

MOUND



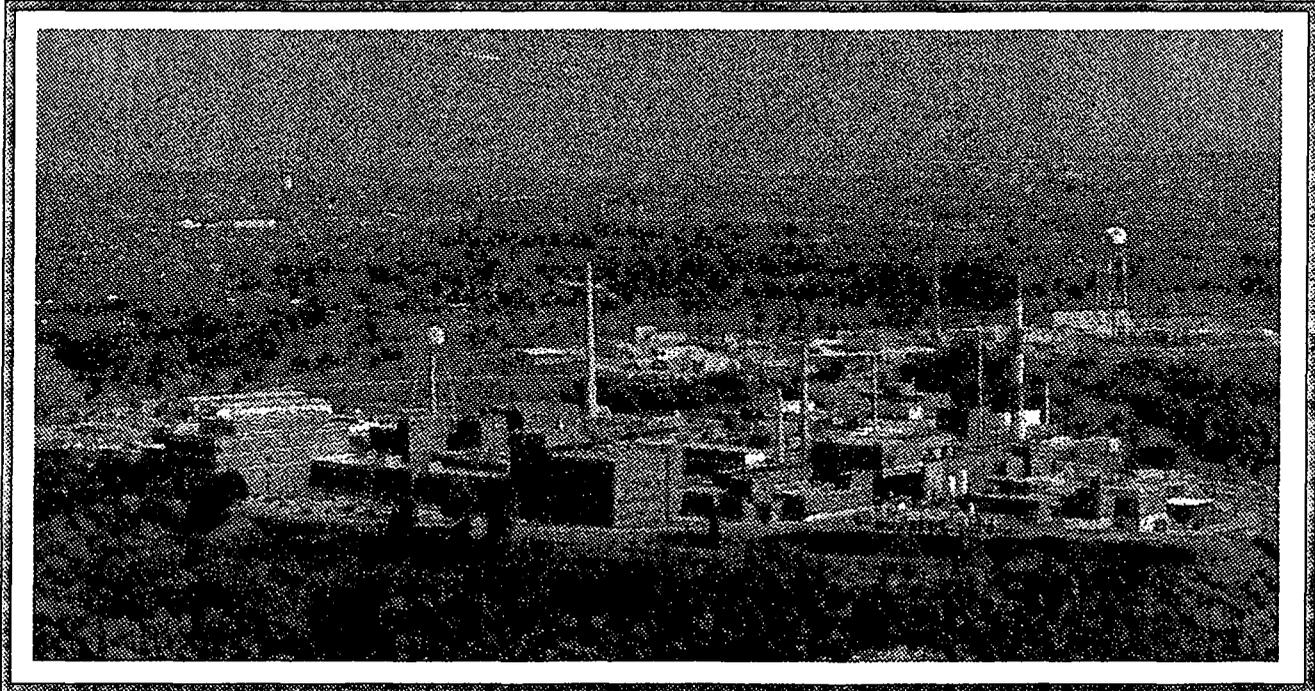
**Environmental
Restoration
Program**



MOUND PLANT

Potential Release Site Package

PRS # 388



REV	DESCRIPTION	DATE
0 PUBLIC RELEASE	Available for comment.	Dec. 19, 1996
1 FINAL		

