



**Westinghouse
Electric Corporation**

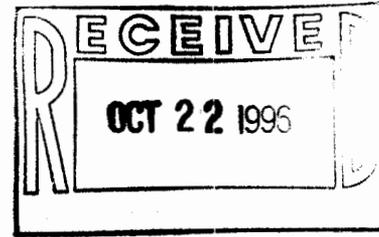
Government Operations

WZ:96:03340
DA:96:2474
Waste Isolation Division

Box 2078
Carlsbad New Mexico 88221

October 18, 1996

Mr. Rafael Casanova, Environmental Scientist
U.S. Environmental Protection Agency
Hazardous Waste Management Division
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733



**Subject: TRANSMITTAL OF SAMPLE LOCATION MAPS AND COMPARISON OF
TOTAL METALS RESULTS FOR WIPP SOLID WASTE MANAGEMENT
UNITS**

Dear Mr. Casanova:

Per your request during our meeting of October 9, 1996, enclosed are twelve maps identifying the locations of the WIPP Solid Waste Management Units (SWMUs). These twelve maps are identified as Figures 1.1 through 12.1. These maps are accompanied with updated comparison tables. Both of these documents will also be included in the Final Voluntary Release Assessment/Corrective Action Report.

Figure 1.1 encompasses all eleven sites where voluntary release assessments have been completed. The remaining Figures 2.1 through 12.1 provide a detailed breakdown by SWMU of the locations where soil samples were collected. These sample location maps are intended to go hand-in-hand with the final validated analytical results on each SWMU. The final validated analytical results were provided to you on September 27, 1996, and October 7, 1996.

Eleven tables comparing total metals concentrations measured in the SWMU soil samples to background concentrations, and to action levels proposed in 40 CFR 264.521 (Subpart S) are also enclosed. These updated comparison tables will supersede comparison tables provided earlier for these eleven SWMUs. Updates consist of the most recent toxicological criteria/reference, and identify the type of laboratory quality assurance/quality control samples used to validate the analytical results.

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If you have any questions, or if you would like to discuss the attached results, please call Mr. S. C. Kouba at (505) 234-8332 or Ms. L. Frank-Supka at (505) 234-8816.

Sincerely,

A handwritten signature in cursive script that reads "K. S. Donovan". The signature is written in black ink and includes a horizontal flourish at the end.

K. S. Donovan, Manager
Environment, Safety, and Health

LFS:clw

Attachments

cc: C. A. Snider DOE/Regulatory Compliance
S. Zappe NMED/RCRA Permits Program

FIGURE 1.1
 APPROXIMATE LOCATION OF SWMU'S WHERE VOLUNTARY
 RELEASE ASSESSMENTS HAVE BEEN COMPLETED

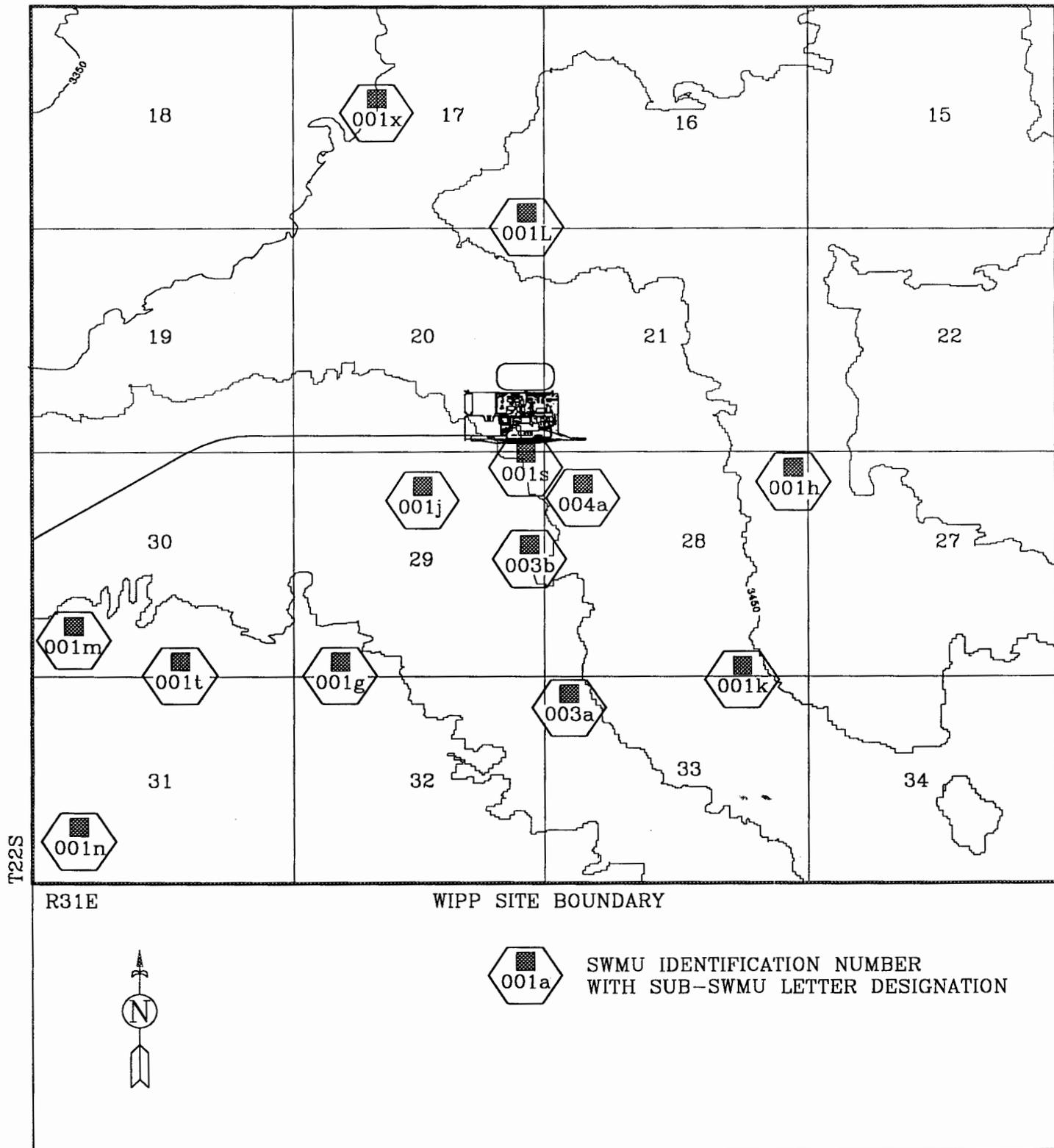


FIGURE 2.1
SAMPLE LOCATION MAP SWMU 001j (P-3)

