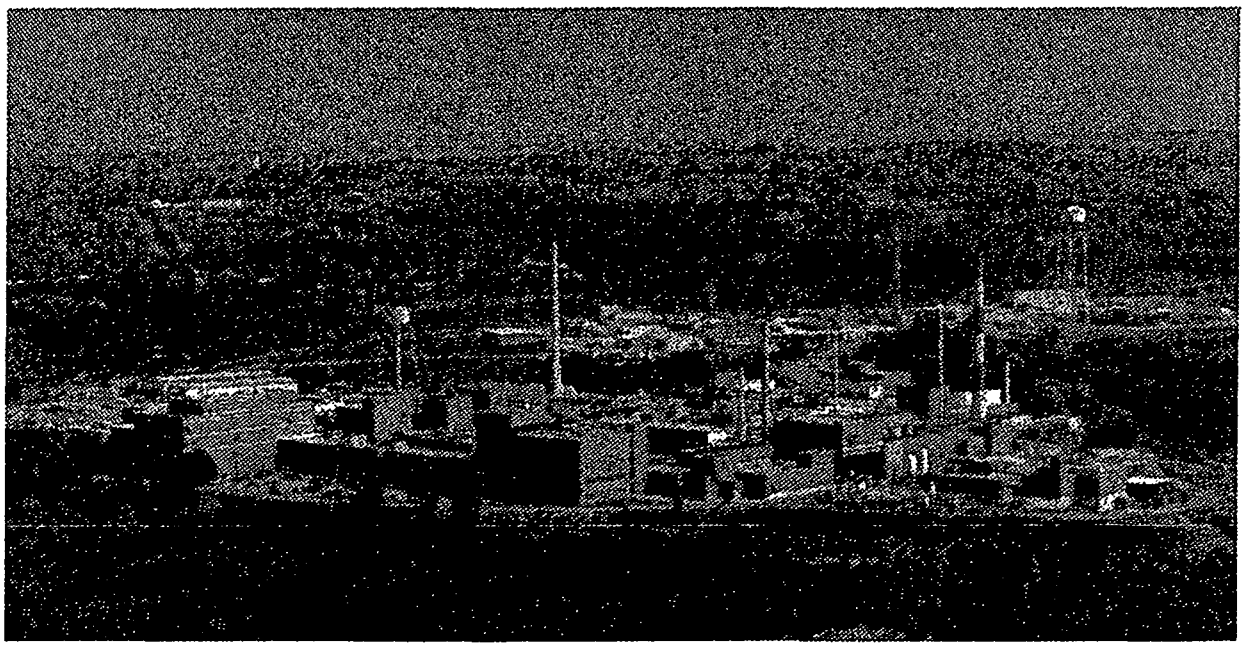
EG&G MOUND-30-03-04-02--9610170017

MOUND

Environmental
Restoration
Program

MOUND PLANT
Potential Release Site Package
PRS # 246

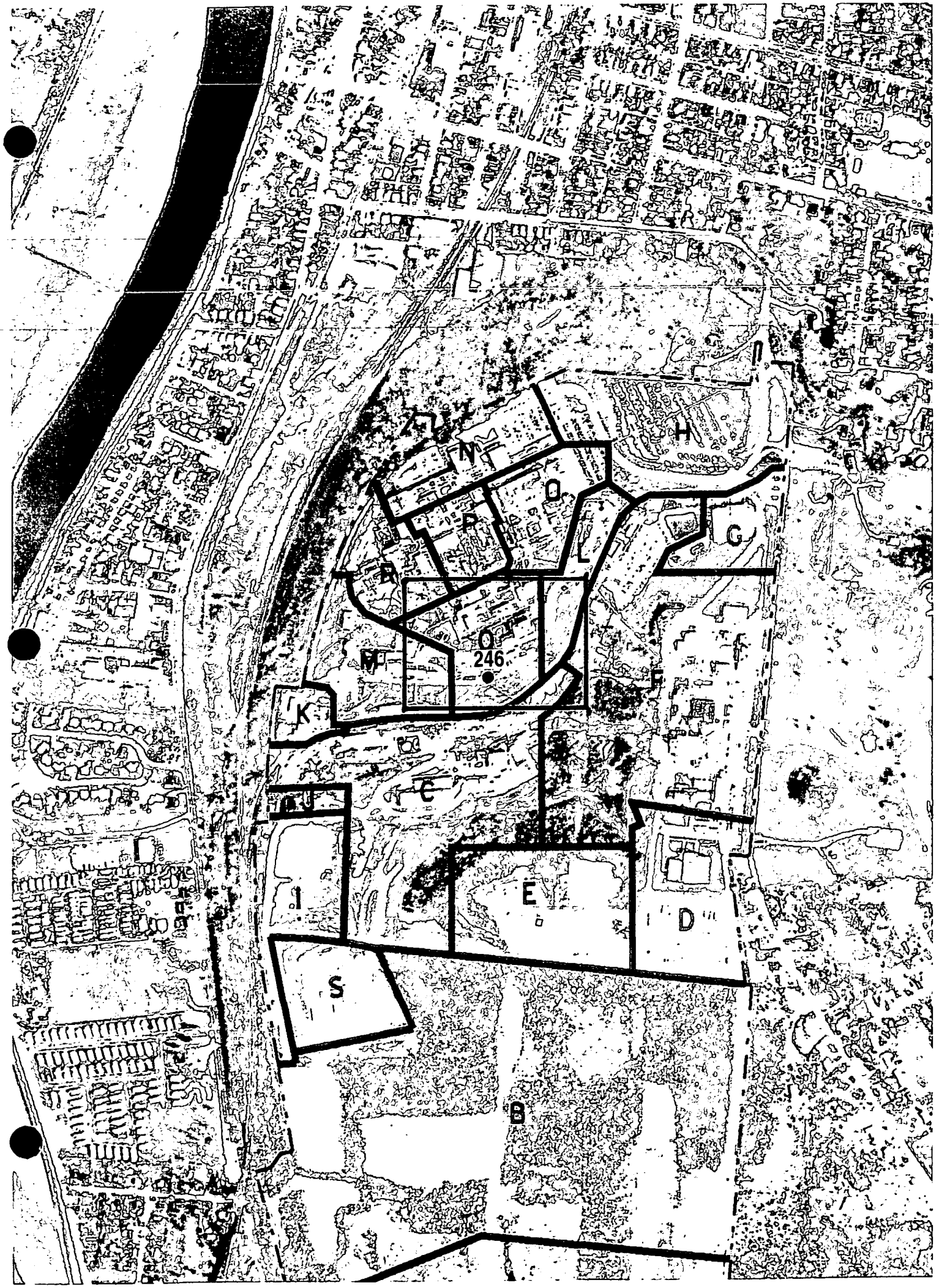


