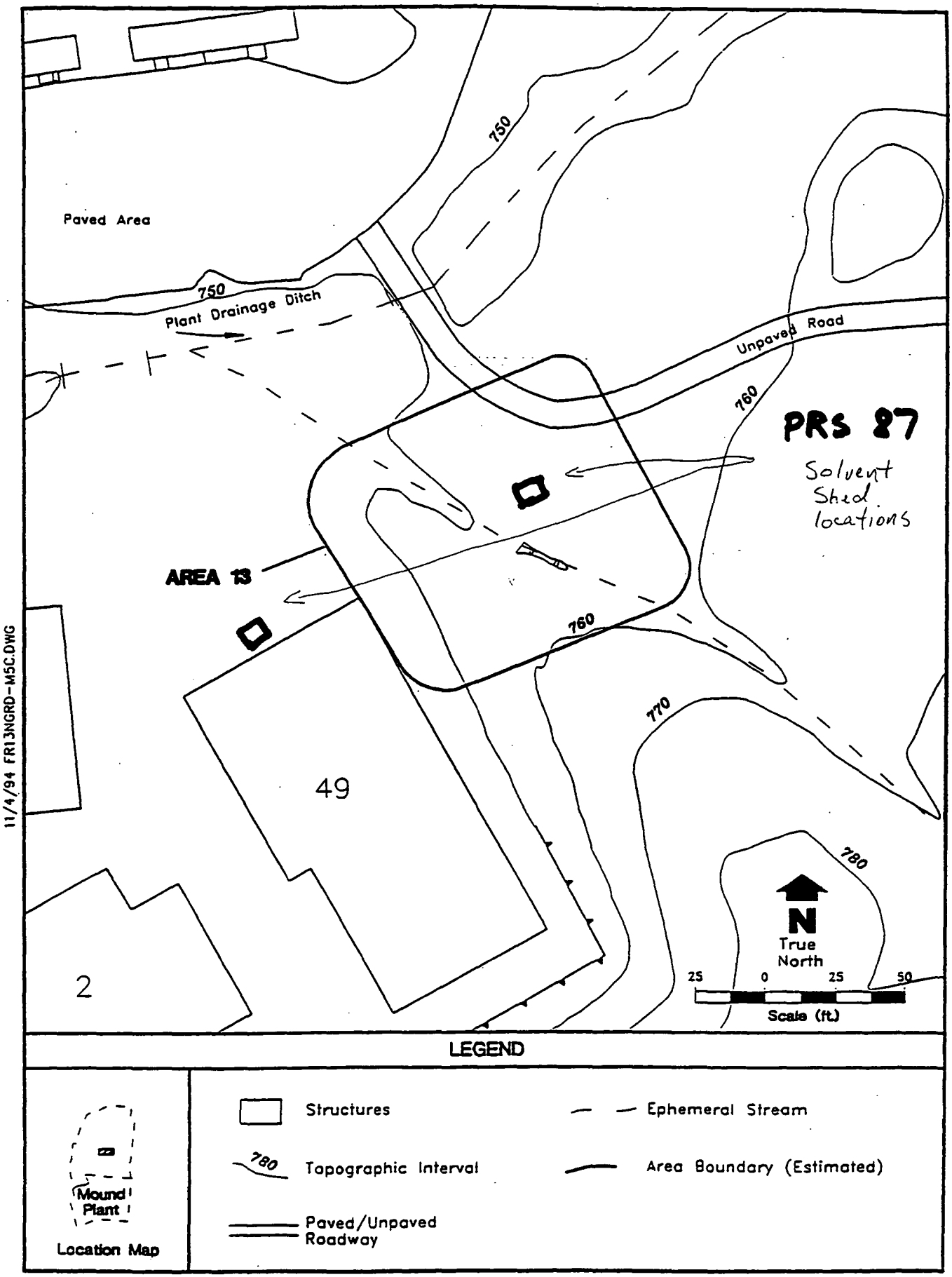


Figure 1.2. Estimated Boundary of Area 13

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.

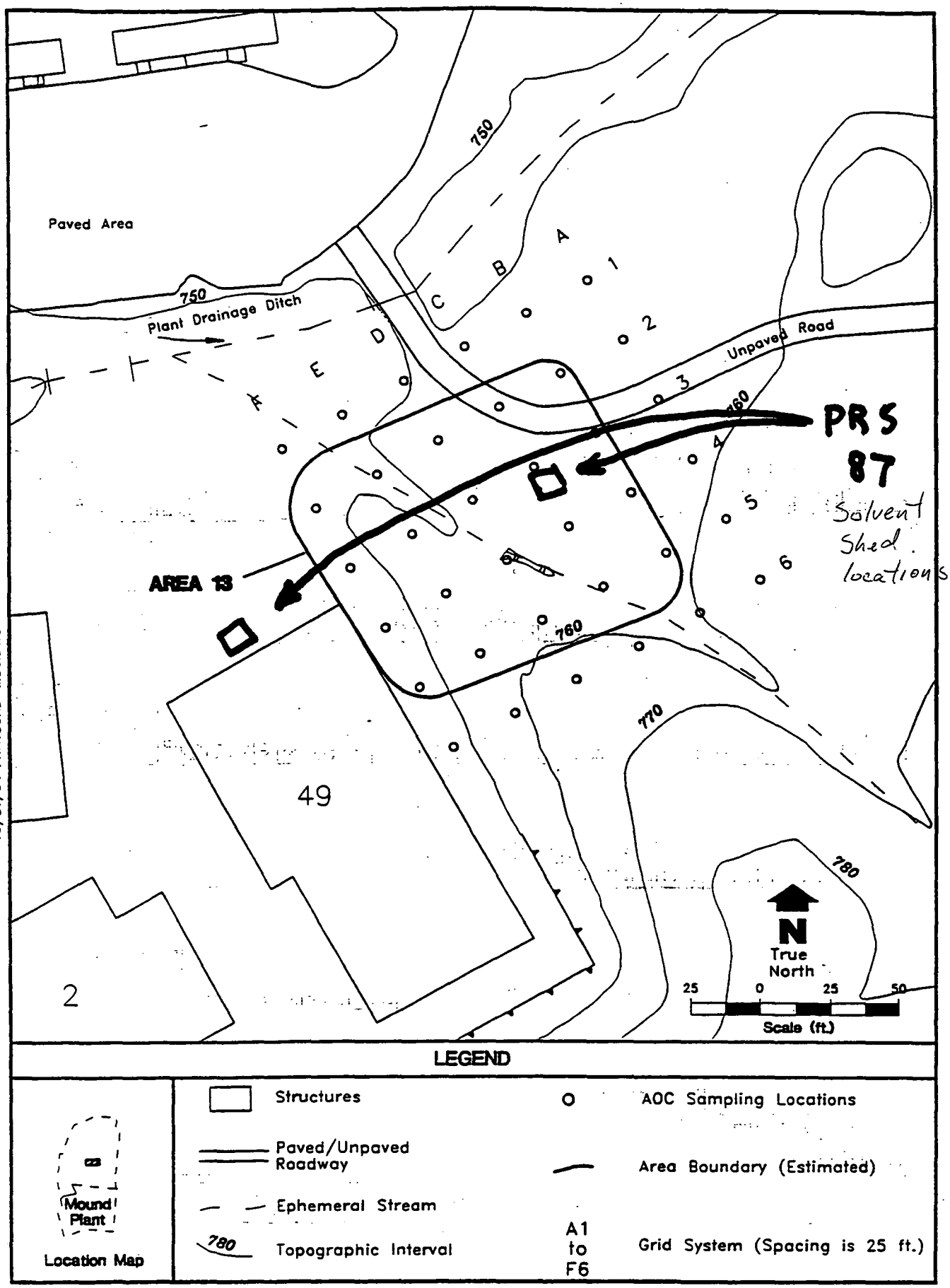


Figure 2.1. Estimated Boundary and Grid System of Area 13

2.1.4. 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

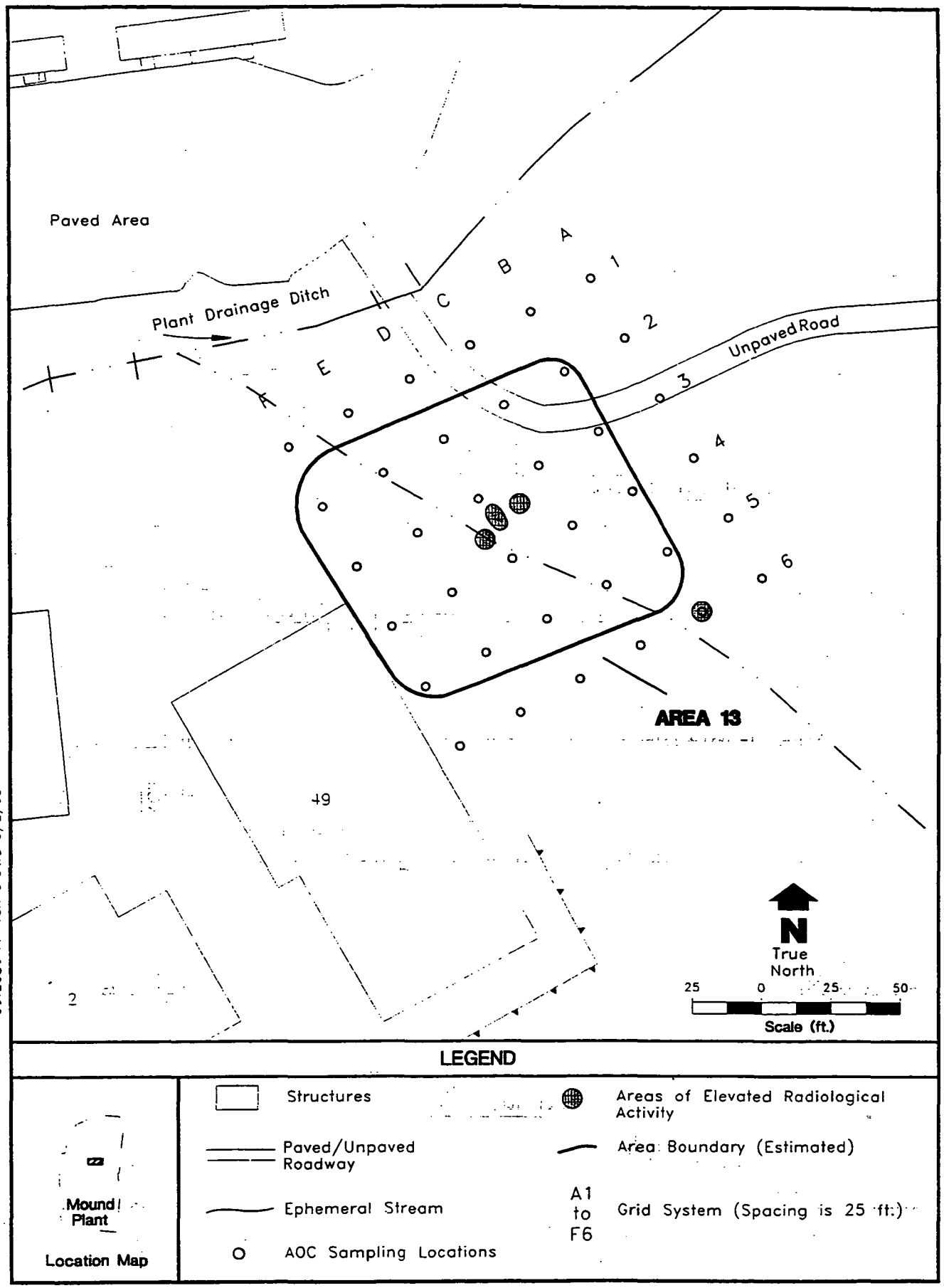


Figure 2.2. Areas of Elevated Surface Radiological Activity (FIDLER Survey)

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.

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)

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)

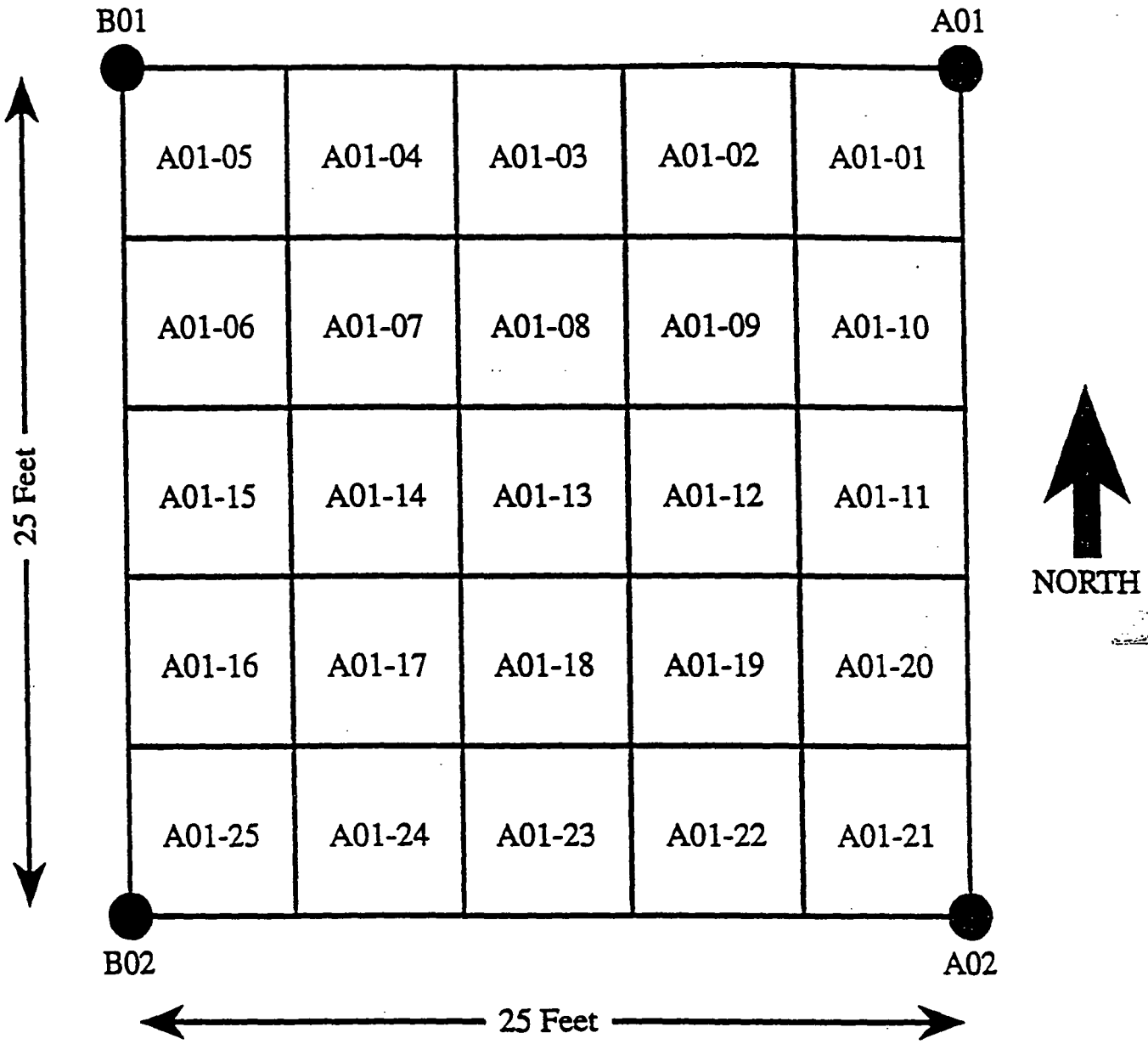
U.S. Department of Energy
Ohio Field Office

