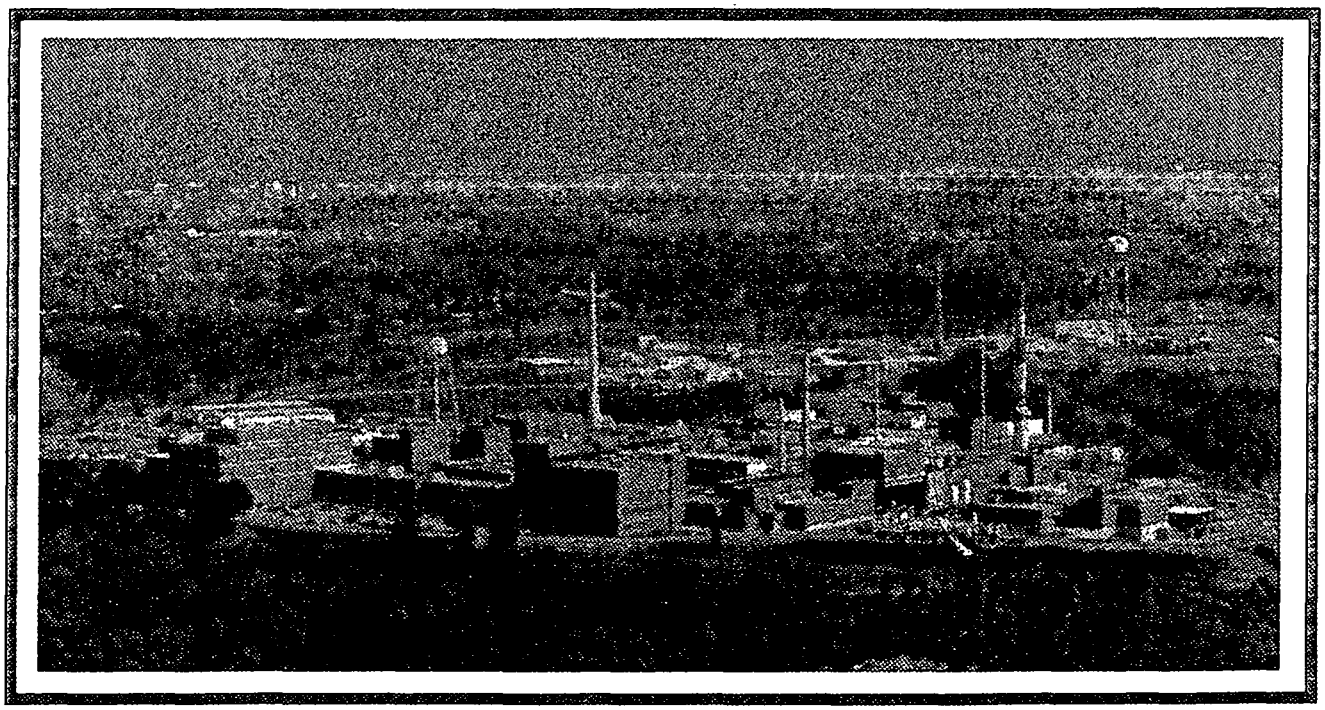
EG&G MOUND-30-03-03-03--9612100019

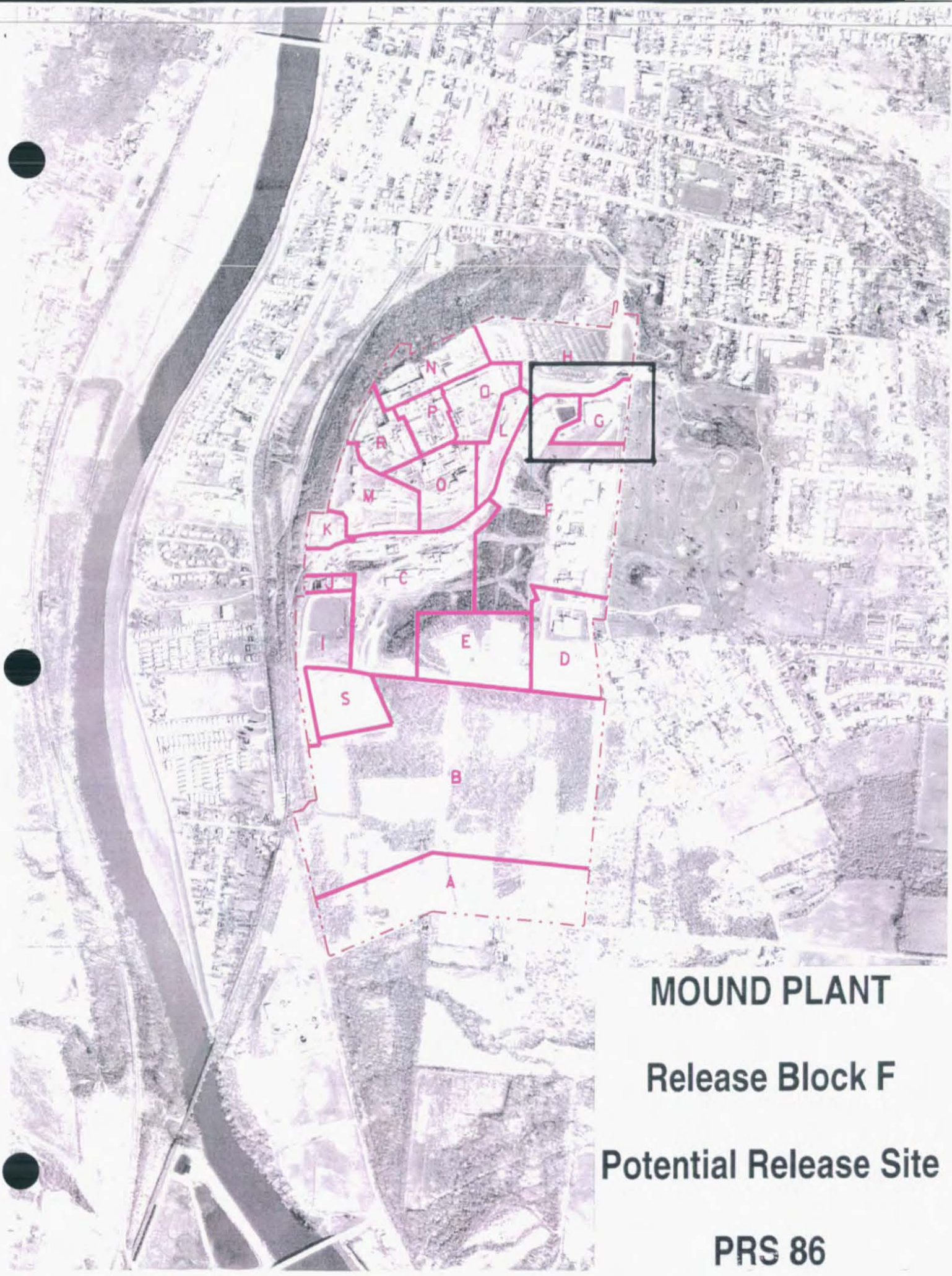
MOUND

Environmental
Restoration
Program

MOUND PLANT
Potential Release Site Package
PRS # 86



REV	DESCRIPTION	DATE
PUBLIC RELEASE 0	Available for comment.	Nov. 21, 1996
FINAL 1		



MOUND PLANT

Release Block F

Potential Release Site

PRS 86

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MOUND PLANT

Release Block F

Potential Release Site

PRS 86

6

PRS 86

PRS HISTORY:

Potential Release Site (PRS) 86 is a former disposal site located south of Building 29. Due to elevated levels of actinium-227 contamination, a decision was made in 1995 to conduct a Removal Site Evaluation (RSE). Implementation of the Removal Action began in August of 1995 and is currently in the final phase of soil excavation.[8]

The PRS 86 area was identified as a suspected burial location of radioactive contaminated soils from SW Building. In 1959/60, approximately three truck loads of soil and gravel containing radium-226, actinium-227, and thorium-228 were disposed of near an inactive septic tank. The septic tank, estimated to be a 1,500 to 3,000 gallon poured concrete tank, was used during the original Mound Plant construction activities and was abandoned in the 1950's.[2]

One soil boring, part of the Operable Unit 5 Area 7 Investigation, detected actinium-227 at a depth of 15 to 18 feet, the suspected depth of the septic tank.

CONTAMINATION:

The Radiological Site Survey in 1983[4] PRS 86 soils from four sample locations (S0274, S0276, C0008, and C0009) were analyzed for radioactivity:

Contaminant	Maximum Concentration Detected	Guideline Criteria
Actinium-227	1400 pCi/g	1 pCi/g
Cesium-137	1.2 pCi/g	0.46 pCi/g

The soil concentrations of Plutonium-238, Thorium, Cobalt-60, Radium-226, and Americium-241 were below guideline criteria.

The Operable Unit 5 Area 7 Investigation[6] PRS 86 soils from one sample location, B16, was analyzed for radioactivity:

Contaminant	Maximum Concentration Detected	Guideline Criteria
Actinium-227	44.68 pCi/g	1 pCi/g

The soil concentrations of Plutonium, Thorium, Uranium, Tritium, Cesium-137, Radium-226, and Americium-241 were below guideline criteria.

Volatile Organic Compound (VOC) Investigations:
During the Soil Gas Reconnaissance Sampling [5] in 1992/93, Freon 11 was detected at a concentration of 33 ppb and Tetrochloroethene (PCE) at concentration of 6 ppb. No other compounds were detected at the location of PRS 86. All compounds that were detected are below Guideline Values (GV).

During the Operable Unit 5 Area 7 Investigation[6], the only VOC detected was 2-Butanone at a concentration of 110 ppb or 0.110 mg/kg which is below GV.

During the Operable Unit 5 Non-AOC Investigation[7], relative soil gas data (PETREX) was not collected at the location of PRS 86.

READING ROOM REFERENCES:

1) Operable Unit 9 Site Scoping Report: Volume 12-Site Summary Report, Final, December 1994. (pages 6-8)
2) Mound Plant Underground Storage Tank Program Plan and Regulatory Status Review, Final, November 1992. (pages 9-11)
3) Operable Unit 9, Site Scoping Report: Volume 7-Waste Management, Final, February 1993. (pages 12-15)
4) Operable Unit 9, Site Scoping Report: Volume 3-Radiological Site Survey, Final, June 1993. (pages 16-23)
5) Reconnaissance Sampling Report, Soil Gas Survey and Geophysical Investigations, Mound Plant Main Hill and SM/PP Hill, February 1993. (pages 24-34)
6) Operable Unit 5, Operational Area Phase I Investigation, Area 7 Field Report, Final, June 1995. (pages 35-42)
7) Operable Unit 5, Operational Area Phase I Investigation, Non-AOC Field Report, Volume II, Final, June 1995. (pages 43-47)
8) Action Memorandum/Removal Site Evaluation, Operable Unit 5, Area 7 Removal Action, Final, February 1996. (pages 48-93)

PREPARED BY:

Gary L. Coons, Member of EG&G Technical Staff

MOUND PLANT
PRS 86
ACTINIUM CONTAMINATION
NEAR UNDERGROUND SEPTIC TANK

RECOMMENDATION:

Potential Release Site (PRS) 86 is an actinium contaminated soils area near an inactive underground septic tank. The contamination is believed to stem from the dumping of approximately 3 truckloads of radiologically contaminated debris in 1959 or 1960.

Concentrations of actinium-227, at PRS 86, have measured as high as 1,400 pCi/g (the 10^{-6} Risk Based Guideline Criteria for actinium-227 is 1.0 pCi/g). Repeated soil samples have located the actinium contamination starting at approximately 6 feet below surface and continuing to a depth of approximately 18 feet.

A PRS 86 Removal Action is currently in progress. Therefore, NO FURTHER ASSESSMENT beyond that described in the action memo is recommended. Verification of the completion of the removal will be documented in the On-Scene Coordinator Report after all work is completed.

CONCURRENCE:

DOE/MB: Arthur W. Kleinrath, Remedial Project Manager 11/21/96 (date)

USEPA: Timothy J. Fischer, Remedial Project Manager 11/21/96 (date)

OEPA: Brian K. Nickel, Project Manager 11/21/96 (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.

Page R

REFERENCE MATERIAL
PRS 86

Document Control No. _____

Environmental Restoration Program

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

MOUND PLANT
MIAMISBURG, OHIO

December 1994

Final

U.S. Department of Energy
Ohio Field Office

EG&G Mound Applied Technologies

Description of History and Nature of Waste Handling						Hazardous Conditions and Incidents			Environmental Data		
No.	Site Name	Location	Status	Potential Hazardous Substances	Ref	Releases	Media	Ref	Analytes[a]	Results	Ref
85	Building 29 Solvent Storage Shed	E-8	Inactive	Acetone	4	Suspected	S	4	1 14	SGS[b] Table B.3 Location 2137 Table B.9 RSS Location S0275	12 6
86	Building 29 Septic Tank (Tank 224)	E-9	Historical	Actinium-227, Radon-222, Thorium-228, Radium-226	3, 4, 6	Suspected	S	4, 6	2	Table B.9 (See discussion for Area 7 in Ref. 6)	6
87	Building 49 Solvent Storage Shed	G-7	Inactive	Organic solvents (including trichloroethene, isopropanol, ethanol, freon-TF, hexane)	4 9	Suspected	S	4	No Data		
88	Tritium in Buried Valley Aquifer	H-4	Historical	Tritium	1 18	Tritium, historically remediated	GW	18	16	Table B.9	11 18
89	Test Fire Residual Storage Area	H-7	In service	Unexploded detonation devices	4, 5, 18	None Suspected		5	No Data		
90	Site Survey Project Potential Hot Spot Location S0425	G-8	Grounds	Thorium	6	Unknown			14	Table B.9 (Appendix E in Ref. 6)	6
91	Main Hill Seep 0601	F-5	NA	Tritium, VOCs	5, 18	Tritium, VOCs	SW	13	3, 4, 5, 10, 11, 16	Tables B.6, B.7, B.8, and B.9	18
92	Main Hill Seep 0602	G-7	NA	Tritium, VOCs	5, 18	Tritium, VOCs	SW	13	3, 4, 5, 10, 11, 16	Tables B.6, B.7, B.8, and B.9	18
	Main Hill Seep 0603	D-8	NA	Tritium, VOCs	5, 18	Tritium, VOCs	SW	13	No Data		
	Main Hill Seep 0604	D-6	NA	Tritium, VOCs	5, 18	Tritium, VOCs	SW	13	No Data		
	Main Hill Seep 0605	D-6	NA	Tritium, VOCs	5, 18	Tritium, VOCs	SW	13	3, 4, 5, 10, 11, 16	Tables B.6, B.7, B.8, and B.9	18
	Main Hill Seep 0606	C-7	NA	Tritium, VOCs	5, 18	Tritium, VOCs	SW	13	No Data		
	Main Hill Seep 0607	C-7	NA	Tritium, VOCs	5, 18	Tritium, VOCs	SW	13	3, 4, 5, 10, 11, 16	Tables B.6, B.7, B.8, and B.9	18
	Main Hill Seep 0608	D-6	NA	Tritium, VOCs	5, 18	Tritium, VOCs	SW	13	3, 4, 5, 10, 11, 16	Tables B.6, B.7, B.8, and B.9	18

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
2. DOE 1992a
3. DOE 1992c
4. DOE 1993a
5. EPA 1988a
6. DOE 1993d
7. DOE 1993c
8. DOE 1992d
9. Fentiman 1990
10. DOE 1992f
11. Styron and Meyer 1981
12. DOE 1993b
13. DOE 1993d
14. DOE 1991b
15. Halford 1990
16. DOE 1993e
17. DOE 1990
18. DOE 1992a
19. Rogers 1975
20. DOE 1992h
21. Dames and Moore 1976a, b
22. DOE 1992i
23. DOE 1992j
24. DOE 1994
25. EG&G 1994

Document Control No. _____

Environmental Restoration Program

MOUND PLANT UNDERGROUND STORAGE TANK PROGRAM PLAN AND REGULATORY STATUS REVIEW

MOUND PLANT
MIAMISBURG, OHIO

November 1992

FINAL

(Revision 0)

Department of Energy
Albuquerque Field Office

Environmental Restoration Program
EG&G Mound Applied Technologies

2.3.13. Building 29, East of Building: Historic Septic Tank (Tank 224)

An estimated 1,500- to 3,000-gallon poured concrete septic tank located in Area 7 near Building 29 was constructed in the late 1940s for use during the original Mound Plant construction activities; it was abandoned in the 1950s (DOE, 1991c; Kabot, 1992b). The tank was built without a leach field and apparently drained directly to a ravine. In 1959 or 1960, approximately three truck loads of soil and gravel, estimated to be 200 cubic feet, containing radium-226, actinium-227, and thorium-228 were disposed of in the inactive septic tank. The soil and gravel resulted from excavation and construction activities at SW Building. The septic tank site is a part of Area 7 at Mound Plant, which has been assigned to the ER Program (FFA) in Operable Unit 5 for investigation.

~~2.3.14. Building M, Room M38: Metal Plating Rinse Water Sump (Tank 225)~~

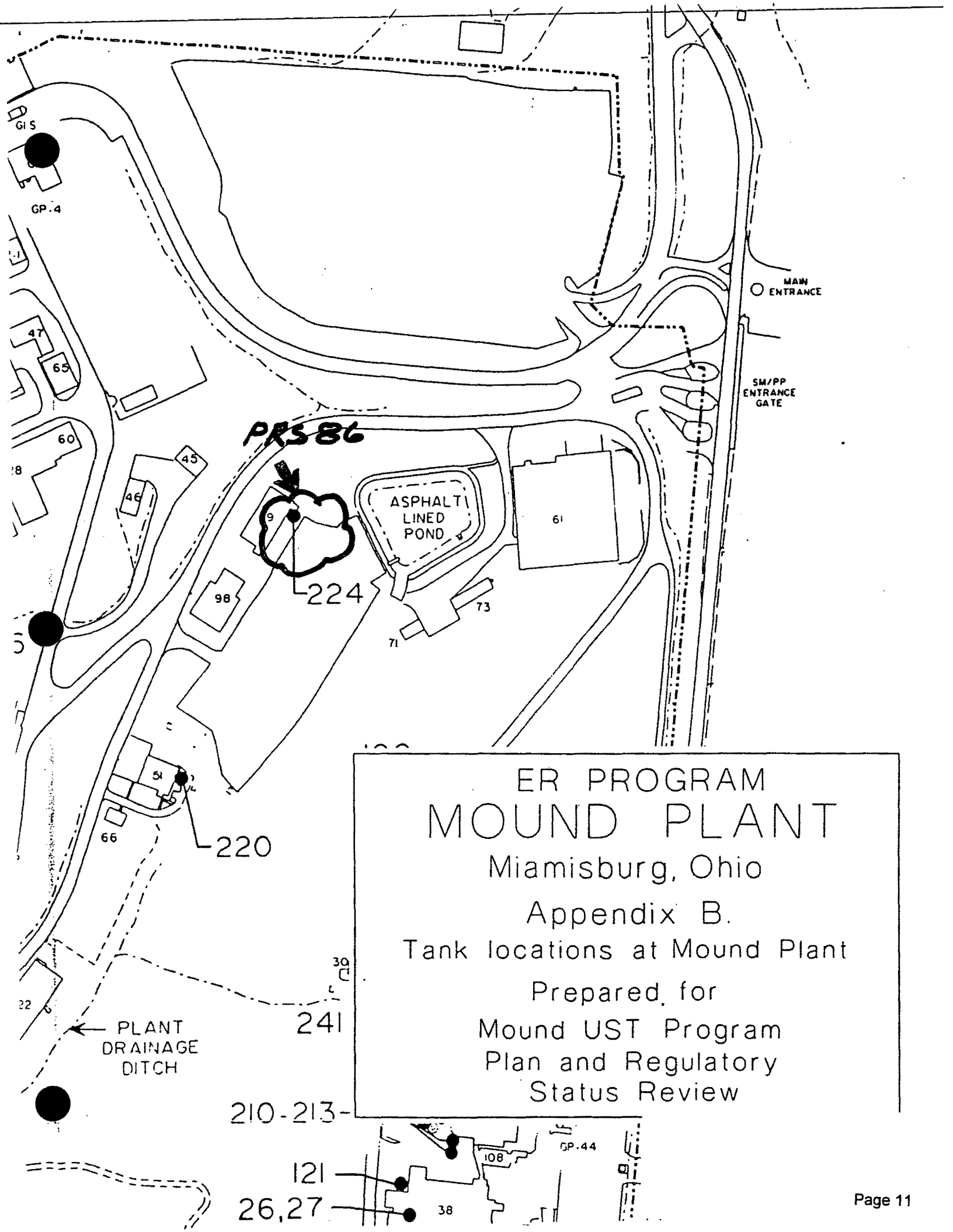
A 350-gallon, concrete sump was formerly used to collect rinse water from a metal plating operation prior to discharge to sanitary waste treatment at SD Building. Although it is still in place, the sump was reportedly last used in 1984 (Andersen, 1991f).

This tank is considered to have been a wastewater treatment unit and part of a wastewater treatment system that discharges subject to CWA §402 (NPDES) (O.A.C. 3745-33) regulations. As such, this tank was excluded under both RCRA hazardous waste and UST regulations [40 CFR Part 264 (O.A.C. 3745-54) and 40 CFR Part 280 (O.A.C. 1301: 7-9), respectively].

2.3.15. SW Building, Room SW10: Beta Wastewater Sump (Tank 226)

A 100-gallon, stainless-steel sump was formerly used to collect beta wastewaters from floor drains in the SW10 process laboratory. The sump drained via aboveground piping to the beta wastewater influent tanks at WD Building. Although it is still in place, the sump is currently inactive.

Due to its function in nuclear operations at Mound Plant this sump is subject to the AEA. The sump is not subject to RCRA as it did not receive hazardous waste (EG&G, 1990b). Although the sump does receive "regulated substances" in the form of radionuclides, it is deferred from most of the requirements of 40 CFR Part 280 as "UST systems containing radioactive material that are regulated under the Atomic Energy Act of 1954," per 40 CFR 280.10(c)(2). It is completely exempt from Ohio UST regulations per O.A.C. 1301: 7-9(A)(8).



ER PROGRAM

MOUND PLANT

Miamisburg, Ohio

Appendix B.