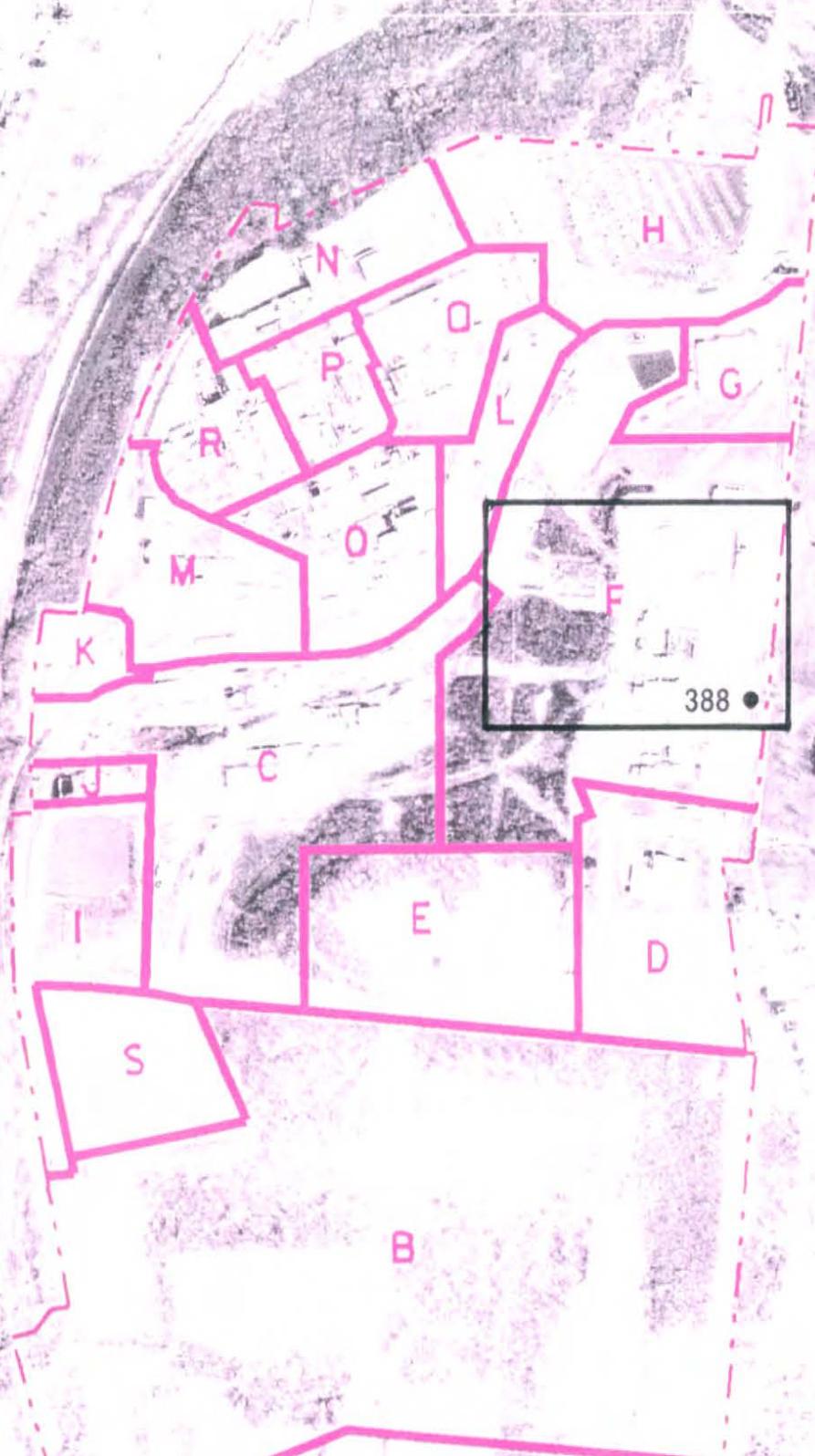


MOUND PLANT

Release Block F

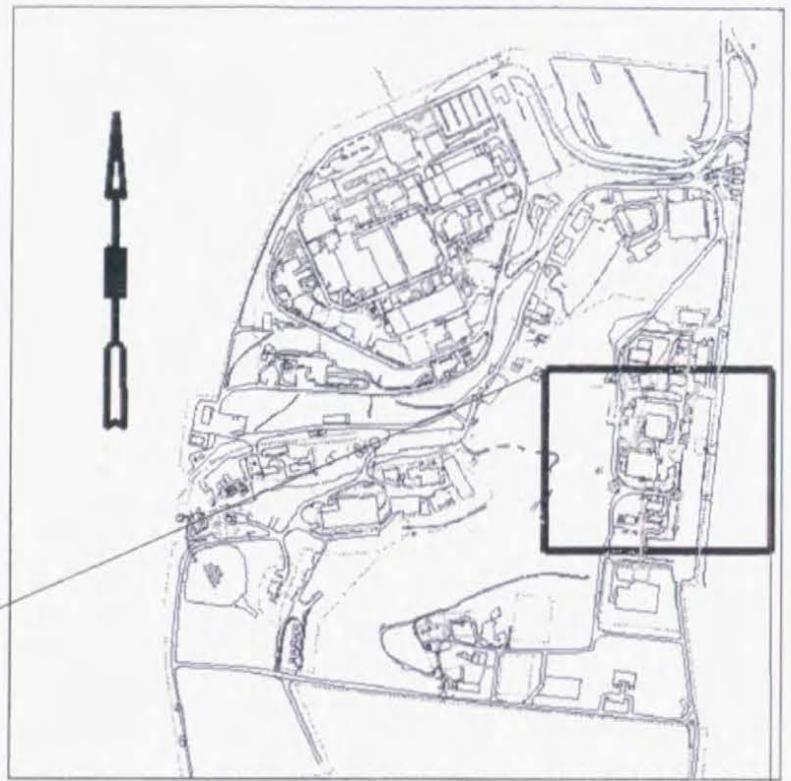
Potential Release Site

PRS 388



388 •

Mound Plant
Release Block F
Potential Release Site
PRS 388





PRS 388

PRS HISTORY:

Potential Release Site (PRS) 388 is a sampling location in the parking lot area next to the SM/PP Hill Area. PRS 388 was identified as a potential release site as a result of halogenated hydrocarbon chemicals detected during a PETREX qualitative soil gas survey performed in 1994.^{1,2}

CONTAMINATION:

In the mid 1980's, the Radiological Site Survey³ study of this area found:

- The maximum plutonium-238 (Pu-238) concentration was 6.55 pCi/g.
- The maximum thorium-232 (Th-232) concentration was 4.3 pCi/g

All radiological results are below Mound's ALARA (as low as reasonably achievable) standard of 25 pCi/g for Pu-238 and the regulatory limit of 5 pCi/g for Th-232.⁶

In 1994, the OU5, Operational Area Phase I Investigation^{1,2} investigated this site for volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) by the PETREX qualitative soil gas survey. The OU5, Non-AOC Field Report also investigated a surface sample at this location for radionuclides via FIDLER and Mound soil screening analysis.^{1,2} Sample results corresponding to PRS 388 are listed relative to coordinates (13N 1W) and sample #941 within the referenced material.¹ Results showed:

- Relatively moderate ion counts of total aromatic hydrocarbons
- No detection of total semivolatile hydrocarbons
- Relatively moderate ion counts of petroleum hydrocarbons
- Relatively high ion counts of total halogenated hydrocarbons.
- 15 pCi/g for plutonium-238 (Pu-238). This is below the Mound ALARA value of 25 pCi/g.
- 1.1 pCi/g for thorium-232 (Th-232). This is below the regulatory limit of 5 pCi/g.⁶

In 1996 the Soil Gas Confirmation Investigation⁵ sampled within 25 feet of PRS 388 (See map on Pg. 29). Sample 000006 was taken over a depth of 1 to 3 feet and analyzed for volatiles, semivolatiles, pesticides/PCBs, explosives, metals and radionuclides. Results of the investigation showed that the concentrations of all of the analytes were below their respective ALARA, regulatory, or 10^{-6} Risk Based Guideline Criteria except as shown on the table below:

Contaminant	Maximum Concentration	Guideline Criteria
Benzo(a) Pyrene	450 ppb	410 ppb ⁴
Cesium-137	0.861 pCi/g	0.46 pCi/g ⁴

READING ROOM REFERENCES:

- 1) OU5, Operational Area Phase I Investigation, Non-AOC Field Report, Volume II, Final, June 1995. (pages 10-19)
- 2) OU5, Operational Area Phase I Investigation, Non-AOC Field Report, Volume I, Final, (Revision 1), June 1995. (pages 6-9)
- 3) OU9, Site Scoping Report: Volume 3 - Radiological Site Survey, Final, June 1993. (pages 20-22)
- 4) Risk Based Guideline Values, December 1993, Final, Revision 0

OTHER REFERENCES:

- 5) Further Assessment Soil Gas Confirmation Sampling, 1996. (pages 23-33)
- 6) Code of Federal Regulations CFR 192.41 and CFR 192.12

PREPARED BY:

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

**MOUND PLANT
PRS 388
SOIL CONTAMINATION - PARKING LOT AREA
NEAR SM/PP HILLSIDE**

RECOMMENDATION:

Potential Release Site (PRS) 388 was identified due to elevated qualitative PETREX hydrocarbon levels. During the 1996 soil gas confirmation investigation all concentrations of volatile, semivolatile, PCBs, pesticides, metals, radionuclides, and explosives, in the soils related to this PRS, were below their applicable 2×10^{-6} Risk Based Guideline Criteria, ALARA, regulatory, or background levels. Therefore, NO FURTHER ASSESSMENT is recommended.

CONCURRENCE:

DOE/MB:

Arthur W. Kleinrath 11/20/96
Arthur W. Kleinrath, Remedial Project Manager (date)

USEPA:

Timothy J. Fischer 11/20/96
Timothy J. Fischer, Remedial Project Manager (date)

OEPA:

Brian K. Nickel 11/20/96
Brian K. Nickel, Project Manager (date)

SUMMARY OF COMMENTS AND RESPONSES:

Comment period from _____ to _____

- No comments were received during the comment period.
- Comment responses can be found on page _____ of this package.

REFERENCE MATERIAL
PRS 388

Environmental Restoration Program

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

**MOUND PLANT
MIAMISBURG, OHIO**

VOLUME I - TEXT

June 1995

Final (Revision 0)



**U.S. Department of Energy
Ohio Field Office**

EG&G Mound Applied Technologies

2.2.4. Presentation of Chemical Data

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

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,
- total semi-volatile hydrocarbons,
- total C₅ - C₁₁ petroleum hydrocarbons, and
- total halogenated hydrocarbons.