EG&G Mound Applied Technologies

APPENDIX C

RADIOLOGICAL DATA

(FIDLER SURVEY & SOIL SCREENING FACILITY DATA)



Operable Unit 5, Operational Area, Phase 1 Investigation - Generic Sampling Identification Scheme for the FIDLER survey conducted in Area 13

APPENDIX C
RADIOLOGICAL DATA (FIDLER SURVEY MOUND SOIL SCREENING FACILITY DATA)

	FIDLER SURVEY DATA						MOUND SOIL SCREENING FACILITY DATA	
SMPID	Contamination Criteria CH1	FIDLER Readings CH1	Contamination Criteria CH2	FIDLER Readings CH2	Contamination Criteria Out Channel	FIDLER Readings Out Channel	Plutonium - 238	Thorium - 232
	Units: CPM	Units: CPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: pCi/g	Units: pCi/g
	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
13A01	NA	NA	NA	NA	NA	NR	NS	NS
13A01-01	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13A01-02	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13A01-03	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13A01-04	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13A01-05	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13A01-06	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13A01-07	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13A01-08	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13A01-09	236.6	NA	12.09	NA	13.65	7.5	NC	NC
13A01-10	236.6	NA	12.09	NA	13.65	6.0	NC	NC
13A01-11	236.6	NA	12.09	NA	13.65	6.5	NC	NC
13A01-12	236.6	NA	12.09	NA	13.65	8.5	NC	NC
13A01-13	236.6	NA	12.09	NA	13.65	8.5	NC	NC
13A01-14	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13A01-15	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13A01-16	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13A01-17	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13A01-18	236.6	NA	12.09	NA	13.65	7.5	NC	NC
13A01-19	236.6	NA	12.09	NA	13.65	6.5	NC	NC
13A01-20	236.6	NA	12.09	NA	13.65	7.0	NC	NC
13A01-21	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13A01-22	236.6	NA	12.09	NA	13.65	8.5	NC	NC
13A01-23	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13A01-24	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13A01-25	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13A02	NA	NA	NA	NA	NA	NR	21	0.5
13A02-01	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13A02-02	236.6	NA	12.09	NA	13.65	7.5	NC	NC
13A02-03	236.6	NA	12.09	NA	13.65	7.5	NC	NC

APPENDIX C
RADIOLOGICAL DATA (FIDLER SURVEY MOUND SOIL SCREENING FACILITY DATA)

	FIDLER SURVEY DATA						MOUND SOIL SCREENING FACILITY DATA	
SMPID	Contamination Criteria CH1	FIDLER Readings CH1	Contamination Criteria CH2	FIDLER Readings CH2	Contamination Criteria Out Channel	FIDLER Readings Out Channel	Plutonium - 238	Thorium - 232
	Units: CPM	Units: CPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: pCi/g	Units: pCi/g
	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
13A02-04	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13A02-05	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13A02-06	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13A02-07	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13A02-08	236.6	NA	12.09	NA	13.65	8.5	NC	NC
13A02-09	236.6	NA	12.09	NA	13.65	7.5	NC	NC
13A02-10	236.6	NA	12.09	NA	13.65	7.5	NC	NC
13A02-11	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13A02-12	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13A02-13	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13A02-14	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13A02-15	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13A02-16	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13A02-17	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13A02-18	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13A02-19	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13A02-20	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13A02-21	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13A02-22	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13A02-23	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13A02-24	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13A02-25	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13A03	NA	NA	NA	NA	NA	NR	14	1.1
13A03-01	236.6	NA	12.09	NA	13.65	10.5	NC	NC
13A03-02	236.6	NA	12.09	NA	13.65	10.5	NC	NC
13A03-03	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13A03-04	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13A03-05	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13A03-06	236.6	NA	12.09	NA	13.65	11.0	NC	NC
13A03-07	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13A03-08	236.6	NA	12.09	NA	13.65	10.5	NC	NC

APPENDIX C
RADIOLOGICAL DATA (FIDLER SURVEY MOUND SOIL SCREENING FACILITY DATA)

	FIDLER SURVEY DATA						MOUND SOIL SCREENING FACILITY DATA	
SMPID	Contamination Criteria CH1	FIDLER Readings CH1	Contamination Criteria CH2	FIDLER Readings CH2	Contamination Criteria Out Channel	FIDLER Readings Out Channel	Plutonium - 238	Thorium - 232
	Units: CPM	Units: CPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: pCi/g	Units: pCi/g
	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
13A03-09	236.6	NA	12.09	NA	13.65	10.5	NC	NC
13A03-10	236.6	NA	12.09	NA	13.65	10.5	NC	NC
13A03-11	NA	NA	NA	NA	NA	NR	NC	NC
13A03-12	NA	NA	NA	NA	NA	NR	NC	NC
13A03-13	NA	NA	NA	NA	NA	NR	NC	NC
13A03-14	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13A03-15	236.6	NA	12.09	NA	13.65	10.5	NC	NC
13A03-16	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13A03-17	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13A03-18	NA	NA	NA	NA	NA	NR	NC	NC
13A03-19	NA	NA	NA	NA	NA	NR	NC	NC
13A03-20	NA	NA	NA	NA	NA	NR	NC	NC
13A03-21	NA	NA	NA	NA	NA	NR	NC	NC
13A03-22	NA	NA	NA	NA	NA	NR	NC	NC
13A03-23	NA	NA	NA	NA	NA	NR	NC	NC
13A03-24	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13A03-25	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13A04	236.6	NA	12.09	NA	13.65	10.0	13	1.0
13A05	236.6	NA	12.09	NA	13.65	9.5	12	0.7
13A06	236.6	NA	12.09	NA	13.65	9.5	19	0.7
13B01	NA	NA	NA	NA	NA	NR	NS	NS
13B01-01	236.6	NA	12.09	NA	13.65	7.5	NC	NC
13B01-02	236.6	NA	12.09	NA	13.65	7.0	NC	NC
13B01-03	236.6	NA	12.09	NA	13.65	7.0	NC	NC
13B01-04	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13B01-05	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13B01-06	236.6	NA	12.09	NA	13.65	6.0	NC	NC
13B01-07	236.6	NA	12.09	NA	13.65	6.0	NC	NC
13B01-08	236.6	NA	12.09	NA	13.65	6.0	NC	NC
13B01-09	236.6	NA	12.09	NA	13.65	6.5	NC	NC
13B01-10	236.6	NA	12.09	NA	13.65	11.0	NC	NC

APPENDIX C
RADIOLOGICAL DATA (FIDLER SURVEY MOUND SOIL SCREENING FACILITY DATA)

	FIDLER SURVEY DATA						MOUND SOIL SCREENING FACILITY DATA	
SMPID	Contamination Criteria CH1	FIDLER Readings CH1	Contamination Criteria CH2	FIDLER Readings CH2	Contamination Criteria Out Channel	FIDLER Readings Out Channel	Plutonium - 238	Thorium - 232
	Units: CPM	Units: CPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: pCi/g	Units: pCi/g
	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
13B01-11	236.6	NA	12.09	NA	13.65	8.5	NC	NC
13B01-12	236.6	NA	12.09	NA	13.65	6.5	NC	NC
13B01-13	236.6	NA	12.09	NA	13.65	6.5	NC	NC
13B01-14	236.6	NA	12.09	NA	13.65	6.5	NC	NC
13B01-15	236.6	NA	12.09	NA	13.65	6.5	NC	NC
13B01-16	236.6	NA	12.09	NA	13.65	6.0	NC	NC
13B01-17	236.6	NA	12.09	NA	13.65	6.5	NC	NC
13B01-18	236.6	NA	12.09	NA	13.65	6.5	NC	NC
13B01-19	236.6	NA	12.09	NA	13.65	6.0	NC	NC
13B01-20	236.6	NA	12.09	NA	13.65	7.0	NC	NC
13B01-21	236.6	NA	12.09	NA	13.65	6.0	NC	NC
13B01-22	236.6	NA	12.09	NA	13.65	6.5	NC	NC
13B01-23	236.6	NA	12.09	NA	13.65	6.5	NC	NC
13B01-24	236.6	NA	12.09	NA	13.65	5.5	NC	NC
13B01-25	236.6	NA	12.09	NA	13.65	6.0	NC	NC
13B02	NA	NA	NA	NA	NA	NR	NS	NS
13B02-01	240.5	NA	13.26	NA	14.3	5.0	NC	NC
13B02-02	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13B02-03	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13B02-04	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13B02-05	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13B02-06	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13B02-07	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13B02-08	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13B02-09	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13B02-10	240.5	NA	13.26	NA	14.3	6.5	NC	NC
13B02-11	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13B02-12	240.5	NA	13.26	NA	14.3	6.5	NC	NC
13B02-13	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13B02-14	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13B02-15	240.5	NA	13.26	NA	14.3	5.5	NC	NC

APPENDIX C
RADIOLOGICAL DATA (FIDLER SURVEY MOUND SOIL SCREENING FACILITY DATA)

	FIDLER SURVEY DATA						MOUND SOIL SCREENING FACILITY DATA	
SMPID	Contamination Criteria CH1	FIDLER Readings CH1	Contamination Criteria CH2	FIDLER Readings CH2	Contamination Criteria Out Channel	FIDLER Readings Out Channel	Plutonium - 238	Thorium - 232
	Units: CPM	Units: CPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: pCi/g	Units: pCi/g
	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
13B02-16	NA	NA	NA	NA	NA	NR	NC	NC
13B02-17	NA	NA	NA	NA	NA	NR	NC	NC
13B02-18	NA	NA	NA	NA	NA	NR	NC	NC
13B02-19	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13B02-20	240.5	NA	13.26	NA	14.3	6.5	NC	NC
13B02-21	240.5	NA	13.26	NA	14.3	7.0	NC	NC
13B02-22	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13B02-23	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13B02-24	240.5	NA	13.26	NA	14.3	5.0	NC	NC
13B02-25	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13B03	NA	NA	NA	NA	NA	NR	NS	NS
13B03-01	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13B03-02	236.6	NA	12.09	NA	13.65	8.5	NC	NC
13B03-03	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13B03-04	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13B03-05	236.6	NA	12.09	NA	13.65	7.0	NC	NC
13B03-06	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13B03-07	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13B03-08	236.6	NA	12.09	NA	13.65	11.0	NC	NC
13B03-09	236.6	NA	12.09	NA	13.65	10.5	NC	NC
13B03-10	236.6	NA	12.09	NA	13.65	10.5	NC	NC
13B03-11	236.6	NA	12.09	NA	13.65	11.0	NC	NC
13B03-12	236.6	NA	12.09	NA	13.65	11.0	NC	NC
13B03-13	236.6	NA	12.09	NA	13.65	11.0	NC	NC
13B03-14	236.6	NA	12.09	NA	13.65	10.5	NC	NC
13B03-15	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13B03-16	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13B03-17	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13B03-18	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13B03-19	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13B03-20	236.6	NA	12.09	NA	13.65	10.0	NC	NC

APPENDIX C
RADIOLOGICAL DATA (FIDLER SURVEY MOUND SOIL SCREENING FACILITY DATA)

	FIDLER SURVEY DATA						MOUND SOIL SCREENING FACILITY DATA	
SMPID	Contamination Criteria CH1	FIDLER Readings CH1	Contamination Criteria CH2	FIDLER Readings CH2	Contamination Criteria Out Channel	FIDLER Readings Out Channel	Plutonium - 238	Thorium - 232
	Units: CPM	Units: CPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: pCi/g	Units: pCi/g
	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
13B03-21	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13B03-22	236.6	NA	12.09	NA	13.65	8.5	NC	NC
13B03-23	236.6	NA	12.09	NA	13.65	8.5	NC	NC
13B03-24	236.6	NA	12.09	NA	13.65	6.0	NC	NC
13B03-25	236.6	NA	12.09	NA	13.65	6.0	NC	NC
13B04	236.6	NA	12.09	NA	13.65	9.5	11	0.8
13B05	236.6	NA	12.09	NA	13.65	9.0	15	0.7
13B06	236.6	NA	12.09	NA	13.65	12.0	24	0.8
13C01	NA	NA	NA	NA	NA	NR	NS	NS
13C01-01	236.6	NA	12.09	NA	13.65	6.5	NC	NC
13C01-02	236.6	NA	12.09	NA	13.65	7.0	NC	NC
13C01-03	236.6	NA	12.09	NA	13.65	6.5	NC	NC
13C01-04	236.6	NA	12.09	NA	13.65	6.5	NC	NC
13C01-05	236.6	NA	12.09	NA	13.65	7.0	NC	NC
13C01-06	236.6	NA	12.09	NA	13.65	6.0	NC	NC
13C01-07	236.6	NA	12.09	NA	13.65	6.5	NC	NC
13C01-08	236.6	NA	12.09	NA	13.65	6.0	NC	NC
13C01-09	236.6	NA	12.09	NA	13.65	6.5	NC	NC
13C01-10	236.6	NA	12.09	NA	13.65	5.5	NC	NC
13C01-11	236.6	NA	12.09	NA	13.65	6.5	NC	NC
13C01-12	236.6	NA	12.09	NA	13.65	6.5	NC	NC
13C01-13	236.6	NA	12.09	NA	13.65	6.5	NC	NC
13C01-14	236.6	NA	12.09	NA	13.65	6.0	NC	NC
13C01-15	236.6	NA	12.09	NA	13.65	6.5	NC	NC
13C01-16	236.6	NA	12.09	NA	13.65	6.5	NC	NC
13C01-17	236.6	NA	12.09	NA	13.65	6.0	NC	NC
13C01-18	236.6	NA	12.09	NA	13.65	6.0	NC	NC
13C01-19	236.6	NA	12.09	NA	13.65	6.0	NC	NC
13C01-20	236.6	NA	12.09	NA	13.65	6.0	NC	NC
13C01-21	236.6	NA	12.09	NA	13.65	6.0	NC	NC
13C01-22	236.6	NA	12.09	NA	13.65	6.5	NC	NC

