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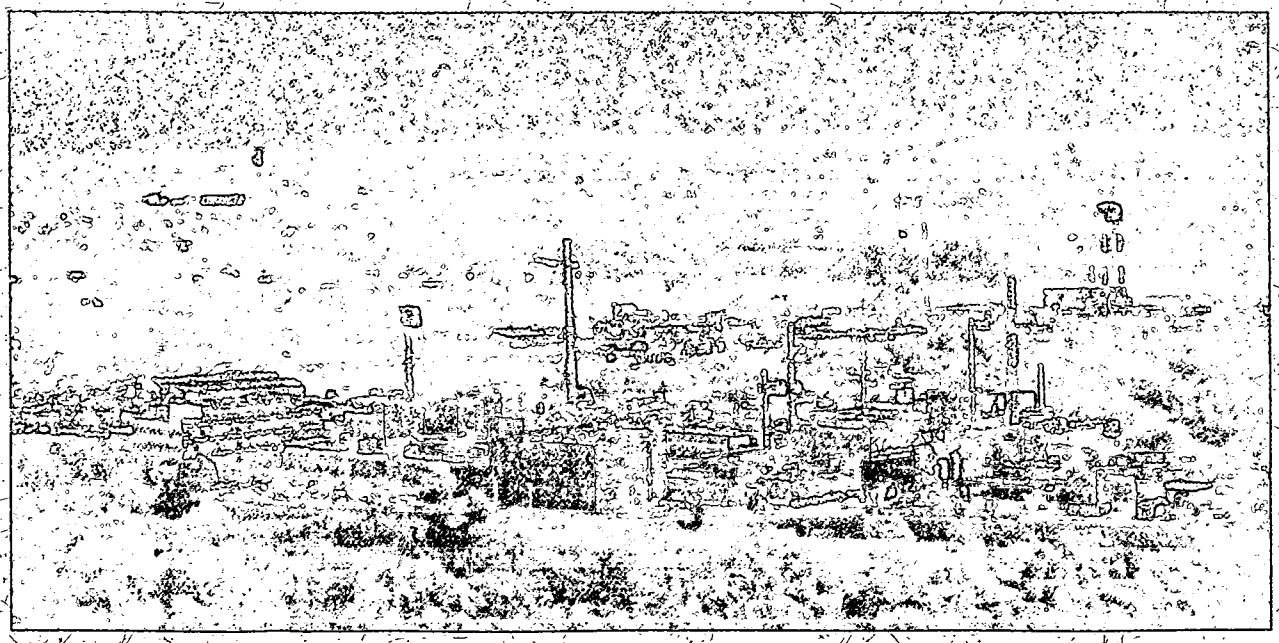
MOUND

Environmental
Restoration
Program

Miamisburg Closure Project
Potential Release Site Package

PRS 282

Public Review Draft
January 2003



MOUND

Environmental Restoration Program

MIAMISBURG CLOSURE PROJECT
POTENTIAL RELEASE SITE PACKAGE
Notice of Public Review Period

The following Potential Release Site (PRS) package 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 8 January 2003 through 7 February 2003.

PRS 282 : Spoils Area

Questions can be referred to Paul Lucas at (937) 865-4578.

PRS 282 Package Tracking Sheet

REVISION	DESCRIPTION	DATE
Working Draft (to DOE)		
Draft (to Core Team)		
Draft Proposed Final	Binned FA on 19 June 1996. Submitted Addendum 1 for FA results and received NFA bin on 11 December 2002. Revised Addendum 1 text and recommendation page per OEPA comments. No USEPA comments. Added leaching equations. Added Addendum 1 to original Package for Public Review.	
Public Review Draft	Public review period 8 Jan-7 Feb 2003.	**January 2003**
Final		

ADDENDUM 1

SUPPORTING NFA RECOMMENDATION

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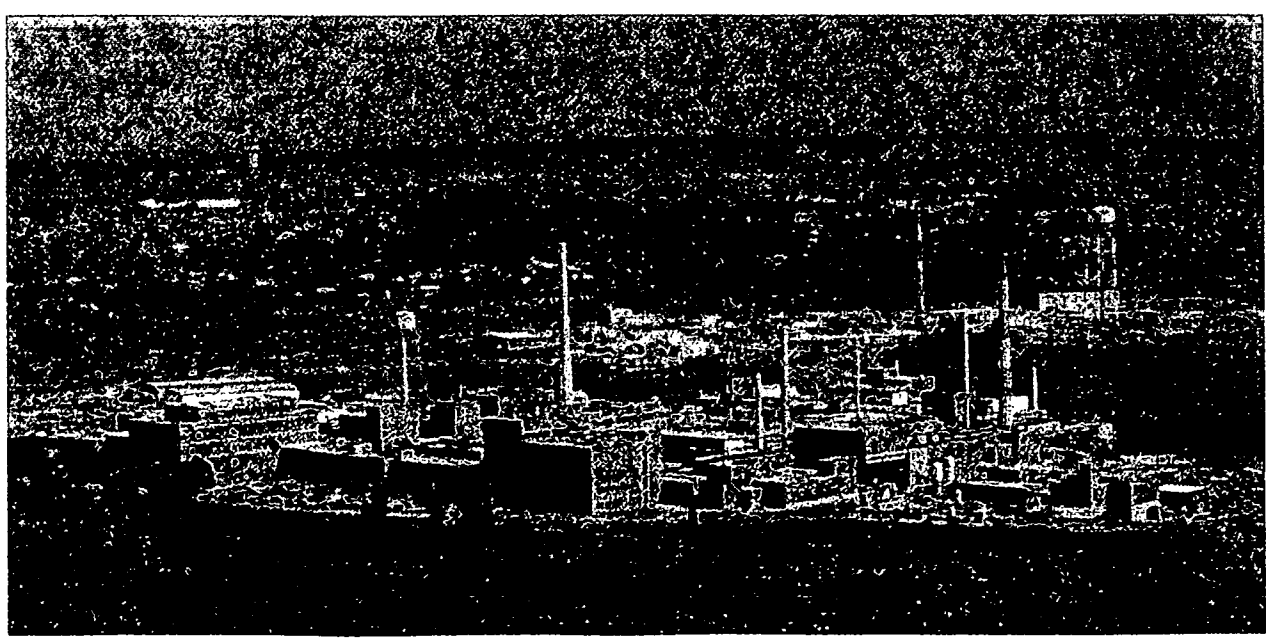
Miamisburg Closure Project

Potential Release Site Package

PRS 282

Addendum 1

Public Review Draft
January 2003



PRS HISTORY:

Potential Release Site (PRS 282, Figure 1) is identified as the site's historic soil spoils area and was binned Further Assessment (FA) by the Core Team on 19 June 1996. Further Assessment sampling was completed between May and June of 2002 per the Sampling and Analysis Plan (**SAP**)[1] approved by the Core Team.

FURTHER ASSESSMENT ACTIVITY:

The potential contaminants of concern (thorium-232 and plutonium-238) were identified based on site process history. Benzene, toluene, ethylbenzene, and xylene (BTEX) analyses were added based on a report of gasoline contaminated soil disposal at PRS 282. BTEX analyses were selectively performed based on field screening headspace and photo/flame ionization detector (PID/FID) readings.

All soil samples (397 plus 40 duplicates) were analyzed per the SAP by onsite gamma spectroscopy and 10% (41 plus 4 duplicates) were forwarded offsite for isotopic plutonium and thorium analysis. Two samples and one duplicate were submitted for BTEX analyses based on field screening results.

FA sample locations are presented on Figure 2. The FA **Data Report**[2] presents a full account of soil sampling activities and sample results (onsite and offsite laboratory analyses).

There were no FA sample results for detected analytes (rad and BTEX) above cleanup objectives (10^{-5} Risk-Based Guideline Value (RBGV) plus background) or hazard index of 1. A detection of total xylenes was assessed (details in Attachment 1) and found not to be at a level to impact groundwater via leaching from soil. Maximum exceedances to screening levels identified as a result of FA are presented in Table 1. There are no unqualified historic radionuclide detections above screening levels.

Table 1: FA Results above Screening Levels (pCi/g)

Radionuclide	No. >SL	Max. Result	Location & interval	Screening Level (SL)	Cleanup Objective
Actinium-227+D	5 of 397	0.91	B120, 0-5'	0.56	4.6
Radium-226+D	17 of 397	2.72	B053, 0-4'	2.1	2.9
Lead-210	6 of 397	1.98	B116, 4-8'	1.8	7.4

RBGV: Risk-Based Guideline Value

FIGURES:

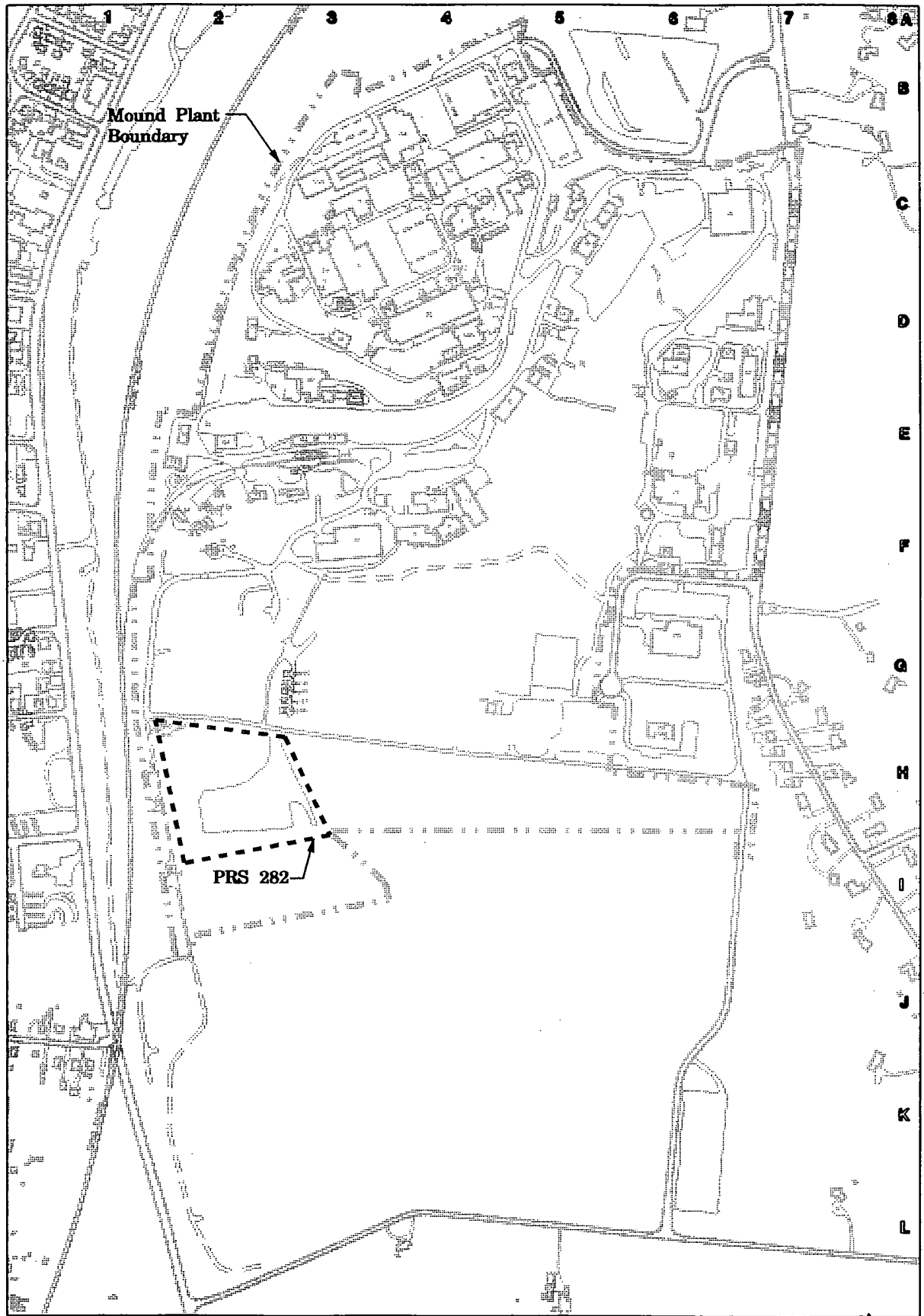
Figure 1: Location of PRS 282
Figure 2: PRS 282 Sample Locations

REFERENCES:

1) PRS 282 Sampling & Analysis Plan, Final, April 2002
2) PRS 282 Data Report, Rev. 0, November 2002

PREPARED BY:

Karen M. Arthur, BWXT of Ohio, Inc., ER QA



2 of 4

Legend

- Structures
- Paved roadway
- Unpaved roadway
- Railroad
- Water course
- Fence
- Mound Plant boundary
- Contour line

0 100 200 400 600 800 1000
Scale In Feet

ISS	DATE	REVISION	BY	CHKR	ENG	M
	02/15/02	ISSUE FOR GENERAL USE	SSP			

MOUND
Environmental Restoration Geographic Information System

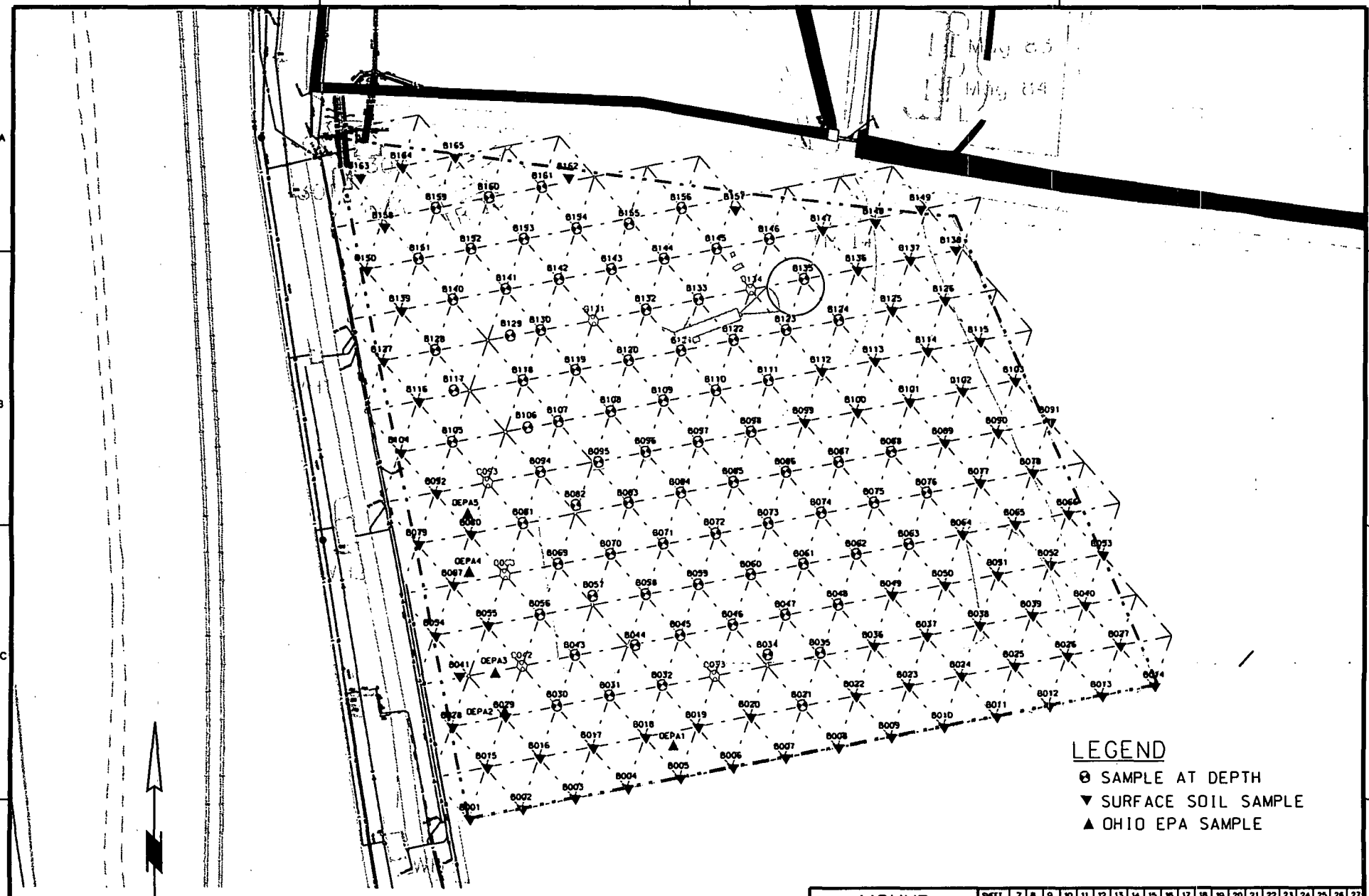
SHEET 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
ISSUE
SHEET 1 2 3 4 5 6
ISSUE ▲
PART CLASSIFICATION

( ) TITLE CLASSIFICATION

Figure 1
Location of PRS 282

DRAWING CLASSIFICATION: UNCLASSIFIED
SIZE: D
DRAWING NUMBER: gen_site_plan.dgn
JOB NUMBER:
DWG TYPE: SITE
PROJ:
CASE:
SCALE: Graphic
SHEET 1 OF
STATUS: MO-REL-09/14/99
DESIGN: MSTATION / J

gen_site_plan.dgn



3 of 4

ISS	DATE	REVISION	BY	CHKR	DWG	LPM/C	APVD	#
A	11/13/02	ISSUE FOR REPORT	KRW					

MOUND

Environmental Restoration Geographic Information System

SHEET	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
ISSUE																					
SHEET	1	2	3	4	5	6															
ISSUE	A																				

PART CLASSIFICATION

FIGURE 2
PRS - 282
SAMPLE LOCATIONS

DRAWING CLASSIFICATION: UNCLASSIFIED

SIZE

DRAWING NUMBER: prs282_grid.dgn

JOB NUMBER: ☆

DWG TYPE: STE | PRNG: ER-GIS | CAGE: | SCALE: GRAPHIC | SHEET 1 OF 1

STATUS: MD-REL-09/23/97 | ORIGIN: MSTATION / J

MIAMISBURG CLOSURE PROJECT
PRS 282

RECOMMENDATION:

Potential Release Site (PRS 282) is identified as the site's historic soil spoils area. It became a PRS based on historic soil excavation activities that may have included common site contaminants, namely plutonium-238 and thorium-232. Even though existing sample results indicated that radionuclide contamination was not present, Further Assessment was warranted based on the large area involved versus the number of historic sample results. Additionally FA was performed to investigate a report of disposal of gasoline contaminated soil at PRS 282. Further Assessment was performed and confirmed the absence of radionuclide contamination in excess of cleanup objectives (10^{-5} Risk-Based Guideline Values plus background). It also confirmed that BTEX/VOCs were at acceptable levels (when compared to available hazard index of one values) and do not have the potential to leach unacceptable concentrations to groundwater..