The following subsections describe the distribution of compounds listed above.

2.2.4.1. Distribution of Total Aromatic Hydrocarbons

Total aromatic hydrocarbons are reported as the combined levels of C₆ to C₁₁ aromatic (benzene based) hydrocarbon compounds detected in the soil gas samples. The majority of the samples contained only the lighter (C₆ through C₉) aromatics. A few samples were observed to contain C₁₀ and heavier aromatic hydrocarbons.

→ The soil gas survey indicates that the areas demonstrating the greatest relative levels of aromatics are the northern and southern portions of the Non-AOC East section and large portions of the Fuel Area and Area 61. Aromatics in the soil gas across the Non-AOC East section occur with combinations of other hydrocarbons in mixtures which are characteristic of weathered fuels. The near isolated occurrences of C₇ and C₈ aromatics, toluene, and ethylbenzene/xylenes in several samples may also indicate the presence of components of solvents or thinners in the subsurface. The presence of a variety of aromatic hydrocarbons was confirmed by Thermal Desorption Gas Chromatograph/Mass Spectrometry (TD-GC/MS)

2.2.4.3. Distribution of Total C₅ to C₁₁ Petroleum Hydrocarbons

Total C₅ to C₁₁ petroleum hydrocarbons reported include alkanes, cycloalkanes, alkenes, cycloalkenes, dienes (collectively referred to as aliphatics), aromatics, naphthalene, and alkyl naphthalenes. These compounds together make up the bulk of most petroleum fuels, oils, and lubricants. Total C₅ and C₁₁ petroleum hydrocarbons are reported to best illustrate the occurrence in soil gas of petroleum product vapor of which aromatic and semi-volatile compounds may not be prominent components.

The areal distribution of total C₅ to C₁₁ petroleum hydrocarbons is shown in Appendix E, Plate 4. The distribution of these petroleum hydrocarbons is similar to that of total aromatics, except that aromatics occur more widely across the Non-AOC East section. This finding supports earlier observations that the majority of hydrocarbons in the soil gas likely derive from fuels which contain abundant levels of both aromatics and a broad assortment of aliphatic hydrocarbons.

The distribution of elevated relative levels of total petroleum hydrocarbons within the Non-AOC South and Non-AOC West sections is nearly identical to that of aromatics and exhibited in several large areas. Elevated relative levels of aromatic and aliphatic hydrocarbons occur in several zones surrounding AOC 3 and the AOC SDB grid coordinates 9N25, 9.5N25.5, 12N24, and 13N26. Two additional zones of elevated response to total petroleum hydrocarbons occur in the northwest of the Non-AOC, northwest of the access road which parallels the northwest border of OU5 (at grid coordinates 14N15, 15N14, and 16N13) and on the northern border of the Non-AOC North (at grid coordinates 27N4 and 27N5).

2.2.4.4. Distribution of Total Halogenated Hydrocarbons

Total halogenated hydrocarbons are reported as the combined levels of PCE, TCE, trichlorofluoromethane (Freon-11), trichlorotrifluoroethane (Freon-113), trichloroethane (TCA), and dichlorobenzene (DCB). PCE, TCE, and TCA are volatile liquids commonly used as solvents and cleaning agents of petroleum based products. Freon-11 and Freon-113 are highly volatile liquids used as refrigerants or solvents in vapor degreasers. DCB, as a liquid, is used in solvents and cleaning agents (1,3- and 1,4- isomers) and also a solid used as a fumigant (1,2- isomer).

The areal distribution of total halogenated hydrocarbons in the soil gas is displayed in Appendix E, Plate 5. However, the distribution of specific halogenated compounds in the soil gas throughout the Non-AOC

is limited. PCE was detected more frequently in the soil gas than the other halogenated hydrocarbons. Thus, most of the elevated responses to total halogenated hydrocarbons principally reflect the presence of PCE in the soil gas. The presence of PCE was confirmed in the soil gas by TD-GC/MS at sample locations 8N3, 13N3, and 27N5 in the Non-AOC and D3, D4, E3, and E5 in Area 61.

→ Exceptions to this rule were the occurrence of pronounced levels of TCE at several locations (grid coordinates 4N14, 9N6, 20N10, 9N21, 10N14, 10N13, 3.5N13.5, 19N10.75, and 8N25); DCB at one locations (grid coordinate 2N18); and chloroform at two locations (grid coordinates 20N7 and 18N8). The highest relative levels of PCE were detected at five locations (7N13, 26.25N2.25, 13N1, 12N18, and 19N10.75).

2.2.5. Historical Chemical Data

No historical chemical data is available for the Non-AOC. Limited historical chemical data is available for comparison to Area 61 and the Fuel Area from a 1992 soil gas survey (DOE 1993e).

2.2.5.1. Non-AOC

Due to the lack of historical data, no comparison can be performed for the Non-AOC soil gas survey for this report.

2.2.5.2. Areas of Special Interest

A soil gas survey was performed in Area 61 and near the Fuel Area in 1992 as part of a reconnaissance sampling investigation (DOE 1993e). A total of 18 samples were collected from 10 locations at various depths near the Fuel Area. Two samples were collected from Area 61. All samples were analyzed for six organic compounds, primarily halogenated hydrocarbons and one aromatic hydrocarbon (toluene). Sample locations for the Fuel Area and Area 61 are shown in Figures 2.3 and 2.4 respectively.

Soil gas sampling was performed by driving sections of drill rod and steel points into the subsurface and drawing soil vapor to a gas collection system mounted on a mobile unit. Soil vapor was analyzed in an on-site mobile laboratory for VOCs. Quality control samples were collected and analyzed throughout the field effort to monitor system efficiency. Targeted contaminant concentrations were reported as parts per

Environmental Restoration Program

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

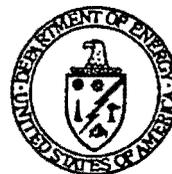
**MOUND PLANT
MIAMISBURG, OHIO**

VOLUME II - APPENDICES A-G

June 1995

Final (Revision 0)

**U.S. Department of Energy
Ohio Field Office**



EG&G Mound Applied Technologies

APPENDIX E
SOIL GAS SURVEY REPORT

**Final Report of the PETREX® Soil Gas Survey
Of The Non-Area of Concern, Operable Unit 5**

**U.S. Department of Energy Mound Facility
Miamisburg, Ohio**

The majority of the soil gas samples from the NonAOC West demonstrated only mildly elevated levels of light weight aromatics, alkanes, cycloalkanes/alkenes, and cycloalkenes/dienes. All of these compounds are components of fuels or oils and, thus, may have originated through dispersion and migration, over time, from the same occurrences of weathered fuels or oils indicated by the samples named above. The collection points of samples containing the highest levels of petroleum hydrocarbons may correspond to source areas or former points of release of petroleum products.

