BWX Technologies, Inc.
a McDermott company

BWXT of Ohio, Inc.
1 Mound Road
P.O. Box 3030
Miamisburg, Ohio 45343-3030
(937) 865-4020

ESC-128/00
August 23, 2000

00-TC/08-23

Mr. Richard B. Provencher, Director
Miamisburg Environmental Management Project
U.S. Department of Energy
P.O. Box 66
Miamisburg, OH 45343-0066

ATTENTION: Dewain Eckman

SUBJECT: Contract No. DE-AC24-97OH20044
POTENTIAL RELEASE SITE (PRS) 99/100 DATA PACKAGE - PUBLIC REVIEW DRAFT

REFERENCE: Statement of Work Requirement C 7.1e -- Regulator Reports

Dear Mr. Provencher:

The attached Potential Release Site (PRS) 99/100 Data Package has been authorized for release to USEPA, OEPA, and ODH by Art Kleinrath of MEMP. On July 12, 2000 the Core Team decided that this PRS requires No Further Assessment. This package will enter public review from August 23, 2000 through September 25, 2000.

If you or members of your staff have any questions regarding the document, or if additional support is required, please contact Dave Rakel at extension 4203.

Sincerely,

JSStapleton

Jeffrey S. Stapleton
Manager, Environmental Safeguards & Compliance

JSS/nmg

Enclosures as stated

cc: Tim Fischer, USEPA, (1) w/attachment
Brian Nickel, OEPA, (2) w/attachment
Ruth Vandegrift, ODH, (1) w/attachment
Art Kleinrath, MEMP, (2) w/attachment
Dann Bird, MMCIC, (2) w/attachment
John Krueger, BWXT of Ohio, (2) w/attachment
Floyd Hertweck, (1) w/attachment
Public Reading Room, (5) w/attachment
DCC

MOUND

Environmental
Restoration
Program

MOUND PLANT POTENTIAL RELEASE SITE PACKAGE

Notice of Public Review Period

OhioEPA

The Potential Release Site (PRS) 99/100 Data 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 August 23, 2000 through September 25, 2000.

Potential Release Site 99/100:
Area 6, WD Building Filter-Cleaning Waste/Area F, Chromium Trench

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

3001-0009030002

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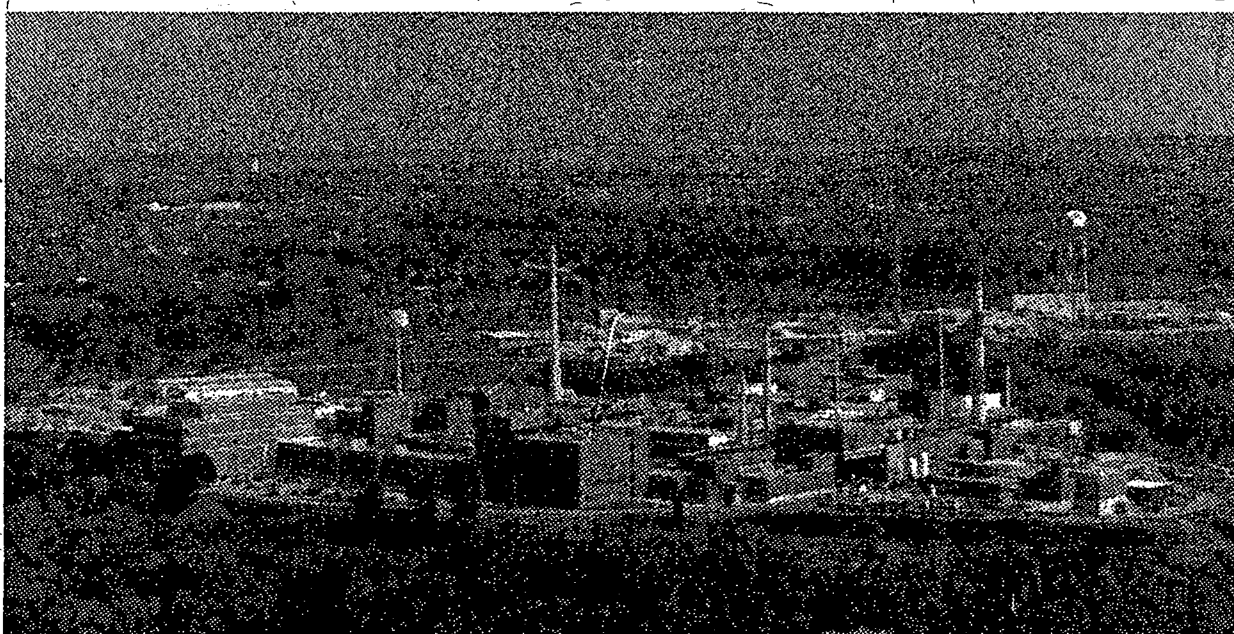
MOUND PLANT

Potential Release Site Package
PRS # 99/100

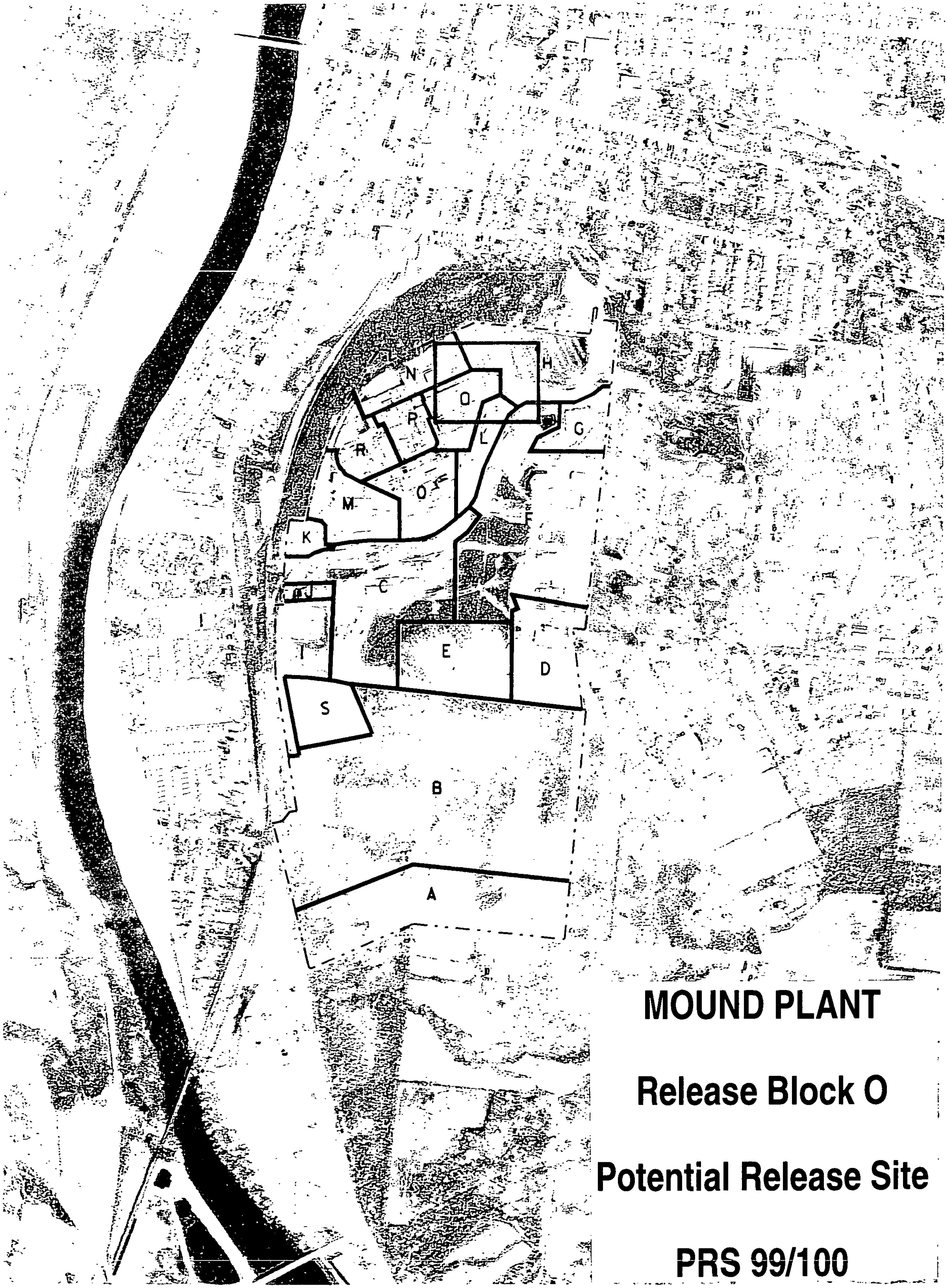


PRS 99/100

REV	DESCRIPTION	DATE
WORKING DRAFT		
Draft	Binned FA, 12/13/95	**Nov. 2, 1995**
Draft Proposed Final	Further Assessment sampling evaluations result in declaring that PRS 99 is a Removal Action. PRS 99 recommendation inserted. Public Review: October 6, 1999 - November 5, 1999	**Sept. 16, 1999**
Public Review Draft		**Sept. 27, 1999**
Final	RA activities to generate new Working Draft	Nov. 6, 1999

PRS 99/100 Addendum 1

REV	DESCRIPTION	DATE
WORKING DRAFT		**July 12, 2000**
Draft	PRS 99/100 (Addendum 1) binned NFA at July 2000 Core Team Meeting.	**July 12, 2000**
Draft Proposed Final	Core Team approves "Public Review Draft: at August 2000 Core Team Meeting	**August 16, 2000**
Public Review Draft	Public Review: August 23, 2000 - September 25, 2000	**Aug. 16, 2000**
Final		



MOUND PLANT

Release Block O

Potential Release Site

PRS 99/100

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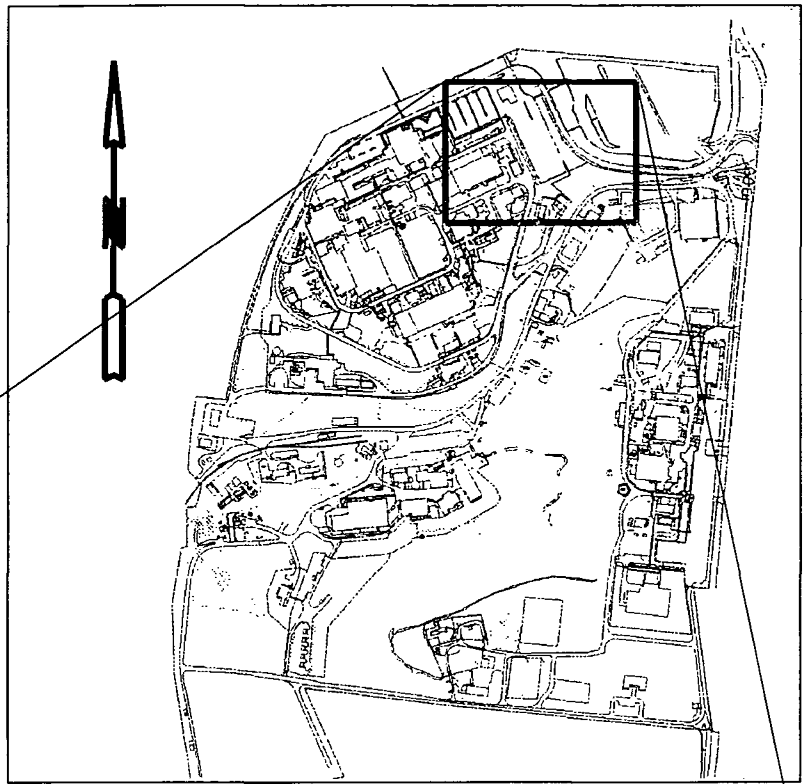
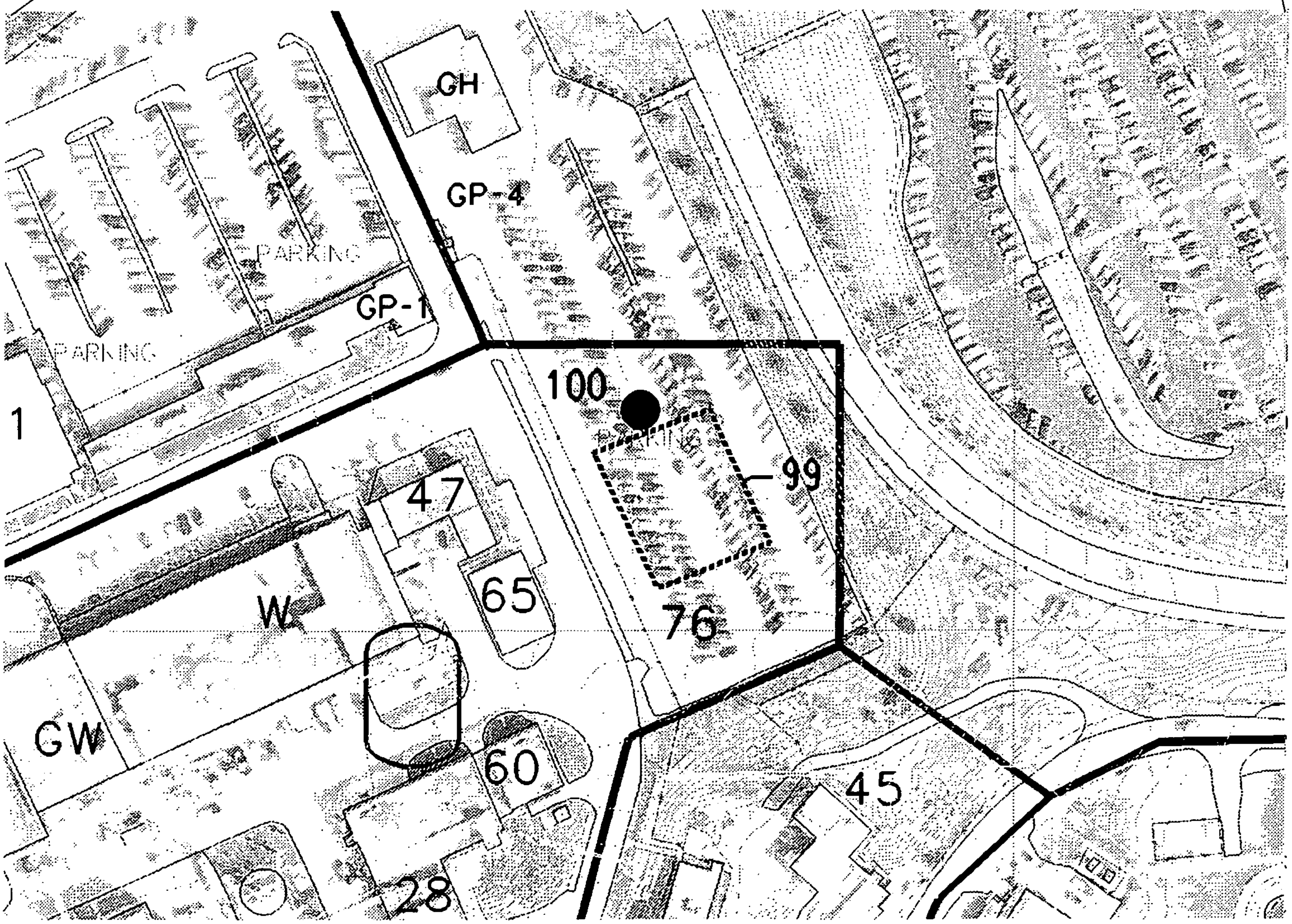
Mound Plant

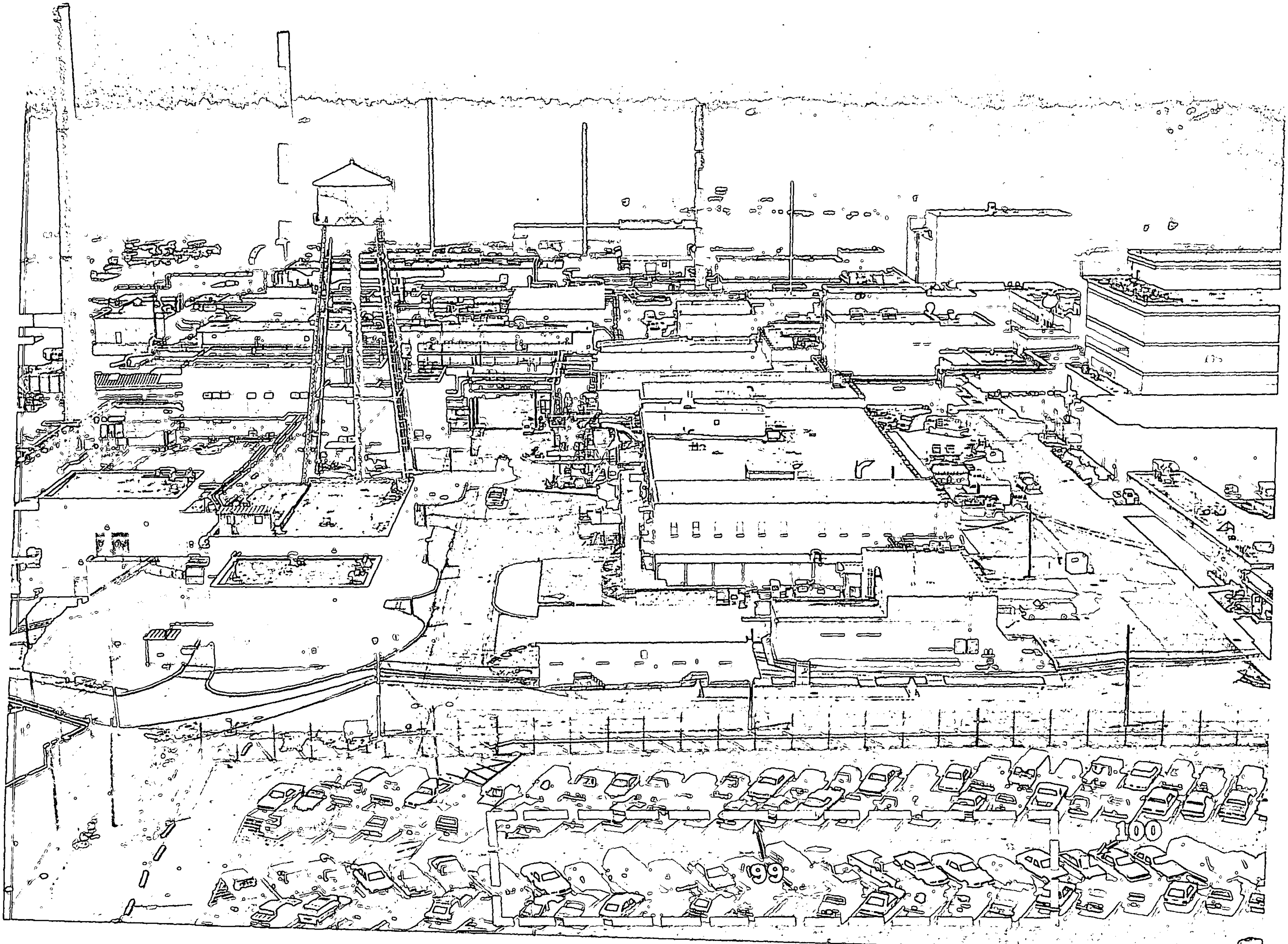
Release Block O

Potential Release Site

PRS 99/100






99
100

PRS 99/100

PRS HISTORY:

Potential Release Site (PRS) 99/100 is located under the parking lot just south of GH Building. PRS 100 is also referred to as Area F or the Chromium Trench. PRS 99, which is located within the PRS 100 boundaries is also referred to as Area 6.[1,3,4,5]

PRS 100 was a trench that was used as a burial site in 1963.[4] From the original plating shop dismantled in 1962, approximately 110 gallons of chromium plating bath solution were treated with sodium bisulfite, resulting in reduction, and disposed of in the PRS 100 trench in 1963.[3] It is unknown if the chromium solution was placed in the trench while still in drums or if it was poured from the drums into the trench.[5] It is reported that the old tanks from the original plating shop were also buried at this location, as part of the expansion of the parking lot.[3] This trench, reported to be approximately 100 feet long by 40 feet wide, was backfilled 15 to 30 feet deep with clean fill when the parking lot was built.[5]

PRS 99 is a trench that resides near the center of PRS 100. In 1964, at least three 55-gallon drums of polonium-210 contaminated sand were placed in this area.[2,3] The sand resulted from the cleaning (sandblasting) of the metal framework of the WD Building sand filters.[2,3] The sand was originally contained in drums that were crushed and placed in the disposal area/trench.[4] The sand may have also been contaminated with cobalt-60 and cesium-137.[5] A report indicates the trench may also contain a plutonium contaminated washing machine.[2,4] This trench, along with Area F, was backfilled 15 to 30 feet in depth with clean fill when the parking lot was built.[5]

CONTAMINATION:

1). In 1985, the Radiological Site Survey[2] investigated radionuclides via Mound Soil Screening, radiochemistry and gamma spectroscopy. One surface soil sample in the vicinity of PRS 99/100 (location S0078) was analyzed for plutonium, thorium and tritium. Ten core samples in the vicinity of PRS 99/100 (location C0003) were analyzed for cobalt-60, radium-226, americium-241 and cesium-137. Results of the investigation showed all radionuclide detections in the soil were below their applicable guideline criteria.[6,8]

2). Polonium-210 has a half-life of 138.4 days and should no longer be present due to radioactive decay.[2,3,5]

3). In 1990, a magnetic survey of the area detected one large and seven smaller anomalies.[7]

READING ROOM REFERENCES:

1) Operable Unit 9, Site Scoping Report: Volume 12 - Site Summary Report, December 1994. (pages 6-9)
2) Operable Unit 9, Site Scoping Report: Volume 3 - Radiological Site Survey, June 1993. (pages 10- 15)
3) Operable Unit 9, Site Scoping Report: Volume 7 - Waste Management, July 1992. (pages 16-18)
4) Operable Unit 2, Technical Memorandum #1, Preinvestigation Evaluation of Remedial Action Technologies (PERAT), Draft (Revision 0), August 1991. (pages 19-24)
5) Operable Unit 2, Chromium Trench Removal Site Evaluation, Draft (Revision 0), February 1995. (pages 25-35)
6) Risk Based Guideline Values, Final, (Revision 0), December 1995.

OTHER REFERENCES:

7) Letter Report: Preliminary Results of Reconnaissance Magnetic Survey, Mound Plant Areas 2, 6, 7, and C, Working Draft, November 1990. (pages 36-42)
8) Code of Federal Regulations, 40 CFR 192.41 and 40 CFR 192.12.

PREPARED BY:

Irwin D. Dumtschin, Member of EG&G Technical Staff

MOUND PLANT RECOMMENDATION
PRS 99
Area 6, WD Building Filter-Cleaning Waste

Background:

In 1963, chromium plating bath solution and Polonium-210 contaminated sand were disposed of in a trench located below the present parking lot south of GH Building. The trench has been reported to be approximately 100 feet long by 40 feet wide and covered by 15 to 30 feet of fill dirt.

Recommendation:

Binned with PRS 100, PRS 99 is a trench in the parking lot south of GH Building. It was believed to contain drums of Polonium-210 contaminated sand resulting from the sandblast cleaning of the WD Building sand filters. It was thought that the sand may also be contaminated with Cobalt-60 and Cesium-137.

On December 13, 1995, the Core Team recommended *Further Assessment* (FA) for both PRS 99 and PRS 100. Subsequently, the costs of further investigation versus the costs of removing the potentially contaminated soils were evaluated. On July 10, 1997, this evaluation resulted in the decision to continue with the original FA recommendation.

In February 1999, 137 investigative samples were collected from 46 borings in the parking lot south of GH Building to include PRS 99. One sample located in PRS 99 displayed elevated Plutonium-238 in soil at 106 pCi/g, as compared to the Guideline value of 55 pCi/g. A trenching investigation at this location yielded evidence of greater contamination (up to 839 pCi/g of Plutonium-238) over a defined geographic area. The Core Team, therefore, now recommends that a Removal Action be accomplished for PRS 99.

Concurrence:

DOE/MEMP: [signature] 9/16/99
Art Kleinrath, Remedial Project Manager (date)

USEPA: [signature] 9/16/99
Timothy J. Fischer, Remedial Project Manager (date)

OEPA: [signature] 9/16/99
Brian K. Nickel, Project Manager (date)

REFERENCE MATERIAL
PRS 99/100

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

Table II.1. List of Sites in the Mound Plant Environmental Restoration Program by Operable Unit Cross-Referenced to the RCRA Facilities Assessment and CEARP Phase I

	ER Program Sites	RCRA Facility Assessment (SWMU's and Other Areas of Concern)	CEARP Phase I (Category-Site)
Area B Groundwater, Operable Unit 1:			
	Site Sanitary Landfill	LF-1 lined landfill	
	Area 18, Landfill Cover		3-Area 18
	Contaminated Soil and Pond Area	LF-2 past landfill	1-Area B
Main Hill Seeps Operable Unit 2:			
	Seeps	D North slope springs G Hillside hole	
	Area 15, Old SW Cave	F SW Building C	3-Area 15
PRS 99	Area 6, WD Building Filter Waste	DD Main Hill-6	3-Area 6
PRS 100	Area F Chromium Trench	MI-7 Chromium trench	3-Area F
	Cooling Tower Basins	MI-8 Cooling tower basins CS-16 Cooling tower storage	
	Building E Solvent Storage Shed	CS-2 Bldg E solvent storage	
	Building G Garage Area	P Bldg G spills	2-Bldg G
	Monitoring Well 34-1	MI-13 Monitoring well 34-1	
Miscellaneous Sites, Operable Unit 3 (Closed [DOE 1993c] and site reassigned):			
	Farm Trash Area	LF-5 South property dump	
	Underground Sewage Lines	SD-10 Underground sewer lines	
	Paint Shop Area	N Paint shop spills	2-Paint shop
	Powerhouse Area	O Powerhouse spills	2-Powerhouse
	Area C, Waste Storage Area	MI-6 Lithium carbonate disposal	1-Area C
	Building 61, Former Equipment Area	Q Bldg 61 spills	2-Bldg 61
	Oil Burn Structure	MI-3 Oil burn structure	
	Fire-Fighting Training Facility Pit	MI-5 Fire fighter training	
	Area I, Buildings 1, 27 Leach Pits	SI-4 Bldg 1 leach pit SI-5 Bldg 27 leach pit	I-Area I
	Building 27 Sump Area	SU-3 Bldg 27 sump	
	Building 27 Concrete Flume	MI-14 Bldg 27 flume	
	Building 27 Solvent Storage Area	CS-12 Bldg 27 solvent storage	
	Glass Melter Room Sump	SU-1 Glass melter room sump	
	WD Building Drum Staging Area	CS-18 WD Bldg drum area	
	Area H, Pyrotechnic Waste Disposal	OB-8 Pyrotechnic waste disposal	1-Area H
	Pyrotechnic Waste Shed	OB-5 Pyrotechnic waste shed	
	Thermal Treatment Unit Area	OB-2 Thermal treatment unit	
	Trash Burner Area	OB-1 Trash burner	
	Waste Oil Drumfield Area	CS-6 Waste oil drumfield	
	Old Firing Range Drum Storage Site	CS-10 Old firing range storage	
	Building 34 Aviation Fuel Tank	UT-2 Aviation fuel tank	
	Building 51 Waste Solvent Tank	UT-1 Waste solvent tank IN-3 Waste solvent incinerator AP-10 Waste solvent incinerator scrubber	

Table A.1. Comprehensive Tabulation of Potential Release Sites

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
99	Area 6, WD Building Filter-Cleaning Waste	D-8	Historical	Polonium-210, Cobalt-60, Radium-226	1, 4, 5, 6, 18	Suspected	S	4	2, 14	Table B.1 (Table III.4 in Ref. 6)	6
100	Area F, Chromium Trench	D-8	Historical	Chromium plating bath solution treated with sodium bisulfide, cadmium, nickel, silver	1, 4, 5, 18	Suspected	S	4	1	SGS[b] Table B.4 Locations 1109, 1110	12
101	Cooling Tower Basins	E-7 E-8	In service	Sulfuric acid Chromates NALCO 2575 (phosphonate base, tolytriazole, polyacrylate, sodium chromate) NALCO 2532 (bistributyltin) oxide, n-alkylidimethylbenzyl ammonium chloride, potassium hydroxide) NALCO 2590 (calcium hypochlorite) ANCO CSA (phosphonate base, tolytriazole, polyacrylate) MICROBICIDE 77 (5-chloro-2 methyl-4-isothiazolin-3-one, 2-methyl-4-isothiazolin-3-one) ANCO ALGAECIDE No. 1 (2-benzyl-4-chlorophenol, sodium hydroxide) SILTEX (sodium polyacrylate) ANCOCIDE 4020 (glutaraldehyde) ANCOSPERSE 3830 (polyalkylene glycol, n-alkyldimethylbenzylammonium chloride) ANCOOL 3310 (phosphonate, triazole, sodium molybdate, sodium hydroxide)	4, 5, 18	Blowdown water is released to storm sewer and drainage ditch.		4	No Data		

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

<u>Reference List</u>

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

Document Control No. ______________

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

available. The site history for this area suggests that significant subsurface radioactive contamination may be present; the releases that occurred here were either the result of surface water runoff from Area 5 described below, or the overflow of the influent tanks discussed above.

3.4. AREA 5

Area 5 is located on the southern side of the Main Hill at Mound Plant, adjacent to Building 48 (Plate 1). Area 5 is the result of a December 1970 waste-line break that released polonium-210 waste liquids to the surrounding soils. A total of 39 30-gallon drums of soil, with an estimated polonium content of 20 μCi, were boxed and shipped offsite (Davis 1972). No cleanup levels are documented. The boundaries of Area 5 (Plate 1) are based on an interpretation of the site survey data made in the preparation of this report. The area did not appear on the results reported from the aerial survey conducted in 1976 (EG&G 1978). Soil contamination identified near Area 5 on the Building 48 Hillside is described in subsection 4.1.9.

The evaluation of the Site Survey Project data for this report does not agree with the evaluation presented in the original report (Table III.3). The differences lie in the reporting of the cesium-137 concentrations detected by gamma spectroscopy. The laboratory results (gamma-spectroscopy printout in Appendix E) give the cesium-137 concentrations for the corresponding Area 5 samples as <LDL, which means that the results were less than the LDL of 0.5 pCi/g. The original report (Stought et al. 1988) indicated that these samples had between 0.1 and 0.99 pCi/g of cesium-137. Cesium-137 was detected nearby at 1.6 pCi/g in the sample collected from surface location 0373 (S0373 on Table III.3). The boundary of Area 5 (Plate 1) is drawn to include S0373.

The maximum cobalt-60 concentration found in Area 5, 250 pCi/g, was detected in the sample collected from core location 0064 at a depth of 108 inches (C0064 on Table III.3). All other detected concentrations were less than 40 pCi/g. Measurable concentrations of cobalt-60 were found as deep as 234 inches (Table III.3). Mound Plant drawing #FSE16472 (DOE 1992f) indicates the depth to bedrock in this area ranges from 16 to 22 ft. The boring logs are not available, so it is not known if the Area 5 core locations were sampled to bedrock.

➡

3.5. AREA 6

Area 6 is the location of a trench used for the disposal of approximately three drums of polonium-210-contaminated sand. It is located in what is now a parking lot on the northeast side of the Main Hill, near Buildings 45 and 60 (Plate 1). The location and extent of Area 6, shown on Plate 1, are estimates. In 1964, at least three 55-gallon drums of polonium-contaminated sand were placed in this area. The sand was contaminated during cleaning (sand-blasting) of the metal framework of the WD Building sand filters. The sand was originally contained in drums that were placed in Area 6, in a 100-ft by 40-ft trench. The trench may also contain a polonium-contaminated washing machine. Polonium has a half-life of 138.4 days, and is no longer present due to radioactive decay.

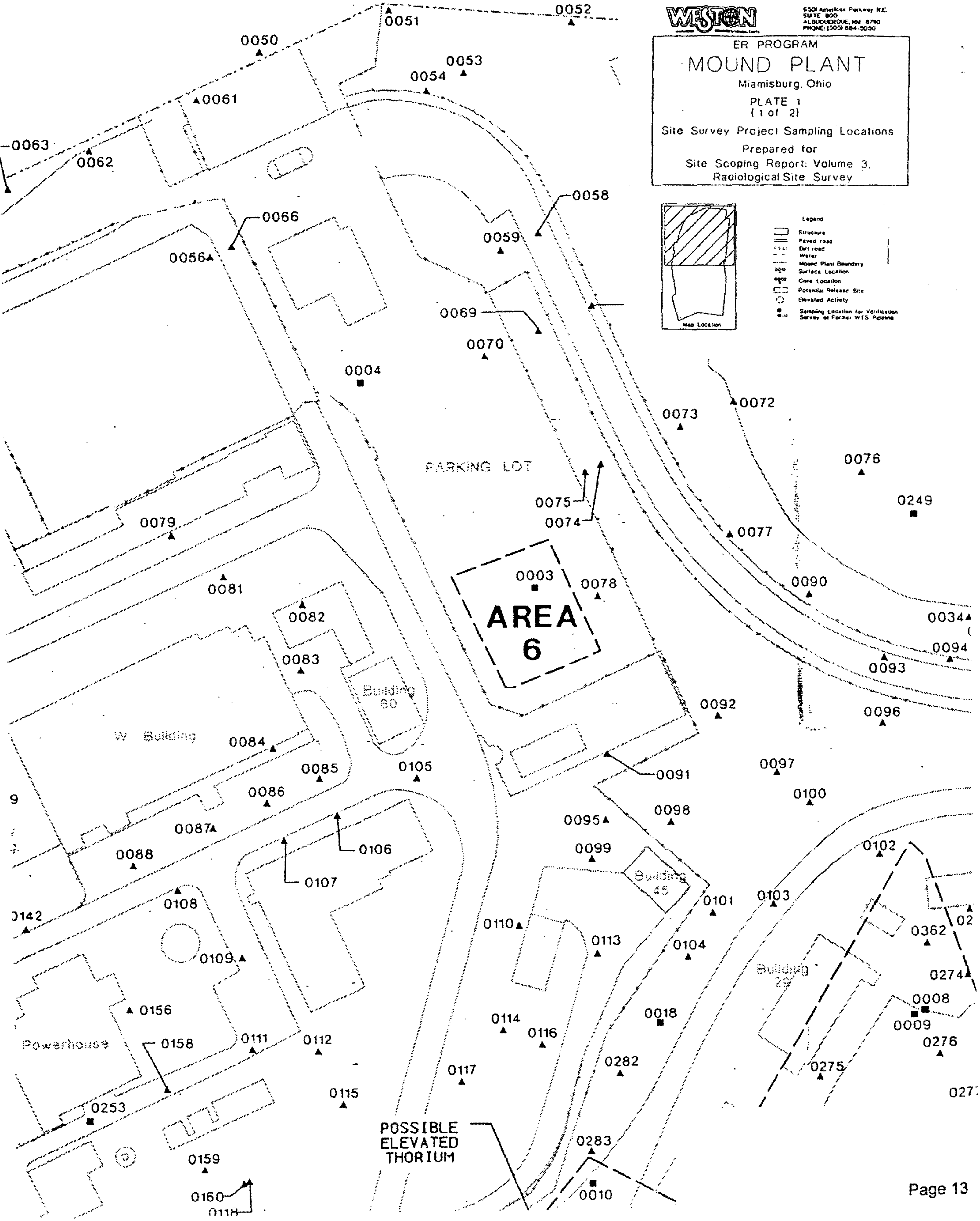
No surface soil samples were collected during the Site Survey Project, and only one core location was sampled in Area 6, location C0003 (Plate 1; Table III.4). No results were given for plutonium-238 or thorium for the samples collected from this core location. Gamma spectroscopy results were given, with radium-226 being the only radionuclide detected above the LDLs and with all measurements below 1 pCi/g.

Area 6 may have been covered with up to 30 ft of fill when the parking lot was built. The core location sampled during the Site Survey Project was only sampled to 180 inches, or 15 ft. Because the boring log for location 0003 is not available, it is not known if drilling was stopped because bedrock was reached or if any signs of the original trench were observed during the sampling. The location of the buried drums may be indicated by the magnetic anomaly depicted in the Preliminary Results of Reconnaissance Magnetic Survey (DOE 1990).

3.6 AREA 7

Area 7 is a large area located in the upper valley at Mound Plant, in the area of Buildings 29, 51, 66, and 98 (Plate 1). This area was once a steep ravine (part of the plant drainage ditch) that has a long history of debris disposal and infilling, including the disposal of approximately 2,500 empty thorium drums (1955-1966) some of which may have been removed and placed in Area 2; a polonium-contaminated washing machine (date unknown); a thorium-contaminated flat bed truck (mid-1960s); and soil containing actinium-227, radium-226, and thorium-228 from the SW Building, which was placed in an old septic tank behind Building 29. When a parking lot was built in this area, up to 40 ft of fill was used to level the ravine, except where the septic tank was located. The extent of Area 7 shown on Plate 1 is based on an interpretation of the site survey data made in the preparation of this report, and is similar to the area depicted in the original Site Survey Project Report. In the mid-1960s, materials contaminated with polonium-210 were also buried on the side of the ravine (Figure 3.1). An exhaust system from the remodeling of T Building and a large stainless steel washing machine were among the items. Smaller items contaminated with polonium-210 may also have been buried (Garner 1991). Additional discussions of Area 7 are provided in subsections 5.5 and 7.2.