MOUND PLANT

Release Block Q

Potential Release Site

PRS 246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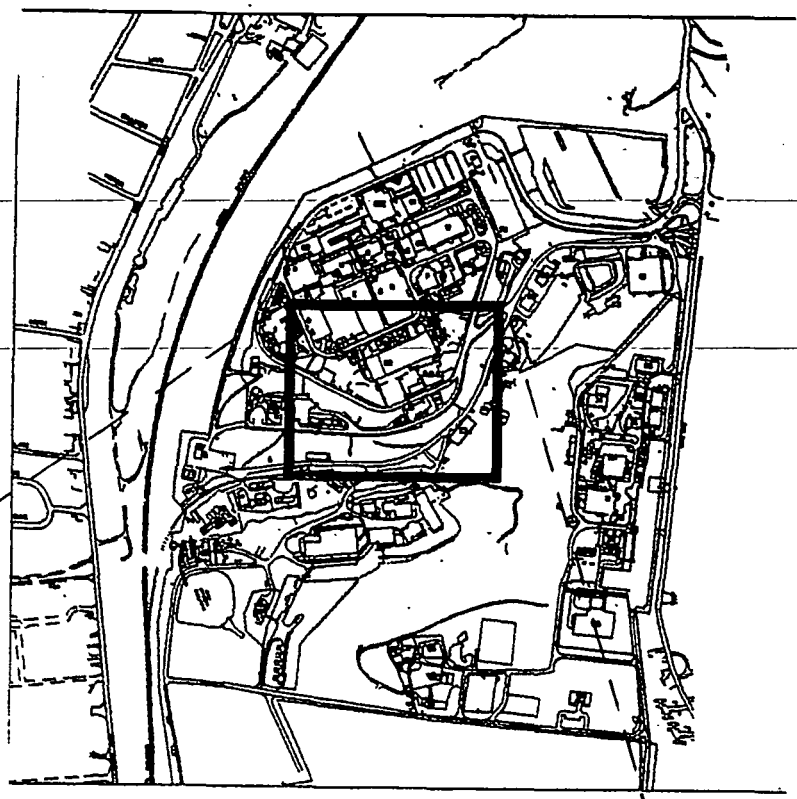
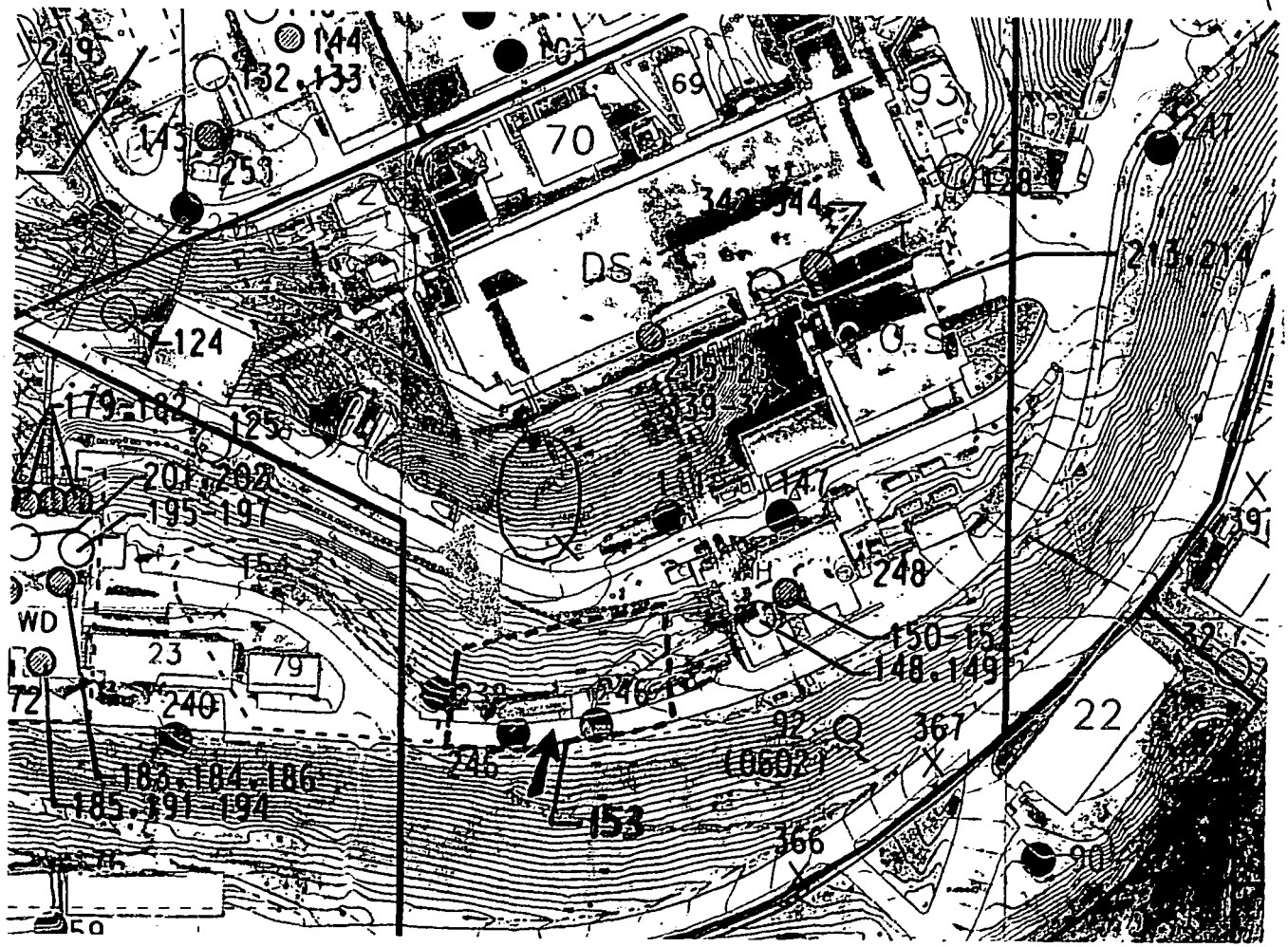
MOUND PLANT