Prominent levels of halogenated hydrocarbons were detected rarely within the NonAOC-West. The highest levels of PCE were detected in samples #1024, and #1028. The highest levels of TCE were detected in samples #1010, #1058, #1066, and #1096. A mildly elevated level of dichlorobenzene was detected in sample #963. Trace levels of trichloroethane (TCA) were detected in samples #964, #1001, and #1021. Low levels of trichlorofluoromethane (Freon-11) were detected in samples #964, #969, #997, #1004, #1007, #1028, #1034, #1060, and #1092 (see the mass spectrum of sample #1004).

Five samples from the NonAOC-West yielded a high response to ions derived from petroleum hydrocarbons which have the same atomic mass as the principal ions derived from the halogenated hydrocarbons also targeted by this survey (see response to total halogenated hydrocarbons in Table 2 and Plate 5). This high response and coincidence of atomic masses has masked response to halogenated hydrocarbons of similar or lesser magnitude in these samples. Of these five, only samples #1022 and #1071 contain levels of hydrocarbons capable of masking levels of halogenated hydrocarbons greater than 100,000 ion counts. To determine whether elevated levels of halogenated organics may also be present in these two samples, sample duplicates have been submitted for TD-GC/MS analysis. Chromatographic separation of individual compounds in each sample afforded by this analytical process should resolve between elevated levels of any halogenated compounds and petroleum hydrocarbons. TD-GC/MS analysis of these five samples is pending. Results will be reported as a separate document as soon as they are available.

8.2.3 NonAOC-East

Numerous soil gas samples from the NonAOC-East showed similar combinations of petroleum hydrocarbons. Samples #909, #911, #919, and #1067 demonstrated the most elevated levels of a combination of compounds typical of the vapor of weathered light to medium weight fuels. Furthermore, samples #912, #928, and #929 exhibited singularly high levels of toluene and ethylbenzene/xylenes which could indicate the presence in the subsurface of the components of solvents or thinners. Samples #923, #925, #946, #948, #953, #993, and #994 contained elevated levels of a combination of C₄ to C₁₄ hydrocarbons typical of the composition of vapor from weathered medium to heavy weight fuels or oils. Soil gas samples representative of the balance of the NonAOC-East principally demonstrated only low relative levels of a combination of light weight aromatics, alkanes, and cycloalkanes/alkenes which are common to most petroleum products. Similar to the findings for the NonAOC-West, results of the survey of the NonAOC-East suggest the presence of source areas or points of release of various petroleum products and

the occurrence of the subsurface dispersion and migration of components of these products to other portions of the site.

Detections of elevated levels of halogenated hydrocarbons in the soil gas within the NonAOC-East were infrequent. Prominent occurrences of PCE were noted at the collection points of samples #915, #919, and #941. Prominent occurrences of TCE were detected in the soil gas at the collection points of samples #915 and #956. No other halogenated organics were detected at elevated levels in the soil gas within the NonAOC-East.

The pronounced levels of petroleum hydrocarbons in samples #923, #946, #948, and #953 has potentially masked response to halogenated hydrocarbons greater than 100,000 ion counts. To determine whether elevated levels of halogenated organics may be present in these four samples, sample duplicates have been submitted for TD-GC/MS analysis. TD-GC/MS analysis of these four samples is pending. Results will be reported as soon as they are available.

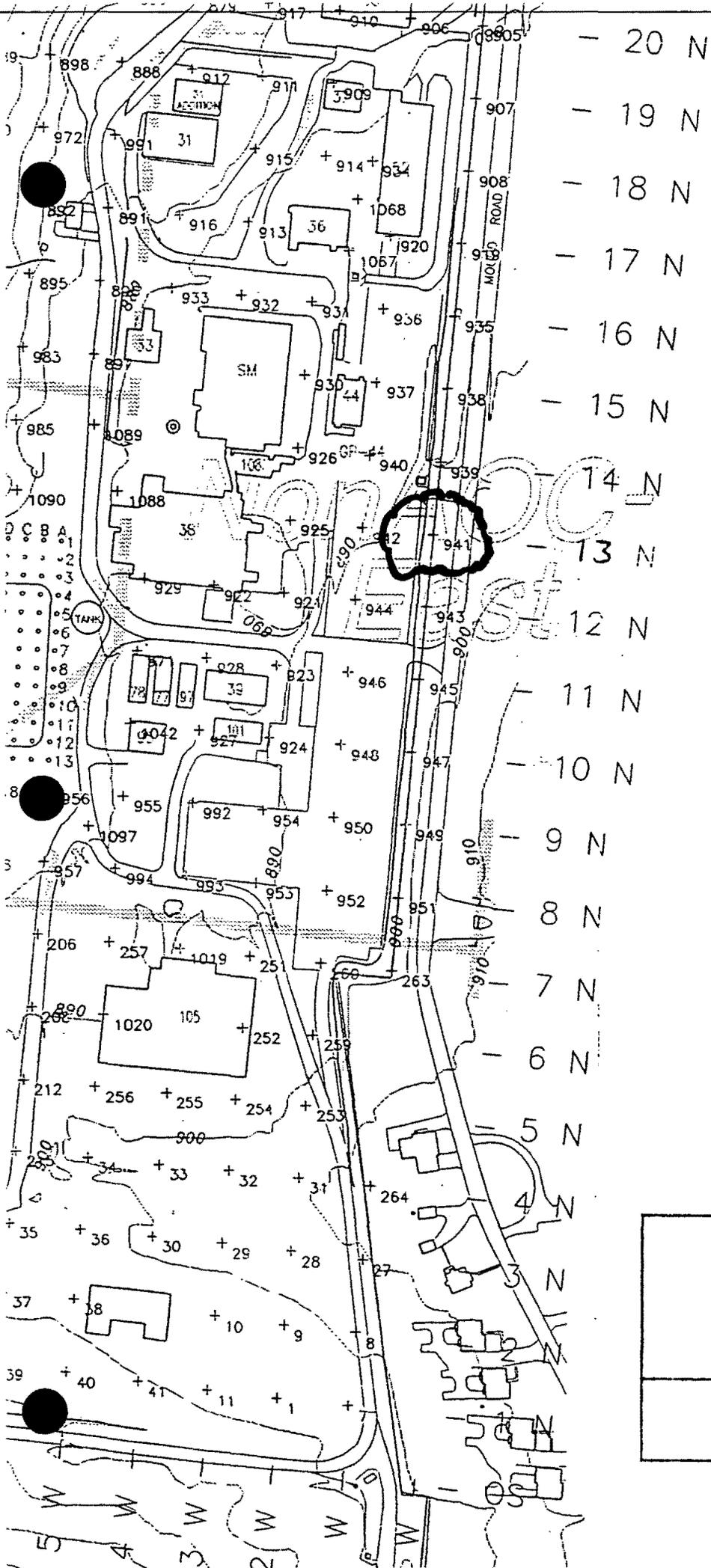
~~8.2.4 NonAOC North~~

~~High relative levels of petroleum hydrocarbons were detected at many points within the NonAOC-North, particularly in the Fuel Area and in the eastern half of the site both along the border with the NonAOC-East and at several points surrounding Building No. 61.~~