Tank locations at Mound Plant

Prepared for

Mound UST Program

Plan and Regulatory

Status Review

Document Control No. _____

Environmental Restoration Program

EG&G MOUND-29-01 -01 -07 -07 -9502080001

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

MOUND PLANT
MIAMISBURG, OHIO

February 1993

FINAL
(Revision 0)

Department of Energy
Albuquerque Field Office

Environmental Restoration Program
EG&G Mound Applied Technologies

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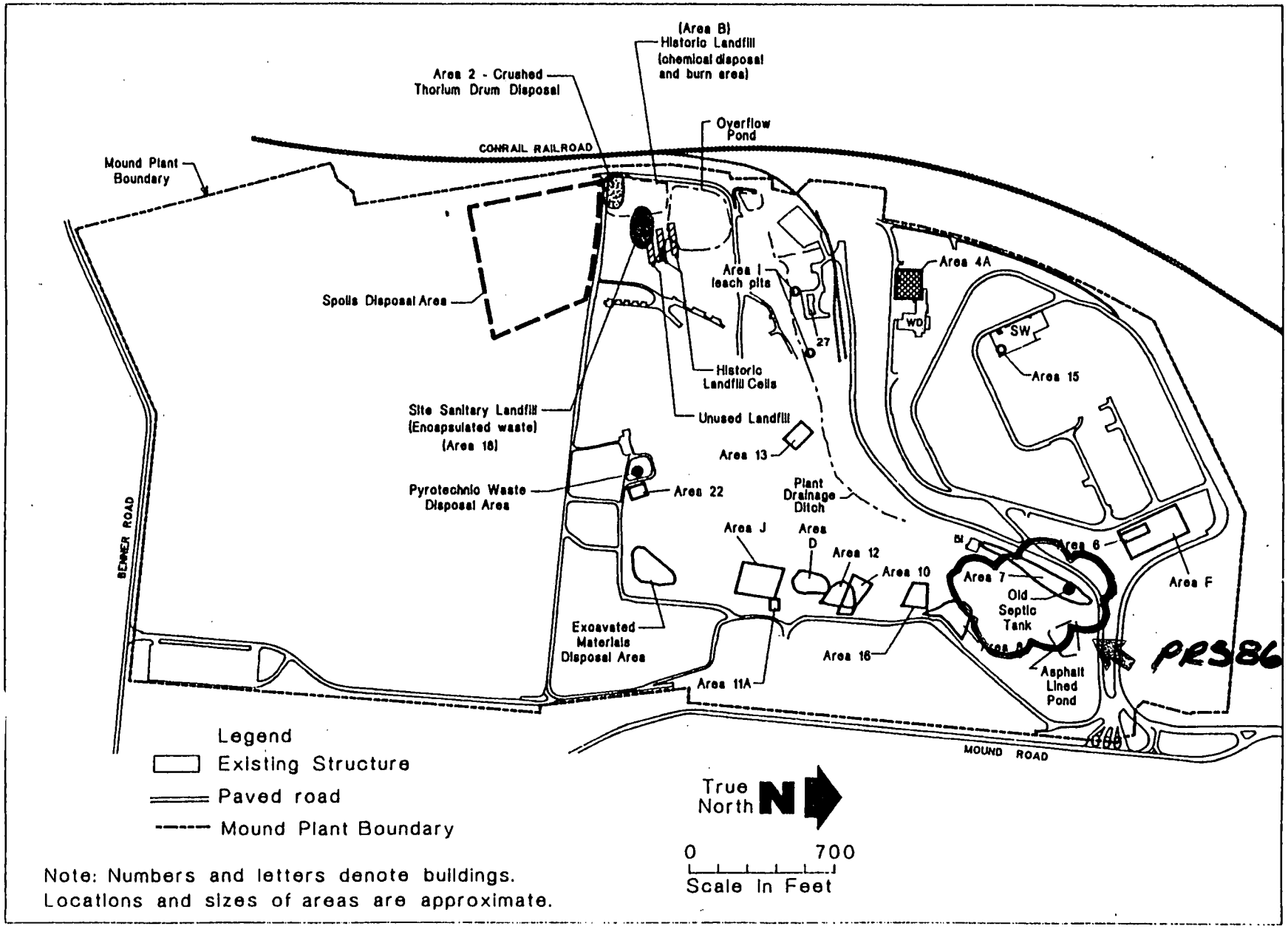


Figure 6.1 On-plant waste disposal areas.

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

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

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

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

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

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

Area 7 has been the site of extended disposal of residual materials including thorium, polonium-210, and some actinium-227. The thorium repackaging operations that extended from the mid-1950s to the mid-1960s generated between 15,000 and 20,000 steel drums. It is estimated that between 10,000 and 15,000 of these drums were crushed and buried along the western part of the original ravine. The remainder are probably buried in Area 2. This disposal tended to create usable land along this part of the ravine. In the Site Scoping Report: Volume 3 - Radiological Survey Report (DOE 1991c), it was reported that 2,500 drums were buried in Area 7, but that number fails to account for

the continued replacement and repacking of the drums over the 10-year time span. The best current estimate is that the majority of these drums were placed in Area 7 (Meyer 1991; Garner 1991) and the remainder in Area 2. Also associated with the thorium project was a flatbed truck and a conveyor belt device used in the repackaging operations. This truck was previously reported to have been buried in the early 1950s and to have been contaminated with polonium-210 (DOE 1991c). It now appears likely that the dominant contaminant was thorium-232 from the repackaging operations and that the truck could not have been buried until that operation was completed in the mid-1960s (Garner 1991).

In either 1959 or 1960, concrete, soil, and gravel excavated from the west side of the SW Building were dumped in an old septic tank in the northern part of what is now included in Area 7 (DOE 1991c). The septic tank was installed for use during plant construction, but was abandoned during the 1950s. The contaminated materials contained radium-226, actinium-227, and thorium-228, which probably originated from a leaky sump (MCC 1953-1957) associated with the "old cave," now known as Area 15. The dirt and gravel were excavated in 1955 as part of the construction of the thorium refinery project (Meyer 1955c). The volume of material involved is estimated to have been about 100 to 150 ft^3 (Garner 1991). The septic tank appears to have been drilled, and core samples were collected during the Site Survey Project (DOE 1991c). Residual actinium-227 was detected at a concentration of 1,400 pCi/g at a depth of 144 inches (DOE 1991c).

In the mid-1960s, materials contaminated with polonium-210, including an exhaust system from the remodeling of T Building and a large stainless steel washing machine, were also buried on the side of the ravine. Smaller items contaminated with polonium-210 may also have been buried (Garner 1991).

During the research for this report, one unusual entry was noted in the logbooks maintained by decontamination workers. The log records that on April 29, 1965, seven 30-gallon drums [sic] of dirt were removed from road below Warehouse [sic] 15A (MRC 1961-1968). Warehouse 15A was used during this time period for a storage and shipping point for radioactive trash and wastes. No other information was obtained for this activity.

During the early 1970s, it was rumored that some of the trash from the historic landfill was excavated and removed to the ravine (DOE 1991a). This rumor has been difficult to substantiate; but, if true, it would suggest the possibility that some hazardous chemicals could have been relocated from the historic landfill to Area 7. Area 7 was identified as a historic burial site for materials containing residual radionuclides. The original map compiled during that early effort (Hebb 1972) is reproduced in Appendix A. Some errors were apparent on the original map. For example, the thorium contamination was listed as thorium-228 when in fact thorium-232 was the dominant isotope in the thorium sludges.

Document Control No. DGC

Environmental Restoration Program

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

MOUND PLANT
MIAMISBURG, OHIO

June 1993

FINAL

Department of Energy
Albuquerque Field Office

Environmental Restoration Program
EG&G Mound Applied Technologies

in a 100-ft by 40-ft trench. The trench may also contain a polonium-contaminated washing machine. Polonium has a half-life of 138.4 days, and is no longer present due to radioactive decay.

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

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

3.6. AREA 7

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

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

in the project report (Stought et al. 1988) is accurate. However, a more recent survey of the sanitary sewage drying beds in Area 3 indicate higher levels than reported by the Site Survey Project. Of 15 samples collected in the beds in 1988, the highest had a thorium-232 concentration of 63 pCi/g and a plutonium-238 concentration of 1235 pCi/g (Collins 1988). Additional discussion is provided in subsection 4.1.11.

The depth of the core samples collected in Area 3 during the Site Survey Project ranged from 18 inches to a maximum of 180 inches. Most core locations were only sampled to a depth of approximately 36 inches. The depth to bedrock in this area appears to range from 300 to 900 inches or about 25 to 75 ft (DOE 1992b). Boring logs are available for two Area 3 core locations, 0105 and 0113, and indicate that these locations were not sampled to bedrock (Appendix B).

5.5. AREA 7

Area 7 is a large area located in the upper valley at Mound Plant, behind or below Buildings 29, 51, 66, and 98 (Plate 1). This area was once a steep ravine that formed the upper reach of the plant drainage ditch. This area has a long history of debris disposal and infilling, including the disposal of approximately 10,000 empty thorium drums in the late 1950s to early 1960s, a polonium-contaminated washing machine (date unknown); a thorium-contaminated flat bed truck, and other equipment used in repackaging the thorium sludges. In the mid 1960s, materials contaminated with polonium-210 were also buried on the side of the ravine. An exhaust system from the remodeling of T Building and a large stainless steel washing machine were among the items. Smaller items contaminated with polonium-210, may also have been buried. The Site Scoping Report: Volume 6 - Photo History (DOE 1992b) documents several episodes of filling and construction. Plate 4 - Estimation of Fill Materials in Site Scoping Report: Volume 5 - Topographic Maps (DOE 1992a) indicates that over 30 feet of fill materials may exist in Area 7.

The current extent of Area 7 shown on Plate 1 is based on an interpretation of the site survey data made in the preparation of this report, and is similar to the area depicted in the original Site Survey Project Report (Stought et al. 1988). The area shown is actually larger than the estimate of the area used in the historic disposals. On the north end of Area 7 is an old buried septic tank that was first used during plant construction, and was the site of disposal of actinium- and radium-bearing soils excavated from the SW Building in 1955 (DOE 1992g), which is described in section 7 of this report.

The samples from the locations in Area 7 were analyzed mainly for plutonium-238 and thorium. The maximum plutonium-238 concentration detected was 7.40 pCi/g in the surface sample from location 0286 (S0286 on Table III.5). The maximum total thorium concentration detected, 20.52 pCi/g, was found in the surface sample collected from location S0298. Other radionuclides detected in Area 7

ER PROGRAM

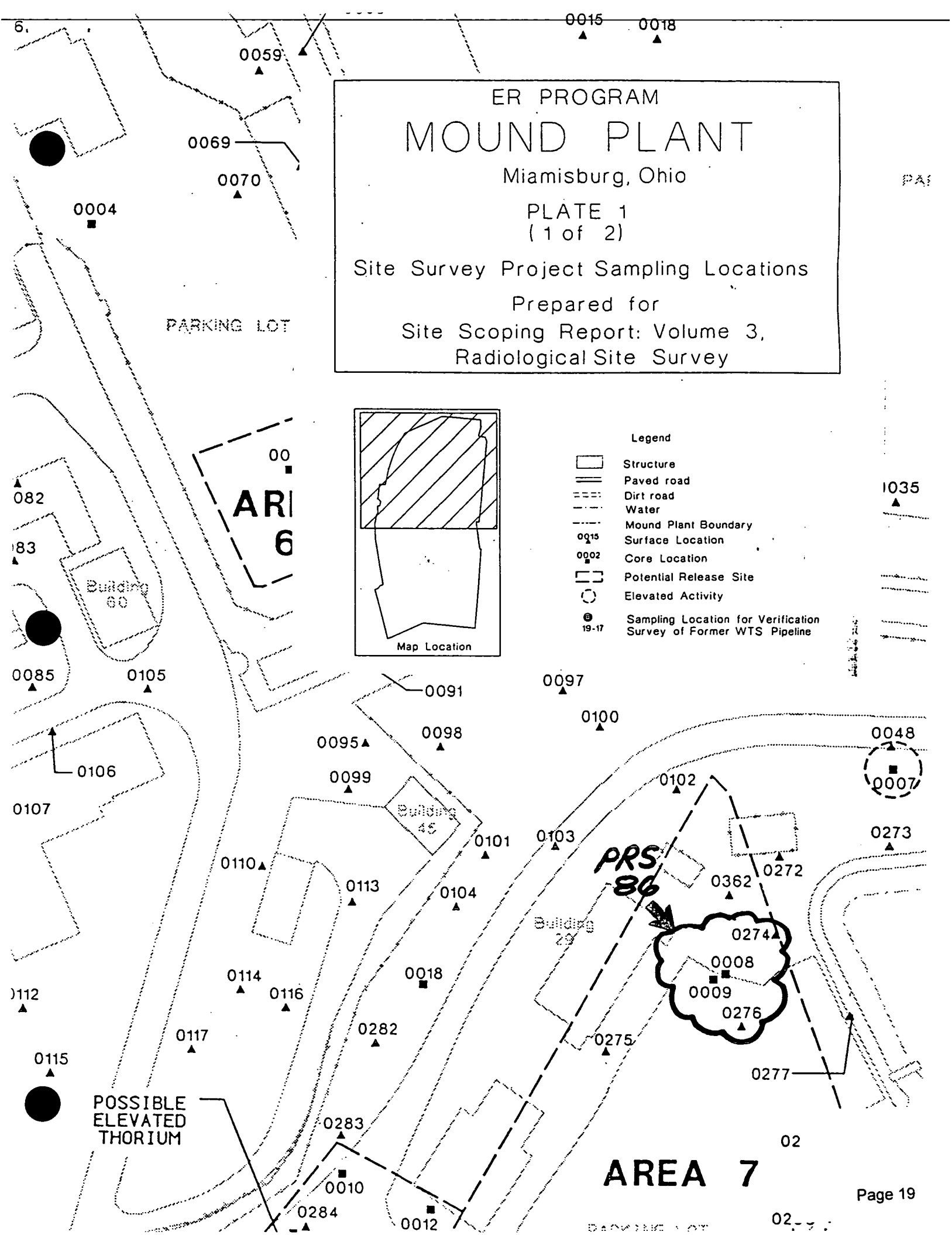
MOUND PLANT

Miamisburg, Ohio

PLATE 1
(1 of 2)

Site Survey Project Sampling Locations

Prepared for
Site Scoping Report: Volume 3,
Radiological Site Survey



Map Location[a]	Coordinates South	Coordinates West	MRC ID No.	Mo-Yr	Depth (inch)	Pu-238 (pCi/g)	Thorium[b] (pCi/g)	Tritium (pCi/mL)	Co-60 (pCi/g)	Cs-137 (pCi/g)	Ra-226 (pCi/g)	Am-241 (pCi/g)
S0271	2650	1755	2826	10-83	0	0.01	b					
C0007	1800	1860	8352	11-84	54	0.39[c]	41.63[c]					
			8353	11-84	108	0.08[c]	5.14[c]					
S0272	1825	1960	5972	07-84	0	0.37	b					
S0273	1850	1885	2871	10-83	0	0.04	b					
S0274	1875	1985	5971	07-84	0	0.01	b					
C0008	1885	2030	10611	09-85	18	NR	NR		LDL	LDL	0.5	LDL
			10612	09-85	36	NR	NR		LDL	LDL	0.6	LDL
			10613	09-85	54	NR	NR		LDL	LDL	0.7	LDL
			10614	09-85	72	NR	NR		LDL	1.2	0.7	LDL
			10615	09-85	90	NR	NR		LDL	LDL	0.9	LDL
			10616	09-85	108	NR	NR		LDL	LDL	0.5	LDL
			10617	09-85	126	NR	NR		LDL	LDL	1	LDL
			(Note: 50 pCi/g of Ac-227 was detected in this sample using gamma spec.)									
			10618	09-85	144	NR	NR		LDL	LDL	1	LDL
			(Note: 1400 pCi/g of Ac-227 was detected in this sample using gamma spec.)									
			10619	09-85	162	NR	NR		LDL	LDL	0.9	LDL
			10620	09-85	180	NR	NR		LDL	LDL	0.5	LDL
			10621	09-85	198	NR	NR		LDL	LDL	1	LDL
			(Note: 300 pCi/g of Ac-227 was detected in this sample using gamma spec.)									
			10622	09-85	216	NR	NR		LDL	LDL	0.7	LDL
			(Note: 10 pCi/g of Ac-227 was detected in this sample using gamma spec.)									
C0009	1885	2040	10713	09-85	0	NR	NR		LDL	LDL	0.5	LDL
			10714	09-85	18	NR	NR		LDL	LDL	0.7	LDL
			10715	09-85	36	NR	NR		LDL	LDL	2.0	LDL
			10716	09-85	48	NR	NR		LDL	LDL	0.7	LDL
			10717	09-85	72	NR	NR		LDL	LDL	0.6	LDL
			(Note: 30 pCi/g of Ac-227 was detected in this sample using gamma spec.)									
			10718	09-85	90	NR	NR		LDL	LDL	1.2	LDL
			(Note: 200 pCi/g of Ac-227 was detected in this sample using gamma spec.)									
			10719	09-85	108	NR	NR		LDL	LDL	1.5	LDL

GAMMA SPECTROSCOPY

E-16

Map Location[a]	Coordinates South	Coordinates West	MRC ID No.	Mo-Yr	Depth (inch)	Pu-238 (pCi/g)	Thorium[b] (pCi/g)	Tritium (pCi/mL)	Co-60 (pCi/g)	Cs-137 (pCi/g)	Ra-226 (pCi/g)	Am-241 (pCi/g)
C 0009			10720	09-85	126	NR	NR		LDL	LDL	0.8	LDL
			(Note: 20 pCi/g of Ac-227 was detected in this sample using gamma spec.)									
			10721	09-85	144	NR	NR					
			10722	09-85	156	NR	NR		LDL	LDL	0.7	LDL
			10723	09-85	180	NR	NR					
			10724	09-85	198	NR	NR		LDL	LDL	0.8	LDL
S0275	1900	2135	5970	07-84	0	0.29	b					
C0010	1900	2350	1734	05-83	18	0.36	b					
			1735	05-83	36	0.16	11.15					
			1736	05-83	54	NR	18.00					
			1737	05-83	90	0.03	14.41					
			1738	05-83	108	0.03[c]	27.83[c]					
			1739	05-83	162	0.01	5.76					
			1740	05-83	180	0.01	b					
			1741	05-83	198	<0.01	b					
			1742	05-83	216	0.01	5.44					
			1743	05-83	228	<0.01	b					
S0276	1925	2035	5973	07-84	0	1.27	b		LDL[•]	LDL[•]	1.5[•]	LDL[•]
C0011	1925	2400	1784	05-83	18	8.97[c]	37.69[c]		LDL	LDL	1.5	LDL
			1785	05-83	72	0.42	4.43					
			1786	05-83	90	0.20	b					
			1787	05-83	108	0.31	b					
			1788	05-83	126	0.46	b					
			1789	05-83	198	0.44	b					
			1790	05-83	216	0.84	11.13					
S0277	1950	1960	2870	10-83	0	0.53	b					
C0012	1950	2300	1725	05-83	18	0.13	b					
			1726	05-83	36	0.16[c]	5.44[c]		LDL	LDL	1.0	LDL
			1727	05-83	54	0.20	5.88					
			1728	05-83	72	0.05	b					
			1729	05-83	108	0.05	b					

Map Location[a]	Coordinates South	Coordinates West	MRC ID No.	Mo-Yr	Depth (inch)	Pu-238 (pCi/g)	Thorium[b] (pCi/g)	Tritium (pCi/mL)	Co-60 (pCi/g)	Cs-137 (pCi/g)	Ra-226 (pCi/g)	Am-241 (pCi/g)
C0289	2422.7	2081.0	None[d]	07-84	0	NR	0.6					
			None[d]	07-84	12	NR	1.1					
			None[d]	07-84	24	NR	0.5					
			None[d]	07-84	36	NR	0.8					
			None[d]	07-84	48	NR	1.0					
			None[d]	07-84	60	NR	0.8					
C0290	2401.5	2102.1	None[d]	07-84	0	NR	0.7					
			None[d]	07-84	12	NR	0.8					
			None[d]	07-84	24	NR	0.8					
			None[d]	07-84	36	NR	0.8					
			None[d]	07-84	48	NR	0.6					
			None[d]	07-84	60	NR	0.9					
			None[d]	07-84	72	NR	0.8					
C0291	2915.3	2490.3	None[d]	07-84	0	NR	0.6					
			None[d]	07-84	12	NR	0.4					
			None[d]	07-84	24	NR	0.5					
			None[d]	07-84	36	NR	0.4					
			None[d]	07-84	48	NR	0.4					
			None[d]	07-84	60	NR	0.3					
			None[d]	07-84	72	NR	0.5					
			None[d]	07-84	84	NR	0.4					
			None[d]	07-84	96	NR	0.7					
			None[d]	07-84	108	NR	0.6					
			None[d]	07-84	120	NR	0.3					
			None[d]	07-84	132	NR	0.3					
S1092	2185	3362	8413	12-84	f	0.31	323.5[g]					

MOUND SOIL SCREEN DATA

[a]C denotes core location and S denotes surface sample location on Plate 1.
[b]Thorium results of $\leq$ 2 pCi/g are listed as "b".
[c]Verification sample analyzed for QA/QC.
[d]No MRC ID assigned because *in situ* gamma spectrometry was performed for thorium-232.
[e]Gamma results could not be confirmed using the gamma spectroscopy printout given in this appendix.
[f]The depth for this sample was given as "SS". For mapping purposes (Plates 1 and 5), this is assumed to be a surface sample.
[g]Sample results were given isotopically for this sample and included 0.99 pCi/g thorium-228; 321 pCi/g thorium-230; and 1.5 pCi/g thorium-232, for a total of 323.5 pCi/g.

LDL - The sample result was below the Lower Detection Limit, which was estimated to be 0.5 pCi/g for cesium-137, cobalt-60, and americium-241. The LDL for radium-226 or actinium-227 was estimated to be 1 pCi/g.

NR - No result provided. (Note: no samples were taken for plutonium-238 when *in situ* gamma spectrometry was performed.)

22-03-10-10
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Environmental Restoration Program

RECONNAISSANCE SAMPLING REPORT SOIL GAS SURVEY AND GEOPHYSICAL INVESTIGATIONS, MOUND PLANT MAIN HILL AND SM/PP HILL

REPORT
APPENDICES A, B AND D

MOUND PLANT
MIAMISBURG, OHIO

February 1993

Department of Energy
Albuquerque Field Office

Environmental Restoration Program
EG&G Mound Applied Technologies

Table II.8 summarizes the positive detections from the Building 51 area sampling effort. Seven of the eight target compounds were detected in the soil vapor samples. These detections are shown on Figures 2.29 through 2.36. These figures also show Area 7 results. Toluene was the only VOC detected in either of the two water samples. Freon 11 was detected at two locations and three depths at concentrations ranging from 5 to 89 ppb (Figure 2.29). Freon 113 was detected in the 15- and 25-foot samples at one location at 9 and 18 ppb, respectively (Figure 2.30). Cis-12DCE was detected in the 15-foot samples from two locations at concentrations of 8 and 18 ppb (Figures 2.31). 111TCA was detected at two locations and three depths at concentrations ranging from 4 to 37 ppb (Figure 2.32). PCE was detected at three locations and four depths at concentrations ranging from 7 to 44 ppb (Figure 2.33). TCE was detected in the 15- and 25-foot samples at three locations at concentrations ranging from 9 to 207 ppb (Figure 2.34). Toluene was detected at four locations and six depths at concentrations ranging from 0.2 to 37 ppb, however, all but the water sample collected from the 25-foot depth at location 4160 showed associated blank detections (Figure 2.35). Figure 2.36 shows the total VOCs detected at each location near Building 51 (excluding samples with associated blank interferences).

Table II.9 summarizes the blank detections from the Building 51 sampling effort. Two soil gas ambient blanks and one water trip blank contained toluene from 0.1 to 5 ppb.

2.3.4. Area 7

A total of 53 investigative samples were collected from Area 7. All locations were sampled at a 5-foot depth except samples 2211 and 2212, which were contingency samples collected from a 15-foot depth. One of the 5-foot samples was a water sample (2036). Table II.10 summarizes the positive detections from the Area 7 sampling effort. Area 7 detection figures are repeats of the Building 51 figures. Six of the eight target compounds were detected at Area 7. Freon 11 was detected at three locations at concentrations ranging from 7 to 32 ppb (Figure 2.29). Freon 113 was detected at four locations ranging from 4 to 33 ppb (Figure 2.30). CIS-12DCE was detected at two locations ranging from 3 to 10 ppb (Figure 2.31). 111TCA was detected at five locations ranging from 2 to 22 ppb (Figure 2.32). PCE was detected at two locations at 6 and 7 ppb (Figure 2.33). Toluene was detected at 24 locations within Area 7. Eight of the 24 locations had associated blank detections of toluene. Sample 2036 was a water sample, which also showed toluene in its associated field blank. Figure 2.35 illustrates the Area 7 toluene detections that do not have these associated blank detections. Figure 2.36 shows the total VOCs detected at each of the Area 7 sample locations.

