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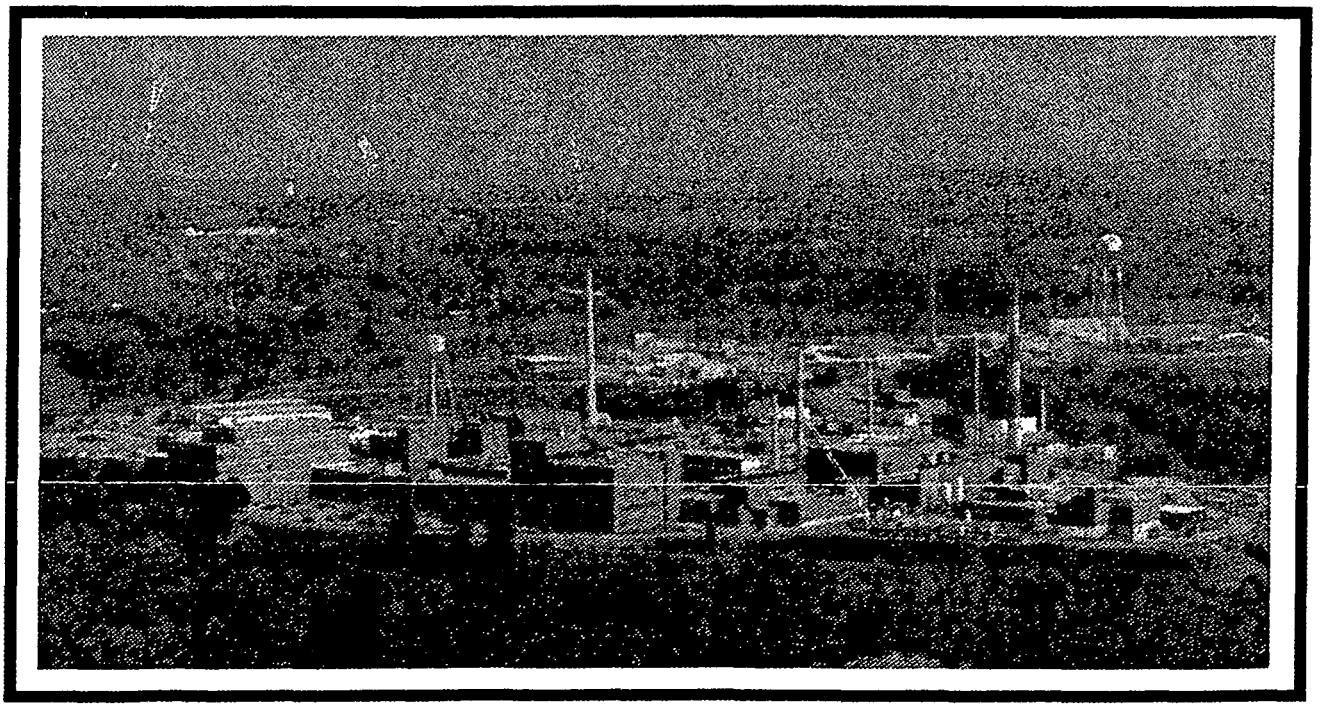
MOUND

Environmental Restoration Program

MOUND PLANT

Potential Release Site Package

PRS # 237



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PUBLIC RELEASE 0	Available for comments.	Oct. 6, 1997
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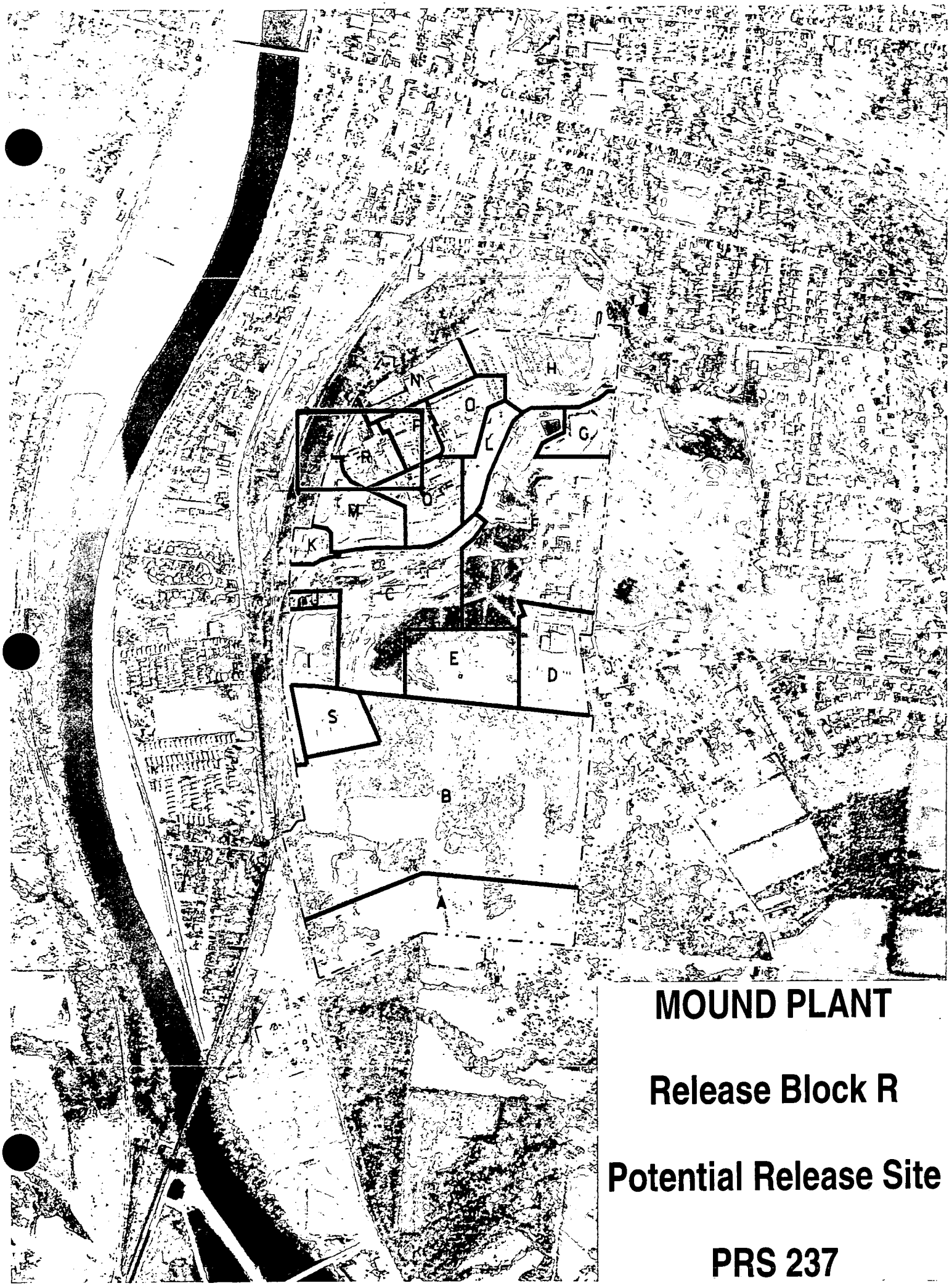
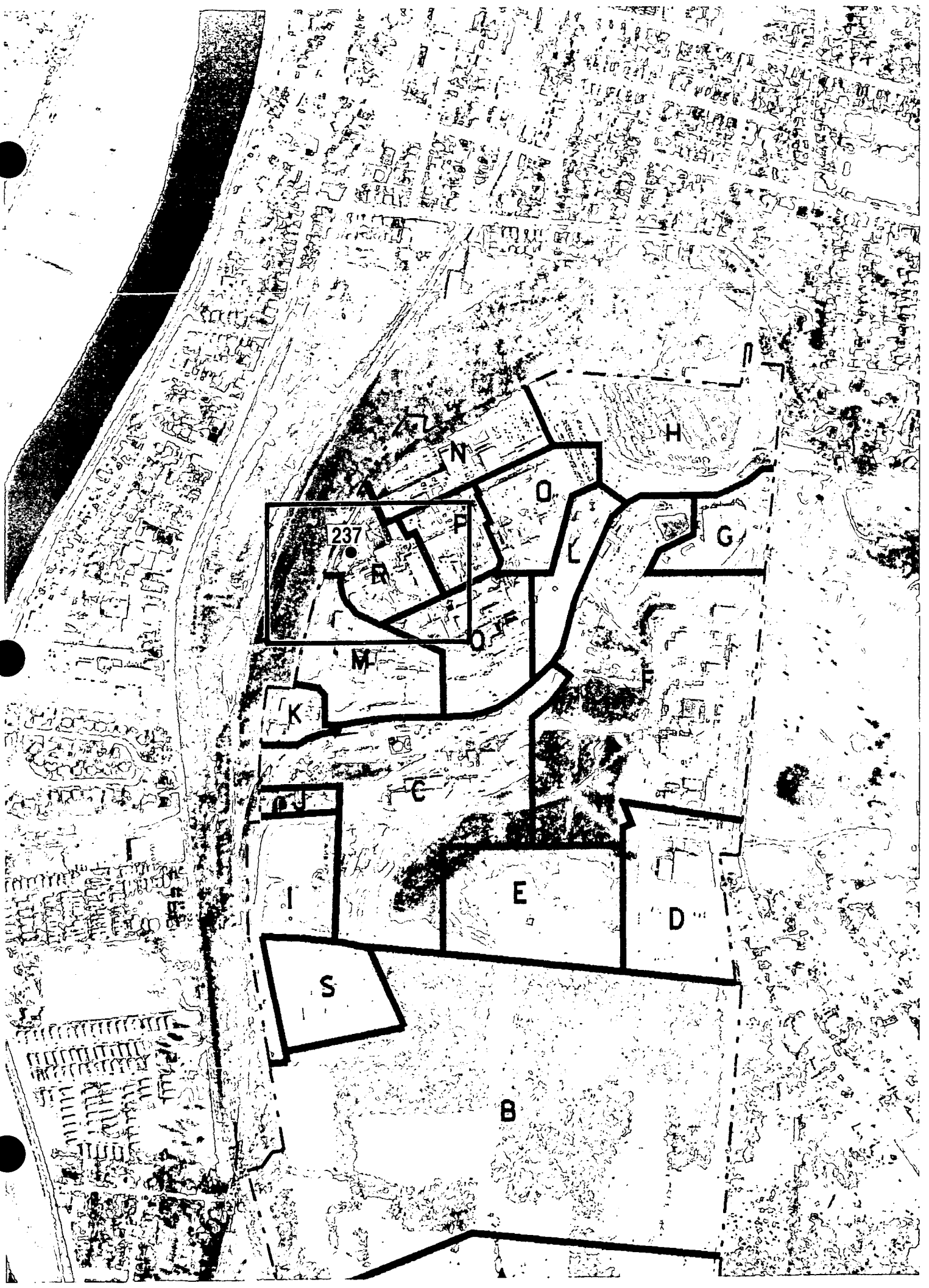