Release Block Q

Potential Release Site

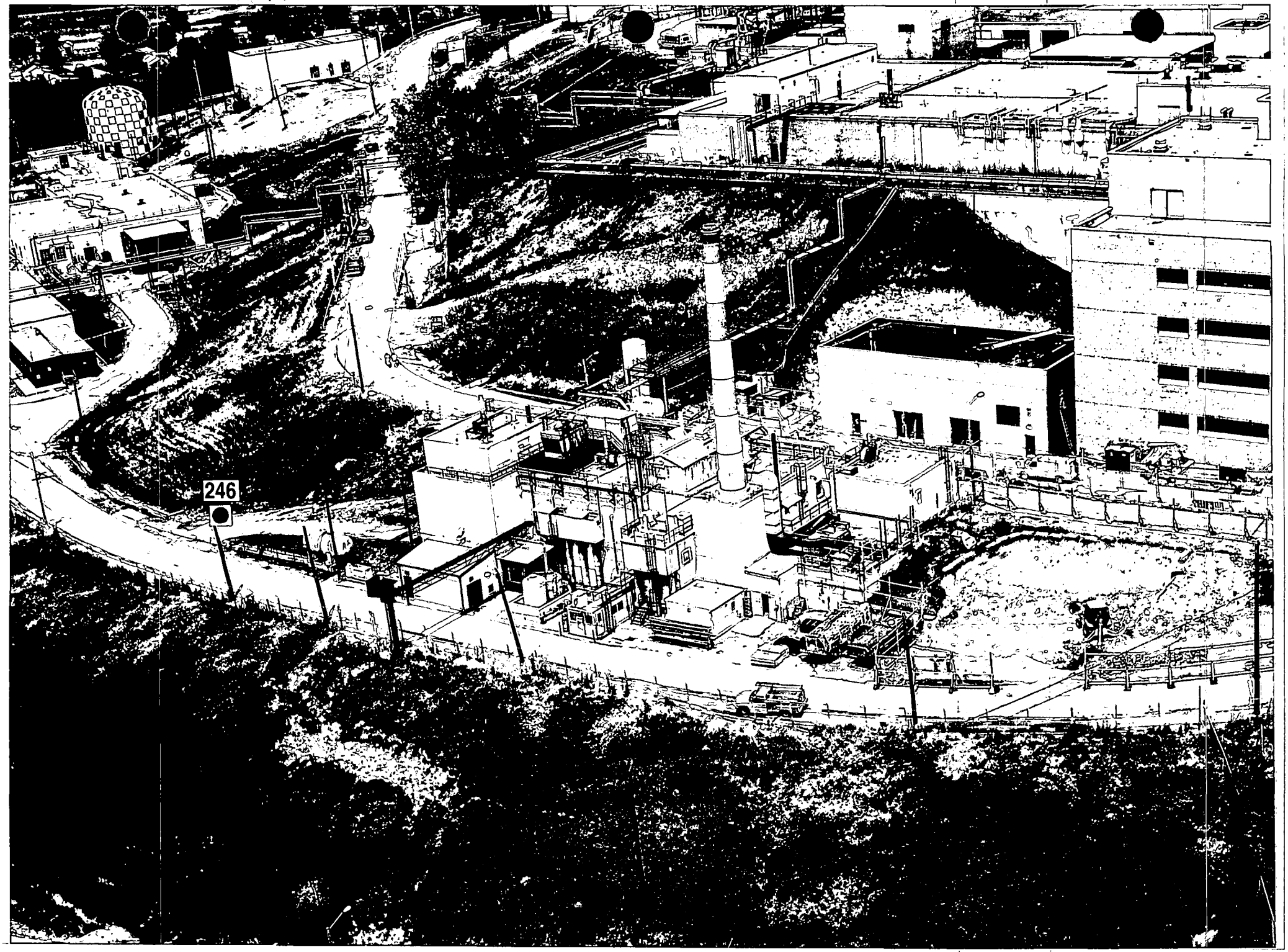
PRS 246





REV O AUG 2 2 1996

REV O OCT 0 7 1996


246

PRS 246

PRS HISTORY:

Potential Release Site (PRS) 246 is due to the results of the Soil Gas Survey.[1,2] The PRS is in the roadway south of HH Building and approximately midway between the HH and WD buildings. HH Building has been used for general purposes, including radioactive processing (various radionuclides), and isotope separation. Numerous inorganic chemicals have been associated with those activities. WD Building has been used to separate alpha and beta radioactive materials from waste waters. Waste sludges have been composed of both inorganic and organic chemicals, and processing includes bulk use of a variety of inorganic chemical salts and acids.

CONTAMINATION:

I. Investigation:

The Soil Gas Survey[2] detected TCE and PCE, both at levels less than calculated acceptable soil gas readings.

The Radiological Survey[3] detected plutonium and thorium below guideline values and cesium-137 above the guideline value.

II. Potential Contamination:

Contaminant	Maximum Concentration (Detected or Calculated*)	Guideline Criteria
Trichloroethene (TCE)	9 ppb	2400 ppb[4]
Tetrachloroethene (PCE)	15 ppb	3100 ppb[4]
Plutonium (Pu-238)	1.9 pCi/g	25 pCi/g (Mound ALARA)
Thorium	4.02 pCi/g	5 pCi/g[5]
Cesium (Cs-137)	1.0 pCi/g	0.46 pCi/g

READING ROOM REFERENCES:

1) Operable Unit 9 Site Scoping Report: Volume 12-Site Scoping Report, December 1994. (pages 5-6)
2) Soil Gas Survey and Geophysical Investigations Main Hill and SM/PP Hill Areas Reconnaissance Sampling, February 1993. (pages 7-10)
3) Operable Unit 9 Site Scoping Report: Volume 3 - Radiological Site Survey, June 1993. (pages 11-17)

OTHER REFERENCES:

4) Comparison of Actual Soil Gas Values with Calculated Acceptable Soil Gas Values. (pages 18-20)
5) Code of Federal Regulations, 40 CFR192.12 and 40 CFR192.41.

PREPARED BY:

Dean A. Buckner, Member of EG&G Technical Staff

MOUND PLANT
PRS 246
SOIL CONTAMINATED AREA
BY HH & WD BUILDINGS

RECOMMENDATION:

Potential Release Site (PRS) 246 was designated as a PRS due to the detection of trichloroethene (TCE) and tetrachloroethene (PCE) during the 1993 Soil Gas Survey.

Levels of the soil gas contaminants were less than calculated acceptable guideline criteria of 2400 parts per billion (ppb) for TCE and 3100 ppb for PCE. Plutonium was detected below the ALARA limit of 25 pCi/g and thorium was detected below the accepted regulatory limit of 5 pCi/g (surface) and 15 pCi/g (at depth). One sample, out of 49 samples, detected Cesium-137 at the $2x10^{-6}$ risk level. The other 48 sample results were below the 10^{-6} Risk Based Guideline Values.

Therefore, PRS 246 requires NO FURTHER ASSESSMENT.

CONCURRENCE:

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

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

OEPA: _____ 10/3/96
Brian K. Nickel, Project Manager (date)

SUMMARY OF COMMENTS AND RESPONSES:

Comment period from _____ to _____

☐ No comments were received during the comment period.

☐ Comment responses can be found on page _____ of this package.