APPENDIX C
RADIOLOGICAL DATA (FIDLER SURVEY MOUND SOIL SCREENING FACILITY DATA)

	FIDLER SURVEY DATA						MOUND SOIL SCREENING FACILITY DATA	
SMPID	Contamination Criteria CH1	FIDLER Readings CH1	Contamination Criteria CH2	FIDLER Readings CH2	Contamination Criteria Out Channel	FIDLER Readings Out Channel	Plutonium - 238	Thorium - 232
	Units: CPM	Units: CPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: pCi/g	Units: pCi/g
	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
13C01-23	236.6	NA	12.09	NA	13.65	6.5	NC	NC
13C01-24	236.6	NA	12.09	NA	13.65	6.5	NC	NC
13C01-25	236.6	NA	12.09	NA	13.65	6.5	NC	NC
13C02	NA	NA	NA	NA	NA	NR	NS	NS
13C02-01	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13C02-02	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13C02-03	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13C02-04	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13C02-05	240.5	NA	13.26	NA	14.3	5.0	NC	NC
13C02-06	240.5	NA	13.26	NA	14.3	5.0	NC	NC
13C02-07	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13C02-08	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13C02-09	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13C02-10	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13C02-11	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13C02-12	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13C02-13	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13C02-14	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13C02-15	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13C02-16	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13C02-17	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13C02-18	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13C02-19	240.5	NA	13.26	NA	14.3	6.5	NC	NC
13C02-20	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13C02-21	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13C02-22	240.5	NA	13.26	NA	14.3	6.5	NC	NC
13C02-23	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13C02-24	240.5	NA	13.26	NA	14.3	6.5	NC	NC
13C02-25	240.5	NA	13.26	NA	14.3	6.5	NC	NC
13C03	NA	NA	NA	NA	NA	NR	NS	NS
13C03-01	236.6	NA	12.09	NA	13.65	8.0	NC	NC

APPENDIX C
RADIOLOGICAL DATA (FIDLER SURVEY MOUND SOIL SCREENING FACILITY DATA)

	FIDLER SURVEY DATA						MOUND SOIL SCREENING FACILITY DATA	
SMPID	Contamination Criteria CH1	FIDLER Readings CH1	Contamination Criteria CH2	FIDLER Readings CH2	Contamination Criteria Out Channel	FIDLER Readings Out Channel	Plutonium - 238	Thorium - 232
	Units: CPM	Units: CPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: pCi/g	Units: pCi/g
	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
13C03-02	236.6	NA	12.09	NA	13.65	8.5	NC	NC
13C03-03	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13C03-04	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13C03-05	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13C03-06	236.6	NA	12.09	NA	13.65	11.5	NC	NC
13C03-07	236.6	NA	12.09	NA	13.65	11.0	NC	NC
13C03-08	236.6	NA	12.09	NA	13.65	11.5	NC	NC
13C03-09	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13C03-10	236.6	NA	12.09	NA	13.65	11.0	NC	NC
13C03-11	236.6	NA	12.09	NA	13.65	10.5	NC	NC
13C03-12	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13C03-13	236.6	NA	12.09	NA	13.65	11.0	NC	NC
13C03-14	236.6	NA	12.09	NA	13.65	11.0	NC	NC
13C03-15	236.6	NA	12.09	NA	13.65	11.5	NC	NC
13C03-16	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13C03-17	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13C03-18	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13C03-19	NA	NA	NA	NA	NA	NR	NC	NC
13C03-20	NA	NA	NA	NA	NA	NR	NC	NC
13C03-21	NA	NA	NA	NA	NA	NR	NC	NC
13C03-22	NA	NA	NA	NA	NA	NR	NC	NC
13C03-23	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13C03-24	236.6	NA	12.09	NA	13.65	7.0	NC	NC
13C03-25	236.6	NA	12.09	NA	13.65	7.0	NC	NC
13C04	236.6	NA	12.09	NA	13.65	5.5	8	0.6
13C05	236.6	NA	12.09	NA	13.65	6.0	10	0.5
13C05-01	NA	NA	NA	NA	NA	NR	NC	NC
13C05-02	NA	NA	NA	NA	NA	NR	NC	NC
13C05-03	NA	NA	NA	NA	NA	NR	NC	NC
13C05-04	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13C05-05	236.6	NA	12.09	NA	13.65	9.5	NC	NC

APPENDIX C
RADIOLOGICAL DATA (FIDLER SURVEY MOUND SOIL SCREENING FACILITY DATA)

	FIDLER SURVEY DATA						MOUND SOIL SCREENING FACILITY DATA	
SMPID	Contamination Criteria CH1	FIDLER Readings CH1	Contamination Criteria CH2	FIDLER Readings CH2	Contamination Criteria Out Channel	FIDLER Readings Out Channel	Plutonium - 238	Thorium - 232
	Units: CPM	Units: CPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: pCi/g	Units: pCi/g
	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
13C05-06	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13C05-07	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13C05-08	NA	NA	NA	NA	NA	NR	NC	NC
13C05-09	NA	NA	NA	NA	NA	NR	NC	NC
13C05-10	NA	NA	NA	NA	NA	NR	NC	NC
13C05-11	NA	NA	NA	NA	NA	NR	NC	NC
13C05-12	NA	NA	NA	NA	NA	NR	NC	NC
13C05-13	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13C05-14	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13C05-15	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13C05-16	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13C05-17	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13C05-18	236.6	NA	12.09	NA	13.65	8.5	NC	NC
13C05-19	236.6	NA	12.09	NA	13.65	8.5	NC	NC
13C05-20	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13C05-21	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13C05-22	236.6	NA	12.09	NA	13.65	8.5	NC	NC
13C05-23	236.6	NA	12.09	NA	13.65	8.5	NC	NC
13C05-24	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13C05-25	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13C06	236.6	NA	12.09	NA	13.65	11.0	17	1.0
13D01	NA	NA	NA	NA	NA	NR	NS	NS
13D01-01	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13D01-02	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13D01-03	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13D01-04	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13D01-05	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13D01-06	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13D01-07	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13D01-08	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13D01-09	240.5	NA	13.26	NA	14.3	6.0	NC	NC

APPENDIX C
RADIOLOGICAL DATA (FIDLER SURVEY MOUND SOIL SCREENING FACILITY DATA)

	FIDLER SURVEY DATA						MOUND SOIL SCREENING FACILITY DATA	
SMPID	Contamination Criteria CH1	FIDLER Readings CH1	Contamination Criteria CH2	FIDLER Readings CH2	Contamination Criteria Out Channel	FIDLER Readings Out Channel	Plutonium - 238	Thorium - 232
	Units: CPM	Units: CPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: pCi/g	Units: pCi/g
	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
13D01-10	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13D01-11	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13D01-12	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13D01-13	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13D01-14	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13D01-15	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13D01-16	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13D01-17	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13D01-18	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13D01-19	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13D01-20	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13D01-21	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13D01-22	240.5	NA	13.26	NA	14.3	5.0	NC	NC
13D01-23	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13D01-24	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13D01-25	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13D02	NA	NA	NA	NA	NA	NR	NS	NS
13D02-01	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13D02-02	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13D02-03	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13D02-04	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13D02-05	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13D02-06	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13D02-07	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13D02-08	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13D02-09	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13D02-10	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13D02-11	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13D02-12	240.5	NA	13.26	NA	14.3	6.5	NC	NC
13D02-13	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13D02-14	240.5	NA	13.26	NA	14.3	6.0	NC	NC

APPENDIX C
RADIOLOGICAL DATA (FIDLER SURVEY MOUND SOIL SCREENING FACILITY DATA)

	FIDLER SURVEY DATA						MOUND SOIL SCREENING FACILITY DATA	
SMPID	Contamination Criteria CH1	FIDLER Readings CH1	Contamination Criteria CH2	FIDLER Readings CH2	Contamination Criteria Out Channel	FIDLER Readings Out Channel	Plutonium - 238	Thorium - 232
	Units: CPM	Units: CPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: pCi/g	Units: pCi/g
	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
13D02-15	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13D02-16	240.5	NA	13.26	NA	14.3	5.0	NC	NC
13D02-17	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13D02-18	240.5	NA	13.26	NA	14.3	6.5	NC	NC
13D02-19	240.5	NA	13.26	NA	14.3	6.5	NC	NC
13D02-20	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13D02-21	240.5	NA	13.26	NA	14.3	6.5	NC	NC
13D02-22	240.5	NA	13.26	NA	14.3	6.5	NC	NC
13D02-23	240.5	NA	13.26	NA	14.3	6.5	NC	NC
13D02-24	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13D02-25	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13D03	NA	NA	NA	NA	NA	NR	NS	NS
13D03-01	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13D03-02	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13D03-03	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13D03-04	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13D03-05	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13D03-06	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13D03-07	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13D03-08	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13D03-09	236.6	NA	12.09	NA	13.65	10.5	NC	NC
13D03-10	236.6	NA	12.09	NA	13.65	11.0	NC	NC
13D03-11	236.6	NA	12.09	NA	13.65	11.0	NC	NC
13D03-12	236.6	NA	12.09	NA	13.65	11.5	NC	NC
13D03-13	236.6	NA	12.09	NA	13.65	10.5	NC	NC
13D03-14	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13D03-15	236.6	NA	12.09	NA	13.65	10.5	NC	NC
13D03-16	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13D03-17	236.6	NA	12.09	NA	13.65	10.5	NC	NC
13D03-18	236.6	NA	12.09	NA	13.65	11.0	NC	NC
13D03-19	236.6	NA	12.09	NA	13.65	10.5	NC	NC

APPENDIX C
RADIOLOGICAL DATA (FIDLER SURVEY MOUND SOIL SCREENING FACILITY DATA)

	FIDLER SURVEY DATA						MOUND SOIL SCREENING FACILITY DATA	
SMPID	Contamination Criteria CH1	FIDLER Readings CH1	Contamination Criteria CH2	FIDLER Readings CH2	Contamination Criteria Out Channel	FIDLER Readings Out Channel	Plutonium - 238	Thorium - 232
	Units: CPM	Units: CPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: pCi/g	Units: pCi/g
	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
13D03-20	236.6	NA	12.09	NA	13.65	11.0	NC	NC
13D03-21	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13D03-22	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13D03-23	236.6	NA	12.09	NA	13.65	11.0	NC	NC
13D03-24	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13D03-25	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13D04	NA	NA	NA	NA	NA	NR	17	0.8
13D04-01	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13D04-02	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13D04-03	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13D04-04	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13D04-05	236.6	NA	12.09	NA	13.65	8.5	NC	NC
13D04-06	236.6	NA	12.09	NA	13.65	8.5	NC	NC
13D04-07	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13D04-08	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13D04-09	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13D04-10	236.6	NA	12.09	NA	13.65	11.0	NC	NC
13D04-11	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13D04-12	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13D04-13	236.6	NA	12.09	NA	13.65	8.5	NC	NC
13D04-14	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13D04-15	236.6	NA	12.09	NA	13.65	8.5	NC	NC
13D04-16	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13D04-17	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13D04-18	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13D04-19	236.6	NA	12.09	NA	13.65	8.5	NC	NC
13D04-20	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13D04-21	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13D04-22	236.6	NA	12.09	NA	13.65	8.5	NC	NC
13D04-23	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13D04-24	236.6	NA	12.09	NA	13.65	9.0	NC	NC

APPENDIX C
RADIOLOGICAL DATA (FIDLER SURVEY MOUND SOIL SCREENING FACILITY DATA)

	FIDLER SURVEY DATA						MOUND SOIL SCREENING FACILITY DATA	
SMPID	Contamination Criteria CH1	FIDLER Readings CH1	Contamination Criteria CH2	FIDLER Readings CH2	Contamination Criteria Out Channel	FIDLER Readings Out Channel	Plutonium - 238	Thorium - 232
	Units: CPM	Units: CPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: pCi/g	Units: pCi/g
	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
13D04-25	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13D05	NA	NA	NA	NA	NA	NR	13	0.9
13D05-01	236.6	NA	12.09	NA	13.65	10.0	NC	NC
13D05-02	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13D05-03	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13D05-04	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13D05-05	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13D05-06	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13D05-07	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13D05-08	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13D05-09	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13D05-10	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13D05-11	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13D05-12	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13D05-13	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13D05-14	236.6	NA	12.09	NA	13.65	8.5	NC	NC
13D05-15	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13D05-16	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13D05-17	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13D05-18	236.6	NA	12.09	NA	13.65	9.5	NC	NC
13D05-19	236.6	NA	12.09	NA	13.65	9.0	NC	NC
13D05-20	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13D05-21	236.6	NA	12.09	NA	13.65	8.5	NC	NC
13D05-22	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13D05-23	236.6	NA	12.09	NA	13.65	8.5	NC	NC
13D05-24	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13D05-25	236.6	NA	12.09	NA	13.65	8.0	NC	NC
13D06	NA	NA	NA	NA	NA	NR	NS	NS
13E01	NA	NA	NA	NA	NA	NR	NS	NS
13E01-01	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13E01-02	240.5	NA	13.26	NA	14.3	6.0	NC	NC