MOUND PLANT

Release Block R

Potential Release Site

PRS 237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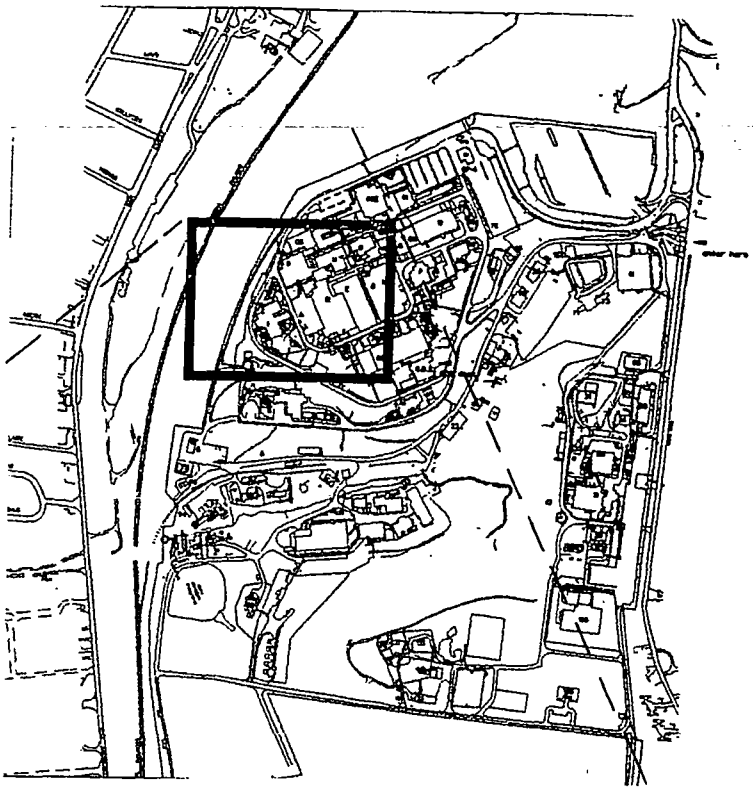
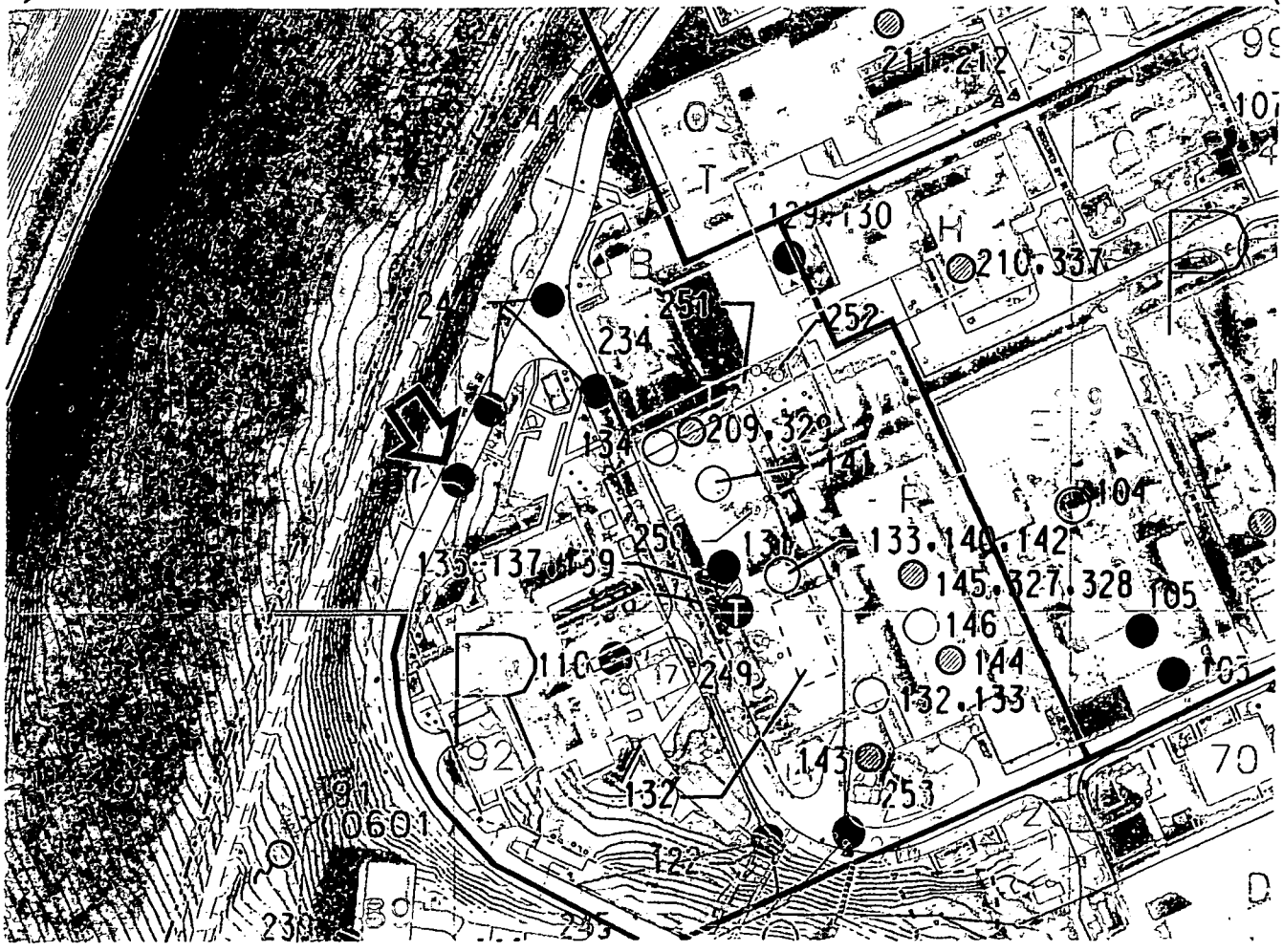
MOUND PLANT

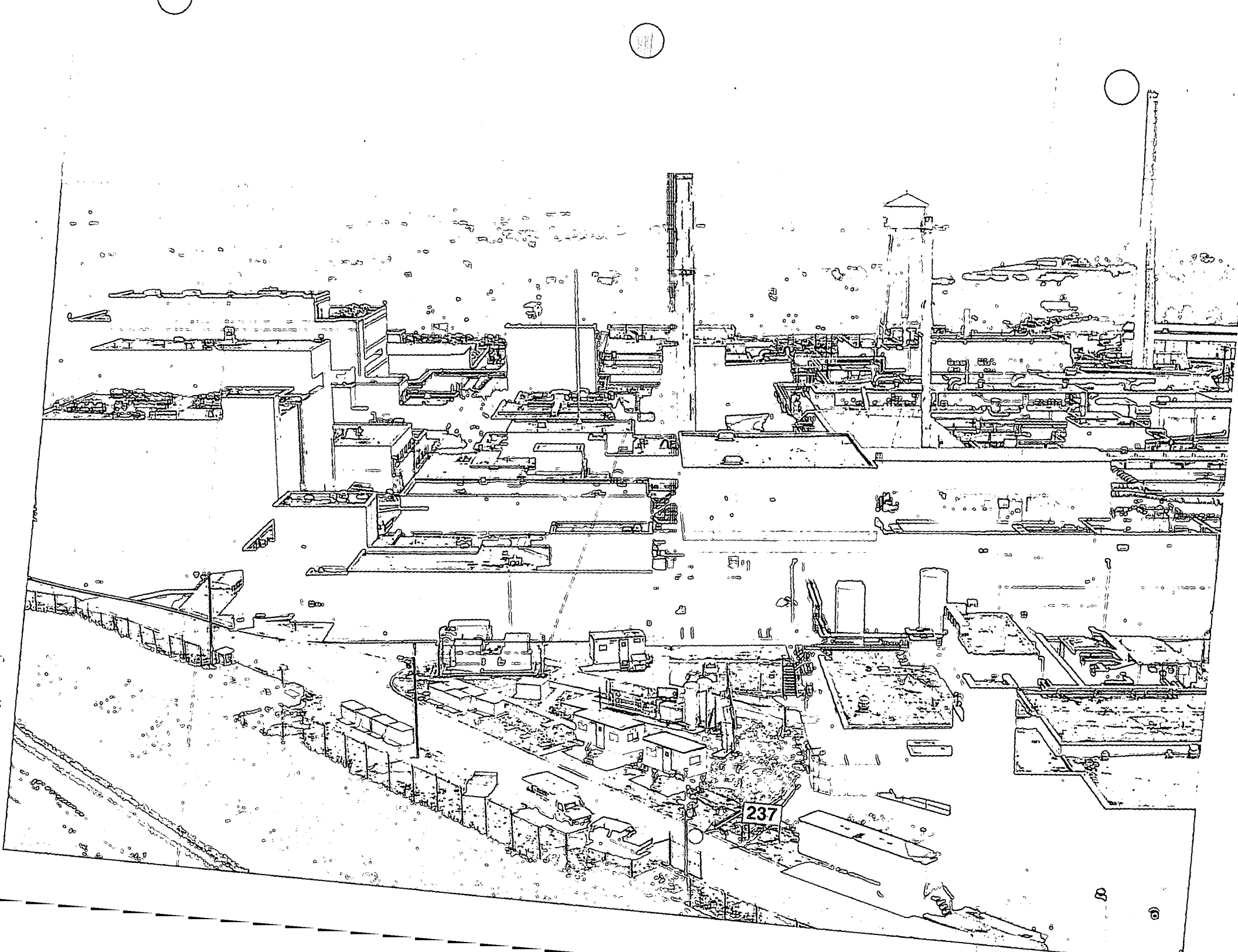
Release Block R

Potential Release Site

PRS 237






237

PRS 237

PRS HISTORY:

Potential Release Site (PRS) 237 became a PRS due to the elevated detections of cesium-137 and cobalt-60 found during the Site Survey Project.[2] PRS 237 is located approximately 100 feet northwest of I Building.

I Building was the location of explosive research, testing and manufacturing in the late 1950s and early 1960s.[4] No additional contamination generating processes or activities are known to have occurred in this area.