The samples from Area 7 were analyzed mainly for plutonium-238 and thorium. The maximum plutonium-238 concentration detected was 7.40 pCi/g in the surface sample from location S0286 (Table III.5). The maximum total thorium concentration detected, 20.52 pCi/g, was found in the surface sample collected from location S0298 (Table III.5). Other radionuclides detected in Area 7 included radium-226, cesium-137, and tritium. Maximum concentrations detected were 2 pCi/g, 1.2


WESTON
ER PROGRAM
MOUND PLANT
Miamisburg, Ohio
PLATE 1
(1 of 2)
Site Survey Project Sampling Locations
Prepared for
Site Scoping Report: Volume 3,
Radiological Site Survey
Legend
Structure
Paved road
Dirt road
Water
Mound Plant Boundary
Surface Location
Core Location
Potential Release Site
Elevated Activity
Sampling Location for Verification Survey of Former WTS Pipeline
Map Location
PARKING LOT
AREA 6
Building 60
W Building
Building 45
Building 29
Powerhouse
POSSIBLE ELEVATED THORIUM
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0010

Map Location[a]	Coordinates South	West	MRC ID No.	Mo-Yr	Depth (inch)	Pu-238 (pCi/g)	Thorium[b] (pCi/g)	Tritium (pCi/mL)	Co-60 (pCi/g)	Cs-137 (pCi/g)	Ra-226 (pCi/g)	Am-241 (pCi/g)
S0073	1350	2010	3031	10-83	0	0.57	b	1.66				
S0074	1350	2085	6440	08-84	0	0.48	b					
S0075	1350	2100	3032	10-83	0	0.40	b					
C0003	1420	2180	10665	10-85	18	NR	NR		LDL	LDL	0.4	LDL
			10666	10-85	36	NR	NR		LDL	LDL	0.6	LDL
			10667	10-85	54	NR	NR		LDL	LDL	0.7	LDL
			10668	10-85	72	NR	NR		LDL	LDL	0.7	LDL
			10669	10-85	90	NR	NR		LDL	LDL	0.8	LDL
			10670	10-85	108	NR	NR		LDL	LDL	0.9	LDL
			10671	10-85	126	NR	NR		LDL	LDL	0.7	LDL
			10672	10-85	144	NR	NR		LDL	LDL	0.5	LDL
			10673	10-85	162	NR	NR		LDL	LDL	0.4	LDL
			10674	10-85	180	NR	NR		LDL	LDL	0.5	LDL
S0076	1450	1885	3027	10-83	0	2.57[c]	b	1.31				
S0077	1450	2010	3028	10-83	0	0.76	b					
S0078	1450	2135	3029	10-83	0	1.59	b	1.54				
C0004	1200	2240	8342	11-84	36	0.10	4.47					
			8343	11-84	72	0.01	2.49					
S0079	1250	2440	3039	10-83	0	0.03	b	1.32				
S0080	1250	2615	3040	10-83	0	1.19	b					
S0081	1300	2415	6135	08-84	0	0.10	b					
S0082	1350	2365	3038	10-83	0	0.04	b					
S0083	1400	2390	3043	10-83	0	1.14	b					
S0084	1450	2440	6136	08-84	0	0.08	b					

Table III.4. Mound Site Survey Project - Area 6

Plate 1 Location[a]	Coordinates South	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)
C0003	1420	2180	10665	10-85	18	NR	NR		LDL	LDL	0.4	LDL
			10666	10-85	36	NR	NR		LDL	LDL	0.6	LDL
			10667	10-85	54	NR	NR		LDL	LDL	0.7	LDL
			10668	10-85	72	NR	NR		LDL	LDL	0.7	LDL
			10669	10-85	90	NR	NR		LDL	LDL	0.8	LDL
			10670	10-85	108	NR	NR		LDL	LDL	0.9	LDL
			10671	10-85	126	NR	NR		LDL	LDL	0.7	LDL
			10672	10-85	144	NR	NR		LDL	LDL	0.5	LDL
			10673	10-85	162	NR	NR		LDL	LDL	0.4	LDL
			10674	10-85	180	NR	NR		LDL	LDL	0.5	LDL

[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

DEC

ENVIRONMENTAL RESTORATION PROGRAM

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

MOUND PLANT
MIAMISBURG, OHIO

July 1992

DEPARTMENT OF ENERGY
ALBUQUERQUE FIELD OFFICE

ENVIRONMENTAL RESTORATION PROGRAM
TECHNICAL SUPPORT OFFICE
LOS ALAMOS NATIONAL LABORATORY

DRAFT FINAL
(REVISION 0)

rinses and the deionized water spray rinses, was disposed of in the sanitary sewer system. In 1989, the process of disposing of the sodium hydroxide and potassium permanganate solution in the sanitary sewer system was stopped. These solutions are now drummed and picked up by Mound waste management personnel. Currently, only the cascade rinse water drains to the small sump. The old tank is thought to still be connected to the sanitary sewer system as is the new sump. The old tank served as the sampling station for NPDES Outfall 001. The new sump in the production plating shop is currently sampled for that requirement.

Concrete containment pits with curbs are located under the plating shop process equipment to contain any spills or leaks. The pits are segregated so that acid materials do not mix with basic materials. Any material that collects in the pits is removed by pumping it into drums for disposal by Mound waste management. Floor drains within the building are connected to the sanitary sewer system. Administrative and physical controls prevent plating wastes from being disposed of in these drains (Johnson 1991).

When the original plating shop was dismantled in 1962, the plating solutions were neutralized and the solutes precipitated. The resulting wastes included sludges and a supernatant liquid. The liquid was released to the sanitary sewer through the old tank. The sludges were drummed in two 55-gallon steel drums and buried in the small parking lot on the northeast corner of the Main Hill. The old tanks were also buried at this location, as part of the expansion of the parking lot. This burial site is now known as Area F (DOE 1992g).

3.2.3. Vapor Degreaser

The vapor degreaser is in the plating shop in the M Building on the Main Hill (Figure 3.1). Small machined metal parts are cleaned by solvent vapors produced in the chamber of the degreaser. The fully enclosed metal chamber is approximately 3 ft long, 2 ft wide, and 4 ft deep and has a 15-gallon solvent capacity. The wastes produced in this unit are spent solvents. Spent solvents and vapors are retained in the degreaser cleaning chamber. The solvent used in the vapor degreaser is Perclene D. The unit began operating in the late 1970s and is still in use. Spent solvent is transferred to drums and transported to the hazardous waste storage area in Building 72.

3.3. MAINTENANCE SHOP

The Building G garage is used to maintain the automobiles, trucks, buses, and heavy-duty equipment used at Mound (Figure 3.1). The building is approximately 122 ft by 62 ft and is made of structural steel and brick with concrete floors. It has concrete floors and is located in the northwest corner of also supported by the interpretation of historic aerial photographs, which indicate that the historic landfill may have occupied areas presently under the paved roads (DOE 1991f).

Area 2 was investigated for radiological contamination during the Site Survey Project (DOE 1991b). The maximum concentration of plutonium-238 was 17.1 pCi/g in a sample taken at a depth of 18 inches. The maximum thorium concentration detected was 3.31 pCi/g at a depth of 108 inches. Neither of the two boreholes in the area appear to have been located to exactly penetrate the thorium drums (DOE 1991b).

6.1.1.2. Area 6, Polonium-Contaminated Waste (Historical)

Area 6 is southeast of the GH Building on the Main Hill, in the northern portion of Mound (DOE 1991b) (Figure 6.1). The area is currently a parking lot and may overlap Area F, the chromium trench. In 1964, at least three 55-gallon drums of polonium-contaminated sand were placed in this area. The sand was contaminated during cleaning (sandblasting) of the metal framework of the WD Building sand filters. The sand was originally contained in drums that were placed in Area 6, in a 100-ft by 40-ft trench. The trench was covered with up to 30 ft of clean fill dirt before the parking lot was built. The trench may also contain a polonium-contaminated washing machine (Thomas 1991). Polonium has a half-life of 138.4 days and is no longer present due to radioactive decay. The 1982 to 1985 Radiological Site Survey (DOE 1991c) detected low levels of radium-226 (all below 1 pCi/g) in soil samples at various depths.

6.1.1.3. Area 7, Thorium, Polonium, and Actinium Wastes (Historical)

Area 7 is in the northeast portion of Mound, southwest of the asphalt-lined pond (Figure 6.1). The area encompasses about 140,000 ft^2 and is currently covered by a paved parking lot constructed in 1984. Buildings 51, 66, and 98 are also located over the area, which originally formed the upper reach of the plant drainage ditch. Many years of debris disposal and infilling have buried the original ravine (DOE 1992c).

Area 7 has been the site of extended disposal of residual materials including thorium, polonium-210, and some actinium-227. The thorium repackaging operations that extended from the mid-1950s to the mid-1960s generated between 15,000 and 20,000 steel drums. It is estimated that between 10,000 and 15,000 of these drums were crushed and buried along the western part of the original ravine. The remainder are probably buried in Area 2. This disposal tended to create usable land along this part of the ravine. In the Site Scoping Report: Volume 3 - Radiological Survey Report (DOE 1991c), it was reported that 2,500 drums were buried in Area 7, but that number fails to account for of the landfill is within design specifications; however, the east slope is more gradual than specified because of the extra fill placed there. The height of the landfill was surveyed and checked for settling a year or two after construction; although no known written report exists, a verbal report suggests little or no settling occurred (DOE 1992g). During the 1982 to 1985 Radiological Site Survey (DOE 1991c), the maximum plutonium-238 concentration found in the core samples taken at the site sanitary landfill was 3.71 pCi/g at a sample depth of 126 inches. The maximum plutonium-238 concentration measured in the surface samples was 0.98 pCi/g. No thorium concentrations above 2 pCi/g were detected in any of the Area 18 samples (core or surface).

6.3.3. Area F, Chromium Trench (Historical)

The chromium trench is beneath an asphalt parking lot on the Main Hill, just south of the GH Building in Area F (Figure 6.1). Area 6 is within Area F's boundaries. In 1963, approximately 110 gallons of chromium plating bath solution treated with sodium bisulfite were disposed of in a trench in this area. These wastes were deposited onto the ground surface in the trench with no apparent release controls. The disposal actions occurred only in 1963 when the old plating lab was replaced by a new facility. No formal closure was undertaken.

There is a low to moderate potential for the contamination from the chromium plating bath solution disposal particles to reach the underlying groundwater. No release controls were used, but the area is capped with asphalt. The amount of chromium placed in Area F was substantially below the 24-hour reportable quantity of 1,000 pounds. It is thought that the small amount of residual chromium would not likely pose a health hazard (DOE 1992g).

6.3.4. Summary of Hazardous and Mixed Waste Disposal

Hazardous and mixed wastes are generated by the production, research, and development activities at Mound. Few waste generation records exist for the period preceding the waste management program that began in the 1970s. Records for the justification for the waste incinerator indicate that approximately 250 gallons of waste oils and solvents were generated each week in the early 1970s (Ashby 1973). In 1969, a total of 12,449 gallons of liquid waste oils and solvents were destroyed (Hebb 1970b). Beginning in July 1970, chemical wastes were collected and disposed of off-plant by private contractors, including Industrial Waste Disposal, Inc., of Dayton, Ohio, and Industrial Waste Disposal Liquid Waste, Inc., of Tremont City, Ohio (Storey 1970). The chemical wastes were disposed of in Ohio, Kentucky, or Michigan. From 1971 through 1973, some liquid chemical wastes were disposed of by burning in the waste incinerator. Although several test burns were conducted (Russell 1971; Werner 1972a), it is not known how much of the accumulated wastes were actually treated in

ENVIRONMENTAL RESTORATION PROGRAM

OPERABLE UNIT 2
TECHNICAL MEMORANDUM #1
PREINVESTIGATION EVALUATION OF REMEDIAL ACTION TECHNOLOGIES (PERAT)

MOUND PLANT
MIAMISBURG, OHIO

August 1991

DEPARTMENT OF ENERGY
ALBUQUERQUE OPERATIONS OFFICE

ENVIRONMENTAL RESTORATION PROGRAM
TECHNICAL SUPPORT OFFICE
LOS ALAMOS NATIONAL LABORATORY

DRAFT
(REVISION 0)

Table ES.1. Known Contaminants at Operable Unit 2 Type I Release Sites

Release Site	Known Contaminants	
Seeps	Radionuclides:	Tritium and uranium-233
	VOCS:	Trichloroethene Tetrachloroethene Methylene chloride 1,1,1-Trichloroethane 1,2-*trans*-Dichloroethene Trichloromethane Toluene Acetone Chloroform Bromoform
	Inorganics:	Nitrate Sulfate Chloride
Contaminated soil below the SW Building	Radionuclides:	Tritium and uranium-233
	VOCs:	Trichloroethene Tetrachloroethane 1,2-*trans*-Dichloroethene Methylene chloride
	Inorganics:	Nitrate Sulfate Chloride
Monitoring well 0034	VOCs:	Methylene chloride
E Building solvent storage shed	VOCs:	Trichloroethene Ethanol Methanol
G Building garage area	VOCs:	Gasoline constituents
Cooling tower basins and drum storage area	Water Treatment Additives:	Rust inhibitors Organics Algicides
Area F, chromium trench	Metals:	Chromium
Area 6, WD Building filter cleaning waste	Radionuclides:	Polonium-210 Plutonium-238 Cesium-137
Area 15, crane tracks, and shielding from old SW Cave	Radionuclides:	Radon-222 and parent and daughter isotopes Thorium-232 and actinium-227

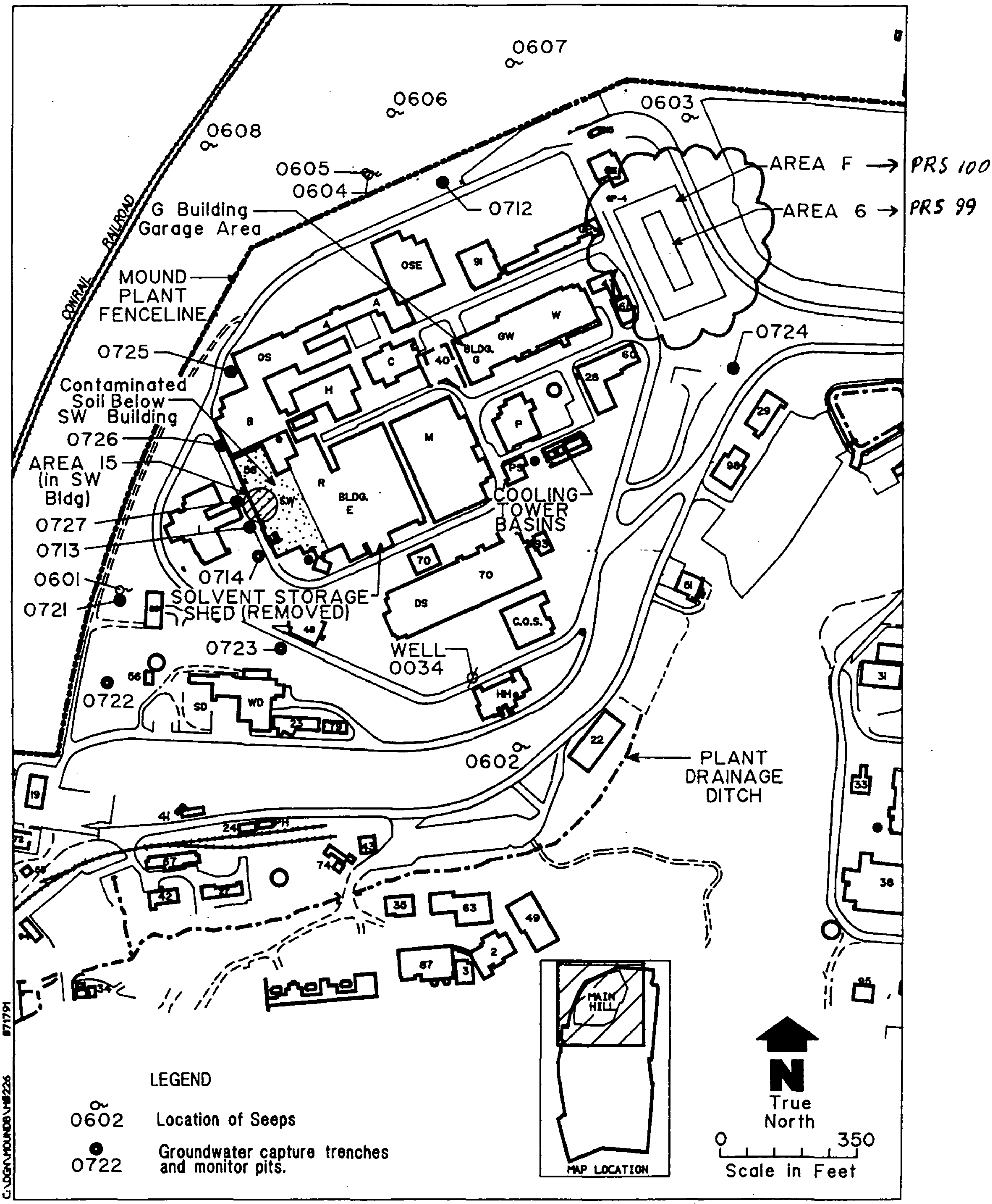


Figure 2.1. Type 1 potential release sites, Operable Unit 2.

- potential location-specific ARARs and TBC federal requirements,
- potential location-specific ARARs and TBC state of Ohio requirements, and
- discussion of action-specific ARARs and TBCs.

Contaminants in groundwater that exceed the primary drinking water standards are tritium, trichloroethene, tetrachloroethane, methylene chloride, and nitrate. Uranium-233 concentrations in groundwater near the SW Building and in seep 0601 exceed the minimum range of the proposed drinking water standard for uranium.

Inorganic constituents that exceed secondary drinking water standards in groundwater include sulfate and chloride.

2.2. GENERIC CONCEPTUAL SITE MODEL

Figure 2.2 shows the generic conceptual site model for Operable Unit 2. The suspected release sites included in this operable unit contain surface soil and near-surface soil contaminated with radioactive and chemical contaminants. The primary sources of radioactive contamination presented in the conceptual model result from the leaching of radioactive contaminated soils present beneath the SW Building. Contaminated soil beneath the SW Building is also a primary source for nonradioactive contaminants, including VOCs and the inorganic constituents nitrate, sulfates, and chlorides. Undocumented releases by leaks from waste lines and process lines are suspected sources for radioactive and nonradioactive contaminants. Radioactive contaminants are also entombed in concrete in a sealed room in the SW Building. Storage areas, including the E Building solvent storage shed (recently demolished), the G Building garage area, and the cooling tower basin and drum storage area, are also potential primary sources of contamination. Waste disposal trenches that are potential release sites are the Area F, chromium trench; and Area 6, WD Building filter cleaning waste disposal area. Monitoring Well 0034 is a potential release site due to a suspected one time disposal of waste oil into the well.