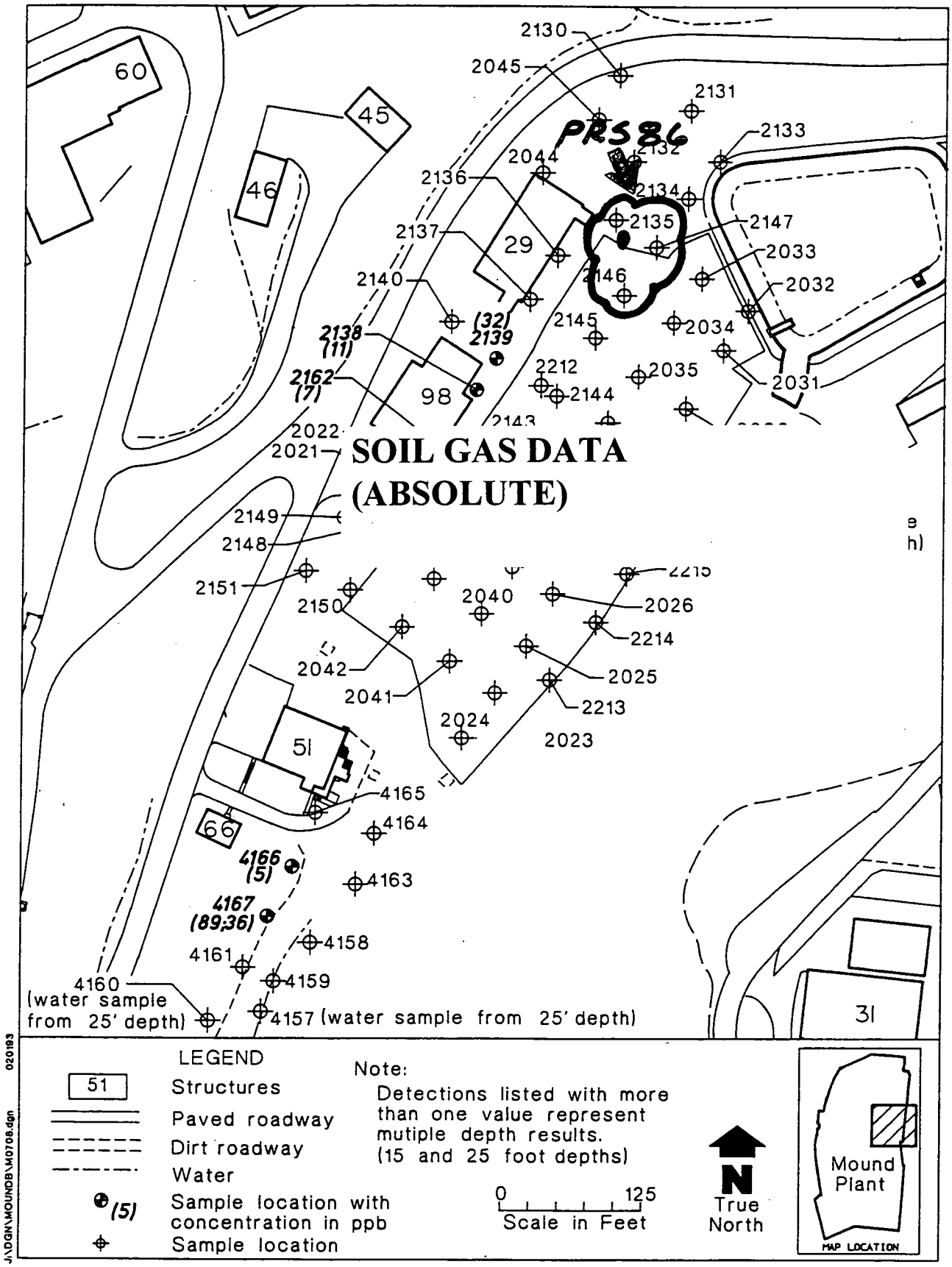


Figure 2.29. Freon II detection map for Area 7 and Building 51.

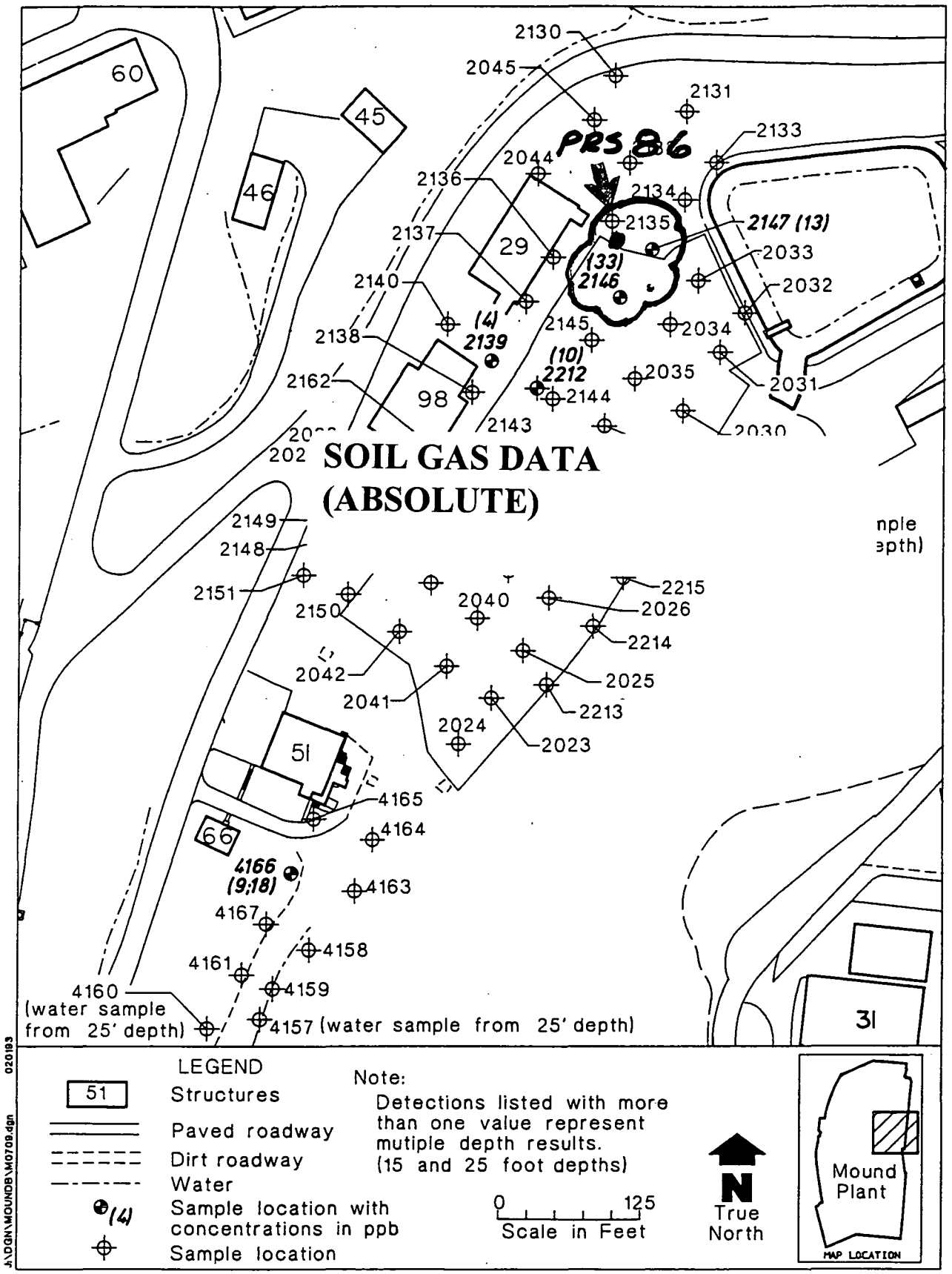


Figure 2.30. Freon 113 detection map Area 7 and Building 51.

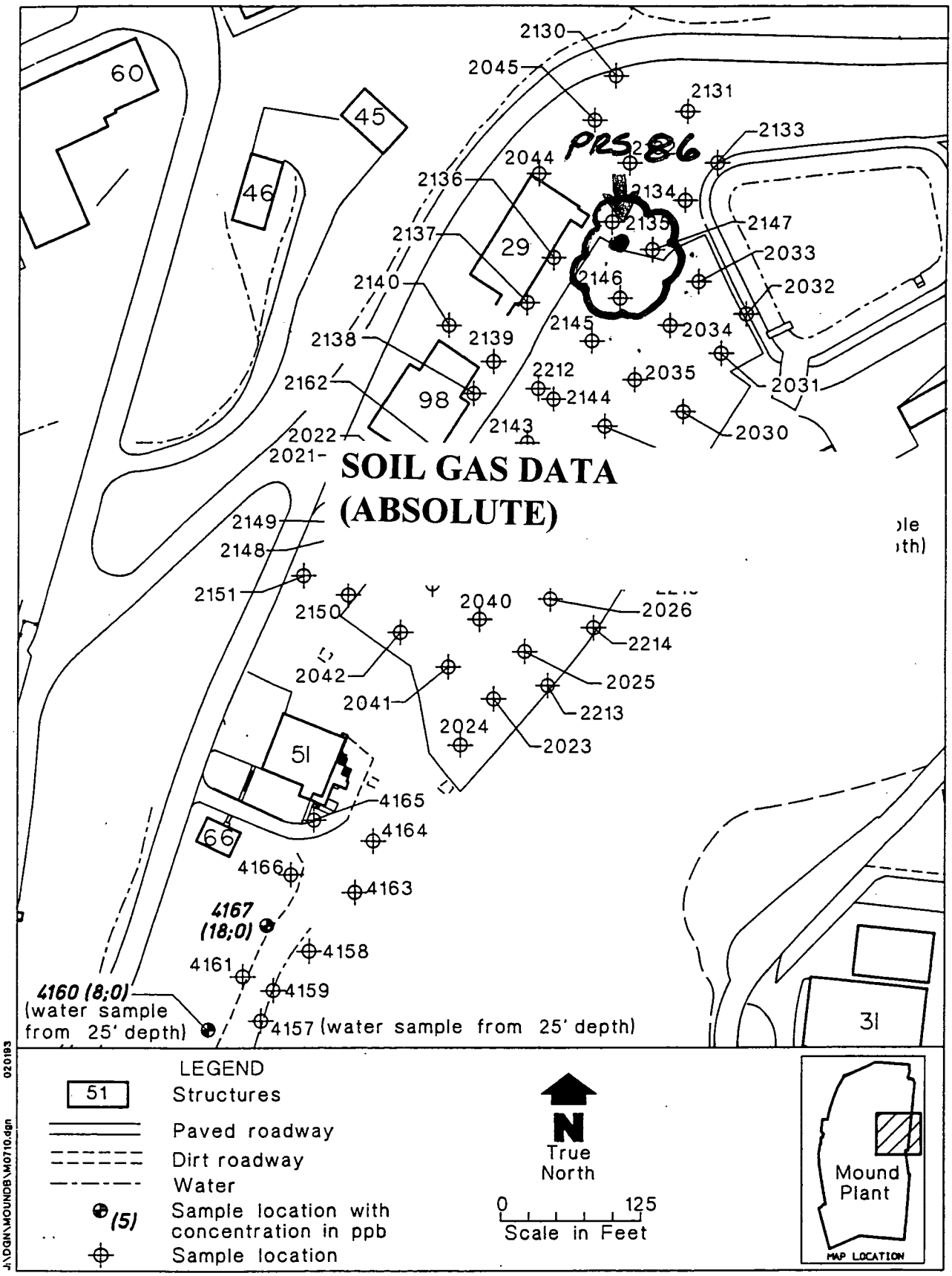


Figure 2.31. CIS-1,2-Dichloroethene detection map for Area 7 and Building 51.

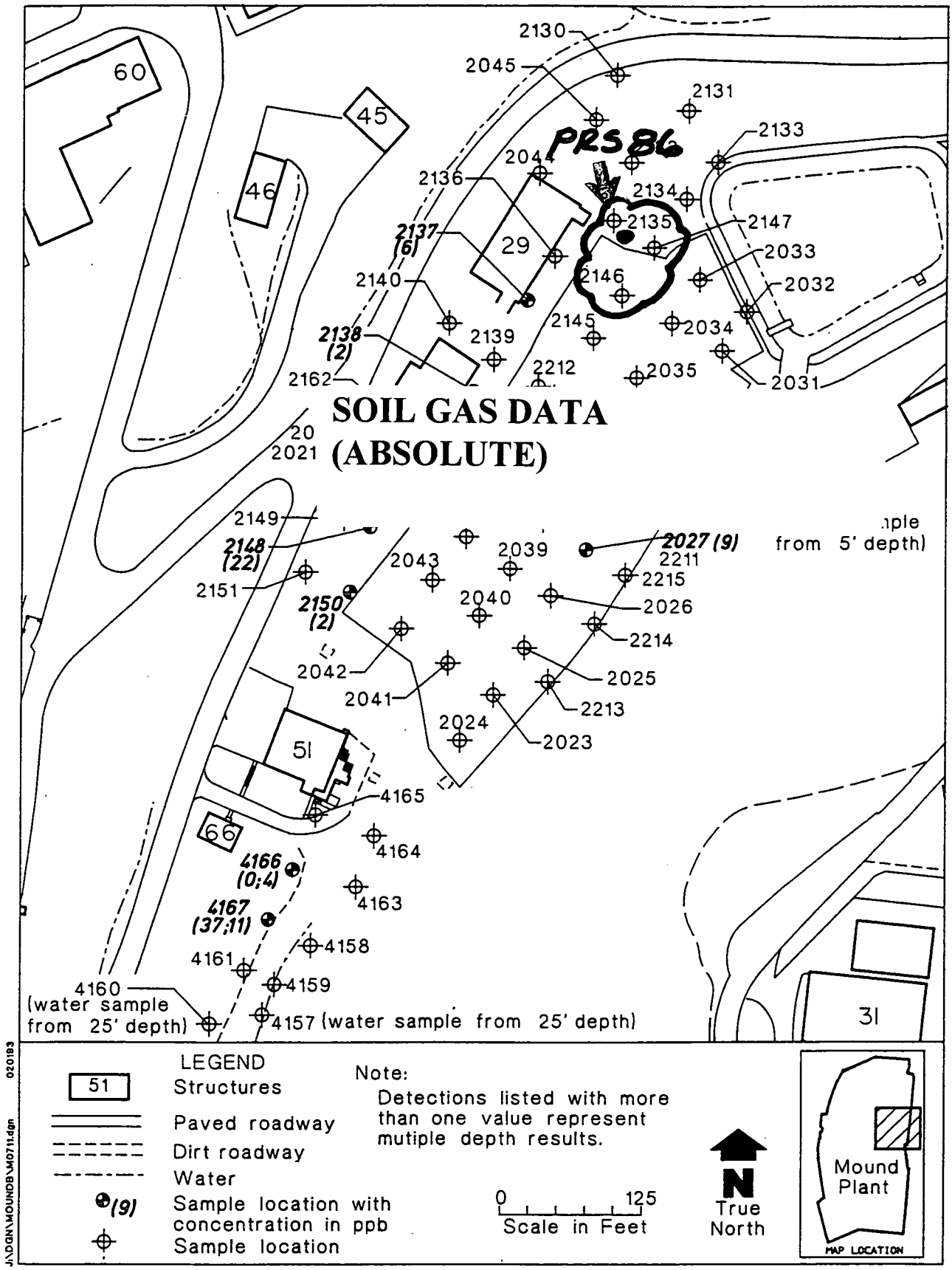


Figure 2.32. 1,1,1-Trichloroethane detection map for Area 7 and Building 51.

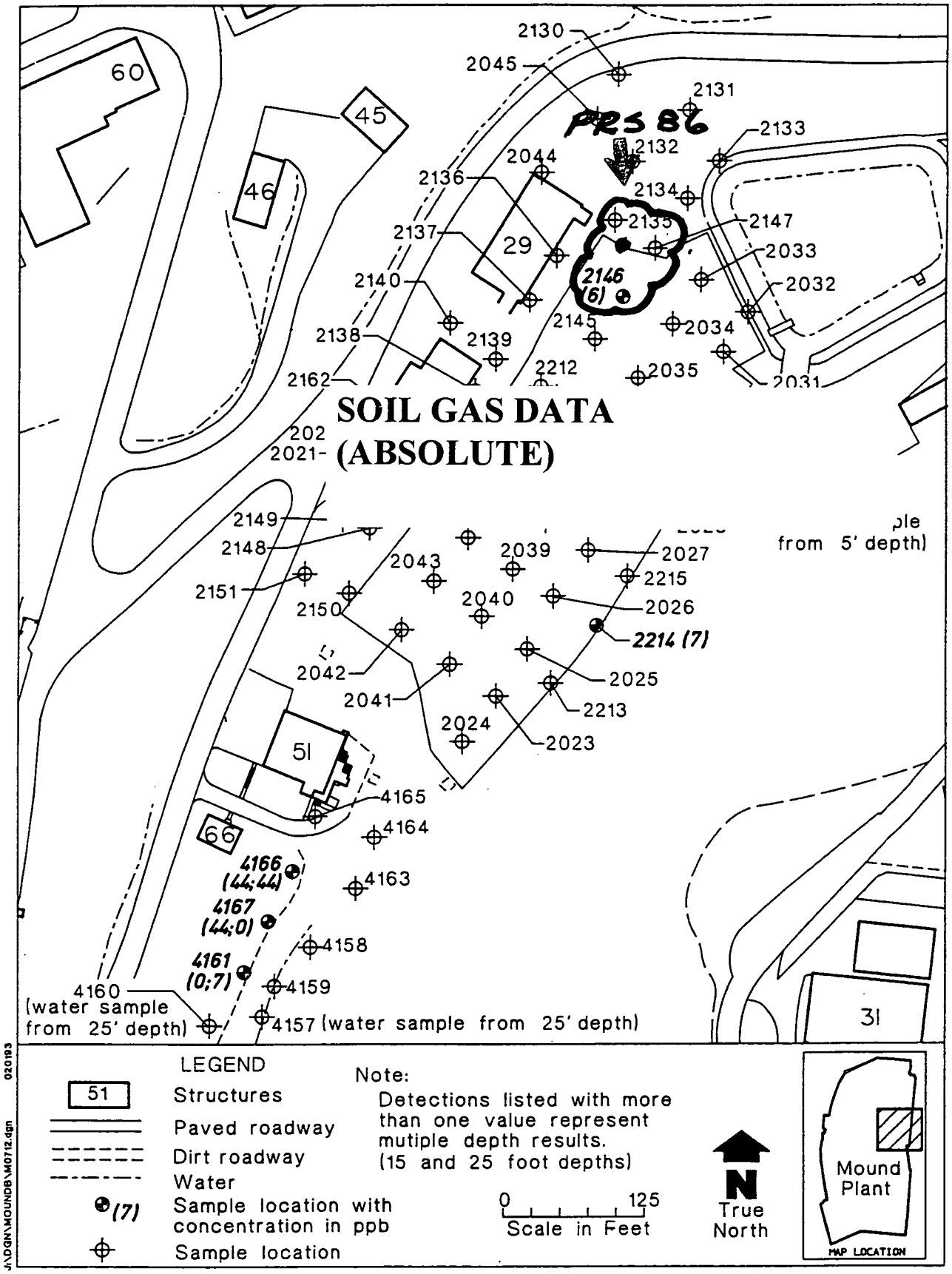


Figure 2.33. Tetrachloroethene detection map for Area 7 and Building 51.

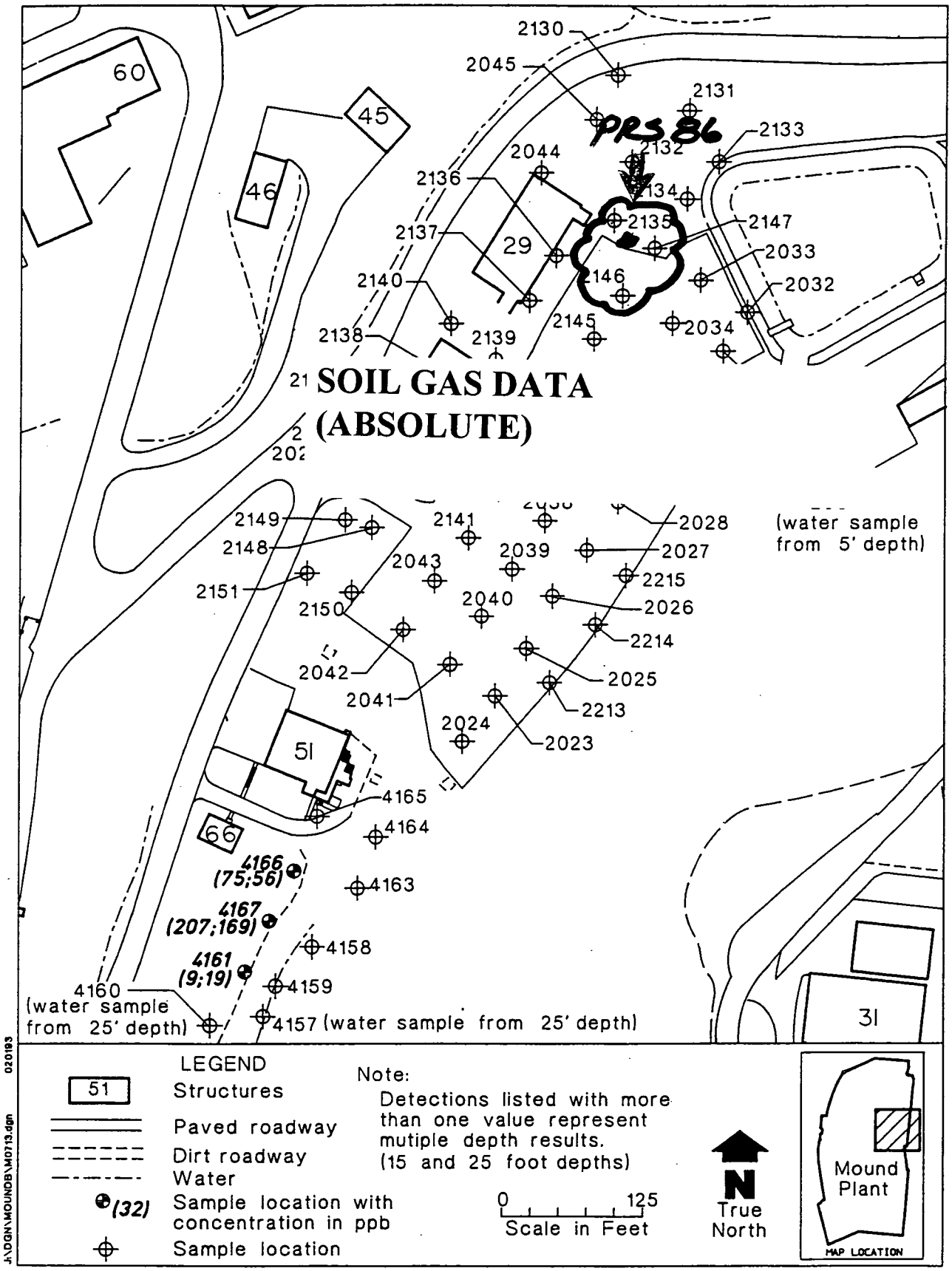


Figure 2.34. Trichloroethene detection map for Area 7 and Building 51.