REFERENCE MATERIAL
PRS 246

Document Control No. _____

Environmental Restoration Program

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

MOUND PLANT
MIAMISBURG, OHIO

December 1994

Final

U.S. Department of Energy
Ohio Field Office

EG&G Mound Applied Technologies

Table A.1. Comprehensive Tabulation of Potential Release Sites

Description of History and Nature of Waste Handling						Hazardous Conditions and Incidents			Environmental Data		
No.	Site Name	Location	Status	Potential Hazardous Substances	Ref	Releases	Media	Ref	Analytes[a]	Results	Ref
241	Northwest Parking Lots	D-7	Grounds	Toluene, Freon-113, Trichloroethene	12	Indicated by Soil Gas Survey	S	12	1	SGS[b] Table B.4 Locations 1002, 1007, 1008, 1009, 1010, 1014, 1101, 1102, 1106, 1109, 1110	12
242	VOC Potential Hot Spot Location 1016	D-7	Grounds	Toluene, Trichloroethene	12				1	SGS[b] Table B.4	12
243	VOC Potential Hot Spot Location 1064	E-7	Grounds	Toluene	12						
244	VOC Potential Hot Spot Locations 1076, 1077, 1079, and 1080	E-6	Grounds	Toluene, Freon-113, 1,1,1-Trichloroethane	12						
245	VOC Potential Hot Spot Location 1085	F-6	Grounds	Freon-113, Trichloroethene, 1,1,1-Trichloroethane	12						
246	VOC Potential Hot Spot Locations 1117 and 1118	G-7	Grounds	Tetrachloroethene	12						
247	VOC Potential Hot Spot Location 1129	F-8	Grounds	Freon-113, Trichloroethene, 1,1,1-Trichloroethane, Tetrachloroethene	12	Indicated by soil gas survey	S	12	1	SGS[b] Table B.4	12
248	HH Building Stack	F-7	In service	Polonium-210, Tritium	4, 18	None suspected beyond routine emissions	A	4, 18	Emissions reported in Annual Environmental Monitoring Reports		18
249	SW Building Stack (NCPDF)	E-6	In service	Tritium	4, 18						
250	SW Building Stack (SW1C)	E-6	In service	Uranium-238	4, 18						
	W Building Stack (HEFS)	E-6	In service	Tritium	4, 18						
	B Building Stack	E-6	Inactive	Polonium-210, Tritium	4, 18						
	T Building WEST Stack	F-6	In service	Tritium, Plutonium-238 -239, Uranium-238	4, 18						
	T Building EAST Stack	E-7	In service	Tritium, Plutonium-238, Uranium-238	4, 18						
	/D Building Stack (ALR)	F-6	In service	Plutonium-238	4, 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 "Phase I Installation Assessment Mound (DRAFT)."
2. DOE 1992a "Remedial Investigation/Feasibility Study, Operable Unit 9, Site-Wide Work Plan (Final)."
3. DOE 1992c "Mound Plant Underground Storage Tank Program Plan & Regulatory Status Review (Final)."
4. DOE 1993a "Site Scoping Report: Volume 7 - Waste Management (Final)."
5. EPA 1988a "Preliminary Review/Visual Site Inspection for RCRA Facility Assessment of Mound Plant."
6. DOE 1993d "Operable Unit 9, Site Scoping Report: Volume 3 - Radiological Site Survey (Final)."
7. DOE 1993c "Operable Unit 3, Miscellaneous Sites Limited Field Investigation Report."
8. DOE 1992d "Reconnaissance Sampling Report Decontamination & Decommissioning Areas, OU6, (Final)."
9. Fentiman 1990 "Characterization of Mound's Hazardous, Radioactive and Mixed Wastes."
10. DOE 1992f "Operable Unit 9, Site Scoping Report: Volume 11 - Spills and Response Actions (Final)."
11. Styron and Meyer 1981 "Potable Water Standards Project: Final Report."
12. DOE 1993b "Reconnaissance Sampling Report - Soil Gas Survey & Geophysical Investigations, Mound Plant Main Hill and SM/PP Hill (Final)."
13. DOE 1993d "Operable Unit 9, Site Scoping Report: Volume 3 - Radiological Site Survey (Final)."
14. DOE 1991b "Main Hill Seeps, Operable Unit 2, On-Scene Coordinator Report for CERCLA Section 104 Remedial Action, West Powerhouse PCB Site."
15. Halford 1990 "Results of South Pond Sampling."
16. DOE 1993e "Operable Unit 4, Special Canal Sampling Report, Miami Erie Canal."
17. DOE 1990 "Preliminary Results of Reconnaissance Magnetic Survey of Mound Plant Areas 2, 6, 7, and C."
18. DOE 1992a "Remedial Investigation/Feasibility Study, Operable Unit 9, Site-Wide Work Plan (Final)."
19. Rogers 1975 "Mound Laboratory Environmental Plutonium Study, 1974."
20. DOE 1992h "Ground Water and Seep Water Quality Data Report Through First Quarter, FY92."
21. Dames and Moore 1976 a, b "Potable Water Standards Project Mound Laboratory" and "Evaluation of the Buried Valley Aquifer Adjacent to Mound Laboratory."
22. DOE 1992I "Closure Report, Building 34 - Aviation Fuel Storage Tank."
23. DOE 1992J "Closure Report, Building 51 - Waste Storage Tank."
24. DOE 1994 "Operable Unit 1, Remedial Investigation Report."
25. EG&G 1994 "Active Underground Storage Tank Plan."

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ENVIRONMENTAL RESTORATION PROGRAM

SOIL GAS SURVEY AND GEOPHYSICAL INVESTIGATIONS MAIN HILL AND SM/PP HILL AREAS RECONNAISSANCE SAMPLING

MOUND PLANT
MIAMISBURG, OHIO

February 1993

DEPARTMENT OF ENERGY
ALBUQUERQUE OFFICE

ENVIRONMENTAL RESTORATION PROGRAM
EG&G MOUND APPLIED TECHNOLOGIES

TABLE II.4. SUMMARY OF POSITIVE DETECTIONS – MAIN HILL
(ppb)

SAMPLE ID	SAMPLE DATE	FREON 11	FREON 113	TRAN-12DCE	CIS-12DCE	111TCA	PCE	TCE	TOLUENE
MND-01-1113-0005	17 AUG 92	---	---	---	---	---	---	11	---
MND-01-1114-0005	17 AUG 92	---	9	---	---	315	10	357	5 *
MND-01-1114-1005	17 AUG 92	---	---	---	---	259	9	263	3 *
MND-01-1115-0005	17 AUG 92	---	---	---	---	56	---	13	---
MND-01-1117-0005	18 AUG 92	---	---	---	---	---	12	8	---
MND-01-1117-1005	18 AUG 92	---	---	---	---	---	15	9	---
MND-01-1118-0005	18 AUG 92	---	---	---	---	---	3	---	---
MND-01-1119-0005	18 AUG 92	---	---	---	---	---	---	---	213
MND-01-1122-0005	18 AUG 92	801	13	---	---	---	---	---	---
MND-01-1123-0005	18 AUG 92	---	---	---	---	---	---	---	5 *
MND-01-1124-0005	18 AUG 92	---	---	---	---	---	---	---	8884 *
MND-01-1127-0005	18 AUG 92	---	---	---	---	---	4	---	27 *
MND-01-1129-0005	18 AUG 92	---	10	---	---	37	12	4	11 *
MND-01-1190-0005	24 SEP 92	240	477	---	---	---	---	---	5 *
MND-01-1190-1005	24 SEP 92	287	707	---	---	---	---	---	3 *
MND-01-1192-0005	24 SEP 92	---	---	---	---	---	---	---	5 *
MND-01-1193-0005	24 SEP 92	---	---	---	---	---	---	---	16 *
MND-01-1196-0005	25 SEP 92	---	---	---	---	---	---	4	64
MND-01-1197-0002	25 SEP 92	---	---	---	---	---	---	23	5
MND-01-1198-0006	25 SEP 92	---	24	13	518	33	---	474	5
MND-01-1199-0002	25 SEP 92	---	10218	---	120	---	---	479	---
MND-01-1201-0007	25 SEP 92	---	4716	13	811	---	---	130	48
MND-01-1201-1007	25 SEP 92	---	5895	---	612	---	---	117	43
MND-01-1202-0002	25 SEP 92	---	6419	66	2499	9	---	1921	3
MND-01-1202-1002	25 SEP 92	---	9301	41	1706	---	---	1737	---
MND-01-1203-0002	25 SEP 92	---	1475	---	334	---	---	45	192
MND-01-1204-0005	25 SEP 92	---	453	---	---	---	---	11	5
MND-01-1205-0005	25 SEP 92	---	---	---	---	---	---	---	21
MND-01-1206-0005	26 SEP 92	---	---	---	---	---	---	---	23142
MND-01-1207-0005	26 SEP 92	---	---	---	---	---	---	---	90
MND-01-1227-0005	28 SEP 92	---	10	---	---	---	---	---	4700
MND-01-1228-0005	28 SEP 92	---	---	---	---	---	---	---	11
MND-01-1230-0005	28 SEP 92	---	---	---	---	---	---	---	13
MND-01-1230-1005	28 SEP 92	---	---	---	---	---	---	---	5
MND-01-1231-0005	28 SEP 92	---	48	---	---	---	34	21	5
MND-01-1232-0005	28 SEP 92	---	4	---	---	---	13	8	24
MND-01-1233-0002	29 SEP 92	---	29	---	---	---	---	---	72
MND-01-1233-1002	29 SEP 92	---	29	---	---	---	---	---	64