The release mechanisms from the primary sources described above have in most instances lead to a secondary source of contaminated soils. The primary release mechanism for the entombed radionuclides is radon gas. The secondary release mechanisms include volatile emissions, dust, infiltration, percolation, and storm water runoff. The pathways of concern in Operable Unit 2 include transport of contaminants or contaminated soils by groundwater, surface water, and wind. Potential receptors include aquatic and terrestrial biota, area residents, site visitors, and site employees.

- Siltex, Andersen Chemical Company;
- ANCO Microbicide 77, Andersen Chemical Company (EPA Registration);
- 5-chloro-2-methyl-4-isothiazolin-3-one;
- 2-methyl-4-isothiazolin-3-one;
- cooling water treatment - CSA, Andersen Chemical Company; and
- organo-phosphate, triazonl, polyacrylate.

Several inches of freeboard were observed during the visual site inspection of the cooling tower basins (Kearney 1988). No stains were observed on the side of the basins or on the surrounding surface.

The cooling tower drum storage area is adjacent to the cooling towers. The storage area consists of an asphalt pad that slopes to the south. The storage area is used to store 55-gallon drums containing waste oil and ethylene glycol. There were 15 drums present in the area during the visual site inspection (Kearney 1988). All drums were closed-topped, but there was visual evidence of leakage from one of the drums. There are no documented releases from the cooling tower basins or the cooling tower drum storage area.

PRS 100

3.1.7. Area F, Chromium Trench

The Area F chromium trench is located on the Main Hill; the trench is currently beneath an asphalt parking lot just south of the GH Building (Figure 2.1). The trench was used only in 1963. Area F includes Area 6 within its boundaries (subsection 3.1.8). In 1963, approximately 110 gallons of chromium plating bath solution were treated with sodium bisulfite, resulting in reduction, and disposed of in a trench at Area F (DOE 1986). Data are not available on the amount of residual chromium that may exist in the trench or if it is an environmental hazard.

PRS 99

3.1.8. Area 6, WD Building Filter-Cleaning Waste

This site is located on the Main Hill, in the parking lot south of the guard island (Figure 2.1). Area 6, which is a trench with dimensions of approximately 100 ft by 40 ft (4,000 ft^2), is located near the center of Area F. Area 6 was covered with fill dirt (up to 30 ft) before the parking lot was built.

In 1964, three 55-gallon drums of polonium-210-contaminated sand were placed in this area. The sand resulted from the cleaning (sandblasting) of the metal framework of the WD Building sand filters. The sand was originally contained in drums that were crushed and placed in the disposal area/trench.

The area was then covered with clean backfill. Because of its short half-life (138.4 days), the polonium-210 is no longer present due to radioactive decay. There is concern that the polonium-210-contaminated sand may also have been contaminated with cesium-137. According to Mound Plant personnel, Area 6 also contains a plutonium-contaminated washing machine and a chromium trench that was used for the disposal of chromium plating solution (Area F, section 3.1.7). The Mound Site Survey Project analyzed surface and core soil samples that were collected from Area 6. No radioactive constituents were identified (DOE 1991c).

3.1.9. Area 15, Crane Tracks, and Shielding from the Old SW Cave

The old cave formally occupied a portion of the SW Building and is known as Area 15 (Figure 2.1). The old cave was used for hot cell work from 1958 to 1960 (DOE 1986). The SW Building had a 20-ft ceiling and contained several operations during this time period. The cave, approximately 1,000 ft^2, was entombed around 1961 when the equipment (overhead crane, crane tracks, and shielding) were collapsed and covered with approximately 12 inches of concrete. This process is known as in-place entombment (AEC 1974). A new room was later built on top of the concrete and is in use today. The area outside the SW Building, adjacent to the old cave area, has been covered by several feet of concrete. Remedial action will be performed in 1993 by the Mound Plant D&D Program.

Approximately 1 Ci of radon-222 (3.82-day half-life) is released per year from the old cave through a stack that is monitored by Mound Plant personnel. Radon-222 is the decay product of radium-226. Radon is the only known contaminant being released from Area 15. Other radionuclides thought to be present within the entombment are actinium-227 and thorium-228 (DOE 1986).

Due to the presence of tritium, uranium-233, VOCs, and nitrates, groundwater contamination at seep 0601, in the SW Building groundwater capture system, and in monitoring pits located west of the SW Building has been attributed to soils beneath the SW Building. However, no contaminants detected in the seeps, groundwater capture system, or monitoring pits can be attributed specifically to Area 15.

Soil samples collected under the SW Building by Dames and Moore (1977) showed tritium in soil moisture. No samples have been collected from the concrete of the cave entombment or the soils below the entombment. Although the release of radon confirms the presence of radioactive contaminants within the concrete, the entombment process is generally considered sufficient to prevent the migration of most contaminants (AEC 1974). Radon, a noble gas, has a greater mobility than any of the other radionuclides (actinium-227 and thorium-228) that were present when the room was entombed. Radon is able to move through the pores in the concrete. Historical records do not indicate that the old cave is the source for tritium in soils under the building, as tritium processing was

Environmental Restoration Program

CHROMIUM TRENCH REMOVAL SITE EVALUATION OPERABLE UNIT 2

MOUND PLANT
MIAMISBURG, OHIO

February 1995

DRAFT

(Revision 0)

Department of Energy
Ohio Field Office

Environmental Restoration Program
EG&G Mound Applied Technologies

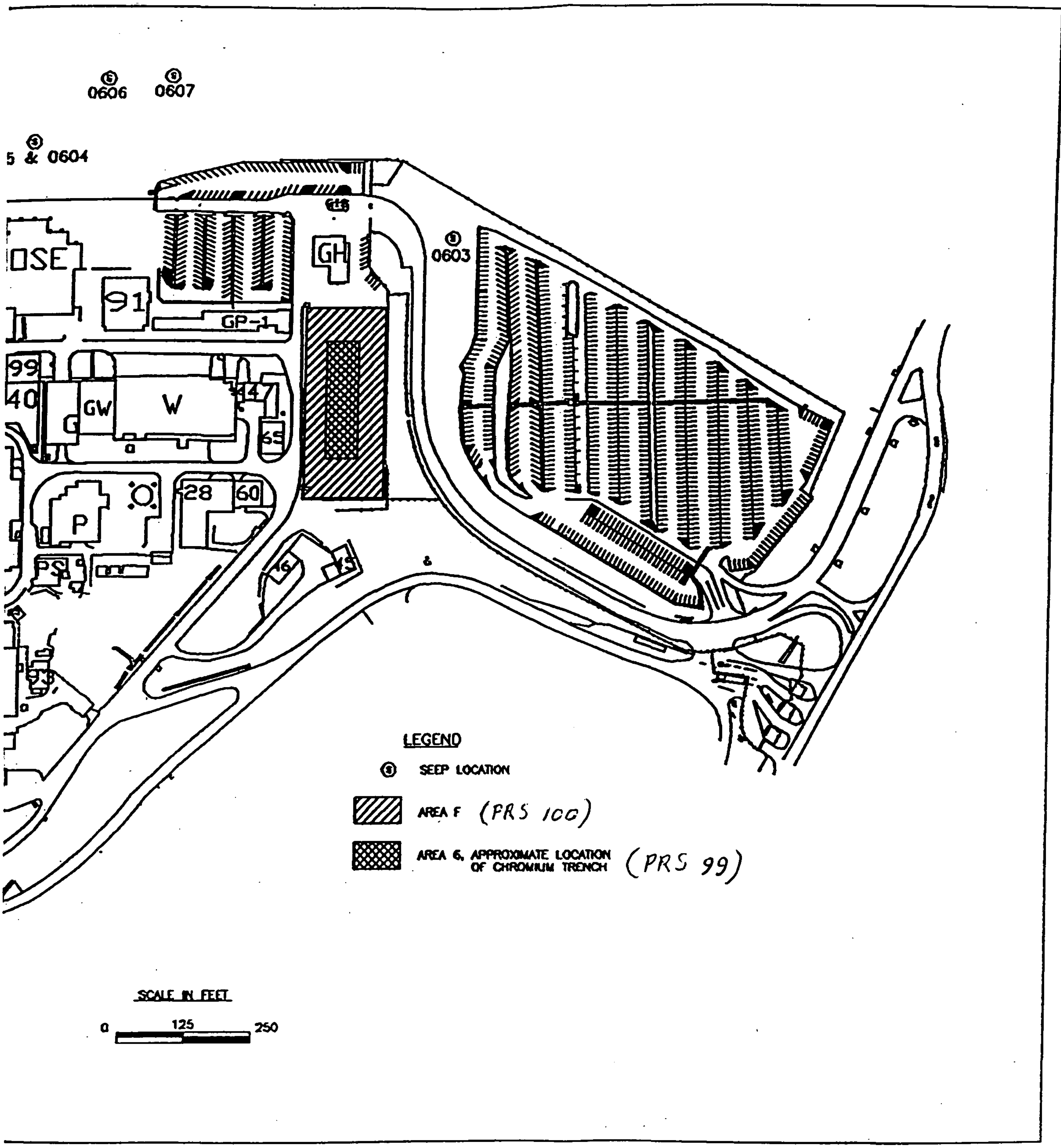


Figure 2.2. Location of Chromium Trench

EXECUTIVE SUMMARY

This Removal Site Evaluation was performed in accordance with the National Oil and Hazardous Substances Contingency Plan (NCP) 40 CFR Part 300 and has identified a potential threat to human health, welfare, and the environment from a hazardous substance as defined by the Mound Plant Federal Facilities Agreement (FFA) (Docket No. OH 890:008 984), in subsurface soils and groundwater. The area of concern is located on the Main Hill at Mound Plant.

Past investigations at Mound Plant have identified the presence of a trench under the GH Building parking lot on the Main Hill. This trench, known as the chromium trench, has previously been identified as having received chromium waste. Historical use of the trench indicates that this chromium waste could potentially contribute to soil and groundwater contamination. The purpose of this RSE is to evaluate the need for additional action related to the trench. The RSE includes: an evaluation of the potential of the trench to contaminate the surrounding environment, the potential risk involved with the contamination, and the feasibility of performing a remediation, if needed. This RSE was performed using existing data.

The parking lot south of the GH Building is referred to as Area F, and the trench within Area F is referred to as Area 6. In 1963, 110 gallons of chromium plating bath solution treated with sodium bisulfide were disposed of in a trench in Area 6. In 1964 three 55 gallon drums of polonium-210 contaminated sand were also placed in or around the chromium trench. The sand was contained in drums that were crushed prior to being disposed of in the trench area. The sand may have also been contaminated with cobalt-60 and cesium-137.

Current information fails to accurately pinpoint the exact location of the trench. A magnetic survey of the trench area located an anomaly, which may be the trench. Its size suggests that a much larger magnetic source is in the trench than would be expected from only chromium plating solutions, drums of contaminated sand, and a washing machine.

Currently there is little information on effects the chromium trench has had on the environment. Limited investigations do show that the GH Building parking lot subsurface soils contain areas with ferrous materials, and contamination in the upper 5 feet from volatile organic compounds (VOCs).

To determine the need for a removal action, eight factors were considered, and it was determined that a removal action was appropriate for the soils in and around the chromium trench. However, the amount of data fails to provide enough information to perform an accurate action memorandum.

Therefore, additional sampling is proposed for the GH Building parking lot. Based on the results of the sampling, an accurate evaluation of remedial alternatives can be made.

2. BACKGROUND

Mound Plant is a 306-acre site on the border of the city of Miamisburg in Montgomery County, Ohio (Figure 2.1). The site is approximately 10 miles south-southwest of Dayton and 45 miles north of Cincinnati. The chromium trench is one of 325 potential release sites identified at Mound Plant (DOE 1993a), and is located on the eastern end of the Main Hill (Operable Unit 2). The trench is bordered by the GH Building to the north, the lower parking lot to the east, building 45 to the south, and buildings 47 and 65 to the west (Figure 2.2).

The Main Hill of Mound Plant site is underlain by shale and thinly bedded limestone bedrock. Water within the shale is thought to be transmitted along fractures until deflected laterally at the intersections of competent shale beds unaffected by fracturing. This water then emerges at the surface along hillsides, as seeps. The seeps are believed to be associated with the perched groundwater in the bedrock.

There are eight groundwater seeps around the Main Hill at Mound Plant. Seep 0603 is located nearest the chromium trench. Seep 0603 is located northeast of the suspected location of the chromium trench and is at an elevation of 843.0' msl. The chromium trench is believed to be at an elevation of approximately 850.0' msl. Although seep 0603 is at the correct elevation to be influenced by the chromium trench, groundwater potentially impacted by the chromium trench most likely flows to the south-east based on bedrock topography in the area. No known seep lies downgradient of the chromium trench.

As noted above, the apparent competent bedrock surface in the area of the chromium trench dips to the southeast (DOE 1994a), and groundwater flow near the chromium trench is believed to be to the southeast. There are no near-by monitoring wells downgradient of the chromium trench to assess if groundwater has been impacted by the trench. Although chromium has been detected in both groundwater and production wells at the site, (2880 ppb at monitoring well 0305, 6.2 ppb at production well 0071 DOE,1993b), it is unknown if the contamination in these wells is due to the chromium trench or other on-site sources. Both these wells are located at the southwest end of Mound Plant, and are probably unrelated to the chromium trench.

The trench area was not covered for approximately one to two years during 1963 and 1964. This was the operational period of the trench, and construction period of the parking lot. Since 1964 the trench area has been covered with the asphalt parking lot. Because the area of the chromium trench is now covered, infiltration from precipitation is reduced. It is not known if the trench was constructed in the bedrock or overlying soils. The trench depth is also unknown.

Topographic maps indicate that there may be as little as 15 feet of fill covering the trench. This was determined by comparing pre-Mound topographic maps with current topographic maps, and using the information from the magnetic survey to approximate the location of the trench. If true, this depth contradicts other information that the trench is 30 feet below ground surface (DOE 1992a).

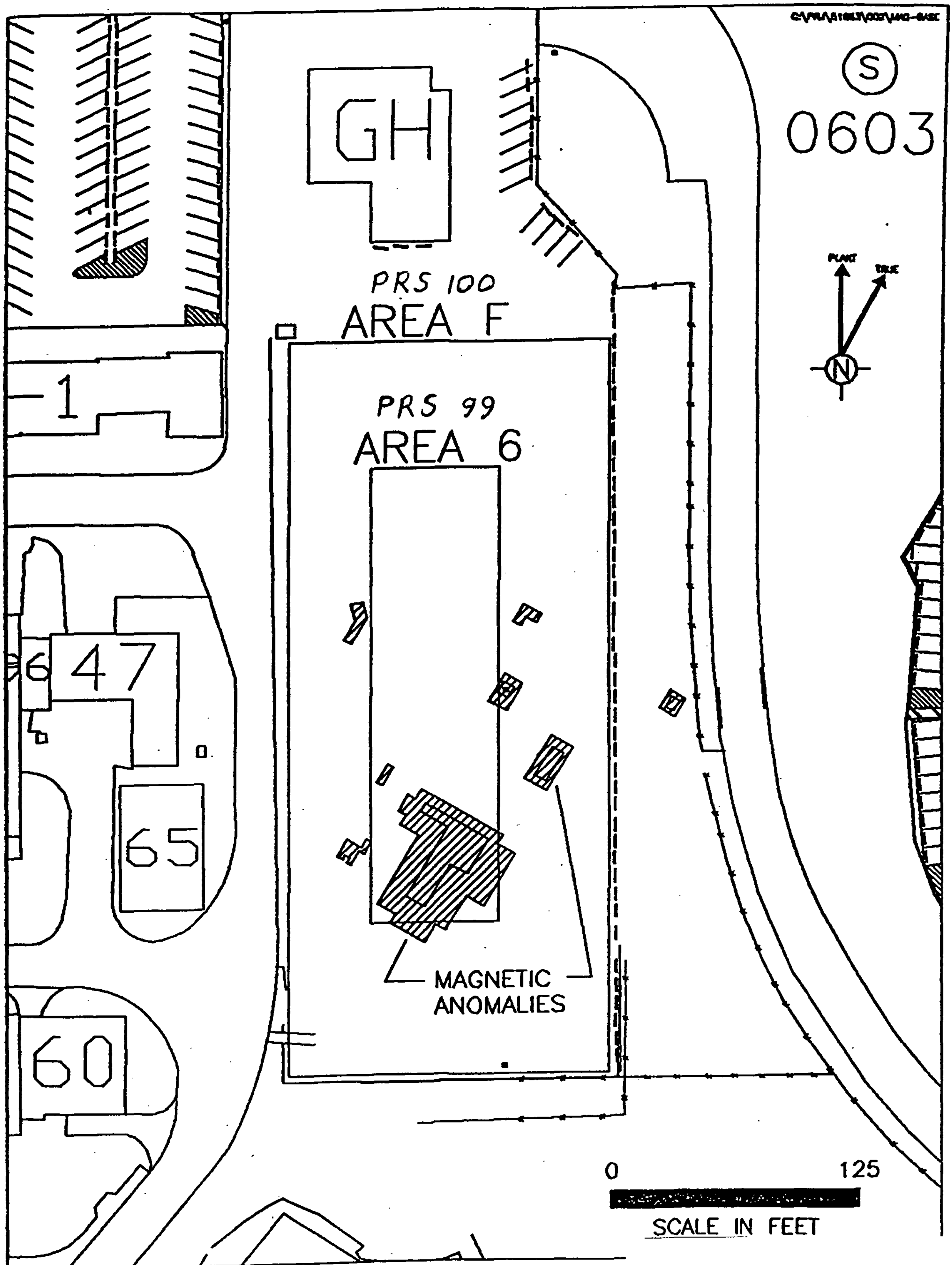


Figure 3.1. Interpretive Map of Magnetic Anom

3. SOURCE AND NATURE OF THE RELEASE

3.1. HISTORY

The parking lot south of GH Building is also referred to as Area F (DOE 1992a) and the chromium trench within Area F is referred to as Area 6. The chromium trench has been reported to be approximately 100 feet by 40 feet, and located near the center of Area F. Area 6 was filled with fill dirt (up to 30 feet) before the parking lot was built.

In 1963 approximately 110 gallons of chromium plating bath solution were treated with sodium bisulfide, resulting in a chemical reduction. The treated solution was disposed of in a trench at Area 6. It is unknown if the chromium solution was placed in the trench while still in drums or if it was poured from the drums into the trench. The amount of chromium supposedly placed in Area F was substantially below the 24 hour reportable quantity of 1000 pounds of chromium (DOE 1992a). The trench was reportedly only used in 1963.

