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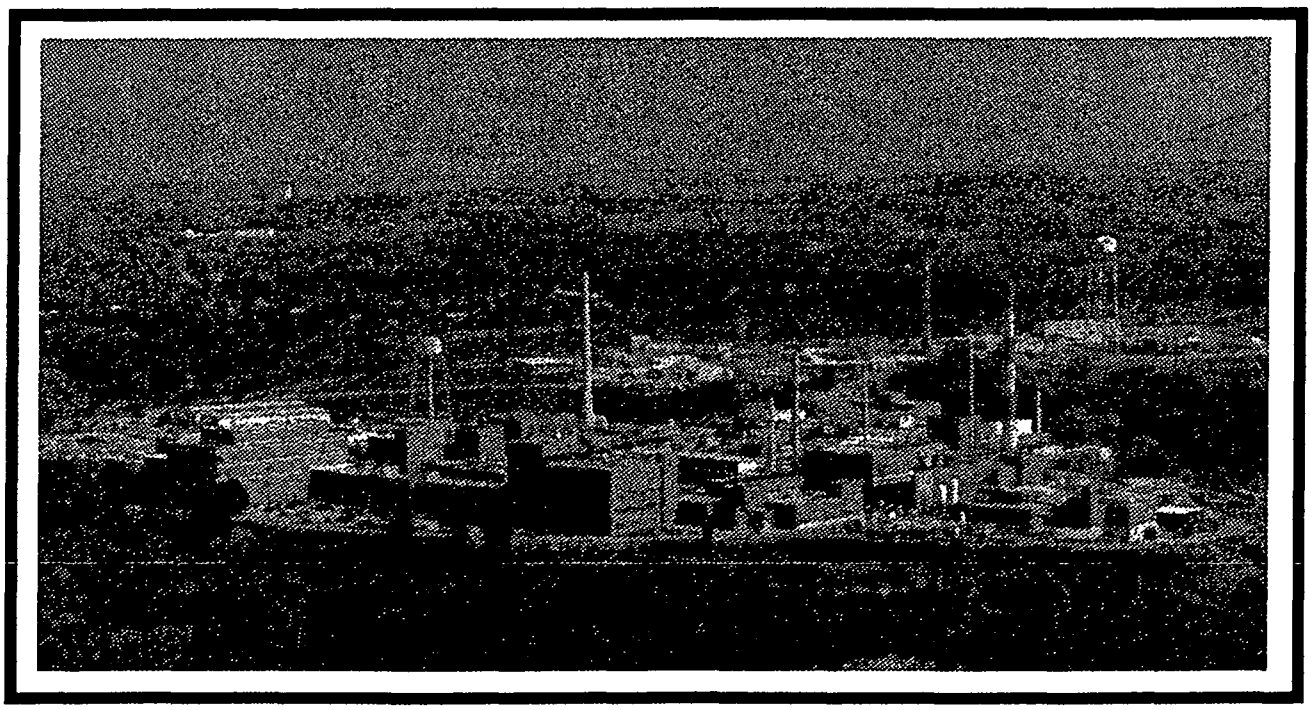
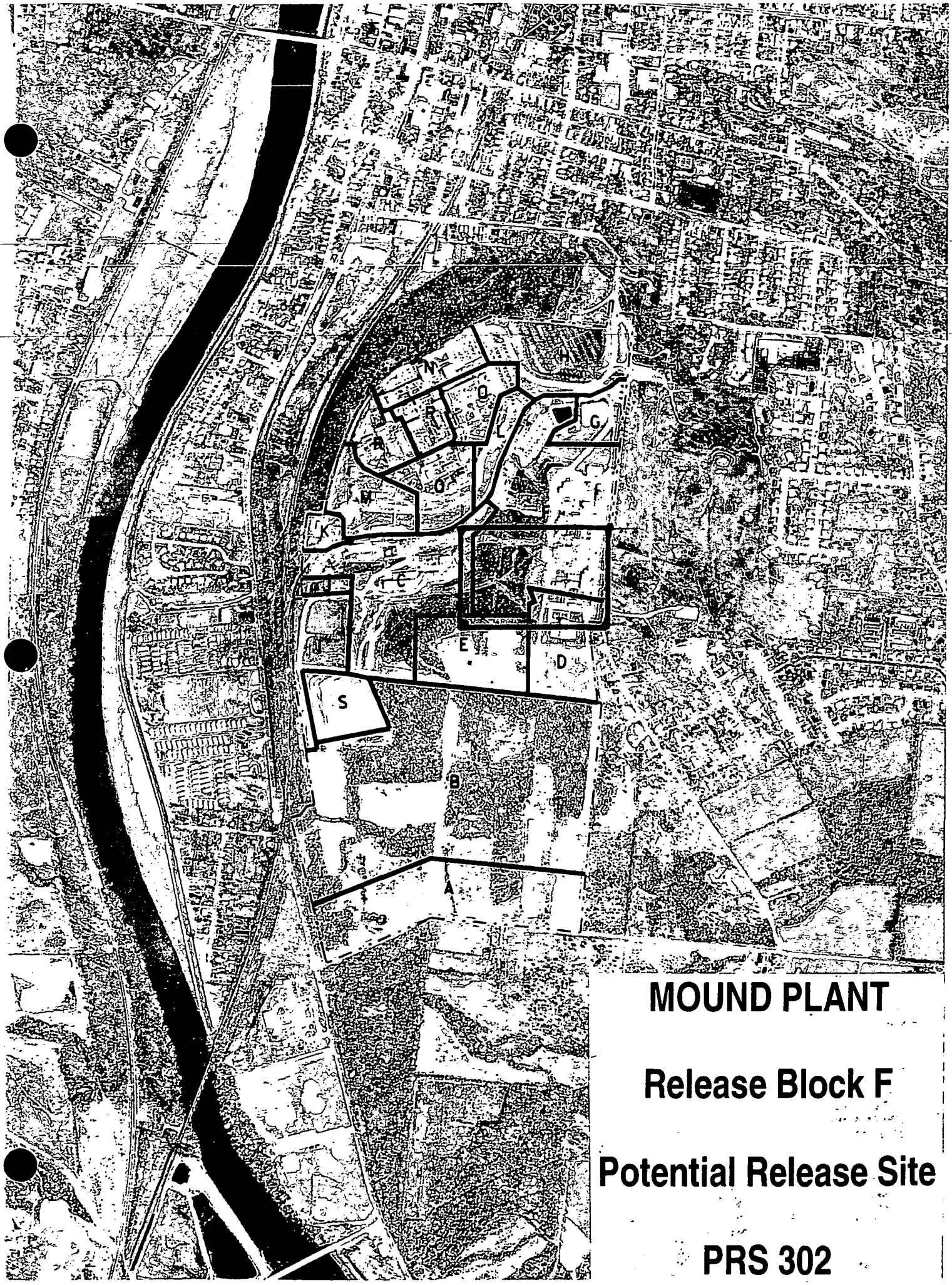
MOUND

Environmental
Restoration
Program

MOUND PLANT
Potential Release Site Package
PRS # 302





MOUND PLANT

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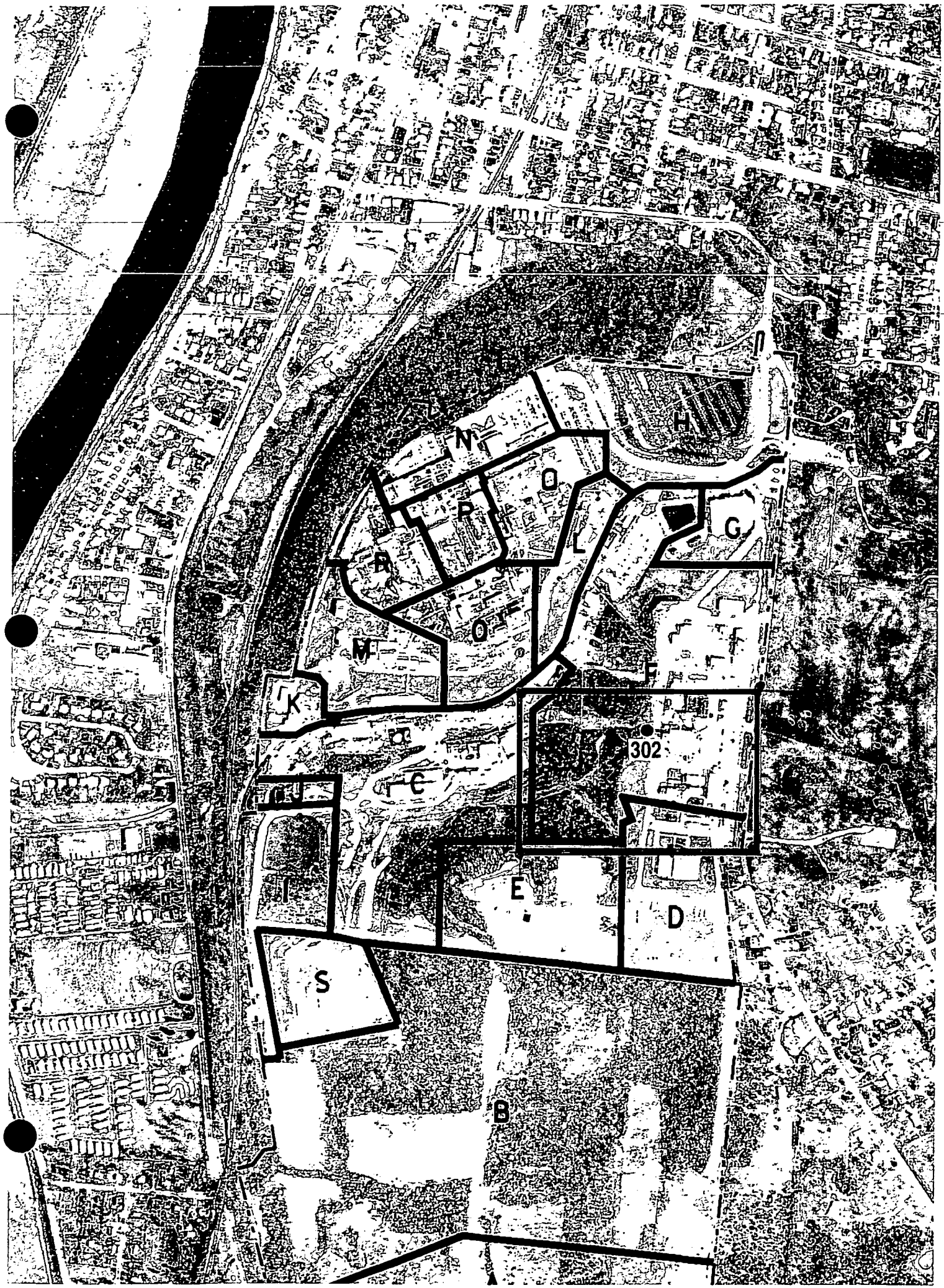
Potential Release Site

PRS 302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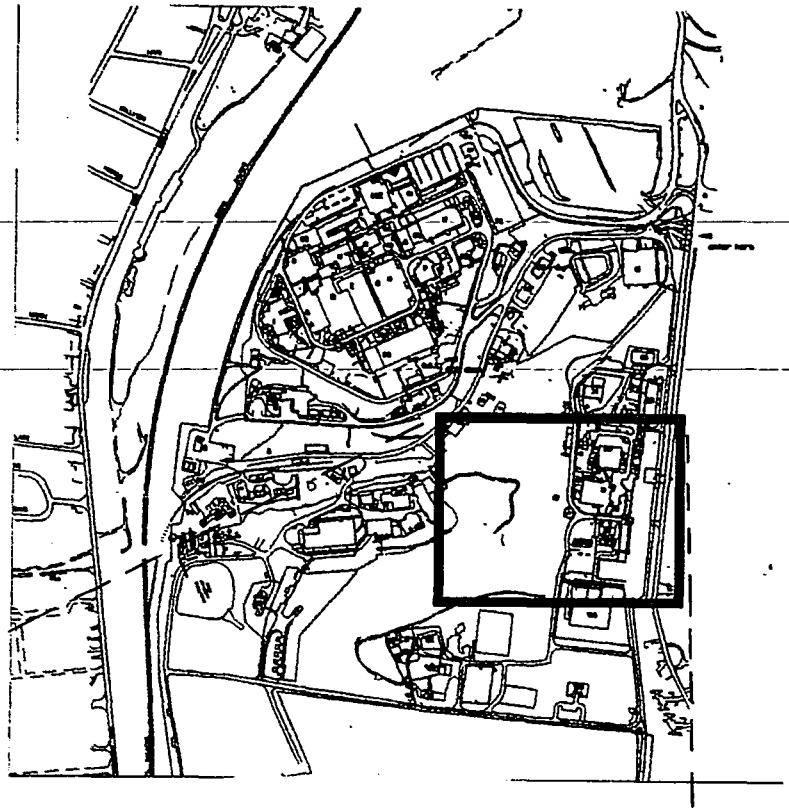
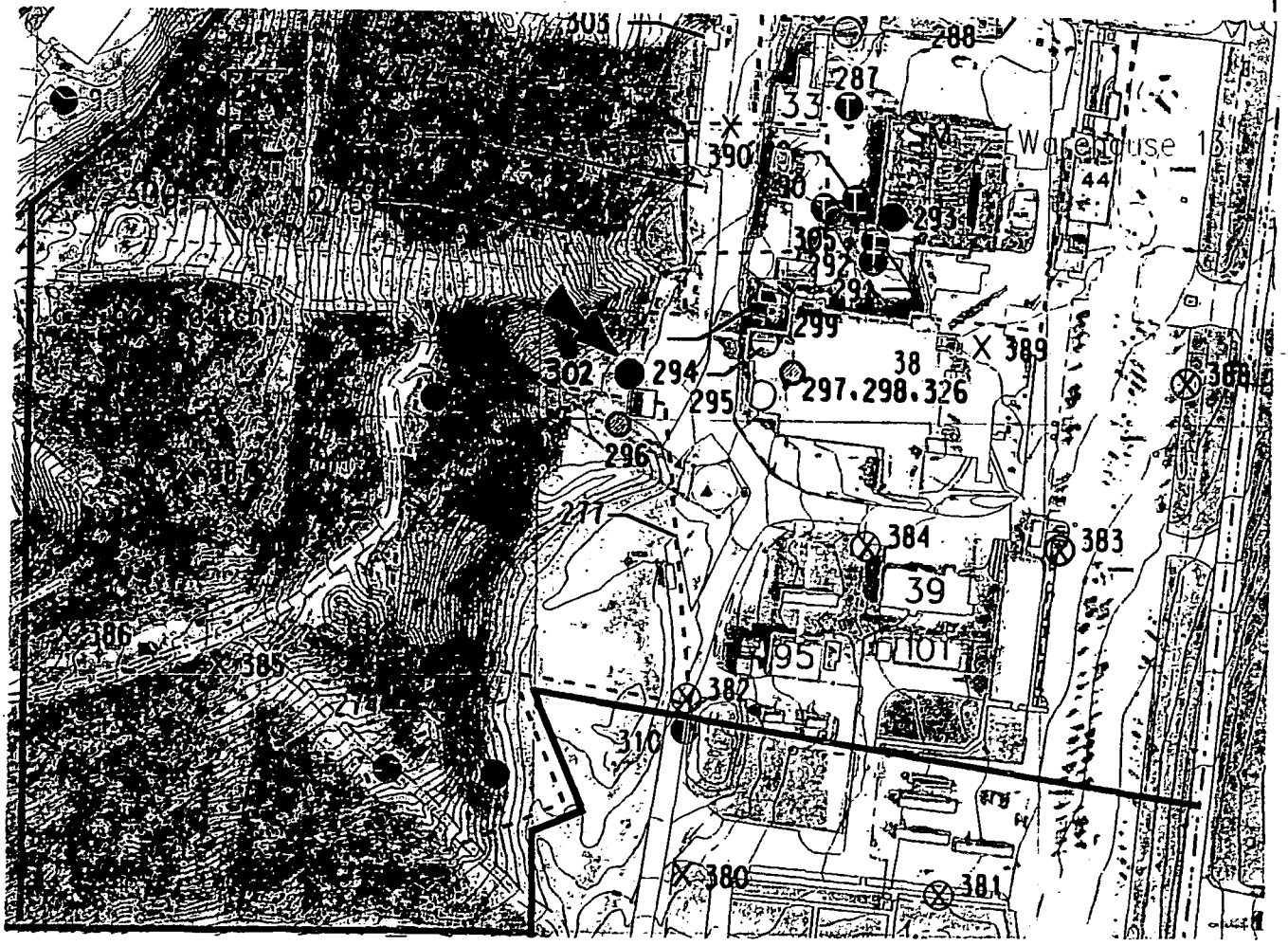
MOUND PLANT

Release Block F

Potential Release Site

PRS 302





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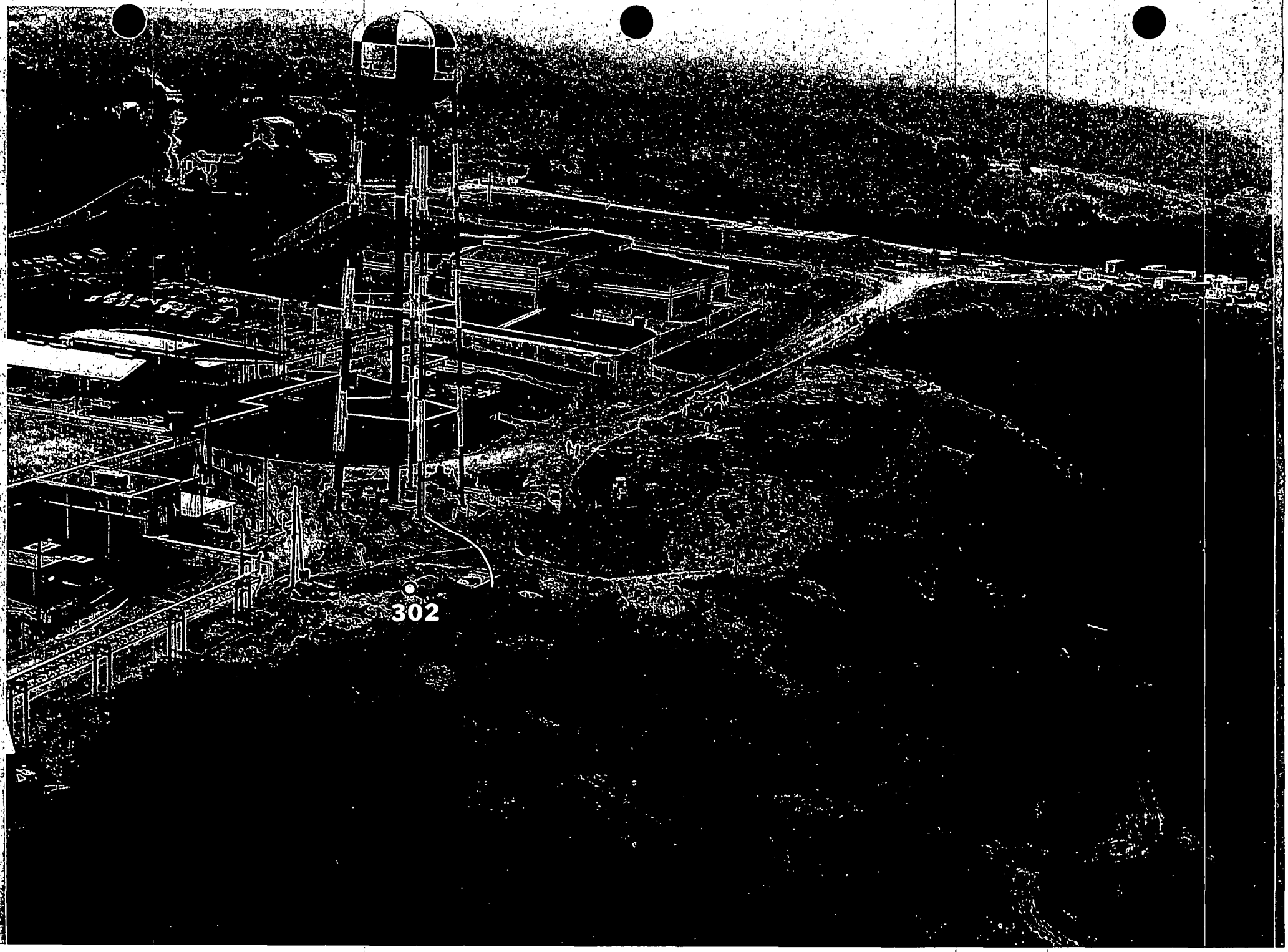
302

PRS 302

PRS HISTORY:

Potential Release Site (PRS) 302[1] was originally identified by the Comprehensive Environmental Assessment and Response Program Phase 1: Installation Assessment[2] as the Area D acid leach field. It is located west of Building 38 on the upper slope of the SM/PP Hill. Area D reportedly had dimensions of 30 by 80 feet[3], yet the leach field itself may have had dimensions of approximately 10 ft. by 10 ft.[6]

The leach field was placed in service in 1967 to catch spills from the plutonium processing facility in Building 38. Tanks inside Building 38, which contained nitric acid or caustic solutions, were surrounded by a metal tray to catch leaks or spills.[4] Any liquids in the tray were collected and routed through a pipe to the acid leach field, where limestone was provided to neutralize any acid. In 1987, the acid and caustic tanks routed to the leach field were taken out of service and the drainline capped.[4] No records of significant spills or releases exist.

In 1991, the leach bed and acid transfer line were removed by the Mound Decommission and Decontamination (D&D) Program. The drainline, limestone, and soils identified to be contaminated with plutonium-238 were removed and boxed for off-site disposal.[6]

CONTAMINATION:

Four separate investigations have been conducted at the Area D acid leach field, 2 reconnaissance surveys, a removal sampling, and a final verification survey. Reconnaissance sampling was performed by the Site Survey Project 1983-84[4] and by the Environmental Restoration Program in 1989.[5] Neither of the reconnaissance surveys detected radiological contaminants above their guideline values. The 1989 Reconnaissance sampling efforts included 20 samples in 5 boreholes for volatile and semi-volatile organic compounds, pesticides, and polychlorinated biphenals (PCBs), total metals and radiological parameters.[5] The study[5] detected only beryllium at 1.8 parts per million (ppm) compared to a guideline value of 0.70 ppm.

In October 1991, during decontamination and decommissioning activities in which the leach bed and drain line were removed, approximately 130 soil samples were screened for plutonium and thorium by the Mound Soil Screening Facility.[6] Results from this sampling found:

- Maximum plutonium-238 concentration 221 pCi/g.[6] The ALARA guideline criteria for plutonium-238 is 25 pCi/g.
- Thorium-232 concentrations were less than 6.5 pCi/g.[6] The guideline criteria for thorium-232 is 5 pCi/g (surface) and 15 pCi/g (subsurface).

In May 1993, verification samples were taken in the area of the acid leach field and drainline after decontamination and decommissioning. Samples were taken from 4 borehole locations at the leach field and 5 locations along the drainline.[6] Seventeen soil samples were collected from depths ranging from 1 to 10 feet and analyzed for volatile and semi-volatile organic compounds, pesticides and PCBs, total metals and radiological parameters.[6] Two contaminants were found in concentrations exceeding their guideline criteria. Beryllium was detected at 0.95 ppm and bismuth-207 at 0.19- 0.20 pCi/g were found[6] at concentrations exceeding their guideline values of 0.70 ppm and 0.175 pCi/g, respectively.

READING ROOM REFERENCES:

1) Operable Unit 9, Site Scoping Report: Volume 12 - Site Summary Report, December 1994. (pages 6-8)
2) Comprehensive Environmental Assessment and Response Program Phase 1: Installation Assessment, April 1986. (pages 9-10)
3) Operable Unit 9, Remedial Investigation/Feasibility Study, Site-Wide Work Plan, May 1992. (pages 11-12)
4) Operable Unit 9, Site Scoping Report: Volume 3 - Radiological Site Survey, June 1993. (pages 13-16)
5) Reconnaissance Sampling Report, Decontamination and Decommissioning Areas, Operable Unit 6, April 1992. (pages 17-31)
6) Decontamination and Decommissioning Program Operable Unit 6 Verification Report, OU6, Area D Acid Leach Bed and Drain Line, March 1994. (pages 32-94)

PREPARED BY:

James Booth, Member of EG&G Technical Staff

MOUND PLANT
PRS 302
AREA D - ACID LEACH FIELD

RECOMMENDATION:

PRS 302 was identified as the acid leach field, which was intended to neutralize acidic solutions spilled from a plutonium processing facility. In October 1991, the drain line, limestone (pit) and soil that were identified as being contaminated with plutonium-238 were removed and boxed for off-site disposal.

Verification samples were collected in 1993. Plutonium was below the Mound ALARA guideline of 25 pCi/g, and thorium was below the accepted regulatory standard of 5 pCi/g (surface) and 15 pCi/g (subsurface). All other contaminants were at or below the 10^{-6} Risk Based Guideline Value.

Therefore, PRS 302 requires NO FURTHER ASSESSMENT.

CONCURRENCE:

DOE/MB: Arthur W. Kleinrath, Remedial Project Manager — 10/3/96 (date)

USEPA: Timothy J. Fischer, Remedial Project Manager — 10/3/96 (date)

OEPA: Brian K. Nickel, Project Manager — 10/3/96 (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 302

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 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
300	Area 19, Underground Waste Transfer Line	G-6 G-7 G-8 G-9	Historical	Plutonium-238, Nitric acid	1, 4, 5, 18	Plutonium-238	S	1, 6, 18	14	Tables B.1, B.6, B.7, and B.8	6, 8
301	Building 38 In-Line Incinerator	G-9	Historical	Plutonium-238	2, 4	None Suspected D&D 1986			No Data - pending verification		
302	Area D, Acid Leach Field	H-8 H-9 G-8 G-9	Historical	Plutonium-238, Thorium	1, 4, 5, 18	Plutonium-238	S	6	4, 6 14	Tables B.6, B.7, and B.8 Table B.1 (Table IV.10 in Ref. 6)	8 6
303	Warehouse 14 (AKA Pad 14)	G- 9	Grounds	Thorium sludge constituents Plutonium-238	4	None Suspected			14	Table B.9 RSS[c] Locations C0127 and C0128 (Appendix E in Ref. 6)	6
304	Excavated Materials Disposal Area (AKA Rader's Hill)	I-8	Grounds	Thorium	4	Thorium < 2 pci/gm	S	6	14	Table B.1	6
305	SM Stack	G-9	In service	Plutonium-238	4	None suspected beyond routine emissions	A	4, 18	No Data		
306	SM/PP Hill Seep 0609	L-9	NA	None suspected	5, 18	None suspected			No Data		
[illegible]	Site Survey Project Potential Hot Spot Location C0007	E-9	Grounds	Thorium	6	Isolated activity from unknown source			14	Table B.9 (Appendix E in Ref. 6)	6
	Site Survey Project Potential Hot Spot Location C0028	F-10	Grounds	Thorium	6						
	Site Survey Project Potential Hot Spot Location S0307	F-9	Grounds	Thorium	6						
	Site Survey Project Potential Hot Spot Location S0647	H-9	Grounds	Cesium-137	6				15	Table B.9 (Appendix E in Ref. 6)	6

[a]Analyte List Codes
[b]SGS, Soil Gas Survey
[c]RSS, Radiological Site Survey

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

Reference List

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

ALBUQUERQUE OPERATIONS OFFICE
ENVIRONMENT, SAFETY AND HEALTH DIVISION
ENVIRONMENTAL PROGRAMS BRANCH

COMPREHENSIVE ENVIRONMENTAL ASSESSMENT AND RESPONSE PROGRAM

PHASE I:
INSTALLATION ASSESSMENT
MOUND

NOT FOR PUBLIC DISSEMINATION

May contain unclassified controlled nuclear information subject to Section 148 of the AEA, as amended (42 USC 2168). Approval by the Department of Energy prior to release is required.