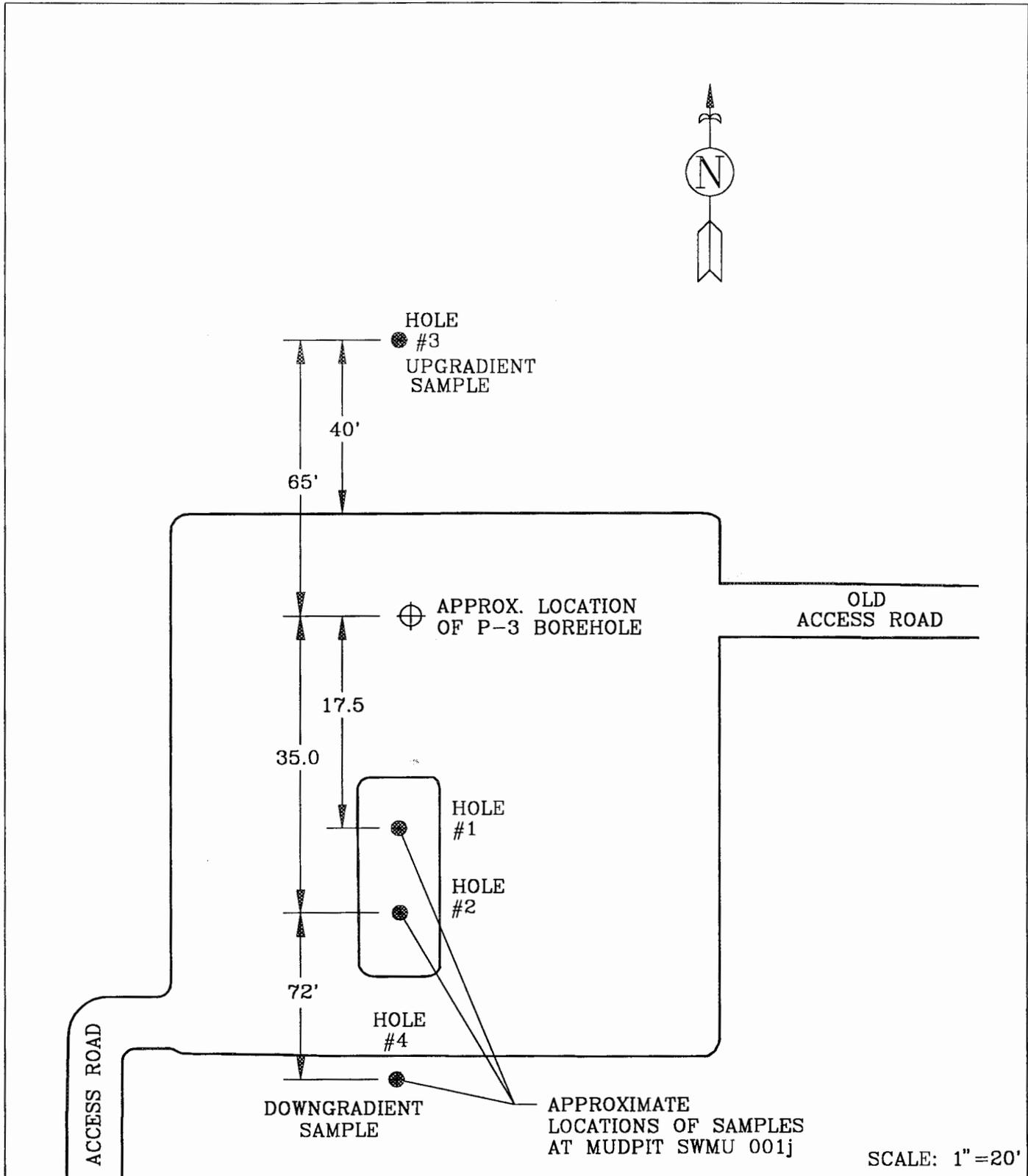


FIGURE 3.1
SAMPLE LOCATION MAP SWMU 001m (P-6)

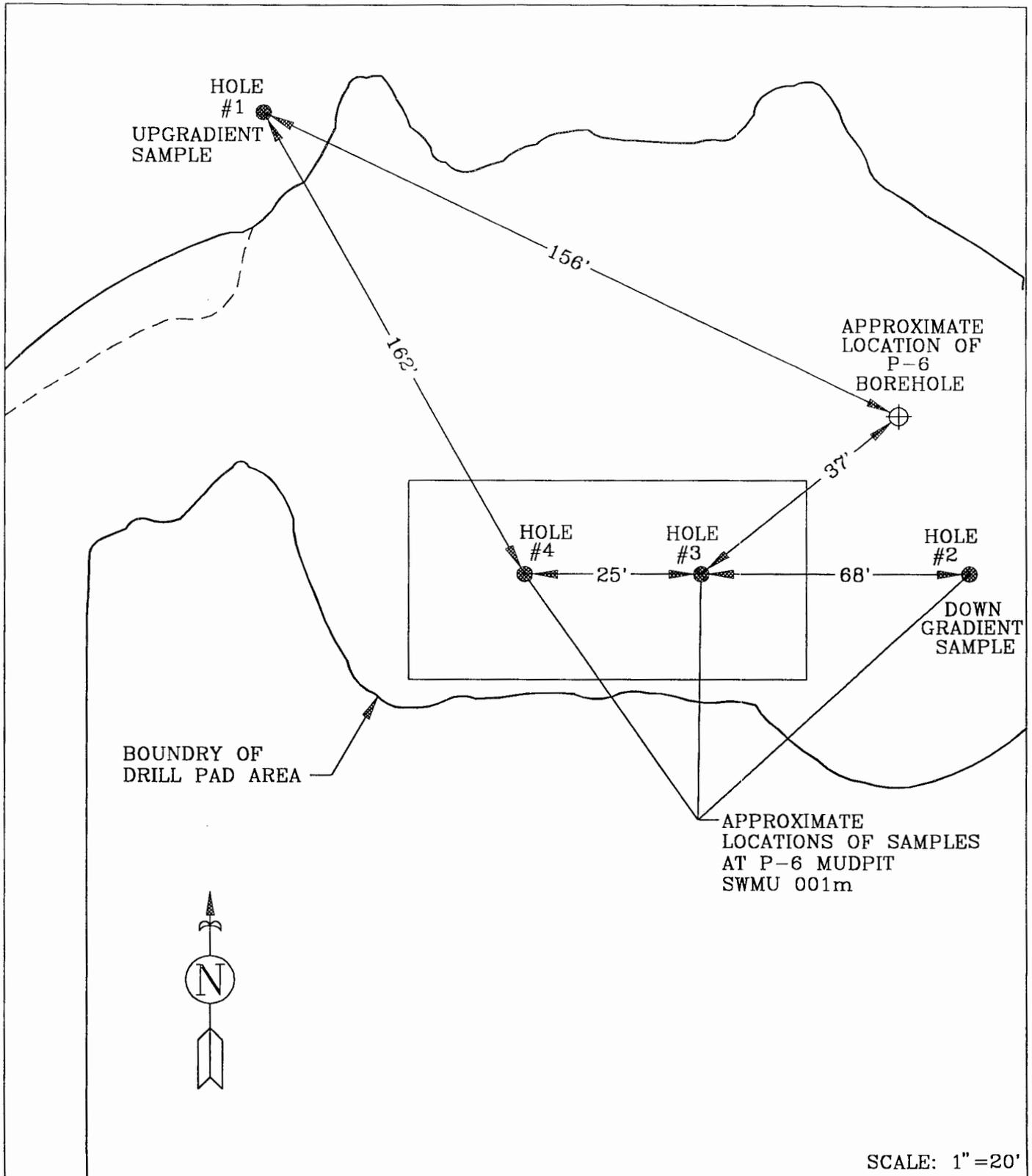


FIGURE 4.1
SAMPLE LOCATION MAP SWMU 001t (IMC-374)