In 1964, three 55 gallon drums of polonium-210 contaminated sand were placed in this area. The sand was the waste product from sand blasting of the metal framework of the WD Building sand filters. The sand was originally contained in drums which were then crushed and placed in the disposal area/trench. The area was then covered with clean backfill. Because of its short half life of 138.4 days, the polonium-210 should no longer be present due to radioactive decay. There is a concern that the polonium-210 contaminated sand may also have been contaminated with cobalt-60 and cesium-137 (DOE 1993b).

3.2. EXISTING INFORMATION

During a magnetic survey of Area 6, (DOE 1990) one large and seven smaller anomalies were detected in the area (Figure 3.1). The largest anomaly is believed to be the chromium trench, located in the south-central portion of Area 6. Magnetometer surveys detect ferromagnetic materials (such as steel and iron) which have magnetic susceptibilities that are several orders of magnitude higher than magnetic susceptibilities of common earth materials. Reportedly, only three crushed 55 gallon drums, a washing machine, and the possibility of two additional drums with chromium solution are buried in the trench. The size of the largest anomaly suggest that a greater amount of ferrous material was placed in the trench than reported. The other anomalies may represent small groupings of drums, construction debris, or other ferrous materials that may be contributing to the overall impact of the chromium trench on the environment (DOE 1990).

The effect of the chromium trench on local soils is unknown at this time. Because the chromium trench is reportedly under 30 feet of clean fill, it has not been thoroughly investigated. Soil gas samples taken in the GH Building parking lot indicate volatile organic compounds (VOC) contamination in the upper 5.0

feet. Trichloroethene and toluene were the only contaminants detected as shown in Table III.1. Trichloroethene was detected at 6 and 8 ppb, and toluene at 13 and 255 ppb. The fill may not have been clean or has been influenced since being placed in the area (DOE 1992c).

One soil boring has been drilled in the GH Building parking lot; it was sampled at 18 inch intervals for radiological isotopes. Only radium-226 was detected, and all of the detections were below 1 pCi/g as shown in Table III.2. Reportedly radium-226 was only disposed of on-site in the upper plant valley in and around an old septic tank, located approximately 500 feet south of the chromium trench area. The boring was terminated at 15 feet and it is unknown if bedrock or evidence of the trench were detected in the boring (DOE 1992b).

Storm and sanitary sewers in the area of the GH Building parking lot were video surveyed in the summer of 1994. Results showed storm sewers running north-south between building 65 and the chromium trench, just west and upgradient of the trench, are in poor condition and probably leaking storm water to the subsurface (DOE 1994b). The storm sewer line from storm sewer manhole 04 004 to storm drain 04 014 has several cracks and offset joints. This sewer line drains runoff from the parking west of GH Building and the eastern end of the roads located on the Main Hill. During a rain event, large quantities of runoff travel south in this sewer line, with probable impact on the subsurface.

Table III.1. Soil Gas Survey in the GH Building Parking Lot

Sample Number	Trichloroethene	Toluene
Sample 1108	6 ppb	ND
Sample 1109	8 ppb	13 ppb
Sample 1110	ND	225 ppb

ND = Not
ppb = parts per billion

Table III.2. Radiologic Survey in the GH Building Parking Lot

Depth in Inches	18	36	54	72	90	108	126	144	162	180
Radium-226 pCi/g	0.4	0.6	0.7	0.7	0.8	0.9	0.7	0.5	0.4	0.5

5. DETERMINATION OF THE NEED FOR REMOVAL ACTION

The NCP provides eight factors that shall be considered in determining the appropriateness of a removal action under 40 CFR 300.415(b)(2). These criteria, as applied to the contamination of groundwater and soil at the chromium trench are shown in Table V.1.

Table V.1. Removal Action Criteria

Criteria	Chromium Trench Conditions
(i) ... potential exposure to nearby human populations, animals,or the food chain from hazardous substances or pollutants or contaminants;	Contamination may exit the site via groundwater seeps and subsurface groundwater flow, providing potential for exposure to humans, animals, and the food chain.
(ii) ... actual or potential contamination of drinking water supplies or sensitive ecosystems;	There is a potential to contaminate drinking water supplies through migration of pollutants from the trench to the Buried Valley Aquifer.
(iii) ... Hazardous substances or pollutants or contaminants in drums, barrels,tanks,or other bulk storage containers, that may pose a threat of release.	Trench was excavated and used to hold chromium plating solution, crushed drums containing contaminated sand, and a contaminated washing machine.
(iv) ... High levels of hazardous substances or pollutants or contaminants in soil largely at or near the surface, that may migrate;	Unknown at this time, soil gas survey in 1992 indicated VOC contamination at a depth of 5.0 feet beneath the GH Building parking lot.
(v) ... Weather conditions that may cause substances or pollutants or contaminates to migrate or be released;	Asphalt parking lot inhibits rainfall infiltration, however subsurface utilities are damaged in the area and this may supply water which aids migration of contaminates.
(vi) ... Threat of fire or explosion;	No apparent threat.
(vii) ... The availability of other appropriate federal or state response mechanisms to respond to the release;	None identified.
(viii) ... Other situations or factors that may pose threats to public health or welfare or the environment;	The possibility of future construction activities that could expose the contents of the chromium trench to the environment.

Based on the above criteria, a removal action is appropriate for the soils in and around the chromium trench.

6. REMOVAL ACTION LIMITATIONS

If the chromium trench is at its reported depth of 30 feet, excavation to remediate the trench would prove very difficult. Shoring would be required as well as continuous monitoring for radiological isotopes. The excavation would require removing much larger quantities of soil to allow the excavation equipment to enter the excavation to remove soil at a depth of 30 feet. This would likely require removing fences and closing roadways. If, however, the trench is at a depth of 15 feet as indicated in Section 2, excavation could be the least disruptive of the remediation alternatives. It is also unknown if the backfill material was in fact clean, or was contaminated with radiological isotopes. By removing the asphalt parking lot and the fill materials covering the chromium trench, the potential for exposure to the contents of the trench is increased. Also the potential for contaminants to migrate off site or to become air-borne is increased.

Because of the lack of data, it is difficult to speculate on other possible remedial alternatives. It is unknown if there is mixed waste present and whether volatile organics, pesticides, poly chlorinated biphenyls, or other organic compounds are present. Remedial alternatives will vary depending on the contaminants present. Therefore, it is difficult to judge what limitations may be associated with the different remedial alternatives.

7. CONCLUSIONS

Current information fails to accurately pinpoint the exact location of the trench. Information gathered during a magnetic survey of Area 6 (chromium trench) located one large anomaly approximately 40x70 feet and seven other anomalies of smaller proportions in the area. Based on the reported size of the trench, the large anomaly may be the chromium trench. The magnetic survey suggest a much larger magnetic source in the chromium trench than would be expected from only the chromium plating solution, drums of contaminated sand, and a washing machine. In past investigations the chromium trench was reported to be covered with 30 feet of fill. Topographic maps indicate that there may be as little as 15 feet of fill covering the trench. The other magnetic anomalies in this area may vary in depth from a few feet to 30 feet under the present ground surface. At this time, the source of the smaller anomalies is unknown. It appears from their random locations in the subsurface area that they were disposed of at different times and depths during the construction of the GH Building parking lot.

There has only been a single attempt at drilling a soil boring in the area of the trench, this boring was terminated at 15 feet. Because the boring log is not available, it is unknown if drilling was stopped because bedrock was encountered or because signs of the original trench or its fill were observed during the sampling.

Although there is very little data to evaluate the need for a removal action, Section 5 indicates there is a potential for release of hazardous substances or contaminants to the environment. In addition, there is a potential for the chromium trench to contaminate a drinking water supply.

ENVIRONMENTAL RESTORATION PROGRAM

LETTER REPORT: PRELIMINARY RESULTS OF RECONNAISSANCE MAGNETIC SURVEY

MOUND PLANT

AREAS 2, 6, 7, AND C

November 1990

DEPARTMENT OF ENERGY

ALBUQUERQUE OPERATIONS OFFICE

ENVIRONMENTAL RESTORATION PROGRAM

TECHNICAL SUPPORT OFFICE

LOS ALAMOS NATIONAL LABORATORY

WORKING DRAFT

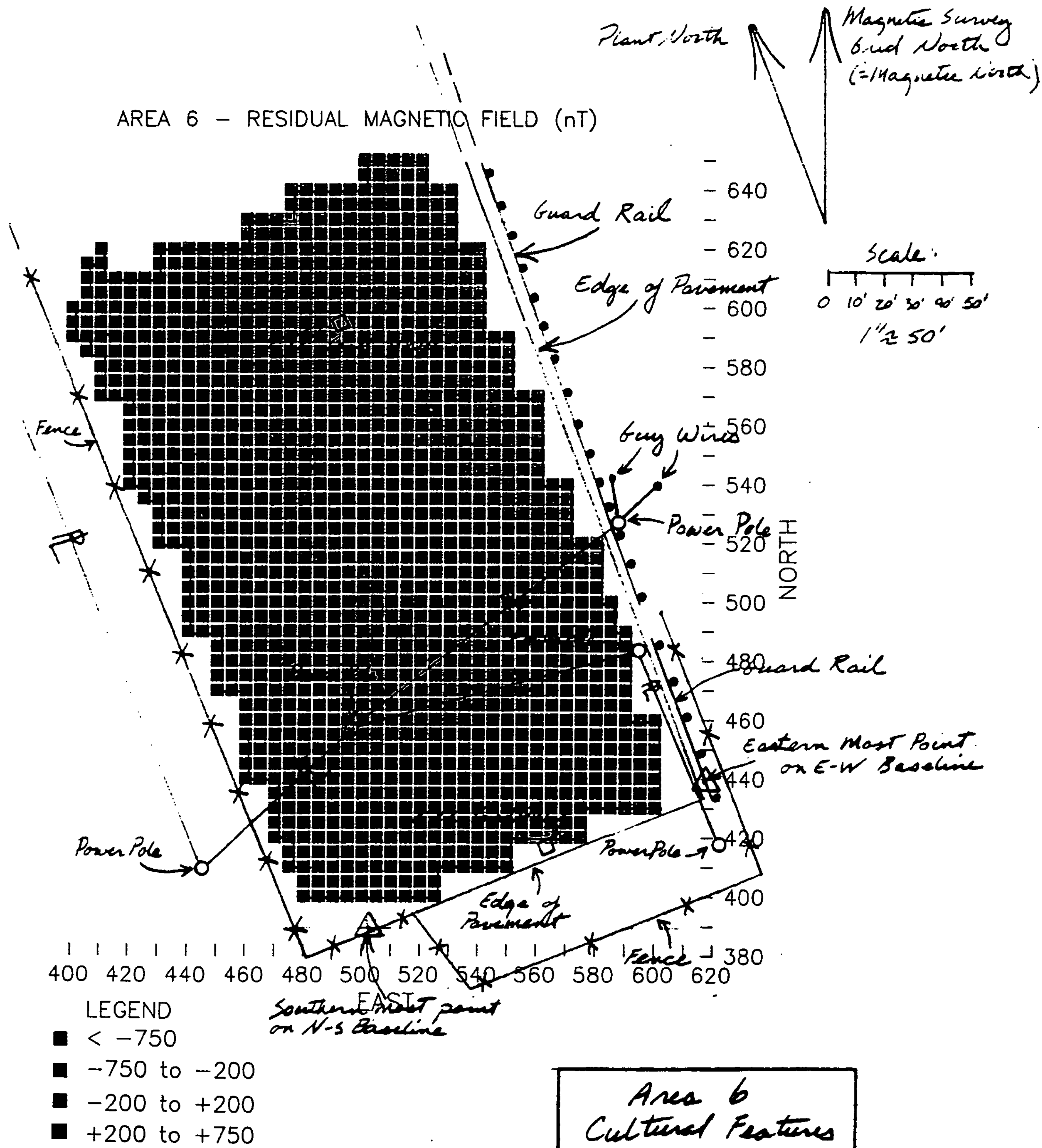


Figure 7. Color postings plot of residual magnetic

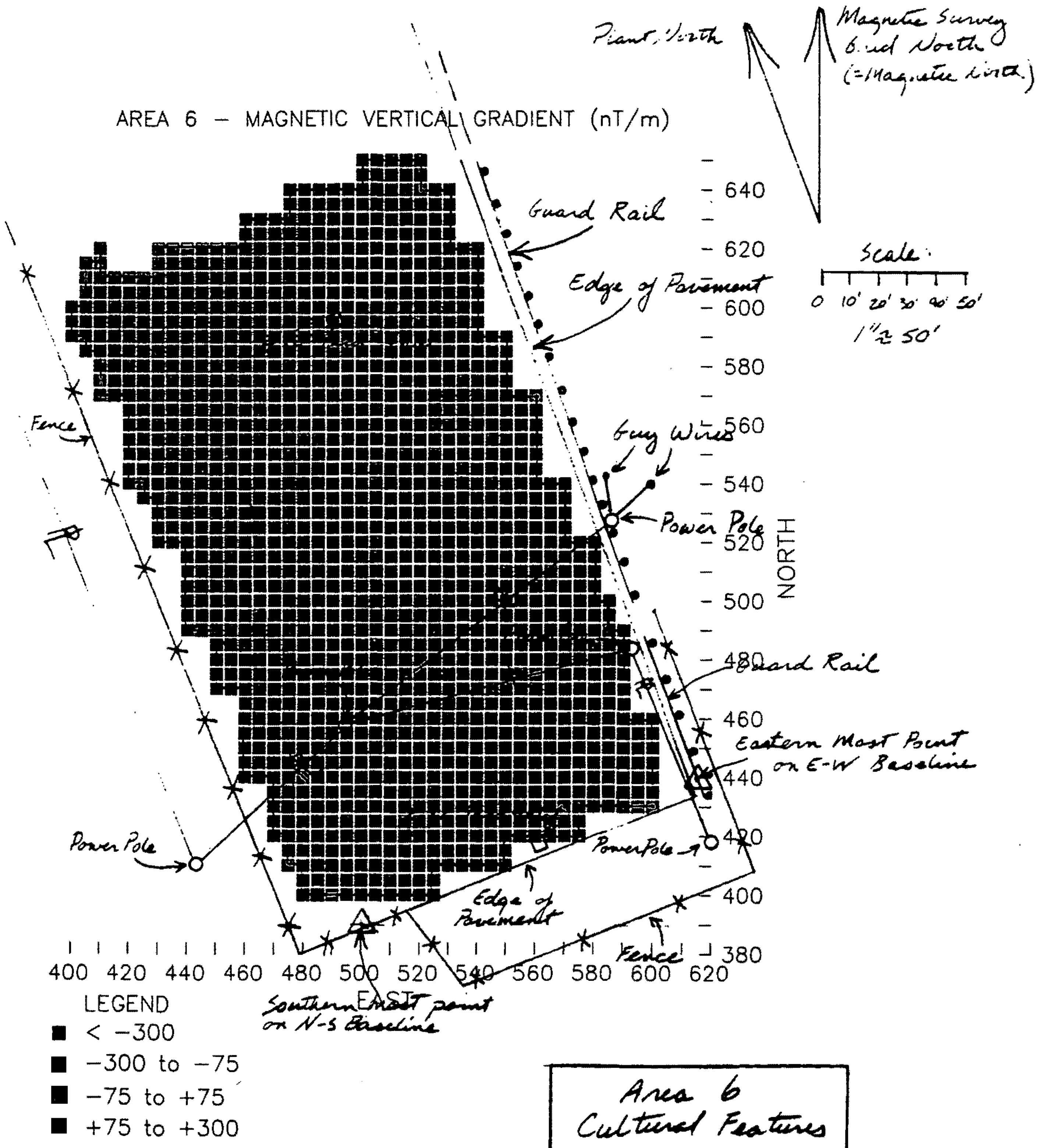


Figure 8. Color postings plot of magnetic vertical gr

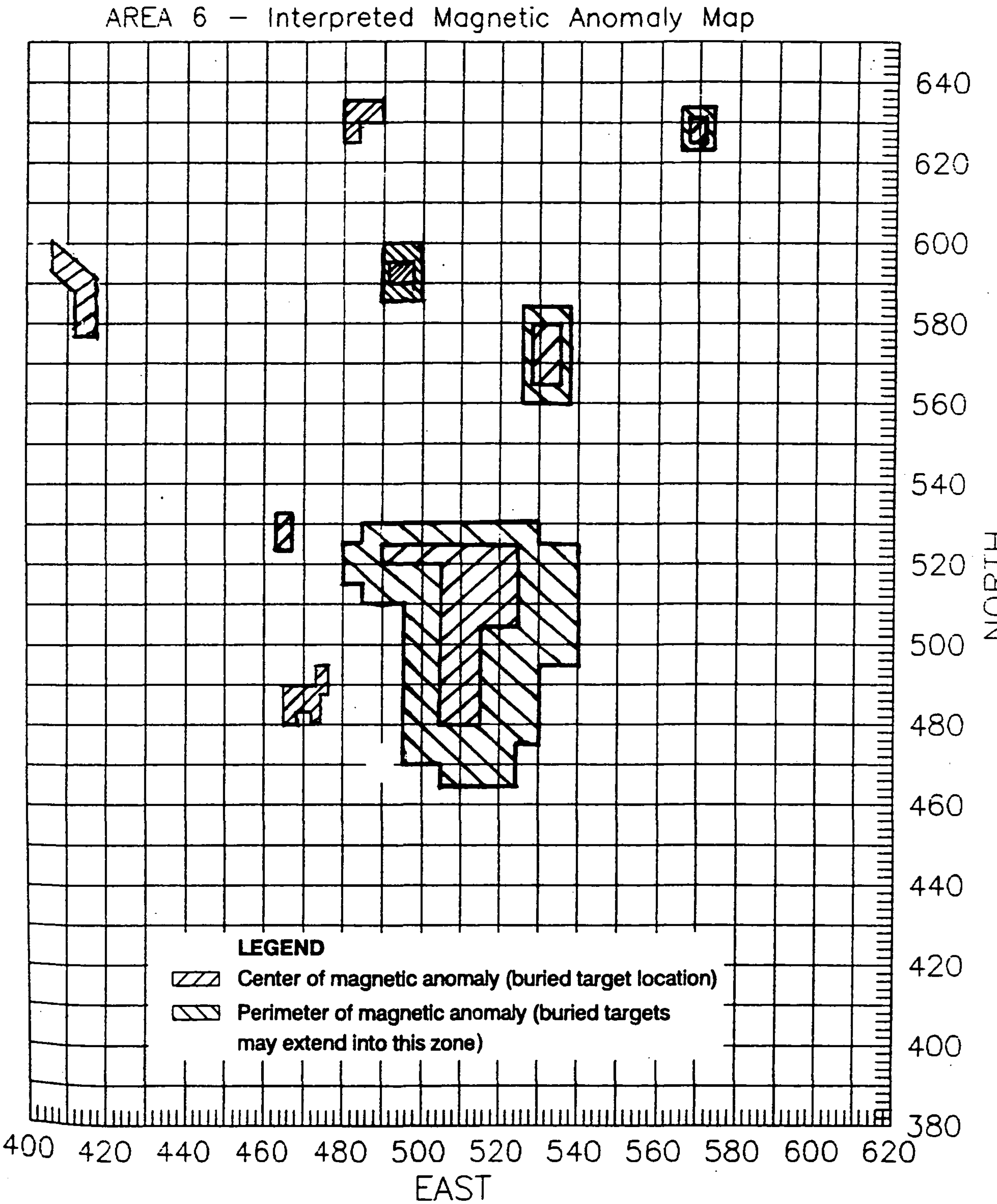


Figure 9. Interpretive map of magnetic anomalies in Area 6.