April 1986

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Table V.1 (cont)

Area	Planned Future Actions (PFA)
C	Area C was a stagnant water area of about 150 ft in diameter. Lithium containers, probably containing residual lithium carbonate, were dumped in this area during the mid 1950s. Other wastes may have also been dumped in this area, however, the quantity of hazardous substances, if any, would have been limited. It appears that fill has been added to the area. An old warehouse was also located in this area. There is not sufficient information to make a definitive statement on the existence of hazardous substances at area C. (Interviews 1985.) CERCLA Finding--Positive for FFSDIF, PA, and PSI; however, there is not sufficient information to calculate a HRS Migration Mode Score. PFA--A CEARP Phase I supplemental reconnaissance field study will be conducted to determine the presence of hazardous substances and potential for ground water contamination. Based on the results of this study, appropriate action will be taken.
D	Area D served as the leach bed for plutonium operations in PP Bldg. The leach bed received caustic or acidic solutions with plutonium contamination. Residual hazardous substances in the leach bed are probably limited to radioactive contamination. The area is being evaluated under the Site Survey Program. (Interviews 1985; Site Survey Program 1985.) Due to the status of activities (i.e., CEARP Phase IV) a CERCLA finding under FFSDIF, PA, and PSI; and HRS and MHRS scoring are not appropriate for this site. PFA--Area D was submitted to and accepted by the USDOE Surplus Facilities Management Program (SFMP). SFMP remedial action is scheduled.
E	A single contractor waste oil dumping event (<5 gal) occurred in area E. Oil contaminated soil was removed and disposed at a USDOE disposal facility. (Interviews 1985.) CERCLA Finding--Negative for FFSDIF, PA, and PSI; therefore, a HRS Migration Mode Score is not calculated. PFA--No further action is warranted.
F	During 1966 a chromium plating bath (110 gal) was treated with sodium bisulfide and dumped in a trench at area F. The area is currently covered with an asphalt parking lot and the small amount residual chromium does not pose a health hazard. Additionally, the amount of material dumped is substantially below the 24 hour reportable quantity of 1,000 lbs for chromium. (Interviews 1985.) CERCLA Finding--Negative for FFSDIF, PA, and PSI; therefore, a HRS Migration Mode Score is not calculated. PFA--No further action is warranted.

ENVIRONMENTAL RESTORATION PROGRAM

REMEDIAL INVESTIGATION/FEASIBILITY STUDY
OPERABLE UNIT 9, SITE-WIDE
WORK PLAN

MOUND PLANT
MIAMISBURG, OHIO

February 1991

DEPARTMENT OF ENERGY

ALBUQUERQUE OPERATIONS OFFICE

ENVIRONMENTAL RESTORATION PROGRAM

TECHNICAL SUPPORT OFFICE

LOS ALAMOS NATIONAL LABORATORY

DRAFT
(REVISION 1)

The SM Building was used from 1960 to 1970 for special metallurgical studies (DOE 1986). Contaminants include plutonium-238 (10,000 pCi/g), thorium (9.99 pCi/g), and radium-226 (0.9 pCi/g) (DOE 1991c).

6.9. AREA 19, UNDERGROUND WASTE TRANSFER LINE (WASTE DISPOSAL PIPELINE)

Area 19 represents two (1.5-inch- and 2-inch-diameter) underground waste transfer lines that were used to transfer low-level and higher level plutonium-238 liquid waste from the SM/PP area on the east side of Mound Plant to the WD Building (Figure A.6). Use of the lines began in 1967. Both lines were approximately 1,800 ft long. The lines were flanged at 10-ft intervals and operated by gravity feed. Use of the low-level line was discontinued in September 1974, and use of the higher level line was discontinued in April 1976 because of leakage. The lines were removed by the Mound Plant D&D Program in 1986. Soils near the waste lines, contaminated with plutonium-238 by leakage, were excavated and removed as part of this remedial action. The target cleanup level was 25 pCi/g. The depth of the waste lines varied from about 4 ft to 17 ft at the crest of SM/PP Hill. This increase in depth was due to the presence of fill material.

6.10. AREA D, THE ACID LEACH FIELD

Area D served as a leach bed for plutonium processing operations in Building 38 (Figure A.6). Acid waste from Building 38 was released to the leach field, where naturally occurring limestone was used to neutralize the waste. Area D is fairly ill-defined and partially covered by fill dirt. The former leach field basically covers a 30-ft by 80-ft rectangle (2,400 ft^2) across the top of the SM/PP slope. It is contiguous with Area J and adjacent to Area 12 (both of Operable Unit 5). Mound personnel report that the leach field was used only sporadically; the exact dates of use are not known.

There have been no previous investigations in Area D; however, Area D is adjacent to Area 12, and the Mound Site Survey Project analyzed soil samples from Area 12. The levels of radioactive contaminants may be similar. Elevated levels of plutonium-238 (0.98 pCi/g) were found in the Area 12 samples (DOE 1991c).

6.11. OLD SANITARY WASTEWATER TREATMENT PLANT

The old sanitary wastewater treatment plant is located just west of the WD Building (Figure A.6). It was first used in 1948, taken out of service in 1975, and was replaced by the new sanitary wastewater treatment plant. The plant consisted of a pump room, primary settling tank, aeration tank, digester, chlorinator, and effluent baffle chamber. The system treated sanitary wastewater and some process effluent from the facility. Sources of wastewater included rest rooms, showers, laundry facilities, lab sinks, and rinse water from a metal-finishing operation. All treatment units are open-topped, in-

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

were taken at each location. Table IV.8 gives the locations and the sampling patterns. These locations were plotted on Plate 1; Area 19 was identified based on these locations. The verification sampling was apparently performed after the trench was backfilled. With a few exceptions, the Battelle report indicates that the greatest depth at which contamination typically exceeded 25 pCi/g before removal was approximately 3 to 4 ft (Stenhouse and Kirsch 1986). Assuming that the depth of the backfilled soil was, at a minimum, 3 ft, it is probable that three samples were taken of the backfill material at 1, 2, and possibly 3 ft. It is not known how much backfill was placed in the trench.

Table IV.9 gives the analytical results for the verification survey of Area 19. The plutonium-238 analyses were performed using a Phoswich™ detector coupled to a multichannel analyzer. The system was calibrated to detect the low-energy gamma emissions from plutonium-238, correcting for the presence of thorium-232 as necessary. The LDL for this system was 20 pCi/g for a 400-second count. Twenty-five, or 10 percent, of the samples were also radiochemically analyzed for plutonium-238 by an independent laboratory to confirm the Phoswich™ results. In general, the plutonium-238 levels measured by both methods were comparable, with some inconsistencies for samples containing thorium-232 or having a low sample weight (Stenhouse and Kirsch 1986).

The verification study concluded that more than 90 percent of the samples analyzed contained levels of plutonium-238/thorium-232 within one standard deviation of the 100 pCi/g cleanup level. Samples taken at test hole numbers 7, 14, 22, and 23 contained plutonium-238 in excess of 100 pCi/g (Table IV.9). Contaminated soil was removed from test hole numbers 14 and 22 (Tables IV.8 and IV.9) in September 1990 and was boxed and disposed of by the D&D Program. Samples taken of the excavation walls in 1990 showed plutonium-238 levels to be less than 100 pCi/g after the excavation was completed. This soil removal was documented in an internal Mound Plant memorandum (Rader 1990).

4.1.8. Area D

Area D is located on the SM/PP Hill, adjacent to Area 12, and is the location of an acid-leach field for Building 38, also know as the PP Building (Plate 1). The acid leach field was designed so that a pipe extending from trays holding polypropylene tanks containing nitric acid for use in plutonium-238 processing would release nitric acid to the acid leach field in the event of leaks or spills. The leach field contained limestone gravel/rocks that had been placed there in order to neutralize the nitric acid. Both the pipe and the limestone were below ground surface, but the exact depths are unknown.

One core location was sampled in the apparent vicinity of the Area D acid-leach field. This is location C0146 on Table IV.10 and location 0146 on Plate 1. No significant plutonium-238 or thorium activity

was detected in the samples from this location (a maximum of 0.98 pCi/g of plutonium-238 and less than 2 pCi/g of thorium).

Area D was not identified in the original Site Survey Project Report (Stought et al. 1988), but it has always been included as one of the sites to be addressed by the Mound Plant D&D Program. No significant radioactive contamination was identified during the Site Survey Project, either in the original report or by this evaluation. This is consistent with the site history for this area, which indicates that any nitric acid released would have been raw material prior to processing and, therefore, not contaminated. The D&D of Area D is being conducted as part of the D&D of Building 38 and its utility systems.

The maximum depth sampled in Area D was 180 inches. Borehole data in Mound Plant drawing #FSE16472, reproduced in the Site Scoping Report: Volume II Addendum (DOE 1992f) indicate that the depth to bedrock in this area of the SM/PP Hill ranges from approximately 108 to 228 inches, but this may vary greatly due to the presence of fill dirt. The boring log for location C0146 is not available, so it cannot be determined if bedrock was reached during the sampling.

4.1.9. Building 48 Hillside

A note in the Site Survey Project Report (Table 2.1 in Stought et al. 1988) indicated that elevated levels of plutonium-238 were discovered in an area designated as Block 19. The area of concern is actually located adjacent to a process sewer manhole northwest of Building 48 on the south slope of the Main Hill (Plate 1). This area is referred to as the Building 48 hillside in this report. The Building 48 hillside is also west of Area 5, but is not currently included in the boundaries of Area 5. Internal Mound Plant memoranda reviewed for this report substantiate the note in the project report (Stought et al. 1988) that plutonium-238 concentrations are as high as 32 nCi/g (Draper 1986a). The data sheets are included in Appendix E. The levels of plutonium-238 encountered required that the construction project be abandoned, so the initial holes were simply backfilled and the contamination left in place. The contamination encountered at the Building 48 hillside is attributed to a release of 7.64 mCi of plutonium-238 in November 1967. This incident is listed in the Site Scoping Report: Volume 11: Spills and Response Actions (DOE 1992h). As the Building 48 hillside is associated with the soils adjacent to the alpha waste water sewer lines, similar problems may be anticipated along the length of the lines. These lines are scheduled to undergo D&D.

Table IV.10. Mound Site Survey Project - Area D

Plate 1 Location[a]	Coordinates South	Coordinates West	MRC ID No.	Mo-Yr	Depth (inch)	Plutonium-238 (pCi/g)	Thorium[b] (pCi/g)	Cobalt-60 (pCi/g)	Cesium-137 (pCi/g)	Radium-226 (pCi/g)	Americium-241 (pCi/g)
C0146	2975	2465	1170	12-82	18	0.35	b				
			1171	12-82	36	0.98	b				
			1172	12-82	54	0.12	b				
			1173	12-82	72	0.36	b				
			1174	12-82	90	0.18	b				
			1175	12-82	108	0.21	b				
			1176	12-82	126	0.03	b				
			1177	12-82	144	0.05	b				
			1178	12-82	162	0.01	b				
			1179	12-82	180	0.03	b				

[a]Map locations are given using a "C" to designate core locations and an "S" to designate surface locations.
[b]A "b" indicates that the total thorium concentration was less than the background level of 2.0 pCi/g, using FIDLER screening. Therefore, radiochemical analysis was not performed.

FIDLER - field instrument for the detection of low-energy radiation

MRC ID - Monsanto Research Corporation Identification

pCi/g - picocuries per gram

pCi/mL - picocuries per milliliter

mp.
#9492210015
26-02-06

ENVIRONMENTAL RESTORATION PROGRAM

RECONNAISSANCE SAMPLING REPORT
DECONTAMINATION AND DECOMMISSIONING
AREAS, OPERABLE UNIT 6

MOUND PLANT
MIAMISBURG, OHIO

April 1992

DEPARTMENT OF ENERGY
ALBUQUERQUE FIELD OFFICE

ENVIRONMENTAL RESTORATION PROGRAM
TECHNICAL SUPPORT OFFICE
LOS ALAMOS NATIONAL LABORATORY

DRAFT FINAL
(Revision 0)

Table IV.1. Sample Identification (page 17 of 19)

Area D Sample Numbers

Area/Location/Sample	Depth (ft)	Analyte	Date	Activity[a]	Lab	Batch Number	Location Mound Coordinates		
							South	West	Ground Elevation
MND15-0101-0001	0.0-0.5	TAL metals	07/19/89	5.0/0.7	REA	35526	2971.97	2503.66	876.4
MND15-0101-0001	0.0-0.5	TCL volatile organics, TCL semivolatile organics, and pesticides/PCBs	08/02/89	0.2/0.5	REA	35548			
MND15-0101-0002	3.0-5.0	TAL metals	07/19/89	4.0/1.0	REA	35526			
MND15-0101-0002	3.0-5.0	TCL volatile organics, TCL semivolatile organics, and pesticides/PCBs	08/02/89	10/0.6	REA	35526			
MND15-0101-0003	8.0-9.5	TAL metals	07/19/89	13/0.7	REA	35526			
MND15-0101-0003	8.0-9.5	TCL volatile organics, TCL semivolatile organics, and pesticides/PCBs	08/02/89	6.0/1.0	REA	35526			
MND15-0101-0004	13.0-14.0	Total TCL and TAL[b]	08/02/89	4.0/0.7	REA	35526			
MND15-0102-0001	0.0-0.5	TAL metals	07/20/89	2.0/0.6	REA	35526	2960.81	2504.53	875.8
MND15-0102-0001	0.0-0.5	TCL volatile organics, TCL semivolatile organics, and pesticides/PCBs	08/02/89	0.0/0.5	REA	35548			
MND15-0102-0002	3.0-5.0	TAL metals	07/20/89	9.0/1.3	REA	35526			
MND15-0102-0002	3.0-5.0	TCL volatile organics, TCL semivolatile organics, and pesticides/PCBs	08/02/89	7.0/0.7	REA	35548			
MND15-0102-0003	8.0-10.0	TAL metals	07/20/89	1.0/0.3	REA	35526			
MND15-0102-0003	8.0-10.0	TCL volatile organics, TCL semivolatile organics, and pesticides/PCBs	08/02/89	2.0/0.3	REA	35548			
MND15-0102-0004	13.0-14.5	TAL metals	07/20/89	4.0/0.7	REA	35526			

Table IV.1. Sample Identification (page 18 of 19)

Area D Sample Numbers

Area/Location/Sample	Depth (ft)	Analyte	Date	Activity[a]	Lab	Batch Number	Location Mound Coordinates		
							South	West	Ground Elevation
MND15-0103-0001	0.0-0.5	TAL metals	07/20/89	8.0/0.6	REA	35526	2967.94	2514.14	875.7
MND15-0103-0001	0.0-0.5	TCL volatile organics, TCL semivolatile organics, and pesticides/PCBs	08/02/89	2.0/0.8	REA	35548			
MND15-0103-0002	3.0-5.0	TAL metals	07/20/89	3.0/0.4	REA	35526			
MND15-0103-0002	3.0-5.0	TCL volatile organics, TCL semivolatile organics, and pesticides/PCBs	08/02/89	7.0/0.5	REA	35548			
MND15-0103-0003	8.0-10.0	TAL metals	07/20/89	0.0/1.5	REA	35526			
MND15-0103-0003	8.0-10.0	TCL volatile organics, TCL semivolatile organics, and pesticides/PCBs	08/02/89	2.0/0.9	REA	35548			
MND15-0103-0004	13.0-14.5	TAL metals	07/20/89	6.0/0.6	REA	35526			
MND15-0103-0004	13.0-14.5	TCL volatile organics, TCL semivolatile organics, and pesticides/PCBs	08/02/89	8.0/0.5	REA	35548			
MND15-0104-0001	0.0-0.5	TAL metals	07/20/89	12/0.9	REA	35527	2959.65	2532.95	874.3
MND15-0104-0001	0.0-0.5	TCL volatile organics, TCL semivolatile organics, and pesticides/PCBs	08/02/89	5.0/0.6	REA	35548			
MND15-0104-0002	3.0-5.0	TAL metals	07/20/89	7.0/0.5	REA	35527			
MND15-0104-0002	3.0-5.0	TCL volatile organics, TCL semivolatile organics, and pesticides/PCBs	08/02/89	0.0/0.7	REA	35548			
MND15-0104-0003	8.0-10.0	TAL metals	07/20/89	6.0/0.8	REA	35527			
MND15-0104-0003	8.0-10.0	TCL volatile organics, TCL semivolatile organics, and pesticides/PCBs	08/02/89	1.0/0.3	REA	35548			
MND15-0104-0004	13.0-14.5	TAL metals	07/20/89	10/1.0	REA	35527			
MND15-0104-0004	13.0-14.5	TCL volatile organics, TCL semivolatile organics, and pesticides/PCBs	08/02/89	5.0/0 7	REA	35548			

Table IV.1. Sample Identification (page 19 of 19)

Area D Sample Numbers

Area/Location/Sample	Depth (ft)	Analyte	Date	Activity[a]	Lab	Batch Number	Location Mound Coordinates		
							South	West	Ground Elevation
MND15-0105-0001	0.0-0.5	TAL metals	07/20/89	11/0.7	REA	35527	2948.62	2503.93	874.9
MND15-0105-0001	0.0-0.5	TCL volatile organics, TCL semivolatile organics, and pesticides/PCBs	08/02/89	7.0/0.6	REA	35548			
MND15-0105-0002	3.0-5.0	TAL metals	07/21/89	3.0/0.9	REA	35527			
MND15-0105-0002	3.0-5.0	TCL volatile organics, TCL semivolatile organics, and pesticides/PCBs	08/02/89	3.0/0.7	REA	35548			
MND15-0105-0003	8.0-9.5	TAL metals	07/21/89	18/0.1	REA	35527			
MND15-0105-0003	8.0-9.5	TCL volatile organics, TCL semivolatile organics, and pesticides/PCBs	08/02/89	9.0/0.6	REA	35548			
MND15-0105-0004	13.0-14.0	TAL metals	07/21/89	3.0/0.7	REA	35527			
MND15-0105-0004	13.0-14.0	TCL volatile organics, TCL semivolatile organics, and pesticides/PCBs	08/02/89	6.0/0.7	REA	35548			

[a]Activity is in (pCi/g of Pu-238)/(pCi/g of Th-232). Samples were analyzed at the Mound Plant Soil Screening Facility.
[b]Total TCL and TAL is TCL volatile organics, TCL semivolatile organics, pesticides/PCBs, and TAL metals.

Note: The outflow was surveyed as 2978.65 south, 2497.94 west, with an elevation of 876.5 ft as a reference.

SOIL CHEMISTRY DATA
FACILITY: MND15 AREA D
07/19/89 TO 08/03/89
LOCATION: 0101
NORTH COORDINATE: 47028.03
EAST COORDINATE: 47496.34
REPORT DATE: 01/16/92

DEPTH RANGE (FT)	PARAMETER NAME	SAMP ID	SAMP TYPE	LOG DATE	UNITS OF MEASURE	PVQ	PARAMETER VALUE	DETECTION LIMIT	DILUTION FACTOR
0.0 - .5	ALUMINUM, TOTAL	0001	F	07/19/89	MG/KG	*	3770.	0.	1.
	ARSENIC, TOTAL	0001	F	07/19/89	MG/KG		4.9	0.	1.
	BARIUM, TOTAL	0001	F	07/19/89	MG/KG	*	230.	0.	1.
	BERYLLIUM	0001	F	07/19/89	MG/KG	B	.83	0.	1.
	CALCIUM, TOTAL	0001	F	07/19/89	MG/KG		96600.	0.	1.
	CHROMIUM, TOTAL	0001	F	07/19/89	MG/KG	N	14.2	0.	1.
	COBALT, TOTAL	0001	F	07/19/89	MG/KG	B	7.9	0.	1.
	COPPER, TOTAL	0001	F	07/19/89	MG/KG		9.9	0.	1.
	IRON, TOTAL	0001	F	07/19/89	MG/KG		9790.	0.	1.
	LEAD, TOTAL	0001	F	07/19/89	MG/KG		11.6	0.	1.
	MAGNESIUM, TOTAL	0001	F	07/19/89	MG/KG		31800.	0.	1.
	NICKEL, TOTAL	0001	F	07/19/89	MG/KG	N	27.7	0.	1.
	POTASSIUM, TOTAL	0001	F	07/19/89	MG/KG	B	686.	0.	1.
	SODIUM, TOTAL	0001	F	07/19/89	MG/KG	*	1080.	0.	1.
	VANADIUM, TOTAL	0001	F	07/19/89	MG/KG	E	18.1	0.	1.
	ZINC, TOTAL	0001	F	07/19/89	MG/KG	*	145.	0.	1.
	PLUTONIUM-238	0001	F	07/20/89	PCI/G		5.	-	-
	THORIUM-232	0001	F	07/20/89	PCI/G		.7	-	-
	PLUTONIUM-238	0001	F	08/02/89	PCI/G		0.	-	-
	THORIUM-232	0001	F	08/02/89	PCI/G		.5	-	-
3. - 5.	ALUMINUM, TOTAL	0002	F	07/20/89	MG/KG	*	8360.	0.	1.
	ARSENIC, TOTAL	0002	F	07/20/89	MG/KG		5.7	0.	1.
	BARIUM, TOTAL	0002	F	07/20/89	MG/KG	*	352.	0.	1.
	BERYLLIUM	0002	F	07/20/89	MG/KG	B	1.	0.	1.
	CALCIUM, TOTAL	0002	F	07/20/89	MG/KG		99600.	0.	1.
	CHROMIUM, TOTAL	0002	F	07/20/89	MG/KG	N	20.5	0.	1.
	COBALT, TOTAL	0002	F	07/20/89	MG/KG		12.8	0.	1.
	COPPER, TOTAL	0002	F	07/20/89	MG/KG		13.7	0.	1.
	IRON, TOTAL	0002	F	07/20/89	MG/KG		16100.	0.	1.
	LEAD, TOTAL	0002	F	07/20/89	MG/KG		14.4	0.	1.
	MAGNESIUM, TOTAL	0002	F	07/20/89	MG/KG		35500.	0.	1.
	NICKEL, TOTAL	0002	F	07/20/89	MG/KG	N	48.3	0.	1.
	PLUTONIUM-238	0002	F	07/20/89	PCI/G		4.	-	-
	POTASSIUM, TOTAL	0002	F	07/20/89	MG/KG		1430.	0.	1.
	SILVER, TOTAL	0002	F	07/20/89	MG/KG	N	2.5	0.	1.
	SODIUM, TOTAL	0002	F	07/20/89	MG/KG	*	1750.	0.	1.
	THORIUM-232	0002	F	07/20/89	PCI/G		1.0	-	-
	VANADIUM, TOTAL	0002	F	07/20/89	MG/KG	E	22.9	0.	1.
	ZINC, TOTAL	0002	F	07/20/89	MG/KG	*	230.	0.	1.
	PLUTONIUM-238	0002	F	08/02/89	PCI/G		10.	-	-
	THORIUM-232	0002	F	08/02/89	PCI/G		.6	-	-
8. - 9.5	ALUMINUM, TOTAL	0003	F	07/20/89	MG/KG	*	7570.	0.	1.
	ARSENIC, TOTAL	0003	F	07/20/89	MG/KG		5.9	0.	1.
	BARIUM, TOTAL	0003	F	07/20/89	MG/KG	*	320.	0.	1.
	BERYLLIUM	0003	F	07/20/89	MG/KG		.92	0.	1.
	CALCIUM, TOTAL	0003	F	07/20/89	MG/KG		111000.	0.	1.
	CHROMIUM, TOTAL	0003	F	07/20/89	MG/KG	N	17.2	0.	1.
	COBALT, TOTAL	0003	F	07/20/89	MG/KG		10.5	0.	1.
	COPPER, TOTAL	0003	F	07/20/89	MG/KG		10.1	0.	1.
	IRON, TOTAL	0003	F	07/20/89	MG/KG		14500.	0.	1.
	LEAD, TOTAL	0003	F	07/20/89	MG/KG		19.6	0.	1.
	MAGNESIUM, TOTAL	0003	F	07/20/89	MG/KG		26600.	0.	1.
	NICKEL, TOTAL	0003	F	07/20/89	MG/KG	N	32.2	0.	1.
	PLUTONIUM-238	0003	F	07/20/89	PCI/G		13.	-	-
	POTASSIUM, TOTAL	0003	F	07/20/89	MG/KG		1400.	0.	1.
	SODIUM, TOTAL	0003	F	07/20/89	MG/KG	*	1580.	0.	1.
	THORIUM-232	0003	F	07/20/89	PCI/G		.7	-	-
	VANADIUM, TOTAL	0003	F	07/20/89	MG/KG	E	20.2	0.	1.