CONTAMINATION:

1) In 1983 through 1984, the ***Radiological Site Survey***[2] investigated Mound soils for radionuclides. As part of this investigation, one surface samples was taken at PRS 237 and analyzed for plutonium-238, thorium-232, cobalt-60, cesium-137, radium-226, and americium-241. Results in excess of guideline criteria are shown in the table below. No records can be found indicating if a clean-up of PRS 237 ever took place.[2]

Contaminant	Maximum Concentration Detected	Guideline Criteria
Cesium-137	10 pCi/g [ref 1, 2] (in surface soil)	0.46 pCi/g [ref 3] (in soil)
Cobalt-60	82 pCi/g [ref 1, 2] (in surface soil)	0.1 pCi/g [ref 3] (in soil)

NOTES:
1) The half-life of cobalt-60 is 5.25 years. Hence, two half-lives have past since the Radiological Site Survey. Therefore, if the cobalt-60 was not cleaned up, a cobalt-60 concentration of 82 pCi/g in 1984 would be 20 pCi/g in 1995. Additionally, the 20 pCi/g cobalt-60 concentration averaged over a 150 foot radius (half-acre rule) equates to 3 pCi/g (1995 Other Soils Characterization[5] sampling results were used to average the cobalt-60 readings).
2) The background concentration at the Mound for cesium-137 is 0.43 pCi/g.[6]
3) pCi = picocuries, g = grams.

2) In 1995, the ***Other Soils Characterization***[5] project sampled the area surrounding PRS 237 at six locations approximately 5 to 15 feet from PRS 237 (PRS 237 was not sampled due to the presence of underground utilities). Soil samples were analyzed for organics (by organic vapor analyzer and/or organic vapor meter), metals (by X-ray fluoroscope) and radionuclides (field detection by FIDLER and lab analysis by Mound soil screening). Sample depth was from 0 to 7 feet unless refusal was encountered prior to 7 feet.[7] Sample results were:
   - No radioactive contamination was detected.
   - No organics were detected above background levels.
   - No metal contamination was detected above the 10^{-6} Risk Based Guideline Values.

READING ROOM REFERENCES:

1) OU9, Site Scoping Report: Volume 12 - Site Summary Report, December 1994. (pages 5-7)
2) OU9, Site Scoping Report: Volume 3 - Radiological Site Survey, June 1993. (pages 8-11)
3) Risk Based Guideline Values, Mound Plant, Final, (Revision 3), December 1995. (pages 12-15)
4) OU9, Site Scoping Report: Volume 7 - Waste Management, February 1993. (pages 16-18)

OTHER REFERENCES:

5) Draft, Other Soils Characterization Report, January 1996, with Volume II - Appendices. (pages 19-27)
6) Letter, Radionuclide Background Values for Comparison to Mound Plant Soils. (pages 28-29)
7) Sampling and Analysis Plan for the Other Soils Area, Final, (Rev 1), June 1994. (pages 30-31)

PREPARED BY:

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

MOUND PLANT
PRS 237
Soil Contamination B Area North of I Building

RECOMMENDATION:

Potential Release Site (PRS) 237 became a PRS due to the elevated detections of cesium-137 and cobalt-60 found during the Site Survey Project. Cesium-137 was found at 10 pCI/g and Cobalt-60 at 82 pCi/g as compared to the Guideline Value of 0.46 pC/g and 0.1pCi/g respectively. Subsequent sampling in 1995 detected no radioactive contamination in the surrounding area. PRS 237 is located approximately 100 feet northwest of I Building at the edge of the road.

I Building was the location of explosive research, testing and manufacturing in the late 1950s and early 1960s. No additional contamination generating processes or activities are known to have occurred in this area.

The Core Team originally recommended Further Assessment for PRS 237. Subsequently, the cost of further investigation versus the cost of removing the potentially contaminated soils was evaluated. Cost estimates indicate that the cost of removal is not significantly greater than the cost of further assessment at PRS 237. Additionally Further Assessment findings may indicate the need for a Response (removal) Action, resulting in costs associated with both Further Assessment and Response Action. Therefore, the Core Team recommends a <u>RESPONSE ACTION</u> as a more cost-effective course of action for PRS 237.

CONCURRENCE:

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

USEPA: Timothy J. Fischer, Remedial Project Manager 9/26/97 (date)

OEPA: Brian K. Nickel, Project Manager 9/23/97 (date)

SUMMARY OF COMMENTS AND RESPONSES:

REFERENCE MATERIAL
PRS 237

Document Control No. _____

Environmental Restoration Program

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

MOUND PLANT
MIAMISBURG, OHIO

December 1994

Final

U.S. Department of Energy
Ohio Field Office

EG&G Mound Applied Technologies

Description of History and Nature of Waste Handling						Hazardous Conditions and Incidents			Environmental Data		
No.	Site Name	Location	Status	Potential Hazardous Substances	Ref	Releases	Media	Ref	Analytes[a]	Results	Ref
231	T Building, Corridor 8 Alpha Wastewater Sump (Tank 233)	F-7	Historical Filled with concrete 1982	Alpha wastewater from process area floor drains	3, 4	Unknown - filled with concrete			No Data		
232	T Building, Corridor 7 Alpha Wastewater Sump (Tank 234)	F-7	Historical Filled with concrete 1982	Alpha wastewater from process area floor drains	3, 4	Unknown - filled with concrete			No Data		
233	Room T-63 Alpha Wastewater Sump (Tank 235)	F-7	Historical Filled with concrete 1982	Alpha wastewater from process area floor drains	3, 4	Unknown - filled with concrete			No Data		
234	Building 58 Diesel Fuel Storage Tank (Tank 222)	E-6	Historical	Diesel fuel	3	Tank Removed			No Data		
235	Area of Possible Elevated Thorium Activity	E-8	Grounds	Thorium	6	Possible fugitive dust	S	4, 6	1 14, 15	SGS[b] Table B.3 Locations 2021, 2148, and 2149 Table B.1	12 6
236	Site Survey Project Potential Hot Spot Location S0166	F-6	Grounds	Plutonium-238	6	Isolated activity from unknown sources			13	Table B.9 (Appendix E in Ref. 6)	6
237	Site Survey Project Potential Hot Spot Location S0175	E-5 E-6	Grounds	Cobalt-60, Cesium-137	6				14, 15	Table B.9 (Appendix E in Ref. 6)	6
238	Site Survey Project Potential Hot Spot Location S1092	G-7	Grounds	Thorium	6				14	Table B.9 (Appendix E in Ref. 6)	6
239	Site Survey Project Potential Hot Spot Location S0208	F-5	Grounds	Plutonium-238	6				13	Table B.9 (Appendix E in Ref. 6)	6
240	Site Survey Project Potential Hot Spot	G-6	Grounds	Thorium	6				14	Table B.9 (Appendix E in Ref. 6)	6

Table B.9. Summary of Radiological Data[a,b]

Site Name	Radiological Contaminants															
	Potassium-40	Plutonium-239	Plutonium-238	Cesium-137	Thorium-Total	Tritium	Thorium-232	Cobalt-60	Radium-224, -226, -228	Radon-222	Americium-241	Actinium-227	Uranium-233, -234, -238	Bismuth-210m	Bismuth-207	Reference
172. WDA Building Basement Wash Sump (AKA Glass Melter Room Sump)			257,000			1302 (c)	65.7									7
174. WD Building Drum Staging Area			1,302			ND										7
236. Site Survey Project Potential Hot Spot Location S0166			1.76			12.73										6
237. Site Survey Project Potential Hot Spot Location S0175				10				82	.8							6
238. Site Survey Project Potential Hot Spot Location S1092			0.31		323	.5										6
239. Site Survey Project Potential Hot Spot Location S0208			61			.72										6
240. Site Survey Project Potential Hot Spot Location S0472			1.2		7.5											6
258. Area H Open Burn Pit (AKA Pyrotechnic Waste Disposal Area)			0.81		<2											6
259. Pyrotechnic Waste Shed			0.31		<2											7
260. Thermal Treatment Unit			0.81		<2											7
68. Building 31, Contaminated Material Storage Building			8.15		150											6
70. Underground Sewer Lines G6 and G7						ND										7
9. Old Firing Range Drum Storage Area	26.2			0.121	1.48				12.2							7
0. Waste Oil Drum Field Area			NR		9.2											7
3. Warehouse 14 (AKA Pad 14)			10.2	<2												
7. Site Survey Project Potential Hot Spot Location C0007			.39		41.6											6

MOUNDS\MISSDF4.TBB 09/28/94

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

Reference List

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

ENVIRONMENTAL RESTORATION PROGRAM

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

MOUND PLANT
MIAMISBURG, OHIO

June 1993

DEPARTMENT OF ENERGY
ALBUQUERQUE FIELD OFFICE

ENVIRONMENTAL RESTORATION PROGRAM
EG&G MOUND APPLIED TECHNOLOGIES

FINAL

- Area 21, a historic storage area used formerly used for storage of high-risk wastes from the SW Building (cesium-137 and radium-226).

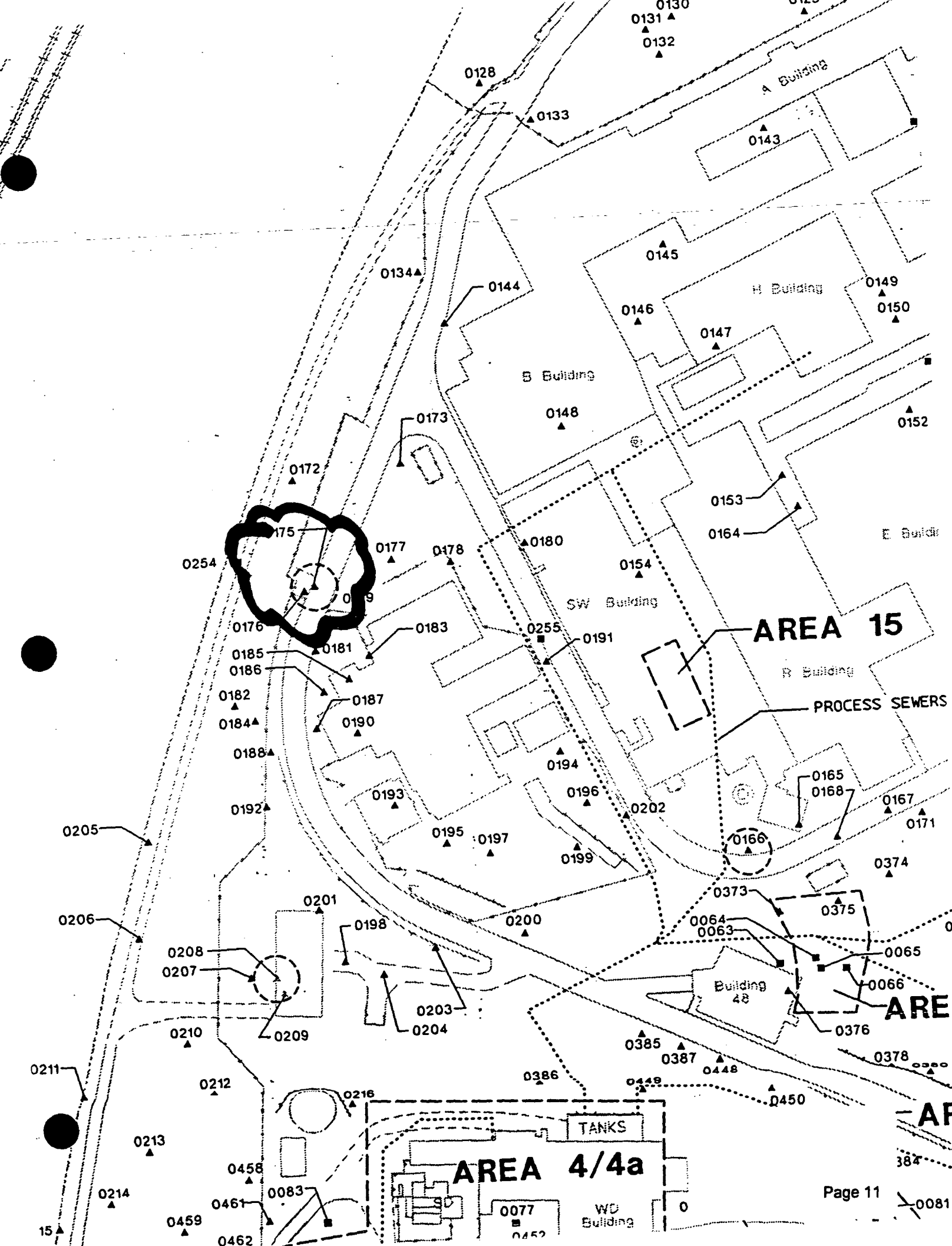
Area 21 was not known at the beginning of the project, but was identified during the initial gamma surveys. Area 15 a historic radium-226/actinium-227 process area entombed in concrete inside the SW Building was not sampled during the investigation. It is known to give off 1 Ci of radon gas per year from the radioactive decay of radium-226. Results of analysis by gamma spectroscopy of samples from 288 locations were reported for radium-226. The distribution of sample locations is shown in Figure 11.2. The highest radium value (3.3 pCi/g) appears to be associated with the thorium areas, except for an isolated location on the far south part of the plant property. Most of the samples results were less than 1 pCi/g, only 65 samples were greater than 1 pCi/g. No samples were collected in the area around the entombed equipment in the SW Building (Area 15).