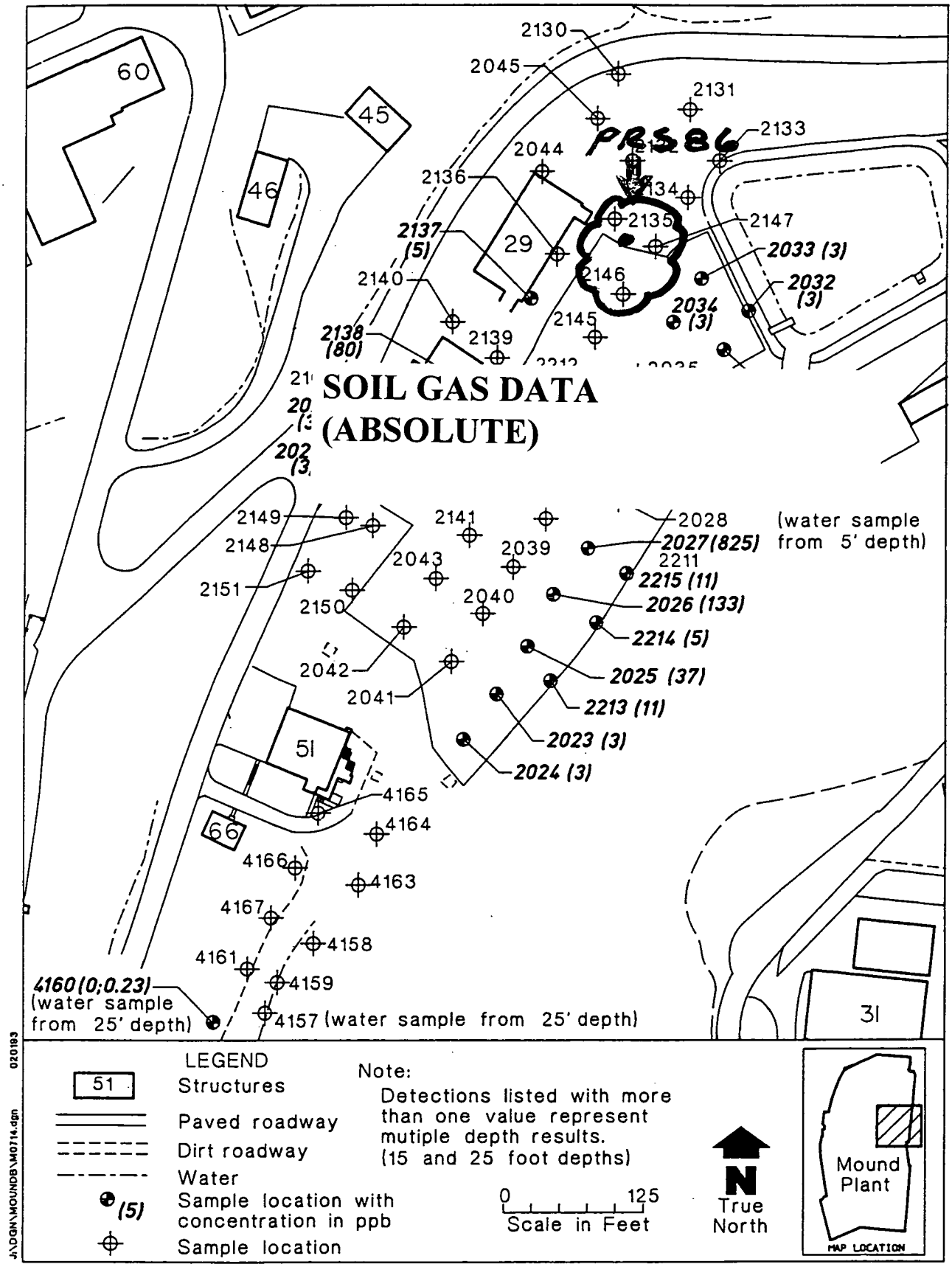


Figure 2.35. Toluene detection map for Area 7 and Building 51.

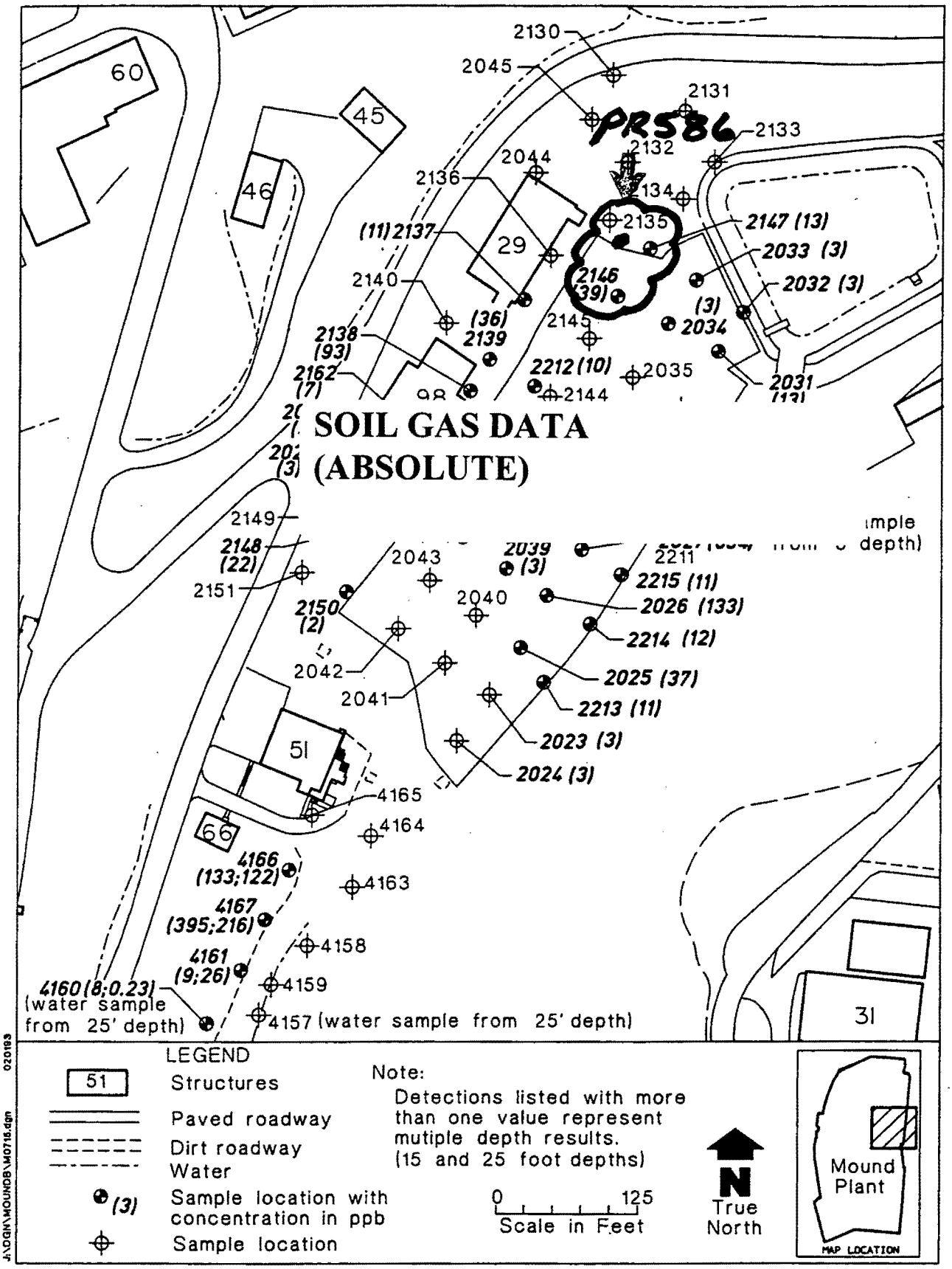


Figure 2.36. Total VOCs detection map for Area 7 and Building 51.

TABLE II.10 SUMMARY OF POSITIVE DETECTIONS–AREA 7
(ppb)

SAMPLE ID	SAMPLE DATE	FREON 11	FREON 113	TRAN–12DCE	CIS–12DCE	111TCA	PCE	TCE	TOLUENE
MND–01–2021–0005	1 AUG 92	---	---	---	---	---	---	---	3
MND–01–2022–0005	1 AUG 92	---	---	---	---	---	---	---	3
MND–01–2023–0005	1 AUG 92	---	---	---	---	---	---	---	3
MND–01–2024–0005	1 AUG 92	---	---	---	---	---	---	---	3
MND–01–2025–0005	1 AUG 92	---	---	---	---	---	---	---	37
MND–01–2026–0005	1 AUG 92	---	---	---	---	---	---	---	133
MND–01–2027–0005	1 AUG 92	---	---	---	---	9	---	---	825
MND–01–2031–0005	1 AUG 92	---	---	---	---	---	---	---	13
MND–01–2032–0005	2 AUG 92	---	---	---	---	---	---	---	3
MND–01–2033–0005	2 AUG 92	---	---	---	---	---	---	---	3
MND–01–2034–0005	2 AUG 92	---	---	---	---	---	---	---	3
MND–01–2034–1005	2 AUG 92	---	---	---	---	---	---	---	3
MND–01–2036–0005w	3 AUG 92	---	---	---	---	---	---	---	242 *
MND–01–2036–1005w	3 AUG 92	---	---	---	---	---	---	---	218 *
MND–01–2039–0005	2 AUG 92	---	---	---	3	---	---	---	---
MND–01–2044–0005	3 AUG 92	---	---	---	---	---	---	---	13 *
MND–01–2137–1005	24 AUG 92	---	---	---	---	6	---	---	5
MND–01–2138–0005	24 AUG 92	11	---	---	---	2	---	---	80
MND–01–2139–0005	25 AUG 92	32	4	---	---	---	---	---	3 *
MND–01–2141–0005	25 AUG 92	---	---	---	10	---	---	---	5 *
MND–01–2142–0005	25 AUG 92	---	---	---	---	---	---	---	11*
MND–01–2142–1005	25 AUG 92	---	---	---	---	---	---	---	11*
MND–01–2145–0005	25 AUG 92	---	---	---	---	---	---	---	5 *
MND–01–2146–0005	25 AUG 92	---	33	---	---	---	6	---	---
MND–01–2147–0005	25 AUG 92	---	13	---	---	---	---	---	---
MND–01–2148–0005	26 AUG 92	---	---	---	---	22	---	---	---
MND–01–2149–0005	26 AUG 92	---	---	---	---	---	---	---	5 *
MND–01–2149–1005	26 AUG 92	---	---	---	---	---	---	---	5 *
MND–01–2150–0005	26 AUG 92	---	---	---	---	2	---	---	5 *
MND–01–2162–0005	30 AUG 92	7	---	---	---	---	---	---	---
MND–01–2212–0015	26 SEP 92	---	10	---					
MND–01–2213–0005	26 SEP 92	---	---	---					
MND–01–2214–0005	26 SEP 92	---	---	---					
MND–01–2215–0005	26 SEP 92	---	---	---					

SOIL GAS DATA (ABSOLUTE)

Notes:

Only sample locations having positive detections are shown.
*: Associated trip, ambient, equipment or field blank contained specified compound.
B: Indicates blank sample.
w: Indicates water sample.

Environmental Restoration Program

OPERABLE UNIT 5
OPERATIONAL AREA PHASE I INVESTIGATION
AREA 7 FIELD REPORT

MOUND PLANT
MIAMISBURG, OHIO

VOLUME I - TEXT

June 1995

Final (Revision 0)

U.S. Department of Energy
Ohio Field Office

EG&G Mound Applied Technologies

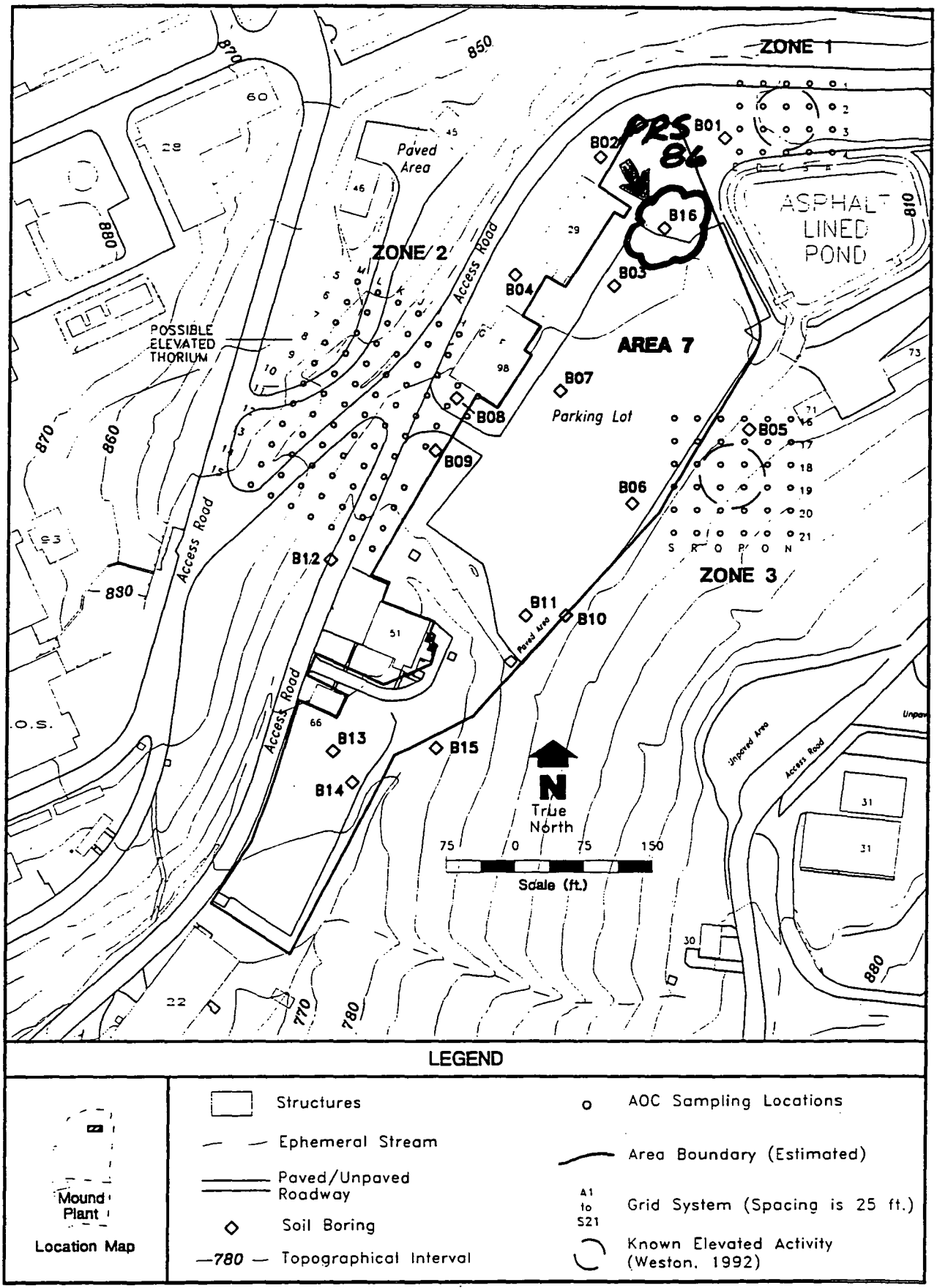


Figure 2.1. Data Collection Points for Area 7 Phase 1 and Phase 2 Investigations

Table II.4. Area 7 Samples Collected
Page 2 of 2

Soil Boring	Sample Type and Depth			
	Surface Soil	Subsurface Soil	Geotechnical	Groundwater
B13	B13001 (0-2 ft)	B13002 (5-10 ft) B13003 (10-16 ft) B13004 (20-25 ft) B13005 (25-28 ft) B13006 (32-34 ft)[V]	B01023 (38-43 ft)[B]	W13001 (26-34 ft) W13101 (26-34 ft)[D]
B14	B14001 (0-2 ft)	B14002 (12-18 ft) B14003 (22-24 ft) B14004 (25-30 ft) B14104 (25-30 ft)[D]	B14021 (84-104 ft)[B]	W14001 (21.5-29 ft)
B15	B15001 (0-2 ft) B15101 (0-2 ft)[D]	B15002 (2-6 ft) B15003 (6-10 ft) B15004 (10-16 ft) B15104 (10-16 ft)[D]		
B16	B16001 (0-2 ft)[R]	B16002 (2-4 ft)[VR] B16003 (5-7 ft)[R] B16004 (10-12 ft)[VR] B16005 (15-18 ft)[VR] B16006 (20-24 ft)[R] B16007 (26-30 ft)[RV] B16107 (26-30 ft) [D]		W16001 (17-18.5 ft)[R]

B - geotechnical bucket sample
D - duplicate sample
R - radiological sample only
T - geotechnical shelby tube sample
V - VOA sample only

composition is typical of vapor derived from partially weathered light to medium weight fuels. The second composition is typical of vapors derived from weathered medium to heavy weight fuels or heating oils.

High relative levels of semi-volatile hydrocarbons, specifically naphthalene, methylnaphthalene, and dihydro-1H-indene, were detected in many of the samples which possessed high relative levels of other medium and heavy weight petroleum hydrocarbons. This is expected as most naphthalenes are common constituents of medium to heavy weight fuels.

All Area 7 soil gas samples were examined for the presence of 2-butanone and various phthalate esters, but these were not detected. This may be due to unique chemical characteristics (e.g., water solubility and high molecular weight) of these compounds which inhibit their occurrence in soil gas.

3.3. SOIL BORINGS SUMMARY

Analytical data and physical properties data from Area 7 soil borings are summarized in the following subsections.

3.3.1. Summary of Analytical Data

To facilitate comparison with historical data, Phase 2 analytical data are summarized per media (i.e. surface soil, subsurface soil, groundwater) and per general contaminant parameter grouping (i.e. radiological, organic, and inorganic). The tables found in the following subsections show the maximum concentrations of analytes detected and the borehole in which the maximum concentration was found. The tables also show the total number of samples in which the analyte was detected. All validated laboratory data are found in Appendix F.2.

3.3.1.1. Surface Soil Radiological Data

Eighteen surface soil samples were collected and analyzed for radionuclides. Table III.1 shows the maximum concentration detected and associated borehole, and the total number of samples in which the analyte was detected. Uranium-238 (U-238) was detected in all 18 surface soil samples and Th-232 was

Table III.1. Maximum Concentrations by Borehole of Radionuclides Detected in Surface Soil Samples from Area 7 Soil Borings

Parameter	Maximum Concentration		Number of Samples with Detects
	Value (pCi/g)	Borehole	
Plutonium-238	1.36	B07	11
Plutonium-239/240	0.12	B07	1
Potassium-40	23.72J	B06	11
Radium-226	0.83	B16	12
Thorium-228	1.53J	B07	10
Thorium-230	1.31J	B01	12
Thorium-232	1.02J	B05	14
Tritium	9.50	B09	4
Uranium-234	1.19	B05	13
Uranium-235	0.23	B05	8
Uranium-238	1.23	B05	18

pCi/g - picocuries per gram
J - estimated value

RADIOCHEMICAL ANALYSIS

Table III.6. Maximum Concentrations by Borehole of Radionuclides Detected in Subsurface Soil Samples from Area 7 Soil Borings

Parameter	Maximum Concentration			Number of Samples with Detects
	Value (pCi/g)	Borehole	Depth (ft BGS)	
Actinium-227	44.68	B16	15-18	2
Cesium-137	0.11	B16	5-7	1
Potassium-40	34.08	B02	5-7	45
Plutonium-238	2.98	B14	25-30	13
Plutonium-239/240	0.27	B14	25-30	3
Radium-226	1.29	B16	15-18	44
Thorium-228	3.07J	B07	15-17	26
Thorium-230	1.23	B06	5-10	34
Thorium-232	1.75J	B07	15-17	42
Tritium	58.5	B09	5-12	8
Uranium-234	2.21J	B07	15-17	36
Uranium-235	0.25	B01	5-7	19
Uranium-238	2.28J	B07	15-17	50

pCi/g - picocuries per gram
ft BGS - feet below ground surface
J - estimated value

RADIOCHEMICAL ANALYSIS

3.3.1.5. Subsurface Soil Organic Data

Volatile Organic Compounds

Fifty-three subsurface soil samples were collected and analyzed for VOCs. Eight were detected in subsurface soil samples from Area 7 soil borings. Table III.7 shows maximum concentrations, associated boreholes and depths, and the total number of samples in which the contaminant was detected. Acetone was detected more frequently than the other VOCs, followed by toluene and hexane. B09, B11, and B14 each showed two maximum concentrations. B09 and B11 are located in the central portion of Area 7 and B14 is located to the south.

Table III.7. Maximum Concentrations by Borehole of VOCs Detected in Subsurface Soil Samples from Area 7 Soil Borings

Parameter	Maximum Concentration			Number of Samples with Detects
	Value (ppb)	Borehole	Depth (ft BGS)	
1,2-Diethylbenzene	13.00	B14	22-24	1
2-Butanone	110.00	B16	26-30	1
Acetone	78.00J	B09	20-25	26
Acetonitrile	120.00J	B09	12-20	2
Hexane	42.00	B14	25-30	4
Methylene Chloride	150.00	B03	15-19	1
PCE	1.00J	B11	4-10	1
Toluene	4.00J	B11	4-10	5

ppb - parts per billion
ft BGS - feet below ground surface
J - estimated value

General Chemistry

ANALYSIS

Semi-Volatile Organic Compounds

Forty-five subsurface soil samples were collected and analyzed for SVOCs. Twenty-three SVOCs were detected in subsurface soil samples from Area 7 soil borings. Table III.8 shows maximum concentrations, associated boreholes and depths, and the total number of samples in which the contaminant was detected. Most of the SVOC maximum contaminant concentration values are from B13 at a depth of 5-10 feet BGS. None of the SVOCs were detected in all the subsurface soil samples and only five of them were found in more than a third of the samples.