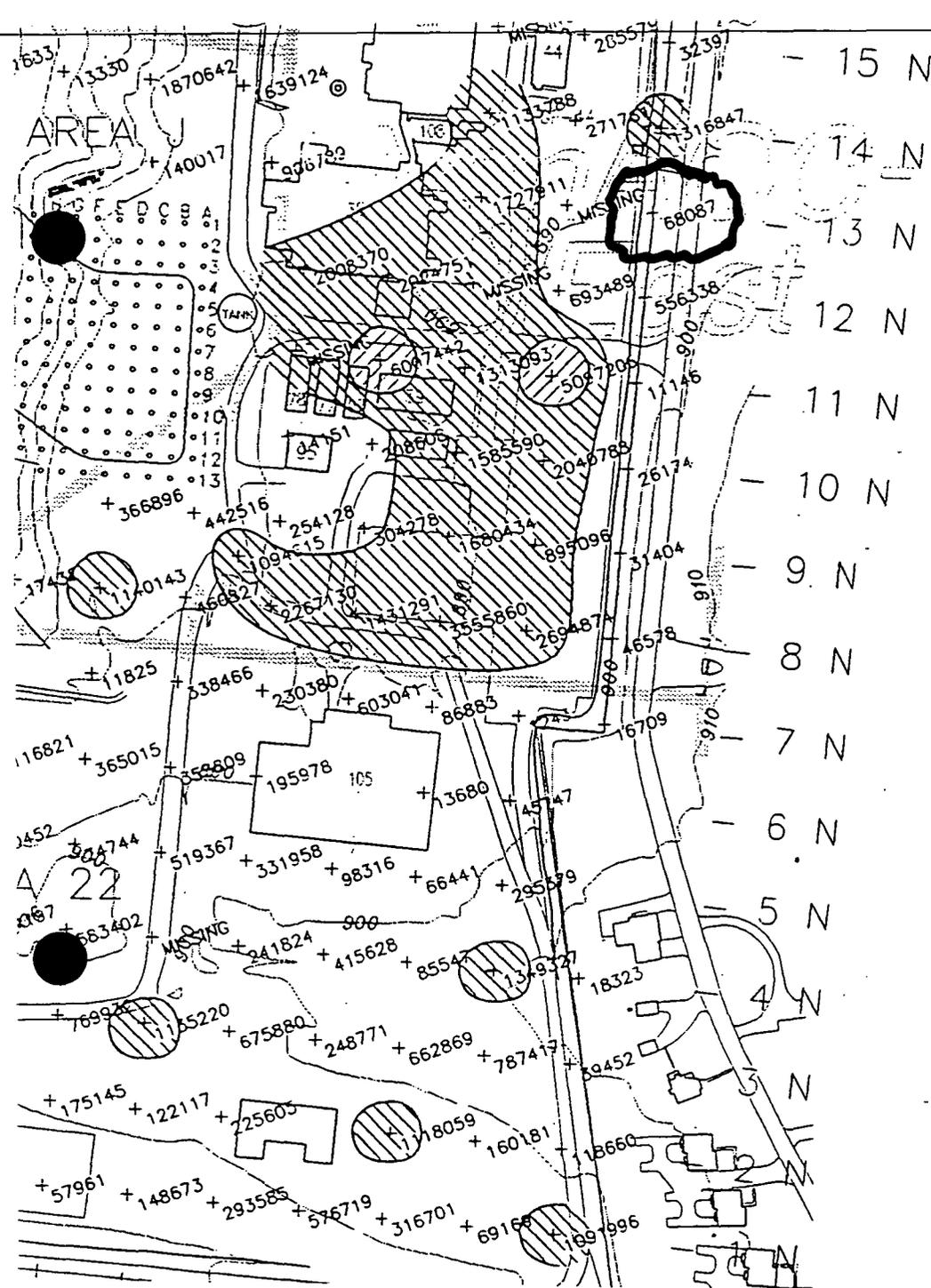
~~The majority of the sampling points within the Fuel Area demonstrated highly elevated levels of aromatic petroleum hydrocarbons, specifically toluene and ethylbenzene/xylenes (see the mass spectra of samples #1075, and #1083). Sample #1074 however, also demonstrated high relative levels of heavier weight aromatics, and medium to heavy weight alkanes, cycloalkanes/alkenes, and cycloalkenes/dienes which are common to medium and heavy weight fuels (see the mass spectrum of sample #1074). The high levels of toluene and ethylbenzene/xylenes in the soil gas at points on the periphery of the Fuel Area (such as the collection points of samples #1079 through #1083) suggest that the toluene and ethylbenzene/xylenes detected in this and other portions of the NonAOC derive wholly from fuels and not from suspected potential purer sources of these aromatics such as solvents or thinners.~~

~~Soil gas at numerous points in the east of the NonAOC-North exhibited compositions similar to that detected in the Fuel Area to the far west. Specifically, samples #847, #856, #857, #888, #896, #897, and #973 demonstrated combinations of C₄ to C₁₁ petroleum hydrocarbons typical of the composition of vapor derived from slightly weathered light to medium weight fuels. While samples #853, #855, #980, and #1014 demonstrated pronounced singular occurrences of the C₆ and C₇ aromatics toluene and ethylbenzene/xylenes. These findings suggest that the hydrocarbons in the subsurface in the eastern half of the NonAOC-North may have originated in a similar fashion as the hydrocarbons in the subsurface in the Fuel Area.~~

AREA 61



Sample Locations
Plate 1



LEGEND				
Relative Response Values (in ion counts):				
NonAOC-South	NonAOC-West	NonAOC-East	NonAOC-North	Area 61
≥ 4,200,000 830,000-4,199,999	≥ 20,000,000 2,600,000-19,999,999	≥ 5,000,000 830,000-4,999,999	≥ 10,000,000 1,500,000-9,999,999	≥ 5,800,000 1,400,000-5,799,999