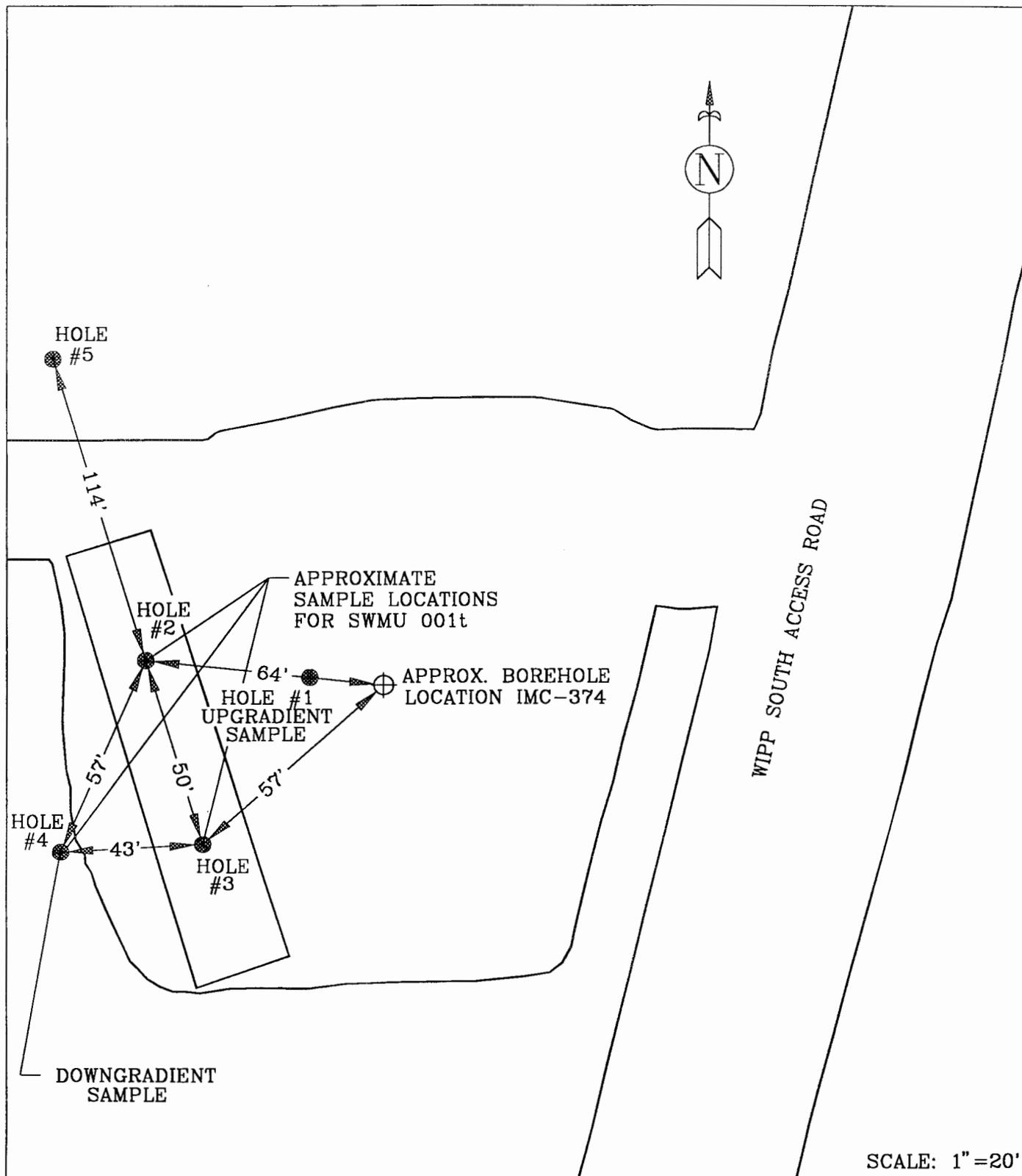


FIGURE 5.1
SAMPLE LOCATION MAP SWMU 001n (P-15)

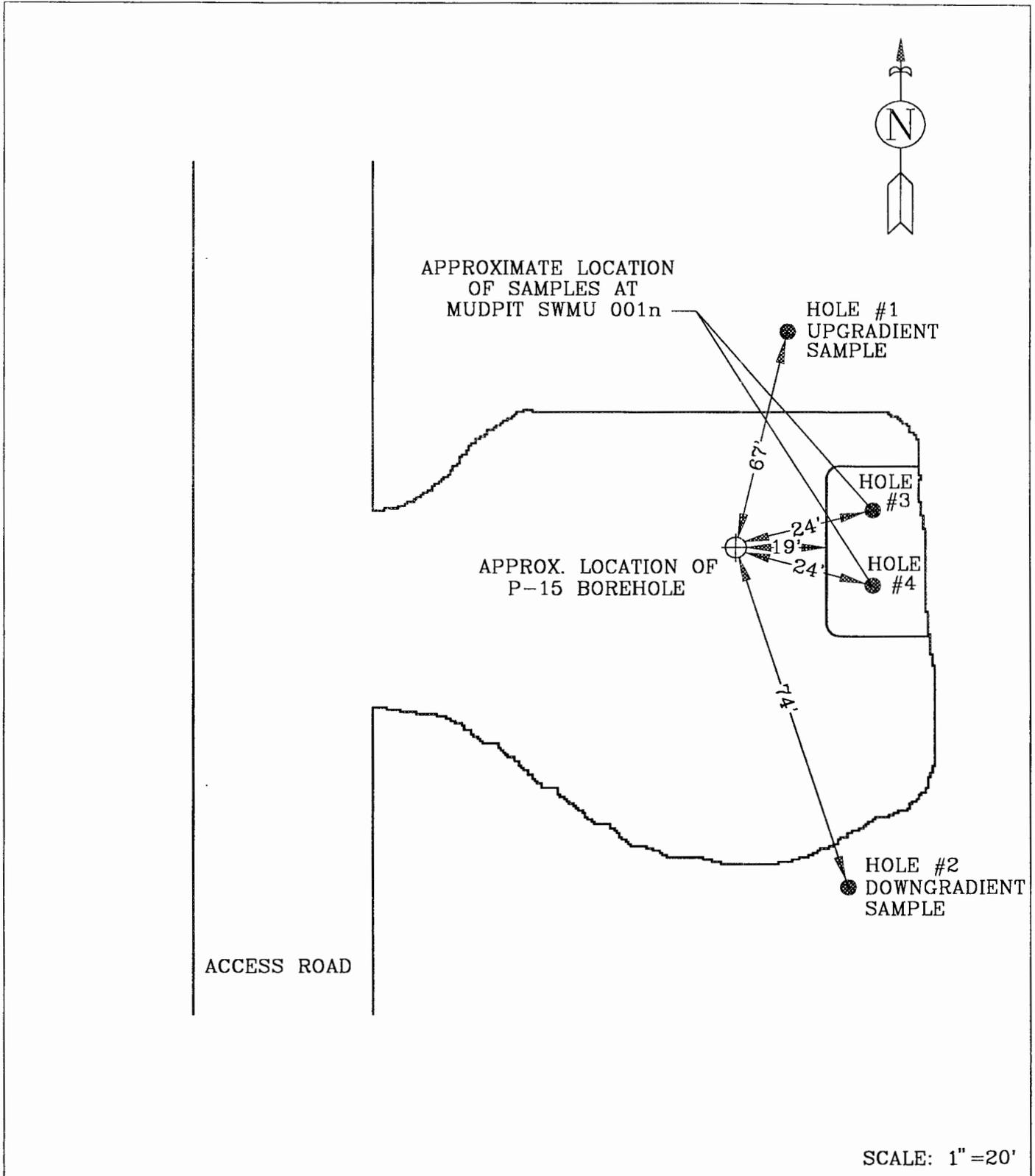


FIGURE 6.1
SAMPLE LOCATION MAP SWMU 001x (WIPP-13)