Figure 3 is a color postings map derived from magnetic vertical gradient readings in Area 2, with a cultural features overlay. The anomaly related to the large cache of crushed thorium drums is not as areally extensive as the residual magnetic field anomaly. This is because the higher resolution of gradient readings more sharply defines the lateral boundaries of buried targets.

A linear anomaly is present in the magnetic vertical gradient plot (Figure 3) at approximately 180 east and trends north-south across the entire survey area. This feature is also evident to a lesser degree in the residual magnetic field plot (Figure 2). The anomaly is probably related to a buried, ferrous feature such as a storm drain. However, site utility maps did not confirm the presence of such a feature. Another north-south oriented linear feature detected in the southern portion of Area 2 at 135 east is related to a buried 16-inch steel culvert, as shown on the cultural feature overlay maps (Figures 2 and 3).

Figures 4 and 5 are profiles of residual magnetic field values and magnetic vertical gradient values, respectively, for measurements along line 470 east in Area 2. The anomaly related to the buried thorium drums is present in the southern portion of both profiles. The anomaly is wider in the residual magnetic field profile than in the magnetic vertical gradient profile, as predicted by theory. The negative anomaly to the north of the drums is dampened in both profiles because of topography. Readings from approximately 240 north to 350 north are within the background range for both plots.

Figure 6 is an interpretive map of magnetic anomalies in Area 2. The large anomalous zone in the south-central portion of the figure is interpreted to represent the burial site for the crushed thorium drums. The burial site has approximate dimensions of 30 ft x 65 ft, for an areal coverage of 1,950 sq ft.

The linear feature shown on Figure 6 is interpreted to represent a ferrous utility such as a cable or pipe that is not reported on Mound Plant utility maps. The interpretive map does not include anomalies that are related to surface cultural features identified in the field.

4.2. RESULTS IN AREA 6

Figure 7 is a color postings plot derived from residual magnetic field readings in Area 2, with an overlay showing cultural features. The survey in this area was designed to define the smallest anomalies that could be positively identified given site conditions. Because of interference from ferrous features on the surface and overhead power lines, the background range for residual field values was set at -200 to +200 nanoteslas (nT). The range of background values is larger than normally used for magnetic surveys designed to detect small targets. This high level of background noise was expected in Area 6. Readings that fell outside the assigned background range are considered to be anomalous and may be related to buried ferrous objects or cultural interference from surface features.

Figure 8 is a color postings plot derived from the magnetic vertical gradient measurements in Area 2, with an overlay of cultural features. The background range selected for this data set is -75 to +75 nanoteslas per meter (nT/m). This figure defines several small anomalous zones that were not identified by the residual magnetic field data. In addition, a linear anomaly related to the overhead power lines is evident in this figure.

Figure 9 is an interpretive map of magnetic anomalies in Area 6. A relatively large anomaly exists between approximately 490 and 525 east and between 480 and 525 north. This anomaly is interpreted to be related to buried ferrous materials beneath the parking lot. Eight additional small anomalies are present throughout the area that are interpreted to represent buried ferrous objects. The interpretive map does not include anomalies that are related to surface cultural features identified in the field. The locations of the centers of the eight areas and the approximate areal coverage of the anomalous zones are listed in Table 1.

4.3. RESULTS IN AREA 7

Figure 10 is a color postings plot derived from residual magnetic field data in Area 7, including a cultural map overlay. The objective of the magnetic survey in this area was to locate a buried flatbed truck; 2,500 crushed, empty thorium drums; and other ferrous debris. The data ranges for the color plot were set to optimize resolution of the large anomaly in the north-central portion of the parking lot. This anomaly is related to a large amount of buried ferrous metal and is interpreted to define the location of the buried truck, thorium drums, and other ferrous debris. The buried debris is identified by positive anomalous readings to the south of the target and directly over it and negative anomalous readings on the north side of the target. This is the typical signature of a randomly oriented collection of ferrous metal objects in the presence of the earth's (ambient) magnetic field. In addition to this large anomaly, the survey also identified a linear anomaly that intersects a manhole cover in the parking lot. This feature is related to a storm drain that was identified on site utility maps (see overlay).

Figure 11 is a color postings plot that was derived from magnetic vertical gradient readings in Area 7, including a cultural map overlay. A pattern similar to the one present in the residual field data set is evident in the north-central portion of the parking lot, with positive anomalous readings to the south and negative anomalous readings to the north of the target. The anomaly related to the buried debris is not as areally extensive as the anomaly on the residual magnetic field plot because of the higher resolution of magnetic vertical gradient readings. In addition, the drain pipe running beneath the parking lot is more clearly identified on the magnetic vertical gradient plot.

Figure 12 and 13 are profiles of residual magnetic field readings and magnetic vertical gradient readings, respectively, for measurements along line 470 east in Area 7. Both profiles show the drain pipe at

Table 1. Locations of Magnetic Anomalies in Area 6 That May Represent Buried Waste

Locations of Center Point of Anomalies: Coordinates Based on the Geophysical Grid[a] North	East	Approximate Areal Coverage of Anomaly (ft^2)
500	510	2,500
485	470	100
575	532	300
582	495	150
527	465	50
590	415	150
630	485	75
627	570	100

[a]Geophysical grid coordinates are shown on Figure 9.

MOUND

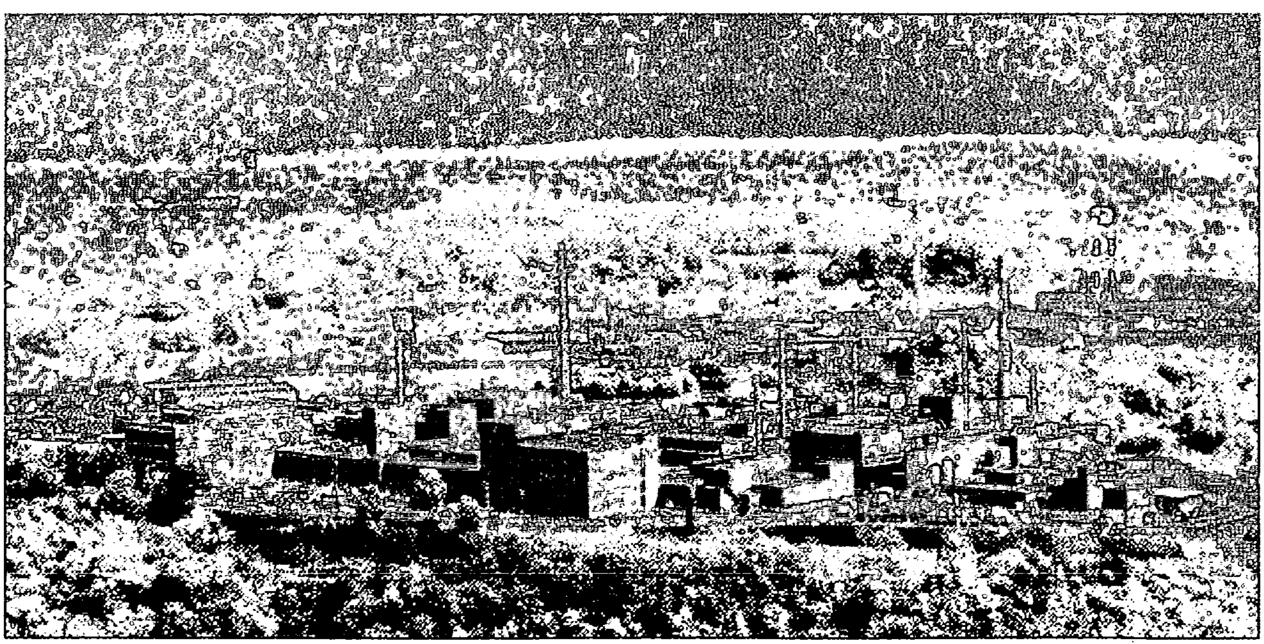
Environmental Restoration Program

MOUND PLANT

Potential Release Site Package

PRS #99/100

Addendum 1



PRS HISTORY:

Potential Release Site (PRS) 100, also known as Area F or Chromium Trench, is located south of the Guard House (GH) Building as shown in Figure 1. PRS 100 is shaped like a rectangle with a hole in the center. PRS 99, also referred to as Area 6 or WD Building Filter Cleaning Waste, is the "hole" within PRS 100 as shown in Figure 2. Both PRS 99 and PRS 100 reside within the limits of the present GH Parking Lot and have historically been presented together as PRS 99/100. Both PRS 99 and PRS 100 were considered potential release sites because of the reported disposal of "neutralized" chromium plating bath solution[1] (PRS 100) and contaminated drums of sand and metal debris (PRS 99). At least one of the plating shop process tanks was reportedly disposed of in the same area as the chromium sludge.[2] Wastes from both PRSs were disposed of in a trench. The configuration and size of each PRS varies from report to report, but neither location was actually documented to be more precise than south of the GH Building parking lot. Given the inconsistency between and lack of referencing of previous reports related to PRS 99 and PRS 100, a reanalysis was performed using available "concrete" information as listed below. The justification for and presentation of graphical information associated with PRS 99 and PRS 100 as presented in this PRS 99/100 Package, Addendum 1 are based on and supported by the following sources:

- aerial photography [*define the largest suspect area*],
- magnetic survey data [*zero in on the likely single location*],
- verified limits of removal action excavation [*confirm that location contained identified waste and all of it was removed*], and
- soil boring characterization of the entire suspect area [*show that waste was not anywhere else within the suspect area*]

Aerial Photography/Parking Lot Expansions. The Guard House (GH) Building and adjacent parking lot are located at the north end of the Mound Plant, on the Main Hill. Aerial photographs showing the progression of the GH Lot expansions are presented in Figure 3 and include 1949, 1959, 1965, and 1968 photographs. The current dimensions of the GH Lot are overlaid on all four photographs for reference.

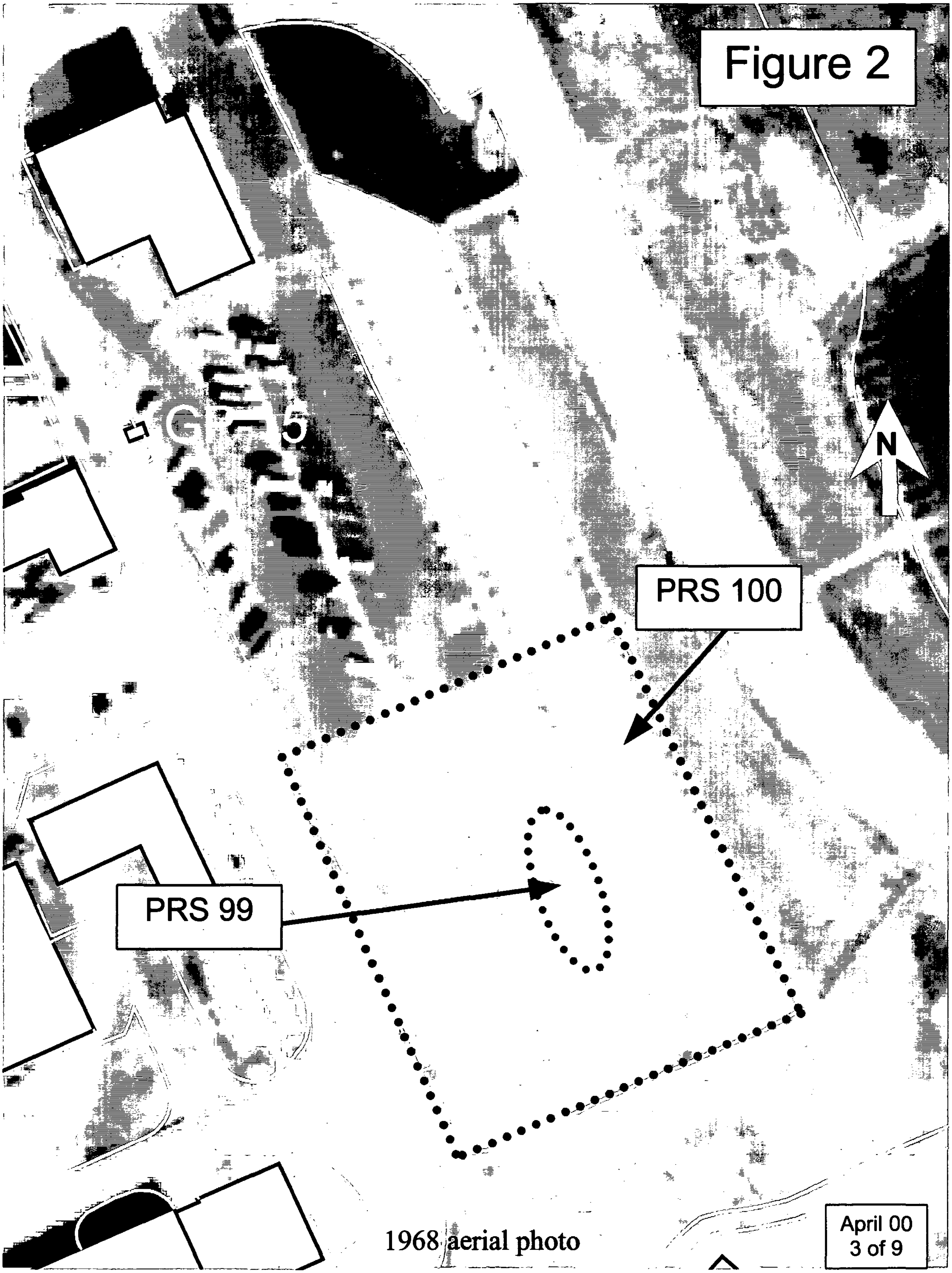
The horizontal extent of the entire area suspected as containing waste (PRS 100) was generated as presented herein based on the reported dates of disposal (1963-64) and the largest area that could have included disposed of material. Aerial photographs dated closest to the reported disposal events in 1963-64 were for 1959 and 1965 (Figure 3). The area encompassed by the GH Lot as photographed in 1959 was not included as a potential release site because it predates the reported disposal period. The area encompassed by the last expansion of the lot (between 1965 and 1968) post-dates the disposal period and was not characterized but was included herein to provide a complete chronology of expansions to the parking lot relative to the disposal period.

The original GH Lot was very small and located northeast of the GH Building, as shown on the 1949 aerial photograph in Figure 3. The 1959 aerial photograph shows the first construction of a

Figure 1

MOUND PLANT
Potential Release Site
PRS 99/100

Figure 2



1968 aerial photo

Figure 3

parking lot south of the GH Building. The 1959 parking lot was much shorter and narrower than the current dimensions. Area next to the lot (southeast) was used for waste disposal, but specific location(s) were not documented. In 1963-64, prior to an expansion of the GH Parking Lot, waste was disposed of in a trench(es) dug next to the GH Lot. By 1965, the lot was expanded south to its current length, burying the trench(es). By 1968, the lot was expanded to its current width.

Activities described below that were performed to characterize and address waste disposed of at PRS 99/100 are depicted in the attached flowchart.

In 1990, a **magnetic survey** of the GH Lot was performed to identify the location of buried material associated with PRS 99 and PRS 100. Several anomalies were detected as shown on Figure 4, but only one was large enough to be a disposal area and was presumed to be the only trench.

In December 1995, PRS 99/100 was binned Further Assessment by the Core Team. The initial assessment activity was a soil boring characterization in February 1999.

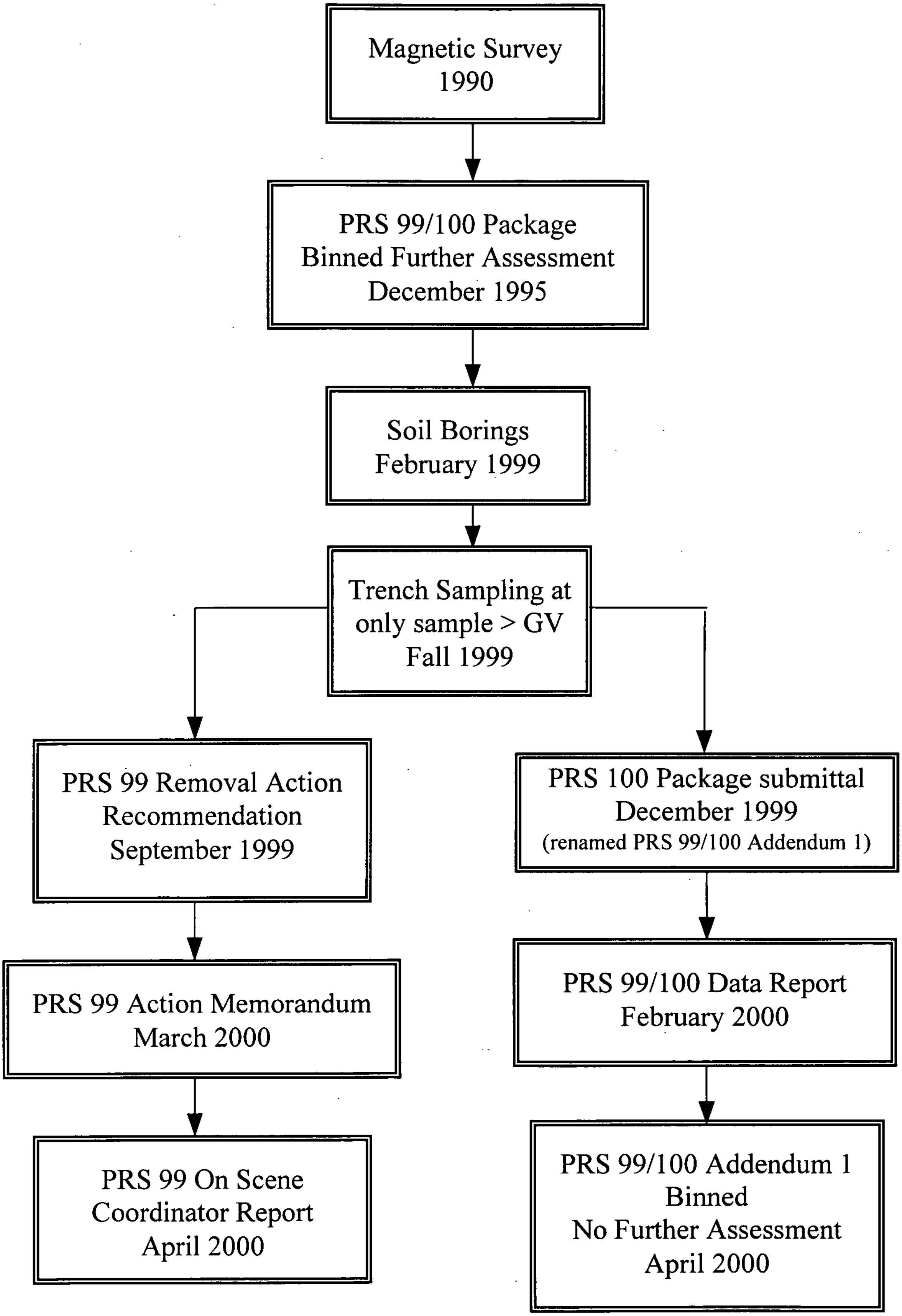
Results of the February 1999 characterization (detailed below) pointed to the need for further characterization within the large anomaly that escalated to a Removal Action. The anomaly was identified as PRS 99 because of the recovery of drums, contaminated sand, and metal debris. The remainder of the area was designated as PRS 100, creating the PRS within a PRS image. The concept that there was only one trench is supported by the fact that only one large anomaly was identified during the magnetic survey. Additional justification of a single trench for both PRSs lies with the recovery of a process tank during the **PRS 99 Removal Action** and the report of disposal of a tank with the PRS 100 waste.