Relative Response
 Total Aromatic
 Hydrocarbons
 Plate 2

APPENDIX D

RADIOLOGICAL DATA (FIDLER SURVEY MOUND SOIL SCREENING FACILITY DATA) FOR NON-AOC POINTS

SMPID	FIDLER SURVEY DATA					MOUND SOIL SCREENING FACILITY DATA			
	Contamination Criteria CH1	FIDLER Readings CH1	Contamination Criteria CH2	FIDLER Readings CH2	FIDLER Readings Out Channel	Plutonium - 238		Thorium - 232	
	Units: CPM	Units: CPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: pCi/g		Units: pCi/g	
	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	Note:	RESULTS	Note:
12N15	157.3	65	8.45	4.0	NC	85	b	0.9	a
12N16	157.3	110	8.45	5.5	NC	9	a	0.7	a
12N17	157.3	60	8.45	3.5	NC	WIPE	c	WIPE	c
12N18	157.3	60	8.45	4.5	NC	WIPE	c	WIPE	c
12N19	157.3	55	8.45	4.5	NC	19	a	0.5	a
12N20	157.3	65	8.45	4.5	NC	WIPE	c	WIPE	c
12N21	157.3	50	8.45	3.5	NC	WIPE	c	WIPE	c
12N22	157.3	85	8.45	5.5	NC	16	a	1	a
12N23	157.3	75	8.45	5.0	NC	WIPE	c	WIPE	c
12N24	157.3	40	8.45	3.5	NC	WIPE	c	WIPE	c
13N01	253.5	180	12.48	10.0	NC	15	a	1.1	a
13N02	253.5	95	12.48	4.5	NC	WIPE	c	WIPE	c
13N03	130	110	6.5	4.5	NC	WIPE	c	WIPE	c
13N25	157.3	40	8.45	4.0	NC	WIPE	c	WIPE	c
13N26	157.3	60	8.45	4.0	NC	WIPE	c	WIPE	c
14N01	253.5	100	12.48	7.0	NC	WIPE	c	WIPE	c
14N02	122.2	80	5.59	4.5	NC	WIPE	c	WIPE	c
14N03	130	75	6.5	5.0	NC	WIPE	c	WIPE	c
14N07	170.3	100	9.72	7.0	NC	NR		NR	
14N08	170.3	150	9.72	10.0	NC	NR		NR	
14N09	170.3	145	9.72	10.0	NC	NR		NR	
14N10	170.3	85	9.72	8.0	NC	NR		NR	
14N11	170.3	115	9.72	10.0	NC	NR		NR	
14N12	170.3	130	9.72	8.0	NC	NR		NR	
14N13	157.3	100	8.45	5.5	NC	NR		NR	
14N15	157.3	70	8.45	4.0	NC	WIPE	c	WIPE	c
14N25	157.3	85	8.45	7.0	NC	9	a	0.6	a
14N26	157.3	80	8.45	7.5	NC	8	a	0.7	a
14N27	157.3	150	8.45	9.0	NC	20	a	0.9	a

a - Mound Soil Screening Facility detection level not exceeded.

ENVIRONMENTAL RESTORATION PROGRAM

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

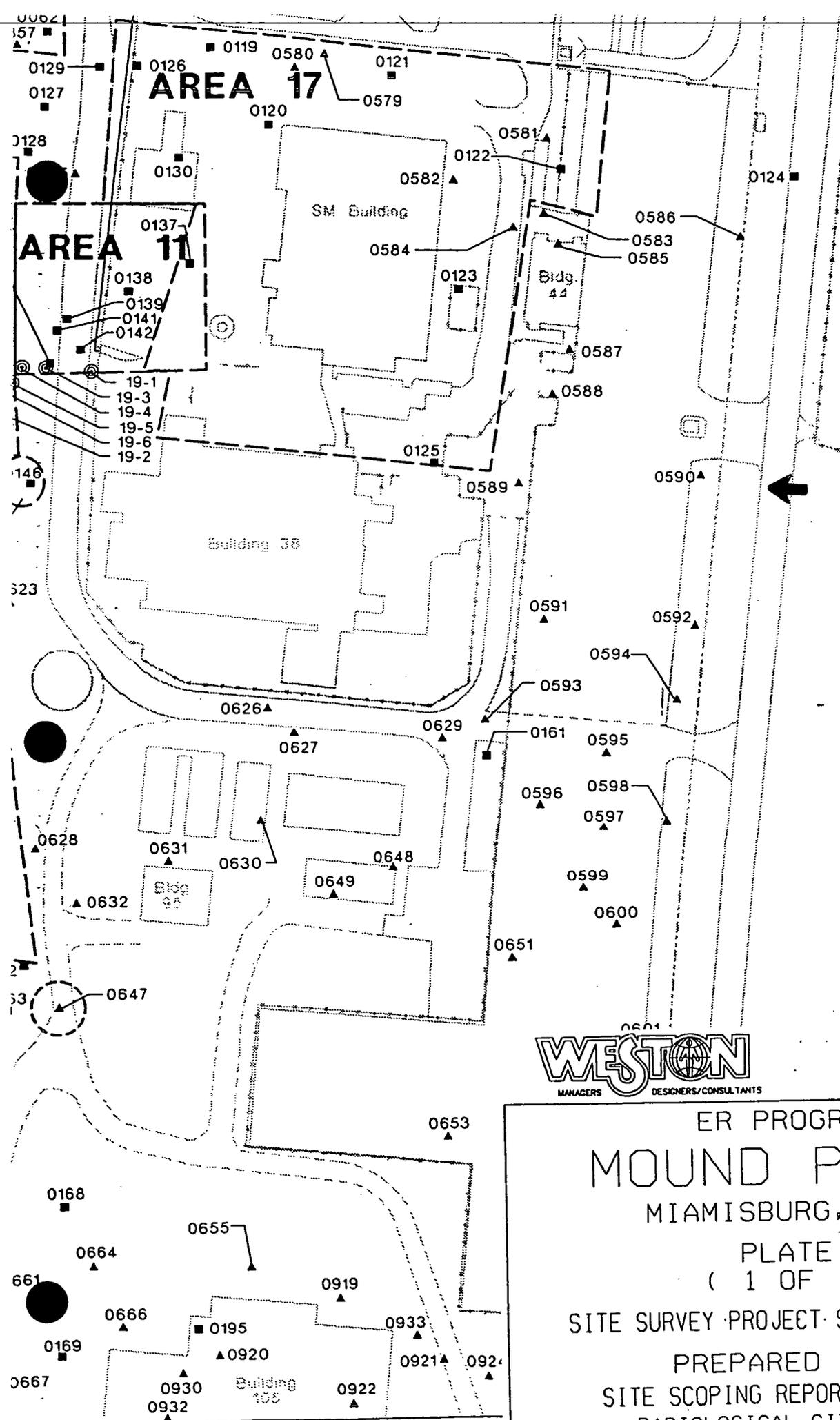
**MOUND PLANT
MIAMISBURG, OHIO**

June 1993

**DEPARTMENT OF ENERGY
ALBUQUERQUE FIELD OFFICE**

**ENVIRONMENTAL RESTORATION PROGRAM
EG&G MOUND APPLIED TECHNOLOGIES**

FINAL



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ER PROGRAM
 MOUND PLANT
 MIAMISBURG, OHIO

PLATE 1
 (1 OF 2)