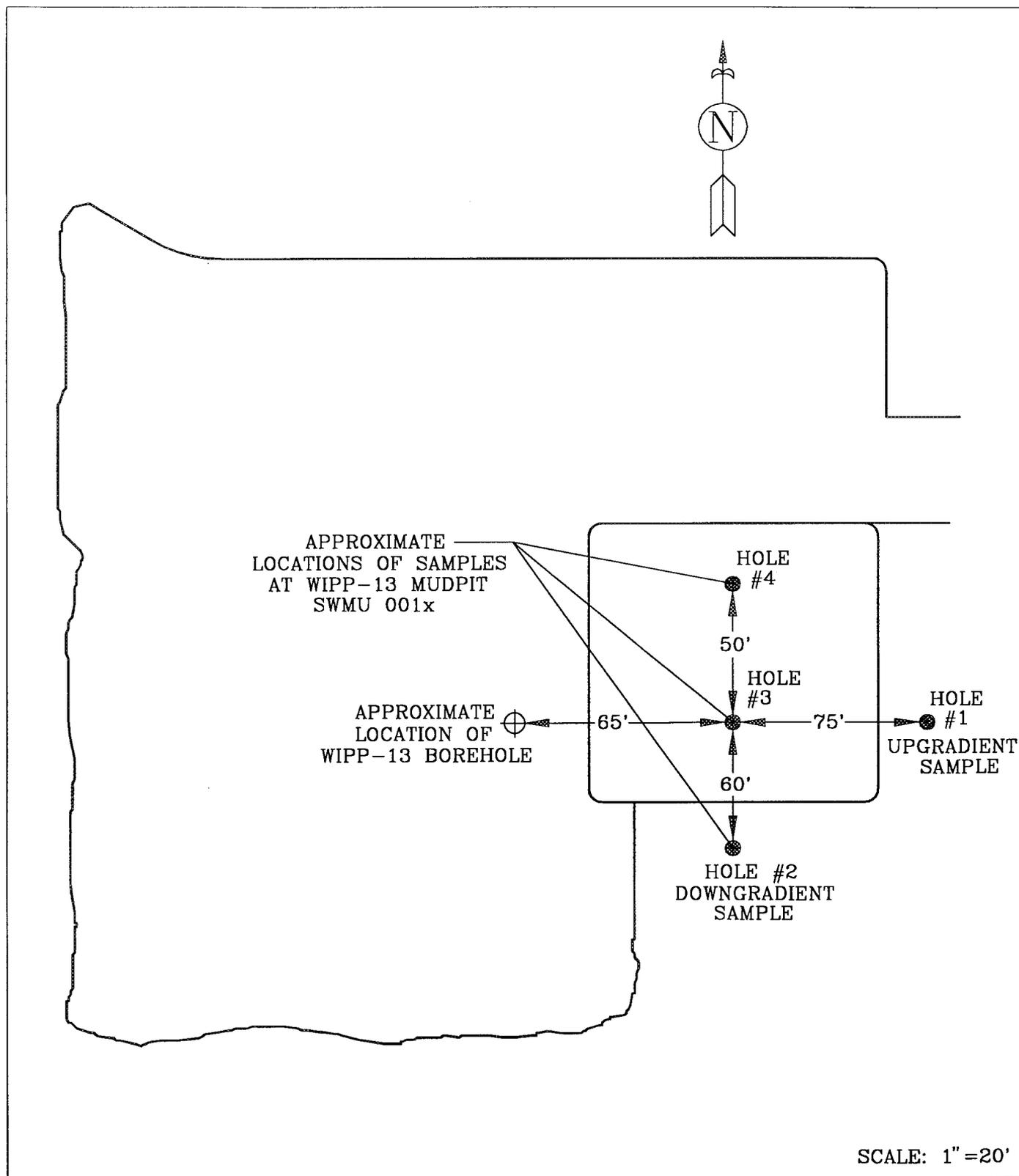


FIGURE 7.1
 SAMPLE LOCATION MAP SWMU 001g (H-14 & P-1)

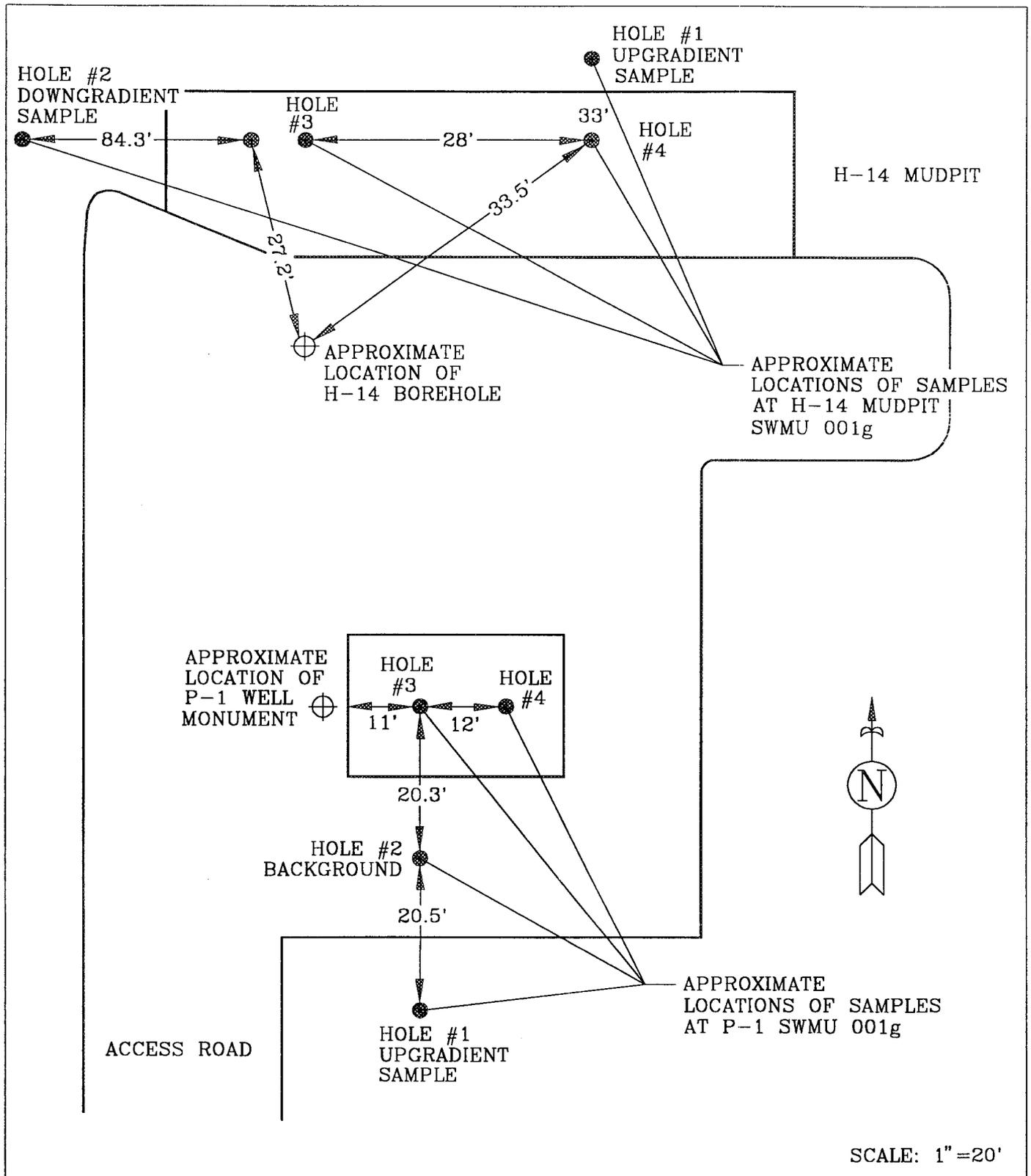


FIGURE 8.1
SAMPLE LOCATION MAP SWMU 001k (P-4)