CONTAMINATION:

Further Assessment of the GH Parking Lot began in February 1999 as prompted by the DOE and EPA-approved **Sampling and Analysis Plan** (SAP)[3]. The investigation was designed using statistics to find disposal areas larger than 20 feet across. Offset borings were added to sample smaller anomalies to confirm or deny the presence of waste. The three northeastern-most anomalies were not sampled due to utility-related issues. Boring locations are identified in Figure 4. Chromium was the contaminant of concern and focus analyte. Others added to the analyte list were lead, nickel, and cadmium. All of the samples were analyzed offsite for metals, ten percent of which were also analyzed offsite for radionuclides (isotopic thorium and plutonium, Ra^{226}, Cs^{137}, Bi^{210m}, Bi^{207}, Am^{241}, K^{40}, and Co^{60}) per the SAP. Onsite gamma spec was performed on all samples to confirm suitability for shipping (2 nCi/g limit).

Of the 137 investigative samples collected from 46 soil borings across the suspect area, only one contaminant of concern was detected in excess of its risk-based guideline value (GV) in an offset boring associated with PRS 99. The sample displayed Pu^{238} (onsite gamma spectroscopy analysis: 120 pCi/g, offsite isotopic analysis: 297 pCi/g) in excess of the GV of 55 pCi/g (10^{-5} risk for Construction worker/Mound employee). This **one exceedance** was the **basis for the PRS 99 Removal Action. All other samples in the other borings** (including samples from soil

History of PRS 99/100



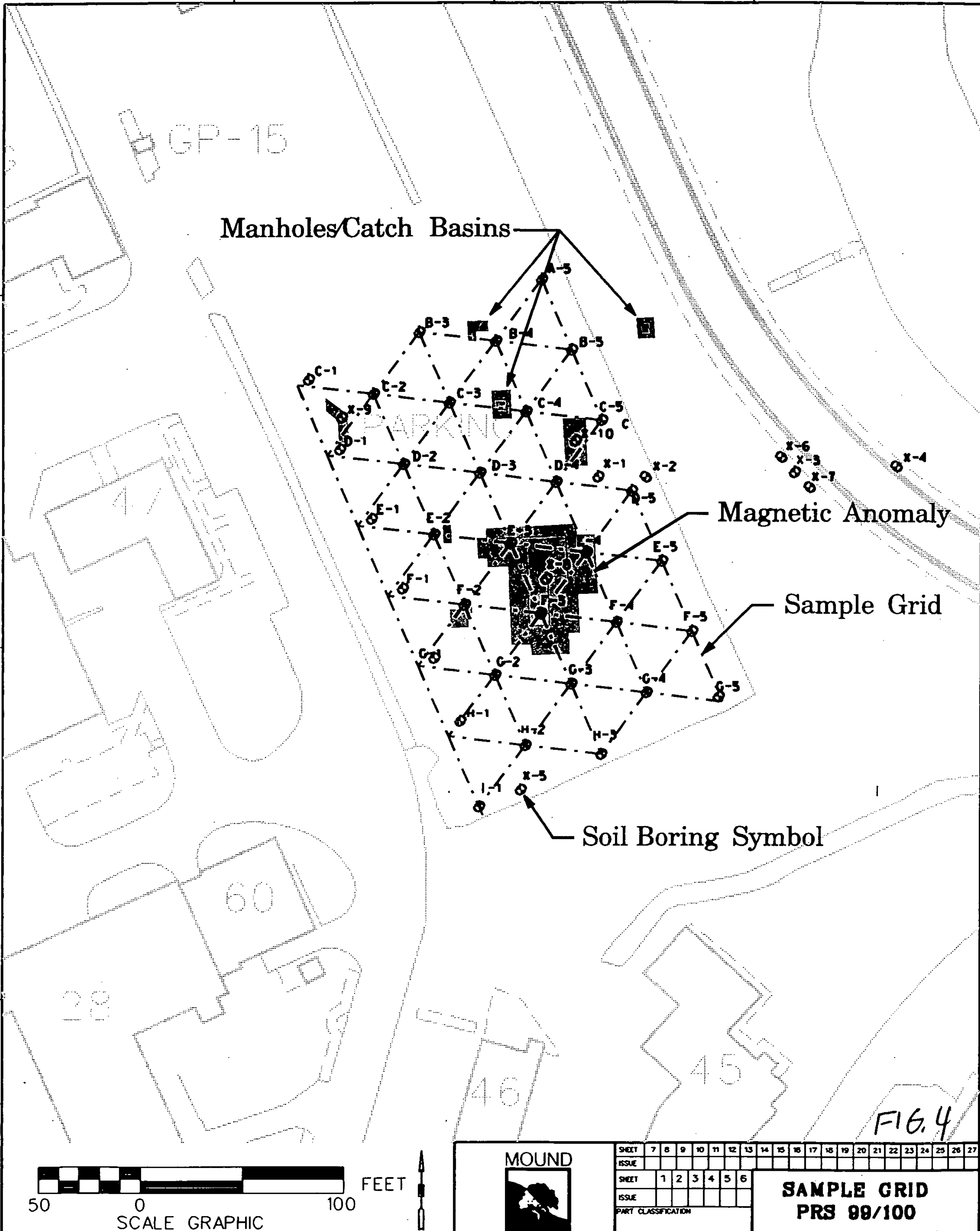


FIG. 4

MOUND

Environmental Restoration Geographic Information System

03/02/00		SSP
ISS	DATE	REVISION	BY	CHKR	DIC	URLEC	APVD

SAMPLE GRID
PRS 99/100

DRAWING CLASSIFICATION: UNCLASSIFIED
DRAWING NUMBER: er_site.dgn
DWG TYPE: STE
PRWG: ER-GIS
SHEET 1 OF 1
STATUS: MD-REL-03/02/00
ORIGIN: MSTATION 5.0

borings installed within the smaller anomalies) **showed no sign of contamination in excess of the 10^{-5} Risk-Based Guideline Values or visual indication of waste.** There were no elevated detections or visual indications of debris associated with any of the PRS 100 samples. Results of the soil boring characterization documented the **absence of contamination in PRS 100.**

The **Further Assessment Data Report for PRS 99/100**[4] presents a full account of field activities and sample results (onsite and offsite laboratory analyses) from the February 1999 soil boring characterization activities.

The **On-Scene Coordinator (OSC) Report** for PRS 99 Removal Action documents that sufficient removal occurred and the cleanup objective was met.

The **Action Memorandum** for the PRS 99 Removal Action identified four contaminants of concern. Table 1 presents current maximum remaining values in PRSs 99 & 100.

Table 1: Residual Contamination in PRS 99/100

Analyte	Result & Data Qualifier	Guideline Value (GV)	Background (Bkgd)	Cleanup Objective
Plutonium^{238} (pCi/g)	54.86*	10^{-5}=55	0.13	55
Cobalt^{60} (pCi/g)	0.208	10^{-6}=0.1	NC	0.1
Thorium^{228+D} (pCi/g)	1.3	10^{-6}=0.1	1.5	3.0
Thorium^{232+D} (pCi/g)	2.71	10^{-6}=0.1	1.4	3.0
Chromium^{+6} (mg/kg)	2.3	HI of 1 = 1,100	NA	

* MDA presented because activity was less than the MDA
NA: not analyzed
NC: not computed due to the large number of non-detects in the sample set

REFERENCES:

1) Chromium Trench Removal Site Evaluation, Operable Unit 2, February 1995, Draft (Rev 0).

2) Operable Unit 9 Site Scoping Report: Volume 7 – Waste Management, February 1993, Final.

3) Excerpt from PRS 99/100 Sampling & Analysis Plan, Draft Final, December 1998.

4) Excerpt from Further Assessment Data Report, PRS 99/100 Soil Borings, Final, Revision 0, July 2000.

PREPARED BY:

Karen M. Arthur, BWXT of Ohio Soils Project Engineer
Joseph C. Geneczko, BWXT of Ohio Technical Staff

MOUND PLANT
PRS 99/100 Addendum 1
GH Parking Lot

RECOMMENDATION:

Both PRS 99 and PRS 100 were considered Potential Release Sites because of the reported disposal of "neutralized" chromium plating bath solution (PRS 100) and contaminated drums of sand and metal debris (PRS 99). A removal for the metal debris and plutonium was concluded with the signing of the On Scene Coordinator Report on July 12, 2000. Based on the results of the removal and further assessment results, all results were less than 10^{-5} risk. Therefore, PRSs 99 & 100 require NO FURTHER ASSESSMENT.

CONCURRENCE:

DOE/MEMP: Art Kleinrath 8/14/2000
Art Kleinrath, Remedial Project Manager (date)

USEPA: Timothy J. Fischer 8/10/00
Timothy J. Fischer, Remedial Project Manager (date)

OEPA: Brian K. Nickel 8/14/00
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 99/100 Addendum 1

REFERENCE 1

Chromium Trench Removal Site Evaluation, Operable Unit 2, February 1995, Draft (Rev 0).

Environmental Restoration Program

CHROMIUM TRENCH REMOVAL SITE EVALUATION OPERABLE UNIT 2

MOUND PLANT
MIAMISBURG, OHIO

February 1995

DRAFT

(Revision 0)

Department of Energy
Ohio Field Office

Environmental Restoration Program
EG&G Mound Applied Technologies

REFERENCE 1 : 1of3

EXECUTIVE SUMMARY

This Removal Site Evaluation was performed in accordance with the National Oil and Hazardous Substances Contingency Plan (NCP) 40 CFR Part 300 and has identified a potential threat to human health, welfare, and the environment from a hazardous substance as defined by the Mound Plant Federal Facilities Agreement (FFA) (Docket No. OH 890:008 984), in subsurface soils and groundwater. The area of concern is located on the Main Hill at Mound Plant.

Past investigations at Mound Plant have identified the presence of a trench under the GH Building parking lot on the Main Hill. This trench, known as the chromium trench, has previously been identified as having received chromium waste. Historical use of the trench indicates that this chromium waste could potentially contribute to soil and groundwater contamination. The purpose of this RSE is to evaluate the need for additional action related to the trench. The RSE includes: an evaluation of the potential of the trench to contaminate the surrounding environment, the potential risk involved with the contamination, and the feasibility of performing a remediation, if needed. This RSE was performed using existing data.

The parking lot south of the GH Building is referred to as Area F, and the trench within Area F is referred to as Area 6. In 1963, 110 gallons of chromium plating bath solution treated with sodium bisulfide were disposed of in a trench in Area 6. In 1964 three 55 gallon drums of polonium-210 contaminated sand were also placed in or around the chromium trench. The sand was contained in drums that were crushed prior to being disposed of in the trench area. The sand may have also been contaminated with cobalt-60 and cesium-137.

PARKING LOT = AREA F = PRS 100
TRENCH W/I LOT = AREA 6 = PRS 99

ONLY ONE TRENCH

Current information fails to accurately pinpoint the exact location of the trench. A magnetic survey of the trench area located an anomaly, which may be the trench. Its size suggests that a much larger magnetic source is in the trench than would be expected from only chromium plating solutions, drums of contaminated sand, and a washing machine.

LARGER SOURCE = IMPELLAR ASSEMBLY & PROCESS TANK

Currently there is little information on effects the chromium trench has had on the environment. Limited investigations do show that the GH Building parking lot subsurface soils contain areas with ferrous materials, and contamination in the upper 5 feet from volatile organic compounds (VOCs).

To determine the need for a removal action, eight factors were considered, and it was determined that a removal action was appropriate for the soils in and around the chromium trench. However, the amount of data fails to provide enough information to perform an accurate action memorandum.

Therefore, additional sampling is proposed for the GH Building parking lot. Based on the results of the sampling, an accurate evaluation of remedial alternatives can be made.

REFERENCE 1: 2 of 3

7. CONCLUSIONS

Current information fails to accurately pinpoint the exact location of the trench. Information gathered during a magnetic survey of Area 6 (chromium trench) located one large anomaly approximately 40x70 feet and seven other anomalies of smaller proportions in the area. Based on the reported size of the trench, the large anomaly may be the chromium trench. The magnetic survey suggest a much larger magnetic source in the chromium trench than would be expected from only the chromium plating solution, drums of contaminated sand, and a washing machine. In past investigations the chromium trench was reported to be covered with 30 feet of fill. Topographic maps indicate that there may be as little as 15 feet of fill covering the trench. The other magnetic anomalies in this area may vary in depth from a few feet to 30 feet under the present ground surface. At this time, the source of the smaller anomalies is unknown. It appears from their random locations in the subsurface area that they were disposed of at different times and depths during the construction of the GH Building parking lot.

There has only been a single attempt at drilling a soil boring in the area of the trench, this boring was terminated at 15 feet. Because the boring log is not available, it is unknown if drilling was stopped because bedrock was encountered or because signs of the original trench or its fill were observed during the sampling.

Although there is very little data to evaluate the need for a removal action, Section 5 indicates there is a potential for release of hazardous substances or contaminants to the environment. In addition, there is a potential for the chromium trench to contaminate a drinking water supply.

REFERENCE 1 : 3 of 2

REFERENCE 2

Operable Unit 9 Site Scoping Report: Volume 7 – Waste Management, February 1993, Final.

ENVIRONMENTAL RESTORATION PROGRAM

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

MOUND PLANT
MIAMISBURG, OHIO

February 1993

DEPARTMENT OF ENERGY
ALBUQUERQUE FIELD OFFICE

ENVIRONMENTAL RESTORATION PROGRAM
EG&G MOUND APPLIED TECHNOLOGIES

FINAL

rinses and the deionized water spray rinses, was disposed of in the sanitary sewer system. In 1989, the process of disposing of the sodium hydroxide and potassium permanganate solution in the sanitary sewer system was stopped. These solutions are now drummed and picked up by Mound waste management personnel. Currently, only the cascade rinse water drains to the small sump. The old tank is thought to still be connected to the sanitary sewer system as is the new sump. The old tank served as the sampling station for NPDES Outfall 001. The new sump in the production plating shop is currently sampled for that requirement.

Concrete containment pits with curbs are located under the plating shop process equipment to contain any spills or leaks. The pits are segregated so that acid materials do not mix with basic materials. Any material that collects in the pits is removed by pumping it into drums for disposal by Mound waste management. Floor drains within the building are connected to the sanitary sewer system. Administrative and physical controls prevent plating wastes from being disposed of in these drains (Johnson 1991).

- PRS text says "at least one tank" because it is not clear in this reference if there was more than one tank. 14 [illegible]

When the original plating shop was dismantled in 1962, the plating solutions were neutralized and the solutes precipitated. The resulting wastes included sludges and a supernatant liquid. The liquid was released to the sanitary sewer through the old tank. The sludges were drummed in two 55-gallon steel drums and buried in the small parking lot on the northeast corner of the Main Hill. The old tanks were also buried at this location, as part of the expansion of the parking lot. This burial site is now known as Area F (DOE 1992g).

PRS 100

3.2.3. Vapor Degreaser

The vapor degreaser is in the plating shop in the M Building on the Main Hill (Figure 3.1). Small machined metal parts are cleaned by solvent vapors produced in the chamber of the degreaser. The fully enclosed metal chamber is approximately 3 ft long, 2 ft wide, and 4 ft deep and has a 15-gallon solvent capacity. The wastes produced in this unit are spent solvents. Spent solvents and vapors are retained in the degreaser cleaning chamber. The solvent used in the vapor degreaser is Perclene D. The unit began operating in the late 1970s and is still in use. Spent solvent is transferred to drums and transported to the hazardous waste storage area in Building 72.