SITE SURVEY PROJECT SAMPLING LOCATIONS

PREPARED FOR
 SITE SCOPING REPORT: VOLUME 3,
 RADIOLOGICAL SITE SURVEY

Map Location ^a	Coordinates South West	MRC ID No.	Mo-Yr	Depth (inch)	Pu-238 (pCi/g)	Thorium ^b (pCi/g)	Tritium (pCi/mL)	Co-60 (pCi/g)	Cs-137 (pCi/g)	Ra-226 (pCi/g)	Am-241 (pCi/g)
C0125	3085	2185	1358	12-82	18	0.43	b				
			1359	12-82	36	0.25	3.11				
			1360	12-82	54	33.60	b				
			1361	12-82	72	0.13 ^c	3.25 ^c				
			1362	12-82	90	1.97	b				
			1363	12-82	108	0.19	b				
S0589	3125	2135	4007	10-83	0	9.00 ^c	b				
S0590	3175	2010	4010	10-83	0	1.05	b				
S0591	3225	2160	4008	10-83	0	6.12	b	0.15			
S0592	3275	2060	4009	10-83	0	4.72	b	0.33			
S0593	3275	2230	4012	10-83	0	1.07	b				
S0594	3320	2095	2928	10-83	0	6.55	2.70				
S0595	3335	2160	2932	10-83	0	0.14	b				
S0596	3350	2220	2933	10-83	0	0.02	b	1.63			
S0597	3385	2185	5813	07-84	0	3.67	b				
S0598	3400	2140	2929	10-83	0	5.30	4.30				
S0599	3425	2220	5814	07-84	0	1.45	b				
S0600	3460	2210	2930	10-83	0	4.06	2.27	0.69			
S0601	3555	2220	2931	10-83	0	0.42 ^c	2.48 ^c	0.58			
C0126	2725	2265	1319	12-82	18	5.57	b				
			1320	12-82	36	79.00 ^c	b				
			1321	12-82	54	6.51	b				
			1322	12-82	72	0.37	b				

^bThorium results of ≤ 2 pCi/g are listed as "b".

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 ListVolatile 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	Dimethylphthalate	2-Nitroaniline
4-Bromophenyl-phenylether	Di-n-butylphthalate	3-Nitroaniline
Butylbenzylphthalate	Di-n-octylphthalate	4-Nitroaniline
Carbazole	4,6-Dinitro-2-methylphenol	Nitrobenzene
4-Chloroaniline	2,4-Dinitrophenol	2-Nitrophenol
4-Chloro-3-methylphenol	2,4-Dinitrotoluene	4-Nitrophenol
2-Chloronaphthalene	2,6-Dinitrotoluene	N-Nitroso-di-n-propylamine
2-Chlorophenol	Fluoranthene	N-Nitroso-diphenylamine
4-Chlorophenyl-phenylether	Fluorene	2,2-oxybis(1-Chloropropane)
Pentachlorophenol	Pyrene	2,4,5-Trichlorobenzene
Phenanthrene	1,2,4-Trichlorobenzene	2,4,6-Trichlorobenzene
Phenol		

Table I.1 Soil Analyte List (Continued)

Pesticides/PCB's

Aroclor-1016	Delta-BHC	Endosulfan II
Aroclor-1221	Gamma-BHC	Endosulfan sulfate
Aroclor-1232	alpha-Chlordane	Endrin
Aroclor-1242	gamma-Chlordane	Endrin aldehyde
Aroclor-1248	4,4'-DDD	Endrin ketone
Aroclor-1254	4,4'-DDE	Heptachlor
Aroclor-1260	4,4'-DDT	Heptachlor epoxide
Aldrin	Dieldrin	Methoxychlor
Alpha-BHC	Endosulfan I	Toxaphene
Beta-BHC		

Inorganics

Aluminum	Copper	Potassium
Antimony	Cyanide	Selenium
Arsenic	Iron	Silver
Barium	Lead	Sodium
Beryllium	Lithium	Thallium
Bismuth	Magnesium	Tin
Cadmium	Manganese	Vanadium
Calcium	Mercury	Zinc
Chromium	Molybdenum	Nitrate/Nitrite
Cobalt	Nickel	Explosives (USATHAMA,PETN)

Radionuclides

Americium-241	Plutonium-238	Thorium-230
Bismuth-207	Plutonium-239/240	Thorium-232
Bismuth-210	Potassium-40	Uranium-234
Cesium-137	Radium-226	Uranium-235
Cobalt-60	Thorium-228	Uranium-238

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

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

Table A.1. Soil Gas Confirmation Detected Volatile Organic Compounds

ANALYTE	SGC NAC 000002	SGC NAC 000003	SGC NAC 000004	SGC NAC 000005	SGC NAC 000006	SGC NAC 000007	Background	10 ⁶ Construction Worker Guidelines
VOLATILES (µg/Kg)								
Acetone	36						NA	105000000
1,2-Dichloroethene (total)							NA	21500000
2-Butanone	12						NA	46500000
Benzene	1 J						NA	8900
Carbon Disulfide							NA	1400000
Chloroform			67				NA	NA
Chloromethane							NA	NA
Ethylbenzene							NA	480
Methylene Chloride	6			7	8		NA	NA
Tetrachloroethene							NA	10500000
Toluene	1 J	1 J					NA	1250000
Trichloroethene						7	NA	41000
Xylene (total)							NA	215000000

Table A.2. Soil Gas Confirmation Detected Semivolatile Organic Compounds

ANALYTE	SGC NAC 000001	SGC NAC 000002	SGC NAC 000003	SGC NAC 000004	SGC NAC 000005	SGC NAC 000006	Background	10 ⁶ Construction Worker Guidelines
SEMIVOLATILES (µg/Kg)								
Acenaphthene		190 J	63 J				NA	NA
Acenaphthylene		730				42 J	NA	NA
Anthracene		1300	66 J		25	55 J	NA	32000000
Benzo(a)anthracene		1500	180 J		160	350 J	NA	4100
Benzo(a)pyrene		1300	180 J		200	450	NA	410
Benzo(b)fluoranthene		1000	180 J		190	460	NA	4100
Benzo(g,h,i)perylene		550	110 J		100	260 J	NA	NA
Benzo(k)fluoranthene		1000	160 J		190	440	NA	41000
Bis(2-ethylhexyl)phthalate							NA	215000
Butylbenzylphthalate							NA	215000000
Carbazole		600	62 J			34 J	NA	NA
Chrysene		1500	220 J		240	490	NA	410000
Di-n-butyl phthalate	120 J			280			NA	105000000
Di-n-octyl phthalate							NA	21500000
Dibenz(a,h)anthracene		180 J	40 J		37	87 J	NA	410
Dibenzofuran		1100	23 J				NA	NA
Diethyl phthalate							NA	NA
Fluoranthene		3400 D	480		400 J	800	NA	42500000
Fluorene		1500	42 J				NA	NA
Indeno(1,2,3-cd)pyrene		690	120 J		130	320 J	NA	4100
2-Methylnaphthalene		970					NA	NA
Naphthalene		4000 D	24 J				NA	NA
Phenanthrene		4700 D	380		150	280 J	NA	NA
Phenol							NA	650000000
Pyrene	24 J	2700 D	440		340	730	NA	32000000