METER VALUE QUALIFIERS (PVQ):
* = CONTROL LIMITS NOT APPLICABLE
B = PRESENT IN BLANK
N = PRS BLW DET LMT(J) NOT SPIKED
E = DET BEYOND CALIBRATION RANGE

SAMPLE TYPE CODES:
F = FIELD SAMPLE

SOIL CHEMISTRY DATA
FACILITY: MND15 AREA D
07/19/89 TO 08/03/89
LOCATION: 2102
NORTH COORDINATE: 99999999.99
EAST COORDINATE: 99999999.99
REPORT DATE: 01/16/92

DEPTH RANGE (FT)	PARAMETER NAME	SAMP ID	SAMP TYPE	LOG DATE	UNITS OF MEASURE	PVQ	PARAMETER VALUE	DETECTION LIMIT	DILUTION FACTOR
0.0 - .5	ALUMINUM, TOTAL	0001	F	07/20/89	MG/KG	•	2890.	0.	1.
	ARSENIC, TOTAL	0001	F	07/20/89	MG/KG		2.7	0.	1.
	BARIUM, TOTAL	0001	F	07/20/89	MG/KG	•	284.	0.	1.
	BERYLLIUM	0001	F	07/20/89	MG/KG		.88	0.	1.
	CALCIUM, TOTAL	0001	F	07/20/89	MG/KG		132000.	0.	1.
	CHROMIUM, TOTAL	0001	F	07/20/89	MG/KG	N	12.	0.	1.
	COBALT, TOTAL	0001	F	07/20/89	MG/KG		8.4	0.	1.
	COPPER, TOTAL	0001	F	07/20/89	MG/KG		7.9	0.	1.
	IRON, TOTAL	0001	F	07/20/89	MG/KG		7280.	0.	1.
	LEAD, TOTAL	0001	F	07/20/89	MG/KG		12.6	0.	1.
	MAGNESIUM, TOTAL	0001	F	07/20/89	MG/KG		51100.	0.	1.
	NICKEL, TOTAL	0001	F	07/20/89	MG/KG	N	21.1	0.	1.
	POTASSIUM, TOTAL	0001	F	07/20/89	MG/KG	B	641.	0.	1.
	SODIUM, TOTAL	0001	F	07/20/89	MG/KG	*	1440.	0.	1.
	THALLIUM, TOTAL	0001	F	07/20/89	MG/KG	B	.15	0.	1.
	VANADIUM, TOTAL	0001	F	07/20/89	MG/KG	E	19.6	0.	1.
	ZINC, TOTAL	0001	F	07/20/89	MG/KG	*	180.	0.	1.

PARAMETER VALUE QUALIFIERS (PVQ):
• = CONTROL LIMITS NOT APPLICABLE
N = PRS BLW DET LMT(J) NOT SPIKED
B = PRESENT IN BLANK
E = DET BEYOND CALIBRATION RANGE

SAMPLE TYPE CODES:
F = FIELD SAMPLE

DATA FILE NAME: SCI10001.DAT

SOIL CHEMISTRY DATA
FACILITY: MND15 AREA D
07/19/89 TO 08/03/89
LOCATION: 0105
NORTH COORDINATE: 47051.38
EAST COORDINATE: 47496.07
REPORT DATE: 01/16/92

DEPTH RANGE (FT)	PARAMETER NAME	SAMP ID	SAMP TYPE	LOG DATE	UNITS OF MEASURE	PVQ	PARAMETER VALUE	DETECTION LIMIT	DILUTION FACTOR
8.0 - 9.5	CHROMIUM, TOTAL	0003	F	07/21/89	MG/KG	E	23.	-	1.00
	COBALT, TOTAL	0003	F	07/21/89	MG/KG	B	8.5	-	1.00
	IRON, TOTAL	0003	F	07/21/89	MG/KG		8460.	-	1.00
	LEAD, TOTAL	0003	F	07/21/89	MG/KG		10.5	-	1.00
	MAGNESIUM, TOTAL	0003	F	07/21/89	MG/KG		22200.	-	1.00
	MANGANESE, TOTAL	0003	F	07/21/89	MG/KG		405.	-	1.00
	NICKEL, TOTAL	0003	F	07/21/89	MG/KG		23.8	-	1.00
8. - 9.5	PLUTONIUM-238	0003	F	07/21/89	PCI/G		18.	-	-
8.0 - 9.5	POTASSIUM, TOTAL	0003	F	07/21/89	MG/KG	B	1060.	-	1.00
	SODIUM, TOTAL	0003	F	07/21/89	MG/KG		1960.	-	1.00
8. - 9.5	THORIUM-232	0003	F	07/21/89	PCI/G		.1	-	-
8.0 - 9.5	VANADIUM, TOTAL	0003	F	07/21/89	MG/KG		26.3	-	1.00
	ZINC, TOTAL	0003	F	07/21/89	MG/KG		230.	-	1.00
8. - 10.	PLUTONIUM-238	0003	F	08/02/89	PCI/G		9.	-	-
	THORIUM-232	0003	F	08/02/89	PCI/G		.6	-	-
13.0 - 14.0	ALUMINUM, TOTAL	0004	F	07/21/89	MG/KG		12700.	-	1.00
	ARSENIC, TOTAL	0004	F	07/21/89	MG/KG		3.8	-	1.00
	ARSENIC, TOTAL	C004	LD	07/21/89	MG/KG		4.91	-	1.00
	BARIUM, TOTAL	0004	F	07/21/89	MG/KG		564.	-	1.00
	BERYLLIUM, TOTAL	0004	F	07/21/89	MG/KG		1.7	-	1.00
	CADMIUM, TOTAL	0004	F	07/21/89	MG/KG		3.9	-	1.00
	CALCIUM, TOTAL	0004	F	07/21/89	MG/KG		59500.	-	1.00
	CHROMIUM, TOTAL	0004	F	07/21/89	MG/KG	E	29.8	-	1.00
	COBALT, TOTAL	0004	F	07/21/89	MG/KG		16.5	-	1.00
	COPPER, TOTAL	0004	F	07/21/89	MG/KG		16.8	-	1.00
	IRON, TOTAL	0004	F	07/21/89	MG/KG		24800.	-	1.00
	LEAD, TOTAL	0004	F	07/21/89	MG/KG		10.4	-	1.00
	LEAD, TOTAL	C004	LD	07/21/89	MG/KG		9.22	-	1.00
	MAGNESIUM, TOTAL	0004	F	07/21/89	MG/KG		8690.	-	1.00
	MANGANESE, TOTAL	0004	F	07/21/89	MG/KG		545.	-	1.00
	MERCURY, TOTAL	0004	F	07/21/89	MG/KG		.13	-	1.00
	NICKEL, TOTAL	0004	F	07/21/89	MG/KG		41.1	-	1.00
13. - 14.	PLUTONIUM-238	0004	F	07/21/89	PCI/G		3.	-	-
13.0 - 14.0	POTASSIUM, TOTAL	0004	F	07/21/89	MG/KG		2170.	-	1.00
	POTASSIUM, TOTAL	C004	LD	07/21/89	MG/KG		2252.19	-	1.00
	SILVER, TOTAL	0004	F	07/21/89	MG/KG		3.9	-	1.00
	SODIUM, TOTAL	0004	F	07/21/89	MG/KG		2480.	-	1.00
13. - 14.	THORIUM-232	0004	F	07/21/89	PCI/G		.7	-	-
13.0 - 14.0	VANADIUM, TOTAL	0004	F	07/21/89	MG/KG		24.3	-	1.00
	ZINC, TOTAL	0004	F	07/21/89	MG/KG		342.	-	1.00
13. - 14.	PLUTONIUM-238	0004	F	08/02/89	PCI/G		6.	-	-
	THORIUM-232	0004	F	08/02/89	PCI/G		.7	-	-

PARAMETER VALUE QUALIFIERS (PVQ):
E = DET BEYOND CALIBRATION RANGE
B = PRESENT IN BLANK
• = CONTROL LIMITS NOT APPLICABLE

SAMPLE TYPE CODES:
F = FIELD SAMPLE
LD = LAB DUPLICATE

SOIL CHEMISTRY DATA
FACILITY: MND15 AREA D
07/19/89 TO 08/03/89
LOCATION: 0105
NORTH COORDINATE: 47051.38
EAST COORDINATE: 47496.07
REPORT DATE: 01/16/92

DEPTH RANGE (FT)	PARAMETER NAME	SAMP ID	SAMP TYPE	LOG DATE	UNITS OF MEASURE	PVQ	PARAMETER VALUE	DETECTION LIMIT	DILUTION FACTOR
0.0 - 0.5	ALUMINUM, TOTAL	0001	F	07/20/89	MG/KG		6670.	-	1.00
	ARSENIC, TOTAL	0001	F	07/20/89	MG/KG		4.3	-	1.00
	BARIUM, TOTAL	0001	F	07/20/89	MG/KG		361.	-	1.00
	BERYLLIUM, TOTAL	0001	F	07/20/89	MG/KG		1.5	-	1.00
	CADMIUM, TOTAL	0001	F	07/20/89	MG/KG		5.5	-	1.00
	CALCIUM, TOTAL	0001	F	07/20/89	MG/KG		112000.	-	1.00
	CHROMIUM, TOTAL	0001	F	07/20/89	MG/KG	E	27.4	-	1.00
	COBALT, TOTAL	0001	F	07/20/89	MG/KG		11.3	-	1.00
	COPPER, TOTAL	0001	F	07/20/89	MG/KG		10.7	-	1.00
	IRON, TOTAL	0001	F	07/20/89	MG/KG		14700.	-	1.00
	LEAD, TOTAL	0001	F	07/20/89	MG/KG		9.3	-	1.00
	MAGNESIUM, TOTAL	0001	F	07/20/89	MG/KG		29500.	-	1.00
	MANGANESE, TOTAL	0001	F	07/20/89	MG/KG		424.	-	1.00
	MERCURY, TOTAL	0001	F	07/20/89	MG/KG		.79	-	1.00
	NICKEL, TOTAL	0001	F	07/20/89	MG/KG		29.8	-	1.00
	POTASSIUM, TOTAL	0001	F	07/20/89	MG/KG		1520.	-	1.00
	SELENIUM, TOTAL	0001	F	07/20/89	MG/KG		5.3	-	1.00
	SODIUM, TOTAL	0001	F	07/20/89	MG/KG		1500.	-	1.00
	THALLIUM, TOTAL	0001	F	07/20/89	MG/KG	B	.31	-	1.00
	VANADIUM, TOTAL	0001	F	07/20/89	MG/KG		25.1	-	1.00
	ZINC, TOTAL	0001	F	07/20/89	MG/KG		225.	-	1.00
0.0 - .5	PLUTONIUM-238	0001	F	07/21/89	PCI/G		11.	-	-
	THORIUM-232	0001	F	07/21/89	PCI/G		.7	-	-
	PLUTONIUM-238	0001	F	08/02/89	PCI/G		7.	-	-
	THORIUM-232	0001	F	08/02/89	PCI/G		.6	-	-
3.0 - 5.0	ALUMINUM, TOTAL	0002	F	07/21/89	MG/KG		7020.	-	1.00
	ARSENIC, TOTAL	0002	F	07/21/89	MG/KG		5.1	-	1.00
	BARIUM, TOTAL	0002	F	07/21/89	MG/KG		391.	-	1.00
	BERYLLIUM, TOTAL	0002	F	07/21/89	MG/KG		1.7	-	1.00
	CADMIUM, TOTAL	0002	F	07/21/89	MG/KG		3.3	-	1.00
	CALCIUM, TOTAL	0002	F	07/21/89	MG/KG		232000.	-	1.00
	CHROMIUM, TOTAL	0002	F	07/21/89	MG/KG	E	23.6	-	1.00
	COBALT, TOTAL	0002	F	07/21/89	MG/KG		10.8	-	1.00
	COPPER, TOTAL	0002	F	07/21/89	MG/KG	B	2.2	-	1.00
	IRON, TOTAL	0002	F	07/21/89	MG/KG		13100.	-	1.00
	LEAD, TOTAL	0002	F	07/21/89	MG/KG		10.6	-	1.00
	MAGNESIUM, TOTAL	0002	F	07/21/89	MG/KG		10600.	-	1.00
	MANGANESE, TOTAL	0002	F	07/21/89	MG/KG		325.	-	1.00
	NICKEL, TOTAL	0002	F	07/21/89	MG/KG		26.2	-	1.00
3. - 5.	PLUTONIUM-238	0002	F	07/21/89	PCI/G		3.	-	-
3.0 - 5.0	POTASSIUM, TOTAL	0002	F	07/21/89	MG/KG		1540.	-	1.00
	SODIUM, TOTAL	0002	F	07/21/89	MG/KG		1800.	-	1.00
	THALLIUM, TOTAL	0002	F	07/21/89	MG/KG	B	.22	-	1.00
3. - 5.	THORIUM-232	0002	F	07/21/89	PCI/G		.9	-	-
3.0 - 5.0	VANADIUM, TOTAL	0002	F	07/21/89	MG/KG		26.2	-	1.00
	ZINC, TOTAL	0002	F	07/21/89	MG/KG		233.	-	1.00
3. - 5.	PLUTONIUM-238	0002	F	08/02/89	PCI/G		3.	-	-
	THORIUM-232	0002	F	08/02/89	PCI/G		.7	-	-
8.0 - 9.5	ALUMINUM, TOTAL	0003	F	07/21/89	MG/KG		3430.	-	1.00
	ARSENIC, TOTAL	0003	F	07/21/89	MG/KG		4.	-	1.00
	BARIUM, TOTAL	0003	F	07/21/89	MG/KG		408.	-	1.00
	BERYLLIUM, TOTAL	0003	F	07/21/89	MG/KG		1.6	-	1.00
	CADMIUM, TOTAL	0003	F	07/21/89	MG/KG		4.3	-	1.00
	CALCIUM, TOTAL	0003	F	07/21/89	MG/KG		271000.	-	1.00

METER VALUE QUALIFIERS (PVQ):
E = DET BEYOND CALIBRATION RANGE
B = PRESENT IN BLANK

SAMPLE TYPE CODES:
F = FIELD SAMPLE

SOIL CHEMISTRY DATA
FACILITY: MND15 AREA D
07/19/89 TO 08/03/89
LOCATION: 0104
NORTH COORDINATE: 47040.35
EAST COORDINATE: 47467.05
REPORT DATE: 01/16/92

DEPTH RANGE (FT)	PARAMETER NAME	SAMP ID	SAMP TYPE	LOG DATE	UNITS OF MEASURE	PVQ	PARAMETER VALUE	DETECTION LIMIT	DILUTION FACTOR
8. - 10.	SODIUM, TOTAL	0003	F	07/20/89	MG/KG	*	1660.	0.	1.
	THORIUM-232	0003	F	07/20/89	PCI/G		.8	-	-
	VANADIUM, TOTAL	0003	F	07/20/89	MG/KG	E	16.9	0.	1.
	ZINC, TOTAL	0003	F	07/20/89	MG/KG	*	244.	0.	1.
13. - 13.5	PLUTONIUM-238	0004	F	08/02/89	PCI/G		5.	-	-
	THORIUM-232	0004	F	08/02/89	PCI/G		.7	-	-
13. - 14.5	ALUMINUM, TOTAL	0004	F	07/20/89	MG/KG	*	12500.	0.	1.
	ARSENIC, TOTAL	0004	F	07/20/89	MG/KG		3.9	0.	1.
	BARIUM, TOTAL	0004	F	07/20/89	MG/KG	*	323.	0.	1.
	BERYLLIUM	0004	F	07/20/89	MG/KG		1.1	0.	1.
	CALCIUM, TOTAL	0004	F	07/20/89	MG/KG		63900.	0.	1.
	CHROMIUM, TOTAL	0004	F	07/20/89	MG/KG	N	18.3	0.	1.
	COBALT, TOTAL	0004	F	07/20/89	MG/KG		13.1	0.	1.
	COPPER, TOTAL	0004	F	07/20/89	MG/KG		12.1	0.	1.
	IRON, TOTAL	0004	F	07/20/89	MG/KG		20900.	0.	1.
	LEAD, TOTAL	0004	F	07/20/89	MG/KG		14.4	0.	1.
	MAGNESIUM, TOTAL	0004	F	07/20/89	MG/KG		5130.	0.	1.
	NICKEL, TOTAL	0004	F	07/20/89	MG/KG	N	32.	0.	1.
	PLUTONIUM-238	0004	F	07/20/89	PCI/G		10.	-	-
	POTASSIUM, TOTAL	0004	F	07/20/89	MG/KG		2000.	0.	1.
	SILVER, TOTAL	0004	F	07/20/89	MG/KG	N	2.	0.	1.
	SODIUM, TOTAL	0004	F	07/20/89	MG/KG	*	1560.	0.	1.
	THORIUM-232	0004	F	07/20/89	PCI/G		1.0	-	-
	VANADIUM, TOTAL	0004	F	07/20/89	MG/KG	E	19.5	0.	1.
	ZINC, TOTAL	0004	F	07/20/89	MG/KG	*	216.	0.	1.

PARAMETER VALUE QUALIFIERS (PVQ):
* = CONTROL LIMITS NOT APPLICABLE
E = DET BEYOND CALIBRATION RANGE
N = PRS BLW DET LMT(J) NOT SPIKED

SAMPLE TYPE CODES:
F = FIELD SAMPLE

SOIL CHEMISTRY DATA
FACILITY: MND15 AREA D
07/19/89 TO 08/03/89
LOCATION: 0104
NORTH COORDINATE: 47040.35
EAST COORDINATE: 47467.05
REPORT DATE: 01/16/92

DEPTH RANGE (FT)	PARAMETER NAME	SAMP ID	SAMP TYPE	LOG DATE	UNITS OF MEASURE	PVQ	PARAMETER VALUE	DETECTION LIMIT	DILUTION FACTOR
0.0 - .5	ALUMINUM, TOTAL	0001	F	07/20/89	MG/KG	*	8010.	0.	1.
	ARSENIC, TOTAL	0001	F	07/20/89	MG/KG		8.6	0.	1.
	BARIUM, TOTAL	0001	F	07/20/89	MG/KG	*	310.	0.	1.
	BERYLLIUM	0001	F	07/20/89	MG/KG		.99	0.	1.
	CALCIUM, TOTAL	0001	F	07/20/89	MG/KG		26200.	0.	1.
	CHROMIUM, TOTAL	0001	F	07/20/89	MG/KG	N	16.6	0.	1.
	COBALT, TOTAL	0001	F	07/20/89	MG/KG		11.7	0.	1.
	COPPER, TOTAL	0001	F	07/20/89	MG/KG		13.8	0.	1.
	IRON, TOTAL	0001	F	07/20/89	MG/KG		15600.	0.	1.
	LEAD, TOTAL	0001	F	07/20/89	MG/KG		18.3	0.	1.
	MAGNESIUM, TOTAL	0001	F	07/20/89	MG/KG		11300.	0.	1.
	NICKEL, TOTAL	0001	F	07/20/89	MG/KG	N	29.2	0.	1.
	PLUTONIUM-238	0001	F	07/20/89	PCI/G		12.	-	-
	POTASSIUM, TOTAL	0001	F	07/20/89	MG/KG	B	808.	0.	1.
	SILVER, TOTAL	0001	F	07/20/89	MG/KG	N	3.6	0.	1.
	SODIUM, TOTAL	0001	F	07/20/89	MG/KG	*	1270.	0.	1.
	THORIUM-232	0001	F	07/20/89	PCI/G		.9	-	-
	VANADIUM, TOTAL	0001	F	07/20/89	MG/KG	E	20.4	0.	1.
	ZINC, TOTAL	0001	F	07/20/89	MG/KG	*	188.	0.	1.
	PLUTONIUM-238	0001	F	08/02/89	PCI/G		5.	-	-
	THORIUM-232	0001	F	08/02/89	PCI/G		.6	-	-
3. - 5.	ALUMINUM, TOTAL	0002	F	07/20/89	MG/KG	*	5620.	0.	1.
	ARSENIC, TOTAL	0002	F	07/20/89	MG/KG		11.7	0.	1.
	BARIUM, TOTAL	0002	F	07/20/89	MG/KG	*	329.	0.	1.
	BERYLLIUM	0002	F	07/20/89	MG/KG		1.	0.	1.
	CALCIUM, TOTAL	0002	F	07/20/89	MG/KG		155000.	0.	1.
	CHROMIUM, TOTAL	0002	F	07/20/89	MG/KG	N	15.1	0.	1.
	COBALT, TOTAL	0002	F	07/20/89	MG/KG	B	10.4	0.	1.
	COPPER, TOTAL	0002	F	07/20/89	MG/KG		5.9	0.	1.
	IRON, TOTAL	0002	F	07/20/89	MG/KG		12000.	0.	1.
	LEAD, TOTAL	0002	F	07/20/89	MG/KG		11.5	0.	1.
	MAGNESIUM, TOTAL	0002	F	07/20/89	MG/KG		33200.	0.	1.
	NICKEL, TOTAL	0002	F	07/20/89	MG/KG	N	27.9	0.	1.
	PLUTONIUM-238	0002	F	07/20/89	PCI/G		7.	-	-
	POTASSIUM, TOTAL	0002	F	07/20/89	MG/KG	B	973.	0.	1.
	SODIUM, TOTAL	0002	F	07/20/89	MG/KG	*	1550.	0.	1.
	THORIUM-232	0002	F	07/20/89	PCI/G		.5	-	-
	VANADIUM, TOTAL	0002	F	07/20/89	MG/KG	E	21.2	0.	1.
	ZINC, TOTAL	0002	F	07/20/89	MG/KG	*	212.	0.	1.
	ENDRIN KETONE	0002	F	08/02/89	UG/KG		20.	18.	1.
	PLUTONIUM-238	0002	F	08/02/89	PCI/G		0.	-	-
	THORIUM-232	0002	F	08/02/89	PCI/G		.7	-	-
8. - 9.5	PLUTONIUM-238	0003	F	08/02/89	PCI/G		1.	-	-
	THORIUM-232	0003	F	08/02/89	PCI/G		.3	-	-
8. - 10.	ALUMINUM, TOTAL	0003	F	07/20/89	MG/KG	*	6010.	0.	1.
	BARIUM, TOTAL	0003	F	07/20/89	MG/KG	*	332.	0.	1.
	BERYLLIUM	0003	F	07/20/89	MG/KG		.98	0.	1.
	CALCIUM, TOTAL	0003	F	07/20/89	MG/KG		194000.	0.	1.
	CHROMIUM, TOTAL	0003	F	07/20/89	MG/KG	N	7.3	0.	1.
	COBALT, TOTAL	0003	F	07/20/89	MG/KG		10.8	0.	1.
	COPPER, TOTAL	0003	F	07/20/89	MG/KG	B	2.9	0.	1.
	IRON, TOTAL	0003	F	07/20/89	MG/KG		13900.	0.	1.
	LEAD, TOTAL	0003	F	07/20/89	MG/KG		7.3	0.	1.
	MAGNESIUM, TOTAL	0003	F	07/20/89	MG/KG		19600.	0.	1.
	NICKEL, TOTAL	0003	F	07/20/89	MG/KG	N	29.9	0.	1.
	PLUTONIUM-238	0003	F	07/20/89	PCI/G		6.	-	-
	POTASSIUM, TOTAL	0003	F	07/20/89	MG/KG		1340.	0.	1.

PARAMETER VALUE QUALIFIERS (PVQ):
* = CONTROL LIMITS NOT APPLICABLE
[illegible] = PRS BLW DET LMT(J) NOT SPIKED
B = PRESENT IN BLANK
E = DET BEYOND CALIBRATION RANGE

SAMPLE TYPE CODES:
F = FIELD SAMPLE

SOIL CHEMISTRY DATA
FACILITY: MND15 AREA D
07/19/89 TO 08/03/89
LOCATION: 0103
NORTH COORDINATE: 47032.06
EAST COORDINATE: 47485.86
REPORT DATE: 01/16/92

DEPTH RANGE (FT)	PARAMETER NAME	SAMP ID	SAMP TYPE	LOG DATE	UNITS OF MEASURE	PVQ	PARAMETER VALUE	DETECTION LIMIT	DILUTION FACTOR
8. - 10.	SODIUM, TOTAL	0003	F	07/20/89	MG/KG	*	1830.	0.	1.
	THORIUM-232	0003	F	07/20/89	PCI/G		1.5	-	-
	VANADIUM, TOTAL	0003	F	07/20/89	MG/KG	E	26.4	0.	1.
	ZINC, TOTAL	0003	F	07/20/89	MG/KG	*	261.	0.	1.
13. - 14.5	ALUMINUM, TOTAL	0004	F	07/20/89	MG/KG	*	12000.	0.	1.
	BARIUM, TOTAL	0004	F	07/20/89	MG/KG	*	319.	0.	1.
	BERYLLIUM	0004	F	07/20/89	MG/KG		1.1	0.	1.
	CALCIUM, TOTAL	0004	F	07/20/89	MG/KG		15000.	0.	1.
	CHROMIUM, TOTAL	0004	F	07/20/89	MG/KG	N	16.	0.	1.
	COBALT, TOTAL	0004	F	07/20/89	MG/KG		11.9	0.	1.
	COPPER, TOTAL	0004	F	07/20/89	MG/KG		12.7	0.	1.
	IRON, TOTAL	0004	F	07/20/89	MG/KG		20300.	0.	1.
	LEAD, TOTAL	0004	F	07/20/89	MG/KG		4.4	0.	1.
	MAGNESIUM, TOTAL	0004	F	07/20/89	MG/KG		3330.	0.	1.
	NICKEL, TOTAL	0004	F	07/20/89	MG/KG	N	31.6	0.	1.
	PLUTONIUM-238	0004	F	07/20/89	PCI/G		6.	-	-
	POTASSIUM, TOTAL	0004	F	07/20/89	MG/KG		1220.	0.	1.
	SILVER, TOTAL	0004	F	07/20/89	MG/KG	N	2.9	0.	1.
	SODIUM, TOTAL	0004	F	07/20/89	MG/KG	*	1430.	0.	1.
	THORIUM-232	0004	F	07/20/89	PCI/G		.6	-	-
	VANADIUM, TOTAL	0004	F	07/20/89	MG/KG	E	16.	0.	1.
	ZINC, TOTAL	0004	F	07/20/89	MG/KG	*	200.	0.	1.
	BETA-BHC	0004	F	08/02/89	UG/KG		12.	10.	1.
	PLUTONIUM-238	0004	F	08/02/89	PCI/G		8.	-	-
	THORIUM-232	0004	F	08/02/89	PCI/G		.5	-	-

PARAMETER VALUE QUALIFIERS (PVQ):
* = CONTROL LIMITS NOT APPLICABLE
E = DET BEYOND CALIBRATION RANGE
N = PRS BLW DET LMT(J) NOT SPIKED

SAMPLE TYPE CODES:
F = FIELD SAMPLE

SOIL CHEMISTRY DATA
FACILITY: MND15 AREA D
07/19/89 TO 08/03/89
LOCATION: 0103
NORTH COORDINATE: 47032.06
EAST COORDINATE: 47485.86
REPORT DATE: 01/16/92