APPENDIX C
RADIOLOGICAL DATA (FIDLER SURVEY MOUND SOIL SCREENING FACILITY DATA)

	FIDLER SURVEY DATA						MOUND SOIL SCREENING FACILITY DATA	
SMPID	Contamination Criteria CH1	FIDLER Readings CH1	Contamination Criteria CH2	FIDLER Readings CH2	Contamination Criteria Out Channel	FIDLER Readings Out Channel	Plutonium - 238	Thorium - 232
	Units: CPM	Units: CPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: pCi/g	Units: pCi/g
	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
13E01-03	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13E01-04	240.5	NA	13.26	NA	14.3	5.0	NC	NC
13E01-05	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13E01-06	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13E01-07	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13E01-08	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13E01-09	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13E01-10	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13E01-11	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13E01-12	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13E01-13	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13E01-14	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13E01-15	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13E01-16	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13E01-17	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13E01-18	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13E01-19	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13E01-20	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13E01-21	240.5	NA	13.26	NA	14.3	6.5	NC	NC
13E01-22	240.5	NA	13.26	NA	14.3	6.5	NC	NC
13E01-23	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13E01-24	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13E01-25	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13E02	NA	NA	NA	NA	NA	NR	NS	NS
13E02-01	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13E02-02	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13E02-03	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13E02-04	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13E02-05	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13E02-06	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13E02-07	240.5	NA	13.26	NA	14.3	6.0	NC	NC

APPENDIX C
RADIOLOGICAL DATA (FIDLER SURVEY MOUND SOIL SCREENING FACILITY DATA)

	FIDLER SURVEY DATA						MOUND SOIL SCREENING FACILITY DATA	
SMPID	Contamination Criteria CH1	FIDLER Readings CH1	Contamination Criteria CH2	FIDLER Readings CH2	Contamination Criteria Out Channel	FIDLER Readings Out Channel	Plutonium - 238	Thorium - 232
	Units: CPM	Units: CPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: pCi/g	Units: pCi/g
	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
13E02-08	240.5	NA	13.26	NA	14.3	6.5	NC	NC
13E02-09	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13E02-10	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13E02-11	240.5	NA	13.26	NA	14.3	5.0	NC	NC
13E02-12	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13E02-13	240.5	NA	13.26	NA	14.3	6.5	NC	NC
13E02-14	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13E02-15	240.5	NA	13.26	NA	14.3	6.5	NC	NC
13E02-16	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13E02-17	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13E02-18	240.5	NA	13.26	NA	14.3	6.5	NC	NC
13E02-19	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13E02-20	240.5	NA	13.26	NA	14.3	5.5	NC	NC
13E02-21	240.5	NA	13.26	NA	14.3	5.0	NC	NC
13E02-22	240.5	NA	13.26	NA	14.3	6.5	NC	NC
13E02-23	240.5	NA	13.26	NA	14.3	6.5	NC	NC
13E02-24	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13E02-25	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13E03	NA	NA	NA	NA	NA	NR	NS	NS
13E03-01	240.5	NA	13.26	NA	14.3	8.0	NC	NC
13E03-02	240.5	NA	13.26	NA	14.3	7.0	NC	NC
13E03-03	240.5	NA	13.26	NA	14.3	7.0	NC	NC
13E03-04	240.5	NA	13.26	NA	14.3	6.5	NC	NC
13E03-05	240.5	NA	13.26	NA	14.3	6.5	NC	NC
13E03-06	240.5	NA	13.26	NA	14.3	6.5	NC	NC
13E03-07	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13E03-08	240.5	NA	13.26	NA	14.3	8.0	NC	NC
13E03-09	240.5	NA	13.26	NA	14.3	8.0	NC	NC
13E03-10	240.5	NA	13.26	NA	14.3	10.0	NC	NC
13E03-11	240.5	NA	13.26	NA	14.3	7.0	NC	NC
13E03-12	240.5	NA	13.26	NA	14.3	7.5	NC	NC

APPENDIX C
RADIOLOGICAL DATA (FIDLER SURVEY MOUND SOIL SCREENING FACILITY DATA)

	FIDLER SURVEY DATA						MOUND SOIL SCREENING FACILITY DATA	
SMPID	Contamination Criteria CH1	FIDLER Readings CH1	Contamination Criteria CH2	FIDLER Readings CH2	Contamination Criteria Out Channel	FIDLER Readings Out Channel	Plutonium - 238	Thorium - 232
	Units: CPM	Units: CPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: pCi/g	Units: pCi/g
	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
13E03-13	240.5	NA	13.26	NA	14.3	7.5	NC	NC
13E03-14	240.5	NA	13.26	NA	14.3	6.5	NC	NC
13E03-15	240.5	NA	13.26	NA	14.3	6.0	NC	NC
13E03-16	240.5	NA	13.26	NA	14.3	7.5	NC	NC
13E03-17	240.5	NA	13.26	NA	14.3	6.5	NC	NC
13E03-18	240.5	NA	13.26	NA	14.3	7.5	NC	NC
13E03-19	240.5	NA	13.26	NA	14.3	9.0	NC	NC
13E03-20	240.5	NA	13.26	NA	14.3	9.5	NC	NC
13E03-21	240.5	NA	13.26	NA	14.3	9.0	NC	NC
13E03-22	240.5	NA	13.26	NA	14.3	8.5	NC	NC
13E03-23	240.5	NA	13.26	NA	14.3	7.5	NC	NC
13E03-24	240.5	NA	13.26	NA	14.3	8.5	NC	NC
13E03-25	240.5	NA	13.26	NA	14.3	8.5	NC	NC
13E04	NA	NA	NA	NA	NA	NR	NS	NS
13E04-01	240.5	NA	13.26	NA	14.3	8.0	NC	NC
13E04-02	240.5	NA	13.26	NA	14.3	7.5	NC	NC
13E04-03	240.5	NA	13.26	NA	14.3	8.0	NC	NC
13E04-04	240.5	NA	13.26	NA	14.3	8.5	NC	NC
13E04-05	240.5	NA	13.26	NA	14.3	8.5	NC	NC
13E04-06	240.5	NA	13.26	NA	14.3	7.5	NC	NC
13E04-07	240.5	NA	13.26	NA	14.3	8.0	NC	NC
13E04-08	240.5	NA	13.26	NA	14.3	7.5	NC	NC
13E04-09	240.5	NA	13.26	NA	14.3	8.0	NC	NC
13E04-10	240.5	NA	13.26	NA	14.3	8.0	NC	NC
13E04-11	240.5	NA	13.26	NA	14.3	8.0	NC	NC
13E04-12	240.5	NA	13.26	NA	14.3	7.5	NC	NC
13E04-13	240.5	NA	13.26	NA	14.3	8.0	NC	NC
13E04-14	240.5	NA	13.26	NA	14.3	9.0	NC	NC
13E04-15	240.5	NA	13.26	NA	14.3	7.5	NC	NC
13E04-16	240.5	NA	13.26	NA	14.3	8.0	NC	NC
13E04-17	240.5	NA	13.26	NA	14.3	8.5	NC	NC

APPENDIX C
RADIOLOGICAL DATA (FIDLER SURVEY MOUND SOIL SCREENING FACILITY DATA)

	FIDLER SURVEY DATA						MOUND SOIL SCREENING FACILITY DATA	
SMPID	Contamination Criteria CH1	FIDLER Readings CH1	Contamination Criteria CH2	FIDLER Readings CH2	Contamination Criteria Out Channel	FIDLER Readings Out Channel	Plutonium - 238	Thorium - 232
	Units: CPM	Units: CPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: pCi/g	Units: pCi/g
	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
13E04-18	240.5	NA	13.26	NA	14.3	7.5	NC	NC
13E04-19	240.5	NA	13.26	NA	14.3	8.0	NC	NC
13E04-20	240.5	NA	13.26	NA	14.3	8.0	NC	NC
13E04-21	240.5	NA	13.26	NA	14.3	8.0	NC	NC
13E04-22	240.5	NA	13.26	NA	14.3	7.5	NC	NC
13E04-23	240.5	NA	13.26	NA	14.3	7.5	NC	NC
13E04-24	240.5	NA	13.26	NA	14.3	8.0	NC	NC
13E04-25	240.5	NA	13.26	NA	14.3	7.5	NC	NC
13E05	NA	NA	NA	NA	NA	NR	NS	NS
13E05-01	240.5	NA	13.26	NA	14.3	7.5	NC	NC
13E05-02	240.5	NA	13.26	NA	14.3	7.5	NC	NC
13E05-03	240.5	NA	13.26	NA	14.3	8.0	NC	NC
13E05-04	240.5	NA	13.26	NA	14.3	7.5	NC	NC
13E05-05	240.5	NA	13.26	NA	14.3	7.5	NC	NC
13E05-06	240.5	NA	13.26	NA	14.3	7.5	NC	NC
13E05-07	240.5	NA	13.26	NA	14.3	7.5	NC	NC
13E05-08	240.5	NA	13.26	NA	14.3	7.0	NC	NC
13E05-09	240.5	NA	13.26	NA	14.3	7.0	NC	NC
13E05-10	240.5	NA	13.26	NA	14.3	7.5	NC	NC
13E05-11	240.5	NA	13.26	NA	14.3	8.0	NC	NC
13E05-12	240.5	NA	13.26	NA	14.3	7.5	NC	NC
13E05-13	240.5	NA	13.26	NA	14.3	8.0	NC	NC
13E05-14	240.5	NA	13.26	NA	14.3	8.5	NC	NC
13E05-15	240.5	NA	13.26	NA	14.3	8.5	NC	NC
13E05-16	240.5	NA	13.26	NA	14.3	8.5	NC	NC
13E05-17	240.5	NA	13.26	NA	14.3	8.0	NC	NC
13E05-18	240.5	NA	13.26	NA	14.3	8.0	NC	NC
13E05-19	240.5	NA	13.26	NA	14.3	7.5	NC	NC
13E05-20	240.5	NA	13.26	NA	14.3	7.0	NC	NC
13E05-21	240.5	NA	13.26	NA	14.3	7.0	NC	NC
13E05-22	240.5	NA	13.26	NA	14.3	7.5	NC	NC

APPENDIX C
RADIOLOGICAL DATA (FIDLER SURVEY MOUND SOIL SCREENING FACILITY DATA)

	FIDLER SURVEY DATA						MOUND SOIL SCREENING FACILITY DATA	
SMPID	Contamination Criteria CH1	FIDLER Readings CH1	Contamination Criteria CH2	FIDLER Readings CH2	Contamination Criteria Out Channel	FIDLER Readings Out Channel	Plutonium - 238	Thorium - 232
	Units: CPM	Units: CPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: pCi/g	Units: pCi/g
	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
13E05-23	240.5	NA	13.26	NA	14.3	7.5	NC	NC
13E05-24	240.5	NA	13.26	NA	14.3	7.0	NC	NC
13E05-25	240.5	NA	13.26	NA	14.3	6.5	NC	NC
13E06	NA	NA	NA	NA	NA	NR	NS	NS
13F01	NA	NA	NA	NA	NA	NR	NS	NS
13F02	NA	NA	NA	NA	NA	NR	NS	NS
13F03	NA	NA	NA	NA	NA	NR	NS	NS
13F04	NA	NA	NA	NA	NA	NR	NS	NS
13F05	NA	NA	NA	NA	NA	NR	NS	NS
13F06	NA	NA	NA	NA	NA	NR	NS	NS

CH1 - Channel 1
CH2 - Channel 2
NR - Reading not recorded.
NC - No sample collected, location not at grid point.
NA - Reading not taken; contamination criteria for the out channel not exceeded.
NS - No sample collected; insufficient soil volume due to gravel/rocky soil conditions.
CPM - Counts per minute
KCPM - Counts per minute x 1000
pCi/g - Picocuries per gram
SMPID - Sample identification number.

APPENDIX D

SOIL GAS SURVEY REPORT

FINAL REPORT OF FINDINGS
OF THE PETREX SOIL GAS SURVEY
AT AREA OF CONCERN -13 / OPERABLE UNIT -5
U. S. DEPARTMENT OF ENERGY MOUND FACILITY
MIAMISBURG, OHIO

PREPARED BY: DATE:

Paul C. Bedard, Project Manager

October 27, 1994

APPROVED BY: DATE:

James H. Viellenave, Vice President

10/27/94

NORTHEAST RESEARCH INSTITUTE LLC
605 PARFET STREET, SUITE 100
LAKEWOOD, COLORADO 80215
(303) 238-0090

0594-2114E

8.2 Findings

Sample analysis indicated the occurrence of light and medium weight (C_4 to C_{11}) petroleum hydrocarbons, and the halogenated hydrocarbons tetrachloroethene (PCE), trichloroethene (TCE), trichloroethane (TCA), trichlorofluoromethane (Freon-11), and trichlorotrifluoroethane (Freon-113) in the soil gas.