Table A.4. Soil Gas Confirmation Detected TAL Inorganics

ANALYTE	SGC NAC 000001	SGC NAC 000002	SGC NAC 000003	SGC NAC 000004	SGC NAC 000005	SGC NAC 000006	Background	10 ⁶ Construction Worker Guidelines
INORGANICS (mg/kg)								
Aluminum	11000	4190	1910	11400	7970	7780	19000	NA
Antimony		0.23 B		0.24 B	0.41 B		NA	425
Arsenic	1.5 B	2.1 B	2.9 B	1.4 B	7	7.2	8.6	320
Barium	48.6	20.7 B	23.7 B	47.1 B	73.6	86.4	180	75000
Beryllium	0.56		0.12 B	0.65	0.38	0.28	1.3	0.7
Bismuth							NA	NA
Cadmium		0.25 B	0.19 B		0.36 B	0.5 B	2.1	1050
Calcium	162000	159000	95500	152000	13600	86200	310000	NA
Chromium	13.2	6.7	3.8	15.2	13	11.6	20	1050000
Cobalt	9.8 B	4.5 B	2.3 B	10.1 B	7.6 B	7.6 B	19	NA
Copper	16.2	11.9	9.9	17.1	14.5	15.2	26	NA
Cyanide							ND	21400
Iron	21300	10600	5680	21800	17200	17700	35000	NA
Lead	6.7	5.2	11.2	8.6	30.9	25.1	48	NA
Lithium	21 B	12.5 B	6.2 B	23 B	7.7 B	10.3 B	26	NA
Magnesium	6160	57800	27900	5670	5210	35600	40000	NA
Manganese	695	384	270	612	383	589	1400	135000
Mercury			0.13				NC	320
Molybdenum	0.43 B	1.2 B	0.77 B		1.7 B	1.5 B	27	NA
Nickel	18.4	9.9	6.4 B	20.6	11.1	16.1	32	21500
Potassium	1780	742 B	346 B	2080	574 B	744 B	1900	NA
Selenium							NA	NA
Silver			0.24 B				1700	5500000
Sodium	228 B	888 B	150 B	137 B	411 B	348 B	240	NA
Thallium							460	NA
Tin	1.1 B			1.4 B	1 B		20	NA
Vanadium	14.9	8.3	4.7	16.3	23.1	18.9	25	7500
Zinc	53.3	29.5		67	59	69.2	140	320000

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

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

ANALYTE	SGC NAC 000007	SGC NAC 000008	SGC NAC 000009	SGC NAC 000010	SGC NAC 000011	SGC NAC 000012	Background	10 ⁶ Construction Worker Guidelines
GENERAL ANALYTES								
% Solids (%)	83.9	95.0	78.9	83.9	90.1	84.7	NA	NA
Nitrate/Nitrite (MG-N/KG)	1.6	26.5	2.2	5.9	5.3	1.8	26	NA

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

ANALYTE	SGC NAC 000019	SGC NAC 000020	SGC NAC 000021	SGC NAC 000022	SGC NAC 000023	SGC NAC 000024	Background	10 ⁶ Construction Worker Guidelines
GENERAL ANALYTES								
% Solids (%)	85.3	87.6	77.4	78.3	77.5	89.5	NA	NA
Nitrate/Nitrite (MG-N/KG)	6.5	2.1	6.1	2.2	11.6	2.2	26	NA

Table A.6. Soil Gas Confirmation Detected Radionuclides

ANALYTE	SGC NAC 000001	SGC NAC 000002	SGC NAC 000003	SGC NAC 000004	SGC NAC 000005	SGC NAC 000006	SGC NAC 000007	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						0.861		0.42	0.46
Cobalt-60								NC	0.1
Plutonium-238	1.42	0.0690	0.833	0.0870	0.543	4.32	0.537	0.13	5.5
Plutonium-239/240			0.0252					0.18	5.5
Potassium-40	21.7	2.95	6.53	27.4	15.1	14.3	10.8	37	NA
Radium-226	1.03	0.478	0.508	1.16	1.22	0.870	0.537	2	0.14
Thorium-228	1.52	0.277	0.370	1.24	1.05	1.06	0.431	1.5	0.85
Thorium-230	0.814	0.374	0.621	0.980	1.19	1.18	0.582	1.9	44
Thorium-232	1.30	0.184	0.315	1.17	0.950	1.18	0.328	1.4	50
Uranium-234	2.19	0.401	0.419	0.934	0.874	0.761	0.551	1.1	37.5
Uranium-235	0.0974		0.0400	0.0349	0.0328			0.11	3.35
Uranium-238	2.35	0.392	0.512	0.918	0.913	0.815	0.574	1.2	11

J - Numerical value is an estimated quantity

B - Analyte detected below CRDL but above instrument detection limit

Table B.2. Comparison Table for Mound Screening Laboratory Results and Quanterra Analytical Laboratory Results

Sample No.	Isotope	Quanterra Results pCi/g	Mound Screening Laboratory Results pCi/g
SGC-NAC-000001	Pu-238	1.42	25
	Th-232	1.30	1.5
SGC-NAC-000002	Pu-238	0.0690	0
	Th-232	0.184	0.3
SGC-NAC-000003	Pu-238	0.833	5
	Th-232	0.315	0.4
SGC-NAC-000004	Pu-238	0.0870	28
	Th-232	1.17	1.0
SGC-NAC-000005	Pu-238	0.543	19
	Th-232	0.850	0
SGC-NAC-000006	Pu-238	4.32	23
	Th-232	1.18	0.9
SGC-NAC-000007	Pu-238	0.937	10
	Th-232	0.328	0.4
SGC-NAC-000009	Pu-238	0.0233	26
	Th-232	0.838	1.2
SGC-NAC-000010	Pu-238	0.107	20
	Th-232	0.708	1.1
SGC-NAC-000011	Pu-238	0.0718	16
	Th-232	0.830	0.5
SGC-NAC-000012	Pu-238	0.101	15
	Th-232	0.769	1.0
SGC-NAC-000013	Pu-238	0.0107	0
	Th-232	0.210	0.4
SGC-NAC-000014	Pu-238	0.671	23
	Th-232	1.08	0.7
SGC-NAC-000015	Pu-238	0.0118	11
	Th-232	1.43	1.4
SGC-NAC-000016	Pu-238	0.253	3
	Th-232	0.894	0.9
SGC-NAC-000017	Pu-238	0.200	26
	Th-232	1.26	1.0
SGC-A66-000040	Pu-238	0.264	1
	Th-232	0.380	0.3
SGC-A66-000041	Pu-238	0.0496	25
	Th-232	0.873	1.0