Pesticides/Polychlorinated Biphenyls

Forty-five subsurface soil samples were collected and analyzed for pesticides/PCBs. Eighteen pesticides/PCBs were detected in subsurface soil samples from Area 7 soil borings. Table III.9 shows maximum concentrations, associated boreholes and depths, and the total number of samples in which the contaminant was detected. Maximum contaminant concentration values of pesticides/PCBs were found in the subsurface in six soil borings - (B01, B03, B07, B13, B14, and B

Table III.12. Maximum Concentrations by Borehole of Radionuclides Detected in Groundwater Samples from Area 7 Soil Borings

Parameter	Maximum Concentration			Number of Samples with Detects
	Value (pCi/L)	Borehole	Depth (ft BGS)	
Americium-241	0.73J	B13	34.0	1
Plutonium-238	2.29J	B14	21.5	1
Potassium-40	199.90	B13	34.0	1
Radium-226	0.81J	B13	34.0	5
Thorium-228	1.24	B03	17.4	4
Thorium-230	0.58J	B13	34.0	3
Thorium-232	0.32J	B03	17.4	3
Tritium	2373.70	B11	12.5	5
Uranium-234	2.94J	B16	17.0	5
Uranium-235	0.39	B16	17.0	3
Uranium-238	3.49	B16	17.0	5

pCi/L - picocuries per liter
J - estimated value
ft BGS - feet below ground surface

RADIOCHEMICAL ANALYSIS

Document Control No._____

Environmental Restoration Program

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

MOUND PLANT
MIAMISBURG, OHIO

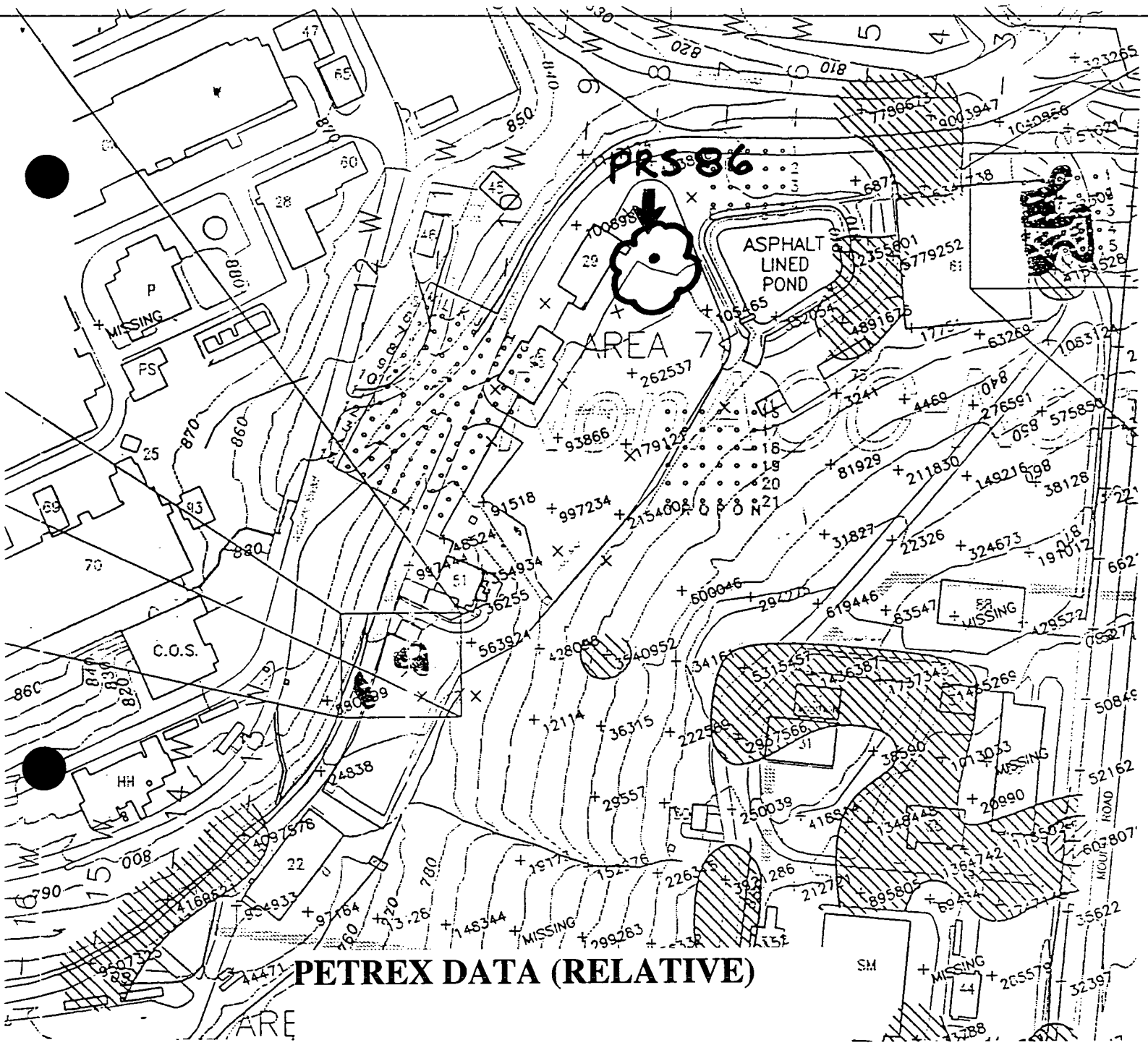
VOLUME II - APPENDICES A-G

June 1995

Final (Revision 0)

U.S. Department of Energy
Ohio Field Office

EG&G Mound Applied Technologies

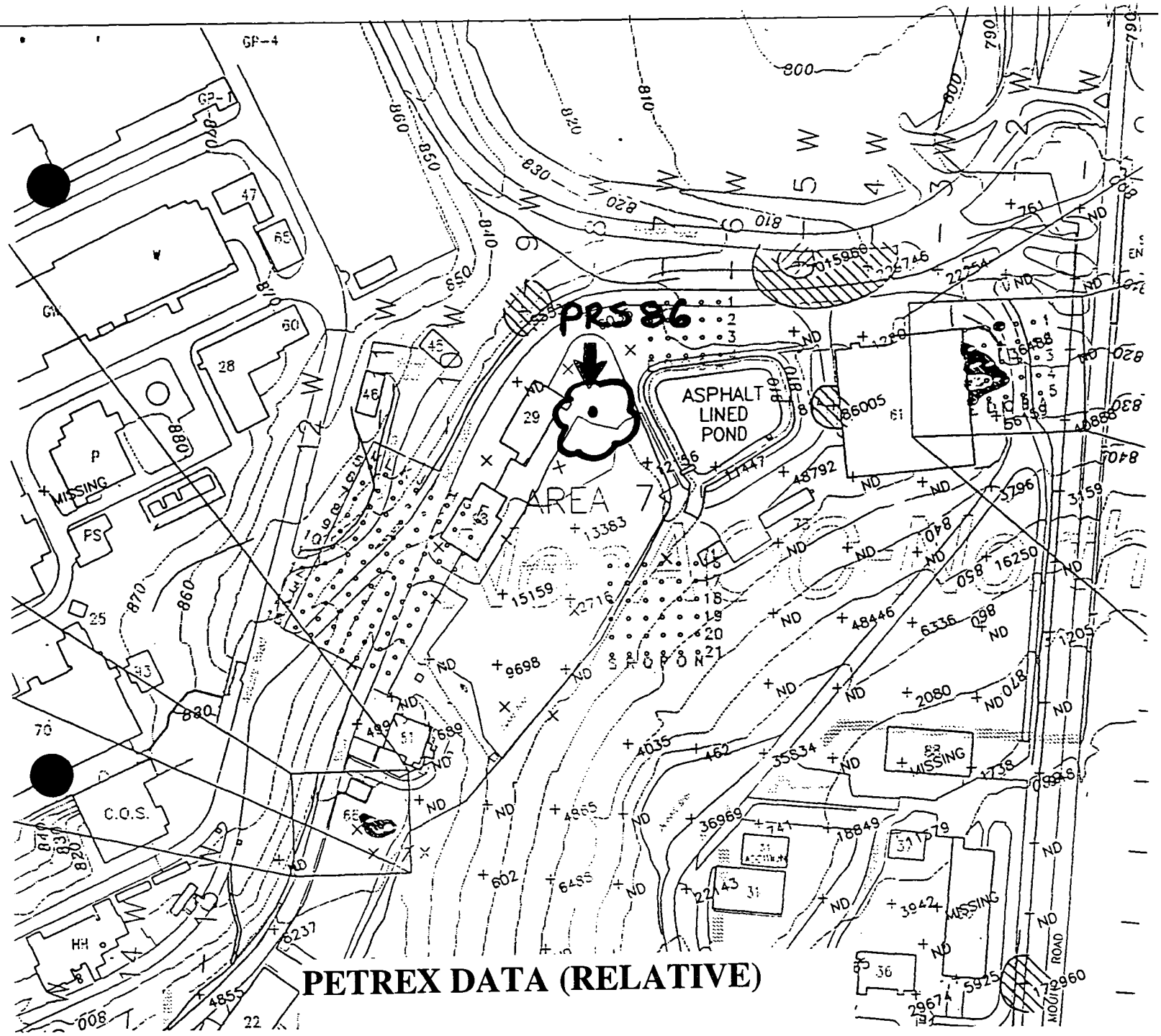


LEGEND				
Relative Response Values (in ion counts):				
NonAOC–South	NonAOC–West	NonAOC–East	NonAOC–North	Area 61
≥ 4,200,000	≥ 20,000,000	≥ 5,000,000	≥ 10,000,000	≥ 5,800,000
850,000–4,199,999	2,600,000–19,999,999	850,000–4,999,999	1,500,000–9,999,999	1,400,000–5,799,999

Relative Response

Total Aromatic Hydrocarbons

Plate 2

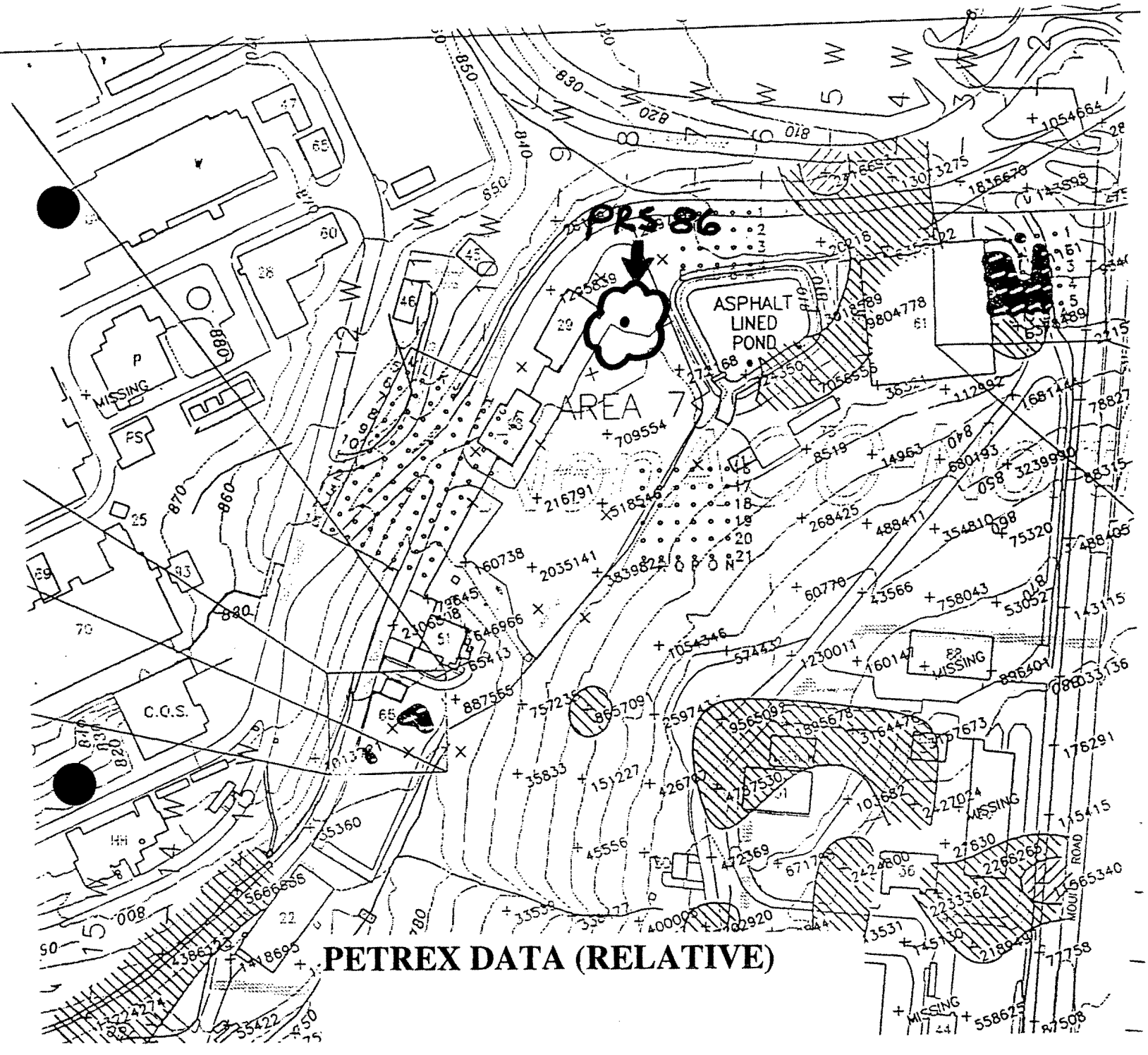


LEGEND				
Relative Response Values (in ion counts):				
NonAOC–South	NonAOC–West	NonAOC–East	NonAOC–North	Area 61
≥ 70,000	≥ 1,000,000	≥ 300,000	≥ 800,000	≥ 1,400,000
7,000–69,999	100,000–999,999	30,000–299,999	80,000–799,999	180,000–1,399,999

Relative Response

Total Semivolatile Hydrocarbons

Plate 3

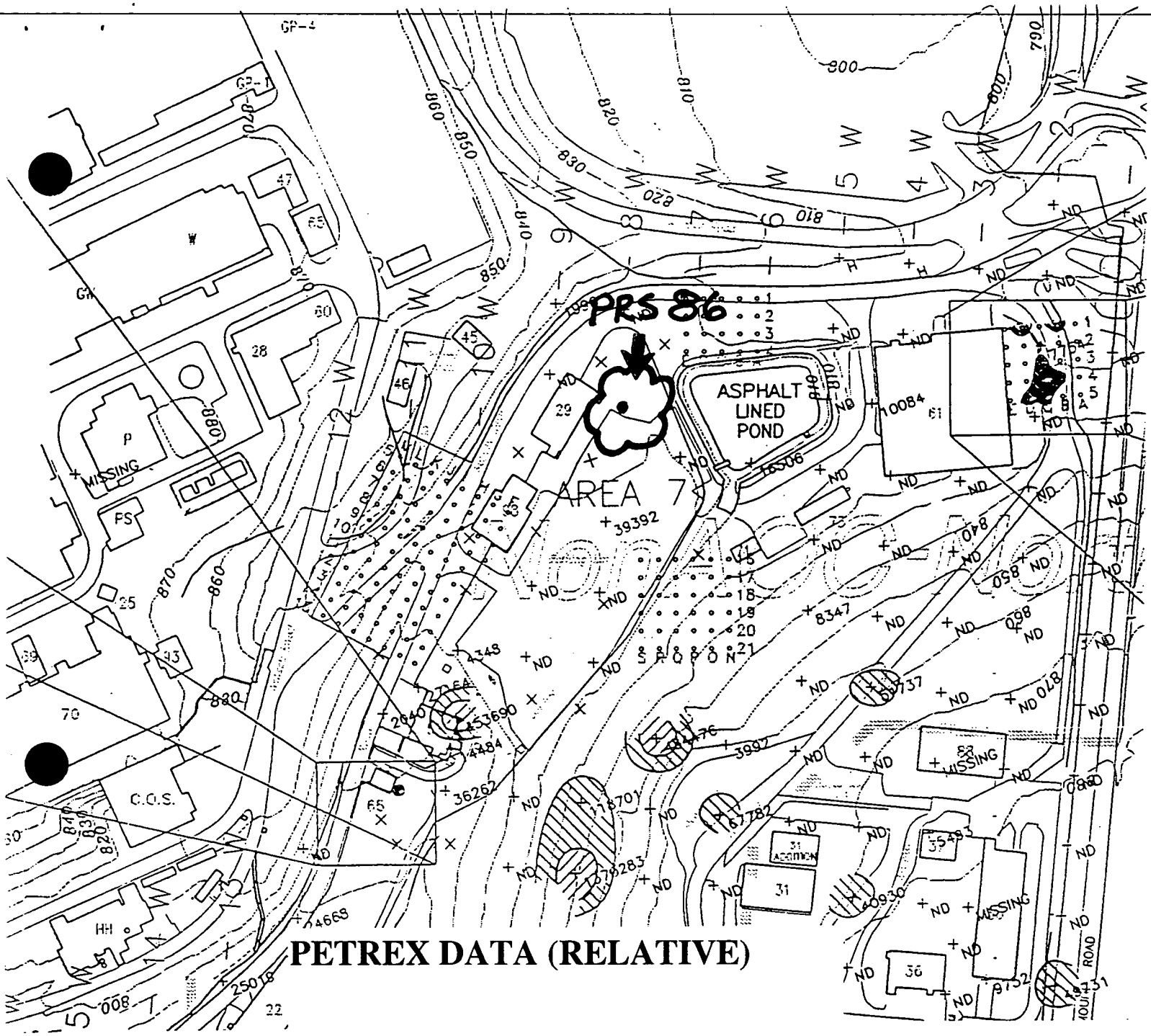


LEGEND				
Relative Response Values (in ion counts):				
NonAOC–South	NonAOC–West	NonAOC–East	NonAOC–North	Area 61
≥ 8,000,000	≥ 29,000,000	≥ 11,500,000	≥ 23,000,000	≥ 25,000,000
1,500,000–7,999,999	3,000,000–28,999,999	1,800,000–11,499,999	4,000,000–22,999,999	3,000,000–24,999,999

Relative Response

Total C5–C11
Petroleum Hydrocarbons

Plate 4



LEGEND				
Relative Response Values (in ion counts):				
NonAOC–South	NonAOC–West	NonAOC–East	NonAOC–North	Area 61
≥ 500,000	≥ 500,000	≥ 80,000	≥ 400,000	≥ 250,000
50,000–499,999	50,000–499,999	20,000–79,999	40,000–399,999	35,000–249,999

Relative Response

Total Halogenated Hydrocarbons

Plate 5

ENVIRONMENTAL RESTORATION PROGRAM

ACTION MEMORANDUM/REMOVAL SITE EVALUATION

OPERABLE UNIT 5
AREA 7 REMOVAL ACTION

MOUND PLANT
MIAMISBURG, OHIO

February 1996

PREPARED BY:

EG&G Mound Applied Technologies
P.O. Box 3000
Miamisburg, Ohio 45343-3000

for the

U.S. DEPARTMENT OF ENERGY
Under Contract
No. DE-AC04-88DP43495

FINAL

MIAMISBURG
AREA OFFICE

Department of Energy
Ohio Field Office
Miamisburg Area Office
P.O. Box 66
Miamisburg, Ohio 45343-0066

NOV 30 1995

Mr. Tim Fischer
U.S. Environmental Protection Agency (USEPA)
HSRM-6J
77 West Jackson Blvd.
Chicago, Illinois 60604

Mr. Brian Nickel
Ohio Environmental Protection Agency (OEPA)
401 East Fifth Street
Dayton, Ohio 45402-2911

Dear Mr. Fischer and Mr. Nickel:

Enclosed for your review, please find a copy of Operable Unit 5, DOE Response to EPA Comments for the Action Memorandum/ Removal Site Evaluation, Area 7 Removal Action, Draft, (Revision 1). If you have any comments, please respond in 30 days.

If there are any questions regarding this submittal, please contact Alan Spesard at (513) 865-3859.

Sincerely,

Arthur W. Kleinrath
Project Engineer Team leader

Enclosure

cc w/enclosure:
John Sands, EM-453, HQ
Ruth Vandergrift, ODH
Regina Bayer, CH2M Hill
Tim Thorp, HAZWRAP
Sue Smiley, OH
Bill Taylor, ATSDR

cc w/o enclosure:
K. Hacker, EG&G
D. Rakel, EG&G
A. Spesard, MB
D. White, MB

the subsurface contamination detected by sampling results during the removal action will indicate the extent of actinium (and other) contamination within the excavated area. Additional sampling being considered will provide further contamination information.

Action #3: None.

Specific Comments:

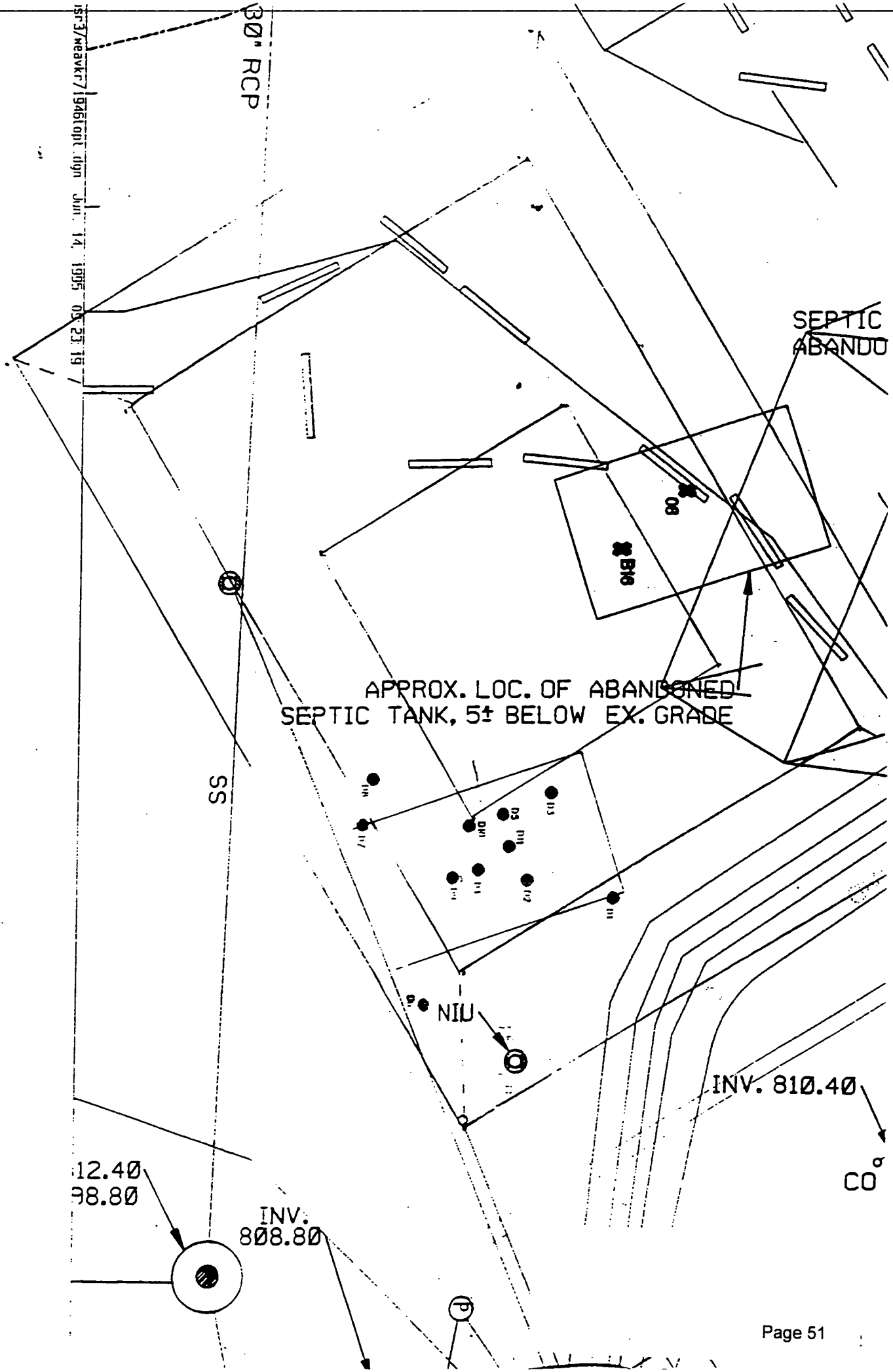
Comment #1: Section 2.3, Page 2-7, first paragraph:
The exact volume and precise location of disposal soils in the removal area is unknown. Verbal reports estimate that approximately five dump truck loads of soils were deposited in and around the tank. In addition, the design of the tank is not clear. Mound should address whether inflow and outflow networks of the tank were present during the disposal period. These networks of pipe installed in excavated earth have the ability to act as preferential flow paths for contaminated water. DOE should recognize that if such paths are present, they too should be investigated for removal.