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.
**: Freon 113 & TCE Off-Scale

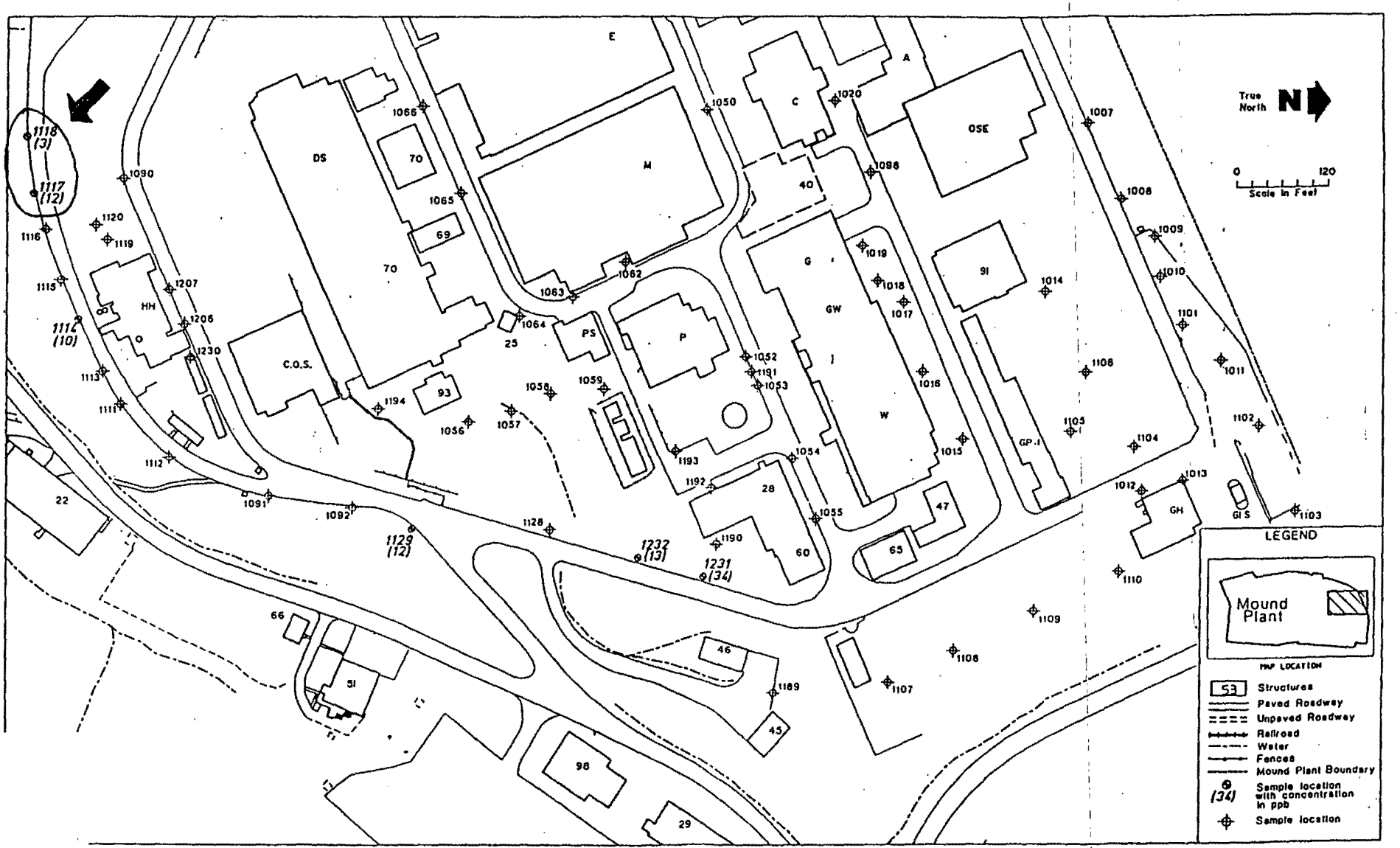

Figure 2.16. Tetrachloroethene detection map for Main Hill East.

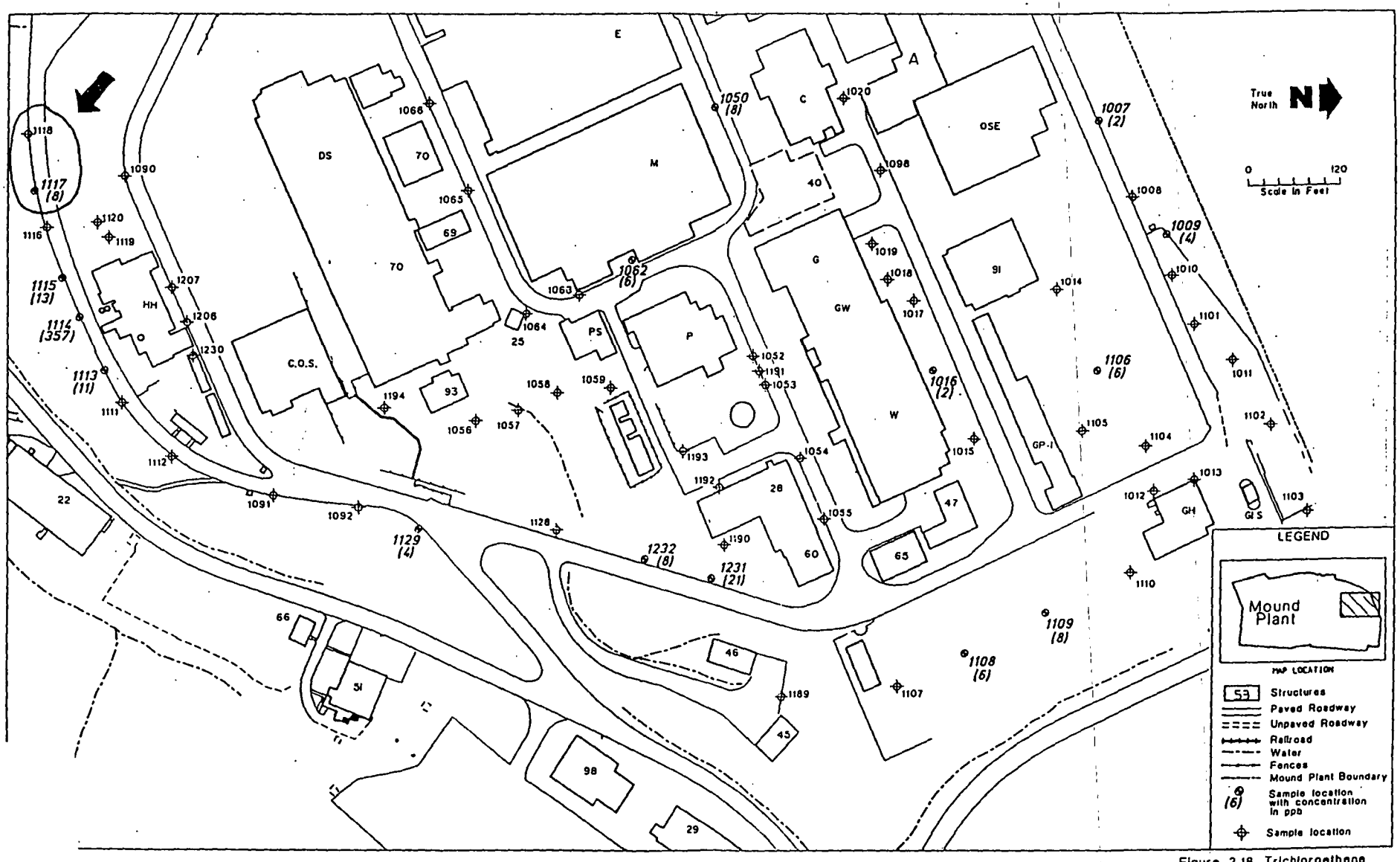

Figure 2.18. Trichloroethene detection map for Main Hill East.