DEPTH RANGE (FT)	PARAMETER NAME	SAMP ID	SAMP TYPE	LOG DATE	UNITS OF MEASURE	PVQ	PARAMETER VALUE	DETECTION LIMIT	DILUTION FACTOR
0.0 - .5	ALUMINUM, TOTAL	0001	F	07/20/89	MG/KG	*	9400.	0.	1.
	ARSENIC, TOTAL	0001	F	07/20/89	MG/KG		8.2	0.	1.
	BARIUM, TOTAL	0001	F	07/20/89	MG/KG	*	274.	0.	1.
	BERYLLIUM	0001	F	07/20/89	MG/KG		1.1	0.	1.
	CALCIUM, TOTAL	0001	F	07/20/89	MG/KG		88400.	0.	1.
	CHROMIUM, TOTAL	0001	F	07/20/89	MG/KG	N	21.5	0.	1.
	COBALT, TOTAL	0001	F	07/20/89	MG/KG		12.7	0.	1.
	COPPER, TOTAL	0001	F	07/20/89	MG/KG		12.5	0.	1.
	IRON, TOTAL	0001	F	07/20/89	MG/KG		18800.	0.	1.
	LEAD, TOTAL	0001	F	07/20/89	MG/KG		25.4	0.	1.
	MAGNESIUM, TOTAL	0001	F	07/20/89	MG/KG		14000.	0.	1.
	NICKEL, TOTAL	0001	F	07/20/89	MG/KG	N	32.2	0.	1.
	PLUTONIUM-238	0001	F	07/20/89	PCI/G		8.	-	-
	POTASSIUM, TOTAL	0001	F	07/20/89	MG/KG		1460.	0.	1.
	SODIUM, TOTAL	0001	F	07/20/89	MG/KG	*	1220.	0.	1.
	THORIUM-232	0001	F	07/20/89	PCI/G		.6	-	-
	VANADIUM, TOTAL	0001	F	07/20/89	MG/KG	E	20.5	0.	1.
	ZINC, TOTAL	0001	F	07/20/89	MG/KG	*	177.	0.	1.
	PLUTONIUM-238	0001	F	08/02/89	PCI/G		2.	-	-
	THORIUM-232	0001	F	08/02/89	PCI/G		.8	-	-
3. - 5.	ALUMINUM, TOTAL	0002	F	07/20/89	MG/KG	*	7960.	0.	1.
	ARSENIC, TOTAL	0002	F	07/20/89	MG/KG		4.6	0.	1.
	BARIUM, TOTAL	0002	F	07/20/89	MG/KG	*	400.	0.	1.
	BERYLLIUM	0002	F	07/20/89	MG/KG		1.	0.	1.
	CALCIUM, TOTAL	0002	F	07/20/89	MG/KG		42700.	0.	1.
	CHROMIUM, TOTAL	0002	F	07/20/89	MG/KG	N	17.	0.	1.
	COBALT, TOTAL	0002	F	07/20/89	MG/KG		9.7	0.	1.
	COPPER, TOTAL	0002	F	07/20/89	MG/KG		14.1	0.	1.
	IRON, TOTAL	0002	F	07/20/89	MG/KG		13300.	0.	1.
	LEAD, TOTAL	0002	F	07/20/89	MG/KG		14.7	0.	1.
	MAGNESIUM, TOTAL	0002	F	07/20/89	MG/KG		16900.	0.	1.
	NICKEL, TOTAL	0002	F	07/20/89	MG/KG	N	25.4	0.	1.
	PLUTONIUM-238	0002	F	07/20/89	PCI/G		3.	-	-
	POTASSIUM, TOTAL	0002	F	07/20/89	MG/KG		1670.	0.	1.
	SILVER, TOTAL	0002	F	07/20/89	MG/KG	N	3.6	0.	1.
	SODIUM, TOTAL	0002	F	07/20/89	MG/KG	*	1610.	0.	1.
	THORIUM-232	0002	F	07/20/89	PCI/G		.4	-	-
	VANADIUM, TOTAL	0002	F	07/20/89	MG/KG	E	20.3	0.	1.
	ZINC, TOTAL	0002	F	07/20/89	MG/KG	*	222.	0.	1.
	PLUTONIUM-238	0002	F	08/02/89	PCI/G		7.	-	-
	THORIUM-232	0002	F	08/02/89	PCI/G		.5	-	-
8. - 9.5	PLUTONIUM-238	0003	F	08/02/89	PCI/G		2.	-	-
	THORIUM-232	0003	F	08/02/89	PCI/G		.9	-	-
8. - 10.	ALUMINUM, TOTAL	0003	F	07/20/89	MG/KG	*	22400.	0.	1.
	ARSENIC, TOTAL	0003	F	07/20/89	MG/KG		9.9	0.	1.
	BARIUM, TOTAL	0003	F	07/20/89	MG/KG	*	388.	0.	1.
	BERYLLIUM	0003	F	07/20/89	MG/KG		1.8	0.	1.
	CALCIUM, TOTAL	0003	F	07/20/89	MG/KG		32800.	0.	1.
	CHROMIUM, TOTAL	0003	F	07/20/89	MG/KG	N	27.3	0.	1.
	COBALT, TOTAL	0003	F	07/20/89	MG/KG		20.1	0.	1.
	COPPER, TOTAL	0003	F	07/20/89	MG/KG		20.4	0.	1.
	IRON, TOTAL	0003	F	07/20/89	MG/KG		37800.	0.	1.
	LEAD, TOTAL	0003	F	07/20/89	MG/KG		25.7	0.	1.
	MAGNESIUM, TOTAL	0003	F	07/20/89	MG/KG		57200.	0.	1.
	NICKEL, TOTAL	0003	F	07/20/89	MG/KG	N	54.6	0.	1.
	PLUTONIUM-238	0003	F	07/20/89	PCI/G		0.	-	-
	POTASSIUM, TOTAL	0003	F	07/20/89	MG/KG		2390.	0.	1.
	SILVER, TOTAL	0003	F	07/20/89	MG/KG	N	4.3	0.	1.

METER VALUE QUALIFIERS (PVQ):
* = CONTROL LIMITS NOT APPLICABLE
N = PRS BLW DET LMT(J) NOT SPIKED
E = DET BEYOND CALIBRATION RANGE

SAMPLE TYPE CODES:
F = FIELD SAMPLF

SOIL CHEMISTRY DATA
FACILITY: MND15 AREA D
07/19/89 TO 08/03/89
LOCATION: 0102
NORTH COORDINATE: 47039.19
EAST COORDINATE: 47495.47
REPORT DATE: 01/16/92

DEPTH RANGE (FT)	PARAMETER NAME	SAMP ID	SAMP TYPE	LOG DATE	UNITS OF MEASURE	PVQ	PARAMETER VALUE	DETECTION LIMIT	DILUTION FACTOR
8. - 10.	ZINC, TOTAL	0003	F	07/20/89	MG/KG	*	195.	0.	1.
	PLUTONIUM-238	0003	F	08/02/89	PCI/G		2.	-	-
	THORIUM-232	0003	F	08/02/89	PCI/G		.3	-	-
13. - 14.5	ALUMINUM, TOTAL	0004	F	07/20/89	MG/KG	*	8360.	0.	1.
	ARSENIC, TOTAL	0004	F	07/20/89	MG/KG		5.3	0.	1.
	BARIUM, TOTAL	0004	F	07/20/89	MG/KG	*	378.	0.	1.
	BERYLLIUM	0004	F	07/20/89	MG/KG		1.2	0.	1.
	CALCIUM, TOTAL	0004	F	07/20/89	MG/KG		117000.	0.	1.
	CHROMIUM, TOTAL	0004	F	07/20/89	MG/KG	N	19.9	0.	1.
	COBALT, TOTAL	0004	F	07/20/89	MG/KG		14.8	0.	1.
	COPPER, TOTAL	0004	F	07/20/89	MG/KG		15.4	0.	1.
	IRON, TOTAL	0004	F	07/20/89	MG/KG		27400.	0.	1.
	LEAD, TOTAL	0004	F	07/20/89	MG/KG		14.5	0.	1.
	MAGNESIUM, TOTAL	0004	F	07/20/89	MG/KG		14500.	0.	1.
	NICKEL, TOTAL	0004	F	07/20/89	MG/KG	N	38.5	0.	1.
	PLUTONIUM-238	0004	F	07/20/89	PCI/G		4.	-	-
	POTASSIUM, TOTAL	0004	F	07/20/89	MG/KG		1450.	0.	1.
	SODIUM, TOTAL	0004	F	07/20/89	MG/KG	*	1700.	0.	1.
	THORIUM-232	0004	F	07/20/89	PCI/G		.7	-	-
	VANADIUM, TOTAL	0004	F	07/20/89	MG/KG	E	19.8	0.	1.
	ZINC, TOTAL	0004	F	07/20/89	MG/KG	•	228.	0.	1.

PARAMETER VALUE QUALIFIERS (PVQ):
• = CONTROL LIMITS NOT APPLICABLE
N = PRS BLW DET LMT(J) NOT SPIKED
E = DET BEYOND CALIBRATION RANGE

SAMPLE TYPE CODES:
F = FIELD SAMPLE

SOIL CHEMISTRY DATA
FACILITY: MND15 AREA D
07/19/89 TO 08/03/89
LOCATION: 0102
NORTH COORDINATE: 47039.19
EAST COORDINATE: 47495.47
REPORT DATE: 01/16/92

DEPTH RANGE (FT)	PARAMETER NAME	SAMP ID	SAMP TYPE	LOG DATE	UNITS OF MEASURE	PVQ	PARAMETER VALUE	DETECTION LIMIT	DILUTION FACTOR
0.0 - .5	ALUMINUM, TOTAL	0001	F	07/20/89	MG/KG	•	3060.	0.	1.
	ARSENIC, TOTAL	0001	F	07/20/89	MG/KG		5.2	0.	1.
	BARIUM, TOTAL	0001	F	07/20/89	MG/KG	*	316.	0.	1.
	BERYLLIUM	0001	F	07/20/89	MG/KG	B	.89	0.	1.
	CALCIUM, TOTAL	0001	F	07/20/89	MG/KG		124000.	0.	1.
	CHROMIUM, TOTAL	0001	F	07/20/89	MG/KG	N	15.3	0.	1.
	COBALT, TOTAL	0001	F	07/20/89	MG/KG	B	7.9	0.	1.
	COPPER, TOTAL	0001	F	07/20/89	MG/KG		6.3	0.	1.
	IRON, TOTAL	0001	F	07/20/89	MG/KG		6730.	0.	1.
	LEAD, TOTAL	0001	F	07/20/89	MG/KG		16.3	0.	1.
	MAGNESIUM, TOTAL	0001	F	07/20/89	MG/KG		41600.	0.	1.
	NICKEL, TOTAL	0001	F	07/20/89	MG/KG	N	25.6	0.	1.
	PLUTONIUM-238	0001	F	07/20/89	PCI/G		2.	-	-
	POTASSIUM, TOTAL	0001	F	07/20/89	MG/KG	B	747.	0.	1.
	SODIUM, TOTAL	0001	F	07/20/89	MG/KG	*	1610.	0.	1.
	THORIUM-232	0001	F	07/20/89	PCI/G		.6	-	-
	VANADIUM, TOTAL	0001	F	07/20/89	MG/KG	E	20.3	0.	1.
	ZINC, TOTAL	0001	F	07/20/89	MG/KG	*	204.	0.	1.
	PLUTONIUM-238	0001	F	08/02/89	PCI/G		0.	-	-
	THORIUM-232	0001	F	08/02/89	PCI/G		.5	-	-
3. - 5.	ALUMINUM, TOTAL	0002	F	07/20/89	MG/KG	*	8690.	0.	1.
	ARSENIC, TOTAL	0002	F	07/20/89	MG/KG		8.4	0.	1.
	BARIUM, TOTAL	0002	F	07/20/89	MG/KG	•	446.	0.	1.
	BERYLLIUM	0002	F	07/20/89	MG/KG		1.2	0.	1.
	CALCIUM, TOTAL	0002	F	07/20/89	MG/KG		59600.	0.	1.
	CHROMIUM, TOTAL	0002	F	07/20/89	MG/KG	N	20.	0.	1.
	COBALT, TOTAL	0002	F	07/20/89	MG/KG		13.	0.	1.
	COPPER, TOTAL	0002	F	07/20/89	MG/KG		16.7	0.	1.
	IRON, TOTAL	0002	F	07/20/89	MG/KG		18500.	0.	1.
	LEAD, TOTAL	0002	F	07/20/89	MG/KG		6.2	0.	1.
	MAGNESIUM, TOTAL	0002	F	07/20/89	MG/KG		26200.	0.	1.
	NICKEL, TOTAL	0002	F	07/20/89	MG/KG	N	38.2	0.	1.
	PLUTONIUM-238	0002	F	07/20/89	PCI/G		9.	-	-
	POTASSIUM, TOTAL	0002	F	07/20/89	MG/KG	B	1130.	0.	1.
	SILVER, TOTAL	0002	F	07/20/89	MG/KG	N	4.3	0.	1.
	SODIUM, TOTAL	0002	F	07/20/89	MG/KG	•	2050.	0.	1.
	THORIUM-232	0002	F	07/20/89	PCI/G		1.3	-	-
	VANADIUM, TOTAL	0002	F	07/20/89	MG/KG	E	21.5	0.	1.
	ZINC, TOTAL	0002	F	07/20/89	MG/KG	*	260.	0.	1.
	PLUTONIUM-238	0002	F	08/02/89	PCI/G		7.	-	-
	THORIUM-232	0002	F	08/02/89	PCI/G		.7	-	-
8. - 10.	ALUMINUM, TOTAL	0003	F	07/20/89	MG/KG	•	5030.	0.	1.
	ARSENIC, TOTAL	0003	F	07/20/89	MG/KG		4.	0.	1.
	BARIUM, TOTAL	0003	F	07/20/89	MG/KG	*	318.	0.	1.
	BERYLLIUM	0003	F	07/20/89	MG/KG		.98	0.	1.
	CALCIUM, TOTAL	0003	F	07/20/89	MG/KG		178000.	0.	1.
	CHROMIUM, TOTAL	0003	F	07/20/89	MG/KG	N	10.9	0.	1.
	COBALT, TOTAL	0003	F	07/20/89	MG/KG		10.1	0.	1.
	COPPER, TOTAL	0003	F	07/20/89	MG/KG		4.9	0.	1.
	IRON, TOTAL	0003	F	07/20/89	MG/KG		12500.	0.	1.
	LEAD, TOTAL	0003	F	07/20/89	MG/KG		8.9	0.	1.
	MAGNESIUM, TOTAL	0003	F	07/20/89	MG/KG		25900.	0.	1.
	NICKEL, TOTAL	0003	F	07/20/89	MG/KG	N	25.5	0.	1.
	PLUTONIUM-238	0003	F	07/20/89	PCI/G		1.	-	-
	POTASSIUM, TOTAL	0003	F	07/20/89	MG/KG		970.	0.	1.
	SODIUM, TOTAL	0003	F	07/20/89	MG/KG	*	1660.	0.	1.
	THORIUM-232	0003	F	07/20/89	PCI/G		.3	-	-
	VANADIUM, TOTAL	0003	F	07/20/89	MG/KG	E	18.9	0.	1.

PARAMETER VALUE QUALIFIERS (PVQ):
* = CONTROL LIMITS NOT APPLICABLE
B = PRESENT IN BLANK
N = PRS BLW DET LMT(J) NOT SPIKED
E = DET BEYOND CALIBRATION RANGE

SAMPLE TYPE CODES:
F = FIELD SAMPLE

SOIL CHEMISTRY DATA
FACILITY: MND15 AREA D
07/19/89 TO 08/03/89
LOCATION: 0101
NORTH COORDINATE: 47028.03
EAST COORDINATE: 47496.34
REPORT DATE: 01/16/92

DEPTH RANGE (FT)	PARAMETER NAME	SAMP ID	SAMP TYPE	LOG DATE	UNITS OF MEASURE	PVQ	PARAMETER VALUE	DETECTION LIMIT	DILUTION FACTOR
8. - 9.5	ZINC, TOTAL	0003	F	07/20/89	MG/KG	*	209.	0.	1.
8. - 10.	PLUTONIUM-238	0003	F	08/02/89	PCI/G		6.	-	-
	THORIUM-232	0003	F	08/02/89	PCI/G		1.0	-	-
13. - 14.	PLUTONIUM-238	0004	F	07/20/89	PCI/G		13.	-	-
	THORIUM-232	0004	F	07/20/89	PCI/G		.2	-	-
	PLUTONIUM-238	0004	F	08/02/89	PCI/G		4.	-	-
	THORIUM-232	0004	F	08/02/89	PCI/G		.7	-	-

PARAMETER VALUE QUALIFIERS (PVQ):
* = CONTROL LIMITS NOT APPLICABLE

SAMPLE TYPE CODES:
F = FIELD SAMPLE

ENVIRONMENTAL RESTORATION PROGRAM

#9407270001
26-02-12-0

DECONTAMINATION AND DECOMMISSIONING PROGRAM
OPERABLE UNIT SIX VERIFICATION REPORT
OU6 AREA D ACID LEACH BED AND DRAIN LINE

MOUND PLANT
MIAMISBURG, OHIO

FINAL

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

Prepared By:

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MARCH 1994

1. INTRODUCTION

This Verification Report (VR) discusses the verification sampling and analysis activities that were conducted in Operable Unit 6 (OU6), Area D to determine if the Decontamination and Decommissioning (D&D) operations accomplished in the area had successfully removed all radioactively contaminated soils that contained plutonium-238 (Pu^{238}) and thorium-228/230/232 ($Th^{228/230/232}$) at concentrations above DOE cleanup criteria, other radioactive isotopes included in the analysis were uranium-234/235/238 ($U^{234/235/238}$), americium-241 (Am^{241}), cobalt-60 (Co^{60}), cesium-137 (Cs^{137}), bismuth-207/210m ($Bi^{207/210m}$), radium-226 (Ra^{226}), and tritium (H^3). This report describes the radioactive and non-radioactive (chemical) contamination that remains in the area following the D&D operations. This VR also discusses the field sampling activities, laboratory analyses, data validation, data analysis and quality assurance procedures that were employed to ensure the resulting data met the data quality objectives of the OU6, Area D Sampling and Analysis Plan (SAP) (DOE 1993a), the OU6 Verification Work Plan (VWP) (DOE 1992a) and the OU6 Quality Assurance Project Plan (QAPjP) (DOE 1992c).

1.1. PURPOSE OF THE VERIFICATION ACTIVITY

The purpose of the verification activity in OU6, Area D can be summarized as follows:

- verify that the cleanup of radioactively contaminated soils in Area D accomplished by the Mound Plant D&D Program is complete (i.e., concentrations of Pu^{238} are below 25 pCi/g (as low as reasonably achievable (ALARA) level) and $Th^{228/230/232}$ are below 5 pCi/g surface, 15 pCi/g subsurface (15 centimeters or greater beneath the land surface), respectively;

- determine if Area D soils contain radioactive and/or chemical contaminants in sufficient concentrations to be considered a source of such contaminants (i.e., contaminant concentrations high enough to pose a mobility threat to down-gradient areas);

- provide sufficient information to determine the types and concentrations (i.e., the nature) of chemical and radiological contaminants remaining in Area D soils following D&D cleanup, and determine laterally and vertically (i.e., the extent), within the sampling zone, where any detectable contaminants may exist in Area D soils following the D&D cleanup efforts; and

- provide remedial investigation (RI) quality data (data that meets CERCLA-based data quality objectives (DQOs) for the site) to address any residual radioactive and chemical contaminants remaining in Area D soils following D&D to support a future feasibility study, risk assessment and Record of Decision (ROD) for OU6.

1.2. SCOPE OF THE VERIFICATION ACTIVITY

The scope of work for the verification sampling in Area D involved the collection of sub-surface soil samples from four different sampling intervals (measured in feet from the point where the former acid

drain line exited the Plutonium Processing (PP) Building) as follows: (1) a maximum of four samples from three soil borings in the 10- to 20-foot interval; (2) an estimated four samples from a single boring in the 20- to 30-foot interval; (3) an estimated four samples from a single boring in the 30- to 40-foot interval; and (4) a maximum of four samples from the 100- to 110-foot interval. Follow-on sampling and analysis efforts were included in the scope of the verification sampling if the results indicated that additional field work was needed to determine the nature and extent of the residual contamination remaining in Area D soils following the D&D cleanup. Additional sampling/analyses activities were also included if unusual conditions, such as unusual odors or discolored or stained soils, were encountered during the verification activities.

1.3. INTRODUCTORY BACKGROUND

Established in 1946, the present Mound Plant is an integrated research, development, and production facility that operates in support of United States Department of Energy (DOE) weapons and energy programs. The Mound Plant is located partly within the city limits of Miamisburg, Ohio, approximately 15 miles southwest of Dayton, Ohio (see Figure 1.1). The plant property encompasses 306 acres and is situated on two hills separated by a northeast-southwest trending valley that is a tributary to the Great Miami River. The Mound Plant is operated by EG&G Mound Applied Technologies, under contract to DOE. The facility manufactures non-nuclear components and tritium-containing components for nuclear weapons. It also develops small heat sources, which are fueled by various radioactive isotopes, for space and defense programs.

1.3.1. Area Description

Area D consists of a former acid leach bed and associated drainpipe leading from the PP Building (Building 38) and is located on the upper slope of the Special Metallurgical/Plutonium Processing (SM/PP) Hill (see Figure 1.2.). The leach bed was constructed to treat concentrated nitric acid and dilute nitric acid solution spills from tanks (reagent-grade acid system) located in the preparation room of the PP Building. These tanks were surrounded by a metal tray to catch leaks or spills. Any spills or leaks were routed through an iron pipe that directed the liquid from beneath the building to the leach bed. The pipe was approximately 110 feet long and was buried three to nine feet below the surface. The leach bed, which was placed in service in 1967, had a surface area of approximately 10 feet by 10 feet and contained approximately one-half ton of crushed limestone to neutralize the acid solutions.

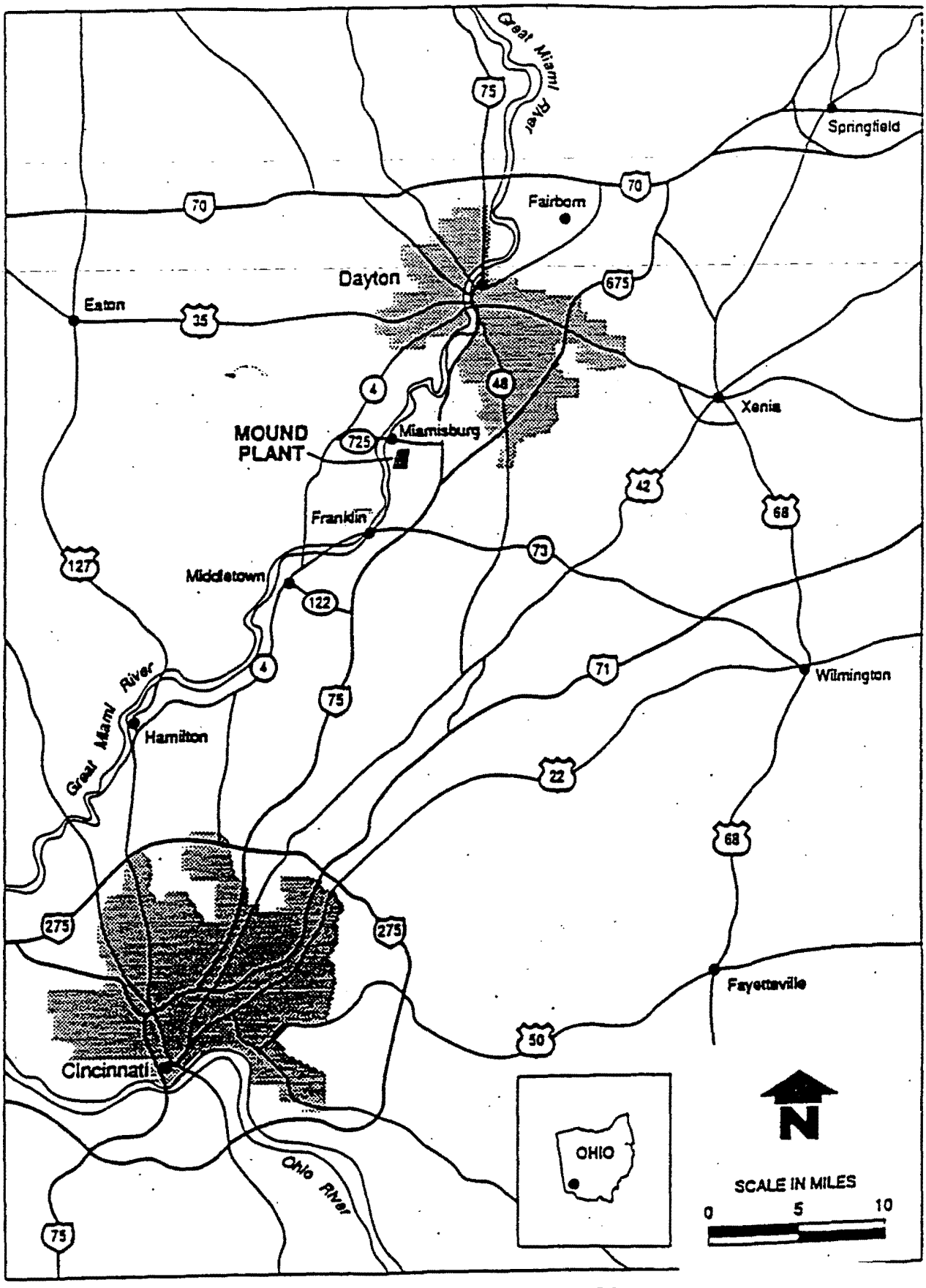

Figure 1.1. Mound Plant Location Map

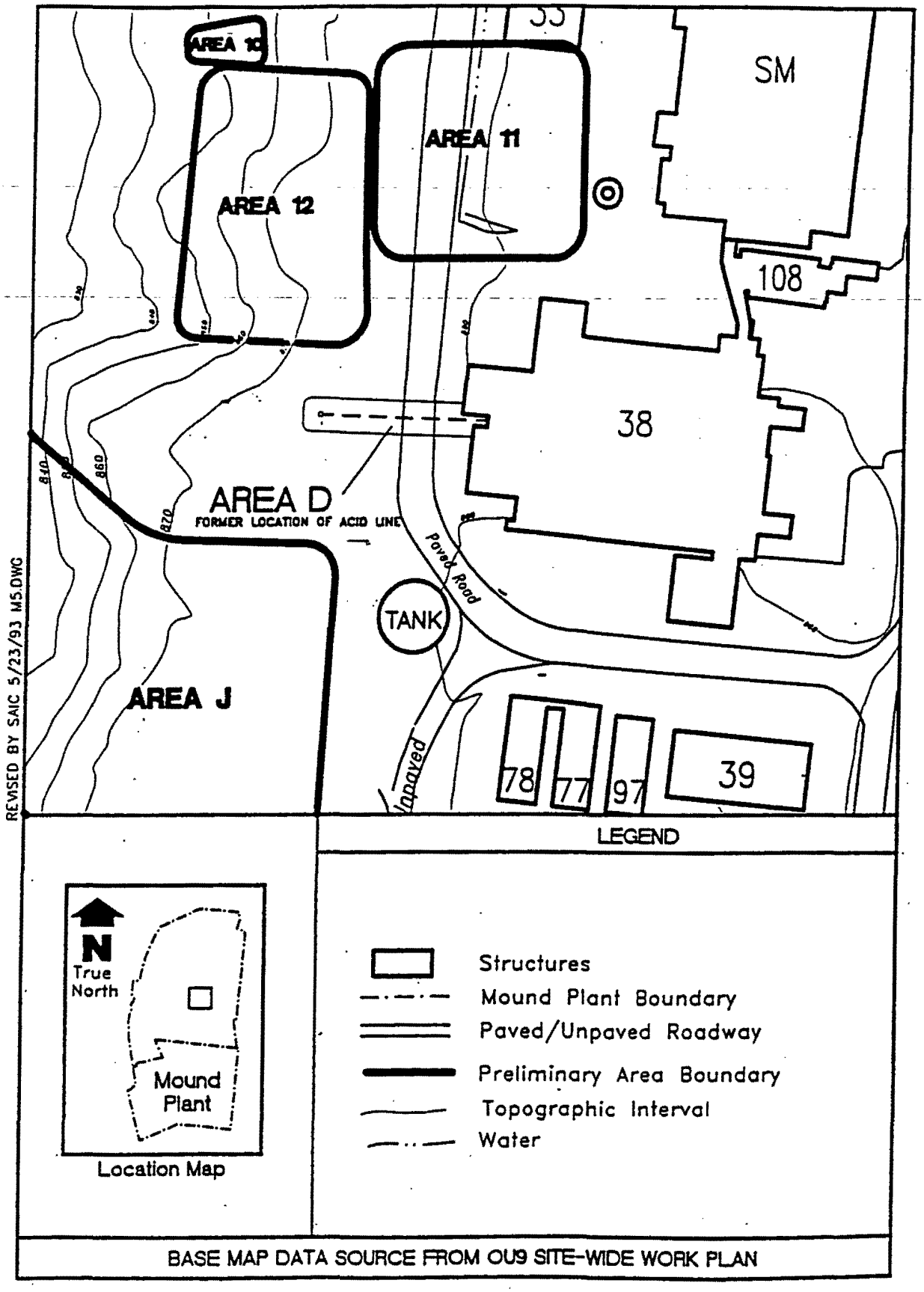

Figure 1.2. Area D Site Location Map

1.3.2. Area History

Historical waste handling and materials processing information indicates that Area D may have been affected by chemicals from adjacent contaminated sites (Areas 10, 11, 12 and J) through natural processes (wind, surface water or groundwater transport, and erosion) or by human activities (excavation, hauling, dumping, etc.). In addition, Area D may have been affected by grounds maintenance operations. These operations involved the use of fertilizers, herbicides, pesticides, and ice removal materials.