The experimental processing of reactor wastes from the Hanford and Oak Ridge nuclear reactors was a relatively unknown project conducted at Mound Plant in the early 1950s. Until the research for this report, the source of cesium-137 contamination at Mound Plant was highly speculative. Although no proof exists, the wastes generated in experimental processes probably serve as the principal source of the contaminant. An associated fission product of strontium-90 probably accompanied the cesium-137, but has not heretofore been an analyte of concern at Mound Plant. No data on the latter have been found. During or subsequent to the Site Survey Project (Stought et al. 1988), four principal areas of cesium-137 contamination have been described:

- Area 20, the location of a waste-line break between the WD and the HH Buildings (cobalt-60, cesium-137, bismuth-210m, and bismuth-207);
- Area 21, a historic storage area used for storage of high-risk wastes from the SW Building (cesium-137 and radium-226);
- Area 22, with cesium-137 concentrations up to 7 pCi/g (believed to be contaminated soil excavated soil from Area 20);
- Hot spot 0175 on the west side of the Main Hill; and
- Hot Spot 0647 on the south end of the SM/PP Hill.

Results of analysis by gamma spectroscopy of samples from 292 locations were reported for cesium-137. The distribution of the sampling locations is shown in Figure 11.3. The highest value reported (270 pCi/g) was at a hot spot (0647) on the south part of the SM/PP Hill. Subsequent sampling indicated that values as high as 4 nCi/g were present. No apparent explanations exist for either of the hot spots. Hot spot 0647 was cleaned up to less than 2 pCi/g soon after it was discovered. No records have been found for the area at location 0175. Subsequent samples taken in Area 20 also indicated much higher values than those reported by the Site Survey Project, but were discovered during a construction excavation. Area 21, an old bunker used for waste storage indicated values to 31 pCi/g. Most reported values of cesium-137 were less than 1 pCi/g; only 5[illegible]

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)
S0161	1775	2795	3093	10-83	0	1.19	b					
S0162	1775	2845	6206	08-84	0	0.62	b					
S0163	1775	2870	6207	08-84	0	0.34	b					
S0164	1505	3175	3096	10-83	0	0.25	b					
S0165	1750	3300	6211	08-84	0	0.22[c]	b					
S0166	1750	3350	4000	10-83	0	34.50	b					
S0167	1775	3225	6212	08-84	0	0.81	b					
S0168	1775	3275	3099	10-83	0	1.76	b	12.73				
S0169	1790	3010	8424	11-84	0	0.05	b					
S0170	1790	3025	3097	10-83	0	0.41	b					
S0171	1790	3200	3098	10-83	0	1.87	b					
S0172	1285	3555	4081	10-83	0	0.17	b	1.65				
S0173	1315	3465	3050	10-83	0	0.17[c]	b					
C0254	1325	3630	8415	11-84	36	0.22	b					
S0175	1375	3580	9845	06-85	0	NR	NR		82	10	0.8	LDL
S0176	1375	3590	3051	10-83	0	2.82	b					
S0177	1385	3510	3055	10-83	0	1.17	b					
S0178	1410	3465	6187	08-84	0	0.55	b					
S0179	1410	3555	6189	08-84	0	0.48	b					


A Building
H Building
B Building
SW Building
R Building
E Buildi
AREA 15
PROCESS SEWERS
Building 48
TANKS
AREA 4/4a
WD Building
0128
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0462
0077
15

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 3)

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^{-6}	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				2.13e+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 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

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Environmental Restoration Program

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

MOUND PLANT
MIAMISBURG, OHIO

February 1993

FINAL
(Revision 0)

Department of Energy
Albuquerque Field Office

Environmental Restoration Program
EG&G Mound Applied Technologies

The lithium hydride stability studies involved the use of furnaces capable of high-temperature operation under controlled atmospheres. These studies were also performed in a dry box. The development of analytical methods for lithium hydride, deuteride, and tritide focused on the following analytes: Kjeldahl nitrogen; total hydrogen, deuterium, and tritium; lithium isotopic ratios; carbon, hydroxide, chloride, oxygen, sodium, potassium, and calcium; and free and isotopic lithium (Rhinehammer 1965).

2.15.2. Waste Generation

Compared with the size of the programs, the wastes generated by them were few. Lithium metal, lithium hydride, deuteride, tritide, hydrogen, deuterium, and tritium represent the majority of the waste produced in these studies. The analytical methods development work used methanol, sulfuric and hydrofluoric acids, ethylbromide, Karl Fisher reagent, tin, mercury, hydrochloric acid, sliver nitrate, hydroiodic acid, barium hydroxide, and Nessler reagent.

Based on activity levels, tritium-contaminated aqueous wastes would be treated and disposed of as discussed in the tritium section. Gaseous waste containing hydrogen, tritium, and deuterium would be sent to the effluent removal system to recover tritium.

Lithium metal, lithium hydride, and deuteride are extremely reactive metals and had to be reacted with water to produce a waste that could be stored or undergo further treatment. The disposal of such wastes reportedly took place at Mound. In the mid-1950s, lithium hydride materials were reported as being disposed of by burning in the swampy area along the lower reach of the plant drainage ditch. The highly reactive materials were simply reacted with the water and allowed to burn. This area was referred to as Area C in the CEARP Installation Assessment (DOE 1986). After Building 34 was constructed in the mid-1960s, the disposal activity was moved to the standing water pond at the historic landfill site, known as Area B (DOE 1992g). Any associated contamination at these areas would be dependent on the effectiveness of the isotope separation operation.

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2.16. DETONATORS AND EXPLOSIVES

In July 1955, plans and proposals were prepared for a detonator facility to be constructed at Mound. Plans were made to use Building I for explosive manufacturing, and Building B was to be used for inert manufacturing (Brawley 1955). In August 1956, Mound was directed to begin work on detonator assemblies required for the weapons program (MCC 1960). Thus began a long-lived program in the development and production of detonators, igniters, and actuators; in the research, development, and manufacture of pyrotechnic material and devices; and in the surveillance testing of explosive components. These programs involved research and development of plastic, adhesive, and ceramic

materials. Research, production, and testing included devices containing small quantities of energetic materials. The program began in the E, I, and SW buildings. In E Building, the plastics development program involved process improvement studies, new material investigations, evaluation of commercially produced plastic, and adhesive chemistry studies. In addition, detonator pilot plant operations and physical studies of high explosives were carried out. The detonator program was expanded into the SW Building in 1960. Explosive manufacturing was planned to take place in the I Building.

In 1961, the explosive program undertook the study of explosive purification. This program as conducted in Building 1 (Rhinehammer 1961).

2.16.1. Process Descriptions

2.16.1.1. Plastics Research

Plastics research at Mound conducted in the late 1950s and early 1960s was directed toward the development of a process for blending diallyl phthlalate powders and filler materials into resins whose chemical and physical properties met certain performance standards and could be molded easily. Asbestos fibers, micas and china clays, and man-made materials such as Dacron were evaluated. Various pigments such as titanium dioxide were also evaluated (Eichelberger 1961a). The process involved formulation, followed by injection molding and physical testing of the finished products. Testing included tensile strength, impact resistance, and residual volatile contents. Formulations typically included Dapon 35, ter-butyl perbenzoate, benzoyl peroxide, 10-undecenoic acid, and acetone.* Typical batches ranged from 15 g to 15 pounds (Eichelberger 1961b).

2.16.1.2. Adhesives Research

In the early 1960s, research conducted on adhesives was directed toward the reevaluation of all previous work on polyurethane and polyurathane-epoxy copolymer systems. Dozens of formulations were studied throughout the program, including effects of polyol content on epoxy-modified polyurethanes and the effects of di-epoxide modifiers on polyurethanes and the adiprene-ferric acetyl acetonate-polyol systems. The polyols used were typically 1,3-butanediol, 1,4-butanediol, 1,2,6-hexanetriol, 1,5-pentanediol, and 1,1,1-trimethylolpropane. Normal formulations required 20 to 30 g of Adiprene resin and 0.02 to 0.2 g of catalysts. Many formulations of commercial adhesives and epoxy compounds were evaluated. Some required solvents such as methyl ethyl ketone. Other amine curing agents, such as 4,4-methylene-bis-(2-chloroanilene), also known as MOCA, were also used. The adhesive formulations were evaluated for elastomer properties, cure times, pot life, viscosity, and application characteristics (Eichelberger 1961b).