Response #1: Mound does not have sufficient information to address the issue of possible inflow and outflow networks that may have been associated with the septic tank. It is believed that the tank had some type of inflow piping from the temporary administration building it served. This would likely have been a gravity flow system and the inflow system would be up gradient from the tank. Due to the suspected location of the tank with respect to the original ravine, the system may or may not have had outflow piping. This could be confirmed if the tank is located during the removal action. Sampling down gradient of the removal action location did not reveal the presence of actinium in the groundwater. If the tank is found, Mound will use the results of sampling data collected around the tank and visual inspections to determine if potential preferential flow paths exist and the need for additional excavation.

Action #1: None.

Comment #2: Section 2.1.4, Page 2-7, Paragraph 1:
Within the proposed removal area Actinium-227 contamination were found at C008, C009 and B-16 (Fig. 1). Of eleven geoprobe borings, two showed contamination (D-1 and D-3). Figure 4 is a cross section highlighting the extent of the known contamination. Apparently the proposed removal area is based on the results of a magnetic survey and a geoprobe study. We request a copy of the geoprobe sampling grid used in the study.

Response #2: A number of sources were used to determine the location for the removal action. These include existing maps, information from soil borings and monitoring wells, a ground-penetrating radar study, and interviews with Mound employees, as well as, the results of the magnetic survey and the geoprobe study.


30" RCP
SEPTIC
ABANDO
B18
APPROX. LOC. OF ABANDONED
SEPTIC TANK, 5± BELOW EX. GRADE
SS
NIU
INV. 810.40
CO
12.40
98.80
INV.
808.80

Specific Comments:

Comment #1: Section 2.1.1 Removal Site Evaluation
Page 2-2
Actinium-227 has a half-life of 21.6 years. Since the contaminated soil was reportedly buried in 1959, a discussion of actinium-227's decay products should be included in the text.

Response #1: Ac-227 decays by β emission to Th-227. Successive α decays produce a decay chain consisting of short-lived isotopes: Ra-223, Rn-219, Po-215, Pb-211, Bi-211, Tl-207, and Pb-207, which is stable. Since all of these decay products have half-lives much shorter than Ac-227 (presumed to be sometime before placement of the soils at the Area 7 site), the parent and decay products are in secular equilibrium, meaning that the relative proportion of all isotopes remains constant. Consequently, all of these decay products are present at the same activity as Ac-227's in the soil samples analyzed. The actual sample analysis scheme took advantage of Ac-227's decay chain by using multichannel analyzers tuned to detect the decay gamma radiation from Th-227 and Ra-223 to detect the presence of Ac-227.

Action #1: None.

Comment #2: Section 2.1.4 Release or Threatened Release into the Environment
Page 2-11, Figure 2.4
Designators should be included on the figure to indicate the cross-section orientation (east-west or north-south).

Response #2: Figure 2.4 is conceptual representation of the subsurface contamination and is not scaled in the horizontal direction. However, by referring to Figure 2.2, the conceptual model is approximately a east-west cross-section viewed looking north.

Action #2: None.

Comment #3: Section 5.1 Proposed Action
Page 5-1, Paragraph 1
A 20 ft. by 20 ft. excavation area does not cover the entire area shown by the Conceptual Model, Figure 2.4, and does not remove all soil greater than 5 pCi/g, the interim clean-up goal for actinium-227 mentioned on page 3-1. Please show on a figure the 20 ft. by 20 ft. area that is being targeted for excavation.

Response #3: The objective of the removal action is not to remove all actinium-contaminated soil in Area 7 that is above a concentration of 5 pCi/g. Rather, the objectives is to mitigate source migration by excavating a specified volume of soil from a predetermined excavation configuration, as described in Section 5.1.1. Using know soil sampling and

historical information, the excavation will be centered over the area of the suspected source of contamination. The 20 ft. by 20 ft. excavation will be centered in the 50 ft. by 50 ft. area (identified as the approximate location of removal action) shown in Figure 2.2.

Action #3: None.

Comment #4: Section 5.1.1 Proposed Action Description
Page 5-3, Paragraph 3
The text states that soils encountered in the excavation will be removed to below the detection limit of the field method used for monitoring the excavation. Provide details on what field instrumentation will be used to monitor the excavation, and what the expected detection limit for actinium-227 will be.

Response #4: As stated in Section 4.4.2, paragraph (i) of the Work Plan (DOE 1994b), each bucket of excavated soil will be screened using a FIDLER detector, in accordance with Mound Manual MD-80036 and the OU5 Field Sampling Plan. The FIDLER can be calibrated to read 5,000 to 7,000 counts per minute which correlates to a lower detection limit (LDL) for actinium-227 of approximately 20 pCi/g. For this removal action, however, the FIDLER will not be calibrated for any specific radionuclide. In accordance with the project Radiological Work Permit, if a reading of 500,000 counts per minute or greater is measured by the FIDLER, a soil sample is to be collected for laboratory analysis, for health and safety measures and to document the results of the excavation. A dedicated lab will be established on-site to analyze the soil samples from the Area 7 removal action. Using a Germanium crystal detector and a 10 minute count time, the LDL for actinium-227 is between 0.4 pCi/g and 10 pCi/g.

Action #4: Page 5-3, Paragraph 3 may need to be revised.

Action #2: A copy of the geoprobe sampling grid is shown in the attached figure. No change is required for the AM/RSE report.

Comment #3: Section 2.1.4, Page 2-13, Paragraph 2:
The second paragraph states that based on boring logs, the aquifer is approximately four feet thick. A point is made that the aquifer is perched and that it is "only a temporal source". An examination of the bore logs does not imply a perched zone. The log for Bore-16 shows gravel extending from 14 to 34 feet deep with water being encountered at 17.5 feet. This aquifer should be recognized as a substantial water boring zone. Whether or not the contamination in well O395 came from the septic area of the SW building is not known. However, the septic area should not be dismissed as a possible source due to underestimation of the transmissiveness of the underlying aquifer.

Response #3: The boring log for B-16 suggests a large amount of fill material (concrete chunks). For this reason, the lithologies from B-3 were used to infer the perched water bearing zone thickness.

Action #3: None.

Comment #4: Section 3.0, Page 3-1, Paragraph 1:
Please note that the final cleanup value for Actinium contaminated soils at Area 7 should be subject to the acceptability of the proposed Mound Guideline Values. In addition, if 5.3 pCi/g (per Guideline Values) represent a risk of 10^{-5} then how would 5 pCi/g calculate to be 7.5×10^{-5}, as indicated in the text?

Response #4: From the Draft version of the Mound Proposed Risk-Based Cleanup Values (Revision 2 May 1995), the actinium cleanup guideline is 10.0 pCi/g for a 10^{-5} risk, based on construction/Mound employee land use and all modes of exposure (ingestion, inhalation, direct exposure). The RESRAD calculation referred to in the AM/RSE was based on different and more conservative assumptions. The net effect is that the selection of 5 pCi/g is still a reasonable choice as the clean-up goal per the removal action.

Action #4: None.

Comment #5: Section 5.1.1, Page 5-1, Paragraph 1:
Expected distribution of Actinium-227 is stated to be between 6-18 feet below ground surface (Section 2.1.4, Page 2-12, Paragraph 4, last sentence). Why excavate to only 16 feet?

Response #5: The sentence on page 2-12 states that the expected distribution of actinium contamination is between 6 ft. and 18 ft. The limitations imposed on this removal action are:

- Keep the excavation above the groundwater table that was detected at 17 ft. below ground surface; and,
- Availability of sufficient quantity of LSA boxes.

As stated in the first line on page 5-6, the removal action will excavate as much of the actinium as feasible.

Action #5: None.

Comment #6: Section 5.1.1, Page 5-1, Paragraph 1:
The paragraph states that if the abandoned tank is encountered during excavation it will be removed. Unless tank contents are confirmed as uncontaminated, DOE should consider removal of the tank.

Response #6: The removal action objective includes removal of the septic tank and contents if the tank is encountered during the excavation.

Action #6: None.

Comment #7: Section 5.1.3.3, Page 5-7:
Mound has acknowledged that the source for Actinium-227 is at least partially located in ground water. Ground water from the source area has the potential to migrate radially down slope (Fig. 2). This radial flow includes southern components of flow that coincide with the regional flow direction of the drainage ditch. However, localized northeastern components of flow are also apparently possible. Soil contamination due to northeastern lateral transport should be considered during excavation as well as contamination from southern and southwestern components of flow.

Response #7: There is no evidence, based on existing data, that the groundwater is contaminated with actinium. The data includes samples collected from down gradient borings B-16 and B-3 and monitoring well 0395.

Action #7: None.

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ACRONYMS

AEC	Atomic Energy Commission
AM	Action Memorandum
ARARs	applicable or relevant and appropriate requirements
BGS	below ground surface
BVA	Buried Valley Aquifer
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
D&D	Decontamination & Decommissioning
DOE	U.S. Department of Energy
EE/CA	Engineering Evaluation/Cost Analysis
EPA	United States Environmental Protection Agency
ER	Environmental Restoration
FFA	Federal Facilities Agreement
FSP	Field Sampling Plan
ID	identification
LSA	Low Specific Activity
mrem	millirem
MSL	Mean Sea Level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NTS	Nevada Test Site
OAC	Ohio Administrative Code
OEPA	Ohio Environmental Protection Agency
OU	Operable Unit
OSC	On-Scene Coordinator
OSHA	Occupational Safety and Health Administration
pCi/g	picocuries per gram
RCRA	Resource Conservation and Recovery Act
RESRAD	Residual Radioactive Material Program
RI/FS	Remedial Investigation/Feasibility Study
RSE	Removal Site Evaluation
SARA	Superfund Amendments and Reauthorization Act
SW	Semi-Works
TRU	Transuranic

ACKNOWLEDGEMENTS

This Action Memorandum/Removal Site Evaluation was prepared by EG&G Mound Applied Technologies for the U.S. Department of Energy. The principal author of this document is Mr. Bob Stanley. The contributors to this document are as follows:

Department of Energy, On-Scene Coordinator: Mr. Arthur Kleinrath
Department of Energy, (Rust-Geotech), Technical Review: Mr. Richard Neff
EG&G Mound Applied Technologies, Project Manager: Mr. Bob Stanley
EG&G Mound Applied Technologies, Technical Review: Dr. Dan Carfagno
EG&G Mound Applied Technologies, Technical Review: Mr. Alec Bray
EG&G Mound Applied Technologies, Technical Review: Mr. Keith McMahan
Science Applications International Corporation, Technical Review: Mr. Mike Balmert

DATE: February 13, 1996

SUBJECT: Request for a Removal Action at Mound Plant Operable Unit 5, Area 7, Miamisburg, Montgomery County, Ohio

FROM: Arthur Kleinrath, Remedial Project Manager/On-Scene Coordinator, Mound Plant, U.S. Department of Energy

TO: Administrative Record

1. PURPOSE

The U.S. Department of Energy (DOE) is the designated lead agency under the Comprehensive, Environmental Response, Compensation, and Liability Act (CERCLA) and removal actions at the Mound Plant are implemented as non-Superfund, federal-lead actions. DOE provides the On-Scene Coordinator (OSC). Non-Superfund federal-lead, removal actions are not subject to United States Environmental Protection Agency (EPA) limitations on the OSC ($50,000 authority) and are not subject to National Oil and Hazardous Substances Pollution Contingency Plan (NCP) limitations on removal actions (i.e., $2,000,000 in cost and 12 months in duration).

This action memorandum (AM) has been completed to document the Removal Site Evaluation (RSE), and to request and document approval of the proposed removal action described herein for the actinium-227 and radium-226 contaminated soils of Mound Operable Unit (OU) 5, Area 7 located within the DOE Mound Plant.

2. SITE CONDITIONS AND BACKGROUND

In 1949, Mound Plant was requested to undertake the production of actinium-227 to support the Atomic Energy Commission's substitution materials program. Since actinium-227 is not present in sufficient quantities in natural source materials to allow for economical recoveries, it is produced by the transmutation of radium-226 with neutrons in a nuclear reactor. Mound Plant conducted two separate small-scale actinium production programs. The first, conducted in R Building, was an experimental separation of radium-226 from barium-rich ore (pitch-blend residue) known as K-65. In October 1949, Mound Plant received 200 pounds of K-65 in a single drum. This material was stored at Mound Plant in an old explosives bunker known as the radium shack. The experimental separation produced small quantities of actinium-227.

The second and largest source of actinium-227 was from a separations process conducted in SW Building. A special shielded facility, known as the cave, was built in June 1951 on the east side of SW Building to separate and purify actinium-227 from irradiated radium-226. The Hanford Nuclear Reservation provided the irradiated radium-226 source.

Liquid wastes from the SW Building separations process were directed through the building floor trenches to separate sumps and a small evaporative treatment system located inside the SW Building. In early 1955, following the concrete entombment of the SW Building Separations Area, the soil beneath the area of SW Building adjacent to the separations area was found to be contaminated primarily with actinium-227, but, to a lesser extent, with radium-226 and thorium-228. The apparent source was identified as leakage from one of the floor sumps used to store liquid waste from the actinium separation operations. The contaminated soil was removed and disposed in what is now Area 7. The actinium-227 contaminated soils deposited in Area 7 are the focus of this removal action.

2.1. SITE DESCRIPTION

This section describes the RSE, physical site location, site characteristics, release of contaminants into the environment and the site's National Priorities List (NPL) status.

2.1.1. Removal Site Evaluation

The RSE requirements, as outlined under EPA's NCP regulations in 40 CFR 300.415, are presented throughout this AM/RSE. The source and nature of the release are described in Sections 2.1.3. and 2.1.4. An evaluation by public health agencies has not been performed for Area 7 and, therefore, is not included in this AM/RSE. The evaluation of potential exposures is described in this section and in Section 3. The determination of the need for a removal action is outlined in this section, in Table II.1.

The NCP includes eight factors that must be considered in determining the appropriateness of a removal action (40 CFR 300.415(b)(2)). These criteria, as applied to the contamination of Area 7 by actinium-227 contaminated soils from the SW Building, are evaluated in Table II.1.

It is suspected that the Area 7 contaminated soil may extend into a perched groundwater strata. Periodic monitoring of drinking water supplies has revealed no actinium-227 or radium-226 contamination. However, the contamination may have the potential to migrate via the plant drainage ditch to the Buried Valley Aquifer (BVA), which has been shown to be connected to nearby drinking water supplies. Therefore, the potential exists for contamination of drinking water supplies or sensitive ecosystems.

The actinium-227 contaminated soils from the SW Building were placed in or around an abandoned septic tank in Area 7 in 1959. The tank was reportedly used as a receptacle for the contaminated soil. As such, the abandoned septic tank could contain actinium-227 contaminated soils that may pose a threat of release. Existing information indicates that levels of actinium-227 up to 1,400 pCi/g have been found that potentially may migrate (DOE 1993a).

In summary, concentrations of actinium-227 exist that (a) provide high levels of contaminants in soils that can migrate, (b) have no other appropriate federal or state response mechanism, and (c) constitute a situation potentially threatening to the public welfare. A time-critical removal action, focused on source removal of the actinium-227 contaminated soils above risk-based guidelines from Area 7, is appropriate to mitigate potential source migration.

Table II.1. Evaluation of Removal Action Appropriateness Criteria [40 CFR 300.415 (b)(2)]

Criteria	Evaluation
(i) "...potential exposure to nearby human populations, animals, or the food chain..."	None
(ii) "Actual or potential contamination of drinking water supplies..."	The actinium-227 contaminated soil is partially located in a saturated layer of soil. Although the drinking water supply currently shows no actinium-227 contamination, the potential for contamination exists due to the unknown hydraulic connections between the Area 7 groundwater, the plant drainage ditch and the BVA.
(iii) "Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers, that may pose a threat of release;"	Part of the actinium-227 contaminated soil may be located within the abandoned septic tank. The tank may have been used as a disposal container to reduce migration of contamination.
(iv) "High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate;"	Cuttings from down gradient wells have detected radium-226. The only known source of radium-226 is the soil from the SW Building that is predominantly contaminated by actinium-227. SW Building soils sampled in Area 7 have found actinium-227 at a maximum concentration of 1,400 pCi/g. The presence of radium-226 down gradient from the source indicates that surface soil and groundwater are also likely pathways for the potential migration of actinium-227.
(v) "Weather conditions that may cause hazardous substances to migrate or be released;"	None
(vi) "Threat of fire or explosion;"	None
(vii) "The availability of other appropriate federal or state response mechanisms to respond to the release;" and	There are no state mechanisms, no other federal mechanisms (DOE is the designated lead agency at Mound under CERCLA), and no other DOE programs to provide an appropriate response.
(viii) "Other situations or factors that may pose threats to public health or welfare or the environment."	None

2.1.2. Physical Location

The Mound Plant is a 306-acre site on the border of the city of Miamisburg in Montgomery County, Ohio (Figure 2.1.). The site is approximately 10 miles south-southwest of Dayton and 45 miles north of Cincinnati. Area 7 is a large area within OU5, approximately 700 ft by 200 ft, located in the upper valley at Mound Plant, behind or below Buildings 29 and 98 (Figure 2.2). Surface water runoff from Area 7 drains to the plant drainage ditch south of Area 7, is conveyed to a holding pond, and is discharged to an NDPES outfall to the Great Miami River.

The removal action site is located within Area 7 near Building 29 and occupies an area of approximately 60 ft by 50 ft. It is roughly bounded by Building 29 to the northwest, the plant entrance road to the north, the asphalt lined pond to the east and the Area 7 parking lot to the south (Figure 2.2).

2.1.3. Site Characteristics

Area 7 was originally a steep ravine that formed the upper reach of the plant drainage ditch, and was historically used for contaminated waste and debris disposal as well as borrow material infilling. The majority of the debris and waste were deposited in the lower reaches (i.e., deep sections) of the ravine. The actinium-227 contaminated soils from the SW Building were reportedly deposited near or around an abandoned septic tank. The abandoned septic tank is located, according to the original plant construction drawings, near the head of the original ravine at the northern end of Area 7.

The abandoned septic tank was originally in use from 1946 through the early 1950's for treatment of sanitary waste discharged from the original Mound Plant construction administration building. The tank is assumed to be a 1,500 to 3,000-gallon concrete septic tank and is believed to have been installed without a leach field (i.e., designed to drain directly into the ravine). The tank has remained unused as a septic tank since it was abandoned in the early 1950's. The tank was reportedly buried within five feet of the original (1946) topography. Backfilling of the ravine has raised the current surface elevation to approximately 10-15 feet above the original contour.

Based on verbal and limited written evidence, the actinium-227 contaminated soils from the SW Building were placed in or near the abandoned septic tank in 1959. The precise role the abandoned tank played (i.e., locator or containment) as the disposal location for the actinium-227 and radium-226 contaminated