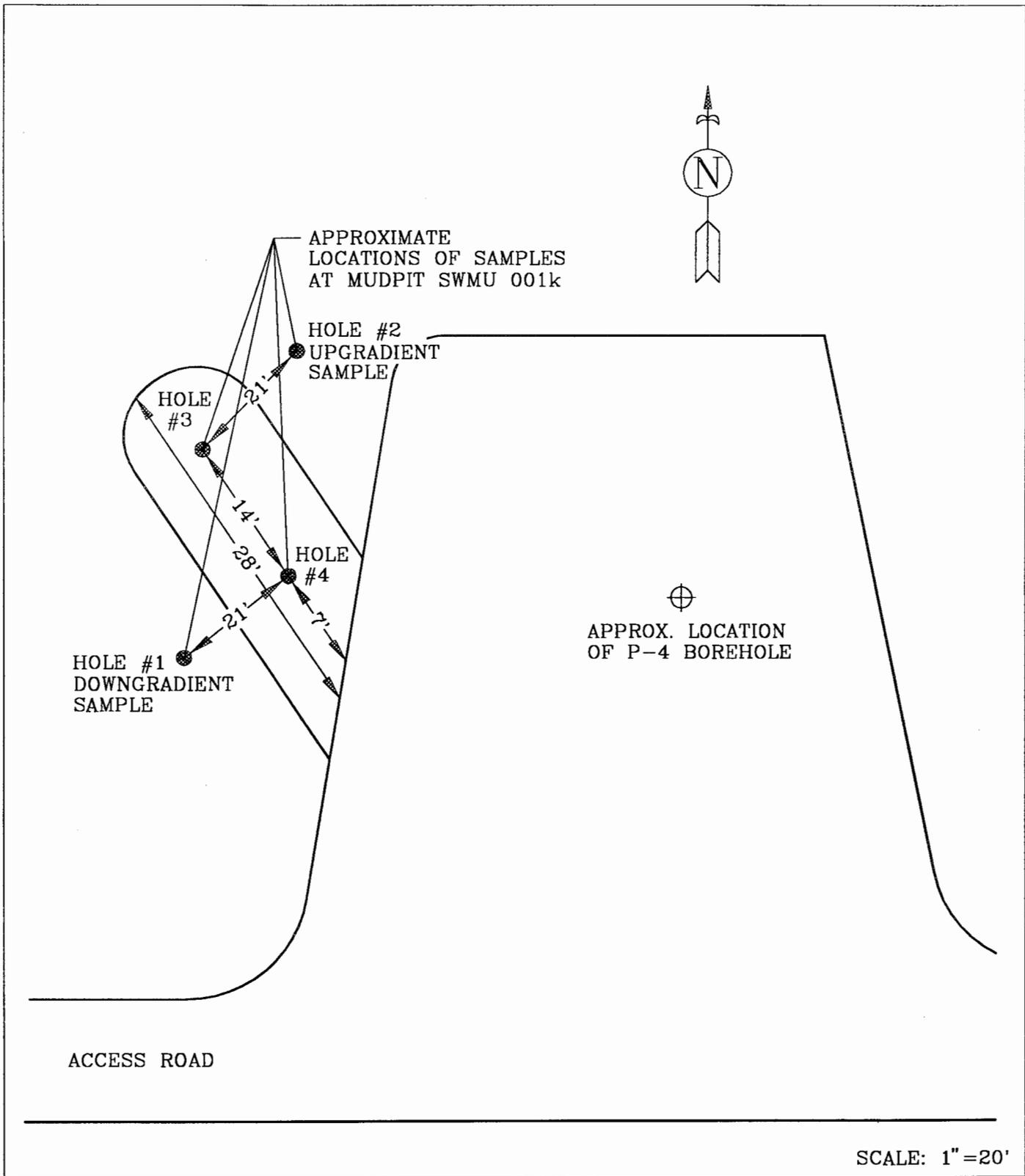


FIGURE 9.1
 SAMPLE LOCATION MAP SWMU 001h (H-15 & P-2)

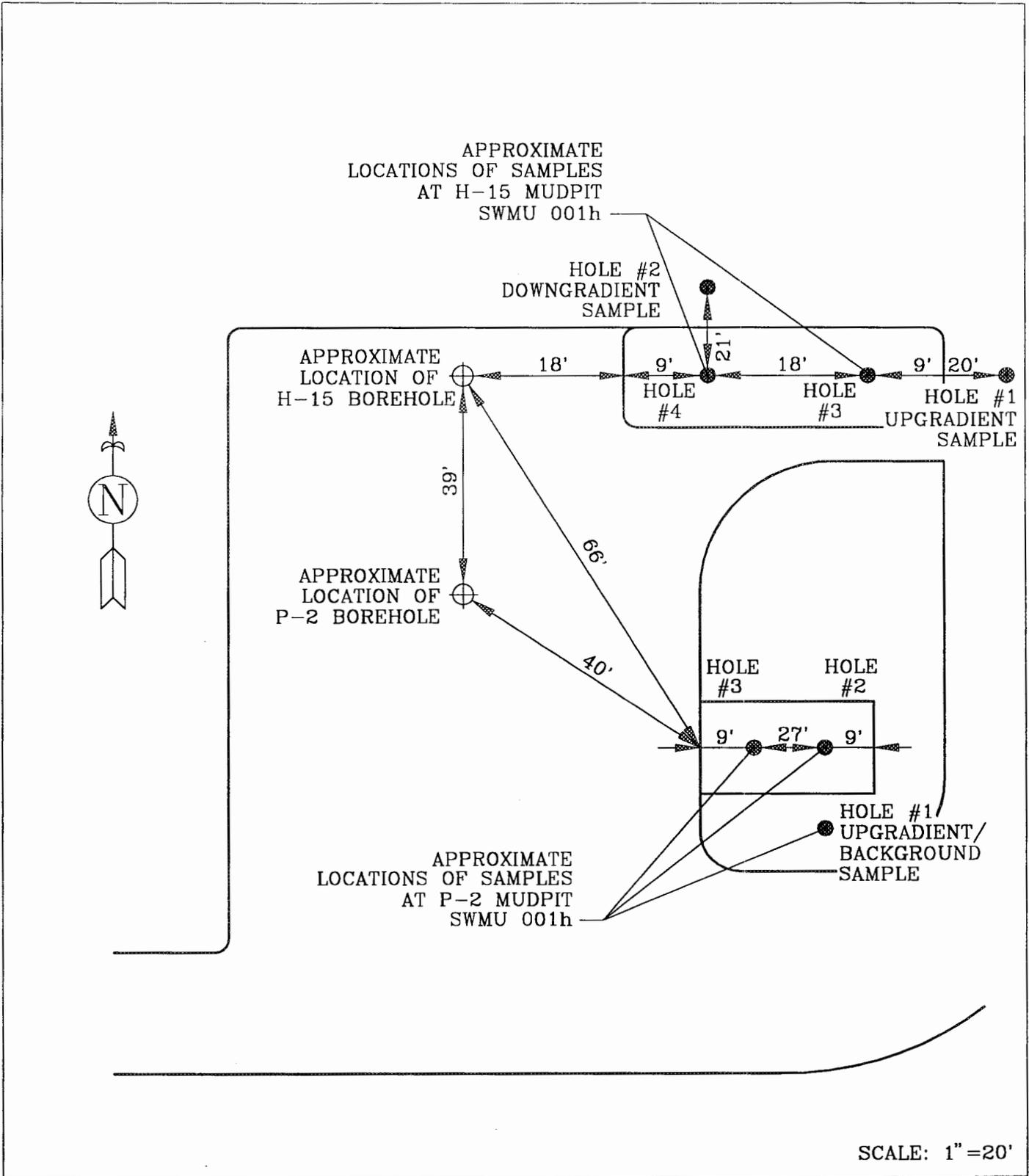


FIGURE 10.1
SAMPLE LOCATION MAP SWMU 001L (WIPP-12 & P-5)

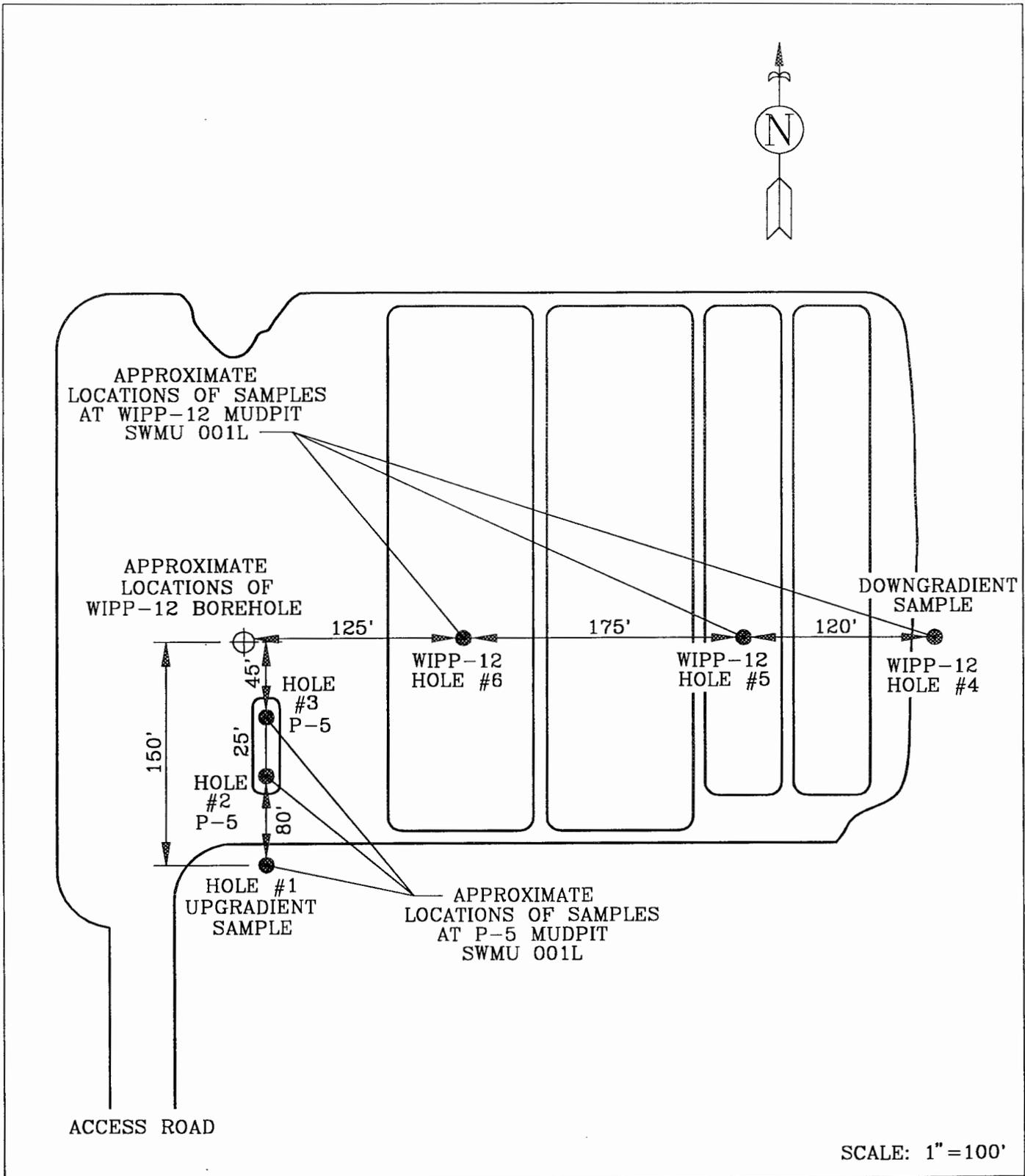


FIGURE 11.1
SAMPLE LOCATION MAP SWMU 001s (ERDA-9)