Therefore, the Core Team recommends a **No Further Assessment** for PRS 282.

A PRS Package with an NFA recommendation signed by the Core Team will be placed in the Public Reading Room for a 30-day review period. Upon closure of the public review comments, if any, the PRS Package will be issued as a final document and made available in the Public Reading Room.

CONCURRENCE:

DOE/MCP: _____ 01/02/03
Robert S. Rothman, Remedial Project Manager (date)

USEPA: _____ 12/30/02
Timothy J. Fischer, Remedial Project Manager (date)

OEPA: _____ 12/30/02
Brian K. Nickel, Project Manager (date)

SUMMARY OF COMMENTS AND RESPONSES:

Comment period from _____ to _____

ATTACHMENT TO ADDENDUM 1

PRS 282 Volatile Organic Compound Detections in Soil

The soil sampling effort at PRS 282 revealed a detection of total xylenes at a concentration of 24 ug/kg in the 0-5 foot interval of sample B146. The Soils Screening Equation was utilized to calculate a soil screening level for total xylenes at PRS 282. The model input parameters are shown below. The calculated soil screening level is 77 mg/kg. This value is considerably above the detection of 24 ug/kg and therefore the PRS is protective of the underlying groundwater with regards to potential leachability of existing xylene.

Model Input Parameters

Parameters for soil leaching calculation:			
Definition	**Parameter**	**Main Hilltop soil**	**Units**
source length parallel to ground water flow	**L**	**50**	**m**
aquifer thickness (estimated thickness along eastern pinchout)	da	2	m
hydraulic conductivity (estimated from Freeze & Cherry, 1979)	K	100	m/y
hydraulic gradient at the source (DOE, Sept. 1994)	**i**	**0.0001**	**m/m**
horizontal distance to receptor (source directly over BVA)	**xr**	**0.05**	**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	2	m
dilution factor (used to multiply the target concentration)	df=	1.00	

- The source length parallel to groundwater flow is conservatively assumed to span the approximate width of the PRS.

- The aquifer thickness is conservatively represented as the eastern pinchout boundary.

- The hydraulic conductivity of 100m/y is a conservative estimate with actual conductivity likely to be higher based on transmissivity data from the OU9 BVA Report, DOE, 1994.

- The hydraulic gradient is likely a very conservative value given the proximity of the PRS to the production wells.

- The horizontal distance to receptor is in essence zero because the PRS is located directly above the eastern margin of the BVA.

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	22.09	**2.07**
Pyrene	3.39E-04	59865	0.02	1197.3		0.68	0.68	0.68	**817.48**
Styrene	1.37E-01	573	0.02	11.46	0.1		0.1	0.10	**1.16**
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	**0.02**
Toluene	2.52E-01	171	0.02	3.42	1		1	1.00	**3.57**
Toxaphene	1.38E-04	501	0.02	10.02	0.003		0.003	0.00	**0.03**
1,2,4-Trichlorobenzene	1.07E-01	1840	0.02	36.8	0.07		0.07	0.07	**2.59**
1,1,1-Trichloroethane	7.63E-01	110	0.02	2.2	0.2		0.2	0.20	**0.49**
1,1,2-Trichloroethane	4.10E-02	61	0.02	1.22	0.005		0.005	0.01	**0.01**
Trichloroethylene	4.35E-01	112	0.02	2.24	0.005		0.005	0.01	**0.01**
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	0.00	**0.00**
Xylenes (total)	2.48E-01	381	0.02	7.62	10		10	10.04	**77.88** ←

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	3.61	**0.37**
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	0.01	**2.55**
Arochlor 1016		147410	0.02	2948.2			0	0.00	---
Arochlor 1254		892520	0.02	17850.4		0.00073	0.00073	0.00	**13.08**
Arochlor 1260		4425557	0.02	88511.14		0.000011	0.000011	0.00	**0.98**
Benzene	2.24E-01	66	0.02	1.32	0.005		0.005	0.01	**0.01**
Benzo(a)anthracene	1.48E-04	272847	0.02	5456.94	0.007		0.007	0.01	**38.35**
Benzo(b)flouranthene	2.53E-04	882588	0.02	17651.76	0.007		0.007	0.01	**124.06**
Benzoic Acid	1.37E-05		0.02			140	140	140.56	**13.18**
Benzo(a)pyrene	3.43E-05	749569	0.02	14991.38	0.0002		0.0002	0.00	**3.01**
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	0.08	**0.10**
Bromoform	2.52E-02	97	0.02	1.94	0.08		0.08	0.08	**0.16**
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	7.33	**2342.37**
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	0.03	**0.04**
Carbon tetrachloride	1.18E+00	187	0.02	3.74	0.005		0.005	0.01	**0.02**
Chlordane	2.73E-03	61155	0.02	1223.1	0.002		0.002	0.00	**2.46**
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	0.08	**0.12**
Chloroform	1.65E-01	47	0.02	0.94	0.08		0.08	0.08	**0.09**
2-Chlorphenol	6.81E-04		0.02				0	0.00	---
Chyrsene	4.96E-05	312425	0.02	6248.5		0.0046	0.0046	0.00	**28.86**
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	**0.37**
DDT	2.20E-03	77577	0.02	1551.54		0.001	0.001	0.00	**1.56**
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	3.01	**1015.39**
1,2-Dichlorobenzene (o)	8.61E-02	693	0.02	13.86	0.6		0.6	0.60	**8.41**
1,2-Dichlorobenzene (p)	1.15E-01	653	0.02	13.06	0.075		0.075	0.08	**0.99**

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	1.10	**0.92**
1,2-Dichloroethane	5.25E-02	20	0.02	0.4	0.005		0.005	0.01	**0.00**
1,1-Dichloroethylene	1.04E+01	64	0.02	1.28	0.007		0.007	0.01	**0.02**
cis-1,2 Dichloroethylene	1.85E-01	29	0.02	0.58	0.07		0.07	0.07	**0.05**
trans-1,2-Dichloroethylene	2.29E-01	50	0.02	1	0.1		0.1	0.10	**0.11**
1,2-Dichloropropane	1.15E-01	59	0.02	1.18	0.005		0.005	0.01	**0.01**
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	0.00	**0.66**
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	0.73	**14366427.18**
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	0.00	**0.38**
Ethylbenzene	3.18E-01	388	0.02	7.76	0.7		0.7	0.70	**5.56**
Fluoranthene	3.83E-04	72025	0.02	1440.5		0.87	0.87	0.87	**1258.33**
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	**0.09**
Heptachlor epoxide	3.40E-04	7236	0.02	144.72	0.0002		0.0002	0.00	**0.03**
Hexachlorobenzene	2.19E-02	27996	0.02	559.92	0.001		0.001	0.00	**0.56**
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	**0.00**
Hexachlorocyclopentadiene	7.05E-01	9589	0.02	191.78	0.05		0.05	0.05	**9.64**
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	**2.28**
Isophorone	2.54E-04	30	0.02	0.6		7.2	7.2	7.23	**5.02**
Methoxychlor	2.60E-04	77936	0.02	1558.72	0.04		0.04	0.04	**62.60**
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	---

ORIGINAL DOCUMENT

SUPPORTING FA RECOMMENDATION

MOUND

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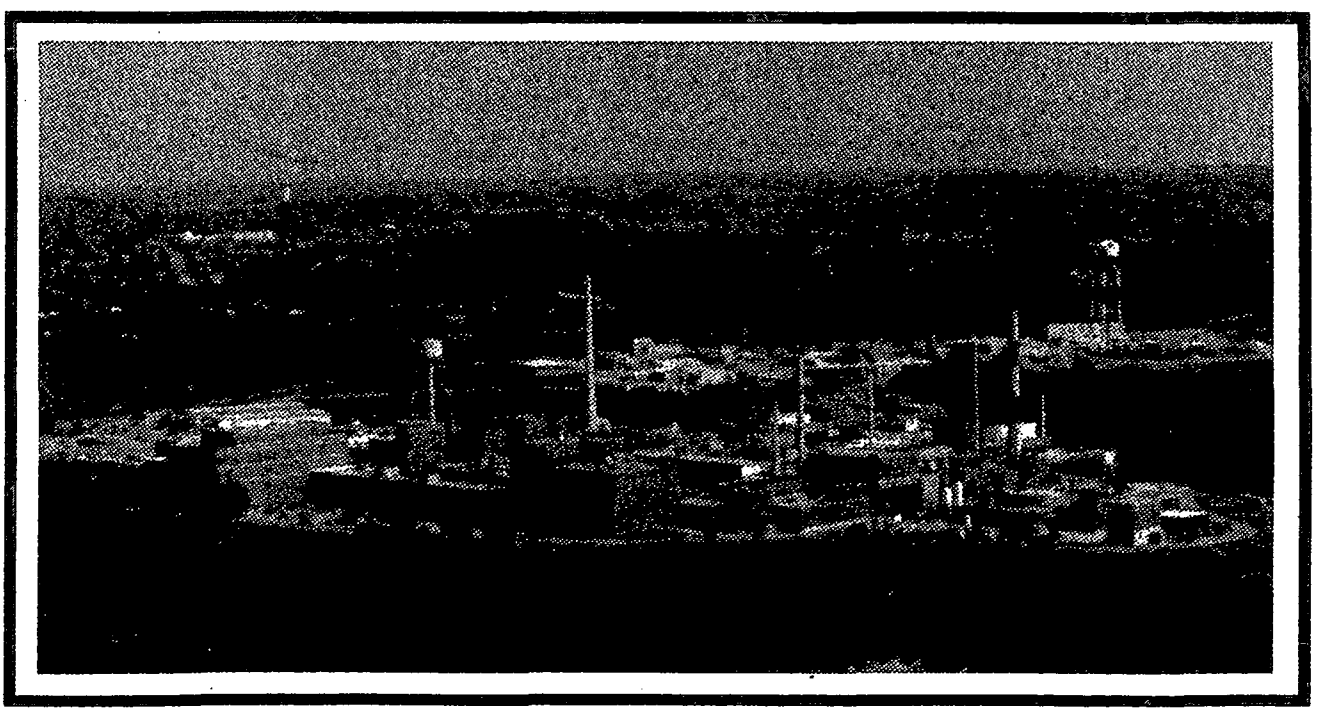
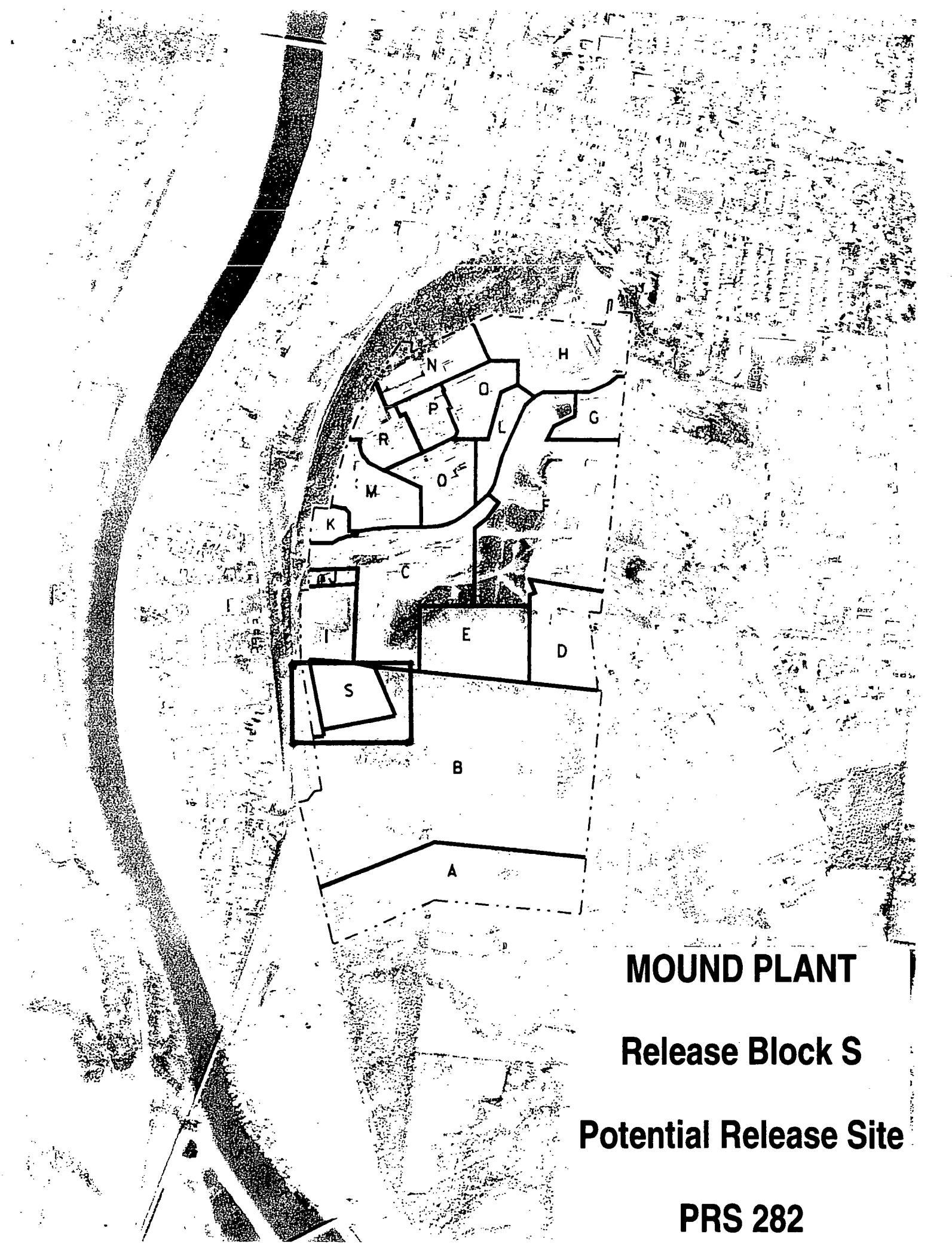
MOUND PLANT

Potential Release Site Package

PRS # 282





MOUND PLANT

Release Block S

Potential Release Site

PRS 282

N
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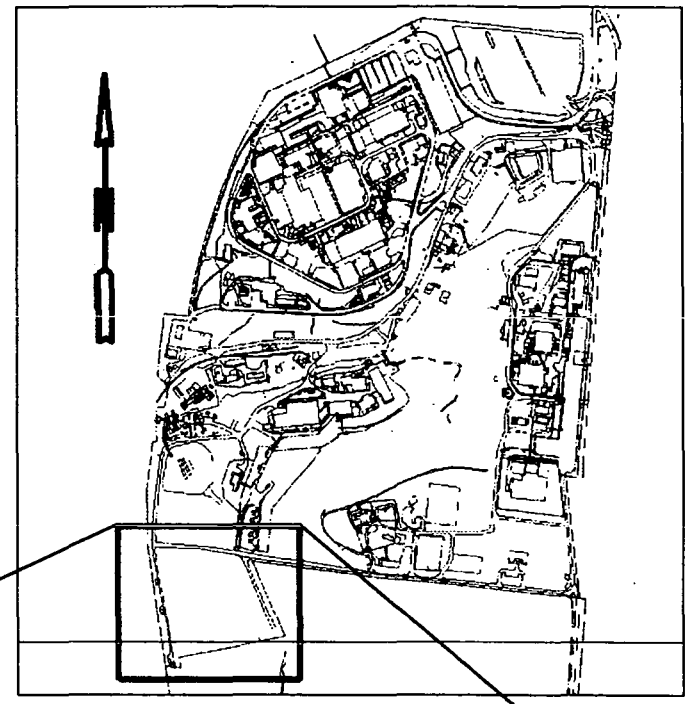
282