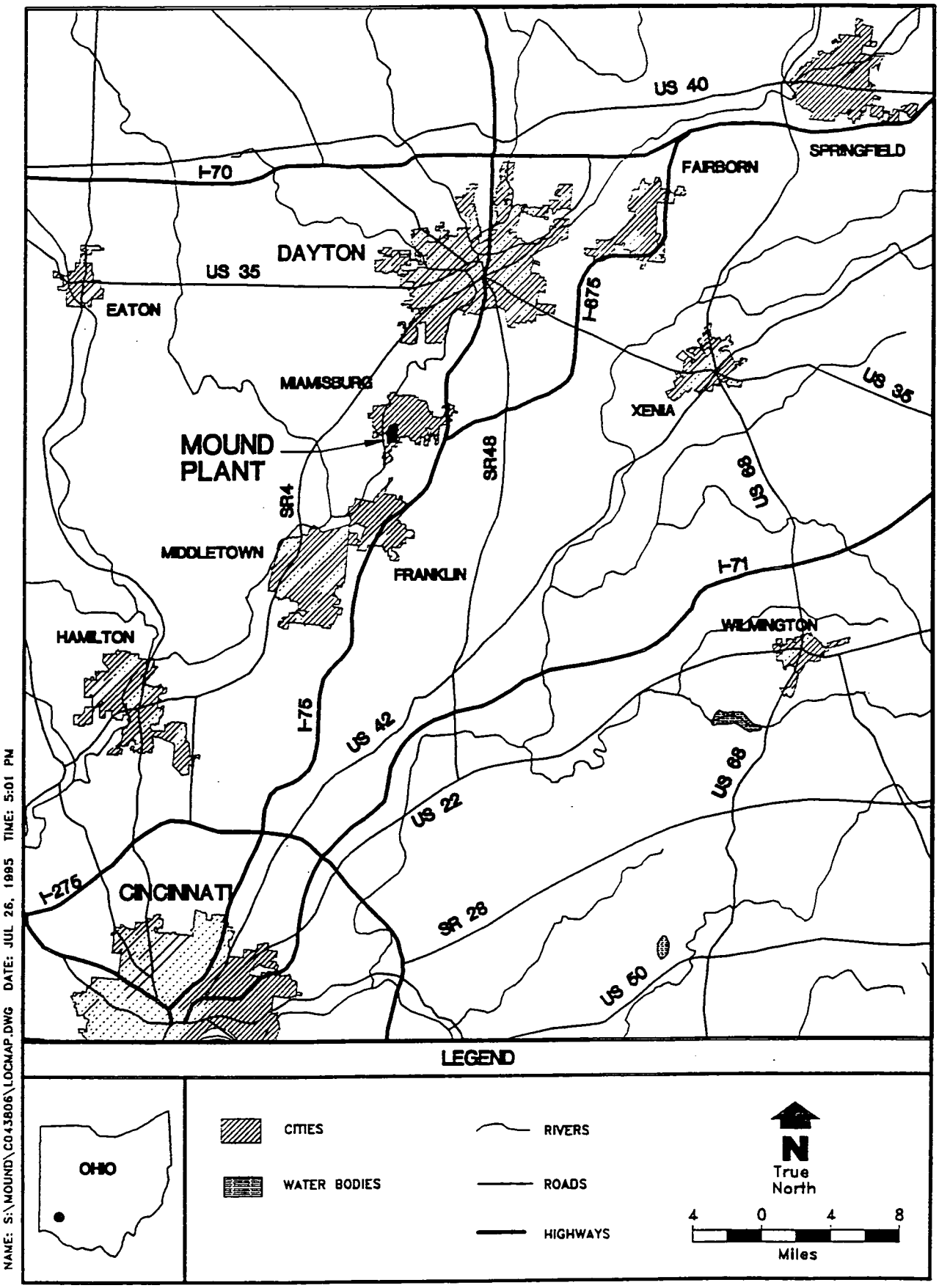


Figure 2.1. Location of Mound Plant, Miamisburg, Ohio

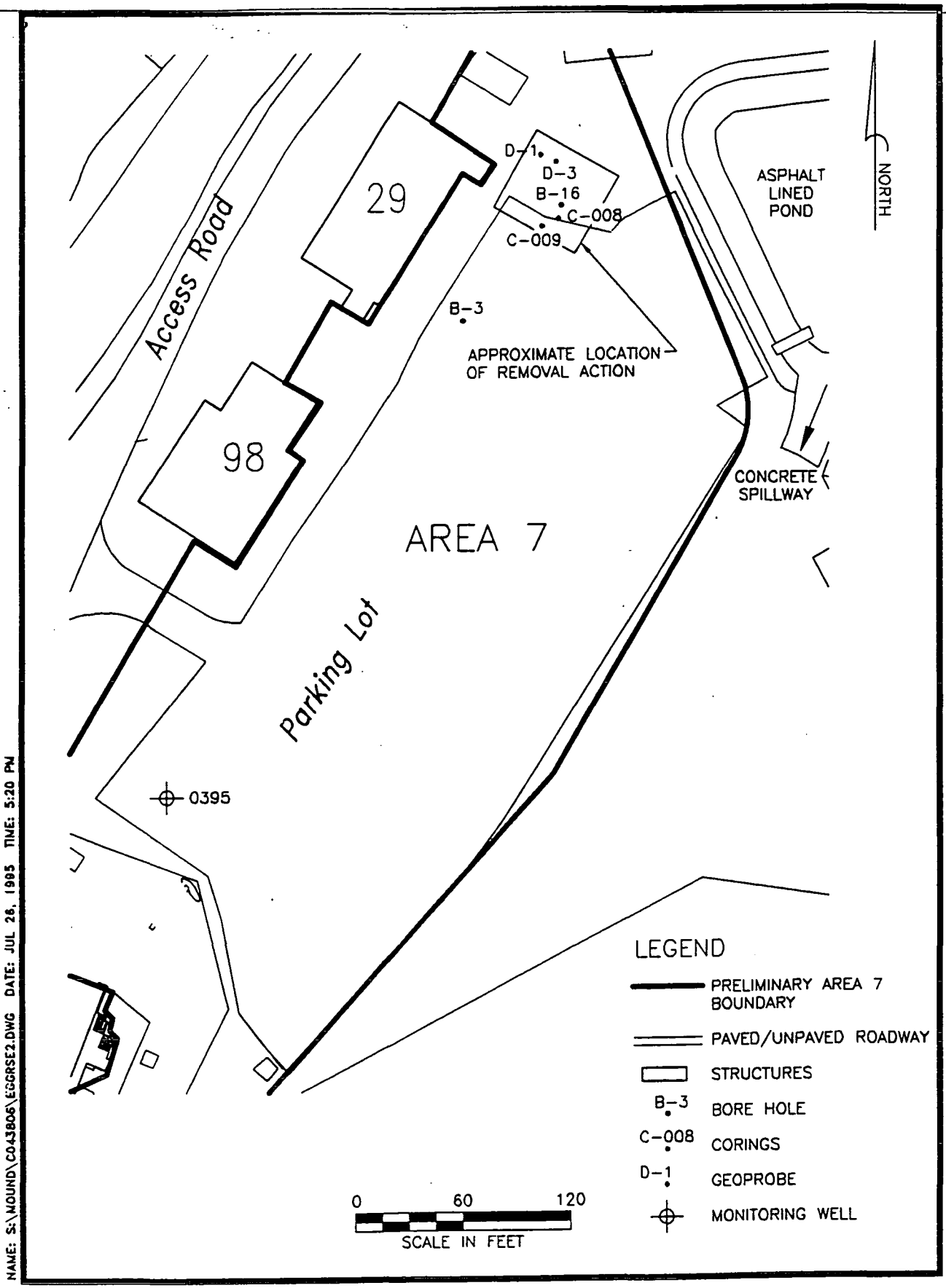


Figure 2.2. Location Map of Area 7

soils is unknown. The exact volume of actinium-227 contaminated soil deposited in Area 7 is not known, although verbal reports estimate that less than five dump truck loads of actinium-227 contaminated soil and gravel from the SW Building were disposed in or around the abandoned septic tank.

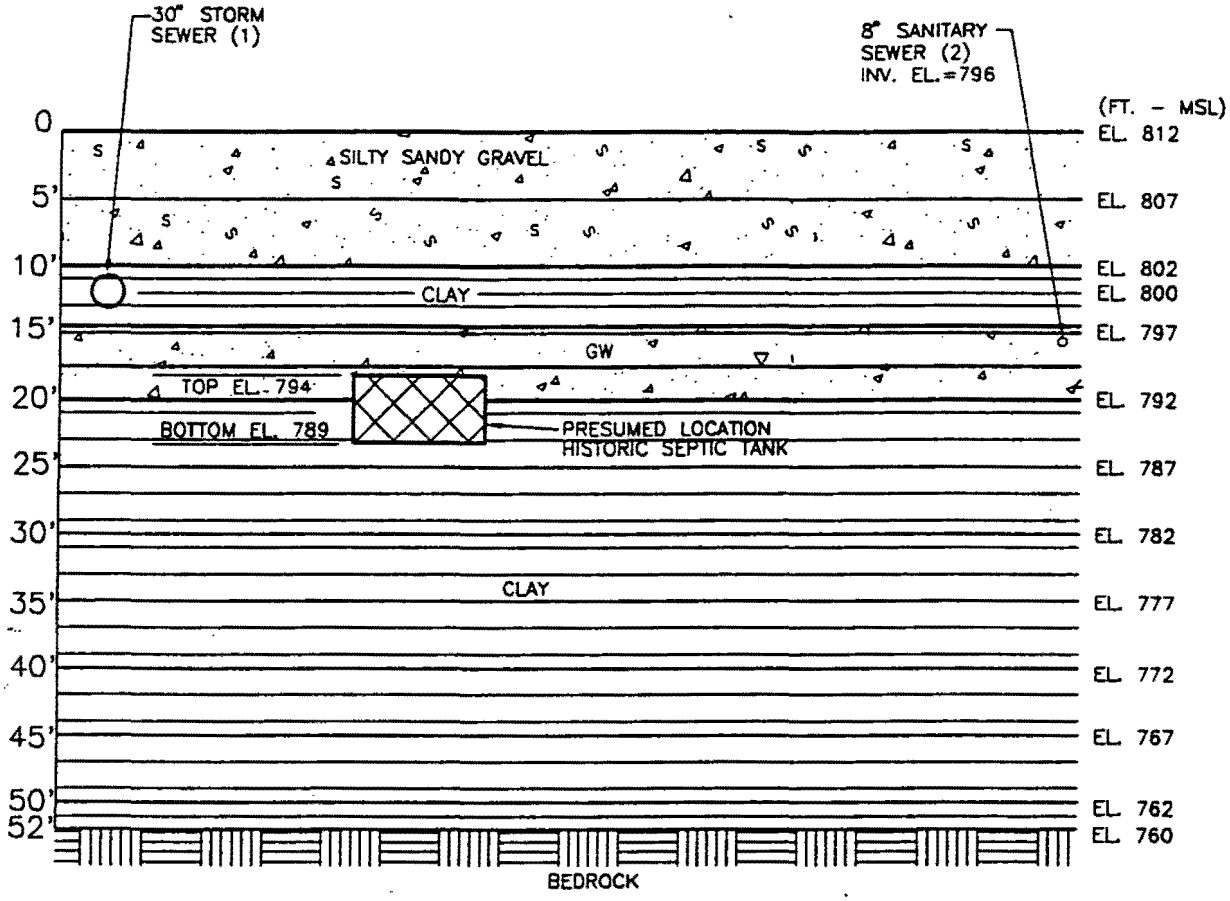
In 1984, the periodic filling of the ravine was completed and the area was leveled for the construction of the current parking lot. The current parking lot elevation is at 812 ft above mean sea level (MSL) in the vicinity of the septic tank. Based on construction drawings, the elevation of the top of the tank appears to have been about five feet below grade in 1947 (794 ft. MSL). The actinium-contaminated soil is expected to extend to the depth of the septic tank. Figure 2.3 is a conceptual illustration of the site stratigraphy that shows the presumed location of the septic tank.

2.1.4. Release or Threatened Release into the Environment

Four borings (C0008, C0009, B-3 and B-16) have been placed near the suspected location for the tank and actinium-227 contaminated soils. Boreholes C0008 and C0009 were drilled as part of the Site Survey Project in 1985 (DOE 1993a). Boreholes B-3 and B-16 were installed in 1994, as part of the OU5 characterization effort. Actinium-227 contamination was detected in soil samples taken from C0008, C0009, and B-16. The maximum actinium-227 concentration in borehole C0008 was 1,400 pCi/g at 12 ft BGS. The maximum concentration in borehole C0009 was 200 pCi/g at 7.5 ft BGS, and the maximum concentration in the more recent borehole B-16 was 45 pCi/g at 15 to 18 ft BGS. Radium-226 was found to a lesser extent in each of the boreholes at a maximum of 2 pCi/g in C0009 (see Table II.2).

In an attempt to further define the locations of the buried septic tank and the source of actinium-227 contamination, Mound conducted a magnetic field survey at Area 7 in May 1995. The magnetic field survey detected the presence of buried objects to the north and west of B16. A series of eleven Geoprobes were installed in this area to collect subsurface information and soil samples. Actinium-227 was detected in two Geoprobe locations (D1 and D3) at depths between 8 ft and 16 ft BGS, with a maximum concentration of 184 pCi/g at D3.

Using the sampling information from the three soil borings and the Geoprobe a conceptual model presented in Figure 2.4 was developed to show the zone of contamination detected in the subsurface.



NOTES:

(1) 30" STORM SEWER CONSTRUCTED OF REINFORCED CONCRETE PIPE (RCP).

(2) 8" SANITARY SEWER CONSTRUCTED OF VITRIFIED CLAY PIPE (VCP).

(3) IDEALIZED STRATIGRAPHY BASED ON B-3 AND B-16 BORING LOGS.

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Figure 2.3. Conceptual Site Stratigraphy

Table II.2. Radiological Results for Area 7 Soil Samples
Page 1 of 2

Location ID	Sample Depth (feet BGS)	Actinium-227 (pCi/g)	Radium-226 (pCi/g)
C0008	1.5	—	0.5
	3.0	—	0.6
	4.5	—	0.7
	6.0	—	0.7
	7.5	—	0.9
	9.0	—	0.5
	10.5	50	1.0
	12.0	1,400	1.0
	13.5	—	0.9
	15.0	—	0.5
	16.5	300	1.0
	18.0	10	0.7
C0009	0.0	—	0.5
	1.5	—	0.7
	3.0	—	2.0
	4.5	—	0.7
	6.0	30.0	0.6
	7.5	200	1.2
	9.0	—	1.5
	10.5	20	0.8
	12.0	—	—
	13.5	—	0.7
	15.0	—	—
	16.5	—	0.8

Table II.2. Radiological Results for Area 7 Soil Samples
Page 2 of 2

Location ID	Sample Depth (feet BGS)	Actinium-227 (pCi/g)	Radium-226 (pCi/g)
B-16	0-2	—	0.83
	10-12	8.9	—
	15-18	44.7	1.29
	20-24	—	0.37
	15-19	—	0.52
	25-28	—	0.71
B-3	15-19	—	0.52
	25-28	—	0.71
D-1	8-12	20	—
	12-16	133	—
D-3	12-16	184	—

— no result given
pCi/g picoCuries per gram
ID identification number
BGS below ground surface

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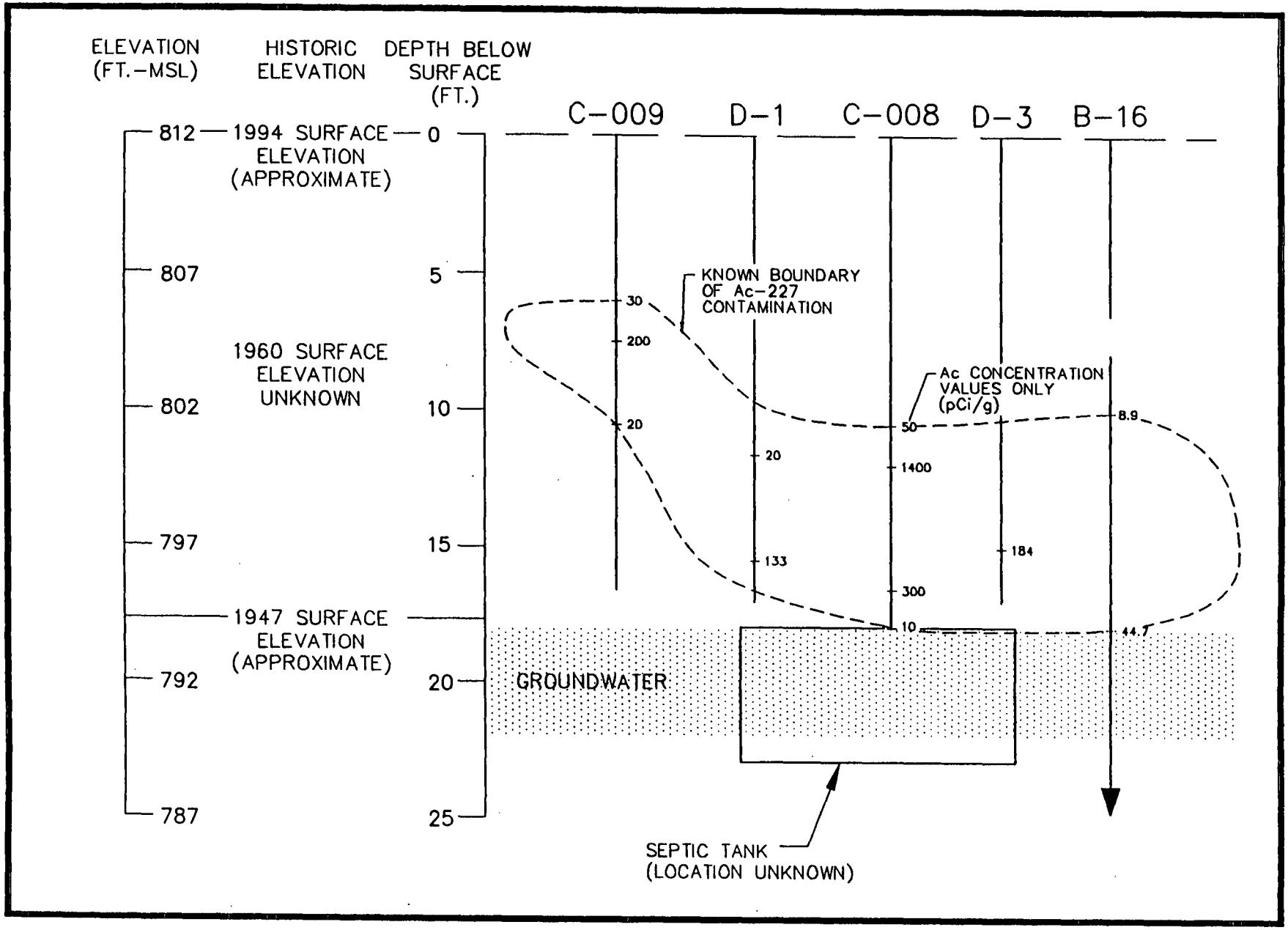


Figure 2.4. Conceptual Model

Thorium-232 which is naturally occurring, was detected in low concentrations in the top seven feet of soil and in the groundwater at B-16. Thorium-232 is ubiquitous to Mound Plant soils and is likely to be present throughout the vertical profile near the abandoned septic tank. Thorium-228 is reported to have been placed in Area 7 with the actinium-227 contaminated soils. Thorium-228 was not reported with sampling results from boreholes C0008 and C0009 but was detected in the soil and groundwater samples at B-16.

The expected depth of the abandoned septic tank, together with the contamination profiles determined from the boreholes indicates that the contaminated soil was placed partially above the top of the tank. Consequently, actinium-227 (and radium-226/thorium-228 to a lesser degree) is expected to be concentrated in a small, contiguous area ranging from 6 to 18 ft BGS in the vicinity of the abandoned septic tank.

No evidence of Resource Conservation and Recovery Act (RCRA) wastes were found in any borings. Further, based on existing information, there is no evidence of RCRA wastes being deposited in the part of Area 7 near the abandoned septic tank. The remaining portions of Area 7 are potentially contaminated with thorium-232, polonium-210, plutonium-238, cesium-137, and tritium according to existing information. Actinium-227 and radium-226 are contaminants unique to the actinium separations processes used in the SW Building and R Building. The abandoned septic tank location is the only reported placement of actinium-227 contaminated soils from the SW Building. No other source of actinium-227 contaminated soil is known in Area 7.

As previously stated, a release into the environment began when the actinium-227 contaminated soils were placed in or around the abandoned septic tank in Area 7 in 1959 and continues through today. In 1993, radium-226 was detected in cuttings from the boring for monitoring well 0395 at 12 and 11 pCi/g at a depth of 60 to 65 ft BGS, and at 11 pCi/g at a depth of 70 to 75 ft BGS. [Note: the geologic log of well 0395 indicates groundwater occurs at 68 ft BGS]. The well is located down gradient of where the contaminated soils from the SW Building were placed in Area 7 (Figure 2.2). The only known source of radium-226 in Area 7 are the soils from the SW Building placed near or around the abandoned septic tank, and it is therefore considered likely that the radium-226 identified in borehole 0395 migrated from the SW Building soils placed in or around the septic tank. Additionally, based on expected distribution of the actinium-227 (and radium-226) contamination between 6 and 18 ft BGS, the contaminated soils are

expected to be partially beneath the recent groundwater level of 17.5 ft BGS, and therefore potentially contributing to a release in groundwater. (See Figure 2.3).

Based on the B-3 and B-16 boring logs the thickness of the groundwater layer ("aquifer") is approximately four feet. The aquifer is assumed to be perched and only a temporal source, from rainfall seeping into more permeable zones. The horizontal extent of the aquifer is expected to be confined; that is, it is not an effectively infinite source. However, it is not known whether this aquifer is connected to well 0395 groundwater. The area of expected actinium contamination (depths of six to 18 ft BGS) may extend into the saturated zone, which is expected to be from 17.5 to 21.5 ft BGS.

2.1.5. National Priorities List Status

The EPA placed the Mound Plant in Miamisburg, Ohio on the NPL by publication in the Federal Register on November 21, 1989.

2.2. OTHER ACTIONS TO DATE

The Mound Plant initiated a CERCLA program in 1989, now guided by the agreement between the DOE, Ohio Environmental Protection Agency (OEPA), and EPA. A Federal Facilities Agreement (FFA) under CERCLA Section 120 was executed between DOE, EPA Region V, and OEPA on October 12, 1990, and was revised on July 15, 1993 (EPA Administrative Docket No. OH 890:008 984). The general purposes of this agreement are to:

- Ensure that the environmental impacts associated with past and present activities at the site are thoroughly investigated and appropriate remedial action taken as necessary to protect the public health, welfare, and the environment;
- Establish a procedural framework and schedule for developing, implementing, maintaining, and monitoring appropriate response actions at the site in accordance with CERCLA, Superfund Amendments and Reauthorization Act (SARA), the NCP, Superfund guidance and policy, and Resource Conservation and Recovery Act (RCRA) guidance and policy; and,
- Facilitate cooperation, exchange of information, and participation of the parties in such actions.

The CERCLA program is assessing and evaluating the current risks, as necessary, for over 325 potential release sites. These potential release sites have been grouped into various OUs.

2.2.1. Previous Actions

In 1985, two core samples (C0008 and C0009) were taken as a part of the Mound Site Survey Project (DOE 1993a). In May, 1994 a ground-penetrating radar survey was performed in an attempt to locate the buried tank (DOE 1994a). In June 1994, boreholes B-3 and B-16 were drilled in Area 7 as a part of the OU5 Operational Area Phase 1 Investigation (SAIC 1995).

2.2.2. Current Actions

Remedial Investigation reporting activities are currently on-going in OU5, some of which include samples from Area 7.

2.3. STATE AND LOCAL AUTHORITIES' ROLES

2.3.1. State and Local Actions to Date

In 1989, as a result of Mound Plant's placement onto the NPL, DOE and the USEPA entered into a FFA which specified the manner in which the Mound CERCLA-based Environmental Restoration (ER) program was to be implemented. In 1994 the FFA was amended to include the OEPA. Under the ER program DOE remains the lead agency.

2.3.2. Potential for Continued State and Local Response

Area 7 is adjacent to Building 29 which is slated for release to commercial (non-DOE) use. Periodic environmental monitoring of Area 7 may be required until final remedial action is implemented for OU5. This monitoring would need to be coordinated with local, state, and federal authorities.

The current plant-wide environmental monitoring program will continue.

3. THREAT TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT

There is currently no EPA cleanup standard for actinium-contaminated soil and no baseline risk assessment has been performed for OU5 Area 7. A risk analysis was conducted for actinium-227 contaminated soil at another location at Mound Plant. For that project, the risk model incorporated a residual radioactive material program (RESRAD) and considered sources, release mechanisms, exposure pathways, and receptors to develop a cleanup goal for actinium-227. Based on the assumptions selected for that project an actinium-227 concentration of 5 pCi/g resulted in a dose of less than 10 millirems (mrem) and a corresponding lifetime cancer risk of 7.5×10^{-5}. Until a risk assessment is performed for OU5 Area 7, this concentration will be used as the actinium-227 cleanup goal for the removal action. The following is a discussion of the potential threat of the source of actinium-227 in the Area 7 subsurface to public health, welfare, or the environment.

3.1. THREATS TO PUBLIC HEALTH OR WELFARE

Concern over the disposal of actinium-227 and radium-226 in and around the septic tank at Area 7 was raised when radium-226 was detected in down gradient well 0395. The presence of radium-226, which is more mobile in soils than actinium-227, suggests that the contaminants may be migrating from the source through the soil with the potential to enter the plant drainage ditch, south of Area 7. The plant drainage ditch is a tributary to a holding pond with a National Pollutant Discharge Elimination System (NPDES) permitted outfall to the Great Miami River. Migration of contamination to the plant drainage ditch creates the potential for exposure to actinium-227 and radium-226.

3.2. THREATS TO THE ENVIRONMENT

As discussed above, actinium-227 and radium-226 contaminated soils were deposited in the former ravine in Area 7. This material has been a source of contamination that has been released to the environment. Subsurface soil and groundwater act as potential pathways for the migration of this contamination to the plant drainage ditch and subsequently to the Great Miami River. No actinium-227 or radium-226 contamination has been detected in the drainage ditch soils or surface waters.

4. ENDANGERMENT DETERMINATION

All AMs must contain an Endangerment Determination (EPA 1990). Actual or threatened releases of pollutants and contaminants from this site, if not addressed by implementing the response action selected in this AM, may present an imminent and substantial endangerment to public health or welfare or the environment. This determination is based on the existing actinium-227 and radium-226 source area located within Area 7 and the potential for the migration of the contamination.

5. PROPOSED ACTION AND ESTIMATED COSTS

5.1. PROPOSED ACTION

The proposed action, in an effort to mitigate source migration, is the removal of actinium-227 contaminated soils in a 20 ft by 20 ft area to a depth of 16 ft BGS, using on-site interim storage and future offsite permanent disposal.

5.1.1. Proposed Action Description

The proposed removal action will include:

- removal of asphalt and concrete from a 60 ft by 50 ft area;
- sloped excavation to six feet BGS;
- excavation of an additional 10 ft BGS in a 20 ft by 20 ft area; and
- backfilling and site restoration.