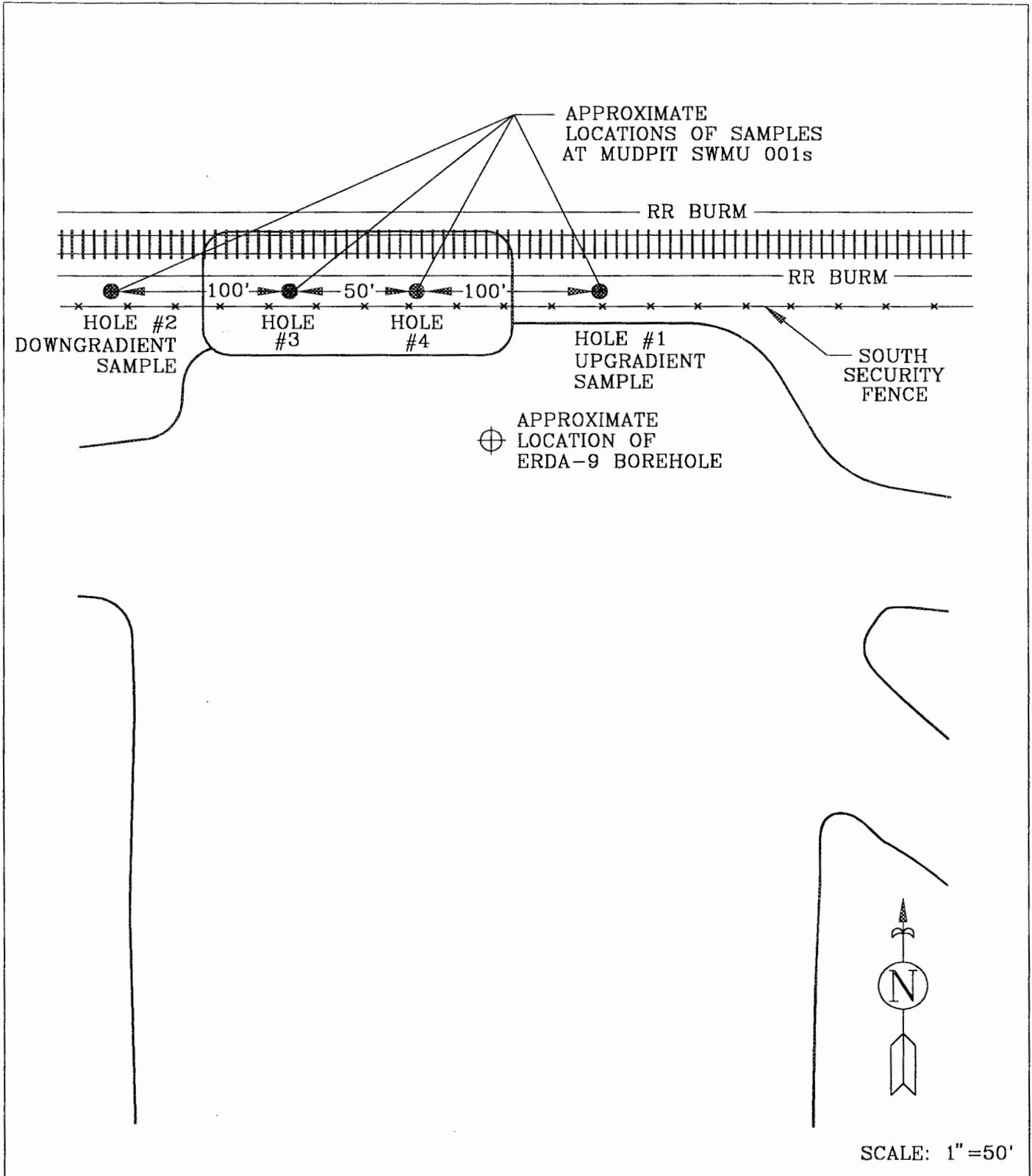
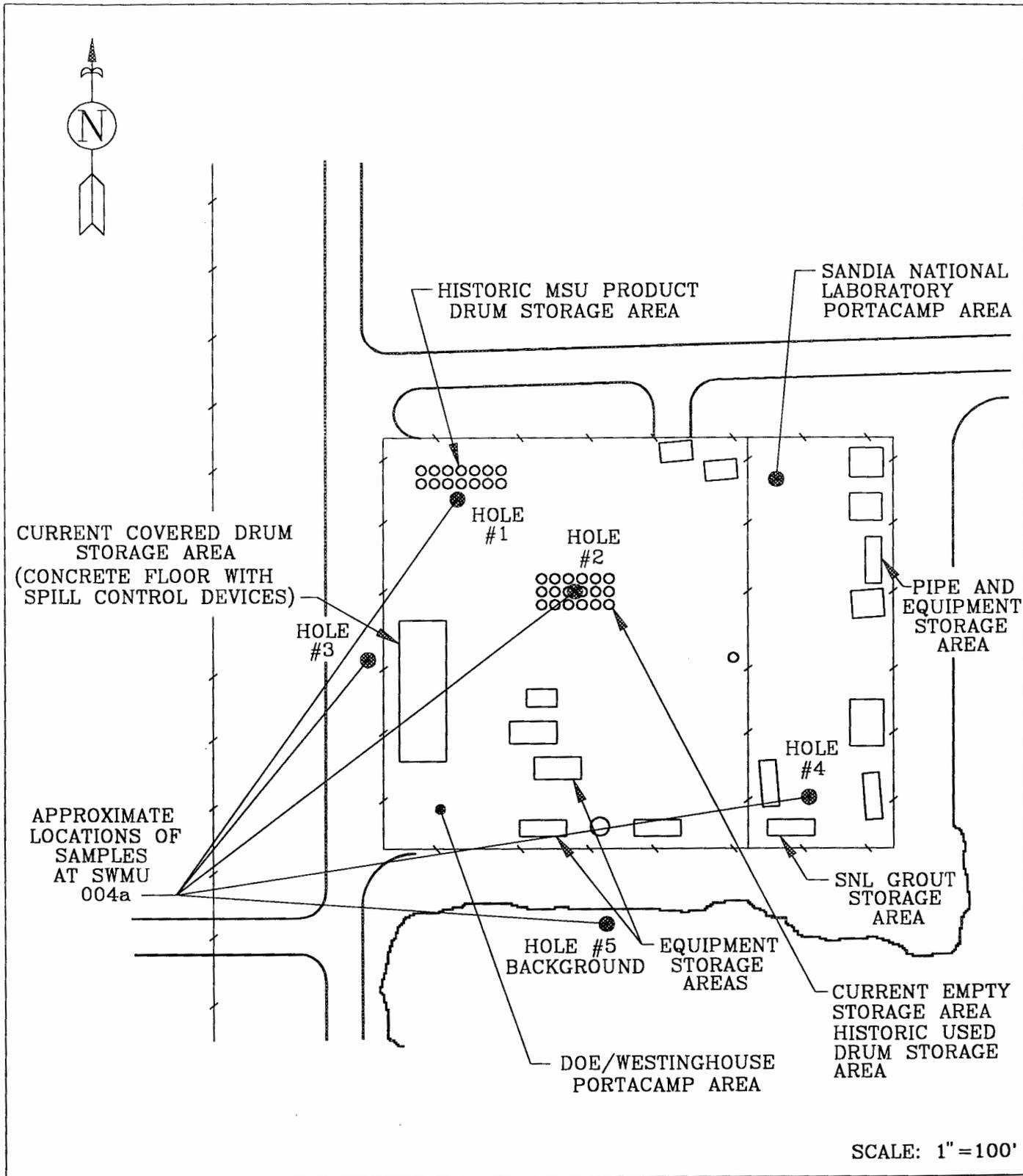