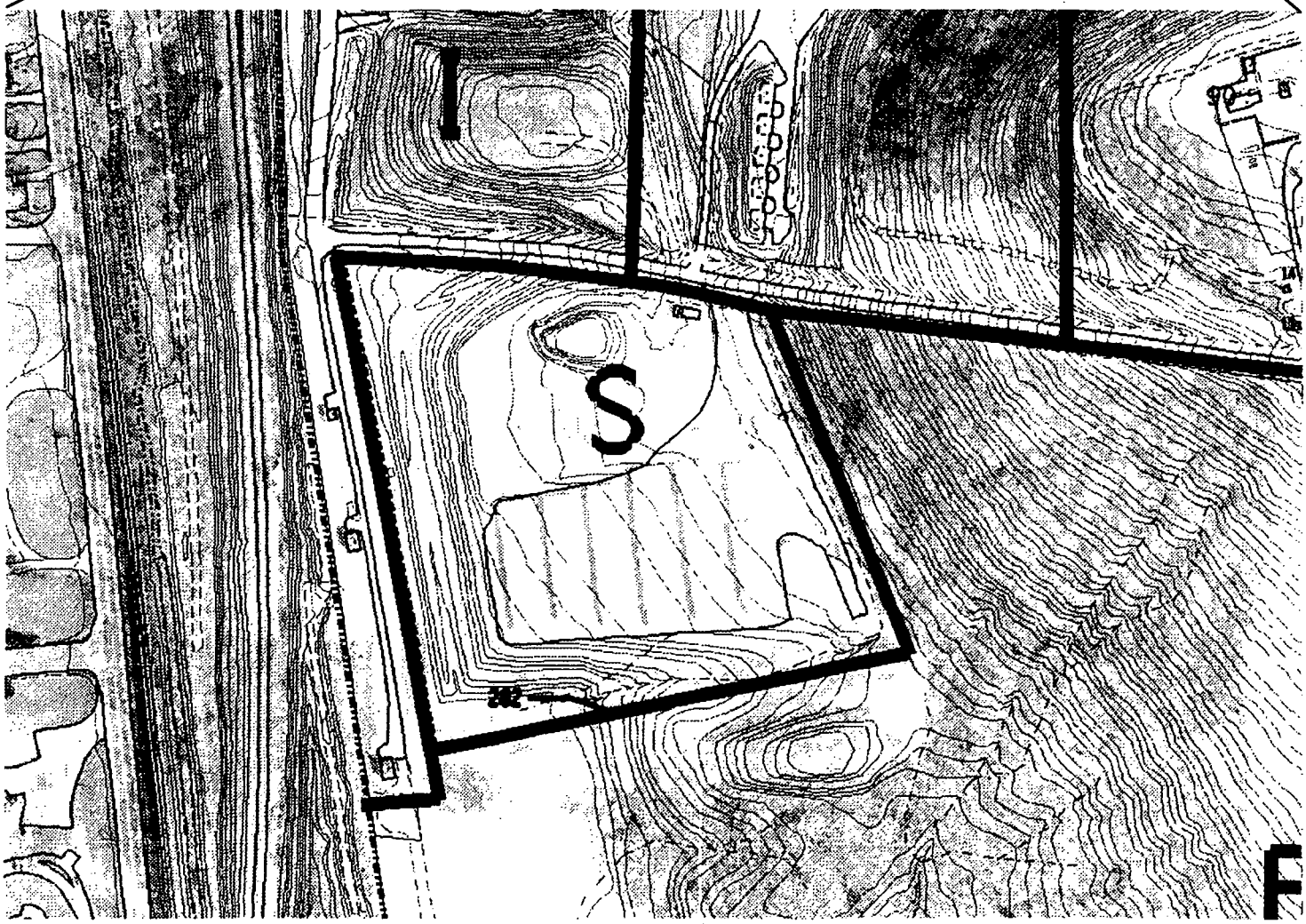
Mound Plant

Release Block S

Potential Release Site

PRS 282





282

PRS 282

PRS HISTORY:

PRS 282, also known as the Spoils Disposal Area, consists of approximately 10 acres of soils located in the northwest corner of Mound's South Property (also known as the "New Property" because it was purchased by Mound in 1981). Just north of PRS 282 is Mound's OU1 historic landfill (PRS package 8/9/10/11/12). Prior to Mound's acquisition, PRS 282 was farm land.

As of this writing, PRS 282 is an active site. PRS 282 acquired the name Spoils Disposal Area because it is used as a repository for soils removed during Mound construction. All soils placed in PRS 282 (Spoils Disposal Area) are screened for plutonium-238 and thorium-232 prior to disposal. The current screening criterion are 25 pCi/g for plutonium and 2 pCi/g for thorium. However, at one time, the thorium disposal criteria was 5 pCi/g.[1, 2]

The contaminants of concern at PRS 282 are plutonium-238, thorium-232, and gasoline contaminated soils (per the OU9 Volume 12 Site Scoping Report).[1] However, because of PRS 282's usage as a soils repository, the potential for all radionuclides and hazardous compounds prevalent at the Mound site will need to be considered.

CONTAMINATION:

1. In 1983, the **Radiological Site Survey**[2] sampled twenty-nine soil locations at PRS 282 from which 26 surface samples and 8 core borings were analyzed. The samples were analyzed via Mound Soil Screening, radiochemistry (for plutonium), and gamma spectroscopy. Results are summarized in the table below:

Contaminant	# Samples Analyzed	Maximum Concentration Detected	Guideline Criteria
Plutonium-238	34	8 pCi/g (in surface soil)	25 pCi/g (Mound ALARA in soil)
Thorium-232	34	Less than 2 pCi/g	5 pCi/g [ref 5] (in surface soil)
Tritium	1	1.90 pCi/mL (in water)	20 pCi/L [ref 4] (in water)
Cobalt-60	2	No detection* (in surface soil)	0.1 pCi/L [ref 4] (in soil)
Cesium-137	2	No detection* (in surface soil)	0.46 pCi/g [ref 4] (in soil)
Americium-241	2	No detection* (in surface soil)	4.95 pCi/g [ref 4] (in soil)
Radium-226	2	0.9 pCi/g (in surface soil)	5 pCi/g [ref 5] (in surface soil)

* Note: In the above table, the detection limit for cobalt-60, cesium and americium-241 was 2 pCi/g

2. In 1992, a piezometer (well P015) was installed near the center of PRS 282. Core borings, taken during well installation, were analyzed for dioxins/furans (discussed in paragraph 3 below), radionuclides, organics, and inorganics.[8] Results showed:
   - All concentrations of radionuclides, organics, and inorganics were below their corresponding 10^{-6} Risk Based Guideline Value in soil.[8, 4]

3. Mound's 1993 **Position Paper on Dioxin in Soils at the Mound Facility**[6] reviewed the results of piezometer well boring P015 (located within PRS 282) for dioxin/furan concentrations. The maximum equivalent concentration for dioxins/furans (2, 3, 7, 8 TCDD) detected in soil was .0077 parts per billion (ppb).[6] The equivalent ATSDR Industrial Guideline Criteria is 20 ppb.[6]

4. In 1995, the **OU5, New Property Extended Phase Field Investigation**[7] sampled monitoring well 402 (located in the Buried Valley Aquifer in the southwestern portion of PRS 282) for radionuclides, VOCs, explosives and inorganics. Results showed:
   - All concentrations of radionuclides, explosives, and inorganics in water were below their corresponding regulatory or 10^{-6} Risk Based Guideline Value.[7, 4]

5. The 1996 **OU5, New Property Remedial Investigation Report**[3] (a comprehensive summary of the OU5, New Property Phase 1 Field Report, OU5, New Property Extended Phase Field Report, the OU9, RSI Report, and the OU9, Hydrogeological Investigation: Groundwater Sweeps Report) summarized soil and groundwater results for the South Property. The results reported for the Spoils Area (PRS 282) consisted of soil samples from monitoring well W402 and groundwater samples from historical well 0353.

   Soil samples, from well W402 (located in the south central part of PRS 282), were analyzed for radionuclides, metals, explosives, pesticides/polychlorinated biphenyls, VOCs, SVOCs, polycyclic hydrocarbons, and phthalate ester). Results showed:
   - All soil concentrations of radionuclides, metals, explosives, pesticides/polychlorinated biphenyls, VOCs, SVOCs, polycyclic hydrocarbons, and phthalate esters at monitoring well W402 were below their respective 10^{-6} Risk Based Guideline Value.[3, 4]

   Groundwater samples, from historical well 0353 (located on the eastern edge of PRS 282), were analyzed for metals. Results showed:
   - All concentrations of metals in groundwater at historic well 0353 were below their corresponding 10^{-6} Risk Based Guideline Value.[3, 4]

Note: For clarity, groundwater sampling of monitoring well W402 was covered in paragraph 4 above rather than with the OU5, New Property Remedial Investigation Report (paragraph 5).

READING ROOM REFERENCES:

1) OU9, Site Scoping Report: Volume 12 - Site Summary Report, December 1994. (pages 7-9)
2) OU9, Site Scoping Report: Volume 3 - Radiological Site Survey, June 1993. (pages 10-17)
3) OU5, New Property Remedial Investigation Report, February 1996. (pages 18-21)
4) Risk Based Guidelines, Revision 0, December 1995. (pages 22-30)
7) OU5, New Property Extended Phase Field Report, July. (pages 43-48)
8) OU1, Remedial Investigation Report, Volume II - Appendices A-O, May 1994. (pages 49-58)

OTHER REFERENCES:

5) Code of Federal Regulations, 40 CFR 192.12 and 40 CFR 192.41.
6) Position Paper on Dioxin in the Soils at the Mound Facility, March 1993. (pages 31-42)

PREPARED BY:

George Liebson, Member of EG&G Technical Staff

MOUND PLANT
PRS 282

RECOMMENDATION:

CONCURRENCE:

DOE/MB: _____
Arthur W. Kleinrath, Remedial Project Manager (date)

USEPA: _____
Timothy J. Fischer, Remedial Project Manager (date)

OEPA: _____
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 282

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	Re
280	Waste Oil Drum Field Area	I-8	Historical	Waste oil Plating Operations waste Explosive/solvent waste Herbicides Waste chemicals Photo-processing waste Batteries Kitchen grease Epoxy resins Ethylene glycol Scintillation vials	4, 5, 18	Confirmed VOCs	S	4	3, 4, 5, 6, 8, 12	Tables B.6, B.7, and B.8 RSS[c] Locations S0263, S0164, S0265, and S0266 (Appendix E in Ref.6) Table B.9	7 6
[redacted]											
282	Spoils Disposal Area/Construction Spoils Area	J-5 K-5	In service	Plutonium-238, Thorium Gasoline contaminated soils from G Building	4, 5, 18	Plutonium-238 < 25 pci/gm Thorium < 5 pci/gm	S	6	14, 15, 16	Table B.1 (Table X.3 in Ref. 6)	6
[redacted]											
283	Area 1, Bulk Transfer of Thorium Drums Plutonium Recoverable Waste Storage)	I to L 6 to 8	Grounds	Thorium sludge constituents, Plutonium-238	1, 4, 5, 18	Thorium dust, Plutonium-238	S	6	3, 4 14, 15, 16	Tables B.6, B.7, and B.8 Table B.1 (Table IV.2 in Ref. 6)	8 6
	g 21, Thorium Sludge Storage Facility	J-7 J-8	Surplus	Thorium sludge constituents	4	Thorium dust	S	4, 6	See Area 1		
	I, Contamination from Building Operations	G-9	Surplus	Plutonium-238	1, 4, 5, 18	Plutonium-238	S	6	3, 4, 5, 6 14, 16	Tables B.6, B.7, and B.8 Table B.1 (Table IV.3 in Ref. 6)	8 6
	, SM Building Sanitary ge Septic Tank Leach Field	F-9 G-9	Surplus	Plutonium-238, Thorium Sanitary wastes from SM Building	1, 4, 5, 18	Plutonium-238	S	6	3, 4, 6 14, 15, 16	Tables B.6, B.7, and B.8 Table B.1 (Table IV.5 in Ref. 6)	8 6

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

ference List

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

Document Control No. DGC

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

of construction residues, such as excavated soils, pieces of concrete, piping, metal banding, plumbing fixtures, and roofing materials, which were either dumped or bulldozed over the side of the hill (DOE 1992c). Area J also includes three areas of ponded water at the base of the slope (DOE 1992g).

Twelve core locations and nine surface locations were sampled, either within or near Area J, as part of the Site Survey Project (Plate 1, and Table X.2). The maximum plutonium-238 concentration measured in these samples was 71.30 pCi/g in the sample taken at a depth of 18 inches at core location 0156 on Plate 1 (C0156 on Table X.2). The maximum thorium activity measured was 30.42 pCi/g in a sample taken at a depth of 162 inches at core location 0160 on Plate 1 (C0160 on Table X.2). Of the nine surface locations sampled, four (0634, 0635, 0636, and 0639 on Plate 1) appear to have been located on the slope of the SM/PP Hill. The other five surface locations and the 12 core locations were probably located in the more level area at the top of the hill.

The maximum depth of the core locations in Area J was 234 inches (C0152 and C0156 on Table X.2), and most were sampled at 54 to 72 inches. Mound Plant drawing #FSE 16472 (DOE 1992f) indicates that the depth to bedrock in this area is approximately 36 inches, but this depth probably varies greatly due to the presence of fill material. It is likely that the Area J core locations were sampled to bedrock, but drilling logs are not available to confirm this.

The upper relatively flat portion of Area J was historically used to stage soils contaminated with thorium and plutonium. Soils and possible other debris were placed in the area as part of excavation projects, including a water line repair below the adjacent water tower, and possible plutonium-contaminated soils from the construction of the overflow pond in the mid-1970s (DOE 1992g). The area may have also been referred to as the dredged materials disposal area (Area 11a) in the map of Hot Waste Burial Sites, reproduced in the Site Scoping Report: Volume 7 - Waste Management (DOE 1992c). In 1988, 150 half-size low specific activity boxes (approximately 150 cubic yards) of soil were removed from the area. Subsequent screening by the Mound Plant soil screening facility indicated levels of thorium and plutonium-238 below 2 and 147 pCi/g, respectively (Rader 1988). The data sheets are included in Appendix E.

10.3. SPOILS DISPOSAL AREA

The spoils disposal area (also known as the construction spoils area) is located south of the overflow pond and Area 18 (Plate 1). This is an engineered disposal area that has been in use since 1985. Soils containing less than 25 pCi/g of plutonium-238 and less than 5 pCi/g of thorium from construction areas at Mound Plant are dumped onto the ground surface, graded, and compacted. This area was not identified in the original Site Survey Project Report, probably because it is only used for the disposal of soils with radioactivity below the guidelines.

Twenty-six surface samples were taken in the spoils disposal area during the Site Survey Project (Plate 1 and Table X.3). The maximum plutonium-238 activity concentration measured in these samples was 8.30 pCi/g in the sample from S0895; no thorium activity greater than 2 pCi/g was measured. Two samples (S0851 and S0810) were also analyzed using gamma spectroscopy. Radium-226 was the only radionuclide detected using this technique. It was detected at 0.9 pCi/g in both samples.

10.4. PLANT DRAINAGE DITCH

The plant drainage ditch at Mound Plant serves as the natural channel for surface water, following roughly an east-to-west course (Figure 10.1 and Plate 1). As the collection point for surface water runoff for both the SM/PP and Main Hills, the ditch is in a position to receive contamination from multiple sources at Mound Plant. The ditch currently begins just south of Building 51 and extends southwestward to a series of three connected retention basins on the western border of the facility (Plate 1). From the retention basins, the water is released from the plant at an outfall permitted under the National Pollution Discharge Elimination System (Plate 1). After release at outfall 002, the water flows through a section of the Miami-Erie Canal, now abandoned, and on to the Great Miami River. Historically, the upper reach of the ditch extended further north than Building 51, below what is now known as Area 7, but has been infilled to provide construction pads. Changes in the geomorphology of both the upper and lower reaches of the ditch are documented in the Site Scoping Report: Volume 6 - Photo History (DOE 1992b).