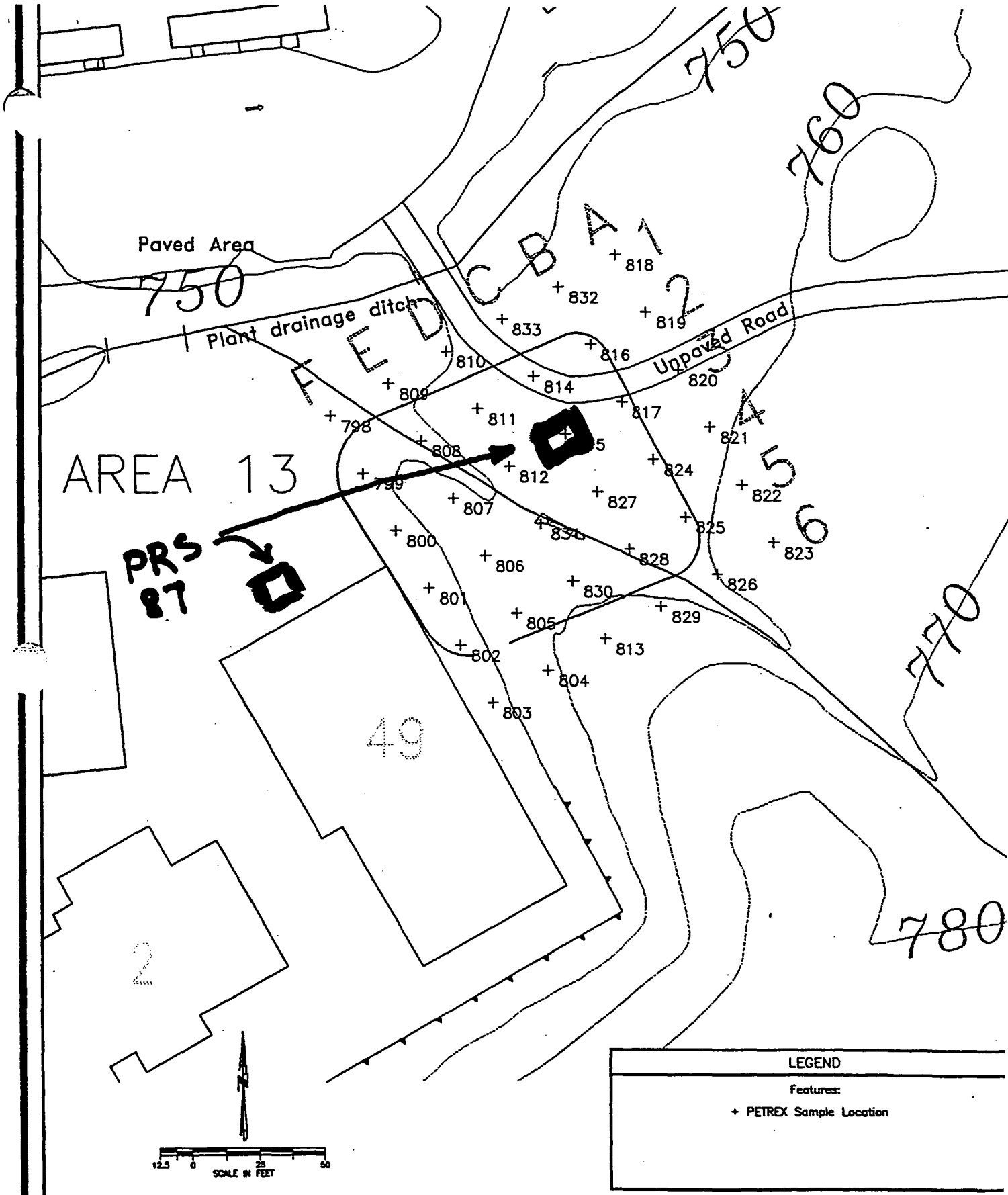
The majority of the samples exhibited a combination of petroleum hydrocarbon compounds of which C_6 to C_{10} aromatics and C_4 to C_9 cycloalkanes/alkenes were the most prominent. C_4 to C_9 alkanes, C_4 to C_{11} cycloalkenes/dienes, and the semivolatile compounds naphthalene and methylnaphthalene were also present in the majority of samples, but at less pronounced levels relative to the combination.

All of these compounds are common constituents of most petroleum fuels, heating oils, some light lubricating oils, and many other petroleum based products. However, the combinations of these hydrocarbon compounds observed in the majority of the samples (exemplified by the mass spectrum of sample #801) are most typical of the composition of vapor derived from the dilute residue of variously weathered fuel-like petroleum products in the subsurface.

TCE and PCE were the most frequently detected halogenated organic compounds in the soil gas (see the mass spectra of samples #809 and #827). The other halogenated hydrocarbons, named above, were detected much less frequently. TCA was confidently detected only in samples #803, #818, #828, and #832 (see mass spectrum of sample #832). Freon-11 and Freon-113 were confidently detected, and generally at only very low relative levels, in samples #800, #803 and #832. Dichloroethene (DCE) was not confidently identified in any sample; however, samples #799, #803, and #828 did exhibit the potential to contain low relative levels of this compound. No other halogenated compounds were detected in the soil gas. The highest relative levels of PCE and TCE were both detected in sample #803.

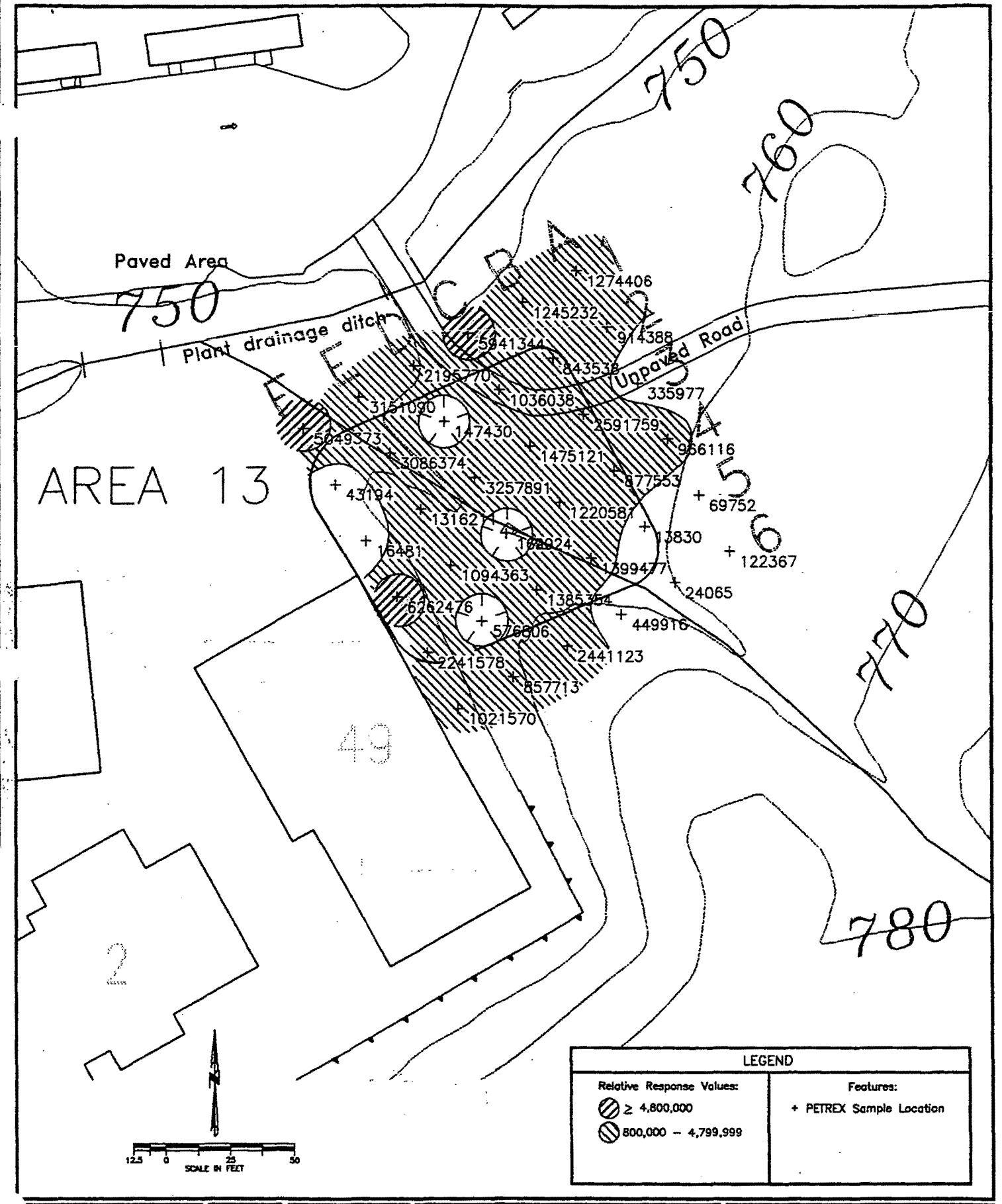
Results for the targeted compound groups and their areal distribution on-site are discussed in greater detail in section 9.0, below.

The high sensitivity to VOC's inherent in the Petrex Technique must be considered in the evaluation of these findings. Elevated relative levels of VOC's and SVOC's in the soil gas detected in this Petrex survey may derive from concentrations of these VOC's and SVOC's in soil and/or groundwater which are below the threshold of detection of most quantitative analyses.

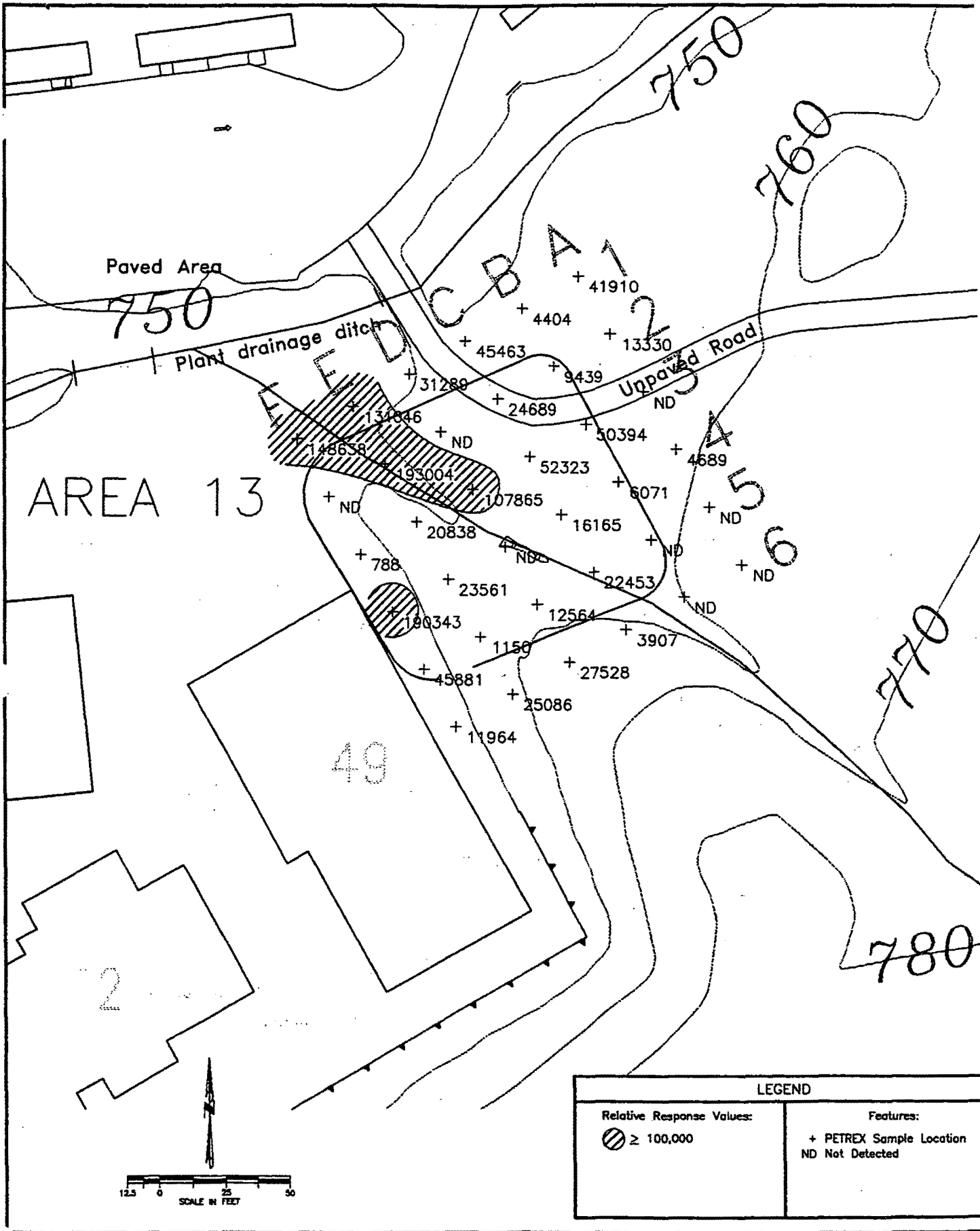


Prepared by: Northeast Research Institute LLC, 605 Parfet Street, Suite 100, Lakewood, Colorado 80215, (303) 238-0090	Drawn By: JCS	Project #: 2114E	AOC-13/Operable Unit-5
	Checked By:	Date: October 10, 1994	USDOE Mound Facility, Miamisburg, Ohio
	Project Manager: PCB	File Name: 13-1.dwg	PETREX FINGERPRINT TECHNOLOGY®

Sample Locations



Prepared by: Northeast Research Institute LLC, 605 Parfet Street, Suite 100, Lakewood, Colorado 80215, (303) 238-0080	Drawn By: JCS	Project #: 2114E	AOC-13/Operable Unit-5	Relative Response
	Checked By:	Date: October 10, 1994	USDOE Mound Facility, Miamisburg, Ohio	Total Aromatic Hydrocarbons
	Project Manager: PCB	File Name: 13-2.dwg	PETREX FINGERPRINT TECHNOLOGY®	Plate 2



Prepared by:
Northeast Research Institute LLC
605 Parfet Street
Suite 100
Lakewood, Colorado 80215
(303) 238-0090

Drawn By: JCS	Project #: 2114E
Checked By:	Date: October 10, 1994
Project Manager: PCB	File Name: 13-3.dwg