ENVIRONMENTAL RESTORATION PROGRAM

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

MOUND PLANT
MIAMISBURG, OHIO

June 1993

DEPARTMENT OF ENERGY
ALBUQUERQUE FIELD OFFICE

ENVIRONMENTAL RESTORATION PROGRAM
EG&G MOUND APPLIED TECHNOLOGIES

FINAL

1494500 1495000

WESTON
MANAGERS DESIGNERS/CONSULTANTS

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SUITE 1000
ALBUQUERQUE, NM 87108
PHONE: (505) 255-1445

ER PROGRAM

MOUND PLANT

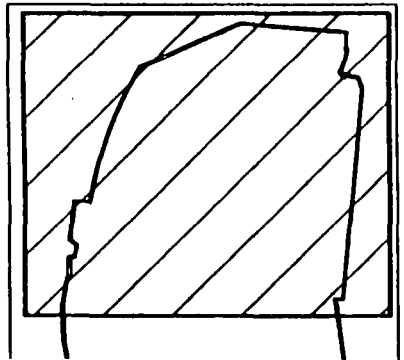
Miamisburg, Ohio

PLATE 1
(1 of 2)

Site Survey Project
Site Survey Project Sampling Locations

Prepared for

Site Scoping Report: Volume 3, Radiological Site Survey



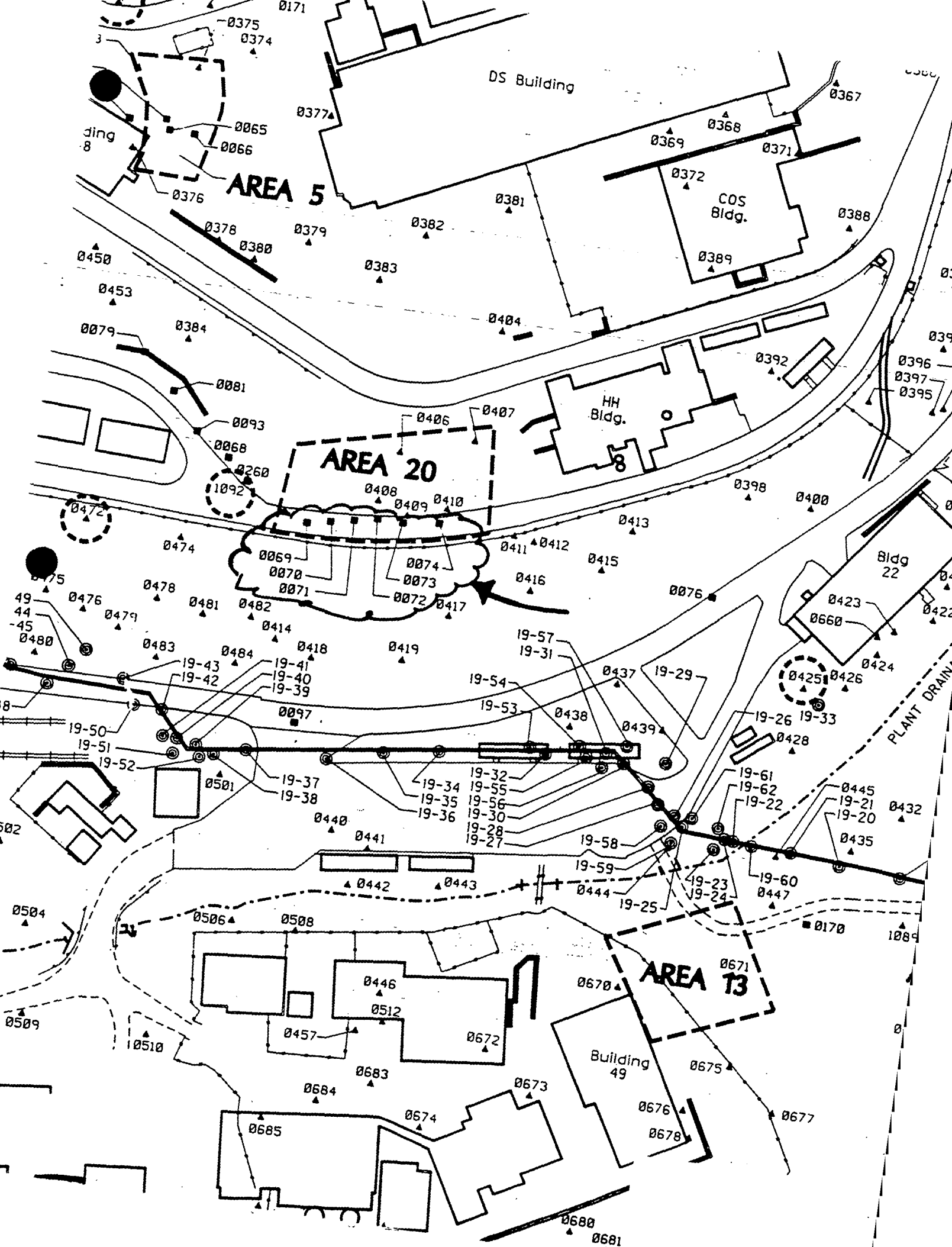
0015 Surface Location

0002 Core Location

Potential Release Site

Elevated Activity

19-17 Sampling Location for Verification Survey of Former WTS Pipeline


AREA 5
AREA 20
AREA 13
DS Building
COS Bldg.
HH Bldg.
Bldg 22
Building 49
PLANT DRAIN
0171
0375
0374
0065
0066
0376
0377
0367
0368
0369
0371
0372
0381
0388
0378
0379
0380
0382
0383
0389
0450
0453
0404
0079
0384
0392
0396
0397
0395
0081
0093
0406
0407
0068
0260
1092
0408
0409
0410
0398
0400
0472
0413
0474
0411
0412
0415
0069
0070
0071
0074
0073
0072
0417
0416
0076
0423
0660
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0475
0478
0481
0482
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0483
0484
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0437
0429
0438
0439
0428
0097
0501
0440
0441
0445
0432
0435
0442
0443
0444
0447
0504
0506
0508
0170
1089
0671
0670
0446
0512
0457
0672
0509
10510
0683
0684
0673
0675
0676
0677
0674
0685
0678
0680
0681

is no longer present due to radioactive decay. The exact location of Area 13 is not exactly known. The locations depicted on Plate 1 indicate the general locations and display the different variations published in various documents. The map of Hot Waste Burial Sites, reproduced in the Site Scoping Report: Volume 7 - Waste Management (DOE 1992g) depicted Area 13 to the far east of Building 49. The Site Survey Project Report (Stought et al. 1988) depicted Area 13 slightly farther west and overlapping Building 49. Evaluation of the historic relationships of the Quonset hut and other historic buildings in the area indicate the actual location was even farther west as shown by the dashed square on Plate 1. The Quonset hut was also moved from the Dayton units to the lower part of the plant valley and is described in the companion reactor waste decontamination subsection 9.3 of this report.