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OTHER SOILS CHARACTERIZATION REPORT

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Table 3.1 Area Designations

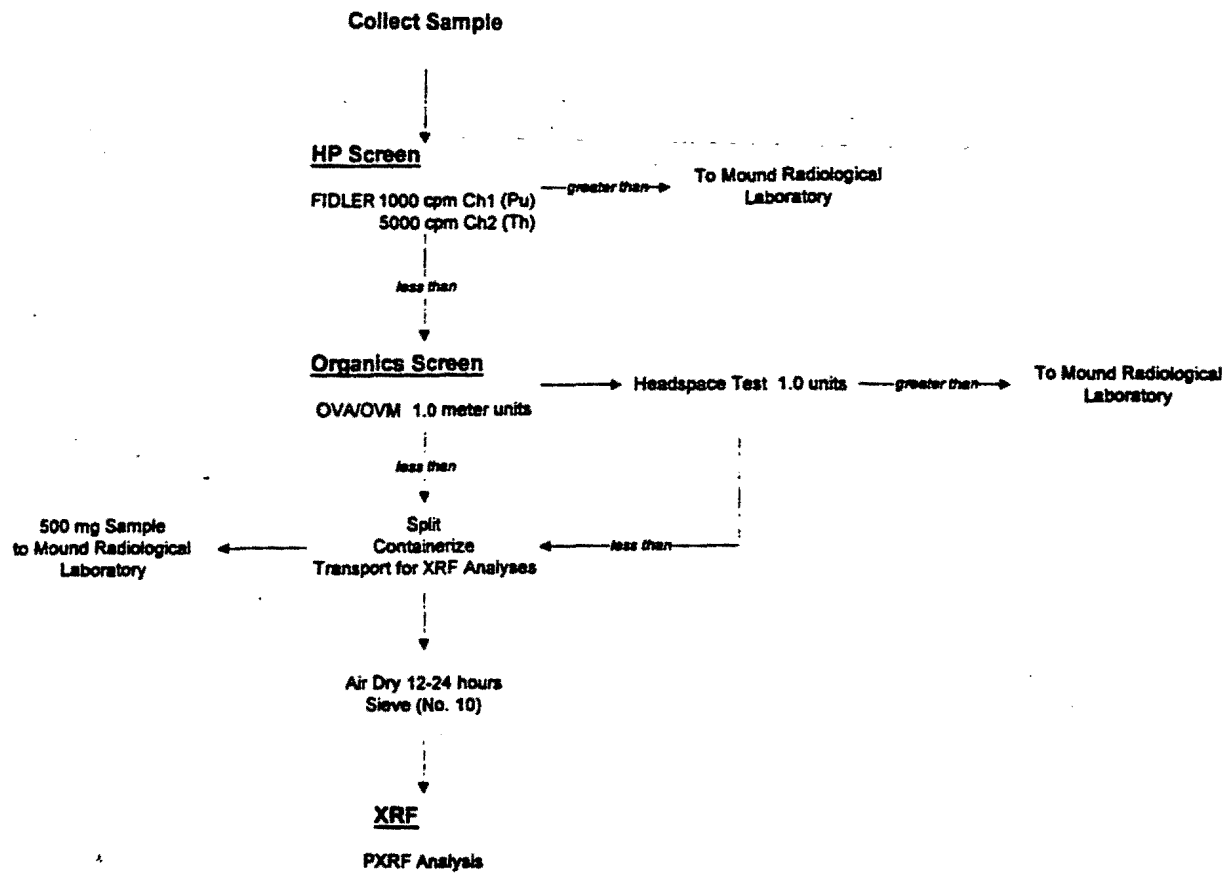
Location	Designation	Location	Designation
Area 5	05	Hot Spot S0166	80
Area 8	08	Hot Spot S0425	81
Area 8 (continued)	88	Hot Spot S0971	83
Area 9	09	Hot Spot S0982	84
Area 9 (continued)	99	Hot Spot S0175	85
Area 10	10	Hot Spot S0647	86
Area 12	12	Hot Spot C0028	87
Area 12 (continued)	72	Hot Spot S0307	90
Area 20	20	Hot Spot S0472	91
Area 23	23	Hot Spot S1092	92
Plant Drainage Ditch	66	Hot Spot S0208	93
Plant Drainage Ditch (cont.)	67	Hot Spot C0007	94

Based on field and Mound Rad Lab data, specific locations were targeted for resampling and offsite analysis. Generally, areas exhibiting the highest observed radionuclide concentrations, or the highest field instrument readings were targeted. Soil collected from these locations were split into representative samples and shipped to both Quanterra Environmental Services, Inc. (Quanterra) for alpha, beta, and gamma spectroscopy, and to Thermo Analytical, Inc. (TMA) for VOC, SVOC, TCLP metals, and cyanide analyses as defined in Section 5.4. All samples were packaged and shipped according to current International Air Transport Association (IATA) regulations. All containers provided for these samples were certified as clean according to US Environmental Protection Association (EPA) standards. The certifications are on file for each lot of containers.

3.1.1.3 Screening

All samples collected in the field were subject to a sequential process of field and onsite laboratory screening in order to determine the extent of contamination. Samples were field screened first for radioactivity, then organic compounds, then were split for radiological compound analyses and PXRF analyses. If health-based action levels were exceeded in the field, then subsequent handling was terminated. These samples were placed in appropriate investigated derived materials (IDM) containers without subsequent handling. Figure 3.1 shows a flow chart for soil screening activities.

FIGURE 3.1 SOIL SCREENING FLOW CHART



Initial field screening of each sample was performed by the RCT with a BICRON FIDLER. The FIDLER is calibrated against Plutonium 238 (Pu238) on Channel 1 and Thorium 232 (Th232) on Channel 2. FIDLER readings are presented in counts per minute (cpm) per 100 cm^2 of probe area. FIDLER results were compared to Mound reportable action levels for these radionuclides. These reportable levels, based on the Mound Health Physics Procedures (MD-80036 Operation 1004), follow:

FIDLER:	1000 cpm above background	Channel 1 (Plutonium)
	5000 cpm above background	Channel 2 (Thorium)

Samples which exceeded 20,000 cpm above background on Channel 2 were theorized to exceed respirable limits of thorium for level D work, and received no further handling. These samples were placed in appropriate IDM containers without subsequent analyses.

After initial screening for radioactivity, the samples were checked for the presence of organic compounds. The soil core was cut in several places, and the cross section was immediately checked for the presence of vapors with an OVA and/or OVM. The sample was then chopped and mixed to form a composite for the sample interval. A Mound-

Three locations in Area 23 were sampled by the field team while wearing Level C respiratory protection. Level of protection and required personnel protective equipment were defined in the RWP and outlined in the site HASP.

Hot Spots

Except as indicated below, all hot spots sampling and screening methods followed the guidelines of the SAP. Minor variations to sample location or labeling conventions are detailed in ISPCNs in Appendix A.

C0028

Field screening of soil samples collected at C0028 showed elevated alpha and beta activity surrounding the Hot Spot. After consultation with the Mound Project Engineer, 8 additional locations were sampled to define the extent of this activity. An additional Mound Rad Lab detection of elevated Pu238 resulted in additional borings in the area. A total of 11 locations were sampled in addition to the original 5 outlined in the SAP.

S0166

Due to the presence of multiple underground utilities at and around this location, the sample depth was reduced from 13 feet to 6 inches. Historic contamination recorded at this location was expected at surface locations.

S0175

Perpendicular underground utilities crossing at this Hot Spot resulted in total reconfiguration of the sampling pattern in this area. Six samples locations were identified around S0175. The new configuration is best illustrated by Figure 5.16 in Section 5.0.

Mound services were required in order to remove 2 sections of fence north of S0175 to allow access to borehole locations.

S0208

A steep slope and limited access resulted in hand augering of soil samples at this location. A stainless steel auger was used to collect samples to a total depth of 2 feet bgs. In order to provide ample sample for Mound Rad Lab and PXRF analyses, the surface sample was incorporated into the 0- to 2-ft. composite sample. The east location was eliminated due to physical constraints (Bldg. 89).

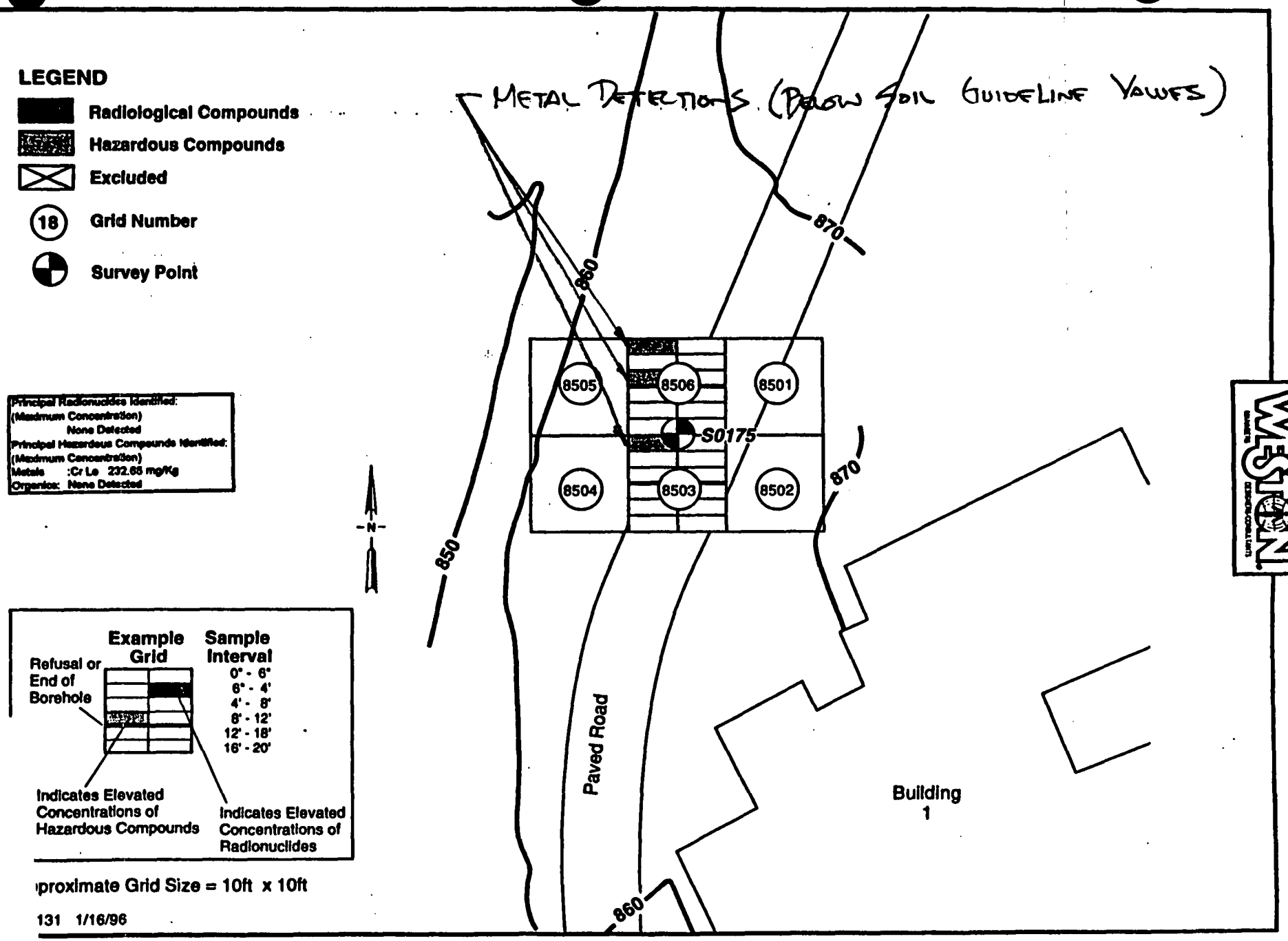


FIGURE 5.16 HOT SPOT S0175

S0175

Three samples from hot spot S0175 (Area 85) triggered field screening action levels:

- Three samples exceeded limits for hazardous compounds

Elevated concentrations of Chromium were detected by the PXRF in soil samples collected from the site.