The engineering flow diagram for the reagent-grade acid system connected to the 3-inch duriron drain line (Drawing Number A-204) (DOE 1965) shows that spills from chemical feed tanks drained from the drip pan to the acid leach bed. These chemical feed tanks contained concentrated nitric acid (reagent-grade) and 0.35 normal, 2 normal, and 7.2 normal nitric acid solutions. Three other chemical feed tanks are shown - one contained a solution of ferrous sulfate, another contained sodium carbonate, and a third contained a 0.35 normal hydroxylamine-nitric acid solution. In 1987, the acid tanks located within Building 38 were taken out of service, and the pipeline from the building to the leach bed was capped. The acid drain line and associated leach bed were subsequently removed by the Mound Plant D&D Program in October 1991, along with any soils known to contain radioactive contamination above the DOE cleanup criteria.

1.4. PREVIOUS SAMPLING IN AREA D

Three separate sampling activities were conducted in Area D prior to the verification sampling described in this report. These previous sampling activities were as follows: (1) The Mound Site Survey Project (Stought et al. 1988); (2) The Mound Plant Reconnaissance Sampling Program (DOE 1992b); and (3) the sampling activities conducted by the Mound Plant D&D Program in 1991 (DOE 1991). No significant chemical contamination was identified during these sampling events. Some Pu^{238} and Th^{232} contamination was found during the D&D activities and subsequently removed by the Mound Plant D&D Program. A summary of these previous sampling events is contained in the Area D SAP (DOE 1993a).

1.5. SUMMARY OF D&D ACTIVITIES

The acid drain line and leach bed in Area D were removed by the Mound Plant D&D Program in October, 1991. During the D&D activities, approximately 130 soil samples were screened for Pu^{238} and Th^{232} by the Mound Plant Soil Screening Facility. The concentrations of Pu^{238} found during the soil screening ranged from 0 to 786 pCi/g and Th^{232} concentrations ranged from 0.3 to 6.5 pCi/g. The maximum plutonium and thorium contamination was found at a distance of approximately 15 feet from the location where the former acid drain

line exited the PP Building. Significant concentrations of plutonium contamination (154 to 221 pCi/g) were also found near the manhole in the former leach bed. The contaminated soils from these locations were subsequently removed by the D&D Program and the remaining soils were found to meet the D&D cleanup goals of 25 pCi/g for Pu^{238} (ALARA) and 5 pCi/g surface, 15 pCi/g subsurface for Th^{232} (indicator isotope used to screen thorium). The D&D release packages for OU6, Area D can be found in Appendix A of the SAP (DOE 1993a).

During the D&D excavations, a section of the acid drain line was found to co-exist with other utilities at a distance between 20 and 30 feet from the PP Building. Consequently, this section of the line was pulled from its buried location without further excavation. Subsequent to the D&D activities, the open excavation was backfilled by placing a layer of fine sand or pea gravel to mark the depth of the trench and the remaining original soil was used to fill the open trench. The sampling program was modified to include a boring in the 20- to 30-foot section of the former drain line to verify the attainment of cleanup in this interval, and to use the sand/pea gravel layer in other sampling intervals as a marker for subsurface soil sampling at depths below the original excavation.

2. VERIFICATION SAMPLING ACTIVITIES

2.1. SAMPLING SCOPE

The scope of work for the verification sampling in Area D was to determine what residual contamination remained in Area D soils following D&D and to provide RI quality data on any residual contaminants by the collection of subsurface soil samples at four sampling intervals. The four intervals were located along the former pipeline extending from PP Building and along the former acid leach bed. The sampling effort was based on the OU6 Area D SAP (DOE 1993a) and sampling guidance was provided in the OU6 QAPjP (DOE 1992c), OU6 Health & Safety Plan (HSP)(DOE 1992a), and the Mound Plant Standard Operating Procedures (SOPs) (DOE 1993b).

2.2. SAMPLING STRATEGY

Based on previous studies of Area D, as summarized in OU6 Area D SAP, the following sampling criteria were established:

- sampling was required in two locations - the leach bed (100-to 110-foot interval along the pipeline) and near PP Building (10- to 20-foot interval along the pipeline),
- samples were to be taken in the first one foot interval below the soil/fill interface,
- one sample of the original backfill was required at each interval, and
- additional samples were to be obtained in the 20- to 30-foot and 30- to 40-foot intervals.

2.2.1. Soil Sampling

The soil samples which were originally planned for Area D verification are summarized in Table II.1. The soil sampling actually performed in Area D is summarized in Table II.2. The actual sampling correlates closely with the planned sampling with the exception of an additional boring taken in the 100- to 110-foot interval. The sampling procedures used were in accordance with the Mound Plant SOPs listed in Table II.3. Soil samples were screened for radioactivity by Mound Plant Health Physics personnel using a field instrument for the detection of low energy radiation (FIDLER). Split samples were also measured for plutonium-238 (Pu^{238}) and thorium-232 (Th^{232}) activity by the Mound Plant Soil Screening Facility prior to sample shipment to the analytical laboratories.

To satisfy the objectives of the SAP, the samples collected in Area D were analyzed for the chemical and radiological constituents listed in Table II.4. These constituents were selected based on former SM/PP

Table II.1. Summary of Planned Area D Soil Sampling

Sample Location	Sample Type/Parameter	Sample Depths[a] (feet)	No. of Sample Depths
10- to 20-ft interval of pipeline	Soil/Radionuclides[b] Soil/All Analytes[c] Backfill/All Analytes[c]	3- to 5- 3- to 5- 1- to 3-	2 1 1
10- to 20-ft interval of pipeline	Soil Screen/Rad Screen	1- to 5-	4
20- to 30-ft interval of pipeline	Soil/Radionuclides[b] Soil/All Analytes[c] Backfill/All Analytes[c]	1- to 6- (continuous) 1- to 3-	2 (est.) 1 (est.) 1
20- to 30-ft interval of pipeline	Soil Screen/Rad Screen	1- to 6- (continuous)	4 (est.)
30- to 40-ft interval of pipeline	Soil/Radionuclides[b] Soil/All Analytes[c] Backfill/All Analytes[c]	1- to 6- (continuous) 1- to 3-	2 (est.) 1 (est.)
30- to 40-ft interval of pipeline	Soil Screen/Rad Screen	1- to 6- (continuous)	4 (est.)
100- to 110-ft interval of pipeline	Soil/Radionuclides[b] Soil/All Analytes[c] Backfill/All Analytes[c]	8- to 10- 8- to 10- 3- to 5-	2 1 1
100- to 110-ft interval of pipeline	Soil Screen/Rad Screen	3- to 10-	4

[a] Estimated depth to soil/fill interface
[b] Radionuclides listed in Table II.5.
[c] All analytes listed in Table II.5.

Table extracted from OU6 Area D SAP (DOE 1993a)

Table II.2. Summary of Actual Area D Soil Sampling

Sample Location	Borehole Number	Date Completed	Sample Number	Depth of Sample (feet)	Sample Type	Analyses Requested
10- to 20-foot interval	BS04	5-19-93	BS0401	3-4	Soil	Radiological[b]
	BS05	5-19-93	BS0501	0.5-2	Backfill	Full[a]
	BS05	5-19-93	BS0502	3-4	Soil	Full[a]
	BS05	5-19-93	BS0503	3-4	Duplicate	Full[a]
	BS06	5-19-93	BS0601	3-4	Soil	Radiological[b]
20- to 30-foot interval	BS08	5-24-93	BS0801	1-2	Backfill	Full[a]
	BS08	5-24-93	BS0802	2-4	Backfill	Radiological[b]
	BS08	5-24-93	BS0803	4-4.5	Soil	Full[a]
30- to 40-foot intervals	BS07	5-20-93	BS0701	1-3	Backfill	Full[a]
	BS07	5-20-93	BS0702	3-4	Backfill	Radiological[b]
	BS07	5-20-93	BS0703	4-4.5	Soil	Full[a]
	BS07	5-20-93	BS0704	4-4.5	Duplicate	Radiological[b]
100- to 110- foot intervals	BS01	5-18-93	BS0101	18-19.2	Soil	Radiological[b]
	BS02	5-18-93	BS0201	9-11	Soil	Full[a]
	BS03	5-18-93	BS0301	5-7	Backfill	Full[a]
	BS03	5-18-93	BS0302	7-10	Soil	Radiological[b]
	BS09	5-20-93	BS0901	8-9	Soil	Radiological[b]

[a] Analyses requested include Target Compound List volatile organics, semi-volatile organics, and pesticides/PCBs; Target Analyte List metals and cyanide (including tin, bismuth, lithium, and molybdenum); selected anions (fluoride, chloride, nitrate-nitrite, and sulfate), and the radionuclides listed in b.

[b] Analyses requested includes: $Pu^{238,239,240}$, $Th^{227,228,230,232}$, $U^{234/235,238}$, H^3, and Gamma Spectrometry (Am^{241}, Cs^{137}, Co^{60}, Bi^{207}, Bi^{210m}, Ra^{226})

Table II.3. Mound Standard Operating Procedures Used During Verification Sampling

SOP	Title
1.1	General Instruction for Field Personnel
1.3	Sample Control and Documentation
1.4	Sample Containers and Preservation
1.5	Guide to Handling, Packaging, and Shipping of Samples
1.6	General Equipment Decontamination
1.8	Personnel Decontamination - Level D Protection
1.9	Personnel Decontamination - Level C Protection
1.15	Guide to Management of Investigative Derived Material
4.1	Soil Boring
5.1	Soil and Rock Borehole Logging and Sampling
5.2	Soil Sampling with a Spade and Scoop
5.3	Subsurface Solid Sampling with Hand Auger and Thin-wall Sampler
6.1	Health & Safety Monitoring
6.2	Health & Safety Monitoring of Organic Vapors with Photoionization Detector
6.4	Total Alpha Surface Contamination Measurements
6.7	Near-Surface and Soil Sample Screening for Low Energy Gamma Radiation Using the FIDLER
6.11	Beta-Gamma Radiation Measurements

Table II.4. OU6 Area D Contaminants of Concern

Chemical Constituents	Radiological Constituents
Acetone	Americium-241
Arsenic	Bismuth-207
Benzene	Bismuth-210m
Beta-BHC	Cesium-137
Bismuth	Cobalt-60
Calcium	Plutonium-238, 239/240
Carbon Tetrachloride	Radium-226
Chloroform	Thorium-228/230/232
Cresols (phenylmethyl)	Tritium
Diethyl Benzene	Uranium-234/235/238
Endrin Ketone	
Fluoride	
Hexane	
Methyl Ethyl Ketone	
Methyl Isobutyl Ketone	
PCBs	
Phenol	
Potassium	
Sodium	
Tetrachloroethane	
Toluene	
Trichloroethane	
Trichloroethene	
Xylene	
Aluminum	
Chromium	
Cobalt	
Copper	
Iron	
Lead	
Mercury	
Nickel	
Zinc	
Nitrate-Nitrite	
Chloride	
Sulfate	

operations, previous sampling results and investigations, and D&D cleanup activities. The list of constituents was extended at the request of the Ohio Environmental Protection Agency (OEPA) to include all Target Compound List (TCL) volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and pesticides/PCBs, and all Target Analyte List (TAL) metals, as shown in Table II.5.

2.2.2. Field Quality Control

Field quality control (QC) samples were collected according to the criteria specified in the OU6 SAP, the OU6 QAPjP, and the Mound Plant SOPs to assess field conditions and sampling techniques. The field QC samples collected for this verification activity are described in detail in Section 2.5.

2.3. SAMPLE DESIGNATIONS

To assure consistency with the OU6 Verification Work Plan and the OU6 QAPjP, the Area D verification sampling program used the sample identification scheme shown in Table IV.1, Section 4 of the OU6 SAP. The sample identification system provides information on the site name, sample matrix, location, and sampling interval.

2.4. FIELD SAMPLING ACTIVITY

Field crews and field sampling equipment were mobilized to Area D on May 17, 1993 to conduct verification sampling activities. All subsurface drilling and sampling operations were conducted in accordance with the approved SAP, except for the addition of a fourth boring in the 100- to 110-foot sampling interval (see Section 3.3.2 for details). A total of nine soil borings were excavated in Area D (see Figure 2.1) and 17 soil samples were obtained for laboratory analysis. The specific sampling intervals and their associated samples are described below.

Soil borings BS01, BS02, BS03 and BS09 were excavated in the 100- to 110-foot sampling interval (distance from PP Building) and five soil samples were extracted for subsequent laboratory analysis as shown in Table II.2. The first three soil borings were drilled on May 18, 1993 by Bowser-Morner, Inc. using 4.25-inch i.d. hollow-stem augers powered by a truck-mounted Mobile B61 drill rig. Soil sampling was conducted continuously in each of these three borings by driving a 24-inch long by 2.5-inch i.d. split barrel sampler through and ahead of the hollow-stem augers to locate the sand/fill interface. After advancing borehole BS01 to a depth of 18 feet below ground surface and collecting a soil sample from 18 to 19.2 feet, it was apparent that the boring had not encountered the sand/fill interface that delineated the former acid leach bed target zone. According to historical records, the D&D activities conducted in

Table II.5. Parameter List for Laboratory Analysis of Samples
page 1 of 2

Volatile Organic Compounds	Semivolatile Organic Compounds	Pesticides/PCBs	Inorganics	Radiological
Chloromethane	Phenol	alpha-BHC	Aluminum	Americium-241
Bromomethane	bis(2-Chloroethyl) ether	beta-BHC	Antimony	Bismuth-207
Vinyl Chloride	2-Chlorophenol	delta-BHC	Arsenic	Bismuth-210m
Chloroethane	1,3-Dichlorobenzene	gamma-BHC	Barium	Cesium-137
Methylene Chloride	1,4-Dichlorobenzene	Heptachlor	Beryllium	Cobalt-60
Acetone	Benzyl alcohol	Aldrin	Cadmium	Plutonium-238,239,240
Carbon disulfide	1,2-Dichlorobenzene	Heptachlor epoxide	Calcium	Radium-226
1,1-Dichloroethene	2-Methylphenol	Endosulfan I	Chromium	Thorium-227,228,230,232
1,1-Dichloroethane	bis(2-Chloroisopropyl) ether	Dieldrin	Cobalt	Tritium
1,2-Dichloroethene	4-Methylphenol	4,4'-DDE	Copper	Uranium-234,235,238
Chloroform	N-Nitroso-di-n-propylamine	Endrin	Iron	
1,2-Dichloroethane	Hexachloroethane	Endosulfan II	Lead	
2-Butanone	Nitrobenzene	4,4'-DDD	Magnesium	
1,1,1-Trichloroethane	Isophorone	Endosulfan sulfate	Manganese	
Carbon Tetrachloride	2-Nitrophenol	4,4'-DDT	Mercury	
Vinyl Acetate	2,4-Dimethylphenol	Methoxychlor	Nickel	
Bromodichloromethane	Benzoic Acid	Endrin ketone	Potassium	
1,2-Dichloropropane	bis(2-Chloroethoxy)methane	Endrin aldehyde	Selenium	
cis-1,3-Dichloropropene	2,4-Dichlorophenol	alpha-Chlordane	Silver	
Trichloroethene	1,2,4-Trichlorobenzene	gamma-Chlordane	Sodium	
Dibromochloromethane	Naphthalene	Toxaphene	Thallium	
1,1,2-Trichloroethane	4-Chloroaniline	Aroclor-1016	Vanadium	
Benzene	Hexachlorobutadiene	Aroclor-1221	Zinc	
trans-1,3-dichloropropene	4-Chloro-3-Methylphenol	Aroclor-1232	Molybdenum	
Tribromomethane	2-Methylnaphthalene	Aroclor-1242	Tin	
4-Methyl-2-pentanone	Hexachlorocyclopentadiene	Aroclor-1248	Bismuth	
2-Hexanone	2,4,6-Trichlorophenol	Aroclor-1254	Lithium	
Tetrachloroethene	2,4,5-Trichlorophenol	Aroclor-1260	Chloride	
Toluene	2-Chloronaphthalene		Fluoride	
1,1,2,2-Tetrachloroethane	2-Nitroaniline		Nitrate-Nitrite	
Chlorobenzene	Dimethylphthalate		Sulfate	
Ethylbenzene	Acenaphthylene			
Styrene	2,6-Dinitrotoluene			
Xylenes (total)	3-Nitroaniline			
	Acenaphthene			

Table II.5. Parameter List for Laboratory Analysis of Samples
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Volatile Organic Compounds	Semivolatile Organic Compounds	Pesticides/PCBs	Inorganics	Radiological
	2,4-Dinitrophenol			
	4-Nitrophenol			
	Benzo(k)fluoranthene			
	Benzo(a)pyrene			
	Indeno(1,2,3-cd)pyrene			
	Dibenzo(a,h)anthracene			
	Benzo(g,h,i)perylene			
	Anthracene			
	Benzo(a)anthracene			
	Chrysene			
	bis(2-Ethylhexyl) phthalate			
	Di-n-octylphthalate			
	Benzo(b)fluoranthene			
	Di-n-butylphthalate			
	Fluoranthene			
	Pyrene			
	Butylbenzylphthalate			
	3,3'-Dichlorobenzidine			
	Dibenzofuran			
	2,4-Dinitrotoluene			
	Diethylphthalate			
	Hexachlorobenzene			
	Pentachlorophenol			
	Phenanthrene			
	4,6-Dinitro-2-methylphenol			
	N-Nitroso-Diphenylamine			
	4-Bromophenyl phenyl ether			
	4-Chlorophenyl phenyl ether			
	Fluorene			
	4-Nitroaniline			

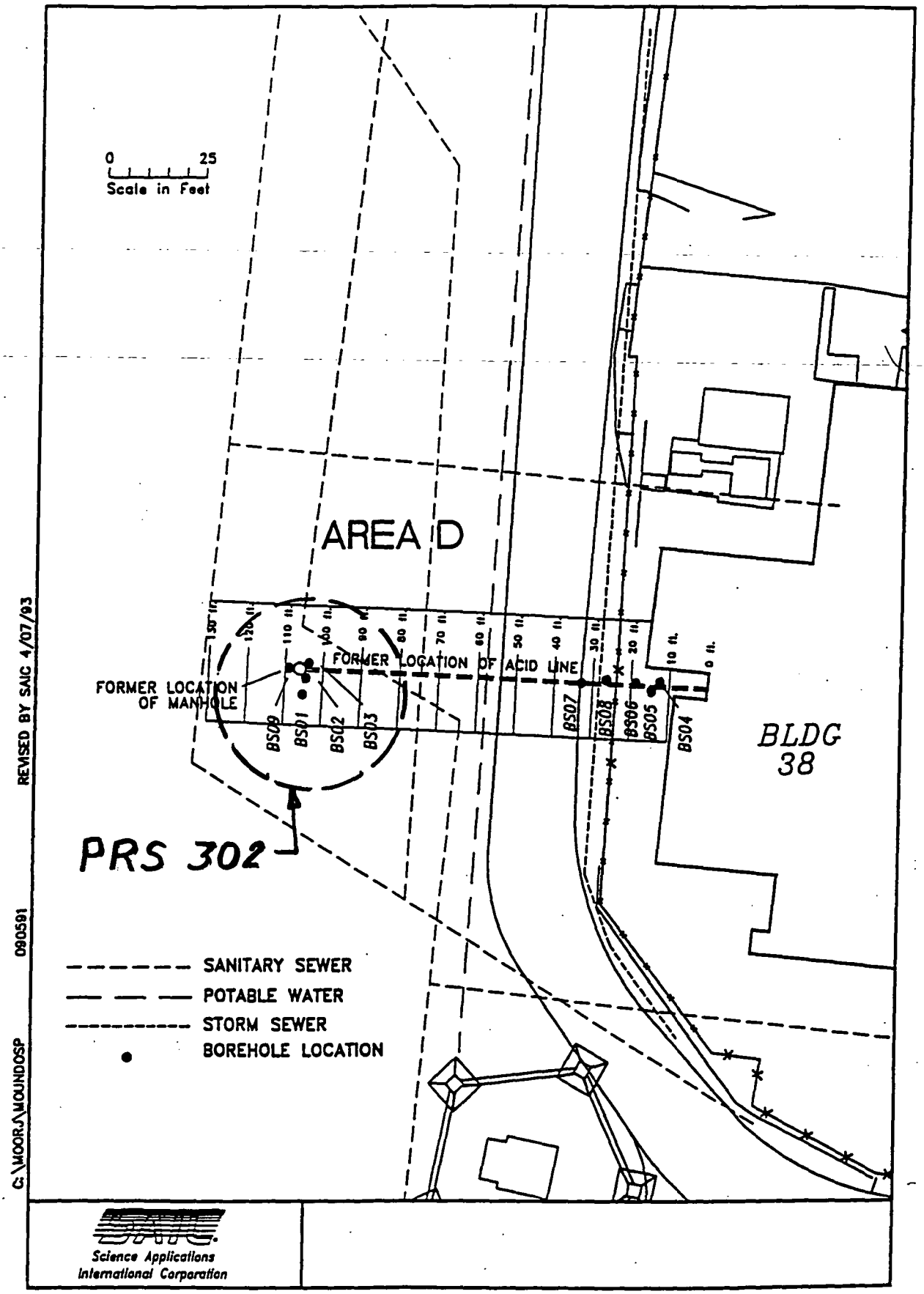

Figure 2.1. Area D Borehole Location Map

Area D removed soils from the former acid leach bed to a depth of 8- to 10-feet. A layer of sand or pea gravel was subsequently used by the D&D field crew to line the bottom of the excavation before the excavation was backfilled. However, this horizon was not detected during the continuous sampling of this borehole.

Soil borings BS02 and BS03 were installed progressively northward of boring location BS01 and both of these borings penetrated the sand/fill horizon at a depth of approximately 7 feet. A soil sample was obtained beneath the sand/fill layer for laboratory analysis as indicated in Table II.2. In addition, a sample of the backfill material was obtained from soil boring BS03 for full analysis as specified in Table II.2.

Boring BS09 was hand augered in the 100- to 110-foot interval to a depth of approximately 8 feet before the sand/fill layer was encountered. A soil sample was obtained beneath this layer using a stainless steel tube sampler to complete the verification sampling requirements in this interval. Bedrock was not encountered in any of the soil borings excavated in this interval, including soil boring BS01 that penetrated to a depth of approximately 19.2 feet.

Boreholes BS04, BS05 and BS06 were installed in the 10- to 20-foot sampling interval on May 19, 1993 using a stainless steel hand auger and 2-inch i.d. by 12-inch long stainless steel tube samplers. A thin sand/gravel layer, which represented the extent of the D&D excavation, was encountered in these borings at a depth of approximately 3 to 3.5 feet. Apparent bedrock was struck at a depth of about 4 feet. As shown in Table II.2, one soil sample was obtained from borehole BS04 and BS06. Three soil samples were obtained from borehole BS05.

Soil Boring BS08 was excavated in the 20- to 30-foot sampling interval on May 24, 1993, and a total of three soil samples were obtained for laboratory analysis as shown in Table II.2.

Verification sampling in the 30- to 40-foot sampling interval was conducted on May 20, 1993. Soil boring BS07 was installed to a depth of about 4.5 feet before apparent bedrock was encountered. The sand/fill layer was encountered at a depth of approximately 4 feet. Four soil samples were collected for laboratory analysis as shown in Table II.2.

2.5. FIELD QUALITY CONTROL SAMPLES

During verification sampling, field QC samples were collected and submitted for analysis to assess field sampling techniques and field conditions. The field QC samples collected included trip blanks, ambient blanks, sample bank blanks, equipment rinsate blanks, and duplicate samples.