AOC-13/Operable Unit-5

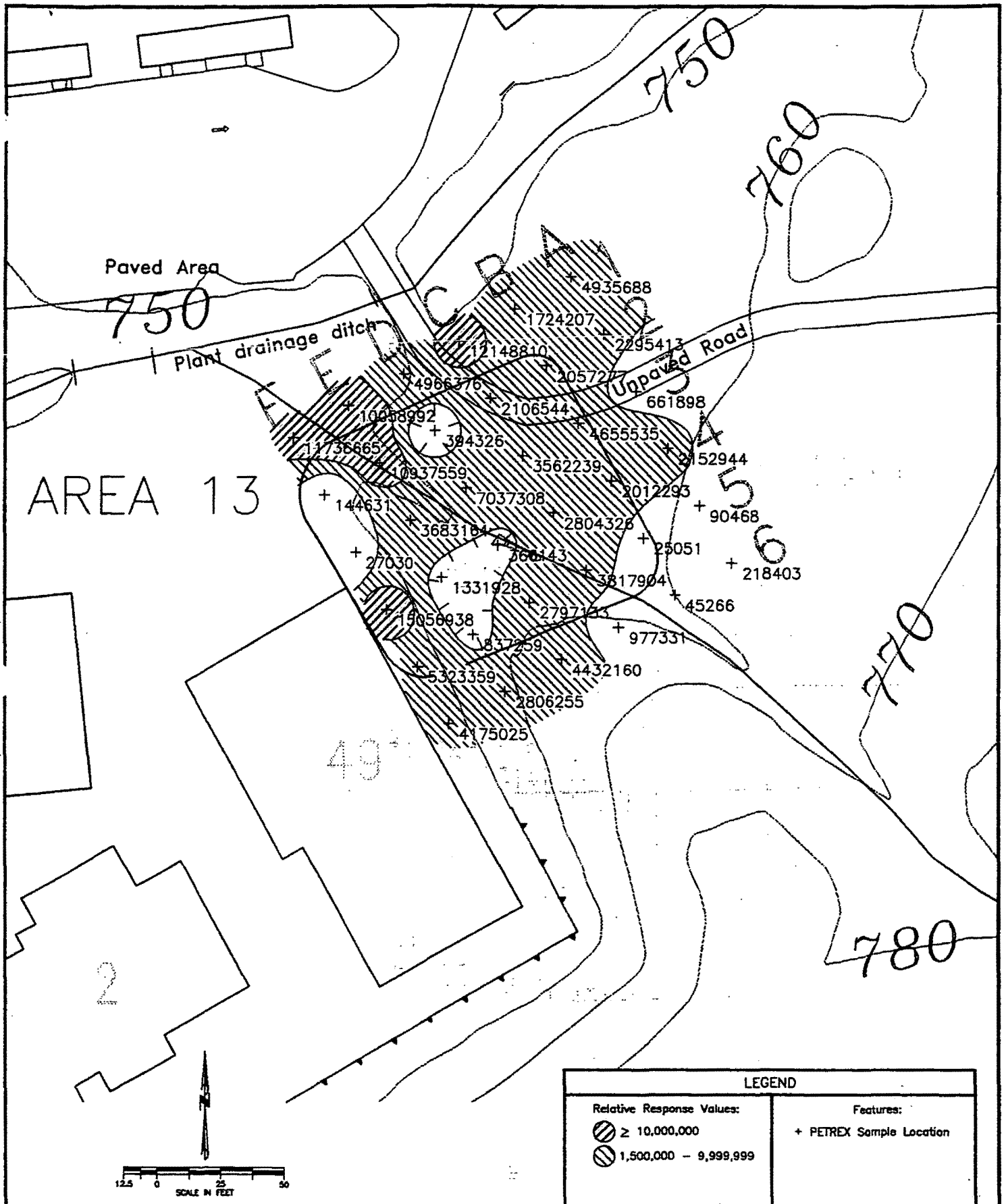
USDOE Mound Facility
Miamisburg, Ohio

PETREX FINGERPRINT TECHNOLOGY®

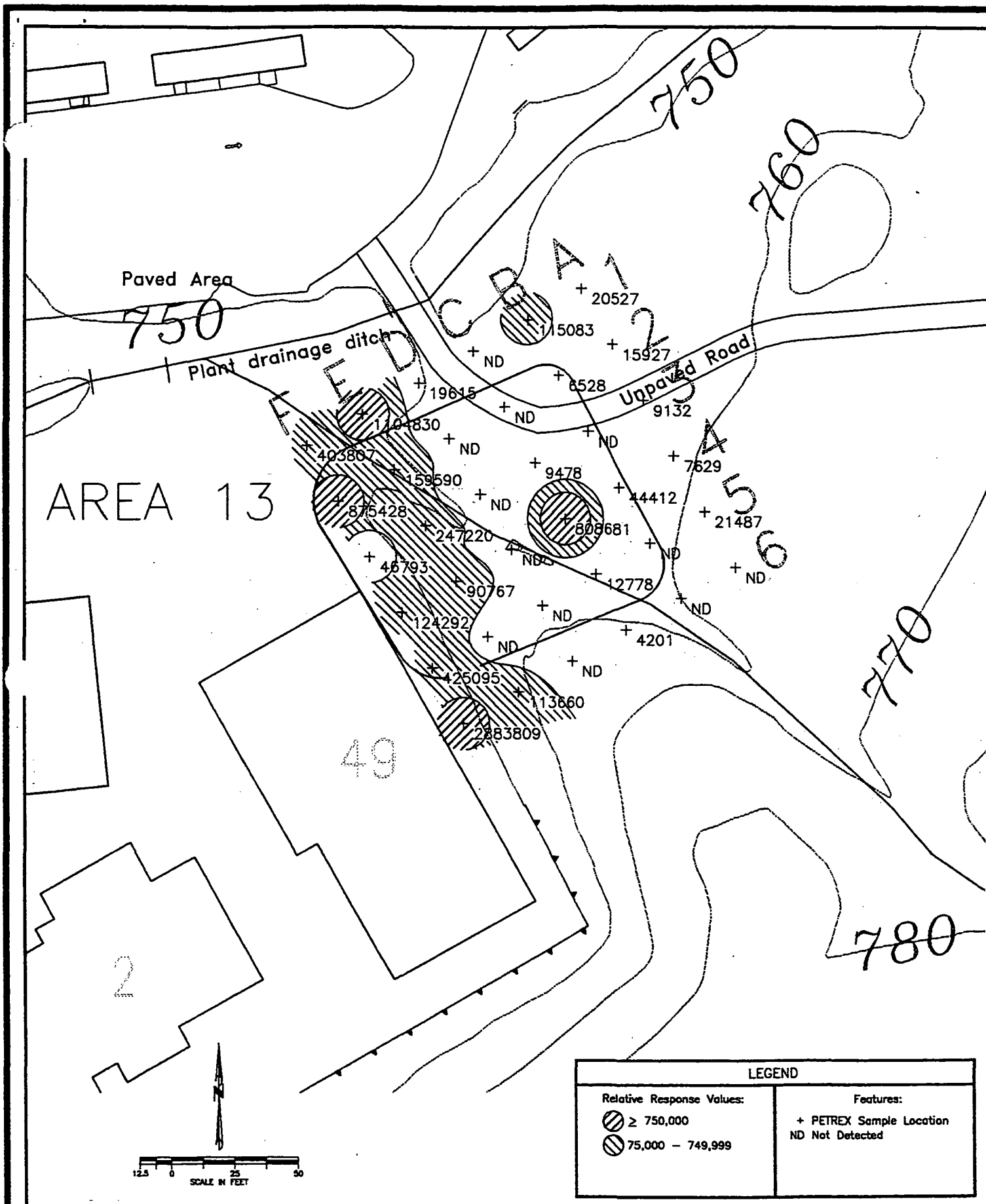
Relative Response

Total Semivolatile Hydrocarbons

Plate 3



Prepared by: Northeast Research Institute LLC, 605 Parfet Street, Suite 100, Lakewood, Colorado 80215, (303) 238-0080	Drawn By: JCS	Project #: 2114E	AOC-13/Operable Unit-5	Relative Response
	Checked By:	Date: October 10, 1994	USDOE Mound Facility, Miamisburg, Ohio	Total C5-C11 Petroleum Hydrocarbons
	Project Manager: PCB	File Name: 13-4.dwg	PETREX FINGERPRINT TECHNOLOGY®	Plate 4



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
	Checked By:	Date: October 10, 1994	USDOE Mound Facility, Miamisburg, Ohio
	Project Manager: PCB	File Name: 13-5.dwg	PETREX FINGERPRINT TECHNOLOGY®

Relative Response

Total Halogenated Hydrocarbons

Plate 5

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

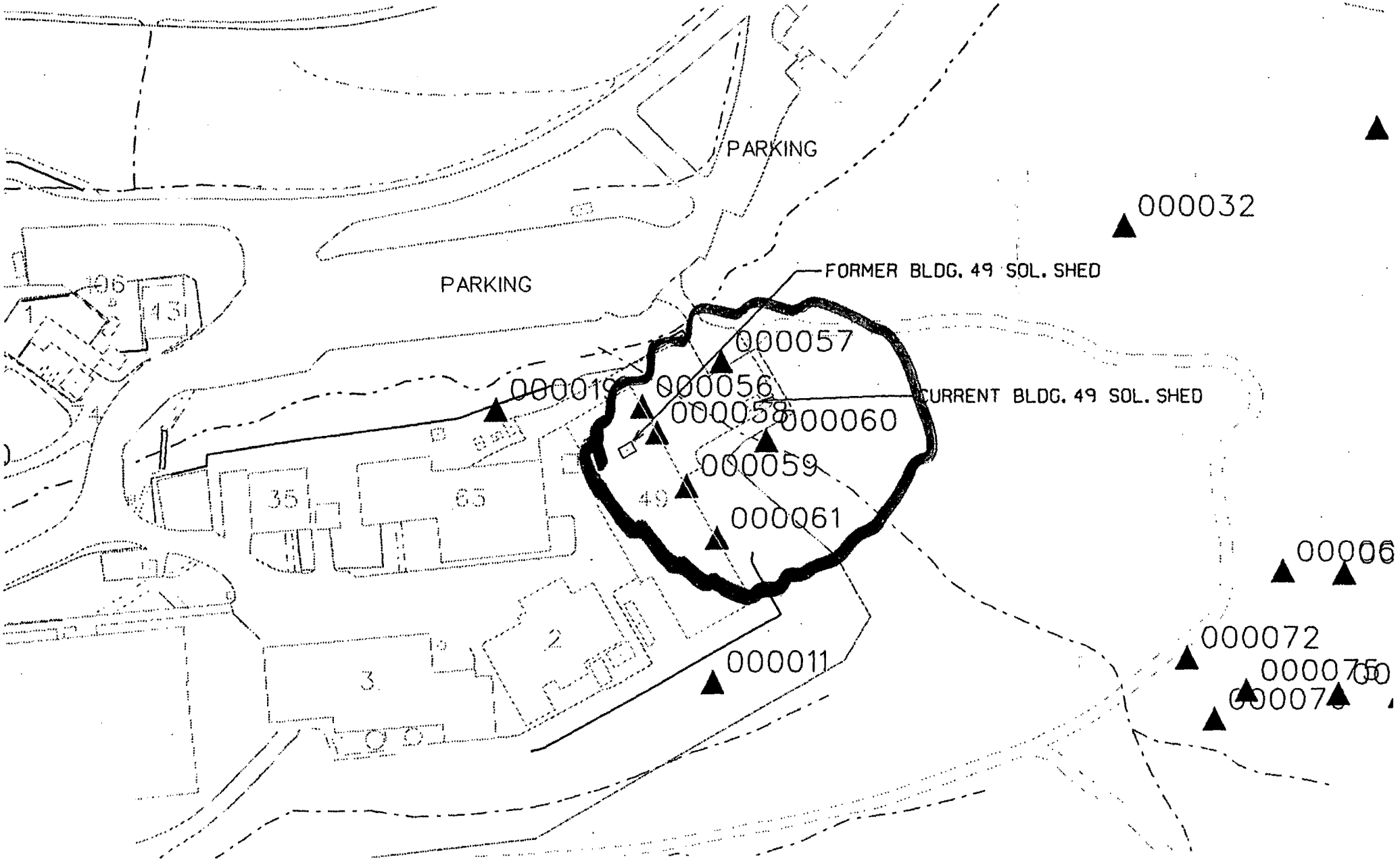


Figure 1.1. Locations of soil sampling sites.

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
SGC-NAC-000012	Drilled to 2 feet due to utilities.
SGC-SAN-000018	Core sampler hit refusal at 2 feet; relocated from inside
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
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;
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
SGC-SDB-000102	Relocation of SGC-SDB-000100; first location surveyed

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

ANALYTE	SGC A61 ~~000055~~	SGC A13 000057	SGC A13 000058	SGC A13 000059	SGC A61 000061	SGC AOJ ~~000063~~	Background	10^{-6} Construction Worker Guidelines
VOLATILES (µg/Kg)								
Acetone							NA	105000000
1,2-Dichloroethene (total)					36		NA	21500000
2-Butanone							NA	46500000
Benzene							NA	8900
Carbon Disulfide							NA	1400000
Chloroform							NA	NA
Chloromethane							NA	NA
Ethylbenzene							NA	480
Methylene Chloride			7				NA	NA
Tetrachloroethene					1 J		NA	10500000
Toluene	1 J			3 J		1 J	NA	1250000
Trichloroethene		3 J			43000 D		NA	41000
Xylene (total)				1 J			NA	2150000000

J - Numerical value is an estimated quantity
NA - Value not available
D - Sample was diluted
C - Estimated due to error in calibration
µg/kg - micrograms per kilogram

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

ANALYTE	SGC A61 ~~000053~~	SGC A13 000056	SGC A13 000057	SGC A13 000058	SGC A13 000060	SGC A13 000061	Background	10^{-6} Construction Worker Guidelines
SEMIVOLATILES (µg/Kg)								
Acenaphthene							NA	NA
Acenaphthylene							NA	NA
Anthracene	79 J				30 J		NA	320000000
Benzo(a)anthracene	210 J			29 J	71 J		NA	4100
Benzo(a)pyrene	190 J			28 J	67 J		NA	410
Benzo(b)fluoranthene	140 J			17 J	55 J		NA	4100
Benzo(g,h,i)perylene	120 J			13 J	60 J		NA	NA
Benzo(k)fluoranthene	150 J			22 J	63 J		NA	41000
Bis(2-ethylhexyl)phthalate		27 J	28 J		36 J	28 J	NA	215000
Butylbenzylphthalate							NA	215000000
Carbazole	24 J						NA	NA
Chrysene	210 J			32 J	81 J		NA	410000
Di-n-butyl phthalate							NA	105000000
Di-n-octyl phthalate							NA	21500000
Dibenz(a,h)anthracene	35 J						NA	410
Dibenzofuran							NA	NA
Diethyl phthalate							NA	NA
Fluoranthene	480	22 J		65 J	190 J		NA	42500000
Fluorene							NA	NA
Indeno(1,2,3-cd)pyrene	100 J			17 J	48 J		NA	4100
2-Methylnaphthalene							NA	NA
Naphthalene							NA	NA
Phenanthrene	290 J			35 J	140 J		NA	NA
Phenol							NA	650000000
Pyrene	390	18 J		57 J	140 J		NA	32000000