3.3. MAINTENANCE SHOP

The Building G garage is used to maintain the automobiles, trucks, buses, and heavy-duty equipment used at Mound (Figure 3.1). The building is approximately 122 ft by 62 ft and is made of structural steel and brick with concrete floors. It has concrete floors and is located in the northwest corner of

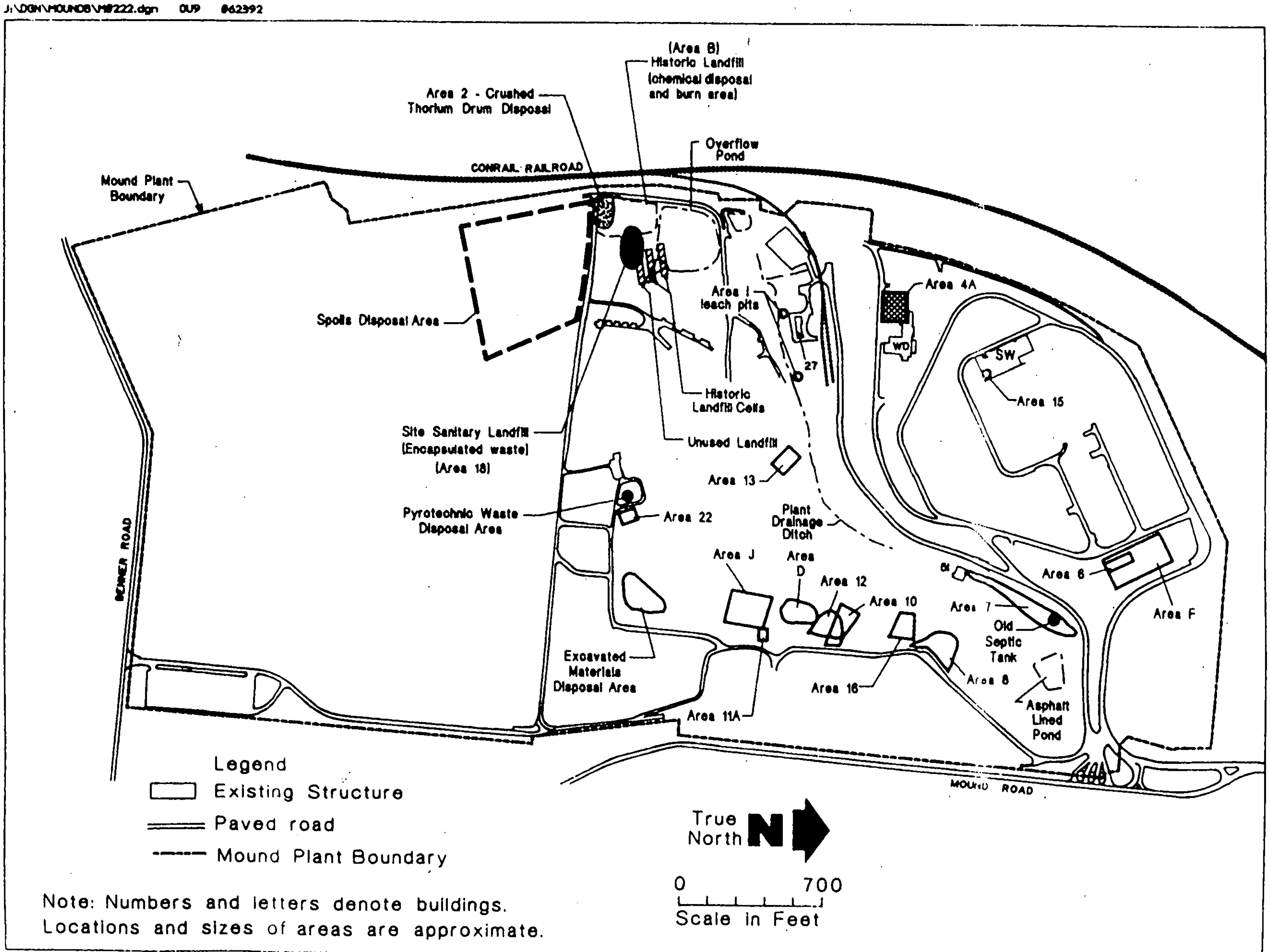


Figure 6.1 On-plant waste disposal areas.

also supported by the interpretation of historic aerial photographs, which indicate that the historic landfill may have occupied areas presently under the paved roads (DOE 1991f).

Area 2 was investigated for radiological contamination during the Site Survey Project (DOE 1991b). The maximum concentration of plutonium-238 was 17.1 pCi/g in a sample taken at a depth of 18 inches. The maximum thorium concentration detected was 3.31 pCi/g at a depth of 108 inches. Neither of the two boreholes in the area appear to have been located to exactly penetrate the thorium drums (DOE 1991b).

6.1.1.2. Area 6, Polonium-Contaminated Waste (Historical) ← PRS 99

PRS 100

Area 6 is southeast of the GH Building on the Main Hill, in the northern portion of Mound (DOE 1991b) (Figure 6.1). The area is currently a parking lot and may overlap Area F, the chromium trench. In 1964, at least three 55-gallon drums of polonium-contaminated sand were placed in this area. The sand was contaminated during cleaning (sandblasting) of the metal framework of the WD Building sand filters. The sand was originally contained in drums that were placed in Area 6, in a 100-ft by 40-ft trench. The trench was covered with up to 30 ft of clean fill dirt before the parking lot was built. The trench may also contain a polonium-contaminated washing machine (Thomas 1991). Polonium has a half-life of 138.4 days and is no longer present due to radioactive decay. The 1982 to 1985 Radiological Site Survey (DOE 1991c) detected low levels of radium-226 (all below 1 pCi/g) in soil samples at various depths.

6.1.1.3. Area 7, Thorium, Polonium, and Actinium Wastes (Historical)

Area 7 is in the northeast portion of Mound, southwest of the asphalt-lined pond (Figure 6.1). The area encompasses about 140,000 ft^2 and is currently covered by a paved parking lot constructed in 1984. Buildings 51, 66, and 98 are also located over the area, which originally formed the upper reach of the plant drainage ditch. Many years of debris disposal and infilling have buried the original ravine (DOE 1992c).

Area 7 has been the site of extended disposal of residual materials including thorium, polonium-210, and some actinium-227. The thorium repackaging operations that extended from the mid-1950s to the mid-1960s generated between 15,000 and 20,000 steel drums. It is estimated that between 10,000 and 15,000 of these drums were crushed and buried along the western part of the original ravine. The remainder are probably buried in Area 2. This disposal tended to create usable land along this part of the ravine. In the Site Scoping Report: Volume 3 - Radiological Survey Report (DOE 1991c), it was reported that 2,500 drums were buried in Area 7, but that number fails to account for of the landfill is within design specifications; however, the east slope is more gradual than specified because of the extra fill placed there. The height of the landfill was surveyed and checked for settling a year or two after construction; although no known written report exists, a verbal report suggests little or no settling occurred (DOE 1992g). During the 1982 to 1985 Radiological Site Survey (DOE 1991c), the maximum plutonium-238 concentration found in the core samples taken at the site sanitary landfill was 3.71 pCi/g at a sample depth of 126 inches. The maximum plutonium-238 concentration measured in the surface samples was 0.98 pCi/g. No thorium concentrations above 2 pCi/g were detected in any of the Area 18 samples (core or surface).

6.3.3. Area F, Chromium Trench (Historical) ← PRS 100

The chromium trench is beneath an asphalt parking lot on the Main Hill, just south of the GH Building in Area F (Figure 6.1). Area 6 is within Area F's boundaries. In 1963, approximately 110 gallons of chromium plating bath solution treated with sodium bisulfite were disposed of in a trench in this area. These wastes were deposited onto the ground surface in the trench with no apparent release controls. The disposal actions occurred only in 1963 when the old plating lab was replaced by a new facility. No formal closure was undertaken.

There is a low to moderate potential for the contamination from the chromium plating bath solution disposal particles to reach the underlying groundwater. No release controls were used, but the area is capped with asphalt. The amount of chromium placed in Area F was substantially below the 24-hour reportable quantity of 1,000 pounds. It is thought that the small amount of residual chromium would not likely pose a health hazard (DOE 1992g).

6.3.4. Summary of Hazardous and Mixed Waste Disposal

Hazardous and mixed wastes are generated by the production, research, and development activities at Mound. Few waste generation records exist for the period preceding the waste management program that began in the 1970s. Records for the justification for the waste incinerator indicate that approximately 250 gallons of waste oils and solvents were generated each week in the early 1970s (Ashby 1973). In 1969, a total of 12,449 gallons of liquid waste oils and solvents were destroyed (Hebb 1970b). Beginning in July 1970, chemical wastes were collected and disposed of off-plant by private contractors, including Industrial Waste Disposal, Inc., of Dayton, Ohio, and Industrial Waste Disposal Liquid Waste, Inc., of Tremont City, Ohio (Storey 1970). The chemical wastes were disposed of in Ohio, Kentucky, or Michigan. From 1971 through 1973, some liquid chemical wastes were disposed of by burning in the waste incinerator. Although several test burns were conducted (Russell 1971; Werner 1972a), it is not known how much of the accumulated wastes were actually treated in

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REFERENCE 3

Excerpts from PRS 99/100 Sampling & Analysis Plan, Draft Final, December 1998.

PRS 99/100 SAMPLING & ANALYSIS PLAN

DRAFT FINAL

Mound Plant
Miamisburg, OH

December 1998

Department of Energy
Ohio Field Office

Prepared by the Soils Project of
BABCOCK & WILCOX OF OHIO

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REFERENCE 4

Excerpts from Further Assessment Data Report for PRS 99/100 Soil Borings, Final, Revision 0, July 2000

FURTHER ASSESSMENT DATA REPORT

PRS 99/100 Soil Borings

Mound Plant
Miamisburg, OH

Final, Revision 0

July 2000

Department of Energy
Ohio Field Office

BWXT of Ohio, Inc.

REF4: 1/10

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3. RESULTS OF ANALYSES

WESTON obtained geological information and soil analytical results from the subsurface investigation at PRS 99/100. This section summarizes the analytical results.

3.1. INORGANIC RESULTS / OFFSITE ANALYSIS

A total of 135 investigative soil samples, 14 field duplicates, 7 field blanks, and 7 matrix spike pairs were submitted for laboratory inorganic analysis. The target analytes included hexavalent chromium, total chromium, cadmium, nickel, and lead. Recra LabNet performed these analyses in accordance with the Methods Compendium (DOE 1995). The sample results for these analyses are listed in Table 4. For comparative purposes, the Mound Plant background levels (DOE 1997) and guideline values have been included in the table.

3.1.1 Hexavalent Chromium Analytical Results

Hexavalent chromium analysis was performed on each of the samples following Compendium Method A-019, Hexavalent Chromium/EPA Method SW7196A. No hexavalent concentrations were found to exceed the Hazard Index 1 Mound risk-based cleanup guideline value of 1,100 mg/kg.

3.1.2 Total Chromium Analytical Results

Total chromium analysis was performed on each of the samples following Compendium Method A-005, CLP Metals/ILM03.0. The background value for comparison to Mound Plant soils for chromium is 20 mg/kg. Although there is no Mound risk-based cleanup guideline value set for total chromium, guideline values are set for each of its components, Chromium III and Chromium VI. All total chromium concentrations were below the Hazard Index 1 Mound risk-based cleanup guideline value of 1,100 mg/kg for Chromium VI and 210,000 mg/kg for

Chromium III. In Table 4, total chromium concentrations were compared to the more conservative 1,100 mg/kg guideline value.

3.1.3 Trivalent Chromium Results

Trivalent chromium is not an analyte and no analysis is performed specifically for it. Trivalent chromium is calculated by subtracting hexavalent chromium results from total chromium results. Since the total chromium results did not exceed the action limits for hexavalent chromium, the trivalent chromium concentration was not significant, and therefore not calculated.

3.1.4 Cadmium Analytical Results

Cadmium analysis was performed on each of the samples following Compendium Method A-005, CLP Metals/ILM03.0. The background value for comparison to Mound Plant soils for cadmium is 2.1 mg/kg. No concentrations detected during this investigation exceed the background value. No concentrations detected exceeded the cadmium Hazard Index 1 Mound risk-based cleanup guideline value of 210 mg/kg.

3.1.5 Nickel Analytical Results

Nickel analysis was performed on each of samples following Compendium Method A-005, CLP Metals/ILM03.0. The background value for comparison to Mound Plant soils for nickel is 32 mg/kg. One sample (000116 at 64.1 mg/kg) exceeded the background value. No nickel concentrations detected exceeded the Hazard Index 1 Mound risk-based cleanup guideline value of 4,300 mg/kg.

3.1.6 Lead Analytical Results

Lead analysis was performed on each of the samples following Compendium Method A-005, CLP Metals/ILM03.0. The background value for comparison to Mound Plant soils for lead is 48 mg/kg. No concentrations detected during this investigation exceed the background value. There is no Mound risk-based guideline value set for lead.

3.2. RADIOLOGICAL RESULTS / OFFSITE ANALYSIS

A total of 14 soil samples, representing ten percent (10%) of the samples collected, were submitted for offsite laboratory radionuclide analysis. Three additional samples were concurrently submitted as quality control samples. Quanterra Laboratory performed the analyses in accordance with the Methods Compendium. The target analytes for offsite analyses were isotopic plutonium, isotopic uranium, isotopic thorium, and gamma spectrometry for cobalt^{60}. Lead^{210} by Gamma Spectrometry was also performed for five of the samples. Quanterra also reported results for americium, bismuth, cesium, potassium and radium that were collected during the gamma spectrometry. Although these radionuclides are not target analytes, the results are tabulated and summarized in this report. Table 6 presents the sample results for radiological analyses performed offsite.

3.2.1. Isotopic Plutonium Analytical Results

Isotopic plutonium (238 and 239/240) analysis was performed on the samples submitted to the laboratory following Compendium Method A-012. Plutonium^{238} was detected at 297 pCi/g in the sand sample collected from the 10-12 foot bgs interval of X8. With the exception of this sample, all other sample activities were detected below the plutonium^{238} 10^{-5} Mound risk-based cleanup guideline value of 55 pCi/g. No plutonium$^{239/240}$ was detected in the samples at or above the laboratory MDA.

3.2.2. Isotopic Uranium Analytical Results

Isotopic uranium (234, 235, and 238) analysis was performed on the samples submitted to the laboratory following Compendium Method A-012. The background value for comparison to Mound Plant soils for uranium^{234} is 1.1

pCi/g. No activities detected during this investigation exceed the background value. No activities detected exceeded the $uranium^{234}$ 10^{-6} Mound risk-based cleanup guideline value of 37.5 pCi/g. $Uranium^{235}$ background value for comparison to Mound Plant soils for $uranium^{235}$ is 0.11 pCi/g. No activities detected during this investigation exceed the background value. No activities detected exceeded the $uranium^{235}$ 10^{-6} Mound risk-based cleanup guideline value of 3.1 pCi/g. The background value for comparison to Mound Plant soils for $uranium^{238}$ is 1.20 pCi/g. No activities detected during this investigation exceed the background value. No activities detected exceeded the $uranium^{238}$ 10^{-6} Mound risk-based cleanup guideline value of 11 pCi/g.

3.2.3. Isotopic Thorium Analytical Results

Isotopic thorium (228, 230, and 232) analysis was performed on the samples submitted to the laboratory following Compendium Method A-012. The background value for comparison to Mound Plant soils for $thorium^{228}$ is 1.50 pCi/g. The guideline value (ALARA goal) for $thorium^{228}$ is 3.0 pCi/g. One sample was reported as non-detect, but the laboratory MDA exceeded the guideline value in this sample. No activities detected during this investigation exceed the background value or the guideline value. The background value for comparison to Mound Plant soils for $thorium^{230}$ is 1.90 pCi/g. The guideline value (Release Block H RRE TPR) for $thorium^{230}$ is 44 pCi/g. No activities detected during this investigation exceed the 10^{-6} guideline value. Two activities exceeded the Mound Plant soils background value. The background value for comparison to Mound Plant soils for $thorium^{232}$ is 1.40 pCi/g. No activities detected during this investigation exceed the background value. No activities detected exceeded the $thorium^{232}$ guideline value (ALARA goal) of 3.0 pCi/g.

3.2.4. Cobalt^{60} Analytical Results

Gamma Spectrometry for cobalt^{60} analysis was performed on the samples submitted to the laboratory following Compendium Method A-015. No cobalt^{60} was detected in the samples at or above the laboratory MDA. The method MDA (1.0 pCi/g) exceeded the 10^{-6} Mound risk-based cleanup guideline value of 0.1 pCi/g, resulting in a reported MDA in excess of the guideline value in ten (10) samples. The maximum MDA reported was 0.208 for sample 000141. The Core Team was informed that the resulting MDAs greater than guideline value were due to the method MDA requirement and not a laboratory QA issue. The Core Team approved the data as usable and the method MDA was subsequently changed to meet the guideline value.

3.2.5. Lead^{210} Analytical Results

According to the SAP, analysis of lead^{210} was required only if the on-site laboratory detected this radionuclide in the gamma screening. Of the samples submitted for radiochemistry analysis, five samples had lead^{210} detected in the on-site screening. Lead^{210} analysis was performed on these five samples following Compendium Method A-015. The guideline value (Release Block H RRE TPR) for lead^{210} is 1.7 pCi/g. One sample had lead^{210} activity exceeding this guideline value. A lead^{210} activity of 2.39 pCi/g was detected in duplicate sample 000143 collected from boring D1.

3.2.6. Americium^{241} Analytical Results

Gamma Spectrometry for americium^{241} was performed on the samples submitted to the laboratory following Compendium Method A-015. Americium^{241} was detected above the laboratory MDA only in sample 000159. The reported activity was 0.485 pCi/g. The 10^{-6} Mound risk-based cleanup guideline value for americium^{241} is 4.95 pCi/g.

3.2.7. Bismuth Analytical Results

Gamma Spectrometry for bismuth^{207} and bismuth^{210} was performed on the samples submitted to the laboratory following Compendium Method A-015. No bismuth^{207} or bismuth^{210} was detected in the samples at or above the laboratory MDA. The guideline value for Bi^{207} is 0.16 pCi/g.

3.2.8. Cesium^{137} Analytical Results

Gamma Spectrometry for cesium^{137} was performed on the samples submitted to the laboratory following Compendium Method A-015. No activities detected exceeded the guideline value for cesium^{137} of 0.42 pCi/g.

3.2.9. Potassium^{40} Analytical Results

Gamma Spectrometry for potassium^{40} was performed on the samples submitted to the laboratory following Compendium Method A-015. There is no Mound risk-based guideline value set for potassium^{40}, but no activities detected during this investigation exceeded the Mound Plant background level of 37.0 pCi/g.

3.2.10 Radium^{226} Analytical Results

Gamma Spectrometry for radium^{226} was performed on the samples submitted to the laboratory following Compendium Method A-015. No activities detected exceeded the Mound background soil concentration for radium^{226} of 2.0 pCi/g.

3.3. RADIOLOGICAL RESULTS - ONSITE ANALYSIS

3.3.1 Gamma Spec Screening

All samples collected were analyzed by onsite gamma spectrometry with results presented in Table 7. Both activity and MDA are presented for each radionuclide for completeness.

3.3.2 Gamma Spec Long Count Pu^{238}

Samples were intended to be analyzed by the Bicron (sodium iodide) detector per the SAP, but by the time the samples were collected, neither the Bicron detector nor the long-count gamma spec was available. The MDA specified in the SAP for the Bicron detector was 25 pCi/g for Pu^{238}. Original gamma spec results for Pu^{238} were unacceptably high, with several MDAs over 100 pCi/g as presented in Table 8. In March 2000, archived samples from the 1999 project were submitted to the onsite gamma spec lab for long count Pu^{238} analysis to bring the MDAs to below guideline value of 55 pCi/g. All of the results of the long counts are presented in Table 5. Long count results for Pu^{238} only are presented in Table 8. All MDAs for the Pu^{238} long counts are below 55 pCi/g and half are below 25 pCi/g.

3.3.3 Alpha Spec Th^{230}

In April 2000, archived samples from the 1999 project were submitted to the onsite alpha spec lab for long count Th^{230} analysis to bring the MDAs to below 1 pCi/g specified in the SAP. Long count results are presented in Table 9 and all MDAs are below 1 pCi/g.

3.4. DATA VALIDATION

QuantaLex, Inc performed data validation on approximately ten percent (10%) of the samples. The results of the data validation are discussed by analysis in the following subsections.

3.4.1. Inorganic and Hexavalent Chromium Analysis

WESTON submitted 15 of 135 investigative samples for validation. During data validation, three deficiencies were identified and each of the deficiencies is described in the following subsections.

- The laboratory duplicate percent difference exceeded the 35% acceptance criteria;

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