Two surface samples were taken in or near the reported location of Area 13 during the Site Survey Project. These locations are S0670 and S0671 (Plate 1; Table III.7). Plutonium-238 was detected at 0.34 and 5.74 pCi/g, respectively (Table III.7). No thorium was detected above 2 pCi/g in these samples. Area 13, like Area 10, is in a position to receive surface water runoff from areas upgradient on the SM/PP Hill, including Area 12, which contains plutonium contamination (subsection 3.1.12). It is believed that the plutonium present in the samples taken in Area 13 may be the result of surface water runoff and not the result of the polonium-contaminated wood placed in the area. No analyses for gamma spectroscopy are known for Area 13.

3.9. AREA 20

Area 20 is located on the southern slope of the Main Hill, just west of the HH Building (Plate 1). In the 1950s, an underground radioactive waste line in this area is reported to have ruptured, releasing polonium-210 and cobalt-60 to the soils in the area. At least two separate incidents are known (DOE 1992c). The aerial survey conducted in 1976 indicated gamma exposure levels of 4.5 to 7.5 μR/hr in Area 20 (EG&G 1978). During construction activities in 1985, radioactively contaminated soils from Area 20 were reportedly excavated and moved to Area 22. The old wasteline remains in place today.

Table III.8 presents the results of the Site Survey Project sampling in Area 20. The sampling locations are shown in Plate 1. No plutonium-238 or thorium results were given for the core locations sampled. Cesium-137 was detected at 1 pCi/g in the surface sample collected from core location 0070 (C0070 on Table III.8). Radium-226 was the only other radionuclide detected in the samples collected from the other core locations.

The samples from the surface locations in Area 20 were analyzed for plutonium-238 and thorium. The maximum concentrations detected were 1.9 and 4.02 pCi/g for plutonium-238 and thorium, respectively. Both of these concentrations were detected in samples collected from surface location 0406 (S0406, Table III.8).

Table III.8. Mound Site Survey Project - Area 20

Plate 1 Location[a]	Coordinates South	Coordinates West	MRC ID No.	Mo-Yr	Depth (inch)	Plutonium-238 (pCi/g)	Thorium[b] (pCi/g)	Cobalt-60 (pCi/g)	Cesium-137 (pCi/g)	Radium-226 (pCi/g)	Americium-241 (pCi/g)
C0069	2235	3320	10804	09-85	0	NR	NR	LDL	LDL	0.5	LDL
			10805	09-85	18	NR	NR	LDL	LDL	0.4	LDL
			10806	09-85	36	NR	NR	LDL	LDL	0.4	LDL
			10807	09-85	54	NR	NR	LDL	LDL	0.6	LDL
			10808	09-85	72	NR	NR	LDL	LDL	0.4	LDL
			10809	09-85	90	NR	NR	LDL	LDL	0.8	LDL
			10910	09-85	108	NR	NR	LDL	LDL	0.6	LDL
			10911	09-85	126	NR	NR	LDL	LDL	0.6	LDL
			10812	09-85	144	NR	NR	LDL	LDL	0.5	LDL
C0070	2240	3300	10792	09-85	0	NR	NR	LDL	1.0	0.7	LDL
			10794	09-85	36	NR	NR	LDL	LDL	0.2	LDL
			10796	09-85	72	NR	NR	LDL	LDL	0.9	LDL
			10798	09-85	108	NR	NR	LDL	LDL	0.5	LDL
			10799	09-85	126	NR	NR	LDL	LDL	0.7	LDL
			10800	09-85	144	NR	NR	LDL	LDL	0.6	LDL
			10801	09-85	162	NR	NR	LDL	LDL	0.5	LDL
			10802	09-85	180	NR	NR	LDL	LDL	0.2	LDL
C0071	2245	3280	10781	09-85	0	NR	NR	LDL	LDL	0.5	LDL
			10782	09-85	18	NR	NR	LDL	LDL	0.2	LDL
			10783	09-85	36	NR	NR	LDL	LDL	0.2	LDL
			10786	09-85	90	NR	NR	LDL	LDL	0.5	LDL
			10787	09-85	108	NR	NR	LDL	LDL	0.2	LDL
			10788	09-85	126	NR	NR	LDL	LDL	0.6	LDL
			10789	09-85	144	NR	NR	LDL	LDL	0.2	LDL
			10790	09-85	162	NR	NR	LDL	LDL	0.6	LDL
			10789	09-85	180	NR	NR	LDL	LDL	0.9	LDL
C0072	2250	3260	10675	09-85	18	NR	NR	LDL	LDL	0.4	LDL
			10676	09-85	36	NR	NR	LDL	LDL	0.5	LDL
			10677	09-85	54	NR	NR	LDL	NR	0.6	LDL
			10678	09-85	72	NR	NR	LDL	LDL	0.4	LDL
			10679	09-85	90	NR	NR	LDL	LDL	0.3	LDL
			10680	09-85	108	NR	NR	LDL	LDL	0.4	LDL
			10681	09-85	126	NR	NR	LDL	LDL	0.5	LDL
			10682	09-85	144	NR	NR	LDL	LDL	0.6	LDL
			10683	09-85	162	NR	NR	LDL	LDL	0.2	LDL
C0073	2260	3240	10770	09-85	0	NR	NR	LDL	LDL	0.5	LDL
			10772	09-85	36	NR	NR	LDL	LDL	0.2	LDL
			10775	09-85	90	NR	NR	LDL	LDL	0.7	LDL
			10777	09-85	126	NR	NR	LDL	LDL	0.6	LDL
			10778	09-85	144	NR	NR	LDL	LDL	0.6	LDL
			10779	09-85	162	NR	NR	LDL	LDL	0.2	LDL

Table III.8. (page 2 of 2)

Plate 1 Location[a]	Coordinates South	West	MRC ID No.	Mo-Yr	Depth (inch)	Plutonium-238 (pCi/g)	Thorium[b] (pCi/g)	Cobalt-60 (pCi/g)	Cesium-137 (pCi/g)	Radium-226 (pCi/g)	Americium-241 (pCi/g)
C0074	2270	3210	10762	09-85	0	NR	NR	LDL	LDL	0.50	LDL
			10763	09-85	18	NR	NR	LDL	LDL	0.40	LDL
			10764	09-85	36	NR	NR	LDL	LDL	0.50	LDL
			10765	09-85	54	NR	NR	LDL	LDL	0.50	LDL
			10766	09-85	72	NR	NR	LDL	LDL	0.50	LDL
			10767	09-85	90	NR	NR	LDL	LDL	0.60	LDL
			10768	09-85	108	NR	NR	LDL	LDL	0.60	LDL
			10769	09-85	126	NR	NR	LDL	LDL	0.70	LDL
S0406	2200	3225	2873	10-83	0	1.90	4.02				
S0407	2210	3160	2872	10-83	0	0.13	b				
S0408	2235	3255	2913	10-83	0	NR	b				
S0409	2255	3235	2914	10-83	0	1.46	b				
S0410	2260	3200	5867	07-84	0	0.48	b				

[a]Map locations are given using a "C" to designate core locations and an "S" to designate surface locations.