J - Numerical value is an estimated quantity
NA - Value not available
µg/kg - micrograms per kilogram

H - Analyzed outside holding time
D - Sample was diluted

Soil Gas Confirmation Sampling
A[illegible]96

Table A.3. Soil Gas Confirmation Detected Pesticides/PCB's

ANALYTE	SGC NAC ~~000008~~	SGC NAC ~~000010~~	SGC NAC ~~000031~~	SGC A66 ~~000041~~	SGC A61 ~~000044~~	SGC A13 000060	Background	10^{-6} Construction Worker Guidelines
PESTICIDES/PCB (µg/kg)								
Aroclor-1248	48			110	98		ND	380
Aroclor-1254	43				55		ND	21500
Alpha-Chlordane							ND	NA
Gamma-Chlordane						3.7	ND	NA
4,4'-DDT							13000	9000
Dieldrin		4.4	5*				ND	185
Endosulfan I				3.4*	2.4*		ND	NA
Endosulfan II							NA	NA
Endrin			11*				ND	NA
Heptachlor						2.9	ND	NA

* - Unconfirmed due to interference
NA - Value not available
ND - No detections in background samples
µg/kg - micrograms per kilogram

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

ANALYTE	SGC A61 ~~00055~~		SGC A13 000056		SGC A13 000057		SGC A13 000058		SGC A13 000059		SGC A13 000060		Background	10^{-6} Construction Worker Guidelines
INORGANICS (mg/kg)														
Aluminum	11300		1610		5660		1260		4400		4700		19000	NA
Antimony			0.61	B	0.79	B					0.84	B	NA	425
Arsenic	6.7		3.5	B	4.3	B	3.1		4.7		5		8.6	320
Barium	77.4		14.7	B	44.8	B	13.3	B	65.1		40.7	B	180	75000
Beryllium	0.8				0.09	B							1.3	0.7
Bismuth													NA	NA
Cadmium			1.1		2.6		0.16	B	2.4		2.6		2.1	1050
Calcium	15500		149000		174000		157000		137000		139000		310000	NA
Chromium	15.5		2.4		5.8		4.2		5		5		20	1050000
Cobalt	13		1.9	B	5.6	B	1.7	B	4.8	B	5.7	B	19	NA
Copper	15.5		9.2		7.7		11		11.5		12.4		26	NA
Cyanide													ND	21400
Iron	24400		5180		12300		4560		11200		11700		35000	NA
Lead	22.1		6.3		9.9		4.4		6		9.4		48	NA
Lithium	15.5	B	3.6	B	7.5	B	4.6	B	8.9	B	7.3	B	26	NA
Magnesium	4720		64200		45500		79100		65100		33700		40000	NA
Manganese	933		233		885		199		215		574		1400	135000
Mercury													NC	320
Molybdenum	1.1	B	1.3	B	1.1	B	1.2	B	2.5	B	1.8	B	27	NA
Nickel	19.1		4.4	B	9.9		4.3	B	10.7		9.6		32	21500
Potassium	1450		374	B	904	B	250	B	985	B	776	B	1900	NA
Selenium													NA	NA
Silver													1700	5500000
Sodium	94.8	B	227	B	265	B	220	B	248	B	268	B	240	NA
Thallium													460	NA
Tin					1.2	B			1.2	B	0.9	B	20	NA
Vanadium	21.6		5.7	B	12.4		5.4		10.1	B	11.6		25	7500
Zinc	54.6		21.5		29.3		37.7		35.7		39		140	320000

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

ANALYTE	SGC A13 000061		SGC A0J ~~000062~~		SGC A0J ~~000063~~		SGC A0J ~~000064~~		SGC A0J ~~000065~~		SGC A0J ~~000066~~		Background	10^{-6} Construction Worker Guidelines
INORGANICS (mg/kg)														
Aluminum	5670		9860		7380		890		5690		2910		19000	NA
Antimony			0.55	B	0.67	B					0.55	B	NA	425
Arsenic	5.4		4.2	B	3.6	B	2	B	2.9		3.7	B	8.6	320
Barium	49.3		66.7		43.1		6.1	B	44.9	B	19.5	B	180	75000
Beryllium	0.1	B	0.25	B	0.14	B			0.38				1.3	0.7
Bismuth													NA	NA
Cadmium	2.9		3.9		3.2		0.49	B			1.4		2.1	1050
Calcium	138000		93600		96600		231000		116000		171000		310000	NA
Chromium	6.3		9.6		8		1.3	B	9		2.4		20	1050000
Cobalt	6.4	B	7.1	B	6.4	B	0.85	B	6	B	2.6	B	19	NA
Copper	14.3		13.2		12.9		1.8	B	12.5		10.5		26	NA
Cyanide													ND	21400
Iron	13800		18100		15300		2330		13500		6330		35000	NA
Lead	7.6		10.3		28.7		4		10		9.4		48	NA
Lithium	14.6	B	11.5	B	12.2	B	1.9	B	13.3	B	3.9	B	26	NA
Magnesium	51800		23700		23000		146000		48800		85800		40000	NA
Manganese	328		419		399		163		345		240		1400	135000
Mercury													NC	320
Molybdenum	3.2	B	1.5	B	1.2	B	0.42	B	2.2	B	0.59	B	27	NA
Nickel	13.8		14.2		12.9		1.4	B	14.3		4.8	B	32	21500
Potassium	1380		1450		628	B	423	B	1400		666	B	1900	NA
Selenium													NA	NA
Silver													1700	5500000
Sodium	245	B	833	B	406	B	483	B	186	B	287	B	240	NA
Thallium													460	NA
Tin	1	B	1.4	B	1.5	B	0.96	B	0.98	B	0.64	B	20	NA
Vanadium	12.2		17.8		13.5		3.4	B	12.6		7.9	B	25	7500
Zinc			46		48.6		8.6		44		21.9		140	320000

J - Numerical value is an estimated quantity

B - Analyte detected below CRDL but above ...

Program

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

ANALYTE	SGC A61 ~~000050~~	SGC A61 ~~000051~~	SGC A61 ~~000052~~	SGC A61 ~~000053~~	SGC NAC ~~000054~~	SGC A61 ~~000055~~	SGC A13 000056	Background	10^{-6} Construction Worker Guidelines
RADIONUCLIDES (pCi/g)									
Americium-241								ND	4.95
Bismuth-207								ND	0.175
Bismuth-210								ND	NA
Cesium-137		0.718						0.42	0.46
Cobalt-60								NC	0.1
Plutonium-238	0.138	2.25	0.0678	0.756	0.147	0.215	0.0451	0.13	5.5
Plutonium-239/240		0.0221	0.00605	0.00862	0.00291			0.18	5.5
Potassium-40	23.2	20.2	30.2	9.48	22.0	18.6	9.27	37	NA
Radium-226	0.794	1.01	0.810	0.532	0.629	1.02		2	0.14
Thorium-228	0.796	0.928	0.879	0.419	0.948	1.35	0.283	1.5	0.85
Thorium-230	0.763	0.833	0.835	0.594	0.867	1.14	0.606	1.9	44
Thorium-232	0.835	0.718	0.976	0.0346	0.896	1.16	0.384	1.4	50
Uranium-234	0.723	0.675	0.653	0.467	0.645	1.02	0.374	1.1	37.5
Uranium-235		0.0565			0.0541	0.0428		0.11	3.35
Uranium-238	0.885	0.734	0.648	0.387	0.816	1.02	0.576	1.2	11

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

ANALYTE	SGC A13 000057	SGC A13 000058	SGC A13 000059	SGC A13 000060	SGC A13 000061	SGC AOJ ~~000062~~	SGC AOJ ~~000063~~	Background	10^{-6} Construction Worker Guidelines
RADIONUCLIDES (pCi/g)									
Americium-241								ND	4.95
Bismuth-207								ND	0.175
Bismuth-210								ND	NA
Cesium-137	0.169							0.42	0.46
Cobalt-60								NC	0.1
Plutonium-238	1.79	0.102	0.0392	0.370	0.0845	0.258	1.33	0.13	5.5
Plutonium-239/240	0.0388					0.00226	0.0208	0.18	5.5
Potassium-40	18.1	6.93	12.6	9.18	7.99	7.38	5.18	37	NA
Radium-226	0.695	0.600	0.982	0.649	0.584	0.492	0.574	2	0.14
Thorium-228	0.983	0.260	0.667	0.494	0.332	0.250	0.440	1.5	0.85
Thorium-230	0.982	0.735	0.984	0.698	0.758	0.618	0.525	1.9	44
Thorium-232	0.755	0.151	0.663	0.529	0.347	0.316	0.437	1.4	50
Uranium-234	0.771	0.619	0.723	0.493	0.461	0.640	0.612	1.1	37.5
Uranium-235	0.0422							0.11	3.35
Uranium-238	0.772	0.737	0.784	0.649	0.564	0.623	0.713	1.2	11

ND - No detections in background samples
NA - Data not available
NC - Background value not computed
pCi/g - picocuries per gram

RISK-BASED GUIDELINE VALUES

MOUND PLANT
MIAMISBURG, OHIO

December 1995

Submitted to the
Office of Southwestern Area Programs (EM-453)
Environmental Restoration
and the
Miamisburg Area Office
U.S. DEPARTMENT OF ENERGY

Prepared by
HAZARDOUS WASTE REMEDIAL ACTIONS PROGRAM
Environmental Management and Enrichment Facilities
Managed by
LOCKHEED MARTIN ENERGY SYSTEMS, INC.
for the
U.S. DEPARTMENT OF ENERGY
under contract DE-AC05-84OR21400

FINAL
(REVISION 0)

TABLE 5A

Commercial/Office Worker - Soil Guideline Values: Chemicals (Units = mg/kg)

CHEMICAL	Ingestion				Inhalation				Ingestion + Inhalation			
	GV for TR=10^{-4}	GV for TR=10^{-5}	GV for TR=10^{-6}	GV for HI=1	GV for TR=10^{-4}	GV for TR=10^{-5}	GV for TR=10^{-6}	GV for HI=1	GV for TR=10^{-4}	GV for TR=10^{-5}	GV for TR=10^{-6}	GV for HI=1
Tribromomethane	7.2E+04	7.2E+03	7.2E+02	4.1E+04	1.6E+09	1.6E+08	1.6E+07		7.2E+04	7.2E+03	7.2E+02	
Trichloroethylene* (TCE)	5.2E+04	5.2E+03	5.2E+02		4.4E+02	4.4E+02	4.5E+01		4.4E+02	4.1E+02	4.1E+01	
Trichlorofluoromethane				6.1E+05				7.3E+02				7.3E+02
Trichloromethane	9.4E+04	9.4E+03	9.4E+02	2.0E+04	3.1E+02	3.1E+01	3.1E+00		3.1E+02	3.1E+01	3.1E+00	
Xylene				4.1E+06								
bis(2-Ethylhexyl)phthalate	4.1E+04	4.1E+03	4.1E+02	4.1E+04								
PAHs												
Acenaphthylene												
Anthracene				6.1E+05								
Benzo(a)anthracene	7.8E+02	7.8E+01	7.8E+00									
Benzo(a)pyrene	7.8E+01	7.8E+00	7.8E-01									
Benzo(b)fluoranthene	7.8E+02	7.8E+01	7.8E+00									
Benzo(g,h,i)perylene												
Benzo(k)fluoranthene	7.8E+03	7.8E+02	7.8E+01									
Dibenz(a,h)anthracene	7.8E+01	7.8E+00	7.8E-01									

* Trichloroethylene is also known as trichloroethene or TCE

SOIL SCREENING LEVEL CALCULATIONS

Soil concentrations that pose no calculated threat to groundwater

REFERENCES

Schairbaum, J.R. and Frost, J.P. 1988. "The Hydrology of Sicamore Farm - A Preliminary Report." Center for Ground water Management, Wright State University. September 20, 1988.

DOE. 1994. "Operable Unit 9, Hydrogeologic Investigation: Bedrock Report." U.S. Department of Energy, Albuquerque Field Office, Albuquerque, New Mexico. January, 1994.

USEPA. 1994. "Technical Background Document for soil Screening Guidance - Review Draft." U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. EPA/540/R-94/106 December, 1994

Soil Screening Level (15m source, 0.1 hydraulic gradient, 300m from receptor)

A Soil Screening Level (SSL) is the level of contamination that can exist in soil that does not adversely affect the quality of groundwater at a potential drinking water source such as the Buried Valley Aquifer (BVA).

Soil Screening Calculations are used to determine if a PRS may adversely affect ground water quality due to leaching of organic soil contaminants. These equations conservatively calculate the effects of soil leaching and ground water mixing at a particular PRS. The input parameters represent conditions at the PRS. MCLs are assumed to be protective of ground water that will be used as a drinking water source. Note that the distance a PRS lies from a potential drinking water receptor (BVA) generally controls the amount of ground water mixing.

NOTE: Once the equation calculates a mixing zone depth (d) that is equal to the aquifer thickness (da), no additional mixing or dilution takes place. This is the maximum attentuation that the Soil Screening Level Equation calculates. All distances to a potential receptor greater than the distance that first causes the mixing zone depth to equal the aquifer thickness creates no additional attenuation. For this reason, the tables are only reproduced until (d) is equal to the aquifer thickness, which in the case of the Mound Plant Bedrock is 15 m.