Rinsate blanks were used to evaluate the success of the equipment decontamination process. After decontamination, the sampling equipment was rinsed a final time with deionized/distilled water. The rinsate was collected and analyzed for the same parameters as the primary soil samples. One rinsate blank was collected for every 10 or fewer samples. Equipment rinsate, R00001, was collected on May 19, 1993 for organic, inorganic and radiological analysis, and equipment rinsate, R00002, was collected on May 21, 1993 for radiological analysis only.

Field duplicates were prepared to evaluate sample variability and sampling technique precision. Although true soil duplicates are not possible because soil is not homogeneous, thorough mixing of the soil provided a more homogeneous sample. VOC samples were collected prior to homogenization due to potential loss of VOCs during mixing. One field duplicate was collected for every 10 or fewer primary samples. One pair of duplicates, BS0502 and BS0503, was collected for organic, inorganic, and radiological analysis. A second duplicate pair, BS0703 and BS0704, was collected for radiological analysis only. Duplicate samples were analyzed for the same parameters as the primary soil samples.

Trip blanks, (40 milliliter (mL) vials of deionized water) were used to evaluate contamination that could be introduced during sample shipment. A trip blank (in duplicate) was included in each shipping cooler containing VOC samples each day sampling occurred and was analyzed for TCL VOCs. Trip blanks were prepared at the laboratory and shipped to the site. Trip blanks were shipped in duplicate at the request of the laboratory to ensure adequate sample volume for analysis in case of breakage or if re-analysis was required.

A temperature blank (a 40 mL vial of water) was used to monitor the temperature of the samples during shipment. One blank was included in each cooler containing samples that required temperature maintenance at 4 $\pm$ 2 degrees Celsius, per the OU6 QAPjP. The temperature of the blank was recorded on the chain of custody form at the time of shipment to the laboratory and was recorded again at the time of sample receipt by the laboratory. Radiological water samples did not require temperature maintenance.

An ambient blank and a sample bank blank were collected on May 19, 1993 for VOC analysis. Ambient blank, A00002, which was prepared in duplicate at the 10- to 20-foot sampling interval with deionized water, was used to monitor for VOC contamination potentially introduced to samples at the work site. Sample bank blank, SBB002, which was prepared in duplicate with deionized water inside the sample trailer where the samples were being prepared for shipment, was used to monitor for VOC contamination potentially introduced to the samples from the sample handling area.

2.6. HEALTH AND SAFETY MONITORING

The purpose of health and safety (H&S) monitoring was to identify and quantify airborne contaminants and physical agents to assist the site health and safety coordinator (SHSC) in the following:

- selecting the appropriate level of personal protective equipment (PPE);
- identifying areas where protection was needed;
- assessing the potential health effects of exposure; and
- determining the need for specific medical monitoring.

Each work location (e.g., BS01) was surveyed with the appropriate instrument before work activities began and periodically during the work. Measurement data were recorded on the appropriate SOP forms which were bound in the Health and Safety Logbook and the Soil Borings Logbook. Table II.6 summarizes the monitoring results per soil boring. The following subsections discuss the results of the H&S monitoring activity for this task.

2.6.1. Soil Borings BS01, BS02, & BS03

A hollow stem auger drill rig was used for sample locations BS01, BS02, and BS03. A photoionization detector (PID) was used to detect the presence of total concentrations of organic vapors with an ionization potential of less than 10.2 electron volts (eV). A combustible gas indicator (CGI) was used to measure the lower explosive limit (LEL) of combustible vapors. The instruments did not detect the presence of potential contaminants. The CGI also had an oxygen (O_2) sensor and was used to measure the percent of O_2 downhole to determine if a correction factor would be required for the LEL reading. The O_2 measurement was 20.9% which is the normal concentration present in ambient air. Respiratory protection was not required or worn for these sample locations. An EG&G Mound Plant health physics technician screened personnel, samples and equipment with an alpha scintillometer and a FIDLER at the exit point of the exclusion area. No elevated readings (NER) were reported for either instrument. A real-time aerosol monitor (RAM) which measures airborne particulates was not used because light rains prevented

Table II.6. Results of Health and Safety Monitoring

SAMPLE	PID	$\%0_2$	CGI	FIDLER	ALPHA SCINTILLOMETER	SOUND LEVEL METER
BS01	ND	20.9	ND	NER	NER	< 80 dBA
BS02	ND	20.9	ND	NER	NER	< 80 dBA
BS03	ND	20.9	ND	NER	NER	< 80 dBA
BS04	ND	20.9	ND	NER	NER	100 dBA[a]
BS05	ND	20.9	ND	NER	NER	NA
BS06	ND	20.9	ND	NER	NER	NA
BS07	ND	20.9	ND	NER[b]	NER	NA[c]
BS08	ND	20.9	ND	NER	NER	NA[c]
BS09	ND	20.9	ND	NER	NER	NA

[a] - Sound level measurements were 100 dBA when the power saw was operated.

[b] - Final sample indicated 800 counts above background on the FIDLER. Sample was rescanned; however, FIDLER indicated no elevated reading. Sample was sent to soil screens lab; no elevated reading was reported.

[c] - Sound level measurements were not taken when the concrete saw was operated at these locations.

CGI - Combustible gas indicator
dBA - Decibels on the A scale
FIDLER - Field instrument for the detection of low-energy radiation
NA - Not analyzed
ND - None detected
NER - No elevated readings
PID - Photoionization detector
$\%\ 0_2$ - Percent oxygen

the formation of dusts during drilling and sampling activities. A sound level meter was used to record the level of sound during drilling activities. The sound measurement was less than 80 decibels on the A scale (dBA). Since the sound level measurement was less than the Occupational Safety and Health Administration (OSHA) action level of 85 dBA, hearing protection was not utilized.

2.6.2. Soil Borings BS04, BS07, & BS08

A power saw was used to cut through the asphalt pavement to gain access to the soil for sample locations BS04, BS07, and BS08. BS07 and BS08 required the use of a pick in addition to the saw due to the thickness of the pavement. Hand augering was required for the three locations due to BS04 located within the security island, the high voltage lines directly above the sample locations and the congestion of utilities near the sampling locations. The PID and CGI instruments did not detect the presence of potential contaminants. The O_2 measurement was 20.9%. Respiratory protection was not required or worn for these sample locations. An EG&G Mound Plant health physics technician screened personnel, samples and equipment with an alpha scintillometer and a FIDLER at the exit point of the exclusion area. NERs were reported for either instrument except at borehole BS07. When the last sample from this boring location was screened with a FIDLER, the instrument indicated approximately 800 counts above the background. Work was immediately stopped while the health physics technician rescanned the sample. The second scan produced NER. The sample was sent to the Mound Plant soil screens lab to be checked further. The lab reported NER. Work was resumed after the health physics technician presumed the FIDLER produced an erroneous reading. The RAM was not used because hand augering produces very little if any dusts. The sound level meter indicated readings of 100 dBA during power saw operations to gain access through the asphalt which required the use of hearing protection in the exclusion area.

2.6.3. Soil Borings BS05, BS06, & BS09

A power saw and pick were used to cut through the asphalt pavement to gain access to the soil for BS05 and BS06 due to the thickness of the pavement. Hand augering was required for these two locations due to overhead high voltage lines and the congestion of utilities near the sampling locations. The EG&G Mound Plant construction inspector required BS09 to be hand augered to a minimum depth of 5 feet to ensure all potentially present utilities were cleared. Once clear of potential utilities the Field Team Leader decided to continue with the hand auger until the sand/fill layer was encountered at a sampling depth of approximately 8 feet. Several core samplers were broken during this effort due to the soil content (i.e., rocks). The PID and CGI instruments did not detect the presence of potential contaminants. The O_2 measurement was 20.9%. Respiratory protection was not required or worn for these sample locations.

An EG&G Mound Plant health physics technician screened personnel, samples and equipment with an alpha scintillometer and a FIDLER at the exit point of the exclusion area. NERs were reported for both instruments. The RAM was not used because hand augering produces very little if any dust. Hearing protection was worn when the saw was used on the asphalt pavement; however, a sound level reading was not taken since previous readings were 100 dBA for sawing activities.

2.7. AUDIT AND SURVEILLANCES

2.7.1. Health and Safety Audit

An initial audit of the work areas and required documentation was conducted prior to the field work. Safety equipment (i.e., traffic cones, construction barrels) were required for sampling conducted on the roadway. All necessary training and medical surveillance requirements were complete. All monitoring equipment was calibrated prior to field sampling activities.

There were no H&S discrepancies noted during the field activities. A calibration check was performed daily on all monitoring equipment. All soil samples were screened using the appropriate monitoring equipment. No organic vapors or combustible gases were detected above normal background levels in any of the soils screened. One sample elicited a FIDLER response above background, however, after further screenings, no appreciable radioactivity above background was found (see Section 4, Table IV.1.). Refer to Appendix A for further details of the H&S Audit.

2.7.2 Quality Assurance Surveillance

Quality assurance (QA) surveillances were completed on May 17, 18, and 20, 1993 for the Area D verification sampling. The purpose of the surveillance was to observe sampling, decontamination, sample management, and project documentation for the D&D verification sampling. No problems requiring corrective action were encountered. Refer to Appendix A for further details of the QA surveillance.

2.7.3 Quality Assurance Laboratory Audit of PACE, Inc.

PACE, Inc. was audited on June 30 - July 1, 1993. The purpose of the audit was to facilitate coordination of SAIC analytical project work, to assess the implementation of the PACE, Inc. Golden, Colorado QAPjP, and to determine the general performance of PACE, Inc. Golden, Colorado in providing analytical services support. It was the conclusion of the audit team that PACE, Inc., Golden, Colorado is staffed by qualified personnel and has the expertise, instrumentation, and capacity to support the Basic Ordering Agreement for Radiological Analysis. Refer to Appendix A for details of the audit findings.

5. DATA ANALYSIS

5.1. PLUTONIUM-238 AND THORIUM-232

As discussed in Section 1 of this report, the primary purpose of the verification study in Area D was to verify that the cleanup of radioactively contaminated soils in Area D carried out by the Mound Plant D&D program met the cleanup standards required by DOE. The cleanup for plutonium and thorium would be considered complete if the concentrations of Pu^{238} were below 25 pCi/g for both surface and subsurface soil and Th^{232} concentrations were below 5 pCi/g for surface soils and 15 pCi/g for subsurface soils. To meet this objective, the statistical procedures in EPA's Methods for Evaluating the Attainment of Cleanup Standards, Volume 1, Soils and Solid Media (EPA 1989) guidance were used for determining whether the mean concentration in Area D attained the cleanup standards.

Since the mean of the sampling data from Area D is only an estimate of the true population mean of the entire sample area, EPA's guidance requires the calculation of an upper one-sided confidence interval. This upper confidence interval provides a range of values within which the true population mean concentration is located. A one-sided confidence interval and the following four-part decision rule was used to test whether Area D attained the cleanup standards for Pu^{238} and Th^{232}.

Area D can be declared clean from a D&D perspective, if: 1) the upper 95 percent confidence interval is less than the cleanup standard of 25 pCi/g Pu^{238} for all soils; and 2) the upper 95 percent confidence interval is less than the cleanup standard of 5 pCi/g Th^{232} for surface soils; and 3) the upper 95 percent confidence interval is less than the cleanup standard of 15 pCi/g Th^{232} for subsurface soils.

Following EPA's guidance, the following summary statistics (displayed in Table V.1.) were calculated for both Pu^{238} and Th^{232}:

- the number of samples collected,
- the minimum value,
- the maximum value,
- the mean concentration,
- the standard error of the mean, and
- the upper one-sided 95 percent confidence limit.

Table V.1. Plutonium and Thorium Summary Statistics

Parameter	Number of Detections	Concentration (pCi/g)			Standard Error (pCi/g)	Upper 95 C.I. (pCi/g)
		Minimum	Maximum	Mean		
Pu^{238}	17	0.00	21.0	4.27	1.70	8.66
Th^{232}	17	0.12	5.4	0.90	0.30	1.67

As evidenced in Table V.1., the maximum concentrations for both Pu^{238} and Th^{232} (21.0 and 5.4 pCi/g respectively) were less than the required cleanup levels (note: the 5.4 pCi/g for Th^{232} was found in a subsurface sample - 3 feet below the surface). In addition, the upper 95% confidence intervals (C.I.) for both Pu^{238} and Th^{232} (8.66 and 1.67 pCi/g, respectively) are less than the cleanup standards regardless of the sampling depth. Therefore, the mean concentrations for Pu^{238} and Th^{232} in Area D attained the required cleanup standards.

5.2. OTHER POTENTIAL AREA D CONTAMINATION

As discussed in Section 1 of this report, a second purpose of the verification study was to determine if Area D contains radioactive and/or chemical contaminants in sufficient concentrations to be considered a source of such contamination (i.e., contaminant concentrations high enough to pose a mobility threat to down-gradient areas). To meet this objective, EPA's Risk Assessment Guidance for Superfund Volume 1 (1989) was used for determining whether the concentration of other potential contaminants of concern (COC) in the samples collected in Area D exceeded established detection limits, background concentrations (if known), or established actions levels.

A list of potential COCs was developed using the following four-part decision rule (EPA 1989). Potential COCs were considered for further evaluation if:

1) the COC was positively detected (above the analytical method detection limit) in at least one environmental soil sample; or

2) the mean COC concentration was significantly higher than naturally occurring levels of the same chemical (background); or

3) the mean COC concentration exceeded established action levels for soils; or

4) the COC was quantified at concentrations significantly above method detection levels (examination of "J" versus "U" qualified data).

After the chemical and other radiological sample data were collected, validated and stored in a centralized data base, the following summary statistics were calculated for each analyte: 1) the number of samples collected, 2) the number of detections, 3) the maximum value, and 4) the mean concentration.

5.2.1. Analyte Concentrations Compared to Method Detection Limits

A systematic process, following the decision rule discussed above, was used to narrow the list of potential COCs. Table V.2. displays the total number of environmental samples (excluding QC samples - trip blanks, rinsates, and rejected results) that were collected for each chemical and radiological analyte sampled in Area D. Also included in Table V.2. is the number of times the particular analyte was detected (hits), the number of times it was not detected (misses) and the percentage of detections. The analytes detected (see Table V.2) are a combination of those analytes whose concentrations were measured above method detection limits (true hits) and those analytes whose concentrations were measured near or below the method detection level and were, therefore estimated values (designated with a "J" data qualifier).

As indicated in Table V.2., over 1700 sample analysis results were measured in Area D for a total of 183 different analytes. Of the 183 analytes measured, a total of 110 analytes were sampled for in Area D but were never detected in any of the environmental samples.

Following decision rule number 1 discussed above, the list of potential COC was reduced to 73 by deleting all analytes that were never detected in any of the environmental samples. For this reduction, a detection was assumed if there was: 1) no data qualifier attached to the sample result (true hit), or 2) a "J" data qualifier was attached to the sample result (an estimated value).

5.2.2. Analyte Concentrations Compared to Background

The next reduction in potential COCs was conducted following decision rule number 2, comparison of analyte means to background concentrations. According to DOE, background data should be used in site characterization studies for differentiating between naturally occurring constituents (including global or regional fallout) and specific site contamination. If sufficient background data are not available, no constituent known to be a potential contaminant can be eliminated from an assessment even if the sampled concentration is measured at a minimum level. At the Mound Plant and surrounding areas, many potential COCs occur naturally at low concentrations in background soils. However, at this time a complete list of background levels for potential contaminants of concern does not exist for the Mound plant. A study

Table V.2 Area D Environmental Samples Summary Statistics - Set 1
Analytical Detects (Hits) Versus Analytical Non-Detects (Misses)
Page 1 of 7

Analyte Type	Parameter	Total Number of Samples	Number Of Hits	Number Of Misses	Percentage Of Hits
Anion	Chloride	9	9	0	100.0
Anion	Fluoride	9	9	0	100.0
Anion	Sulfate	9	8	1	88.8
Anion	Nitrate/Nitrite	9	8	1	88.8
Metal	Arsenic	9	4	5	44.4
Anion	Cyanide	9	0	9	0.0
Metal	Mercury	9	2	7	22.2
Metal	Aluminum	9	9	0	100.0
Metal	Antimony	4	2	2	50.0
Metal	Bismuth	9	2	7	22.2
Metal	Barium	9	9	0	100.0
Metal	Beryllium	9	4	5	44.4
Metal	Cadmium	9	3	6	33.3
Metal	Calcium	9	5	4	55.5
Metal	Chromium	9	5	4	55.5
Metal	Cobalt	9	4	5	44.4
Metal	Copper	9	9	0	100.0
Metal	Iron	9	9	0	100.0
Metal	Lithium	9	7	2	77.7
Metal	Molybdenum	9	3	6	33.3
Metal	Magnesium	9	9	0	100.0
Metal	Manganese	9	9	0	100.0
Metal	Nickel	9	3	6	33.3
Metal	Potassium	9	9	0	100.0
Metal	Silver	1	0	1	0.0
Metal	Sodium	8	8	0	100.0
Metal	Tin	9	2	7	22.2

Table V.2 Area D Environmental Samples Summary Statistics - Set 1
Analytical Detects (Hits) Versus Analytical Non-Detects (Misses)
Page 2 of 7

Analyte Type	Parameter	Total Number of Samples	Number Of Hits	Number Of Misses	Percentage Of Hits
Metal	Vanadium	9	9	0	100.0
Metal	Zinc	9	9	0	100.0
Metal	Lead	9	7	2	77.7
Metal	Selenium	9	9	0	100.0
Metal	Thallium	9	0	9	0.0
Pesticide	4,4'-DDD	9	0	9	0.0
Pesticide	4,4'-DDE	9	1	8	11.1
Pesticide	4,4'-DDT	9	1	8	11.1
Pesticide	Aldrin	9	0	9	0.0
PCB	Aroclor-1016	9	0	9	0.0
PCB	Aroclor-1221	9	0	9	0.0
PCB	Aroclor-1232	9	0	9	0.0
PCB	Aroclor-1242	9	0	9	0.0
PCB	Aroclor-1248	9	0	9	0.0
PCB	Aroclor-1254	9	0	9	0.0
PCB	Aroclor-1260	9	0	9	0.0
Pesticide	Dieldrin	9	0	9	0.0
Pesticide	Endosulfan I	9	0	9	0.0
Pesticide	Endosulfan II	9	0	9	0.0
Pesticide	Endosulfan sulfate	9	0	9	0.0
Pesticide	Endrin	9	0	9	0.0
Pesticide	Endrin Aldehyde	9	0	9	0.0
Pesticide	Endrin Ketone	9	1	8	11.1
Pesticide	Heptachlor	9	0	9	0.0
Pesticide	Heptachlor epoxide	9	0	9	0.0
Pesticide	Methoxychlor	9	1	8	11.1
Pesticide	Toxaphene	9	0	9	0.0

Table V.2 Area D Environmental Samples Summary Statistics - Set 1
Analytical Detects (Hits) Versus Analytical Non-Detects (Misses)

Analyte Type	Parameter	Total Number of Samples	Number Of Hits	Number Of Misses	Percentage Of Hits
Pesticide	alpha-BHC	9	0	9	0.0
Pesticide	alpha-Chlordane	9	1	8	11.1
Pesticide	beta-BHC	9	0	9	0.0
Pesticide	delta-BHC	9	0	9	0.0
Pesticide	gamma-BHC (Lindane)	9	0	9	0.0
Pesticide	gamma-Chlordane	9	1	8	11.1
SVOC	1,2,4-Trichlorobenzene	9	0	9	0.0
SVOC	1,2-Dichlorobenzene	9	0	9	0.0
SVOC	1,3-Dichlorobenzene	9	0	9	0.0
SVOC	1,4-Dichlorobenzene	9	0	9	0.0
SVOC	2,2'-oxybis (1-Chloropropane)	9	0	9	0.0
SVOC	2,4,5-Trichlorophenol	9	0	9	0.0
SVOC	2,4,6-Trichlorophenol	9	0	9	0.0
SVOC	2,4-Dichlorophenol	9	0	9	0.0
SVOC	2,4-Dimethylphenol	9	0	9	0.0
SVOC	2,4-Dinitrophenol	9	0	9	0.0
SVOC	2,4-Dinitrotoluene	9	0	9	0.0
SVOC	2,6-Dinitrotoluene	9	0	9	0.0
SVOC	2-Chloronaphthalene	9	0	9	0.0
SVOC	2-Chlorophenol	9	0	9	0.0
SVOC	2-Methylnaphthalene	9	0	9	0.0
SVOC	2-Methylphenol	9	0	9	0.0
SVOC	2-Nitroaniline	9	0	9	0.0
SVOC	2-Nitrophenol	9	0	9	0.0
SVOC	4-Hydroxy-4-methyl-2-pentanone	2	0	2	0.0
SVOC	3,3'-Dichlorobenzene	9	1	8	11.1

Table V.2 Area D Environmental Samples Summary Statistics - Set 1
Analytical Detects (Hits) Versus Analytical Non-Detects (Misses)
Page 4 of 7

Analyte Type	Parameter	Total Number of Samples	Number Of Hits	Number Of Misses	Percentage Of Hits
SVOC	3-Nitroaniline	9	0	9	0.0
SVOC	4,6-Dinitro-2-methylphenol	9	0	9	0.0
SVOC	4-Bromophenyl-phenyl ether	9	0	9	0.0
SVOC	4-Chloro-3-methylphenol	9	0	9	0.0
SVOC	4-Chloroaniline	9	0	9	0.0
SVOC	4-Chlorophenyl-phenyl ether	9	0	9	0.0
SVOC	4-Methylphenol	9	0	9	0.0
SVOC	4-Nitroaniline	9	0	9	0.0
SVOC	4-Nitrophenol	9	0	9	0.0
SVOC	Acenaphthene	9	0	9	0.0
SVOC	Acenaphthylene	9	2	7	22.2
SVOC	Anthracene	9	0	9	0.0
SVOC	Benzo(a)anthracene	9	5	4	55.5
SVOC	Benzo(a)pyrene	9	5	4	55.5
SVOC	Benzo(b)fluoranthene	9	5	4	55.5
SVOC	Benzo(g,h,i)perylene	9	4	5	44.4
SVOC	Benzo(k)fluoranthene	9	4	5	44.4
SVOC	Butylbenzylphthalate	9	0	9	0.0
SVOC	Carbazole	9	0	9	0.0
SVOC	Chrysene	9	5	4	55.5
SVOC	Di-n-butylphthalate	9	1	8	11.1
SVOC	Di-n-octylphthalate	9	0	9	0.0
SVOC	Dibenzo(a,h)anthracene	9	0	9	0.0
SVOC	Dibenzofuran	9	0	9	0.0
SVOC	Diethylphthalate	9	0	9	0.0
SVOC	Dimethylphthalate	9	0	9	0.0

Table V.2 Area D Environmental Samples Summary Statistics - Set 1
Analytical Detects (Hits) Versus Analytical Non-Detects (Misses)
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Analyte Type	Parameter	Total Number of Samples	Number Of Hits	Number Of Misses	Percentage Of Hits
SVOC	Fluoranthene	9	6	3	66.6
SVOC	Fluorene	9	0	9	0.0
SVOC	Hexachlorobenzene	9	0	9	0.0
SVOC	Hexachlorobutadiene	9	0	9	0.0
SVOC	Hexachlorocyclopentadiene	9	0	9	0.0
SVOC	Hexachloroethane	9	0	9	0.0
SVOC	Indeno(1,2,3-c,d)pyrene	7	2	5	28.5
SVOC	Isophorone	9	0	9	0.0
SVOC	N-Nitroso-di-n-propylamine	9	0	9	0.0
SVOC	N-Nitroso-diphenylamine	9	0	9	0.0
SVOC	Naphthalene	9	0	9	0.0
SVOC	Nitrobenzene	9	0	9	0.0
SVOC	Pentachlorophenol	9	0	9	0.0
SVOC	Phenanthrene	9	4	5	44.4
SVOC	Phenol	9	0	9	0.0
SVOC	Pyrene	8	4	4	50.0
SVOC	Unknown	5	4	1	80.0
SVOC	Unknown Alkane	2	2	0	100.0
SVOC	Unknown Carboxylic Acid	4	1	3	25.0
SVOC	Unknown Ester Carboxylic Acid	4	1	3	25.0
SVOC	Unknown Ester Hexanedioic Acid	3	1	2	33.3
SVOC	Unknown Hydrocarbon	4	4	0	100.0
SVOC	Unknown Phthalate	2	0	2	0.0
SVOC	Unknown PAH	1	1	0	100.0
SVOC	bis(2-Chloroethoxy) methane	9	0	9	0.0

Table V.2 Area D Environmental Samples Summary Statistics - Set 1
Analytical Detects (Hits) Versus Analytical Non-Detects (Misses)
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Analyte Type	Parameter	Total Number of Samples	Number Of Hits	Number Of Misses	Percentage Of Hits
SVOC	bis(2-Chloroethyl)ether	9	0	9	0.0
SVOC	bis(2-Ethylhexyl)phthalate	9	3	6	33.3
VOC	1,1,1-Trichloroethane	9	0	9	0.0
VOC	1,1,2,2-Tetrachloroethane	9	0	9	0.0
VOC	1,1,2-Trichloroethane	9	0	9	0.0
VOC	1,1-Dichloroethane	9	0	9	0.0
VOC	1,1-Dichloroethene	9	0	9	0.0
VOC	1,2-Dichloroethane	9	0	9	0.0
VOC	1,2-Dichloroethene	9	0	9	0.0
VOC	1,2-Dichloropropane	9	0	9	0.0
VOC	2-Butanone	8	1	7	12.5
VOC	2-Hexanone	9	0	9	0.0
VOC	4-Methyl-2-pentanone	9	0	9	0.0
VOC	Acetone	9	5	4	55.5
VOC	Benzene	9	0	9	0.0
VOC	Bromodichloromethane	9	0	9	0.0
VOC	Bromoform	9	0	9	0.0
VOC	Bromomethane	9	0	9	0.0
VOC	Carbon Disulfide	9	0	9	0.0
VOC	Carbon Tetrachloroethane	9	0	9	0.0
VOC	Chlorobenzene	9	0	9	0.0
VOC	Chloroethane	9	0	9	0.0
VOC	Chloroform	9	0	9	0.0
VOC	Chloromethane	9	0	9	0.0
VOC	Dibromochloromethane	9	0	9	0.0
VOC	Diethylbenzene,Total	9	0	9	0.0
VOC	Ethylbenzene	9	0	9	0.0

Table V.2 Area D Environmental Samples Summary Statistics - Set 1
Analytical Detects (Hits) Versus Analytical Non-Detects (Misses)
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Analyte Type	Parameter	Total Number of Samples	Number Of Hits	Number Of Misses	Percentage Of Hits
VOC	Methylene Chloride	9	1	8	11.1
VOC	Styrene	9	0	9	0.0
VOC	Tetrachloroethene	9	0	9	0.0
VOC	Toluene	9	0	9	0.0
VOC	Trichloroethene	9	0	9	0.0
VOC	Vinyl Chloride	9	0	9	0.0
VOC	Xylene, Total	9	0	9	0.0
VOC	cis-1,3-Dichloropropane	9	0	9	0.0
VOC	trans-1,3-Dichloropropane	9	0	9	0.0
RADS	Bismuth-207	17	17	0	100.0
RADS	Bismuth-210	17	17	0	100.0
RADS	Cobalt-60	17	17	0	100.0
RADS	Cesium-137	17	17	0	100.0
RADS	Plutonium-238	17	17	0	100.0
RADS	Plutonium-239/240	17	17	0	100.0
RADS	Thorium-227	17	17	0	100.0
RADS	Thorium-228	17	17	0	100.0
RADS	Thorium-230	17	17	0	100.0
RADS	Thorium-232	17	17	0	100.0
RADS	Uranium-234	17	17	0	100.0
RADS	Uranium-235	17	17	0	100.0
RADS	Uranium-238	17	17	0	100.0
RADS	Americium-241	17	17	0	100.0
RADS	Tritium	17	17	0	100.0
RADS	Radium-226	17	17	0	100.0

is currently being conducted by Mound to determine average background values and associated confidence levels. That study will be completed in 1994.