Table 5.13 shows Hot Spot S0175 field results exceeding action levels. Figure 5.16 graphically represents Hot Spot S0175 field sampling results.

Table 5.13 Hot Spot S0175 Field Sampling Results

	FIDLER		Organics		Rad Laboratory					
Sample ID	Channel 1 (1K)	Channel 2 (5K)	OVA	OVM	Pu 238 (25)		Th 232 (5)	Ra 226 (5)	Cs 137 (15)	Am 241(20)
8503-5001	<1000	<5000	<1	NA	<25.4	U	0.2	1.3	0.04	<0.03
8506-5001	<1000	<5000	<1	NA	<41	U	0.5	1.1	0.3	<0.04
8506-5007	<1000	<5000	<1	NA	<40	U	0.4	1.1	<0.02	<0.04

	PXRF Metals									
Sample ID	As (102.07)	Ba (1489)	Cd	Cr HI	Cr LO (164.43)		Pb (172)	Hg	Se	Ag (2559)
8503-5001	55.692	179.68	<44.5	<347	232.65	*	<10	<37	<14	<29
8506-5001	36.903	224.67	<44.5	<347	165.27	*	42.598	<37	<14	<29
8506-5007	47.831	154.95	<44.5	<347	181.86	*	<10	<37	<14	44.3564

This table lists only those samples whose reported concentrations exceeded the Other Soils field action levels.

THESE VALUES ARE 5,000 TIMES LESS THAN THE RISK-BASED GUIDELINE VALUES

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OTHER SOILS CHARACTERIZATION REPORT

Volume II – Appendices

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Gamma Scan Data

Sample ID		Co 60	Cs 137	Ra 226	Ac 227	Th 230	Th 232	Pa 231	U 238	Pu 238	Am 241
7208-5001		<0.04	0.05	1.7	<0.2	<6.2	0.6	<1.4	<5.4	<68.5	<0.07
7208-5004		<0.04	0.04	1.8	<0.2	<6.7	0.5	<1.3	<6.2	<40.5	<0.05
7208-5006	D	<0.02	0.09	1.15	<0.15	<4.06	1.22	<0.74	<2.63	<32.54	<0.04
7208-5008		<0.04	0.06	1.7	<0.4	<9.4	1.1	<2.1	<5.2	<88.5	<0.1
7208-5012	D	<0.02	0.13	0.9	<0.1	<4	0.9	<0.5	0.7	<43.4	<0.04
7208-5012		<0.05	<0.1	<1.1	<0.4	<9.2	0.9	<2.3	<5.6	<85	<0.1
7209-5001		<0.02	<0.03	0.6	<0.2	<6	4.4	<0.8	0.6	<58	<0.06
7209-5004		<0.02	0.05	1.6	<0.2	<5.6	2	<1.3	<3	<46	<0.05
7209-5006		<0.02	0.04	1.21	<0.17	<4.03	0.72	<0.76	<2.99	<40.28	<0.04
[redacted]											
8501-5001		<0.02	<0.02	1.2	<0.1	<3	0.2	<0.6	<2.6	<28	<0.03
8501-5004		<0.02	<0.01	0.8	<0.1	<2.7	0.3	<0.6	<2.4	<28	<0.03
8501-5007		<0.02	<0.02	1.4	<0.2	<3.2	0.5	<0.7	<2.7	<27	<0.03
8502-5001		<0.01	<0.01	0.9	<0.09	<2.3	0.2	<0.7	<1.9	<25.4	<0.02
8502-5004		<0.02	<0.02	0.4	<0.1	<3	0.4	<0.4	0.4	<34.3	<0.03
8502-5007		<0.02	<0.02	1	<0.1	<2.8	0.39	<0.6	<2.8	<23	<0.03
8503-5001		<0.02	0.04	1.3	<0.1	<2.8	0.2	<0.6	<2.8	<25.4	<0.03
8503-5004		<0.02	<0.02	0.8	<0.09	<2.7	0.3	<0.8	<2.7	<26.9	<0.03
8503-5007		<0.02	<0.01	0.9	<0.1	<2.7	0.33	<0.6	<2.9	<25	<0.03
8504-5001		<0.02	0.12	1.51	<0.14	<3.25	0.49	<0.66	<2.74	<31.37	<0.03
8505-5001		<0.02	0.18	1.82	<0.16	<3.27	0.57	<0.68	<3.18	<35.41	<0.04
8505-5004	D	<0.02	0.02	1.18	<0.14	<3.39	0.52	<0.64	<2.88	<29.34	<0.04
8505-5004		<0.02	0.03	1.45	<0.14	<3.29	0.51	<0.6	<2.86	<30.45	<0.04
8505-5007	D	<0.02	<0.02	1.04	<0.14	<3.36	0.5	<0.59	<2.54	<32.4	<0.03
8505-5007		<0.02	<0.02	1.39	<0.12	<3.09	0.55	<0.65	<2.82	<29.85	<0.03
8506-5001	D	<0.02	0.2	2	<0.25	<6	1.1	<1.3	<2.5	<57	<0.06
8506-5001		<0.02	0.3	1.1	<0.15	<4.1	0.5	<1	<2.8	<41	<0.04
8506-5004		<0.02	<0.01	1.3	<0.2	<3.1	0.37	<0.6	<2.3	<31	<0.03
8506-5007		<0.02	<0.02	1.1	<0.1	<4.2	0.4	<0.9	<3.2	<40	<0.04
[redacted]											
8602-5003		<0.02	<0.02	0.8	<0.1	<3	0.5	<0.6	<2.5	<35.4	<0.0
8603-5003		<0.01	0.02	0.9	<0.1	<2.4	0.2	<0.5	<2	<26.3	<0.0
8604-5003		<0.02	<0.02	1.3	<0.1	<3.2	0.3	<0.7	<2.5	<34.7	<0.0
8605-5003		<0.02	<0.02	1.7	<0.2	<3.6	0.6	<0.8	<2.4	<38.6	<0.04
8706-5001		<0.11	0.07	<1.98	<0.8	<20.19	0.89	<3.14	<12.41	<168.9	<0.19
8706-5004		<0.09	<0.1	<1.46	<0.53	<10.04	0.77	<3.31	<18.61	<103.4	<0.15
8707-5001		<0.09	0.15	2.45	<0.46	<13.55	0.46	<3.29	<14.72	<128.5	<0.11
8707-5004		<0.07	<0.07	<1.36	0.87	<11.01	0.83	<3	<10.58	<116.9	<0.14
8707-5007	D	0.06	<0.08	<1.7	<0.7	<15.88	0.84	<3.26	<9.63	<118.6	<0.15
8707-5007		<0.07	<0.07	<1.36	0.87	<11.01	0.83	<3	<10.58	<116.9	<0.14
8708-5001		0.05	<0.12	4.29	<0.84	<0.37	0.84	<4.46	<15.78	<208.2	<0.19
8708-5004		<0.05	0.08	<1.5	<0.44	<11.1	0.46	<3.61	<10.86	<128.7	<0.13
8708-5007		<0.06	<0.09	2.09	<0.82	<12.74	0.42	<3.91	5.67	<130	<0.11
8709-5001		<0.12	0.22	3.99	<0.88	<18.29	0.94	<6.26	<24.3	<151	<0.22
8709-5004		<0.11	<0.06	<2.21	<0.81	<7.02	0.6	<3.3	<13.71	<165.7	<0.15
8709-5007		0.06	<0.09	2.76	<0.48	<13.69	0.71	<3.06	9.82	106.3	<0.12
8710-5001		<0.1	0.16	2.02	0.77	<16.64	0.76	<3.2	9.82	<115.9	<0.14
8710-5004		<0.06	<0.04	<1.42	<0.74	<11.99	0.42	<2.13	<15.82	<157	<0.15
8710-5006		<0.06	<0.1	2.09	0.38	<9.1	0.36	<2.41	<11.85	<97.04	<0.12
8711-5001		<0.02	0.02	1	0.1	<3.1	0.4	<0.8	<2.6	<25.8	<0.03
8711-5004		<0.01	<0.01	0.8	<0.1	<2.6	0.2	<0.7	<2.2	<23.5	<0.03
8711-5007	D	<0.02	<0.02	0.9	<0.1	<3.3	0.3	<0.8	<2.9	<31.8	<0.03
8711-5007		<0.02	<0.02	0.8	<0.1	<2.8	0.4	<0.8	<2.6	<23.7	<0.03
8712-5001		<0.04	0.06	1.29	<0.24	<6.68	0.36	<1.45	<6.34	<54.51	<0.06
8712-5004		<0.02	<0.02	0.9	<0.1	<3.1	0.4	<0.7	<2.6	<28	<0.03
8712-5007		<0.02	<0.02	1	<0.1	<3.3	0.6	<0.8	<3	<31.6	<0.03
8713-5001		<0.03	0.07	1.8	<0.2	<4	0.7	<1.1	<3.4	<32	<0.04
8713-5004		<0.01	0.01	0.9	<0.1	<2.8	0.4	<0.7	<2.4	<24.5	<0.03
8713-5006		<0.03	<0.03	<0.7	<0.23	<5.99	0.34	<1.2	<6.54	<64.37	<0.05
8714-5001		<0.02	<0.02	0.9	<0.2	<3.9	0.7	<0.9	<3.1	<42.5	<0.04
8714-5004		<0.02	<0.02	1.6	<0.1	<4.1	0.8	<1.1	<3.4	<36.2	<0.04
8716-5001		<0.03	0.2	2	<0.2	<4.5	0.8	<1.3	<3.6	<40.5	<0.05
8807-5001		<0.02	0.2	1.5	<0.1	<4	0.8	<1	<3.5	<41.4	<0.04
8807-5004		<0.03	<0.03	1.5	<0.1	<4	0.9	<1.1	<4.2	<41	<0.04
8807-5008		<0.02	<0.02	1.4	<0.1	<3.8	0.8	<1.1	<3.9	<38.7	<0.04
8807-5012		<0.02	<0.02	1.5	<0.17	<4.04	0.9	<0.77	<4.11	<40.57	<0.04
8808-5001		<0.02	0.1	0.8	<0.1	<3.9	0.9	<0.6	0.8	<43.9	<0.04
8808-5004		<0.02	<0.02	1.3	<0.1	<3.7	0.8	<0.7	<3.3	<34.3	<0.04