FIGURE 12.1

SAMPLE LOCATION MAP SWMU 004a (PORTACAMP STORAGE AREA)



**Table 2.1: Comparison of Total Metals Results to Action Levels
SWMU # 001j, Mudpit P-3**

Metal Analyte	Background Concentration (mg/kg) ⁽¹⁾⁽²⁾⁽⁷⁾	Maximum SWMU Concentration (mg/kg) ⁽¹⁾⁽³⁾⁽⁷⁾	Subpart S Level (mg/kg) ⁽⁴⁾
12-24 inches bgs			
Total Arsenic (As)	0.5	0.8	20
Total Barium (Ba)	17	34	6000
Total Cadmium (Cd)	0.5 U	0.5 U	80
Total Chromium (Cr)	26	22	400
Total Lead (Pb)	1.5	2.1	400 ⁽⁵⁾
Total Mercury (Hg)	0.03	0.06	20
Total Thallium (Tl)	20 U	20 U	6 ⁽⁶⁾
60-72 inches bgs			
Total Arsenic (As)	0.6	1.2	20
Total Barium (Ba)	20	32	6000
Total Cadmium (Cd)	0.5 U	0.5 U	80
Total Chromium (Cr)	5	5	400
Total Lead (Pb)	2	2.6	400 ⁽⁵⁾
Total Mercury (Hg)	0.03 U	0.06	20
Total Thallium (Tl)	20 U	20 U	6 ⁽⁶⁾

mg/kg Milligrams per kilogram
bgs Below ground surface

- 1) Results are presented in mg/kg, wet weight.
- 2) Background upgradient soil concentrations as measured in Hole #3.
- 3) Maximum concentration measured in soil samples collected from within Mudpit P-3 (Holes #1 and #2).
- 4) Action levels updated using the most recent toxicological criteria contained in the EPA Integrated Risk Information System (IRIS) database and the equations contained in Appendix E of proposed 40 CFR 264.521(d), FR Vol.55, No. 145, IV A Systemic Toxicants, p. 30871.
- 5) No action levels are included in Subpart S for lead. The action level of 400 mg/kg included in the table is the residential soil cleanup level recommended by the EPA Office of Solid Waste.
- 6) Thallium as thallium chloride.
- 7) The following data qualifiers are used as defined in the USEPA National Functional Guidelines for Organic and Inorganic Data Review (EPA, 1994):

- J Result should be considered an estimated value
- U Analyte was not detected; value is the method reporting limit
- UJ Analyte was not detected; however the reporting limit presented should be considered an estimated value

Table 3.1: Comparison of Total Metals Results to Action Levels
SWMU # 001m, Mudpit P-6

Metal Analyte	Background Concentration (mg/kg) ⁽¹⁾⁽²⁾⁽⁷⁾	Maximum SWMU Concentration (mg/kg) ⁽¹⁾⁽³⁾⁽⁷⁾	Subpart S Level (mg/kg) ⁽⁴⁾
12-24 inches bgs			
Total Arsenic (As)	0.4 J ⁽⁸⁾	0.6 J ⁽⁸⁾	20
Total Barium (Ba)	11 J ⁽⁹⁾	24 J ⁽⁹⁾	6000
Total Cadmium (Cd)	0.5 UJ ⁽⁹⁾	0.5 UJ ⁽⁹⁾	80
Total Chromium (Cr)	2 UJ ⁽⁹⁾	3 J ⁽⁹⁾	400
Total Lead (Pb)	1.3	1.6	400 ⁽⁵⁾
Total Mercury (Hg)	0.03 U	0.05	20
Total Thallium (Tl)	20 U	20 U	6 ⁽⁶⁾
60-72 inches bgs			
Total Arsenic (As)	0.5 J ⁽⁸⁾	1 J ⁽⁸⁾	20
Total Barium (Ba)	10 J ⁽⁹⁾	83 J ⁽⁹⁾	6000
Total Cadmium (Cd)	0.5 UJ ⁽⁹⁾	0.5 UJ ⁽⁹⁾	40
Total Chromium (Cr)	4 J ⁽⁹⁾	6 J ⁽⁹⁾	400
Total Lead (Pb)	1.2	1.8	400 ⁽⁵⁾
Total Mercury (Hg)	0.03 U	0.04	20
Total Thallium (Tl)	20 U	20 U	6 ⁽⁶⁾

mg/kg Milligrams per kilogram
bgs Below ground surface

- 1) Results are presented in mg/kg, wet weight.
- 2) Background upgradient soil concentrations as measured in Hole #1.
- 3) Maximum concentration measured in soil samples collected from within Mudpit P-6 (Holes #3 and #4).
- 4) Action levels updated using the most recent toxicological criteria contained in the EPA Integrated Risk Information System (IRIS) database and the equations contained in Appendix E of proposed 40 CFR 264.521(d), FR Vol.55, No. 145, IV A Systemic Toxicants, p. 30871.
- 5) No action levels are included in Subpart S for lead. The action level of 400 mg/kg included in the table is the residential soil cleanup level recommended by the EPA Office of Solid Waste.
- 6) Thallium as thallium chloride.
- 7) The following data qualifiers are used as defined in the USEPA National Functional Guidelines for Organic and Inorganic Data Review (EPA, 1994):

J Result should be considered an estimated value

U Analyte was not detected; value is the method reporting limit

UJ Analyte was not detected; however the reporting limit presented should be considered an estimated value

8) The matrix spike (MS) recoveries were slightly below EPA control criteria of 75 percent.

9) The laboratory control spike (LCS) recoveries were slightly below EPA control criteria of 80 percent.

**Table 4.1: Comparison of Total Metals Results to Action Levels
SWMU # 001t, Mudpit IMC 374**

Metal Analyte	Background Concentration (mg/kg) ⁽¹⁾⁽²⁾⁽⁷⁾	Maximum SWMU Concentration (mg/kg) ⁽¹⁾⁽²⁾⁽⁷⁾	Subpart S Level (mg/kg) ⁽⁴⁾
12-24 inches bgs			
Total Arsenic (As)	0.5	0.7	20
Total Barium (Ba)	10	16	6000
Total Cadmium (Cd)	0.5 U	0.5 U	80
Total Chromium (Cr)	4	4	400
Total Lead (Pb)	1.5	1.6	400 ⁽⁵⁾
Total Mercury (Hg)	0.02 UJ ⁽⁶⁾	0.02 UJ ⁽⁶⁾	20
Total Thallium (Tl)	20 UJ ⁽⁹⁾	20 UJ ⁽⁹⁾	6 ⁽⁶⁾
60-72 inches bgs			
Total Arsenic (As)	0.6	0.8	20
Total Barium (Ba)	15	16	6000
Total Cadmium (Cd)	0.5 U	0.5 U	80
Total Chromium (Cr)	5	5	400
Total Lead (Pb)	1.6	1.7	400 ⁽⁵⁾
Total Mercury (Hg)	0.02 UJ ⁽⁶⁾	0.02 UJ ⁽⁶⁾	20
Total Thallium (Tl)	20 UJ ⁽⁹⁾	20 UJ ⁽⁹⁾	6 ⁽⁶⁾

mg/kg Milligrams per kilogram
bgs Below ground surface

- 1) Results are presented in mg/kg, wet weight.
- 2) Background upgradient soil concentrations as measured in Hole #1.
- 3) Maximum concentration measured in soil samples collected from within Mudpit IMC 374 (Holes #2 and #3).
- 4) Action levels updated using the most recent toxicological criteria contained in the EPA Integrated Risk Information System (IRIS) database and the equations contained in Appendix E of proposed 40 CFR 264.521(d), FR Vol.55, No. 145, IV A Systemic Toxicants, p. 30871.
- 5) No action levels are included in Subpart S for lead. The action level of 400 mg/kg included in the table is the residential soil cleanup level recommended by the EPA Office of Solid Waste.
- 6) **Thallium as thallium chloride.**
- 7) The following data qualifiers are used as defined in the USEPA National Functional Guidelines for Organic and Inorganic Data Review (EPA, 1994):
 - J Result should be considered an estimated value
 - U Analyte was not detected; value is the method reporting limit
 - UJ Analyte was not detected; however the reporting limit presented should be considered an estimated value
- 8) The laboratory control spike (LCS) recoveries were slightly below EPA control criteria of 80 percent.
- 9) The laboratory failed to spike the matrix spike sample with thallium. Therefore, no matrix spike recovery data were available and the associated investigation results were qualified as estimated.