In 1974, an investigation was performed as part of the Miami-Erie Canal investigations to document the levels of plutonium-238 present in the sediments of the plant drainage ditch (see section 1 for additional information). Because the drainage ditch was investigated in 1974, no further sampling was performed as part of the Site Survey Project. During the 1974 study, sediment samples were taken at 11 locations in the ditch proper and 1 location (#12) slightly upgradient of the recognized start of the ditch (Figure 10.1). (These locations are not shown on Plate 1 because coordinates were not documented.) Plutonium-238 concentrations measured using a radiochemical procedure ranged from less than 1 pCi/g to a maximum of 535 pCi/g at location #6. These results are presented in Table X.4. The portions of the ditch most highly contaminated appear to be at the northern end of the ditch (#11) and at the center (#5 and #6). The top 0 to 3 ft of ditch sediments appear to contain roughly 95 percent of the plutonium-238, although elevated levels of plutonium-238 were found in sediments as deep as 5 to 6 ft (Table X.4). More recently, samples taken by the Mound Plant D & D Program in selected portions of the drainage ditch (as part of the Area 19 verification study) and Area 16 have shown similar concentrations.

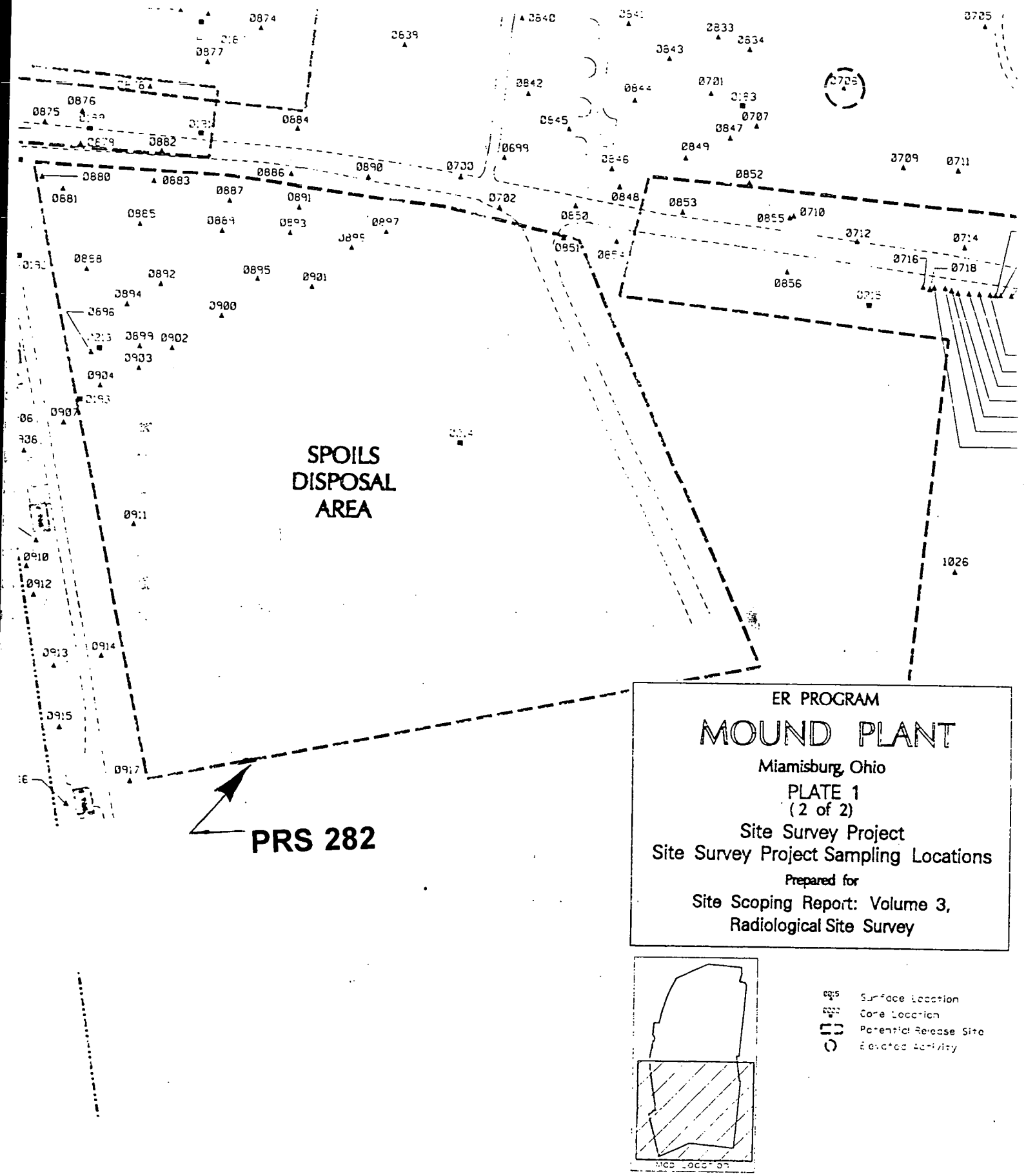

SPOILS
DISPOSAL
AREA
PRS 282
ER PROGRAM
MOUND PLANT
Miamisburg, Ohio
PLATE 1
(2 of 2)
Site Survey Project
Site Survey Project Sampling Locations
Prepared for
Site Scoping Report: Volume 3,
Radiological Site Survey
Surface Location
Core Location
Potential Release Site
Elevated Activity

Table X.3. (page 2 of 2)

Plate 1 Location[a]	Coordinates South	Coordinates West	MRC ID No.	Mo-Yr	Depth (inch)	Plutonium-238 (pCi/g)	Thorium[b] (pCi/g)	Tritium (pCi/mL)	Cobalt-60 (pCi/g)	Cesium-137 (pCi/g)	Radium-226 (pCi/g)	Americium-241 (pCi/g)
S0894	3230	4815	7850	10-84	0	0.02	b					
S0895	3260	4680	7846	10-84	0	8.30	b					
S0896	3260	4870	7854	10-84	0	0.06	b					
S0897	3270	4535	7839	10-84	0	0.03	b					
S0898	3270	4575	7840	10-84	0	0.02	b					
S0899	3275	4820	7853	10-84	0	0.04	b					
S0900	3280	4730	7848	10-84	0	0.62	b					
S0901	3290	4630	7847	10-84	0	1.29	b					
S0902	3290	4790	7849	10-84	0	0.37	b					
S0903	3295	4830	7851	10-84	0	0.09	b					
S0904	3295	4875	7852	10-84	0	0.03	b					
S0911	3440	4900	4050	10-83	0	2.03	b					

[a]Map locations are given using a "C" to designate core locations and an "S" to designate surface locations.
[b]A "b" indicates that the total thorium concentration was less than the background level of 2.0 pCi/g, using FIDLER screening. Therefore, radiochemical analysis was not performed.
FIDLER - field instrument for the detection of low-energy radiation
LDL - The measured concentration was below the lower detection limit, estimated to be 0.5 pCi/g for cobalt-60, cesium-137, and americium-241; and 1 pCi/g for radium-226.
MRC ID - Monsanto Research Corporation identification
NR - No result given
pCi/g - picocuries per gram
pCi/mL - picocuries per milliliter

Table X.3. Mound Site Survey Project - Spoils Disposal Area

Plate 1 Location[a]	Coordinates South	Coordinates West	MRC ID No.	Mo-Yr	Depth (inch)	Plutonium-238 (pCi/g)	Thorium[b] (pCi/g)	Tritium (pCi/mL)	Cobalt-60 (pCi/g)	Cesium-137 (pCi/g)	Radium-226 (pCi/g)	Americium-241 (pCi/g)
S0851	3350	4365	4026	10-83	0	1.82	b					
S0880	3075	4845	6384	08-84	0	4.68	b		LDL	LDL	0.9	LDL
S0881	3095	4830	7835	10-84	0	5.59	b		LDL	LDL	0.9	LDL
S0883	3125	4740	7836	10-84	0	1.22	b					
S0884	3135	4580	6389	08-84	0	2.93	b					
S0885	3160	4770	7843	10-84	0	0.01	b					
S0886	3175	4605	2601	10-83	0	0.55	b	1.90				
S0887	3175	4675	7837	10-84	0	0.08	b					
S0888	3180	4840	7844	10-84	0	0.15	b					
S0889	3200	4695	7842	10-84	0	0.01	b					
S0890	3210	4530	2602	10-83	0	0.28	b					
S0891	3210	4610	7836	10-84	0	0.23	b					
S0892	3225	4775	7845	10-84	0	0.47	b					
S0893	3230	4630	7841	10-84	0	0.01	b					

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)
S0903	3295	4830	7851	10-84	0	0.09	b					
S0904	3295	4875	7852	10-84	0	0.03	b					
C0192	3340	4900	8510	12-84	90	0.02	b					
			5811	12-84	180	0.01	b					
S0905	3250	4950	6393	08-84	0	0.17[c]	2.46[c]					
C0193	3300	4900	7752	09-84	90	0.89	b					
			7753	09-84	180	0.29	b					
S0906	3300	4975	6391	08-84	0	9.92	b					
S0907	3315	4925	6392	08-84	0	1.15	b		LDL	0.6	1.2	LDL
S0908	3325	4975	4047	10-83	0	1.08	b					
S0909	3415	5000	4045	10-83	0	1.85	b					
S0910	3435	5020	6390	08-84	0	0.22	b		LDL	1.5	1.4	LDL
S0911	3440	4900	4050	10-83	0	2.03[c]	b					
S0912	3465	5025	6397	08-84	0	0.19	b					
S0913	3540	5035	6396	08-84	0	0.08	b					
S0914	3550	4986	4049	10-83	0	2.29	b	0.45				
S0915	3600	5055	6395	08-84	0	2.19	b					
S0916	3675	5080	6394	08-84	0	0.69	b					
S0917	3680	5010	4048	10-83	0	2.32	b	0.21				

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)
C0213	3260	4860	2660	09-83	30	0.18	b					
			2661	09-83	60	0.93[c]	b					
			2662	09-83	240	0.16	b					
C0214	3500	4550	2714	09-83	30	0.01	b					
			2715	09-83	60	0.01[c]	b					
			2716	09-83	180	0.01	b					
C0215	3540	4100	2708	09-83	60	0.02	b		LDL	LDL	0.9	LDL
			2709	09-83	72	0.04	b					
			2710	09-83	96	0.01	b					
S1004	3720	3780	10553	08-85	0	7.58	b					
S1005	3720	3800	10528	08-85	0	4.21	b					
S1006	3720	3820	E-22	03-82	0	396.40	b					
S1007	3725	3820	E-8	03-82	0	216.30	b					
S1008	3730	3755	9137	05-85	0	124.20	b					
S1009	3730	3900	E-19	03-82	0	1.20	b					
C0216	3740	5050	2663	09-83	30	0.24	b					
			2664	09-83	60	0.49	b					
			2665	09-83	240	0.72	b					
C0217	3750	3740	2704	09-83	30	0.06[c]	b					
S1010	3750	3795	E-17	03-82	0	23.30	b					
S1011	3760	3710	9136	05-85	0	56.20	8.79					
S1012	3760	3800	10554	08-85	0	13.00	b					
S1013	3760	3820	10529	08-85	0	1.34	b					

Document Control No.

Environmental Restoration Program

OPERABLE UNIT 5 NEW PROPERTY REMEDIAL INVESTIGATIO REPORT

MOUND PLANT
MIAMISBURG, OHIO

February 1996

Final (Revision 0)

U.S. Department of Energy
Ohio Field Office

EG&G Mound Applied Technologies

Mound New Property Investigation
Comparison of Ground Water with OU 5 Background
Sample results exceeding background concentrations.

---------- Location=New Property Group=All STATION=W402 ----------

Analyte (units)	LABQUAL	RESULTS	DATAQUAL	2 Sigma Rad Count Uncert.	Background Criteria	Concentration/ Criteria Ratio
Chloride (MG/L)		156.00	=	.	.	.
Sulfate (MG/L)		70.00	=	.	.	.
Aluminum (UG/L)		9950.00	=	.	7820.00	1.3
Bismuth (UG/L)	B	147.00	=	.	29.60	5.0
Calcium (UG/L)		179000.00	=	.	111000.00	1.6
Potassium (UG/L)	E	7410.00	J	.	7300.00	1.0
Vanadium (UG/L)	B	15.00	=	.	13.20	1.1

---------- Location=New Property Group=All STATION=W411 ----------

Analyte (units)	LABQUAL	RESULTS	DATAQUAL	2 Sigma Rad Count Uncert.	Background Criteria	Concentration/ Criteria Ratio
Chloride (MG/L)		232.00	[illegible]	.	.	.
Sulfate (MG/L)		62.20	=	.	.	.
Aluminum (UG/L)		31500.00	=	.	7820.00	4.0
Bismuth (UG/L)		264.00	=	.	29.[illegible]	8.9
Calcium (UG/L)		255000.00	J	.	111000.00	2.3
Cobalt (UG/L)	B	[illegible]20	=	.	[illegible].90	1.0
Magnesium (UG/L)	E	81[illegible]0.00	J	.	6[illegible]00.00	1.3
Nickel (UG/L)	B	[illegible]32.90	J	.	24.90	1.3
Potassium (UG/L)	E	[illegible]8400.00	J	.	7300.00	3.9
Vanadium (UG/L)	B	29.10	=	.	13.20	2.2
2,4,6-Trinitrotoluene (UG/L)	J	0.26	J	.	.	.
Phenol (UG/L)	J	1.00	J	.	.	.
bis(2-ethylhexyl)phthalate (UG/L)	J	2.00	J	.	.	.
1,2-Dichloroethene (UG/L)	J	4.00	J	.	.	.
Trichloroethene (UG/L)		8.00	=	.	.	.

Minimum, average and maximum are based on the reported detection limit.
Generated by program mndcmp15 on 18SEP95 at 15:58 using datasets mndnew02, sweep02 and seep02.

Mound New Property Investigation
Comparison of Soil Results with OU 9 Background Criteria
Sample results exceeding background concentrations.

---------- Location=New Property Group=Below 2 feet STATION=W402 Depth(Ft.)=24.0-26.0 ----------

Analyte (units)	LABQUAL	RESULTS	DATAQUAL	2 Sigma Rad Count Uncert.	Background Criteria	Concentration/ Criteria Ratio
Sulfate (MG/KG)		480.00	J	.	150.00	3.2
Antimony (MG/KG)	N*	2.30	J	.	0.45	5.1
Magnesium (MG/KG)		40300.00	=	.	40000.00	1.0

Minimum, average and maximum are based on the reported detection limit.
Generated by program mndcmp14 on 18SEP95 at 17:30 using datasets mndnew02.