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DATE	FILE	ID	"TIME"	"CrHi"	"K"	"Ca"	"Ti"	"CrLO"	"Mn"	"Fe"	"Co"	"Ni"	"Cu"	"Zn"	"As"	"Se"
21-Aug-95	A082195B	7509-6017	16.813	-360.76	28166	66440	2819.9	89.908	650.38	24393	196.76	4.6675	-18.314	49.777	18.289	-0.03497
27-Jul-95	A072795A	8001-5001	13.048	-752.65	3612.8	239163	484.09	-125.73	-81.682	6783.3	-28.108	-0.29142	41.645	8.6526	43.93	16.751
27-Jul-95	A072795A	8002-5001	13.279	-814.78	2821.4	240077	562.14	-122.84	499.13	9799.5	41.673	23.351	50.502	97.535	14.425	36.426
27-Jul-95	A072795A	8003-5001	13.566	-680.85	3021.6	217459	378.2	-124.47	316.5	6791.2	54.095	-6.5998	30.267	35.447	14.564	25.232
27-Jul-95	A072795A	8004-5001	13.949	-832.78	3207.3	233723	474.14	-165.14	135.5	7209.9	-157.94	34.288	57.321	-4.1015	17.988	10.338
27-Jul-95	A072795A	8005-5001	14.231	-669.8	3434.4	216227	846.62	-123.82	165.48	11062	79.5	-10.237	92.262	161.41	9.0517	16.953
27-Jul-95	A072795A	8005-6001	14.465	-484.6	3005.4	215162	840.03	-205.56	552.22	11902	44.774	-41.742	79.02	111.3	-7.1289	18.565
5-Apr-95	A040595A	8101-5001	15.475	-121.78	13327	71145	1355.6	178.18	104.58	17285	-237.16	-32.095	24.337	76.417	48.025	-35.259
5-Apr-95	A040595A	8101-5004	16.083	-120.43	26805	90596	2526.3	85.377	273.37	22434	-125.59	35.244	-46.942	17.041	30.836	-40.244
5-Apr-95	A040595A	8101-5008	16.318	73.752	33032	99630	2856.5	-67.12	16.873	27704	-254.09	18.813	-27.935	23.386	26.751	-41.534
5-Apr-95	A040595B	8101-5012	17.05	730.8	18477	182197	1973	135.53	0	17065	0	0	0	52.35	0	0
5-Apr-95	A040595B	8101-5012	17.283	86.716	18766	182439	2060.1	99.297	214.45	18865	-361.87	11.022	-17.29	4.1906	14.916	-28.916
6-Apr-95	A040695A	8101-5016	8.886	-129.25	29574	119404	2885.4	-14.114	25.085	24373	-254.56	8.3728	18.841	68.382	28.158	-24.087
5-Apr-95	A040595B	8101-6012	17.51	121.75	20572	165731	2011.9	76.179	17.465	18657	-99.67	5.4681	25.614	23.296	12.406	-46.752
29-Mar-95	81025001	8102-5001	10.77	-740.15	13924	74662	2117	-0.38568	554.96	18525	-47.373	-19.926	5.3061	719.35	6.4901	-15.065
29-Mar-95	81025004	8102-5004	10.509	-807.94	30176	103032	3111.8	-111.06	647.25	27286	-84.816	-24.256	52.128	121.78	-1.9319	-17.855
29-Mar-95	81025008	8102-5008	10.282	-635.51	34826	95827	3520.1	-104.44	454.97	28083	-252.4	85.09	49.456	96.373	4.3029	-21.1
29-Mar-95	81025012	8102-5012	10.01	-870.59	22673	161826	2523.9	-124.17	504.92	23739	-174.84	76.338	43.951	73.414	-7.3438	-15.646
29-Mar-95	81026001	8102-6001	11.087	-597.7	13550	71799	1930.3	29.259	280.78	18028	-212.14	-47.581	64.071	773.8	-7.9482	-4.1828
24-Mar-95	81035001	8103-5001	12.702	-467.07	16843	62850	1824.5	-14.976	456.17	18580	-78.785	12.965	67.579	157.75	-1.15	-9.1047
24-Mar-95	81035004	8103-5004	12.96	-770.17	33723	93378	3535.7	-30.376	876.07	28041	129.06	-21.529	75.378	88.423	-7.4634	-30.947
24-Mar-95	81035008	8103-5008	13.197	-496.66	32970	106327	3208.7	-106.39	348.91	27740	22.513	76.687	45.49	84.255	1.6091	-3.7808
24-Mar-95	81035012	8103-5012	13.497	-382.09	38016	100989	3957.4	-46.659	435.71	31310	195.21	25.898	79.18	51.705	-33.38	-8.9191
24-Mar-95	81035016	8103-5016	13.767	-661.47	33683	106370	3386	-71.252	510.32	26620	-82.267	28.661	74.464	115.4	13.212	-8.4544
24-Mar-95	81045001	8104-5001	12.413	-652.02	15088	58459	2026.3	-33.269	670.69	19216	-23.66	33.126	58.978	141.51	14.997	-5.6564
23-Mar-95	8104-5004	8104-5004	15.566	-466.69	27638	108353	2715	-77.774	274.36	25504	-96.936	16.124	13.361	84.881	-9.5305	4.8881
23-Mar-95	8104-5008	8104-5008	15.328	-558.29	27083	127977	2490.1	-95.38	540.61	23395	69.155	8.9215	35.034	99.435	-12.098	-15.182
23-Mar-95	81045012	8104-5012	15.076	-719.95	13695	222541	1503.6	-178.91	346.53	15640	69.203	29.599	24.791	71.162	24.345	-11.975
23-Mar-95	81046004	8104-6004	15.807	-557.09	28439	104980	2641.2	26.686	657.86	26219	104.73	-89.77	-1.9848	46.331	8.7635	-27.336
13-Mar-95	81055001	8105-5001	14.792	-260.19	15053	46843	2180.7	14.595	182.43	20859	-147.06	-0.26957	-18.714	320.66	47.653	2.1262
13-Mar-95	81055004	8105-5004	16.429	-576.28	8488.9	124085	1119.9	78.473	-227.42	11762	-49.037	-46.112	2.5309	84.452	44.628	-0.79656
13-Mar-95	81055008	8105-5008	14.545	-36.667	15964	129109	1740.8	-34.005	105.2	15206	63.029	-93.811	-14.695	96.812	37.86	12.76
13-Mar-95	81055012	8105-5012	16.213	-273.41	33120	121095	3236.4	-80.233	167.28	24616	138.42	-62.609	-11.777	73.962	49.116	7.4301
6-Apr-95	A040695A	8301-5001	9.238	-56.882	23933	67606	2690.3	19.286	524.67	26557	-212.53	45.244	-3.1291	67.791	41.83	-18.474
6-Apr-95	A040695A	8301-5004	9.471	-359.38	18259	152963	1979.9	40.576	-24.624	21739	-120.05	50.83	1.3992	39.291	18.643	-40.336
5-Apr-95	A040595A	8302-5001	14.146	-21.67	28823	58956	2828.9	-0.08359	482.61	29685	-169.23	-18.285	27.231	85.158	17.084	-31.804
5-Apr-95	A040595A	8302-5004	14.376	-229.71	20843	63925	2613.8	107.03	925.26	23219	-20.539	63.044	-5.1819	84.239	16.187	-32.662
6-Apr-95	A040695A	8303-5001	9.694	-243.35	23439	78227	2870.2	43.783	518.57	26618	-163.24	2.1177	8.274	63.065	35.236	-38.551
5-Apr-95	A040595A	8303-5004	14.704	180.72	22486	142797	2406.3	32.337	-151.18	22998	-76.174	-18.268	77.156	25.324	-8.1202	-24.842
5-[illegible]95	A040595A	8304-5001	14.934	-14.856	15698	51777	2659.2	76.742	552.81	17488	-52.354	-48.763	43.121	43.672	16.716	-30.223
5-[illegible]95	A040595A	8304-5004	15.214	-138.39	17735	126849	1821.9	162.69	358.06	20584	-150.68	71.452	-16.001	20.899	40.297	-24.047
6-Ap[illegible]	A040695A	8305-5001	9.924	-121.68	19038	29824	2698.1	95.019	634	28680	-49.005	-42.045	13.547	56.815	11.757	-28.134
6-Ap[illegible]	A040695A	8305-5004	10.171	-100.78	18054	53311	2970.4	1.1125	627.72	23192	36.481	-59.588	34.269	43.205	13.811	-33.133
[illegible]pr-[illegible]	A040595A	8401-5001	13.208	26.596	16977	27064	2990.2	47.757	526.99	21405	-71.548	2.0537	6.0756	22.827	27.996	-28.035
3[illegible]-[illegible]	A040[illegible]	8401-5004	13.432	-181.56	14689	176307	1869.2	11.881	338.81	17821	-105.42	-29.971	-35.972	48.253	26.002	-38.765
5-A[illegible]	[illegible]	8401-6004	13.68	-317.35	12908	173650	1695.3	125.88	220.94	16523	-253.24	47.115	9.0811	40.831	45.812	-30.834
6-Apr-[illegible]	[illegible]695	8402-5001	10.426	-262.24	17108	17827	2892.6	34.536	677.34	20241	-0.69549	-42.077	12.334	45.529	-4.5052	-28.852
30-M[illegible]	8402500[illegible]	8402-5004	9.098	-522.72	13855	101196	2197	-129.64	769.23	18356	-123.57	-17.274	37.818	37.621	5.9983	-5.6632
[illegible]r-95	A040695[illegible]	8403-5001	10.664	-188.59	16238	31853	2827.7	68.125	332.51	18950	-194.25	-63.42	-16.222	12.007	20.171	-37.078
3[illegible]	84035004	8403-5004	9.363	-604.45	12169	174597	1336.9	-136	224.57	14664	-134.86	17.476	48.718	71.964	-2.7337	-10.915
6-Ap[illegible]	[illegible]	8404-5001	10.886	-225.25	15599	18700	2554.2	69.802	364.88	20007	29.035	-30.493	-27.177	53.247	25.709	-23.306
6-Apr-95	A040[illegible]	8404-5004	11.142	-107.97	13221	146126	1901.3	88.277	386.93	18818	16.875	-5.2231	-14.276	21.89	12.331	-38.736
6-Apr-95	A040695A	8404-6004	11.402	-229.96	14678	155225	2050.2	-20.697	531.9	20829	-41.119	-9.8775	-13.443	64.801	14.692	-44.393
30-Mar-95	84055001	8405-5001	8.874	-476.54	18753	22355	3471	0.52046	743.92	21512	-186.81	-10.393	78.415	57.195	10.071	2.1635
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
31-Aug-95	A083195A	8501-5001	14.058	-217.16	3372.4	251950	262.98	-170.16	-191.77	8331	-24.371	-5.4001	-56.593	24.236	55.785	-10.652
31-Aug-95	A083195A	8501-5004	14.286	-895.65	4800.6	241339	414.15	-46.661	-33.473	9482.9	-89.09	151.5	-48.576	7.3346	70.43	-6.7607
31-Aug-95	A083195A	8501-5007	14.506	-775.34	16235	129652	1567.8	83.833	358.29	17954	138.63	3.4418	19.309	15.772	70.842	-8.4164
30-Aug-95	A083095B	8502-5001	16.308	-1076.8	5882.4	240452	611.51	-200.83	-430.36	8943	42.985	-12.316	-53.279	-43.269	72.601	-8.6042
30-Aug-95	A083095B	8502-5004	16.523	-1226.2	9511.8	184857	786.68	-34.196	-23.359	18104	-74.442	72.084	-12.178	-8.7073	56.116	-21.719
30-Aug-95	A083095B	8502-5007	16.736	-1110.2	15037	159642	1101.6	-26.746	243.71	15576	70.252	-6.1291	-61.044	13.58	59.298	-11.981
28-Aug-95	A082895B	8503-5001	15.971	-194.47	12131	82345	1785.1	232.65	293.75	15182	91.296	-42.912	16.746	57.943	55.692	-9.8496
28-Aug-95	A082895B	8503-5004	16.183	-225.07	21260	115358	1805.1	142.54	655.03	18664	90.417	-66.26	-75.537	11.31	63.191	-30.619
28-Aug-95	A082895B	8503-5007	16.396	-320.69	19800	124331	1605	160.63	289.08	17344	15.802	-72.351	-75.025	-35.845	59.545	-33.16
30-Aug-95	A083095B	8504-5001	17.847	-1218.6	14546	47438	1719.2	124.35	549.61	17054	116.12	-22.882	28.504	112.2	48.188	-16.314
30-Aug-95	A083095B	8504-5004	18.075	-1158.4	17426	124612	1462.8	21.402	156.85	18690	-61.021	32.12	-1.1553	31.48	59.639	-8.8428
30-Aug-95	A083095B	8504-5007	18.729	-1132.5	16238	176747	1442.8	-79.074	140.17	16537	-67.488	15.565	19.368	33.555	75.199	-17.505
30-Aug-95	A083095B	8505-5001	16.948	-769.31	16165	48209	1991.4	-3.5783	238.69	17890	176.57	-35.459	21.871	297.56	60.558	-13.083
30-Aug-95	A083095B	8505-5004	17.422	-848.33	21721	108494	2108.1	20.702	349.27	21466	245.18	32.277	-41.376	29.54	57.143	-27.637
30-Aug-95	A083095B	8505-5007	17.634	-1013.5	23684	144654	2130.5	50.881	73.597	21316	374.56	58.234	-24.198	87.601	39.803	-5.4339
30-Aug-95	A083095B	8505-6001	17.208	-760.03	14299	48977	1803.9	36.123	173.85	16673	42.778	2.4528	1.3871	215.27	41.089	-17.053
28-Aug-95	A082895B	8506-5001	18.504	102.54	15467	81770	1831.4	165.27	273.97	17834	155.89	-90.559	15.858	138.99	36.903	-32.111
28-Aug-95	A082895B	8506-5004	18.715	-86.346	20674	125734	1809.1	87.076	140.53	17856	52.794	-111.85	-23.087	4.4656	57.541	-31.258
28-Aug-95	A082895B	8506-5007	19.148	-185.88	19361	115187	1640.2	181.86	331.43	15639	481.65	-81.424	-95.017	18.858	47.831	-39.316
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29-Mar-95	87015004	8701-5004	15.573	-823.19	14186	214296	1652.4	-135.45	622.54	18073	-33.319	5.222	37.655	66.763	-3.1419	3.3306
30-Mar-95	87015008	8701-5008	8.601	-721.91	15955	212220	1526.7	-91.438	774.55	17182	-167.49	16.631	16.34	49.927	13.371	-11.453
29-Mar-95	87016004	8701-6004	15.881	-638.82	15021	232418	1773.6	-229.81	693.91	16678	-129.33	-44.475	37.342	109.41	-1.3773	-17.23
24-Mar-95	87025001	8702-5001	10.832	-569.72	30153	39364	3580.3	-64.459	941.19	37791	112.11	-31.005	49.303	134.67	-3.2917	-15.24
24-Mar-95	87025008	8702-5008	9.619	-702.38	11983	253225	1388.4	-133.62	283.56	14359	32.181	-39.908	23.275	63.994	-4.8614	-5.1928
24-Mar-95	87025011	8702-5011	9.382	-803.27	17611	181501	1820.6	-29.299	449.75	17577	-298.51	27.035	49.288	68.943	-11.964	-8.9381
24-Mar-95	87035001	8703-5001	8.928	-443	20808	9276.9	3902.1	-25.157	748.36	22068	-133.36	22.445	27.448	63.213	0.63634	-11.084
24-Mar-95	87035007	8703-5007	9.153	-1004	17648	164998	1711	-33.673	343.28	18686	-158.31	-24.518	-10.553	47.942	-4.3759	-12.886
24-Mar-95	87045001	8704-5001	10.614	-818.04	21588	15412	2723.3	-42.224	924.46	32192	2.0772	-12.14	9.0776	80.058	1.3156	-18.606
24-Mar-95	87045004	8704-5004	10.389	-1114.7	17379	201577	1828.7	-113.02	426.85	16203	-177.04	30.947	26.07	53.502	21.728	-13.3
24-Mar-95	87055004	8705-5004	9.853	-733.41	18858	124500	2184.3	-59.989	735.29	24475	66.582	0.08735	21.818	58.424	10.86	-24.092
24-Mar-95	87055008	8705-5008	11.381	-772.86	23139	170750	2244.7	-28.196	276.33	20789	-126.61	8.375	27.243	33.119	-13.357	-19.621
24-Mar-95	87056008	8705-6008	11.602	-806.83	20574	164300	2043.2	-89.845	557.66	19214	-17.043	54.152	57.835	79.39	16.885	-0.20627
28-Aug-95	A082895B	8706-5001	18.059	11.09	26424	112540	2454.3	144.93	405.38	25420	215.37	-50.139	-34.319	36.355	81.713	-29.593
28-Aug-95	A082895B	8706-5004	18.28	-114.61	23435	127209	2133.9	152.37	110.99	19545	339.41	-91.362	-63.485	38.988	65.859	-26.458
28-Aug-95	A082895B	8707-5001	17.033	-39.645	16029	153727	2049.1	123.64	474.29	25480	21.069	-65.478	-51.547	4.832	106.23	-34.694
28-Aug-95	A082895B	8707-5004	17.634	92.579	17915	156320	1449.6	303.94	357.86	16622	138.07	-74.38	-44.295	-14.503	64.735	-28.088
28-Aug-95	A082895B	8707-5007	17.847	-380.42	13014	230388	1153.8	-0.4289	24.301	13032	236.88	-50.012	-31.597	-38.454	60.503	-39.197
28-Aug-95	A082895B	8707-6001	17.255	-178.86	14457	137817	1660.8	119.15	311.47	23854	333.7	-96.11	-63.885	36.015	64.324	-47.622
29-Aug-95	A082995A	8708-5001	15.815	-285.68	19326	21921	2638.2	16.572	922.35	29161	148.8	-47.4				