In order to estimate background concentrations while the Mound study is being completed, the information recently collected by DOE in two background studies (one near the Fernald Plant and one near the Oak Ridge Facility) was used. The Fernald study was entitled CERCLA/RCRA Background Soil Study Fernald Environmental Management Project, Fernald, Ohio (DOE 1993c). The Oak Ridge study was entitled Annual Report on Background Soil Characterization Project on the Oak Ridge Reservation, Oak Ridge, TN. (DOE 1993d).

The objective of both DOE background soil characterization projects was to determine background concentrations of organics, metals, and radionuclides in natural soils. These studies were key to environmental restoration projects because they provide remediation projects with 100% validated data on background concentrations which were technically and legally defensible. In both DOE studies, background concentrations (including upper 95% confidence bounds) for a number of different soil areas were calculated and reported. Background data from the Fernald and Oak Ridge studies were combined with the resultant analyte "hit" list generated above (73 analytes) to produce Table V.3.

The MEAN value in Table V.3. represents the average concentration of each analyte from Area D. The FEMP95 value is the 95% upper bound on the soil area that exhibited the highest background concentration in the Fernald study, and the ORR95 is the 95% upper bound on the soil area that exhibited the highest background concentration in Oak Ridge study. Following decision rule number 2 (detection at levels significantly higher than naturally occurring background levels), the FEMP95 background statistics were compared against Area D mean concentrations. Table V.4. lists the 21 analytes that were removed from the list of potential COCs because their mean value in Area D was less than the Fernald background concentrations. Table V.5. lists an additional 4 analytes that were removed from the list of potential COCs because their mean value in Area D was less than the Oak Ridge background concentrations.

After removing analytes whose mean value was less than background, the list of potential COC was reduced by a total of 25 analytes leaving 48 remaining potential COCs. Analytes with relatively low mean concentrations in Area D (i.e., chloride, sulfate, nitrate/nitrite, and cadmium) were not measured in either of the DOE background soil investigations and could not be removed from the potential COC list.

Table V.3. Area D Environmental Samples Summary Statistics
A Comparison of Analytical Detects Versus FEMP and ORR Background Statistics
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Analyte Type	Parameter	Concentration			RCRA Limit	Units
		Mean	FEMP95	ORR95		
Anion	Chloride	262.33	•	•	•	µg/kg
Anion	Fluoride	3.72	•	•	•	µg/kg
Anion	Sulfate	75.00	•	•	•	µg/kg
Anion	Nitrate/Nitrite	3.25	•	•	•	µg/kg
Metal	Arsenic	3.53	6.95	17.00	•	mg/kg
Metal	Mercury	0.11	0.30	0.34	•	mg/kg
Metal	Aluminum	21772.89	11071.00	41900.00	•	mg/kg
Metal	Antimony	16.54	1.10	1.10	•	mg/kg
Metal	Barium	36.46	81.50	125.00	•	mg/kg
Metal	Beryllium	0.60	0.43	1.48	•	mg/kg
Metal	Bismuth	32.51	•	•	•	mg/kg
Metal	Cadmium	1.86	0.41	•	40	mg/kg
Metal	Calcium	200191.11	115693.00	1930.00	•	mg/kg
Metal	Chromium	7.74	14.30	88.10	•	mg/kg
Metal	Cobalt	5.66	11.50	28.50	•	mg/kg
Metal	Copper	7.97	14.90	33.70	•	mg/kg
Metal	Iron	10802.22	22944.00	47800.00	•	mg/kg
Metal	Lithium	5.93	•	32.40	•	mg/kg
Metal	Magnesium	61984.44	31005.00	5030.00	•	mg/kg
Metal	Manganese	375.33	1035.00	2330.00	•	mg/kg
Metal	Molybdenum	3.37	•	•	•	mg/kg
Metal	Nickel	12.89	25.90	33.50	•	mg/kg
Metal	Potassium	713.56	1400.00	5780.00	•	mg/kg
Metal	Sodium	243.00	158.30	•	•	mg/kg
Metal	Tin	16.71	•	•	•	mg/kg
Metal	Vanadium	9.04	25.10	65.80	•	mg/kg
Metal	Zinc	24.48	58.30	68.10	•	mg/kg

Table V.3. Environmental Samples Summary Statistics
A Comparison of Analytical Detects Versus FEMP and ORR Background Statistics
page 2 of 3

Analyte Type	Parameter	Concentration			RCRA Limit	Units
		Mean	FEMP95	ORR95		
Metal	Lead	18.06	19.50	67.70	•	mg/kg
Metal	Selenium	0.72	0.39	1.06	•	mg/kg
Pesticide	4,4'-DDE	3.66	•	•	2000	µg/kg
Pesticide	4,4'-DDT	4.04	•	•	2000	µg/kg
Pesticide	Endrin Ketone	4.83	•	•	•	µg/kg
Pesticide	Methoxychlor	24.89	•	•	•	µg/kg
Pesticide	alpha-Chlordane	6.31	•	•	500	µg/kg
Pesticide	gamma-Chlordane	7.20	•	•	500	µg/kg
Pesticide	3,3'-Dichlorobenzidine	360.00	•	•	•	µg/kg
SVOC	Acenaphthylene	300.33	•	53.00	•	µg/kg
SVOC	Benzo(a)anthracene	269.44	•	2.39	•	µg/kg
SVOC	Benzo(a)pyrene	298.44	•	3.08	•	µg/kg
SVOC	Benzo(b)fluoranthene	300.00	•	1.6	•	µg/kg
SVOC	Benzo(g,h,i)perylene	284.22	•	•	•	µg/kg
SVOC	Benzo(k)fluoranthene	286.22	•	•	•	µg/kg
SVOC	Chrysene	263.77	•	•	•	µg/kg
SVOC	Di-n-butylphthalate	281.11	•	•	•	µg/kg
SVOC	Fluoranthene	286.67	•	20.3	•	µg/kg
SVOC	Indeno(1,2,3-c,d)pyrene	281.71	•	•	•	µg/kg
SVOC	Phenanthrene	256.44	•	112.0	•	µg/kg
SVOC	Pyrene	432.50	•	11.1	•	µg/kg
SVOC	Unknown	85.00	•	•	•	µg/kg
SVOC	Unknown Alkane	150.00	•	•	•	µg/kg
SVOC	Unknown Carboxylic Acid	212.75	•	•	•	µg/kg
SVOC	Unknown Ester Carboxylic Acid	90.25	•	•	•	µg/kg

Table V.3. Area D Environmental Samples Summary Statistics
A Comparison of Analytical Detects Versus FEMP and ORR Background Statistics
page 3 of 3

Analyte Type	Parameter	Concentration			RCRA Limit	Units
		Mean	FEMP95	ORR95		
SVOC	Unknown Ester Hexanedioic Acid	516.67	•	•	•	µg/kg
SVOC	Unknown Hydrocarbon	143.00	•	•	•	µg/kg
SVOC	Unknown Phthalate Ester	120.00	•	•	•	µg/kg
SVOC	bis(2-Ethylhexyl) phthalate	258.66	•	•	50000	µg/kg
VOC	2-Butanone	13.25	•	•	•	µg/kg
VOC	Acetone	39.00	•	•	8,000,000	µg/kg
VOC	Methylene Chloride	23.33	•	•	90000	µg/kg
RADS	Bismuth-207	0.56	•	•	•	pCi/g
RADS	Bismuth-210	0.02	1.72	•	•	pCi/g
RADS	Cobalt-60	0.02	•	•	•	pCi/g
RADS	Cesium-137	0.02	0.45	2.47	•	pCi/g
RADS	Plutonium-239/240	0.08	•	0.04	•	pCi/g
RADS	Thorium-227	0.09	•	•	•	pCi/g
RADS	Thorium-230	0.88	1.51	1.39	•	pCi/g
RADS	Thorium-232	0.90	1.09	2.10	•	pCi/g
RADS	Uranium-234	0.67	1.04	1.59	•	pCi/g
RADS	Uranium-235	0.03	0.09	0.12	•	pCi/g
RADS	Uranium-238	0.71	1.08	1.50	•	pCi/g
RADS	Americium-241	0.03	•	•	•	pCi/g
RADS	Tritium	1.95	•	0.04	•	pCi/g
RADS	Radium-226	1.12	1.20	2.20	•	pCi/g

VOC - Volatile Organic Compounds
SVOC - Semivolatile Organic Compounds
RADS - Radionuclides
• Data Not Available

Table V.4. Area D Environmental Samples Summary Statistics
Parameters Whose Mean Was Less Than The Highest FEMP Background Limits
Parameters Removed From The Potential Contaminants of Concern List

Parameter	Mean	FEMP95	ORR95	RCRA Limit	Units
Arsenic	3.53	6.95	17.00	•	mg/kg
Mercury	0.11	0.30	0.34	•	mg/kg
Barium	36.46	81.50	125.00	•	mg/kg
Chromium	7.74	14.30	88.10	•	mg/kg
Cobalt	5.66	11.50	28.50	•	mg/kg
Copper	7.97	14.90	33.70	•	mg/kg
Iron	10802.22	22944.00	47800.00	•	mg/kg
Manganese	375.33	1035.00	2330.00	•	mg/kg
Nickel	12.89	25.90	33.50	•	mg/kg
Potassium	713.56	1400.00	5780.00	•	mg/kg
Vanadium	9.04	25.10	65.80	•	mg/kg
Zinc	24.48	58.30	68.10	•	mg/kg
Lead	18.06	19.50	67.70	•	mg/kg
Bismuth-210	0.02	1.72	•	•	pCi/g
Cesium-137	0.02	0.46	2.47	•	pCi/g
Thorium-230	0.88	1.51	1.39	•	pCi/g
Thorium-232	0.90	1.09	2.10	•	pCi/g
Uranium-234	0.67	1.04	1.59	•	pCi/g
Uranium-235	0.03	0.09	0.12	•	pCi/g
Uranium-238	0.71	1.08	1.50	•	pCi/g
Radium-226	1.12	1.20	2.20	•	pCi/g

• Data Not Available

Table V.5. Area D Environmental Samples Summary Statistics
Parameters Whose Mean Was Less Than The Highest ORR Background Limits

Parameter	Mean (mg/kg)	FEMP95 (mg/kg)	ORR95 (mg/kg)	RCRA Limit (mg/kg)
Aluminum	21772.89	11071.00	41900.00	•
Beryllium	0.60	0.43	1.48	•
Lithium	5.93	•	32.40	•
Selenium	0.72	0.39	1.06	•

• Data Not Available

5.2.3. Analyte Concentrations Compared to Action Levels

A further reduction in potential COCs was conducted following decision rule number 3 - comparison of analyte means to established action levels (ARARs). The action levels used for this comparison were obtained from EPA's Corrective Action for Solid Waste Management Units at Hazardous Waste Management Facilities; Proposed Rule, (EPA 1990b). EPA's maximum RCRA action levels for soils are also displayed in Table V.3. (RCRA Limit). All Area D analytes whose mean concentration was less then the RCRA action level were removed as potential COCs. Table V.6. lists an additional 8 analytes that were removed from the list of potential COCs because their mean value in Area D was less than the RCRA action limit for contaminants in soils. After removing analytes whose mean value was less than RCRA limit, the list of remaining potential COC was reduced to 40.

5.2.4. Estimated Analyte Concentrations

The last reduction in potential COCs was conducted following decision rule number 4 - comparison of estimated analyte values ("J" data qualifiers) with non-detected values ("U" data qualifiers). When analyte concentrations are very close to method detection limits, the analytical chemist will often specify that the analyte was probably present in the sample but could not quantify the specific analyte concentration. In addition, the laboratory data qualifier may also designate a sample result as being estimated because of potential QC problems (e.g., blank concentration, poor surrogate recoveries, or matrix spike problems) encountered during the laboratory analysis. In both these cases, specific laboratory analyte measurements will be considered estimates and have "J" data qualifiers attached to their results.

Table V.7. displays the data qualifier results for the remaining 40 potential COCs. Note that only 17 of the 40 analytes had positive hits (Number of Hit values that are not equal to zero). To remove those analytes whose estimated values were below method detection limits, the maximum non-detect value ("U" data qualifier) for each analyte was compared to each sample result. If the sample analyte concentration was below the maximum non-detect value, it was deleted from the list of potential COCs.

After removing the analytes following decision rule number 4, the remaining potential COCs are displayed in Table V.8. The total number of potential COCs has been reduced to 23 from an original of 183. The relative importance of these potential COC will be discussed in Section 6.

Table V.6. Area D Environmental Samples Summary Statistics
Parameters Whose Mean Was Less Than The RCRA Limit

Parameter	Mean	FEMP95	ORR95	RCRA Limit	Units
Cadmium	1.86	0.41	•	40	mg/kg
4,4'-DDE	3.65	•	•	2,000	µg/kg
4,4'-DDT	4.04	•	•	2,000	µg/kg
alpha-Chlordane	6.31	•	•	500	µg/kg
gamma-Chlordane	7.20	•	•	500	µg/kg
bis(2-Ethylhexyl) phthalate	258.66	•	•	50,000	µg/kg
Acetone	39.00	•	•	8,000,000	µg/kg
Methylene chloride	23.33	•	•	90,000	µg/kg

• Data Not Available

Table V.7. Area D Environmental Samples Summary Statistics
Distribution of Detects (Hits), Non-Detects (Misses), and Estimated Values
Page 1 of 2

Parameter	Number of Hits	Number of Misses	Number of Estimated Values
2-Butanone	0	7	1
3,3'-Dichlorobenzene	0	8	1
Acenaphthylene	0	7	2
Americium-241	17	0	0
Antimony	2	2	0
Benzo(a)anthracene	0	4	5
Benzo(a)pyrene	0	4	5
Benzo(b)fluoranthene	0	4	5
Benzo(g,h,i)perylene	0	5	4
Benzo(k)fluoranthene	0	5	4
Bismuth-207	17	0	0
Bismuth-210m	2	7	0
Calcium	5	4	0
Chloride	0	0	9
Chrysene	0	4	5
Cobalt-60	5	0	12
Di-n-butylphthalate	0	8	1
Endrin Ketone	0	8	1
Fluoranthene	1	3	5
Fluoride	9	0	0
Tritium	4	0	13
Indeno(1,2,3-c,d)pyrene	0	5	2
Magnesium	9	0	0
Methoxychlor	0	8	1
Molybdenum	3	6	0

Table V.7. Area D Environmental Samples Summary Statistics
Distribution of Detects (Hits), Non-Detects (Misses), and Estimated Values
Page 2 of 2

Parameter	Number of Hits	Number of Misses	Number of Estimated Values
Nitrate/Nitrite	8	1	0
Phenanthrene	0	5	4
Plutonium-239/240	17	0	0
Pyrene	1	4	3
Sodium	8	0	0
Sulfate	0	5	4
Thorium-227	17	0	0
Tin	2	7	0
Unknown	0	1	4
Unknown Alkane	0	0	2
Unknown Carboxylic Acid	0	3	1
Unknown Ester Carboxylic Acid	0	3	1
Unknown Ester Hexanedioic Acid	0	2	1
Unknown Hydrocarbon	0	0	4
Unknown PAH	0	0	1

Table V.8. Area D Environmental Samples Summary Statistics
Final Hit List Statistics

Parameter	Total Number of Hits	Maximum Hit	Mean Hit	Units
Chloride	9	1100.00	262.33	µg/g
Fluoride	9	6.20	3.72	µg/g
Sulfate	9	190.00	75.00	µg/g
Nitrate/Nitrite	9	5.50	3.25	µg/g
Calcium	9	309000.00	234100.00	mg/kg
Magnesium	9	127000.00	61984.44	mg/kg
Sodium	8	486.00	243.00	mg/kg
Endrin Ketone	9	15.00	6.07	mg/kg
Methoxychlor	9	76.00	31.11	µg/kg
Benzo(a)pyrene	9	430.00	320.67	µg/kg
Benzo(b)fluoranthene	9	410.00	318.89	µg/kg
Benzo(k)fluoranthene	9	430.00	314.00	µg/kg
Pyrene	8	580.00	432.50	µg/kg
Unknown Alkane	2	150.00	150.00	µg/kg
Unknown Hydrocarbon	4	280.00	143.00	µg/kg
Unknown PAH	1	120.00	120.00	µg/kg
2-Butanone	8	29.00	13.25	µg/kg
Bismuth-207	17	0.20	0.06	pCI/g
Cobalt-60	17	0.08	0.02	pCI/g
Plutonium-239/240	17	0.46	0.08	pCI/g
Thorium-227	17	0.16	0.09	pCI/g
Americium-241	17	0.14	0.03	pCI/g
Tritium	17	4.10	1.95	pCI/g

5.2.5. Comparison of Results with Previous Studies

As discussed in the Verification Sampling and Analysis Plan (DOE, 1993a), during the 1989 study of Area D, soil samples were analyzed for TAL metals, TCL VOCs and SVOCs, pesticides, and polychlorinated biphenyls. The results from the 1989 study (DOE, 1992b), in which a total of 38 surface and subsurface soil samples were collected, indicated that there was no significant chemical contamination. Specifically, of the 4000+ chemical analyses conducted on the soil samples obtained in this investigation, only two organic compounds were identified above detection levels, beta-BHC (12 ppb) and endrin ketone (20 ppb). In the verification study completed in 1993, endrin ketone was also measured in Area D with a maximum value of 15 ppb and a mean value of 6.07 ppb - very close agreement with the 1989 study. Beta-BHC was not found in any of the environmental samples collected during the 1993 study.

The plutonium concentrations from the 1989 reconnaissance investigation varied from a low of 0 pCi/g to a high of 18 pCi/g with a mean of 5.5 pCi/g. In the 1993 study, plutonium concentrations ranged from a low of 0 pCi/g to a high of 21 pCi/g with a mean of 4.26 pCi/g - very close agreement with the results from the 1989 study. The thorium concentrations from the 1989 reconnaissance investigation varied from a low of 0.3 pCi/g to a high of 1.5 pCi/g with a mean of 0.66 pCi/g. In the 1993 study, thorium concentrations ranged from a low of 0.12 pCi/g to a high of 5.4 pCi/g with a mean of 0.9 pCi/g -very close agreement with the results from the 1989 study.

The results of the 1993 verification study for radiological contamination closely agree with the radiological results of the 1989 study. The chemical results are similar - both studies identified endrin ketone as a potential contaminant; however the 1993 study indicated that there were other potential COCs at very low concentrations that were not found in the 1989 study.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1. CHEMICAL CONTAMINATION

The results of the verification sampling and analysis activities conducted in OU6, Area D show that most (more than 87 percent) of the TCL VOCs, SVOCs, pesticides/PCBs and TAL compounds included in the laboratory analysis were either not detected in site soils or were present at concentrations below known action levels. Four anions (chloride, fluoride, sulfate and nitrate-nitrite) were determined to be present at concentrations that exceeded the four-part decision rule criteria described in Section 5 of this report. Three metals (calcium, magnesium and sodium), two pesticides (endrin ketone and methoxychlor), five SVOCs (benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, pyrene and an unknown PAH), one VOC (2-butanone), one unknown alkane and one unknown hydrocarbon were also found to be present in Area D soils at concentrations that exceeded the four part decision rule criteria.

The elevated anion concentrations are probably due to the release of chemical reagents used in the PP Building (reagent grade nitric acid solutions and ferrous sulfate solutions), as described in the OU6, Area D SAP (DOE, 1993a). The localized use of road salts to control icing conditions during cold weather along the access road that passes over Area D is a likely source of the chloride and fluoride anions. The use of road salts may also be the source of the elevated calcium, magnesium and sodium concentrations found in Area D soils.

Four of the five SVOCs that met the four-part decision rule criteria (benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and pyrene) were detected in all soil samples, while the fifth, an unknown PAH, was detected only in BS0201. These SVOCs are common to the asphalt and road tar materials used to surface the access road that passes over the former acid drain line in Area D and is the most likely source for these organic constituents. The VOC determined to be present in Area D soils (2-Butanone) is a common solvent used in a variety of paints and thinners. This compound is also used in a variety of adhesives, including the adhesive commonly used in the duct tape applied to the outside of the shipping containers. This compound is also a common laboratory contaminant and its presence may be an artifact of the laboratory analysis activities. The source or sources of the unknown alkane and the unknown hydrocarbon reported by the analytical laboratory cannot be surmised as this time.

One of the two pesticides detected in Area D (endrin ketone) was also detected during a previous study conducted in this area (DOE 1992b). As discussed in the SAP (DOE, 1993a), this contaminant was probably discharged through the former acid drain line during routine water rinses of the drip pan in the PP Building. The other pesticide (methoxychlor) is a common ingredient in aerosol sprays that are routinely used to control insect pests and may also have been discharged through the former acid drain line during drip pan rinsing or flushing activities.

6.2. RADIOLOGICAL CONTAMINATION

Six radiological contaminants (bismuth-207, cobalt-60, plutonium-239/240, thorium-227, americium-241 and tritium) were found to be present in Area D soils at concentrations that exceeded the four-part decision rule criteria described in Section 5 of this report. The maximum concentration of americium-241 detected in Area D (0.14 pCi/g) is more than two orders of magnitude below the cleanup level (20 pCi/g) specified in the OU6 VWP. All other isotopes listed above were found at maximum concentrations less than 1 pCi/g, with the exception of tritium (maximum concentration found was 4.10 pCi/g).

The presence of these radioactive materials may be the result of historical releases in adjacent areas (primarily Area 12 and Area J) because they were not common to the PP operations conducted in Building 38. However, the relatively small concentrations of these radiological contaminants in Area D soils suggests their presence may be the result of a variety of other releases, including the use of contaminated process waters or rinse waters in the PP operations.

6.3. CONCLUSIONS

The concentrations of plutonium-238 and thorium in Area D soils are less than the cleanup criteria established by the Mound Plant D&D Program. The concentrations of americium-241, cesium-137, and radium-226 found in Area D soils are also below the cleanup criteria specified in the OU6 VWP (20 pCi/g, 80 pCi/g and 5/15 pCi/g suface/subsurface, respectively). Based upon the results of the verification sampling and analysis activities described in this report, Area D can be considered clean from a D&D perspective. Some residual radiological and chemical contamination remains in Area D soils at relatively low concentrations. Consequently, Area D does not appear to be a source of chemical or radiological contamination (i.e., measured concentations do not appear to be sufficient to impact downgradient areas).

6.4. RECOMMENDATIONS

- On the basis of the results of the verification sampling and analysis activities in OU6, Area D, no further remedial action by the Mound Plant D&D Program is required.

- The verification sampling and analysis results indicate that OU6, Area D soils are not a source of chemical or radiological contamination (i.e., measured concentations do not appear to be sufficient to impact downgradient areas). Therfore, no further verification sampling and analysis activities are needed to address the objectives specified in the OU6, Area D SAP.

- The data obtained from the verification sampling and analysis activities in Area D met the DQOs set forth in the OU6, Area D SAP and the OU6 QAPjP. This data should be used to support the future feasibility study, risk assessment and ROD for OU6.

- The Mound Plant Environmental Restoration Program should review the OU6, Area D verification sampling and analysis data to determine the need for any further remedial action, when background data and cleanup goals are available.