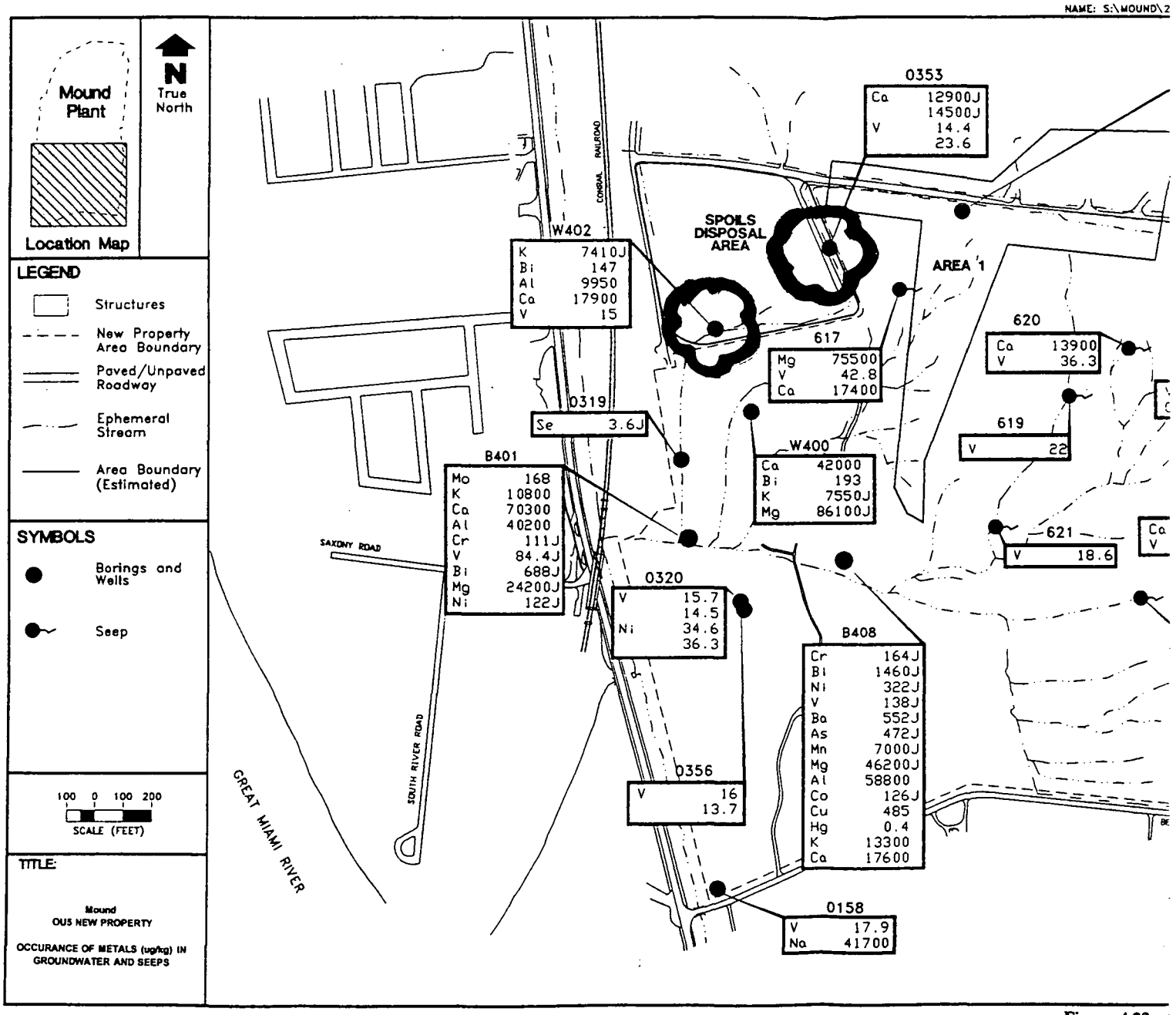

NAME: S:\MOUND\2
Mound Plant
Location Map
N
True North
LEGEND
Structures
New Property Area Boundary
Paved/Unpaved Roadway
Ephemeral Stream
Area Boundary (Estimated)
SYMBOLS
Borings and Wells
Seep
100 0 100 200
SCALE (FEET)
TITLE:
Mound
OU5 NEW PROPERTY
OCCURANCE OF METALS (ug/kg) IN GROUNDWATER AND SEEPS
CONRAIL RAILROAD
SAXONY ROAD
SOUTH RIVER ROAD
GREAT MIAMI RIVER
SPOILS DISPOSAL AREA
AREA 1
0353
Ca 12900J
14500J
V 14.4
23.6
W402
K 7410J
Bi 147
Al 9950
Ca 17900
V 15
617
Mg 75500
V 42.8
Ca 17400
620
Ca 13900
V 36.3
619
V 22
0319
Se 3.6J
W400
Ca 42000
Bi 193
K 7550J
Mg 86100J
B401
Mo 168
K 10800
Ca 70300
Al 40200
Cr 111J
V 84.4J
Bi 688J
Mg 24200J
Ni 122J
621
V 18.6
0320
V 15.7
14.5
Ni 34.6
36.3
B408
Cr 164J
Bi 1460J
Ni 322J
V 138J
Ba 552J
As 472J
Mn 7000J
Mg 46200J
Al 58800
Co 126J
Cu 485
Hg 0.4
K 13300
Ca 17600
0356
V 16
13.7
0158
V 17.9
Na 41700

Figure 4.23.

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 4A

Construction/Mound Employee - Soil/Sediment 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
High Explosives												
HMX				5.50e+04								
PETN												
RDX	2.70e+03	2.70e+02	2.70e+01	3.20e+03								
Inorganics												
Aluminum												
Antimony				4.25e+02								
Arsenic				3.20e+02	6.00e+05	6.00e+04	6.00e+03					
Barium				7.50e+04				1.55e+07				7.50e+04
Beryllium	7.00e+01	7.00e+00	7.00e-01	5.50e+03	3.65e+06	3.65e+05	3.65e+04		7.00e+01	7.00e+00	7.00e-01	
Cadmium (Diet)				1.05e+03	5.00e+06	5.00e+05	5.00e+04					
Chromium III				1.05e+06								
Chromium VI				5.50e+03	7.50e+05	7.50e+04	7.50e+03					
Cobalt												
Copper												

TABLE 4A

Construction/Mound Employee - Soil/Sediment 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^{-4}	GV for HI=1
Cyanide				2.15e+04								
Iron												
Lead												
Lithium												
Manganese (Diet)				1.50e+05				1.55e+06				1.35e+05
Mercury				3.20e+02				9.50e+06				3.20e+02
Nickel				2.15e+04								
Silver				5.50e+03								
Thallium												
Vanadium				7.50e+03								
Zinc				3.20e+05								
Organics												
1,1,1-Trichloroethane												
1,1-Dichloroethane				1.05e+05				3.90e+01				3.90e+01
1,2-Dichloroethane	3.30e+03	3.30e+02	3.30e+01		1.70e+03	1.70e+02	1.70e+01		1.10e+03	1.10e+02	1.10e+01	

TABLE 4A

Construction/Mound Employee - Soil/Sediment 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
1,2-trans-Dichloroethylene				2.15e+04								
2-Butanone				6.50e+05				4.65e+04				4.65e+04
2-Hexanone												
2-Methylnaphthalene												
4-Methyl-2-Pentanone				8.50e+04				3.50e+03				3.50e+03
4-Methylphenol				5.50e+03								
Acetone				1.05e+05								
Benzene	1.05e+04	1.05e+03	1.05e+02		2.45e+03	4.65e+02	4.65e+01		2.45e+03	3.20e+02	3.20e+01	
Benzoic Acid				4.25e+06								
Bromodichloromethane	4.80e+03	4.80e+02	4.80e+01	2.15e+04								
Butyl benzyl phthalate				2.15e+05								
Carbon Disulfide				1.05e+05				1.45e+03				1.40e+03
Carbon Tetrachloride	2.30e+03	2.30e+02	2.30e+01	7.50e+02	2.55e+03	2.55e+02	2.55e+01		1.20e+03	1.20e+02	1.20e+01	
Chloroethane								8.00e+02				
Chrysene	4.10e+04	4.10e+03	4.10e+02									

TABLE 4A

Construction/Mound Employee - Soil/Sediment 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
Cresols												
Di-n-butylphthalate				1.05e+05								
Di-n-octylphthalate				2.15e+04								
Dibromochloromethane	3.55e+03	3.55e+02	3.55e+01	2.15e+04								
Dichloromethane	3.95e+04	3.95e+03	3.95e+02	6.50e+04				5.00e+03				5.00e+03
Diethyl benzene, 1,4-												
Ethyl benzene				1.05e+05				2.40e+00				2.40e+00
Hexane				6.50e+04				4.55e+02				4.55e+02
Isophorone	3.15e+05	3.15e+04	3.15e+03	2.15e+05								
Methyl Iodide												
N-nitroso-diphenylamine	6.00e+04	6.00e+03	6.00e+02									
Pentachlorophenol	2.50e+03	2.50e+02	2.50e+01	3.20e+04								
Phenol				6.50e+05								
Tetrachloroethene				1.05e+04								
Toluene				2.15e+05				1.25e+03				1.25e+03

TABLE 4A

Construction/Mound Employee - Soil/Sediment 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	3.75e+04	3.75e+03	3.75e+02	2.15e+04	8.00e+09	8.00e+08	8.00e+07		3.75e+04	3.75e+03	3.75e+02	
Trichloroethylene	2.70e+04	2.70e+03	2.70e+02		2.20e+03	2.20e+03	2.25e+02		2.20e+03	1.25e+03	1.25e+02	
Trichlorofluoromethane				3.20e+05				3.65e+03				3.65e+03
Trichloromethane	4.90e+04	4.90e+03	4.90e+02	1.05e+04	1.55e+03	1.55e+02	1.55e+01		1.55e+03	1.55e+02	1.55e+01	
Xylene				2.15e+06								
bis(2-Ethylhexyl)phthalate	2.15e+04	2.15e+03	2.15e+02	2.15e+04								
PAHs												
Acenaphthylene												
Anthracene				3.20e+05								
Benzo(a)anthracene	4.10e+02	4.10e+01	4.10e+00									
Benzo(a)pyrene	4.10e+01	4.10e+00	4.10e-01									
Benzo(b)fluoranthene	4.10e+02	4.10e+01	4.10e+00									
Benzo(g,h,i)perylene												
Benzo(k)fluoranthene	4.10e+03	4.10e+02	4.10e+01									
Dibenz(a,h)anthracene	4.10e+01	4.10e+00	4.10e-01									

TABLE 4A

Construction/Mound Employee - Soil/Sediment 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
Fluoranthene				4.25e+04								
Indeno(1,2,3-cd)pyrene	4.10e+02	4.10e+01	4.10e+00									
Phenanthrene												
Pyrene				3.20e+04								
Pesticides/PCBs												
4,4'-DDE	9.00e+02	9.00e+01	9.00e+00									
4,4'-DDT	9.00e+02	9.00e+01	9.00e+00	5.50e+02	9.00e+07	9.00e+06	9.00e+05		9.00e+02	9.00e+01	9.00e+00	
Aroclor 1248	3.85e+01	3.85e+00	3.85e-01									
Aroclor 1254				2.15e+01								
Aroclor 1260	3.85e+01	3.85e+00	3.85e-01									
Beta-BHC	1.65e+02	1.65e+01	1.65e+00		1.70e+07	1.70e+06	1.70e+05		1.65e+02	1.65e+01	1.65e+00	
Dieldrin	1.85e+01	1.85e+00	1.85e-01	5.50e+01	1.90e+06	1.90e+05	1.90e+04		1.85e+01	1.85e+00	1.85e-01	
Endrin Ketone												

TABLE 4B Construction/Mound Employee - Soil/Sediment Guideline Values: Radionuclides (Units = pCi/g)

RADIONUCLIDE	Ingestion			External			Inhalation			Ingestion + External + Inhalation		
	GV for TR=10-4	GV for TR=10-5	GV for TR=10-6	GV for TR=10-4	GV for TR=10-5	GV for TR=10-6	GV for TR=10-4	GV for TR=10-5	GV for TR=10-6	GV for TR=10-4	GV for TR=10-5	GV for TR=10-6
Actinium-227+D	2.65e+02	2.65e+01	2.65e+00	1.65e+02	1.65e+01	1.65e+00	2.20e+05	2.20e+04	2.20e+03	1.00 e+02	1.00 e+01	1.00 e+00
Americium-241	5.00e+02	5.00e+01	5.00e+00	2.10e+04	2.10e+03	2.10e+02	4.45e+05	4.45e+04	4.45e+03	4.45e+02	4.95e+01	4.95 e+00
Bismuth-207	3.30e+04	3.30e+03	3.30e+02	1.75e+01	1.75e+00	1.75e-01	1.80e+09	1.80e+08	1.80e+07	1.75e+01	1.75e+00	1.75 e-01
Cesium-137+D	5.50e+03	5.50e+02	5.50e+01	4.65e+01	4.65e+00	4.65e-01	9.00e+08	9.00e+07	9.00 e+06	4.60e+01	4.60e+00	4.6 e-01
Cobalt-60	9.00e+03	9.00 e+02	9.00 e+01	10.00e+00	1.00e+00	1.00e-01	2.50e+08	2.50e+07	2.50 e+06	1.00 e+01	1.00e+00	1.00 e-01
Plutonium-238	5.50e+02	5.50e+01	5.50 e+00	5.00e+06	5.00 e+05	5.00 e+04	6.50e+05	6.50 e+04	6.50 e+03	5.50e+02	5.50 e+01	5.50 e+00
Plutonium-239	5.50e+02	5.50 e+01	5.50 e+00	7.50e+06	7.50 e+05	7.50 e+04	6.00e+05	6.00 e+04	6.00 e+03	5.50 e+02	5.50 e+01	5.50 e+00
Plutonium-240	5.50e+02	5.50 e+01	5.50 e+00	5.00e+06	5.00 e+05	5.00 e+04	6.00e+05	6.00 e+04	6.00 e+03	5.50 e+02	5.50 e+01	5.50 e+00
Radium-226+D	5.50 e+02	5.50 e+01	5.50 e+00	1.45e+01	1.45e+00	1.45e-01	6.00e+06	6.00e+05	6.00 e+04	1.40e+01	1.40e+00	1.40 e-01
Strontium-90+D	3.00e+03	3.00 e+01	3.00 e+00				2.45e+08	2.45 e+07	2.45 e+06	3.00 e+02	3.00 e+01	3.00 e+00
Thorium-228+D	7.00e+02	7.00 e+01	7.00 e+00	10.00e+01	10.00 e+00	1.00e+00	1.75e+05	1.75e+04	1.75 e+03	8.50e+01	8.50 e+00	8.50 e-01
Thorium-230	4.45e+03	4.45e+02	4.45e+01	2.20e+06	2.20 e+05	2.20 e+04	10.00e+05	10.00 e+04	10.00 e+03	4.40e+03	4.40e+02	4.40 e+01
Thorium-232	5.00e+03	5.00 e+02	5.00 e+01	4.95e+06	4.95 e+05	4.95 e+04	9.00e+05	9.00 e+04	9.00 e+03	5.00e+03	5.00 e+02	5.00 e+01
Tritium	2.35e+06	2.35 e+05	2.35 e+04				1.80e+11	1.80 e+10	1.80 e+09	2.35e+06	2.35 e+05	2.35 e+04

TABLE 4B Construction/Mound Employee - Soil/Sediment Guideline Values: Radionuclides (Units = pCi/g)

RADIONUCLIDE	Ingestion			External			Inhalation			Ingestion + External + Inhalation		
	GV for TR=10-4	GV for TR=10-5	GV for TR=10-6	GV for TR=10-4	GV for TR=10-5	GV for TR=10-6	GV for TR=10-4	GV for TR=10-5	GV for TR=10-6	GV for TR=10-4	GV for TR=10-5	GV for TR=10-6
Uranium-233	3.70e+03	3.70e+02	3.70 e+01	2.75e+06	2.75 e+05	2.75 e+04	1.20e+06	1.20 e+05	1.20 e+04	3.70e+03	3.70 e+02	3.70 e+01
Uranium-234	3.75e+03	3.75 e+02	3.75 e+01	4.55e+06	4.55 e+05	4.55 e+04	1.20e+06	1.20 e+05	1.20 e+04	3.75 e+03	3.75 e+02	3.75 e+01
Uranium-235+D	3.55e+03	3.55 e+02	3.55 e+01	3.65e+02	3.65 e+01	3.65e+00	1.30e+06	1.30 e+05	1.30 e+04	3.35e+02	3.35 e+01	3.35 e+00
Uranium-238+D	2.70e+03	2.70 e+02	2.70 e+01	1.85e+03	1.85 e+02	1.85 e+01	1.40e+06	1.40 e+05	1.40 e+04	1.10e+03	1.10 e+02	1.10 e+01

Position Paper on Dioxin in Soils at the Mound Facility

March 1993

POSITION PAPER ON DIOXIN IN THE SOILS AT THE MOUND FACILITY

INTRODUCTION

This paper summarizes the dioxin/furan analytical results at the Mound Facility. There has been concern that the burning of solvents in the OU1 historical landfill may have caused widespread surface soil dioxin/furan contamination. This paper will show that there are minor local areas of elevated soil dioxin and furan concentrations intimately associated with localized burning activities. These levels are well below typical guideline cleanup levels. Widespread air-borne dissemination of dioxin and furans from burning activities has not occurred.

EXISTING DATA

Soil, sediment, and surface water sampling for dioxin/furan analyses was conducted at the Building 34 Oil Burn Structure, the Building 34 Fire-Fighting Training Pits, and the Building 34 Historical Fire-Fighting Training Pit (OU3 Limited Field Investigation Report) as requested by the U.S. EPA. Dioxin/furan analyses were requested at sites where the burning of solvents and oils may have occurred (Figure 1). Soil samples from boreholes in OU1 were also analyzed for dioxin and furans (OU1 Remedial Investigation Report).

OU3

Dioxins and furans were not detected in any of the 7 surface water and groundwater samples analyzed under OU3 investigations. Out of the 31 soil and sediment samples collected (Appendix D), only 4 samples had detectable dioxin/furan concentrations (Table 1). The TEF adjusted concentration values (EPA 1989) are all well below the typically proposed (CDC guidelines, Paustenbach *et al*, 1986) action levels of 1 ppb (1000pg/g) for surface soils (within 1 ft of the ground surface). Proposed action levels are typically 20-25 ppb for contaminants deeper than 1 ft. The locations of all samples are shown in figures 2, 3, 4.

PARKING
0904
0905
B001
B002
B003
0394
0393
0382
0352
P004
0372
0411
0453
P018
0471
0371
0476
WH1
WH2
WH3
CONRAIL RAILROAD
0304
0544
690
700
710
720
730
740
750
760
770
780
790
800
810
820
830
840
850
860
870

The positive detection at the oil burn structure is only in the sediment within the structure itself (Figure 2). The soils adjacent to the structure show no detectable contamination. Analytical results for dioxin/furan analyses of soil samples from the fire-fighting pits indicate a detected dioxin concentration at surface sample MND33-0111-0001 (Figure 3). No other dioxin/furans were detected in soil samples from the fire-fighting training pits. Two soil samples, MND33-0135-0001 and MND33-0136-0001, from the Building 34 Historical fire-fighting pit (Figure 4) also had positive dioxin/furan detections. All other samples from this location did not have any detectable dioxin or furan concentrations.