The excavated soils will be loaded into low specific activity (LSA) boxes, stored in a Mound Plant interim storage location and disposed of based on analytical results and waste characterization. LSA boxes containing soil classified as hazardous waste will be transferred to a hazardous waste disposal facility or transported to a Mound Plant interim hazardous waste storage location to await final disposal. LSA boxes containing soil classified as transuranic (TRU) waste will be re-labelled and transported to a Mound Plant interim storage location awaiting final offsite disposal. Clean soil will be disposed of in the Mound Spoils Disposal Area or other location to be determined.

Groundwater is estimated to be present at a depth of about 17 feet BGS. This removal action is not expected to reach groundwater.

The upper six feet of soil (i.e., the overburden) is believed to be contaminated, at least in part with thorium-232, which is ubiquitous at Mound Plant. However, the upper six feet of soil is not expected to be contaminated with actinium-227. The overburden will be removed by suitable equipment, leaving sidewalls sloped to a stable configuration. Any uncontaminated portion of the overburden soils will be moved to the uncontaminated spoils area. During the excavation of the overburden, contamination will

be monitored. If contamination is encountered at levels requiring interim storage and potential disposal, the contaminated portion of the soil will be handled according to the procedures for the lower horizons (i.e., interim storage, laboratory analysis, offsite disposal).

The soils below the upper six feet are considered potentially contaminated with actinium-227. Each bucket of soil will be scanned using field instrumentation per the Mound Manual MD-80036 and the OU5 Field Sampling Plan (FSP) (DOE 1993b), noting the grid sampling location and field reading of each lift. The sides of the excavation will be vertically shored or laid back to acceptable slopes. Excavation will be by toothless bucket on a suitable excavator. The excavator will load the soils directly into storage/disposal boxes. The boxes will be moved to a temporary staging area within the boundaries of the existing parking lot for sampling and disposition.

The monitoring and excavation will proceed to the expected depth of 16 feet BGS. At this level, the footprint of the excavation is planned to be approximately 20 ft by 20 ft (400 ft^2). Storage/disposal boxes are available in sufficient numbers to accommodate all of the soil between six feet BGS and 16 feet BGS, within the expected area of excavation.

Migration of the contamination from its original disposal configuration is expected to have occurred, both vertically and laterally. Modification of the excavation to enable pursuit of a limited amount of migrated contamination is allowed for in the selected sloping and excavation methods, and in the number of storage/disposal boxes available for this removal action. However, extensive migration of the contamination can only be removed within the available budget, physical constraints of the site (e.g., utilities, buildings), safety considerations, and excavation equipment limitations.

If the abandoned septic tank is encountered either partially or fully intact during the excavation, it will be freed from the surrounding soils by use of the excavator. The contents of the tank, if any, will be sampled, and the soils around the tank will be sampled to determine, to the extent possible, the original placement pattern of the soils from SW building. Any derived understanding of the probable original placement of the contaminated soils will be used in tracing the lateral extent of the soil migration. The contents of the tank, if any, may be characteristic of the soils originally moved from SW building; samples will be taken and archived for more detailed analysis, should that prove valuable. The remains of the tank will be reduced in size and placed in a metal box(es) for sampling and release or offsite disposal. The septic tank is expected to be contaminated.

The excavated area will be backfilled with clean imported soils. The backfilled soils will be compacted to the extent practical and safe. The area will be returned to use as a parking lot.

The excavated soils will be stored in the LSA boxes until offsite disposal can be effected. The storage area will be monitored and maintained on a routine basis.

At the completion of the removal action, it is expected that some residual contamination will remain, but at low concentrations. Soils encountered in the excavation will have been removed to below the detection limit of the field method used for monitoring the excavation. Each bucket of excavated soil will be screened using a FIDLER detector, in accordance with Mound Manual MD-80036 and the OU5 Field Sampling Plan. The FIDLER can be calibrated to read 5,000 to 7,000 counts per minute which correlates to a lower detection limit (LDL) for actinium-227 of approximately 20 pCi/g. For this removal action, however, the FIDLER will not be calibrated for any specific radionuclide. In accordance with the project Radiological Work Permit, if a reading of 500,000 counts per minute or greater is measured by the FIDLER, a soil sample is to be collected for laboratory analysis, for health and safety measures and to document the results of the excavation. A dedicated lab will be established on-site to analyze the soil samples. Using a Germanium crystal detector and a 10 minute count time, the LDL for actinium-227 is between 0.4 pCi/g and 10 pCi/g. Any contaminated soils beyond the feasible limit of the excavation will remain in place until final site remedial actions are completed.

5.1.1.1. Rationale, Technical Feasibility, Effectiveness

The removal action chosen for Area 7 is necessary to remove an area of known contamination and ensure that further migration of the contamination does not occur. The soils placed in or around the abandoned septic tank represent a volume of concentrated contaminants that can serve as a continuing source of migrating contamination. Direct removal of this source is feasible. Depending on the current distribution of the contamination, complete removal of the actinium-227 contamination may not prove possible.

5.1.1.2. Monitoring

Health and safety monitoring will be performed throughout the removal action according to standard Mound procedures. Sampling and analysis of excavated soils is described in more detail in the OU5, Area 7 Removal Action Work Plan (DOE 1994b).

5.1.1.3. Uncertainties

The major uncertainties at the site are the original location of the septic tank and its contents, the original quantity and contamination levels of actinium-227 contaminated soil, and the current nature and extent of actinium-227 contaminated soil. The minor uncertainties include the current location and condition of the septic tank and the nature and extent of groundwater that may be encountered during the removal.

All of the uncertainties are within manageable bounds. Although the major uncertainties impact the total amount of soil that will potentially need to be removed, given the constraints, the contamination that has migrated beyond the defined bounds and objectives of this removal action will be addressed through final remedial actions. These uncertainties therefore do not significantly affect this removal action.

Uncertainties about the current location and condition of the abandoned septic tank are important, but not a hindrance to the removal action. Sufficient indications about the probable location of the septic tank are available to identify the likely area of its location. Absolute location of the contamination source is not a prerequisite to beginning the removal, and the level of uncertainty regarding the location of the contamination is not a hindrance to the removal action.

Uncertainties about the nature and extent of the groundwater will be addressed in the field. Field decisions on dewatering efforts will be made as information is gained, rather than relying on pre-excavation studies. The need for removing water directly from the excavation will be avoided if possible.

5.1.1.4. Institutional Controls

DOE will remain in control of the Area 7 site for the next several years, although portions of the Mound Plant may be released to non-DOE uses. It is expected that residual contamination will remain after the removal action is complete which will be remediated as part of later OU5 Area 7 remedial actions. Until that time, DOE's control of the site will continue to be relied on as an institutional control to limit access and reduce exposure potential for any remaining contaminants.

5.1.1.5. Offsite Disposal

Contaminated materials taken from the excavation will be disposed of offsite at a later time. At that time, all requirements of the disposal site and any other regulations governing the transportation and disposal of the contaminated materials will be met.

EPA's Offsite Policy does not apply to this removal action.

5.1.1.6. Post-Removal Site Control

Post removal site control will be provided by DOE/Mound. See Institutional Controls above.

5.1.1.7. Cross-Media Relationships and Potential Adverse Impacts

The potential cross-media impact associated with the removal action is the potential for unintended release of contaminated materials to the surface of the parking lot and erosion to nearby drainage ditches. Careful monitoring and control will be implemented during the removal action and for the interim storage of the LSA boxes containing the contaminated materials until they are removed from the site for disposal.

No potential adverse impacts of the removal action have been identified.

5.1.2. Contribution to Remedial Performance

No record of decision for Area 7 has been signed and the long-term cleanup of Area 7 has not been decided. The range of feasible alternatives has not been identified for Area 7. Therefore, it is not possible to identify with certainty the interaction of this removal action with the final cleanup of Area 7. However, reduction of the source of actinium-227 contaminated soils should be consistent with any foreseeable final actions.

To facilitate further actions in or near the site of the removal action, the exact dimensions of the excavation and the levels of contamination identified and removed will be documented. Any areas suspected of containing remaining contamination will also be documented. The excavation will be

documented by photographs, record drawings, the OSC report, and other information collected during the removal action to further delineate the limits of the excavation.

This removal action will address the threat of further migration of the actinium-227 contamination placed in or around the abandoned septic tank. Because final actions for Area 7 are not scheduled for several years, removal of the actinium-227 contaminated soils is necessary to keep the final response actions for Area 7 from being more difficult or extensive than necessary.

The removal action will excavate as much of the actinium-227 contamination as feasible. It is expected that a large portion of the contaminated soil can be removed within the constraints described herein. Any remaining contamination is expected to be at lower concentrations than the materials originally placed in Area 7.

5.1.3. Description of Alternative Technologies

Several alternative technologies were identified and screened for their ability to meet specific criteria for the removal action. Criteria used to screen alternatives include timely response, protection of human health and the environment, effectiveness, implementability and cost.

Alternative technologies frequently evaluated for CERCLA remediation include institutional controls, containment, collection, treatment and disposal. Based on the Area 7 conditions, the following alternatives (in addition to the proposed alternative of excavation and disposal) were developed.

1. No Action
2. Institutional Controls
3. Containment
4. Electrical Separation
5. Soil Washing
6. Vitrification

The performance capabilities of each alternative with respect to the specific criteria is discussed below.

5.1.3.1. No Action

The "No Action" approach was eliminated from consideration because the need for action has been demonstrated as necessary based on the responses to the criteria discussed on Section 2.1.1.

5.1.3.2. Institutional Controls

Existing Mound Plant institutional controls effectively minimize the potential for contact of the Area 7 contamination with the general public. Implementation of additional institutional controls to minimize the potential for human contact with the existing contamination will not prevent further migration of the contaminants from the source. Also, institutional controls will be difficult to implement when commercial use of adjacent areas is permitted. Thus, institutional controls were eliminated from further consideration.

5.1.3.3. Containment

The source of actinium-227 contamination is believed to be located under the existing Area 7 parking lot which serves as a contaminant cap. Vertical barriers, such as sheet piles or slurry walls would have to be installed to prevent the horizontal migration of contaminants. A containment system would be effective in protecting human health and the environment. However, since the source is believed to be at least partially located in groundwater, complete vertical containment of the source would be required to prevent groundwater contact with the contaminants. The close proximity of the suspected source with surrounding structures and utilities complicates the implementability of this alternative and, thus, prevents a timely response. For these reasons, the containment alternative was not selected for the removal action.

5.1.3.4. Electrical Separation

Electrical separation is an in-situ process that relies on low intensity direct current through the contaminated soil to promote the removal of contaminants using mass transfer mechanisms of electro-osmosis and ion migration. In-ground electrodes produce positively charged hydrogen ions at the positive electrode (anode) and hydroxyl ions at the negative electrode (cathode). The hydrogen ions form an acid font which extracts organic compounds, heavy metals and radionuclides from the soil structure and initiates a movement to the negative cathode. Soluble compounds accumulate at the cathode and are pumped to a recovery system.

The effectiveness and implementability of the process is impacted by complex mixtures of radionuclides, depth of the waste, and subsurface anomalies which are all characteristic of the project site. Consequently, a bench scale treatability study using site material would be necessary to determine if the technology is a suitable removal alternative. Due to the time-critical nature of this removal action, known anomalies in the Area 7 subsurface, and the need for a treatability study, electrical separation was not considered a viable alternative.

5.1.3.5. Soil Washing

Soil washing is an ex-situ waste minimization technology that has been successfully proven to remove radionuclides and other contaminants from soils. The liquid-based process removes contaminants either by dissolving or suspending them in a wash solution or by concentrating them by particle size distribution techniques.

The effectiveness of the process is highly dependant on soil characteristics. Soil washing is most effective in sand and gravel. Since the zone of contamination is primarily in clay and a saturated gravel layer, the ability of the process to remove contaminants to action levels is questionable. Thus, the washed media may be unsuitable for use as fill material at the site. In this case, all excavated material would have to be disposed as LSA waste which negates any advantage of treatment. Hence, this alternative was eliminated from consideration.

5.1.3.6. Vitrification

In-situ vitrification involves the use of electric current to convert a contaminated media into glass- or rock-like material. Inorganics and radionuclides are immobilized in the residual product. Process equipment is brought to the site on over-the-road trailers. Electrodes are used to raise the subsurface temperatures to a soil melt temperature between 1,600 and 2,000 °C.

Vitrification is a high-energy-demanding process that requires about 800 to 1,000 kilowatts per ton for treatment. It produces air emissions which would be difficult to collect and expensive to treat, making the cost of vitrification significantly higher than that of soil washing. The presence of groundwater reduces implementability of the process. Inorganic debris in the subsurface should be limited to a maximum of 20 percent by volume for vitrification to be effective. The resulting glass- or rock-like

material makes the effectiveness of vitrification difficult to assess and would render portions of Area 7 unsuitable for commercial use. Consequently, vitrification was eliminated from further consideration.

5.1.4. Engineering Evaluation/Cost Analysis (EE/CA)

Because this is a time-critical removal, an EE/CA is not required.

5.1.5. Applicable or Relevant and Appropriate Requirements (ARARs)

Mound OU5 ARARs for the ER Program Remedial Investigation/Feasibility Study (RI/FS) project have been identified (DOE 1993b). CERCLA regulations require that removal actions comply with ARARs only to the extent practicable.

Only those ARARs that relate to the actual removal action and not to long-term remediation, apply to the removal. The following ARARs are federal and state requirements that are considered practicable for this removal action.

5.1.5.1. Air Quality

- 40 C.F.R. Part 61 Subpart H: National Emissions Standards for Emissions of Radionuclides other than Radon from Department of Energy Facilities.
- Ohio Administrative Code (O.A.C.) 3745-15-07(A): Air Pollution Nuisances Prohibited
- O.A.C. 3745-17-02(A,B,C): Particulate Ambient Air Quality Standards
- O.A.C. 3745-17-05: Particulate Non-Degradation Policy
- O.A.C. 3745-17-08 (A)(1), (A)(2), (B), (D): Emission Restrictions for Fugitive Dust

5.1.5.2. Worker Safety

- 29 C.F.R. Part 1910: Occupational Safety and Health Act (OSHA) - General Industry Standards
- 29 C.F.R. Part 1926: OSHA - Safety and Health Standards
- 29 C.F.R. Part 1904: OSHA - Recordkeeping, Reporting, and Related Regulations

5.1.6. Other Standards and Requirements

The following is a list of other standards and requirements applicable to this removal action.

5.1.6.1. Mound Plant Manuals and Procedures

Mound Plant manuals and procedures applicable to this removal action include:

- Quality Policy and Responsibilities (MD-10334)
- Quality Assurance Program for Engineering Dept. (MD-10241)
- Standards and Calibration System (MD-10096)
- Safety and Hygiene Manual (MD-10286)
- Radiological Protection Program Manual (MD-10019)
- D&D Field Coordinator Manual (MD-10167)
- Low-level Waste Management Manual (MD-81240)
- General Procedures for Calibration of Radiation Protection Instrumentation (MD-10215)
- Waste Certification Program Plan (MD-81020)
- D&D Decontamination Procedures (MD-10332)
- Form ML-7588 Engineering Review Transmittal Sheet
- Form ML-8440 Project Quality Assurance Review
- Form ML-8816 Engineering Department Non Conformance Report
- Health Physics Procedures (MD-80036)
- Work Package Development Manual, Decontamination and Decommissioning - Mound, 1992

- Quality Assurance Plan for Decontamination and Decommissioning Project Management (MD-10241)
- Debris Disposal (WS12)
- Environmental Restoration Procedures (OU9 RI/FS QAPjP)

5.1.6.2. DOE Orders/Criteria

The following list of DOE Orders and criteria are applicable to this removal action:

- Radiation Protection for the Public and the Environment (5400.5)
- Radioactive Waste Management (5820.2A)
- Project Management System (4700.1)
- Radiation Protection for Workers (5480.11)

5.1.7. Project Schedule

The schedule established for planning and implementing the removal action is shown in Figure 5.1.

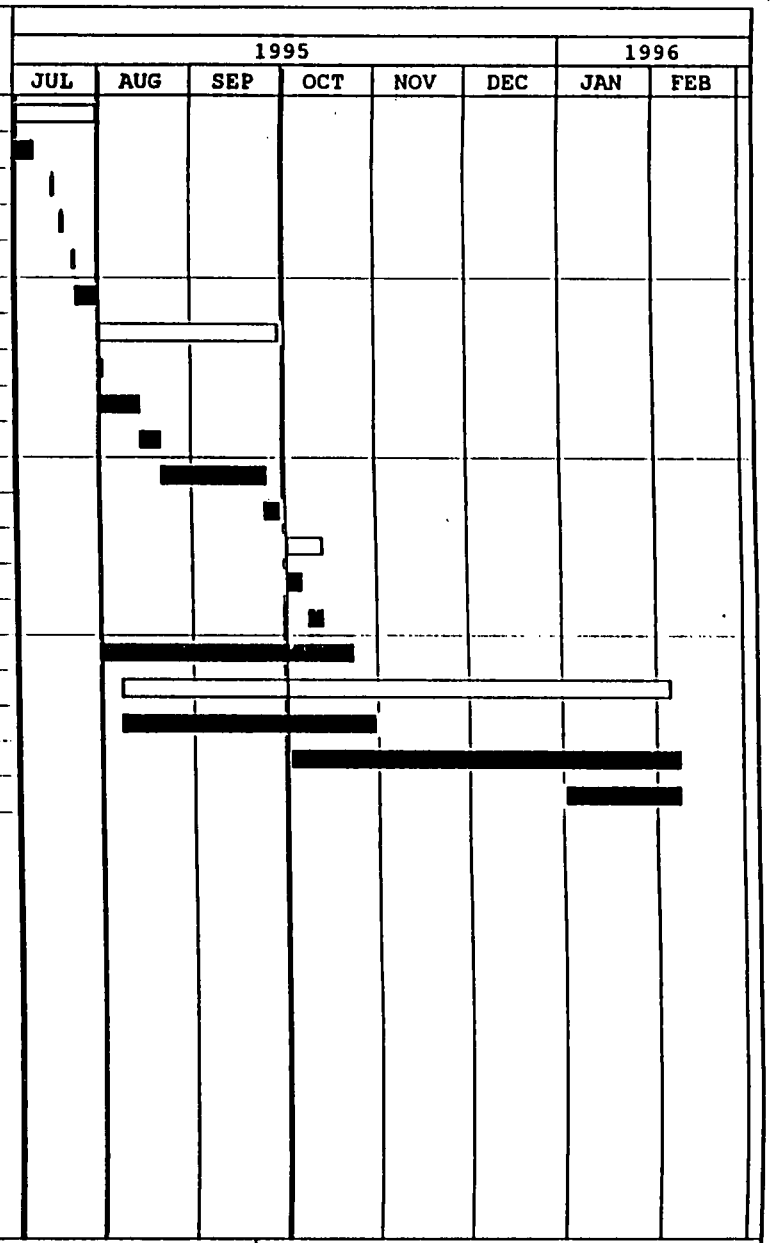
5.2. ESTIMATED COSTS

The cost estimate to perform the removal action is shown in Table V.I. Costs include the construction activities, all engineering and construction management, waste disposal, and site restoration. A detailed breakdown of the estimated removal action costs are presented in the OU5 Area 7 Removal Action Work Plan (DOE 1995 - Future).

Table V.1. Removal Action Cost Estimate

Activity	Cost ($x1000)
Engineering/Project Management	350
Excavation/Site Closure	555
Waste Transportation/Disposal	295
Total	1,200

ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH	WORK DAYS
SITE PREPARATION	5JUL95	31JUL95	19
Set Up Field Equipment, Trailer	5JUL95	10JUL95	4
Survey Utilities	17JUL95	17JUL95	1
Mark Grid	20JUL95	20JUL95	1
Set Up Work Zones	24JUL95	24JUL95	1
Set Up Temporary Storage Area	25JUL95	31JUL95	5
REMOVAL ACTION EXCAVATION	1AUG95	29SEP95	44
Remove Asphalt	1AUG95	2AUG95	2
Excavate Top 6 Feet	1AUG95	14AUG95	11
Install Dig-Face System	15AUG95	21AUG95	5
Excavate From 6 to 16 Feet	22AUG95	25SEP95	25
Remove Dig-Face System	25SEP95	29SEP95	5
SITE CLOSURE	2OCT95	13OCT95	10
Backfill Excavation	2OCT95	6OCT95	5
Demobilization	9OCT95	13OCT95	5
TEMPORARY STORAGE	1AUG95	23OCT95	60
WASTE MANAGEMENT / DISPOSAL	8AUG95	5FEB96	130
Transfer to Mound Interim Storage	8AUG95	30OCT95	60
Disposal at Envirocare	3OCT95	8FEB96	93
OSC REPORT	2JAN96	8FEB96	28



Plot Date 24JUL95
Data Date 5JUL95
Project Start 5JUL95
Project Finish *******

(c) Primavera Systems, Inc.

Summary Activity
Activity Bar

USA?

Sheet 1 of 1

Mound OU5 Area 7 Removal Action

Date	Revision	Checked	Approved

Figure 5.1. Area 7 Removal Action Schedule

6. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

The contamination in Area 7 poses a potential threat to public health and welfare and the environment because:

- the actinium-227 contamination has spread to surrounding soils;
- the actinium-227 contamination potentially threatens groundwater; and
- the source of the actinium-227 contamination (septic tank) has uncertainty associated with it regarding location, physical condition and quantity of contaminated soil.

If no action is taken to remove the contaminated soils, further migration of actinium-227 into surrounding soils and potential migration into groundwater is likely.

7. OUTSTANDING POLICY ISSUES

There are currently no outstanding policy issues affecting performance of this removal action.

8. ENFORCEMENT

The DOE is the sole party responsible for the cleanup of contaminated soils in OU5, Area 7. Therefore, DOE is undertaking the role of lead agency, per the FFA, for the performance of this removal action. The funding for this removal action will be through DOE budget authorization and no Superfund monies will be required.

9. RECOMMENDATION

This decision document represents the selected removal action for the Mound OU5, Area 7 Actinium-Contaminated Soils site in Miamisburg, Ohio, developed in accordance with CERCLA as amended by SARA, and consistent with the NCP. This decision is based on the administrative record for the site.

Conditions at the site meet the NCP Section 300.415 (b)(2) criteria for a removal and I recommend initiation of the response actions.

Approved:

_____ _____

Arthur Kleinrath, DOE/MB, On-Scene Coordinator Date

Disapproved:

_____ _____

Arthur Kleinrath, DOE/MB, On-Scene Coordinator Date

10. REFERENCES

U.S. EPA. 1990. Superfund Removal Procedures Action Memorandum Guidance. Office of Emergency and Remedial Response. U.S. Environmental Protection Agency. December 1990.

DOE. 1993a. "OU9, Site Scoping Report, Volume 3 - Radiological Site Survey" U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, NM. FINAL. June 1993.

DOE. 1993b. "OU5 South Property Remedial Investigation/Feasibility Study Work Plan" prepared for EG&G Mound Applied Technologies and the U.S. Department of Energy. December 1993.

DOE. 1994a. "Removal Action Reconnaissance Report, Ground Penetrating Radar Survey for Area 7 Buried Septic Tank [DRAFT]" prepared for EG&G Mound Applied Technologies and the U.S. Department of Energy. May 1994.

DOE. 1994b. "Actinium-Contaminated Soil Removal Action Work Plan, Operable Unit 5, Area 7." U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, NM. FINAL. October, 1994.

SAIC. 1995. "Operable Unit 5, Operational Area Phase 1 Investigation, Area 7 Field Report," Working Draft, prepared for EG&G Mound Applied Technologies, Miamisburg, OH. December, 1994.