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EG&G MOUND APPLIED TECHNOLOGIES
P.O. BOX 3000 MIAMISBURG, OHIO 45343-3000 • TEL (513) 865-4020

July 27, 1995

BACKGROUND VALUES FOR COMPARISON TO MOUND SOIL, 1995.

Ms. Debra A. White
U.S. Department of Energy
Miamisburg Area Office
P.O. Box 66
Miamisburg, Ohio 45343

Dear Ms. White:

We are pleased to transmit the following tables which propose background concentrations for chemicals in soils. Mostly, these values were calculated from data collected in the OU9 Soils Investigation from locations designated for background samples. Please refer to Section 5, Appendix J, and Appendix K of the OU9 Background Soil Chemistry Report for a description of the calculations and the process used to develop these numbers.

In our review, Dan Carfagno, Alec Bray, and I determined that the thorium-230 value reported in the OU9 Background Soil Chemistry Report (3.0 pCi/g) did not seem scientifically correct. Its background value should be similar to the background value for its parent radionuclides uranium-238 and uranium-234. In the following tables, we have proposed the value 1.9 pCi/g for thorium-230. We computed this value from data collected in the OU9 Regional Soils Investigation.

If you have any questions regarding how the tables were prepared, or if you have further needs, please call me.

Sincerely,

Jim Rigano

Jim Rigano

cc:
Art Kleinrath (DOE/MB)

Radionuclide Background Values for Comparison to Mound Plant Soils

	Maximum Value (pCi/g)	Background* Value (pCi/g)
Americium-241	Not detected in any sample	Not detected in any sample
Bismuth-207	Not detected in any sample	Not detected in any sample
Bismuth-210	Not detected in any sample	Not detected in any sample
Cesium-137	0.73	0.42
Cobalt-60	1.01	Note 1
Plutonium-238	0.25	0.13
Plutonium-239/240	0.32	0.18
Potassium-40	37.9	37
Radium-226	2.95	2
Strontium-90	21.9	0.72
Thorium-228	2.13	1.5
Thorium-230**	2.44	1.9
Thorium-232	1.69	1.4
Tritium	8.28	1.6
Uranium-234	1.16	1.1
Uranium-235/236	0.12	0.11
Uranium-238	1.29	1.2

Note 1: The background value could not be computed due to the large number of non-detects in the sample set.

* Upper 95% Sample Tolerance Limit

** From Regional Soils Investigation

DECONTAMINATION & DECOMMISSIONING PROGRAM

SAMPLING AND ANALYSIS PLAN FOR THE OTHER SOILS AREAS

MOUND PLANT
MIAMISBURG, OHIO

FINAL (Rev 1)

Prepared for:

EG&G MOUND APPLIED TECHNOLOGIES
AND
THE U.S. DEPARTMENT OF ENERGY

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Table III.1. A Listing of Suspected Contaminants of Concern Based on Historical Data Sources

Hot Spot	Depth[1] of Contaminant (feet)	Suspected Contaminants	Sampling Depth (feet)
C0007	9[a]	Thorium, Plutonium	9
C0028	21[a]	Thorium, Plutonium	21
S0166	surface	Plutonium	13
S0175	surface	Cobalt, Cesium, Radium, Americium	7
S0208	surface	Plutonium, Tritium	1.5
S0307	surface	Thorium, Plutonium	15
S0425	surface	Thorium, Plutonium	16
S0472	surface	Thorium, Plutonium	28
S0647	surface	Cobalt, Cesium, Radium, Americium	2.5
S0706	surface	Plutonium	5
S0971	surface	Thorium, Plutonium	3
S0982	surface	Thorium, Plutonium	3
S1092	surface	Thorium, Plutonium	28

[1]Vertical location at hot spot where contamination was detected.
[a]Core sample. Depth is estimate based on previous results.