OU1

The soils around the overflow pond, the sanitary landfill, and the soils spoils area have all been moved and relocated due to construction activities at the Mound Plant. Some of these soils were possibly affected by the burning activities in the historical landfill. Due to the allochthonous nature of these soils, however, a precise location for possible dioxin contaminated soils cannot be determined. For this reason a total of 30 soil samples from 10 soil borings were collected and sampled for dioxins/furans (Table 2 & Figure 5).

DISCUSSION & CONCLUSION

The collection of additonal samples for dioxin and furan analyses is not necessary due to the extremely low levels that have been observed in the solvent and fuel burn areas. None of the analyzed samples at the Mound Plant have TEF adjusted concentrations close to the 1 ppb (1000pg/g) level.

Some of the guidelines previously used at other sites are summarized in a 1987 memo from the Center of Environmental Health to ATSDR:

> Residential sites: Where surface soil in residential areas exceeds one part per billion of 2,3,7,8-TCDD (hereinafter referred to generically as dioxin), removal of the surface soil to a level 1 foot is recommended. If at 1 foot deep, the residual dioxin is 5 to 10 parts per billion, then addition of clean soil to the original grade will be sufficient. In no case is it necessary to remove the soil to a depth of more than 4 feet, provided 4 feet of clean soil is added to reestablish the original grade.

> Industrial sites: In Industrial sites in areas where worker contact to contaminated soil does not occur, it would be acceptable for the average dioxin levels up to 20 parts per billion remain in place. Areas exceeding 20 parts per billion would be evacuated until the residual concentration of less than 20 parts per billion is reached. Then the evacuated areas would be backfilled with appropriate noncontaminated material to the original grade. In no case would evacuation need to proceed beyond a depth of 4 feet.

Although this 1 ppb level is not currently a proposed regulatory guideline, it does provide a reference for comparison to other superfund site cleanup criteria. Note that it has been considered sufficient to clean up dioxins to a depth no greater than 4 feet as the exposure pathway from soils is from the surficial deposits.

Dioxin/furan analytical results, when converted to the equivalent concentration of 2,3,7,8 TCDD (Table 3) and summed, yield the Toxicity Equivalency Factor Adjusted Concentration (TEF Concentration). All the dioxin/furan samples analyzed at the Mound Plant have TEF Concentrations well below the 1 ppb concentration level. The highest level observed in the soils is 165.9 pg/g (.1659 ppb) in sample P004-0031 at a depth of 31 feet below ground surface in fill material. The majority of samples near Building 34, including 4 surface samples, had no dioxin or furan detections.

A dioxin and furan contamination problem does not exist at the Mound Facility due to the extremely low levels of dioxin/furan compounds that have been detected. Further dioxin/furan sampling is not warranted.

Table 2. Toxicity Equivalency Factors of Soil Samples Analyzed for Dioxin/Furans

Sample Number	TEF Concentration	Units
P006-0010	1.73980	pg/g
P006-0015	0.00196	pg/g
P006-0025	0.00510	pg/g
P015-0014	7.6722	pg/g
P015-0045	0.00681	pg/g
B002-0015	0.04212	pg/g
B003-0026	0.02730	pg/g
B003-1026	0.00210	pg/g
B001-0007	0.07800	pg/g
B001-0015	0.01640	pg/g
P003-0006	46.7669	pg/g
P003-0016	2.57820	pg/g
P003-0026	0.00170	pg/g
P001-0036	0.14853	pg/g
P004-0005	0.00790	pg/g
P004-0025	4.4225	pg/g
P004-0031	165.937	pg/g
P004-0038	4.44470	pg/g
P004-0045	0.00540	pg/g
0393-0005	11.2973	pg/g
0393-0021	0.00650	pg/g
0393-1021	0.00630	pg/g
0394-0003	5.59550	pg/g
0394-0011	1.81168	pg/g
P005-0003	0.01670	pg/g
P005-0009	0.83043	pg/g
P005-0018	0.74390	pg/g
P005-0045	0.01890	pg/g
P005-0056	0.11010	pg/g
P005-1056	0.00692	pg/g

NOTE: Action levels may be 1 ppb (1000 pg/g) in soils and a MCL of 50 ppq (pg/L) in water.

The above action level is for residential usage.
The equavelent industrial usage action level is 20 ppb (20,000pg/g).

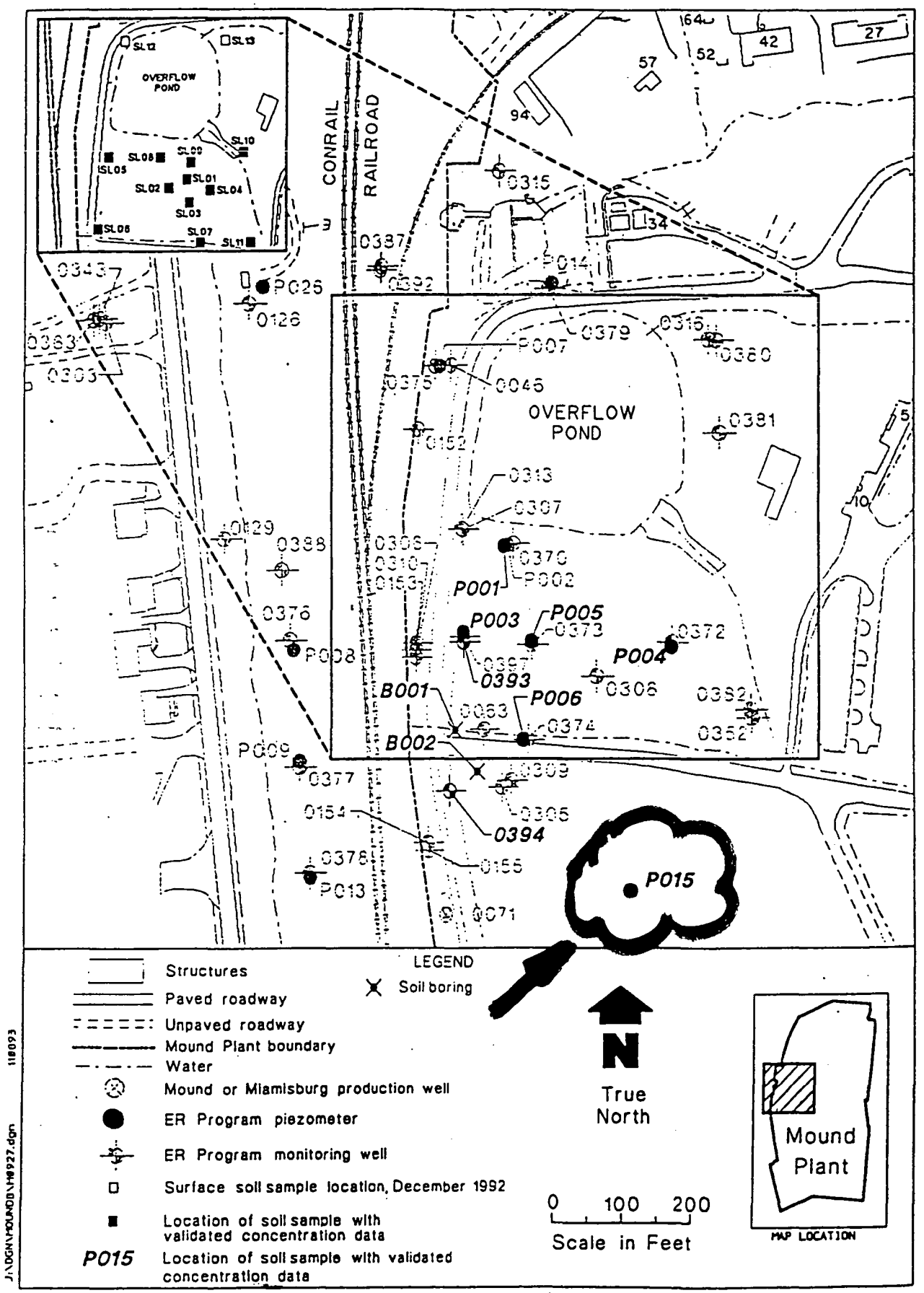


Figure 5 Soil sample locations with validated dioxin and furan compound concentrations, November/December 1992.

Table [illegible]

2,3,7,8-TCDD Toxicity Equivalency Factors (TEFs) for the Polychlorinated Dibenzodioxins and Dibenzofurans

Number	Compound(s)	TEF
1	2,3,7,8-TCDD	1.00
2	1,2,3,7,8-PeCDD	0.50
3	1,2,3,6,7,8-HxCDD	0.10
4	1,2,3,7,8,9-HxCDD	0.10
5	1,2,3,4,7,8-HxCDD	0.10
6	1,2,3,4,6,7,8-HpCDD	0.01
7	1,2,3,4,6,7,8,9-OCDD	0.001
8	2,3,7,8-TCDF	0.1
9	1,2,3,7,8-PeCDF	0.05
10	2,3,4,7,8-PeCDF	0.5
11	1,2,3,6,7,8-HxCDF	0.1
12	1,2,3,7,8,9-HxCDF	0.1
13	1,2,3,4,7,8-HxCDF	0.1
14	2,3,4,6,7,8-HxCDF	0.1
15	1,2,3,4,6,7,8-HpCDF	0.01
16	1,2,3,4,7,8,9-HpCDF	0.01
17	1,2,3,4,6,7,8,9-OCDF	0.001

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OU3; Operable Unit 3; "Miscellaneous Sites Limited Field Investigation Report", July, 1993. U.S. Department of Energy, Albuquerque Field Office, Albuquerque, NM.

Paustenback, D. J., Shu, H. P., Murray, F. J. 1986. "A Critical Examination of Assumptions Used in Risk Assessments of Dioxin Contaminated Soil". Regulatory Toxicology and Pharmacology, 1986.

Validated Positive Detections - Dioxin/Furan

Sample Location	Depth (ft)	1,2,3,4,6,7,8-HpCDF (pg/g)	1,2,3,4,6,7,8-HpCDD (pg/g)	1,2,3,4,7,8,9-HpCDF (pg/g)	1,2,3,4,7,8-HxCDF (pg/g)	Reason for Qualification
B001	5.0-7.0 15.0-16.5	0.45 -	3.2 0.85	- -	- -	
B003	22.0-26.0	.22	-	-	-	
0393	3.0-5.0	3.3J	12.2J	-	2.J	Extraction holding time out 16 days. No impact on data.
0394	2.0-3.0 10.5-11.0	6.3 -	30.3 0.52	0.62 -	2.2 -	
P001	34.5-36.0	-	0.59	-	0.18	
P003	5.0-6.5 15.0-17.0	56.4J 2.8	259.J 4.4	6. -	41.J 1.8	Internal standard recovery high for estimated results, due to ion suppression of recovery standard. Since IS areas appear unaffected, data are probably not affected.
P004	23.0-25.0 30.0-31.5 37.0-38.0	10.4 214. 3.1	84.6J 230. 9.2	1.8 41.4 -	1.7 209. 1.4	MS recovery for HpCDD was high (151%). Possible low bias in reported sample result.
P005	7.5-9.0 16.5-18.0 55.0-59.0	0.36 1. 1.5	- - -	- - -	- 0.49 -	
P006	9.0-10.0	8.	52.4	0.48	1.4	
P015	12.0-14.0	17.3	246.	1.5	1.3	

Validated Positive Detections - Dioxin/Furan

Sample Location	Depth (ft)	2,3,4,6,7,8-HxCDF (pg/g)	2,3,4,7,8-PeCDF (pg/g)	2,3,7,8-TCDD (pg/g)	2,3,7,8-TCDF (pg/g)	OCDD (pg/g)	OCDF (pg/g)	Reason for Qualification
B001	5.0-7.0	0.22	-	-	-	-	0.6	
B002	13.0-15.0	-	-	-	-	-	0.22	
B003	22.0-26.0	-	-	-	-	-	1.1	
0393	3.0-5.0 20-22	0.77J	1.6J	9.6J	2.4J	96.J 6.5J	3.3J	Extraction holding time out by 16 days. No impact on data.
0394	2.0-3.0 10.5-11.0	1. -	1.5 -	3. 1.8	2.8 -	273 -	10.3 0.28	
P001	34.5-36.0	-	0.24	-	-	-	0.33J	Associated MS/MSD recovery for OCDF low (10/18%). Reported results possibly biased low by factor of 5-10.
P003	5.0-6.5 15.0-17.0	11.1 0.92	46.2 1.	- 1.5	59. 0.39	1780.J -	7.9 1.5	Internal standard recovery high for OCDD, due to ion suppression of recovery standard. Since IS area appears unaffected, result is probably not affected.
P004	23.0-25.0 30.0-31.5 37.0-38.0	0.76 64.1 0.66	0.71 150. 0.77	1.3 22.5 3.4	1.6 132. 1.4	1010J 1660J 86.9	6.5J 163.J 1.3	MS/MSD recoveries for OCDF low (10/18%). Reported results possibly biased low by factor of 5-10. MS/MSD recovery for OCDD, 590/-88%, indicates inhomogeneity of soil. Wide variability may affect sample result.
P005	7.5-9.0 16.5-18.0 55.0-59.0	0.21 0.41 0.15	- - -	0.78 0.62 -	- - -	- - -	- - 3.	
P006	9.0-10.0	1.2	-	-	0.99	371	15	
P015	12.0-14.0	0.99	-	-	-	2110	50.2	

Validated Positive Detections - Dioxin/Furan

Sample Location	Depth (ft)	1,2,3,6,7,8-HxCDF (pg/g)	1,2,3,6,7,8-HxCDD (pg/g)	1,2,3,7,8,9-HxCDD (pg/g)	1,2,3,7,8-PeCDD (pg/g)	1,2,3,7,8-PeCDF (pg/g)	Reason for Qualification
0393	3.0-5.0	0.78J	-	-	-	0.96J	Extraction holding time out by 16 days. No impact on data.
0394	2.0-3.0	1.2	1.7	1.8	-	1.1	
P003	5.0-6.5	15.6	11.9	21.2	2.7	9.7	
	15.0-17.0	0.58	-	0.89	-	0.42	
P004	23.0-25.0	1.3	2.1	-	-	0.74	
	30.0-31.5	63.2	28.3	39.7	11	43.2	
	37.0-38.0	0.65	-	-	-	0.75	
P008	9.0-10.0	0.75	1.3	1.5	[illegible]	0.42	
P015	12.0-14.0	2.5	13.7	4.7	0.71	-	

Document Control No.

Environmental Restoration Program

OPERABLE UNIT 5
NEW PROPERTY EXTENDED PHASE
FIELD REPORT

MOUND PLANT
MIAMISBURG, OHIO

VOLUME I - TEXT

Final (Revision 0)

July 1995

U.S. Department of Energy
Ohio Field Office

EG&G Mound Applied Technologies

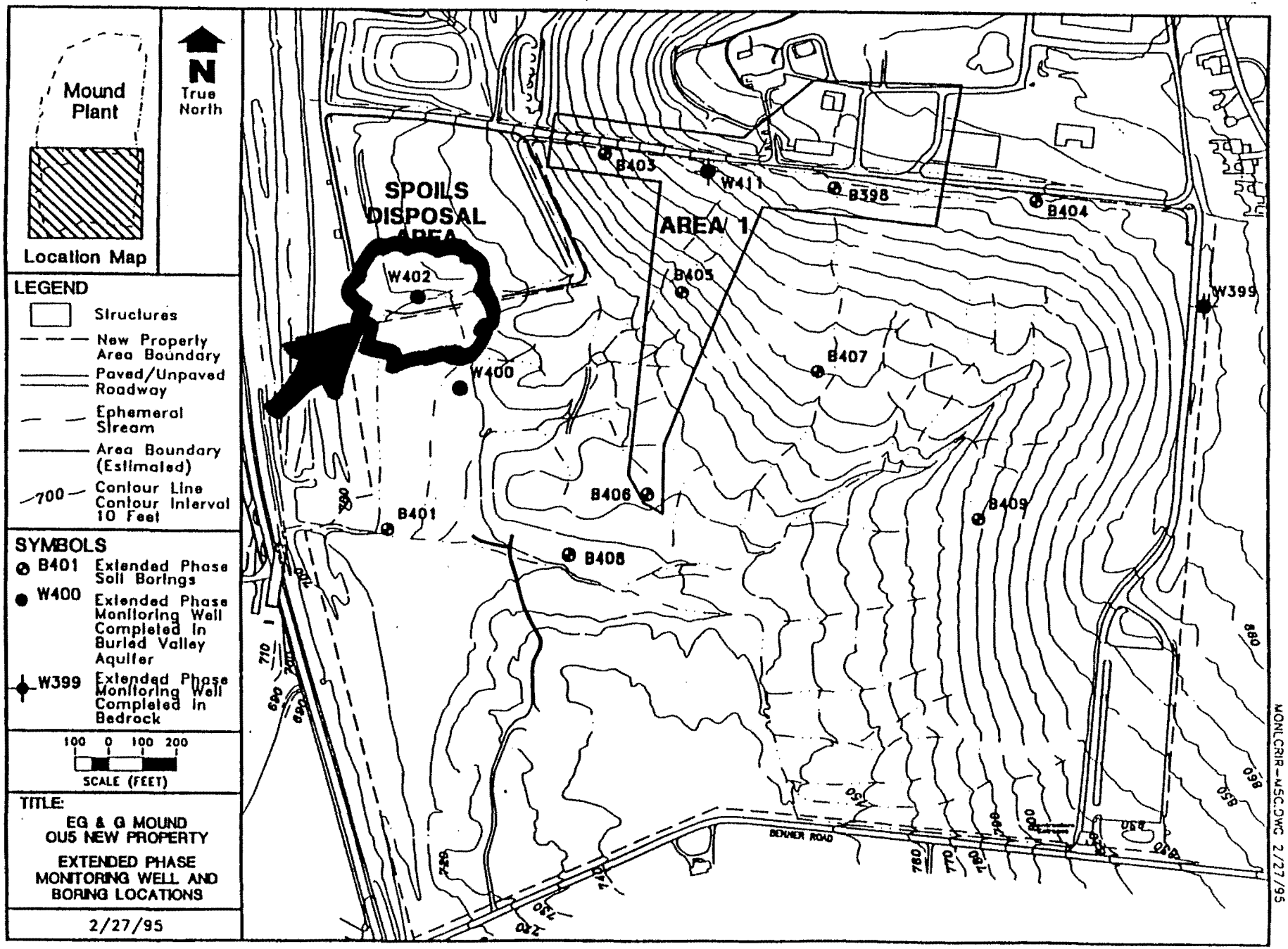

Figure 2.1. Monitoring Well and Boring Locations in the New Property

Table II.7. Results Summary of Chemicals Detected in New Property Groundwater Samples
Page 1 of 3