Parameters for soil leaching calculation:			
Definition	**Parameter**	**Main Hilltop soil**	**Units**
source length parallel to ground water flow	**L**	**15**	**m**
aquifer thickness (DOE 1994)	da	15	m
hydraulic conductivity (DOE 1994)	K	52	m/y
hydraulic gradient at the source	**i**	**0.1**	**m/m**
horizontal distance to receptor	**xr**	**300**	**m**
infiltration rate (Schairbaum & Frost 1988)	in	0.15	m/y
soil-water partition coefficient (Koc * foc for organic chemicals)	Kd	chemical specific	L/kg
saturated porosity	Ow	0.15	
air filled porosity	Oa	0.28	
Henry's Law constant * 41 (0 for metals and radionuclides)	H	chemical specific	
dry soil bulk density	B	1.6	kg/L
soil organic carbon/water partition coefficient	Koc	chemical specific	L/kg
fraction organic carbon in soil (DOE Mound Plant Data Base)	foc	0.02	
mixing zone depth	d	15	m
dilution factor (used to multiply the target concentration)	df=	35.67	

Mixing Zone Depth Calculation

MIXING ZONE DEPTH (d)

$d = (0.0112(L+xr)^2)^{0.5} + da\{1 - \exp[(\ln(L+xr))/Kida)]\}$ (Equation 3)

DILUTION FACTOR (df) (Equation 4)

$df = 1 + Kid/\ln L$

SOIL SCREENING LEVEL CALCULATION

$SSL = Cw\{Kd + (Ow + (OaH))/B\}$ (Equation 1)

$Kd = Koc * foc$ (Equation 2)

INPUT PARAMETER DEFINITION

MCL	mg/L				
Cw	mg/L	target soil leachate. Acceptable water conc. * df			
Kd	L/kg	soil-water partition coefficient			
Ow		saturated porosity			
Oa		air filled porosity			
H		Henry's Law constant * 41 to make dimensionless			
B	kg/L	dry soil bulk density			
Koc	L/kg	soil organic carbon/water partition coefficient			
foc	g/g	fraction organic carbon in soil			

CHEMICAL NAME	H	Koc	foc	Kd	MCL	10-6 GV	Acceptable	Cw	SSL
		L/kg		L/kg	mg/L	mg/L	Concentration	mg/L	mg/kg
Acenapthene	7.54E-03	5846	0.02	116.92			0	0.00	---
Acetone	1.18E-03	0.46	0.02	0.0092		3.6	3.6	128.40	13.25
Aldrin	4.22E-03	94623	0.02	1892.46			0	0.00	---
Anthracene	4.55E-03	18162	0.02	363.24	0.007		0.007	0.25	90.71
Arochlor 1016		147410	0.02	2948.2			0	0.00	---
Arochlor 1254		892520	0.02	17850.4		0.00073	0.00073	0.03	464.77
Arochlor 1260		4425557	0.02	88511.14		0.000011	0.000011	0.00	34.73
Benzene	2.24E-01	66	0.02	1.32	0.005		0.005	0.18	0.26
Benzo(a)anthracene	1.48E-04	272847	0.02	5456.94	0.007		0.007	0.25	1362.44
Benzo(b)flouranthene	2.53E-04	882588	0.02	17651.76	0.007		0.007	0.25	4407.08
Benzoic Acid	1.37E-05		0.02			140	140	4993.33	468.14
Benzo(a)pyrene	3.43E-05	749569	0.02	14991.38	0.0002		0.0002	0.01	106.94
Bis(2-chlorethyl)ether	8.77E-04	76	0.02	1.52			0	0.00	---
Bis(2-ethylhexyl)phthalate	3.43E-04	94361	0.02	1887.22			0	0.00	---
Bomodichloromethane	1.30E-01	54	0.02	1.08	0.08		0.08	2.85	3.41
Bromoform	2.52E-02	97	0.02	1.94	0.08		0.08	2.85	5.82
Butanol	3.50E-04	5	0.02	0.1			0	0.00	---
Butyl benzyl phthalate	7.83E-05	15975	0.02	319.5		7.3	7.3	260.37	83211.56
Carbazole	8.12E-05	2441	0.02	48.82			0	0.00	---
Carbon disulfide	5.21E-01	52	0.02	1.04		0.033	0.033	1.18	1.44
Carbon tetrachloride	1.18E+00	187	0.02	3.74	0.005		0.005	0.18	0.72
Chlordane	2.73E-03	61155	0.02	1223.1	0.002		0.002	0.07	87.25
p-Chloroaniline	4.80E-05	41	0.02	0.82			0	0.00	---
Chlorobenzene	1.79E-01	213	0.02	4.26			0	0.00	---
Chlorodibromomethane	1.02E-01	72	0.02	1.44	0.08		0.08	2.85	4.43
Chloroform	1.65E-01	47	0.02	0.94	0.08		0.08	2.85	3.03
2-Chlorphenol	6.81E-04		0.02				0	0.00	---
Chyrsene	4.96E-05	312425	0.02	6248.5		0.0046	0.0046	0.16	1025.19
DDD	2.03E-04	84937	0.02	1698.74			0	0.00	---
DDE	5.08E-03	108469	0.02	2169.38		0.00017	0.00017	0.01	13.15
DDT	2.20E-03	77577	0.02	1551.54		0.001	0.001	0.04	55.34
Dibenzo(a,h)anthracene	4.59E-07	1914389	0.02	38287.78			0	0.00	---
Di-n-butyl phthalate	5.86E-05	16851	0.02	337.02		3	3	107.00	36071.17
1,2-Dichlorobenzene (o)	8.61E-02	693	0.02	13.86	0.6		0.6	21.40	298.93
1,2-Dichlorobenzene (p)	1.15E-01	653	0.02	13.06	0.075		0.075	2.68	35.24

CHEMICAL NAME	H	Koc	foc	Kd	MCL	10-6 GV	Acceptable	CW	SSL
		L/kg		L/kg	mg/L	mg/L	Concentration	ng/L	mg/kg
3,3-Dichlorobenzidene	8.53E-07	2441	0.02	48.82			0	0.00	---
1,1-Dichloroethane	2.36E-01	35	0.02	0.7		1.1	1.1	39.23	32.76
1,2-Dichloroethane	5.25E-02	20	0.02	0.4	0.005		0.005	0.18	0.09
1,1-Dichloroethylene	1.04E+01	64	0.02	1.28	0.007		0.007	0.25	0.80
cis-1,2 Dichloroethylene	1.85E-01	29	0.02	0.58	0.07		0.07	2.50	1.76
trans-1,2-Dichloroethylene	2.29E-01	50	0.02	1	0.1		0.1	3.57	4.04
1,2-Dichloropropane	1.15E-01	59	0.02	1.18	0.005		0.005	0.18	0.23
1,3-Dichloropropene	1.21E-01	33	0.02	0.66			0	0.00	---
2.4-Dichlorophenol	9.76E-06		0.02				0	0.00	---
Dieldrin	1.09E-04	18388	0.02	367.76		0.0018	0.0018	0.06	23.62
Diethyl phthalate	2.24E-05	152	0.02	3.04			0	0.00	---
2,4-Dimethylphenol	1.33E-04		0.02				0	0.00	---
Dimethyl phthalate	2.37E-05	32	0.02	0.64			0	0.00	---
2,4-Dinitrophenol	1.98E-07		0.02				0	0.00	---
2,4-Dinotrotolulene	6.03E-06	51	0.02	1.02			0	0.00	---
2,6-Dinotrotolulene	5.33E-06	42	0.02	0.84			0	0.00	---
Di-n-octyl phthalate	3.14E-05	9.8E+08	0.02	19601631		0.73	0.73	26.04	510361125.02
Endosulfan	9.47E-04	738	0.02	14.76			0	0.00	---
Endrin	4.88E-05	9335	0.02	186.7	0.002		0.002	0.07	13.32
Ethylbenzene	3.18E-01	388	0.02	7.76	0.7		0.7	24.97	197.47
Fluoranthene	3.83E-04	72025	0.02	1440.5		0.87	0.87	31.03	44701.63
Fluorene	2.99E-03	9226	0.02	184.52			0	0.00	---
Heptachlor	2.41E-02	11651	0.02	233.02	0.0004		0.0004	0.01	3.33
Heptachlor epoxide	3.40E-04	7236	0.02	144.72	0.0002		0.0002	0.01	1.03
Hexachlorobenzene	2.19E-02	27996	0.02	559.92	0.001		0.001	0.04	19.97
Hexachloro-1,3-butadiene	9.80E-01	6992	0.02	139.84			0	0.00	---
alpha-HCH (alpha-BHC)	2.78E-04	1310	0.02	26.2			0	0.00	---
beta-HCH (beta-BHC)	1.42E-05	1392	0.02	27.84		0.000047	0.000047	0.00	0.05
gamma-HCH (lindane)	1.39E-04	1085	0.02	21.7	0.0002		0.0002	0.01	0.16
Hexachlorocyclopentadien	7.05E-01	9589	0.02	191.78	0.05		0.05	1.78	342.39
Hexachloroethane	1.48E-01	1829	0.02	36.58			0	0.00	---
Indeno(1,2,3-c,d)pyrene	1.99E-07	4364700	0.02	87294		0.000026	0.000026	0.00	80.95
Isophorone	2.54E-04	30	0.02	0.6		7.2	7.2	256.80	178.17
Mercury	4.67E-01		0.02		0.002		0.002	0.07	0.01

CHEMICAL NAME	H	Koc	foc	Kd	MCL	10-6 GV	Acceptable	Cw	SSL
		L/kg		L/kg	mg/L	mg/L	Concentration	mg/L	mg/kg
Methoxychlor	2.60E-04	77936	0.02	1558.72	0.04		0.04	1.43	2223.91
Methyl bromide	5.82E-01	11	0.02	0.22			0	0.00	---
Methyl chloride	1.85E+00	7	0.02	0.14			0	0.00	---
Methylene chloride	9.72E-02	13	0.02	0.26			0	0.00	---
2-Methylphenol	6.72E-05		0.02				0	0.00	---
Napthalene	1.98E-02	1549	0.02	30.98			0	0.00	---
Nitrobenzene	8.45E-04		0.02				0	0.00	---
N-Nitrosodiphenylamine	2.86E-02	327	0.02	6.54			0	0.00	---
N-Nitrosodi-n-proplyamine	1.70E-03	17	0.02	0.34			0	0.00	---
Pentachlorobenzene		13274	0.02	265.48			0	0.00	---
Pentachlorophenol	5.82E-04		0.02		0.001		0.001	0.04	0.00
Phenol	2.44E-05		0.02			22	22	784.67	73.57
Pyrene	3.39E-04	59865	0.02	1197.3		0.68	0.68	24.25	29040.79
Styrene	1.37E-01	573	0.02	11.46	0.1		0.1	3.57	41.29
1;1,2,2-Tetrachloroethane	1.53E-02	104	0.02	2.08			0	0.00	---
Tetrachloroethylene	7.09E-01	139	0.02	2.78	0.005		0.005	0.18	0.53
Toluene	2.52E-01	171	0.02	3.42	1		1	35.67	126.90
Toxaphene	1.38E-04	501	0.02	10.02	0.003		0.003	0.11	1.08
1,2,4-Trichlorobenzene	1.07E-01	1840	0.02	36.8	0.07		0.07	2.50	92.16
1,1,1-Trichloroethane	7.63E-01	110	0.02	2.2	0.2		0.2	7.13	17.31
1,1,2-Trichloroethane	4.10E-02	61	0.02	1.22	0.005		0.005	0.18	0.24
Trichloroethylene	4.35E-01	112	0.02	2.24	0.005		0.005	0.18	0.43
2,4,5-Trichlorophenol	1.80E-04		0.02				0	0.00	---
2,4,6-Trichlorophenol	1.66E-04		0.02				0	0.00	---
Vinyl acetate	2.26E-02	5	0.02	0.1			0	0.00	---
Vinyl chloride	3.45E+00	11	0.02	0.22	0.002		0.002	0.07	0.07
Xylenes (total)	2.48E-01	381	0.02	7.62	10		10	356.67	2766.72
Inorganics									
Antimony			0.02		0.006		0.006	0.21	0.02
Arsenic			0.02	29	0.05		0.05	1.78	51.88
Barium			0.02	1.4	2		2	71.33	106.55
Beryllium			0.02	4600	0.004		0.004	0.14	656.28
Bromate			0.02		0.01		0.01	0.36	0.03
Cadmium			0.02	120	0.005		0.005	0.18	21.42
Chloramine			0.02		4		4	142.67	13.38

CHEMICAL NAME	H	Koc	foc	Kd	MCL	10-6 GV	Acceptable	Cw	SSL
		L/kg		L/kg	mg/L	mg/L	Concentration	mg/L	mg/kg
Chlorine			0.02		4		4	142.67	13.38
Chlorine Dioxide			0.02		0.8		0.8	28.53	2.68
Chromium (total)			0.02	19	0.1		0.1	3.57	68.10
Copper			0.02	10000					
Cyanide			0.02		0.2		0.2	7.13	0.67
Fluoride			0.02		4		4	142.67	13.38
Mercury			0.02	145	0.002		0.002	0.07	10.35
Nickel			0.02	21	0.1		0.1	3.57	75.23
Nitrate			0.02		10		10	356.67	33.44
Nitrite			0.02		1		1	35.67	3.34
Selenium			0.02	5	0.05		0.05	1.78	9.08
Sulfate			0.02		500		500	17833.33	1671.88
Zinc			0.02	420					
Thallium			0.02	71	0.002		0.002	0.07	5.07
Radionuclides					pCi/L	pCi/L	pCi/L		—
Radium 226					20		20	713.33	66.88
Radon					300		300	10700.00	1003.13
Tritium				1	20,000		20000	713333.33	780208.33
Actinium 227						0.076	0.076	2.71	0.25
Americium 241						0.15	0.15	5.35	0.50
Bismuth 207						9.4	9.4	335.27	31.43
Cesium 137						1.5	1.5	53.50	5.02
Cobalt 60						2.5	2.5	89.17	8.36
Plutonium 238				100000		0.16	0.16	5.71	570667.20
Plutonium 239				100000		0.15	0.15	5.35	535000.50
Plutonium 240				100000		0.15	0.15	5.35	535000.50
Strontium 90						0.85	0.85	30.32	2.84
Thorium 228						0.21	0.21	7.49	0.70
Thorium 230						1.3	1.3	46.37	4.35
Thorium 232						1.5	1.5	53.50	5.02