[b]A "b" indicates that the total thorium concentration was less than the background level of 2.0 pCi/g, using FIDLER screening. Therefore, radiochemical analysis was not performed.

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

LDL - The measured concentration was below the lower detection limit, estimated to be 0.5 pCi/g for cobalt-60, cesium-137, and americium-241; and 1 pCi/g for radium-226.

MRC ID - Monsanto Research Corporation Identification

NR - No result given

pCi/g - picocuries per gram

pCi/mL - picocuries per milliliter

The presentation of the Site Survey Project data for Area 20 made in this report does not agree with the presentation of data in the original Site Survey Report. The differences lie mainly in the reporting of the cesium-137 and cobalt-60 results. In the original report, cesium concentrations less or equal to the LDL of 0.5 pCi/g were reported as between 0.1 and 1.0 pCi/g. Cobalt concentrations less than the LDL of 0.5 pCi/g were reported as between 0.01 and 0.1 pCi/g (Table III.8).

The depth to bedrock in Area 20 is approximately 324 inches (27 ft) (Mound Plant drawing #FSE16472) (DOE 1992f). The maximum depth of the Site Survey Project boreholes was 180 inches, or 15 ft. Because boring logs are not available, it is not known if bedrock was reached during sampling.

The original Site Survey Project noted that more recent construction data for Area 20 indicated the presence of significant contamination (Garner 1985), as follows:

- 800 pCi/g of cobalt-60,
- 200 pCi/g of cesium-137,
- 400 pCi/g of bismuth-210m, and
- 70 pCi/g of bismuth-207.

This contamination was discovered during routine health physics screening of soil being excavated for sewer work in Area 20. It was reportedly removed to Area 22 during the sewer work. Area 22 is described in the companion General Use Areas section of this report. Other than cobalt-60, the origin of these isotopes in Area 20 is not known for certain. Cesium-137 was probably associated with the processing of reactor wastes, as described in section 9 of this report. However, no connection between the HH Building and the reactor waste decontamination experiments was discovered during the research for this report.

Bismuth-210m and bismuth-207 were undoubtedly associated with the bismuth processing conducted to produce polonium-210, but up to that time were not recognized. Bismuth-210m is a long-lived metastable isotope with a half-life of nearly 3 million years. In addition to gamma radiation, it decays through alpha emission to thallium-206, which in turn decays over a very short half-life (4.3 minutes) to stable lead-206. Thallium-206 is generally known as a descendent in the uranium-238 decay chain. The origin of bismuth-207 is more speculative. It is, however, known to be produced by alpha particle bombardment of bismuth-209 to produce astatine-211, which decays over a very short half-life (7.2 hours) by alpha particle emission to bismuth-207. Bismuth-207 decays over a 30-year half-life by electron capture to lead-207 metastable (lead-207m). Lead-207m decays

COMPARISON OF ACTUAL SOIL GAS VALUES WITH CALCULATED ACCEPTABLE SOIL GAS VALUES

SCREENING POTENTIAL RELEASE SITES BASED ON SOIL GAS READINGS

Soil gas readings can be utilized in the PRS screening process to identify potential release sites that may present a potential soil contamination problem for volatile organics. The soil gas survey that was conducted at Mound as part of the "Reconnaissance Sampling Report–Soil Gas Survey and Geophysical Investigations, Mound Plant Main Hill and SM/PP Hill" investigated 8 volatile compounds. The concentrations of these compounds in the in the vapor phase within the pore spaces of the soil can be correlated to the actual soil contaminant concentrations by utilizing a method developed by ICF Kaiser Engineers. This technique has been used with US EPA Region IX approval at a large Superfund site contaminated with many of the same chemicals found at relatively low levels in soils at the Mound Plant.

The soil concentration can be estimated from the soil gas values by the following equation:

$$Ct = (Cg/Pb)*[[Pb * Kd / H] + [pw / H] + [pt - pw]]$$

where

Cg	concentration of volatile chemical concentrations as soil vapor in ng/ml
Pb	Bulk density of the soil in g/ml
Kd	soil/water partition coefficient in ml/g
H	Dimensionless Henry's Law Constant
pw	water filled porosity
pt	total porosity
Ct	target soil concentration in ng/g or ug/kg (ppb)

The technique that Mound Plant will use for screening a PRS, is to compare the soil gas values obtained at a PRS with soil gas concentrations that are known to be below any regulatory or health based level of concern. The risk based guideline values for the Mound Plant (DOE, December 1995) soils are based upon 10^{-6} risk levels or a hazard index of 1. These values correspond to direct soil exposure to persons who's activities place them at the highest risk, in particular inhalation and ingestion by a Mound Plant construction worker.

Another potential exposure path must be considered, however. The potential for some of the organic contaminants to leach into ground water must be considered in developing protective soil screening levels. A "Mound Plant Soil Screening Level" paper explains the calculation of soil screening levels. For all of the chemicals that the soil gas survey identified, the calculated soil screening level soil concentrations are below the standard guideline values, therefore they are more conservative and are appropriate to be used as the basis for the soil gas calculations.

By re-arranging the equation, and using either the soil guideline values or the soil screening levels as the target soil concentration, a soil gas concentration can be calculated; this calculated soil gas concentration can be compared to the actual observed soil gas values:

$$Cg = (Pb*Ct)/[[Pb*Kd/H] + [pw/H] + [pt-pw]]$$

The values of the soil specific and chemical parameters for this equation are summarized as follows:

Pb	1.6	Bulk density of the soil in g/ml
pw	0.15	water filled porosity
pt	0.43	total porosity
foc	0.02	fraction organic material in soil (used in developing the SSL values)

Typical chemicals that are detected with soil gas sampling are:					
NAME	Henry's	Kd	Calculated Acceptable Soil Screening Level Value	Calculated Acceptable Soil Gas Reading	Calculated Acceptable Soil Gas Reading
		ml/g	mg/kg (ppm)	ng/ml	ppb
Toluene	2.52E-01	3.42	22.06	1.56E+03	414800
Trichloroethene (TCE)	4.35E-01	2.24	0.07	1.26E+01	2400
111 Trichloroethane (TCA)	7.63E-01	2.2	3.01	9.46E+02	173400
Trans-1,2 Dichloroethene (DCE)	2.29E-01	1	0.70	1.41E+02	35700
cis-1,2 Dichloroethene (DCE)	1.85E-01	2.78	0.31	1.97E+01	5000
Freon 11	NA	NA			
Freon 113	NA	NA			
Tetrachloroethene (PCE)	7.09E-01	2.78	0.09	2.13E+01	3100

na not available

IF THE SOIL GAS READING IS BELOW THE VALUES IN THE CALCULATED SOIL GAS READING COLUMN (SHADED), THEN THERE IS NO THREAT TO GROUNDWATER FROM THIS PRS.

The soil screening level values are calculated using the Soil Screening Methodology. The Potential Release Site is assumed to be more than 100 meters from a potential drinking water source with an aquifer thickness of 15 meters and a source size of 10 meters. The hydraulic gradient is assumed to be 0.01 which is conservative for most of the Mound Plant PRSs. In special instances where the PRS lies less than 100 meters from a potential drinking water source, or the hydraulic gradient is much less than 0.01, new SSL values and new acceptable soil gas values will be calculated for that particular PRS.