Parameter	Units	Sample Identification Number						
		W39901	W40001	W40101	W40201	W40211[D]	W40801	W41101
VOCs								
1,2-Dichloroethene	ug/L	---	---	---	---	2J	---	4J
Acrylonitrile	ug/L	---	---	25J	---	---	---	---
Hexane	ug/L	---	---	1J	---	---	---	---
Toluene	ug/L	---	---	1J	---	---	---	---
TCE	ug/L	---	---	---	---	2J	---	8
SVOCs								
Phenol	ug/L	---	---	---	---	1J	---	1J
bis(2-Ethylhexyl) phthalate	ug/L	5J	6J	---	---	1J	3J	2J
Explosives								
2,4,6-Trinitrotoluene	ug/L	---	0.76J	---	---	---	---	0.26J
Anions								
Chloride	mg/L	488	65.3	113	156	157	42.7	232
Fluoride	mg/L	1.04	0.193J	0.31	0.16J	0.201	0.201J	0.393
Sulfate	mg/L	399	29.8	43.7	70	71.5	42.6	62.2
Nitrate-nitrite	mg/L	---	0.552	0.56J	0.648	0.536	0.53J	0.339
Inorganics								
Aluminum	ug/L	1,130J	4,810	40,200	9,950	2,160	58,800	31,500
Antimony	ug/L	2.3	---	---	---	---	---	---
Arsenic	ug/L	---	---	9.9J	---	---	472J	---

Table II.4. Results Summary of Radionuclides Detected in New Property Groundwater Samples (pCi/L)

Radionuclides	Sample Identification Number						
	W39901	W40001	W40101	W40201	W40211[D]	W40801	W41101
Americium-241	---	0.27	---	0.13	---	0.47J	---
Radium-226	1.08J	0.51J	1.22J	0.41J	0.83J	1.22J	0.57J
Thorium-230	---	0.14	0.21J	---	0.69	0.43J	1.17J
Thorium-232	0.22	---	0.15J	---	---	0.35	0.39J
Uranium-234	3.23J	0.61J	0.43J	0.91J	0.75J	0.94J	0.13J
Uranium-235	0.36J	0.14J	---	0.15	0.15	0.07	---
Uranium-238	1.02J	0.53J	0.19	0.5	0.47	1.12	---
Tritium	---	590.2	---	1673.3	1591.5	---	771.6

--- not detected
D indicates a duplicate sample
J estimated quantity
pCi/L picocuries per liter

Table II.7. Results Summary of Chemicals Detected in New Property Groundwater Samples
Page 2 of 3

Parameter	Units	Sample Identification Number						
		W39901	W40001	W40101	W40201	W40211[D]	W40801	W41101
Inorganics (continued)								
Barium	ug/L	46.9J	133J	240J	102J	76.1J	552J	95J
Bismuth	ug/L	---	193	688J	147	111	1,460J	264
Calcium	ug/L	111,000	420,000	703,000	179,000	149,000	1,760,000	255,000J
Chromium	ug/L	309	---	111J	---	---	164J	---
Cobalt	ug/L	8.3	6.9	---	7	---	126J	18.2
Copper	ug/L	8.3	26.9J	160	---	---	485	---
Iron	ug/L	2,840	4,950	136,000J	10,300	2,530	470,000J	31,500
Lead	ug/L	---	8.5J	80.7	6J	---	148	6.7J
Lithium	ug/L	---	8.4	70.1	12.6	3.9	---	132
Magnesium	ug/L	63,200	86,100J	242,000J	55,600J	45,400J	462,000J	81,900J
Manganese	ug/L	220	1,010J	2,190J	317J	111J	7,000J	1,120J
Mercury	ug/L	---	---	---	---	---	0.4	---
Molybdenum	ug/L	---	---	168	---	---	---	---
Nickel	ug/L	394	18.4J	122J	7.4J	---	322J	32.9J
Potassium	ug/L	65,000	7,550J	10,800	7,410J	4,030J	13,300	28,400J
Sodium	ug/L	423,000	24,800	42,400	42,200	42,900	18,900	59,200
Thallium	ug/L	3.6	---	---	---	---	---	---
Vanadium	ug/L	2.5	4.7	84.4J	15	4.1	138J	29.1
Zinc	ug/L	109J	261	413J	67.9	30.3	1,140J	83

3.2. GROUNDWATER SAMPLING

Groundwater samples were collected at six locations and evaluated for inorganic, organic, and radiological constituents. Eight radionuclides were detected in groundwater. Seven radionuclides were detected in samples W40001 and W40801, while six were detected in well W402. These wells are located either downgradient of Area 1 or the Spoils Disposal Area. Pu-238 was not detected in the groundwater. Th-232 was detected in samples W39901, W40101, W40801, and W41101 at concentrations ranging from 0.15 and 0.39J pCi/L. Ra-226 was detected in all groundwater samples at concentrations from 0.51J to 1.22J pCi/L.

Five VOCs were detected in three monitoring wells, and two SVOCs were detected in five wells. Pesticides/PCBs were not detected in the groundwater. 2,4,6-Trinitrotoluene was found in estimated concentrations less than 1 ug/L in wells W400 and W411. Three anions and ten metals were detected in all groundwater samples.

3.3. SEDIMENT SAMPLING

Twenty-seven sediment samples were collected and analyzed for inorganic, organic, radiological, and geotechnical parameters.

Pu-238 was encountered at 11 sample locations, with a maximum concentration of 21.87 pCi/g at SD23. Th-228 occurred in 21 sample locations, with the maximum concentration at 3.78 pCi/g at SD03. Tritium was found in concentrations between 2 and 3 pCi/g at three sample locations. Uranium isotopes (234/235/238) and thorium isotopes 230 and 232 were detected in almost every sediment sampling location.

Acetone was detected in three of the 27 sample locations (SD07, SD08, and SD14). Twenty-one SVOCs, nearly all of them PAHs, were detected in 19 locations. No SVOCs were detected at SD07, SD08, SD10, SD12, SD16, SD20, SD24, SD25, and SD27. SD15 had the highest concentrations and the greatest number of SVOCs in the Extended Phase sediment sampling. Nine pesticides/PCBs were present in 18 of the samples, in trace amounts (0.24J to 3.5J ug/kg). Two lanthanides, cerium and neodymium, were detected in the sediments. Cerium was present in eight samples, at a maximum concentration of 50.9 ug/kg in SD23. Neodymium was detected in seven samples in concentrations as high as 33.4 ug/kg, also in SD23.

Document Control No. AGB

Environmental Restoration Program

OPERABLE UNIT 1
REMEDIAL INVESTIGATION REPORT

MOUND PLANT
MIAMISBURG, OHIO

Volume II – Appendices A-O

May 1994

Final

U.S. Department of Energy
Albuquerque Operations Office

Prepared by
Roy F. Weston, Inc. for
EG&G Mound Applied Technologies

PARKING
0904
0905
B001
B002
B003
0393
0394
0382
0352
0411
0471
0371
0376
0304
WH1
WH2
WH3
CONRAIL RAILROAD
690
700
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720
730
740
750
760
770
780
790
800
810
820
830
840
850
860
870

SOIL CHEMISTRY DATA BY LOCATION
VALIDATED RESULTS
SITE: ARB98 AREA B
LOCATION: P015 PIEZOMETER
NORTH COORDINATE: 596352.10 FT
EAST COORDINATE: 1495271.70 FT
10/22/92 TO 03/05/93
REPORT DATE: 02/25/94

PARAMETER NAME	LOG DATE	SAMPLE ID	DEPTH RANGE (FT)	UNITS OF MEASURE	PVI	PARAMETER VALUE	DETECTION LIMIT	LAB CODE	DILUTION FACTOR
% SOLIDS	10/26/92	0014	12.0- 14.0	% SOLIDS		86.4	-	ITA	1.00
	10/26/92	0045	43.0- 45.0	% SOLIDS		88.9	-	ITA	1.00
	10/26/92	0048	47.0- 48.0	% SOLIDS		91.7	-	ITA	1.00
	10/26/92	1014	12.0- 14.0	% SOLIDS		86.4	-	ITA	1.00
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFUR	10/26/92	0014	12.0- 14.0	PG/G		17.3	-	ITA	1.00
1,2,3,4,6,7,8-HpCDD	10/26/92	0014	12.0- 14.0	PG/G		246.	-	ITA	1.00
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFUR	10/26/92	0014	12.0- 14.0	PG/G		1.5	-	ITA	1.00
1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIO	10/26/92	0014	12.0- 14.0	PG/G		1.9	-	ITA	1.00
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	10/26/92	0014	12.0- 14.0	PG/G		1.3	-	ITA	1.00
1,2,3,5,7,8-HEXACHLORODIBENZOFURAN	10/26/92	0014	12.0- 14.0	PG/G		2.5	-	ITA	1.00
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIO	10/26/92	0014	12.0- 14.0	PG/G		13.7	-	ITA	1.00
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIO	10/26/92	0014	12.0- 14.0	PG/G		4.7	-	ITA	1.00
1,2,3,7,8-PENTACHLORODIBENO-P-DIOXI	10/26/92	0014	12.0- 14.0	PG/G		.71	-	ITA	1.00
1,2-DICHLOROETHENE	10/26/92	0034	32.0- 34.0	UG/KG	J	1.	6.	ITA	1.00
	10/26/92	0048	47.0- 48.0	UG/KG		10.	6.	ITA	1.00
	10/26/92	0055	54.0- 55.0	UG/KG		9.	6.	ITA	1.00
	10/26/92	0056	55.5- 56.0	UG/KG		6.	5.	ITA	1.00
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	10/26/92	0014	12.0- 14.0	PG/G		.99	-	ITA	1.00
2-BUTANONE	10/26/92	0010	9.5- 10.0	UG/KG		13.	11.	ITA	1.00
	10/26/92	0014	12.0- 14.0	UG/KG	J	2.	12.	ITA	1.00
	10/26/92	0020	19.5- 20.0	UG/KG	J	1.	12.	ITA	1.00
	10/26/92	0022	21.5- 22.0	UG/KG	J	11.	12.	ITA	1.00
	10/26/92	0034	32.0- 34.0	UG/KG	J	2.	12.	ITA	1.00
2-HEXANONE	10/26/92	0005	4.5- 5.0	UG/KG	J	2.	5.	ITA	1.00

SOIL CHEMISTRY DATA BY LOCATION
VALIDATED RESULTS
SITE: ARB98 AREA B
LOCATION: P015 PIEZOMETER
NORTH COORDINATE: 596352.10 FT
EAST COORDINATE: 1495271.70 FT
10/22/92 TO 03/05/93
REPORT DATE: 02/25/94

PARAMETER NAME	LOG DATE	SAMPLE ID	DEPTH RANGE (FT)	UNITS OF MEASURE	PVI	PARAMETER VALUE	DETECTION LIMIT	LAB CODE	DILUTION FACTOR
ACETONE	10/26/92	0010	9.5- 10.0	UG/KG		130.	11.	ITA	1.00
ALKALINITY	10/26/92	0014	12.0- 14.0	MG/KG	J	13310.	115.	ITA	1.00
	10/26/92	0045	43.0- 45.0	MG/KG		16872.	112.49	ITA	1.00
	10/26/92	0048	47.0- 48.0	MG/KG		15267.	109.05	ITA	1.00
	10/26/92	1014	12.0- 14.0	MG/KG	J	31250.	115.74	ITA	1.00
ALUMINUM, TOTAL	10/26/92	0014	12.0- 14.0	MG/KG	J	11100.	4.58	ITA	1.00
	10/26/92	1014	12.0- 14.0	MG/KG	J	10400.	4.58	ITA	1.00
ARSENIC, TOTAL	10/26/92	0014	12.0- 14.0	MG/KG	J	5.2	2.29	ITA	1.00
	10/26/92	0045	43.0- 45.0	MG/KG	J	3.8	2.23	ITA	1.00
	10/26/92	0048	47.0- 48.0	MG/KG	J	4.	1.49	ITA	1.00
	10/26/92	1014	12.0- 14.0	MG/KG	J	4.5	2.31	ITA	1.00
BARIUM, TOTAL	10/26/92	0014	12.0- 14.0	MG/KG	B	34.0	45.8	ITA	1.00
	10/26/92	1014	12.0- 14.0	MG/KG	B	41.9	45.8	ITA	1.00
BENZENE	10/26/92	0020	19.5- 20.0	UG/KG	J	2.	2.	ITA	1.00
	10/26/92	0022	21.5- 22.0	UG/KG	J	1.	6.	ITA	1.00
BENZOIC ACID	10/26/92	1014	12.0- 14.0	UG/KG	J	49.	1600.	ITA	1.00
BIS(2-ETHYLHEXYL)PHTHALATE	10/26/92	0014	12.0- 14.0	UG/KG	J	120.	380.	ITA	1.00
	10/26/92	0045	43.0- 45.0	UG/KG	J	55.	370.	ITA	1.00
	10/26/92	0048	47.0- 48.0	UG/KG	J	56.	360.	ITA	1.00
BISMUTH, TOTAL	10/26/92	0014	12.0- 14.0	MG/KG	B	2.0	34.4	ITA	1.00
BUTYL BENZYL PHTHALATE	10/26/92	1014	12.0- 14.0	UG/KG	J	59.	330.	ITA	1.00
CALCIUM, TOTAL	10/26/92	0014	12.0- 14.0	MG/KG	J	87200.	1146.	ITA	1.00
	10/26/92	0045	43.0- 45.0	MG/KG	J	165000.	4726.	ITA	1.00
	10/26/92	0048	47.0- 48.0	MG/KG	J	166000.	4469.	ITA	1.00
	10/26/92	1014	12.0- 14.0	MG/KG	J	88200.	1146.	ITA	1.00
CESIUM-137	10/26/92	1014	12.0- 14.0	PCI/G		.0238	0.	ITA	1.00

SOIL CHEMISTRY DATA BY LOCATION
VALIDATED RESULTS
SITE: ARB9B AREA B
LOCATION: P015 PIEZOMETER
NORTH COORDINATE: 596352.10 FT
EAST COORDINATE: 1495271.70 FT
10/22/92 TO 03/05/93
REPORT DATE: 02/25/94