Sampling Point	Sampling ID	Northing	Easting	Elevation
MOUND OU6 AREA D	BS0101	597555.28120	1497114.26120	876.32000
Depth: 18.0 TO 19.2 FT	MND15-1101-0018			

	Parameter	Results	Units	Validation Qualifier
RADIOLOGIC	Am-241	-0.40	PCI/G	UJ
	H-3	0.02	PCI/G	J
	Ra-226	0.98	PCI/G	
	Bi-207	0.010	PCI/G	J
	Bi-210	0.10	PCI/G	
	Co-60	-0.010	PCI/G	UJ
	Cs-137	-0.010	PCI/G	UJ
	Pu-238	0.017	PCI/G	J
	Pu-239/240	0.013	PCI/G	J
	Th-227	0.023	PCI/G	J
	Th-228	0.84	PCI/G	
	Th-230	0.61	PCI/G	
	Th-232	0.78	PCI/G	
	U-234	0.73	PCI/G	
	U-235	0.030	PCI/G	J
	U-238	0.47	PCI/G	

* LAST ANALYSIS FOR SAMPLE BS0101

Sampling Point	Sampling ID	Northing	Easting	Elevation
MOUND OU6 AREA D	BS0201	597559.33790	1497115.04990	876.26000
Depth: 9.0 TO 11.0 FT	MND15-1102-0009			

	Parameter	Results	Units	Validation Qualifier
ANIONS	Chloride	1100	UG/G	J - C
	Sulfate	190	UG/G	J - C
	Nitrate/Nitrite (NO3/	2.3	UG/G	
	Fluoride	3.0	UG/G	
INORGANIC	Arsenic	5.7	MG/KG	
	Cyanide	3.1	MG/KG	UJ - HC(-)
	Mercury	.12	MG/KG	U
	Aluminum	16500	MG/KG	
	Antimony	1.9	MG/KG	R - S
	Barium	101	MG/KG	J - I(+)
	Beryllium	.95	MG/KG	
	Bismuth	4.30	MG/KG	U
	Cadmium	.48	MG/KG	
	Calcium	3820	MG/KG	
	Chromium	19.3	MG/KG	J - S(-)
	Cobalt	14.7	MG/KG	
	Copper	17.5	MG/KG	J - SI(-)
	Iron	29700	MG/KG	J - I(+)
	Lithium	15.50	MG/KG	
	Manganese	890	MG/KG	
	Molybdenu	1.50	MG/KG	
	Nickel	21.7	MG/KG	J - SI(+)
	Potassium	1500	MG/KG	
	Silver	0.25	MG/KG	R - S
	Sodium	401	MG/KG	
	Tin	2.20	MG/KG	U
	Vanadium	26.1	MG/KG	
	Zinc	60.7	MG/KG	J - I (+)
	Magnesium	3660	MG/KG	
	Lead	16.2	MG/KG	J - S(+)
	Selenium	0.69	MG/KG	J - I(+)
	Thallium	0.25	MG/KG	UJ - SI(-)
PESTICIDES /PCB's	4,4'-DDD	3.9	UG/KG	UJ - K
	4,4'-DDE	3.9	UG/KG	UJ - K
	4,4'-DDT	3.9	UG/KG	UJ - KC

Sampling Point	Sampling ID	Northing	Easting	Elevation
MOUND OU6 AREA D	BS0201	597559.33790	1497115.04990	876.26000
Depth: 9.0 TO 11.0 FT	MND15-1102-0009			

	Parameter	Results	Units	Validation Qualifier
PESTICIDES /PCB's	Aldrin	2.0	UG/KG	UJ - K
	alpha-BHC	2.0	UG/KG	UJ - K
	alpha-Chlordane	2.0	UG/KG	UJ - K
	Aroclor-1016	39.0	UG/KG	UJ - K
	Aroclor-1221	79.0	UG/KG	UJ - K
	Aroclor-1232	39.0	UG/KG	UJ - K
	Aroclor-1242	39.0	UG/KG	UJ - K
	Aroclor-1248	39.0	UG/KG	UJ - K
	Aroclor-1254	39.0	UG/KG	UJ - K
	Aroclor-1260	39.0	UG/KG	UJ - K
	beta-BHC	2.0	UG/KG	UJ - K
	delta-BHC	2.0	UG/KG	UJ - K
	Dieldrin	3.9	UG/KG	UJ - K
	Endosulfan I	2.0	UG/KG	UJ - K
	Endosulfan II	3.9	UG/KG	UJ - K
	Endosulfan sulfate	3.9	UG/KG	UJ - K
	Endrin	3.9	UG/KG	UJ - K
	Endrin Aldehyde	3.9	UG/KG	UJ - K
	Endrin Ketone	3.9	UG/KG	UJ - KC
	gamma-BHC (Lindane)	2.0	UG/KG	UJ - K
	gamma-Chlordane	2.0	UG/KG	UJ - K
	Heptachlor	2.0	UG/KG	UJ - K
	Heptachlor epoxide	2.0	UG/KG	UJ - K
	Methoxychlor	20.0	UG/KG	UJ - KC
	Toxaphene	200.0	UG/KG	UJ - K
RADIOLOGIC	Am-241	-0.11	PCI/G	UJ
	H-3	0.01	PCI/G	J
	Ra-226	2.0	PCI/G	
	Bi-207	0.19	PCI/G	
	Bi-210	0.00	PCI/G	J
	Co-60	0.010	PCI/G	J
	Cs-137	-0.050	PCI/G	UJ
	Pu-238	-0.022	PCI/G	UJ
	Pu-239/240	0.000	PCI/G	
	Th-227	0.086	PCI/G	

Sampling Point	Sampling ID	Northing	Easting	Elevation
MOUND OU6 AREA D	BS0201	597559.33790	1497115.04990	876.26000
Depth: 9.0 TO 11.0 FT	MND15-1102-0009			

	Parameter	Results	Units	Validation Qualifier
RADIOLOGIC	Th-228	0.85	PCI/G	
	Th-230	1.20	PCI/G	
	Th-232	0.75	PCI/G	
	U-234	0.80	PCI/G	
	U-235	0.040	PCI/G	J
	U-238	1.00	PCI/G	
SEMIVOLATILE	1,2,4-Trichlorobenzen	400	UG/KG	UJ - C
	1,2-Dichlorobenzene	400	UG/KG	UJ - H
	1,3-Dichlorobenzene	400	UG/KG	UJ - H
	1,4-Dichlorobenzene	400	UG/KG	UJ - H
	2,2'-oxybis(1-Chlorop	400	UG/KG	UJ - H
	2,4,5-Trichlorophenol	970	UG/KG	UJ - H
	2,4,6-Trichlorophenol	400	UG/KG	UJ - C
	2,4-Dichlorophenol	400	UG/KG	UJ - H
	2,4-Dimethylphenol	400	UG/KG	UJ - H
	2,4-Dinitrophenol	970	UG/KG	UJ - H
	2,4-Dinitrotoluene	400	UG/KG	UJ - H
	2,6-Dinitrotoluene	400	UG/KG	UJ - H
	2-Chloronaphthalene	400	UG/KG	UJ - H
	2-Chlorophenol	400	UG/KG	UJ - H
	2-Methylnaphthalene	400	UG/KG	UJ - H
	2-Methylphenol	400	UG/KG	UJ - H
	2-Nitroaniline	970	UG/KG	UJ - H
	2-Nitrophenol	400	UG/KG	UJ - H
	2-Pentanone, 4-Hydrox	4100	UG/KG	R
	3,3'-Dichlorobenzidin	400	UG/KG	UJ - H
	3-Nitroaniline	970	UG/KG	UJ - H
	4,6-Dinitro-2-methylp	970	UG/KG	UJ - H
	4-Bromophenyl-phenyle	400	UG/KG	UJ - H
	4-Chloro-3-methylphen	400	UG/KG	UJ - H
	4-Chloroaniline	400	UG/KG	UJ - H
	4-Chlorophenyl-phenyl	400	UG/KG	UJ - H
	4-Methylphenol	400	UG/KG	UJ - H
	4-Nitroaniline	970	UG/KG	UJ - H
	4-Nitrophenol	970	UG/KG	UJ - H

Sampling Point	Sampling ID	Northing	Easting	Elevation
MOUND OU6 AREA D	BS0201	597559.33790	1497115.04990	876.26000
Depth: 9.0 TO 11.0 FT	MND15-1102-0009			

	Parameter	Results	Units	Validation Qualifier
SEMIVOLATILE	Acenaphthene	400	UG/KG	UJ - H
	Acenaphthylene	400	UG/KG	UJ - H
	Anthracene	400	UG/KG	UJ - H
	Benzo(a)anthracene	210	UG/KG	J - H
	Benzo(a)pyrene	230	UG/KG	J - I (+)
	Benzo(b)fluoranthene	230	UG/KG	J - I (+)
	Benzo(g,h,i)perylene	140	UG/KG	J - I (+)
	Benzo(k)fluoranthene	180	UG/KG	J - I (+)
	bis(2-Chloroethoxy)me	400	UG/KG	UJ - H
	bis(2-Chloroethyl)eth	400	UG/KG	UJ - H
	bis(2-Ethylhexyl)phth	140	UG/KG	J - H
	Butylbenzylphthalate	400	UG/KG	UJ - H
	Carbazole	400	UG/KG	U
	Chrysene	200	UG/KG	J - H
	Di-n-butylphthalate	140	UG/KG	UJ - H
	Di-n-octylphthalate	400	UG/KG	UJ - H
	Dibenzo(a,h)anthracen	400	UG/KG	UJ - H
	Dibenzofuran	400	UG/KG	UJ - H
	Diethylphthalate	400	UG/KG	UJ - H
	Dimethylphthalate	400	UG/KG	UJ - H
	Fluoranthene	320	UG/KG	J - H
	Fluorene	400	UG/KG	UJ - H
	Hexachlorobenzene	400	UG/KG	UJ - H
	Hexachlorobutadiene	400	UG/KG	UJ - C
	Hexachlorocyclopentad	400	UG/KG	UJ - H
	Hexachloroethane	400	UG/KG	UJ - H
	Indeno(1,2,3-c,d)pyre	140	UG/KG	J - I (+)
	Isophorone	400	UG/KG	UJ - H
	N-Nitroso-di-n-propyl	400	UG/KG	UJ - H
	N-Nitrosodiphenylamin	400	UG/KG	UJ - H
	Naphthalene	400	UG/KG	UJ - H
	Nitrobenzene	400	UG/KG	UJ - H
	Pentachlorophenol	970	UG/KG	UJ - H
	Phenanthrene	190	UG/KG	J - H
	Phenol	400	UG/KG	UJ - H

Sampling Point	Sampling ID	Northing	Easting	Elevation
MOUND OU6 AREA D	BS0201	597559.33790	1497115.04990	876.26000
Depth: 9.0 TO 11.0 FT	MND15-1102-0009			

	Parameter	Results	Units	Validation Qualifier
SEMIVOLATILE	Pyrene	580	UG/KG	J - H
	Unknown	120	UG/KG	R
	Unknown	81	UG/KG	R
	Unknown Carboxylic Acid	200	UG/KG	R
	Unknown Ester Cabroxylic	120	UG/KG	R
	Unknown Ester Hexanedioic	160	UG/KG	R - B
	Unknown Hydrocarbon	280	UG/KG	JN
	Unknown PAH	120	UG/KG	JN
	Unknown Phthalate Est	570	UG/KG	R
VOLATILE	1,1,1-Trichloroethane	12	UG/KG	U
	1,1,2,2-Tetrachloroet	12	UG/KG	U
	1,1,2-Trichloroethane	12	UG/KG	U
	1,1-Dichloroethane	12	UG/KG	U
	1,1-Dichloroethene	12	UG/KG	U
	1,2-Dichloroethane	12	UG/KG	U
	1,2-Dichloroethene	12	UG/KG	U
	1,2-Dichloropropane	12	UG/KG	U
	2-Butanone	29	UG/KG	J - C
	2-Hexanone	12	UG/KG	U
	4-Methyl-2-pentanone	12	UG/KG	U
	Acetone	220	UG/KG	
	Benzene	12	UG/KG	U
	Bromodichloromethane	12	UG/KG	U
	Bromoform	12	UG/KG	U
	Bromomethane	12	UG/KG	U
	Carbon Disulfide	12	UG/KG	U
	Carbon Tetrachloride	12	UG/KG	U
	Chlorobenzene	12	UG/KG	U
	Chloroethane	12	UG/KG	UJ - C
	Chloroform	12	UG/KG	U
	Chloromethane	12	UG/KG	U
	cis-1,3-Dichloropropene	12	UG/KG	U
	Dibromochloromethane	12	UG/KG	U
	Diethylbenzene, Total	12	UG/KG	U
	Ethylbenzene	12	UG/KG	U

Sampling Point	Sampling ID	Northing	Easting	Elevation
MOUND OU6 AREA D	BS0201	597559.33790	1497115.04990	876.26000
Depth: 9.0 TO 11.0 FT	MND15-1102-0009			

	Parameter	Results	Units	Validation Qualifier
VOLATILE	Methylene Chloride	35	UG/KG	U - B
	Styrene	12	UG/KG	U
	Tetrachloroethene	12	UG/KG	U
	Toluene	12	UG/KG	U
	trans-1,3-Dichloropro	12	UG/KG	U
	Trichloroethene	12	UG/KG	U
	Vinyl Chloride	12	UG/KG	U
	Xylene, Total	12	UG/KG	U

* LAST ANALYSIS FOR SAMPLE BS0201

Sampling Point	Sampling ID	Northing	Easting	Elevation
MOUND OU6 AREA D	BS0301	597563.00900	1497115.92270	876.17000
Depth: 5.0 TO 7.0 FT	MND15-1103-0005			

	Parameter	Results	Units	Validation Qualifier
ANIONS	Chloride	350	UG/G	J - C
	Sulfate	110	UG/G	J - C
	Nitrate/Nitrite (NO3/	5.2	UG/G	
	Fluoride	3.0	UG/G	
INORGANIC	Arsenic	4.9	MG/KG	
	Cyanide	2.8	MG/KG	UJ - HC(-)
	Mercury	.11	MG/KG	U
	Aluminum	11600	MG/KG	
	Antimony	8.8	MG/KG	R - S
	Barium	65.9	MG/KG	
	Beryllium	.60	MG/KG	
	Bismuth	19.80	MG/KG	U
	Cadmium	1.1	MG/KG	U
	Calcium	84900	MG/KG	
	Chromium	13.6	MG/KG	J - S(-)
	Cobalt	9.1	MG/KG	
	Copper	13.1	MG/KG	J - S(+)
	Iron	21600	MG/KG	J - I(+)
	Lithium	12.70	MG/KG	
	Magnesium	19800	MG/KG	
	Manganese	551	MG/KG	
	Molybdenu	2.00	MG/KG	U
	Nickel	17.1	MG/KG	J - S(-)
	Potassium	1340	MG/KG	
	Silver	1.1	MG/KG	R - S
	Sodium	233	MG/KG	
	Tin	10.20	MG/KG	U
	Vanadium	19.2	MG/KG	
	Zinc	44.7	MG/KG	
	Lead	11.9	MG/KG	J - S(+)
	Selenium	0.81	MG/KG	
	Thallium	.23	MG/KG	UJ - SI(-)
PESTICIDES /PCB's	4,4'-DDD	15.0	UG/KG	UJ - K
	4,4'-DDE	4.4	UG/KG	JN - K,P
	4,4'-DDT	7.9	UG/KG	JN - K,P,C

Sampling Point	Sampling ID	Northing	Easting	Elevation
MOUND OU6 AREA D	BS0301	597563.00900	1497115.92270	876.17000
Depth: 5.0 TO 7.0 FT	MND15-1103-0005			

	Parameter	Results	Units	Validation Qualifier
PESTICIDES /PCB's	Aldrin	7.6	UG/KG	UJ - K
	alpha-BHC	7.6	UG/KG	UJ - K
?	alpha-Chlordane	42	UG/KG	JN - K,P
	Aroclor-1016	150-	UG/KG	UJ - K
	Aroclor-1221	300.00	UG/KG	UJ - K
	Aroclor-1232	150.00	UG/KG	UJ - K
	Aroclor-1242	150.00	UG/KG	UJ - K
	Aroclor-1248	150.00	UG/KG	UJ - K
	Aroclor-1254	150.00	UG/KG	UJ - K
	Aroclor-1260	150.00	UG/KG	UJ - K
	beta-BHC	7.6	UG/KG	UJ - K
	delta-BHC	7.6	UG/KG	UJ - K
	Dieldrin	15.0	UG/KG	UJ - K
	Endosulfan I	7.6	UG/KG	UJ - K
	Endosulfan II	15.0	UG/KG	UJ - K
	Endosulfan sulfate	15.0	UG/KG	UJ - K
	Endrin	15.0	UG/KG	UJ - K
	Endrin Aldehyde	15.0	UG/KG	UJ - K
	Endrin Ketone	15.0	UG/KG	JN - K,C
	gamma-BHC (Lindane)	7.6	UG/KG	UJ - K
?	gamma-Chlordane	50	UG/KG	J - K
	Heptachlor	7.6	UG/KG	UJ - K
	Heptachlor epoxide	7.6	UG/KG	UJ - K
	Methoxychlor	76.0	UG/KG	JN - K,C
	Toxaphene	760	UG/KG	UJ - K
RADIOLOGIC	Am-241	-0.12	PCI/G	UJ
	H-3	0.10	PCI/G	J
	Ra-226	0.98	PCI/G	
	Bi-207	0.086	PCI/G	
	Bi-210	0.10	PCI/G	
	Co-60	0.030	PCI/G	J
	Cs-137	-0.010	PCI/G	UJ
	Pu-238	4.10	PCI/G	
	Pu-239/240	0.089	PCI/G	
	Th-227	0.050	PCI/G	J

Sampling Point	Sampling ID	Northing	Easting	Elevation
MOUND OU6 AREA D	BS0301	597563.00900	1497115.92270	876.17000
Depth: 5.0 TO 7.0 FT	MND15-1103-0005			

	Parameter	Results	Units	Validation Qualifier
RADIOLOGIC	Th-228	0.39	PCI/G	
	Th-230	0.72	PCI/G	
	Th-232	0.39	PCI/G	
	U-234	0.57	PCI/G	
	U-235	0.027	PCI/G	J
	U-238	0.68	PCI/G	
SEMIVOLATILE	1,2,4-Trichlorobenzen	370.00	UG/KG	U
	1,2-Dichlorobenzene	370.00	UG/KG	U
	1,3-Dichlorobenzene	370.00	UG/KG	U
	1,4-Dichlorobenzene	370.00	UG/KG	U
	2,2'-oxybis(1-Chlorop	370.00	UG/KG	U
	2,4,5-Trichlorophenol	890.00	UG/KG	U
	2,4,6-Trichlorophenol	370.00	UG/KG	U
	2,4-Dichlorophenol	370.00	UG/KG	U
	2,4-Dimethylphenol	370.00	UG/KG	U
	2,4-Dinitrophenol	890.00	UG/KG	UJ - C
	2,4-Dinitrotoluene	370.00	UG/KG	U
	2,6-Dinitrotoluene	370.00	UG/KG	U
	2-Chloronaphthalene	370.00	UG/KG	U
	2-Chlorophenol	370.00	UG/KG	U
	2-Methylnaphthalene	370.00	UG/KG	U
	2-Methylphenol	370.00	UG/KG	U
	2-Nitroaniline	890.00	UG/KG	U
	2-Nitrophenol	370.00	UG/KG	U
	2-Pentanone, 4-Hydrox	860.00	UG/KG	R - B
	3,3'-Dichlorobenzidin	370.00	UG/KG	U
	3-Nitroaniline	890.00	UG/KG	U
	4,6-Dinitro-2-methylp	890.00	UG/KG	U
	4-Bromophenyl-phenyle	370.00	UG/KG	U
	4-Chloro-3-methylphen	370.00	UG/KG	U
	4-Chloroaniline	370.00	UG/KG	U
	4-Chlorophenyl-phenyl	370.00	UG/KG	U
	4-Methylphenol	370.00	UG/KG	U
	4-Nitroaniline	890.00	UG/KG	U
	4-Nitrophenol	890.00	UG/KG	U

Sampling Point	Sampling ID	Northing	Easting	Elevation
MOUND OU6 AREA D	BS0301	597563.00900	1497115.92270	876.17000
Depth: 5.0 TO 7.0 FT	MND15-1103-0005			

	Parameter	Results	Units	Validation Qualifier
SEMIVOLATILE	Acenaphthene	370.00	UG/KG	U
	Acenaphthylene	370.00	UG/KG	U
	Anthracene	370.00	UG/KG	U
	Benzene, methyl-	110.00	UG/KG	R - B
	Benzo(a)anthracene	140.00	UG/KG	J - 1 (+)
	Benzo(a)pyrene	140.00	UG/KG	J - 1 (+)
	Benzo(b)fluoranthene	160.00	UG/KG	J - 1 (+)
	Benzo(g,h,i)perylene	370.00	UG/KG	U
	Benzo(k)fluoranthene	110.00	UG/KG	J - 1 (+)
	bis(2-Chloroethoxy)me	370.00	UG/KG	U
	bis(2-Chloroethyl)eth	370.00	UG/KG	U
	bis(2-Ethylhexyl)phth	290.00	UG/KG	J - 1 (+)
	Butylbenzylphthalate	370.00	UG/KG	U
	Carbazole	370.00	UG/KG	U
	Chrysene	130.00	UG/KG	J - 1 (+)
	Di-n-butylphthalate	370.00	UG/KG	U
	Di-n-octylphthalate	370.00	UG/KG	U
	Dibenzo(a,h)anthracen	370.00	UG/KG	U
	Dibenzofuran	370.00	UG/KG	U
	Diethylphthalate	370.00	UG/KG	U
	Dimethylphthalate	370.00	UG/KG	U
	Ethanone, 1-PHENYL-	110.00	UG/KG	R - B
	Fluoranthene	230.00	UG/KG	J
	Fluorene	370.00	UG/KG	U
	Hexachlorobenzene	370.00	UG/KG	U
	Hexachlorobutadiene	370.00	UG/KG	U
	Hexachlorocyclopentad	370.00	UG/KG	U
	Hexachloroethane	370.00	UG/KG	U
	Indeno(1,2,3-c,d)pyre	370.00	UG/KG	U
	Isophorone	370.00	UG/KG	U
	N-Nitroso-di-n-propyl	370.00	UG/KG	U
	N-Nitrosodiphenylamin	370.00	UG/KG	U
	Naphthalene	370.00	UG/KG	U
	Nitrobenzene	370.00	UG/KG	U
	Pentachlorophenol	890.00	UG/KG	U

Sampling Point	Sampling ID	Northing	Easting	Elevation
MOUND OU6 AREA D	BS0301	597563.00900	1497115.92270	876.17000
Depth: 5.0 TO 7.0 FT	MND15-1103-0005			

	Parameter	Results	Units	Validation Qualifier
SEMIVOLATILE	Phenanthrene	170.00	UG/KG	J
	Phenol	370.00	UG/KG	U
	Pyrene	450.00	UG/KG	J - 1 (+)
	Unknown Carboxylic Acid	190.00	UG/KG	R - B
	Unknown Ester Cabroxylic	110.00	UG/KG	R - B
	Unknown Ester Cabroxylic	74.00	UG/KG	R - B
	Unknown Ester Hexanedioic	110.00	UG/KG	R - B
	Unknown Phthalate Est	480.00	UG/KG	R - B
VOLATILE	1,1,1-Trichloroethane	11	UG/KG	U
	1,1,2,2-Tetrachloroet	11	UG/KG	U
	1,1,2-Trichloroethane	11	UG/KG	U
	1,1-Dichloroethane	11	UG/KG	U
	1,1-Dichloroethene	11	UG/KG	U
	1,2-Dichloroethane	11	UG/KG	U
	1,2-Dichloroethene	11	UG/KG	U
	1,2-Dichloropropane	11	UG/KG	U
	2-Butanone	11	UG/KG	R - C
	2-Hexanone	11	UG/KG	U
	4-Methyl-2-pentanone	11	UG/KG	U
	Acetone	18	UG/KG	
	Benzene	11	UG/KG	U
	Bromodichloromethane	11	UG/KG	U
	Bromoform	11	UG/KG	U
	Bromomethane	11	UG/KG	U
	Carbon Disulfide	11	UG/KG	U
	Carbon Tetrachloride	11	UG/KG	U
	Chlorobenzene	11	UG/KG	U
	Chloroethane	11	UG/KG	UJ - C
	Chloroform	11	UG/KG	U
	Chloromethane	11	UG/KG	U
	cis-1,3-Dichloropropene	11	UG/KG	U
	Dibromochloromethane	11	UG/KG	U
	Diethylbenzene, Total	11	UG/KG	U
	Ethylbenzene	11	UG/KG	U
	Methylene Chloride	71	UG/KG	

Sampling Point	Sampling ID	Northing	Easting	Elevation
MOUND OU6 AREA D	BS0301	597563.00900	1497115.92270	876.17000
Depth: 5.0 TO 7.0 FT	MND15-1103-0005			

	Parameter	Results	Units	Validation Qualifier
VOLATILE	Styrene	11	UG/KG	U
	Tetrachloroethene	11	UG/KG	U
	Toluene	11	UG/KG	U
	trans-1,3-Dichloropro	11	UG/KG	U
	Trichloroethene	11	UG/KG	U
	Vinyl Chloride	11	UG/KG	U
	Xylene, Total	11	UG/KG	U

* LAST ANALYSIS FOR SAMPLE BS0301

Sampling Point	Sampling ID	Northing	Easting	Elevation
MOUND OU6 AREA D	BS0302	597563.00900	1497115.92270	876.17000
Depth: 7.0 TO 10.0 FT	MND15-1103-0010			

	Parameter	Results	Units	Validation Qualifier
RADIOLOGIC	Am-241	0.02	PCI/G	J
	H-3	0.13	PCI/G	J
	Ra-226	1.7	PCI/G	
	Bi-207	-0.040	PCI/G	UJ
	Bi-210	-0.040	PCI/G	UJ
	Co-60	0.080	PCI/G	
	Cs-137	-0.050	PCI/G	UJ
	Pu-238	0.54	PCI/G	
	Pu-239/240	-0.009	PCI/G	UJ
	Th-227	0.140	PCI/G	
	Th-228	0.90	PCI/G	
	Th-230	1.10	PCI/G	
	Th-232	0.91	PCI/G	
	U-234	0.77	PCI/G	
	U-235	0.026	PCI/G	J
	U-238	0.96	PCI/G	

* LAST ANALYSIS FOR SAMPLE BS0302

D-1. OU6 AREA D DATA QUALIFIERS

Environmental data obtained from the laboratory analysis were validated and qualified using the following guidelines:

Data Validation Guidelines for Chemical and Radionuclide Analyses, OU9 Site Wide Quality Assurance Project Plan, DOE, Revision 3, FINAL, June, 1993;

Laboratory Data Validation - Functional Guidelines for Evaluation of Organic Analyses (February 1, 1988); and

Laboratory Data Validation - Functional Guidelines for Evaluation of Inorganic Analyses (July 1, 1988).

The descriptive primary data validation qualifiers applied to the concentrations are listed below:

U The analyte was not detected. The reported concentration is the sample quantitation limit.

UJ The analyte was not detected. The reported concentration is an estimated value.

J The reported value is an estimated quantity.

R The data are unusable. The analyte may or may not be present.

N Presumptive evidence of presence of material.

NJ Presumptive evidence of the presence of the material at an estimated quantity.

Subqualifiers were used to assist in data assessment by indicating the source of the primary qualifier. The subqualifiers are attached to the primary qualifier by a hyphen. The allowable subqualifiers are:

SUBQUALIFIERS - ORGANICS

B - Qualified due to method blank or a field blank
C - Qualified due to calibration
H - Holding time exceeded
K - Qualified due to surrogate recovery
S - Qualified due to matrix spike
I - Qualified due to internal standard
P - Pesticide/PCB results have >25% difference on two different columns
(+) - Potential positive bias (added after subqualifier with a parentheses)
(-) - Potential negative bias (added after subqualifier with a parentheses)

SUBQUALIFIERS - INORGANICS

B - Qualified due to method blank or field blank
C - Qualified due to calibration
H - Holding time exceeded
S - Qualified due to matrix spike recovery
I - Interface
D - Duplicate (replicate) limits exceeded
L - Qualified due to LCS
(+) - Potential positive bias (added after subqualifier with a parentheses)
(-) - Potential negative bias (added after subqualifier with a parentheses)

Radiological data validation qualifiers were consistent with those qualifiers for organics and inorganics, where applicable.

Each data point was reviewed and assessed to determine whether the value was considered usable (no qualifiers), usable but estimated (qualifier J) or not usable (qualifier R). Laboratory and data validation qualifiers were applied to all data, detected and non-detected, as necessary. For the purpose of the verification sampling, VOC and SVOC TICs were used to indicate additional contaminants present that was not included on the TCL list.

Data validation reports were completed in the required EG&G data validation report format as presented in the following section.