PARAMETER NAME	LOG DATE	SAMPLE ID	DEPTH RANGE (FT)	UNITS OF MEASURE	PVI	PARAMETER VALUE	DETECTION LIMIT	LAB CODE	DILUTION FACTOR
CHLORIDE	10/26/92	0014	12.0- 14.0	MG/KG		58.2	5.79	ITA	1.00
	10/26/92	0045	43.0- 45.0	MG/KG		23.1	5.62	ITA	1.00
	10/26/92	0048	47.0- 48.0	MG/KG		38.9	5.45	ITA	1.00
	10/26/92	1014	12.0- 14.0	MG/KG		76.3	5.79	ITA	1.00
CHROMIUM, TOTAL	10/26/92	0014	12.0- 14.0	MG/KG		11.8	2.29	ITA	1.00
	10/26/92	1014	12.0- 14.0	MG/KG		12.3	2.29	ITA	1.00
COBALT, TOTAL	10/26/92	0014	12.0- 14.0	MG/KG	B	9.7	11.5	ITA	1.00
	10/26/92	1014	12.0- 14.0	MG/KG	B	7.5	11.46	ITA	1.00
COPPER, TOTAL	10/26/92	0014	12.0- 14.0	MG/KG		18.5	5.73	ITA	1.00
	10/26/92	0045	43.0- 45.0	MG/KG	B	12.9	23.6	ITA	1.00
	10/26/92	1014	12.0- 14.0	MG/KG	J	16.8	5.73	ITA	1.00
FLUORANTHENE	10/26/92	0014	12.0- 14.0	UG/KG	J	60.	380.	ITA	1.00
FLUORIDE	10/26/92	0014	12.0- 14.0	MG/KG		.95	.58	ITA	1.00
	10/26/92	0045	43.0- 45.0	MG/KG		1.06	.56	ITA	1.00
	10/26/92	0048	47.0- 48.0	MG/KG		.741	.55	ITA	1.00
	10/26/92	1014	12.0- 14.0	MG/KG		1.45	.58	ITA	1.00
HEPTACHLORODIBENZO-P-DIOXIN	10/26/92	0014	12.0- 14.0	PG/G		435.	-	ITA	1.00
HEPTACHLORODIBENZOFURAN	10/26/92	0014	12.0- 14.0	PG/G		69.9	-	ITA	1.00
HEXACHLORODIBENZO-P-DIOXIN	10/26/92	0014	12.0- 14.0	PG/G		51.7	-	ITA	1.00
HEXACHLORODIBENZOFURAN	10/26/92	0014	12.0- 14.0	PG/G		73.9	-	ITA	1.00
IRON, TOTAL	10/26/92	0014	12.0- 14.0	MG/KG		21100.	22.9	ITA	1.00
	10/26/92	0045	43.0- 45.0	MG/KG		13800.	94.5	ITA	1.00
	10/26/92	0048	47.0- 48.0	MG/KG		6890.	89.4	ITA	1.00
	10/26/92	1014	12.0- 14.0	MG/KG		20200.	22.9	ITA	1.00
LEAD, TOTAL	10/26/92	0014	12.0- 14.0	MG/KG	J	8.6	.91	ITA	1.00

SOIL CHEMISTRY DATA BY LOCATION
VALIDATED RESULTS
SITE: ARB98 AREA B
LOCATION: P015 PIEZOMETER
NORTH COORDINATE: 596352.10 FT
EAST COORDINATE: 1495271.70 FT
10/22/92 TO 03/05/93
REPORT DATE: 02/25/94

PARAMETER NAME	LOG DATE	SAMPLE ID	DEPTH RANGE (FT)	UNITS OF MEASURE	PVI	PARAMETER VALUE	DETECTION LIMIT	LAB CODE	DILUTION FACTOR
LEAD, TOTAL	10/26/92	0045	43.0- 45.0	MG/KG	J	5.3	.67	ITA	1.00
	10/26/92	0048	47.0- 48.0	MG/KG	J	6.4	.45	ITA	1.00
	10/26/92	1014	12.0- 14.0	MG/KG	J	11.5	.69	ITA	1.00
LITHIUM, TOTAL	10/26/92	0014	12.0- 14.0	MG/KG		22.4	11.46	ITA	1.00
	10/26/92	1014	12.0- 14.0	MG/KG		19.3	11.5	ITA	1.00
MAGNESIUM, TOTAL	10/26/92	0014	12.0- 14.0	MG/KG	*	14200.	1146.	ITA	1.00
	10/26/92	0045	43.0- 45.0	MG/KG	*	59800.	4726.	ITA	1.00
	10/26/92	0048	47.0- 48.0	MG/KG	*	69900.	4469.	ITA	1.00
	10/26/92	1014	12.0- 14.0	MG/KG	*	19100.	1146.	ITA	1.00
MANGANESE, TOTAL	10/26/92	0014	12.0- 14.0	MG/KG		650.	3.44	ITA	1.00
	10/26/92	0045	43.0- 45.0	MG/KG		754.	14.2	ITA	1.00
	10/26/92	1014	12.0- 14.0	MG/KG		517.	3.44	ITA	1.00
NICKEL, TOTAL	10/26/92	0014	12.0- 14.0	MG/KG		20.6	9.17	ITA	1.00
	10/26/92	1014	12.0- 14.0	MG/KG		20.3	9.17	ITA	1.00
NITRATE	10/26/92	0048	47.0- 48.0	MG/KG		1.12	1.09	ITA	1.00
	10/26/92	1014	12.0- 14.0	MG/KG	J	1.53	1.16	ITA	1.00
OCTACHLORODIBENZO-P-DIOXIN	10/26/92	0014	12.0- 14.0	PG/G		2110.	-	ITA	1.00
OCTACHLORODIBENZOFURAN	10/26/92	0014	12.0- 14.0	PG/G		50.2	-	ITA	1.00
PENTACHLORODIBENZO-P-DIOXIN	10/26/92	0014	12.0- 14.0	PG/G		2.	-	ITA	1.00
PENTACHLORODIBENZOFURAN	10/26/92	0014	12.0- 14.0	PG/G		35.4	-	ITA	1.00
PERCENT MOISTURE	10/26/92	0005	4.5- 5.0	% MOIST		8.	-	ITA	1.00
	10/26/92	0010	9.5- 10.0	% MOIST		8.	-	ITA	1.00
	10/26/92	0014	12.0- 14.0	% MOIST		14.	-	ITA	1.00
	10/26/92	0014	12.0- 14.0	% MOIST		14.	-	ITA	1.00
	10/26/92	0014	12.0- 14.0	% MOIST		14.	-	ITA	1.00
	10/26/92	0020	19.5- 20.0	% MOIST		15.	-	ITA	1.00

SOIL CHEMISTRY DATA BY LOCATION
VALIDATED RESULTS
SITE: ARB98 AREA B
LOCATION: P015 PIEZOMETER
NORTH COORDINATE: 596352.10 FT
EAST COORDINATE: 1495271.70 FT
10/22/92 TO 03/05/93
REPORT DATE: 02/25/94

PARAMETER NAME	LOG DATE	SAMPLE ID	DEPTH RANGE (FT)	UNITS OF MEASURE	PVI	PARAMETER VALUE	DETECTION LIMIT	LAB CODE	DILUTION FACTOR
PERCENT MOISTURE	10/26/92	0022	21.5- 22.0	% MOIST		14.	-	ITA	1.00
	10/26/92	0034	32.0- 34.0	% MOIST		14.	-	ITA	1.00
	10/26/92	0045	43.0- 45.0	% MOIST		11.	-	ITA	1.00
	10/26/92	0045	43.0- 45.0	% MOIST		11.	-	ITA	1.00
	10/26/92	0045	43.0- 45.0	% MOIST		11.	-	ITA	1.00
	10/26/92	0048	47.0- 48.0	% MOIST		8.	-	ITA	1.00
	10/26/92	0048	47.0- 48.0	% MOIST		8.	-	ITA	1.00
	10/26/92	0048	47.0- 48.0	% MOIST		8.	-	ITA	1.00
	10/26/92	0055	54.0- 55.0	% MOIST		11.	-	ITA	1.00
	10/26/92	0056	55.5- 56.0	% MOIST		7.	-	ITA	1.00
	10/26/92	1014	12.0- 14.0	% MOIST		14.	-	ITA	1.00
	10/26/92	1014	12.0- 14.0	% MOIST		14.	-	ITA	1.00
	10/26/92	1014	12.0- 14.0	% MOIST		14.	-	ITA	1.00
PHENANTHRENE	10/26/92	0014	12.0- 14.0	UG/KG	J	42.	380.	ITA	1.00
	10/26/92	1014	12.0- 14.0	UG/KG	J	45.	380.	ITA	1.00
PLUTONIUM-238	10/26/92	0014	12.0- 14.0	PCI/G		.145	.0312	ITA	1.00
	10/26/92	0048	47.0- 48.0	PCI/G		.110	.0698	ITA	1.00
	10/26/92	1014	12.0- 14.0	PCI/G		.292	.0676	ITA	1.00
PLUTONIUM-239/240	10/26/92	0014	12.0- 14.0	PCI/G		.0727	.0312	ITA	1.00
	10/26/92	0048	47.0- 48.0	PCI/G		.0548	.0274	ITA	1.00
POTASSIUM, TOTAL	10/26/92	0014	12.0- 14.0	MG/KG		1950.	1146.	ITA	1.00
	10/26/92	0048	47.0- 48.0	MG/KG	B	481.	893.9	ITA	1.00
	10/26/92	1014	12.0- 14.0	MG/KG		1680.	1146.	ITA	1.00
POTASSIUM-40	10/26/92	0014	12.0- 14.0	PCI/G		17.3	.3	ITA	1.00
	10/26/92	0045	43.0- 45.0	PCI/G		12.9	.3	ITA	1.00
	10/26/92	0048	47.0- 48.0	PCI/G		6.45	.2	ITA	1.00
	10/26/92	1014	12.0- 14.0	PCI/G		14.5	.3	ITA	1.00
PYRENE	10/26/92	0014	12.0- 14.0	UG/KG	J	49.	380.	ITA	1.00
	10/26/92	1014	12.0- 14.0	UG/KG	J	70.	380.	ITA	1.00
RADIUM-226	10/26/92	0014	12.0- 14.0	PCI/G		.919	.02	ITA	1.00

SOIL CHEMISTRY DATA BY LOCATION
VALIDATED RESULTS
SITE: AR898 AREA B
LOCATION: P015 PIEZOMETER
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10/22/92 TO 03/05/93
REPORT DATE: 02/25/94

PARAMETER NAME	LOG DATE	SAMPLE ID	DEPTH RANGE (FT)	UNITS OF MEASURE	PVI	PARAMETER VALUE	DETECTION LIMIT	LAB CODE	DILUTION FACTOR
RADIUM-226	10/26/92	0045	43.0- 45.0	PCI/G		.808	.01	ITA	1.00
	10/26/92	0048	47.0- 48.0	PCI/G		.557	.004	ITA	1.00
	10/26/92	1014	12.0- 14.0	PCI/G		.865	.01	ITA	1.00
SILVER, TOTAL	10/26/92	0014	12.0- 14.0	MG/KG		5.8	2.29	ITA	1.00
	10/26/92	1014	12.0- 14.0	MG/KG		5.3	2.29	ITA	1.00
SODIUM, TOTAL	10/26/92	0045	43.0- 45.0	MG/KG	J	225.	4726.	ITA	1.00
	10/26/92	0048	47.0- 48.0	MG/KG	J	226.	4469.	ITA	1.00
STRONTIUM-90	10/26/92	0048	47.0- 48.0	PCI/G		.358	.354	ITA	1.00
SULFATE	10/26/92	0014	12.0- 14.0	MG/KG		242.8	23.1	ITA	1.00
	10/26/92	0048	47.0- 48.0	MG/KG		23.3	21.81	ITA	1.00
	10/26/92	1014	12.0- 14.0	MG/KG		267.	23.15	ITA	1.00
TETRACHLORODIBENZOFURAN	10/26/92	0014	12.0- 14.0	PG/G		11.2	-	ITA	1.00
TETRACHLOROETHENE	10/26/92	0048	47.0- 48.0	UG/KG	J	5.	6.	ITA	1.00
	10/26/92	0055	54.0- 55.0	UG/KG		8.	6.	ITA	1.00
	10/26/92	0056	55.5- 56.0	UG/KG	J	5.	5.	ITA	1.00
THORIUM-228	10/26/92	0014	12.0- 14.0	PCI/G		.895	.252	ITA	1.00
	10/26/92	0045	43.0- 45.0	PCI/G		.501	.456	ITA	1.00
	10/26/92	1014	12.0- 14.0	PCI/G		.829	.437	ITA	1.00
THORIUM-230	10/26/92	0014	12.0- 14.0	PCI/G		1.	.213	ITA	1.00
	10/26/92	0045	43.0- 45.0	PCI/G		1.22	.355	ITA	1.00
	10/26/92	1014	12.0- 14.0	PCI/G		1.37	.412	ITA	1.00
THORIUM-232	10/26/92	0014	12.0- 14.0	PCI/G		.948	.146	ITA	1.00
	10/26/92	0045	43.0- 45.0	PCI/G		.461	.192	ITA	1.00
	10/26/92	1014	12.0- 14.0	PCI/G		1.03	.155	ITA	1.00
TOLUENE	10/26/92	0020	19.5- 20.0	UG/KG	J	2.	6.	ITA	1.00
	10/26/92	0022	21.5- 22.0	UG/KG	J	2.	6.	ITA	1.00

SOIL CHEMISTRY DATA BY LOCATION
VALIDATED RESULTS
SITE: ARB98 AREA B
LOCATION: P015 PIEZOMETER
NORTH COORDINATE: 596352.10 FT
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10/22/92 TO 03/05/93
REPORT DATE: 02/25/94

PARAMETER NAME	LOG DATE	SAMPLE ID	DEPTH RANGE (FT)	UNITS OF MEASURE	PVI	PARAMETER VALUE	DETECTION LIMIT	LAB CODE	DILUTION FACTOR
TOLUENE	10/26/92	0034	32.0- 34.0	UG/KG	J	1.	6.	ITA	1.00
	10/26/92	0055	54.0- 55.0	UG/KG	J	2.	6.	ITA	1.00
TOTAL ORGANIC CARBON	10/26/92	0005	4.5- 5.0	MG/KG		7585.	35.	ITA	1.00
	10/26/92	0010	9.5- 10.0	MG/KG	J	11315.	24.	ITA	1.00
	10/26/92	0014	12.0- 14.0	MG/KG	J	7363.	43.	ITA	1.00
	10/26/92	0020	19.5- 20.0	MG/KG		6416.	17.	ITA	1.00
	10/26/92	0022	21.5- 22.0	MG/KG		9126.	25.	ITA	1.00
	10/26/92	0034	32.0- 34.0	MG/KG		23489.	35.	ITA	1.00
	10/26/92	0045	43.0- 45.0	MG/KG		6932.	39.	ITA	1.00
	10/26/92	0048	47.0- 48.0	MG/KG		10906.	17.	ITA	1.00
	10/26/92	0055	54.0- 55.0	MG/KG		19274.	22.	ITA	1.00
	10/26/92	0056	55.5- 56.0	MG/KG		12624.	10.	ITA	1.00
	10/26/92	1014	12.0- 14.0	MG/KG	J	14889.	23.	ITA	1.00
TOTAL XYLENES	10/26/92	0055	54.0- 55.0	UG/KG	J	1.	6.	ITA	1.00
TRICHLOROETHENE	10/26/92	0005	4.5- 5.0	UG/KG		16.	5.	ITA	1.00
	10/26/92	0045	43.0- 45.0	UG/KG	J	1.	6.	ITA	1.00
	10/26/92	0048	47.0- 48.0	UG/KG		11.	6.	ITA	1.00
	10/26/92	0055	54.0- 55.0	UG/KG		16.	6.	ITA	1.00
	10/26/92	0056	55.5- 56.0	UG/KG		11.	5.	ITA	1.00
URANIUM-234	10/26/92	0014	12.0- 14.0	PCI/G		1.02	.189	ITA	1.00
	10/26/92	0045	43.0- 45.0	PCI/G		.708	.166	ITA	1.00
	10/26/92	0048	47.0- 48.0	PCI/G		.664	.11	ITA	1.00
	10/26/92	1014	12.0- 14.0	PCI/G		.915	.184	ITA	1.00
URANIUM-238	10/26/92	0014	12.0- 14.0	PCI/G		1.09	.145	ITA	1.00
	10/26/92	0045	43.0- 45.0	PCI/G		.914	.0983	ITA	1.00
	10/26/92	0048	47.0- 48.0	PCI/G		.79	.11	ITA	1.00
	10/26/92	1014	12.0- 14.0	PCI/G		1.01	.0921	ITA	1.00
VANADIUM, TOTAL	10/26/92	0014	12.0- 14.0	MG/KG	J	21.8	2.29	ITA	1.00
	10/26/92	0045	43.0- 45.0	MG/KG	J	14.5	9.45	ITA	1.00
	10/26/92	0048	47.0- 48.0	MG/KG	J	10.5	8.94	ITA	1.00

SOIL CHEMISTRY DATA BY LOCATION
VALIDATED RESULTS
SITE: ARB98 AREA B
LOCATION: P015 PIEZOMETER
NORTH COORDINATE: 596352.10 FT
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10/22/92 TO 03/05/93
REPORT DATE: 02/25/94

PARAMETER NAME	LOG DATE	SAMPLE ID	DEPTH RANGE (FT)	UNITS OF MEASURE	PVI	PARAMETER VALUE	DETECTION LIMIT	LAB CODE	DILUTION FACTOR
VANADIUM, TOTAL	10/26/92	1014	12.0- 14.0	MG/KG	J	22.3	2.29	ITA	1.00
ZINC, TOTAL	10/26/92	0014	12.0- 14.0	MG/KG		45.8	4.58	ITA	1.00
	10/26/92	0045	43.0- 45.0	MG/KG		36.7	18.9	ITA	1.00
	10/26/92	0048	47.0- 48.0	MG/KG		21.7	17.9	ITA	1.00
	10/26/92	1014	12.0- 14.0	MG/KG		48.	4.58	ITA	1.00