**Table 5.1: Comparison of Total Metals Results to Action Levels
SWMU # 001n, Mudpit P-15**

Metal Analyte	Background Concentration (mg/kg) ⁽¹⁾⁽²⁾⁽⁷⁾	Maximum SWMU Concentration (mg/kg) ⁽¹⁾⁽²⁾⁽⁷⁾	Subpart S Level (mg/kg) ⁽⁴⁾
12-24 inches bgs			
Total Arsenic (As)	0.6	0.8	20
Total Barium (Ba)	13	110	6000
Total Cadmium (Cd)	0.5 U	0.5 U	80
Total Chromium (Cr)	4	7	400
Total Lead (Pb)	1.2	2	400 ⁽⁵⁾
Total Mercury (Hg)	0.02 UJ ⁽⁶⁾	0.02 UJ ⁽⁶⁾	20
Total Thallium (Tl)	20 UJ ⁽⁶⁾	20 UJ ⁽⁶⁾	6 ⁽⁶⁾
60-72 inches bgs			
Total Arsenic (As)	0.8	1	20
Total Barium (Ba)	16	42	6000
Total Cadmium (Cd)	1.8	0.5 U	80
Total Chromium (Cr)	5	6	400
Total Lead (Pb)	1.4	2.6	400 ⁽⁵⁾
Total Mercury (Hg)	0.02 UJ ⁽⁶⁾	0.02 UJ ⁽⁶⁾	20
Total Thallium (Tl)	20 UJ ⁽⁶⁾	20 UJ ⁽⁶⁾	6 ⁽⁶⁾

mg/kg Milligrams per kilogram

bgs Below ground surface

- 1) Results are presented in mg/kg, wet weight.
- 2) Background upgradient soil concentrations as measured in Hole #1.
- 3) Maximum concentration measured in soil samples collected from within Mudpit P-15 (Holes #3 and #4).
- 4) Action levels updated using the most recent toxicological criteria contained in the EPA Integrated Risk Information System (IRIS) database and the equations contained in Appendix E of proposed 40 CFR 264.521(d), FR Vol.55, No. 145, IV A Systemic Toxicants, p. 30871.
- 5) No action levels are included in Subpart S for lead. The action level of 400 mg/kg included in the table is the residential soil cleanup level recommended by the EPA Office of Solid Waste.
- 6) **Thallium as thallium chloride.**
- 7) The following data qualifiers are used as defined in the USEPA National Functional Guidelines for Organic and Inorganic Data Review (EPA, 1994):
 - J Result should be considered an estimated value
 - U Analyte was not detected; value is the method reporting limit
 - UJ Analyte was not detected; however the reporting limit presented should be considered an estimated value
- 8) The laboratory control spike (LCS) recoveries were slightly below EPA control criteria of 80 percent.
- 9) The laboratory failed to spike the matrix spike sample with thallium. Therefore, no matrix spike recovery data were available and the associated investigative results were qualified as estimated

**Table 6.1: Comparison of Total Metals Results to Action Levels
SWMU # 001x, WIPP-13**

Metal Analyte	Background Concentration (mg/kg) ⁽¹⁾⁽²⁾⁽⁷⁾	Maximum SWMU Concentration (mg/kg) ⁽¹⁾⁽³⁾⁽⁷⁾	Subpart S Level (mg/kg) ⁽⁴⁾
12-24 inches bgs			
Total Arsenic (As)	0.3 U	1	20
Total Barium (Ba)	10	3800	6000
Total Cadmium (Cd)	0.5 U	0.6	80
Total Chromium (Cr)	3	36	400
Total Lead (Pb)	1.6	270	400 ⁽⁵⁾
Total Mercury (Hg)	0.03 U	0.03 U	20
Total Thallium (Tl)	20 U	20 U	6 ⁽⁶⁾
60-72 inches bgs			
Total Arsenic (As)	0.6	1.2	20
Total Barium (Ba)	12	680	6000
Total Cadmium (Cd)	0.5	0.5 U	80
Total Chromium (Cr)	4	10	400
Total Lead (Pb)	1.5	5	400 ⁽⁵⁾
Total Mercury (Hg)	0.03 U	0.03 U	20
Total Thallium (Tl)	20 U	20 U	6 ⁽⁶⁾

mg/kg Milligrams per kilogram

bgs Below ground surface

- 1) Results are presented in mg/kg, wet weight.
- 2) Background upgradient soil concentrations as measured in Hole #1.
- 3) Maximum concentration measured in soil samples collected from within WIPP-13 (Holes #3 and #4).
- 4) Action levels updated using the most recent toxicological criteria contained in the EPA Integrated Risk Information System (IRIS) database and the equations contained in Appendix E of proposed 40 CFR 264.521(d), FR Vol.55, No. 145, IV A Systemic Toxicants, p. 30871.
- 5) No action levels are included in Subpart S for lead. The action level of 400 mg/kg included in the table is the residential soil cleanup level recommended by the EPA Office of Solid Waste.
- 6) **Thallium as thallium chloride.**
- 7) The following data qualifiers are used as defined in the USEPA National Functional Guidelines for Organic and Inorganic Data Review (EPA, 1994):

- J Result should be considered an estimated value
- U Analyte was not detected; value is the method reporting limit
- UJ Analyte was not detected; however the reporting limit presented should be considered an estimated value

Table 7.1: Comparison of Total Metals Results to Action Levels, SWMU #001g

Metal Analyte	SWMU # 001g, H-14			SWMU # 001g, Mudpit P-1		
	Background Concentration (mg/kg) ⁽¹⁾⁽²⁾⁽⁷⁾	Maximum SWMU Concentration (mg/kg) ⁽¹⁾⁽²⁾⁽⁷⁾	Subpart S Level (mg/kg) ⁽⁴⁾	Background Concentration (mg/kg) ⁽¹⁾⁽²⁾⁽⁷⁾	Maximum SWMU Concentration (mg/kg) ⁽¹⁾⁽²⁾⁽⁷⁾	Subpart S Level (mg/kg) ⁽⁴⁾
12-24 inches bgs						
Total Arsenic (As)	0.9 J ⁽⁸⁾	1.2 J ⁽⁸⁾	20	1 J ⁽⁸⁾	0.9 J ⁽⁸⁾	20
Total Barium (Ba)	15	22	6000	35	17	6000
Total Cadmium (Cd)	0.7 J ⁽⁸⁾	0.5 UJ ⁽⁸⁾	80	0.5 UJ ⁽⁸⁾	0.5 UJ ⁽⁸⁾	80
Total Chromium (Cr)	3	6	400	5	4	400
Total Lead (Pb)	1.9 J ⁽¹⁰⁾	3.4 J ⁽¹⁰⁾	400 ⁽⁵⁾	2.1 J ⁽¹⁰⁾	3.2 J ⁽¹⁰⁾	400 ⁽⁵⁾
Total Mercury (Hg)	0.02 UJ ⁽⁸⁾⁽⁹⁾	0.02 U	20	0.02 U	0.02 U	20
Total Thallium (Tl)	20 U	20	6 ⁽⁶⁾	20 U	20 U	6 ⁽⁶⁾
60-72 inches bgs						
Total Arsenic (As)	2 J ⁽⁸⁾	2.3 J ⁽⁸⁾	20	1.8 J ⁽⁸⁾	1.5 J ⁽⁸⁾	20
Total Barium (Ba)	26	34	6000	52	71	6000
Total Cadmium (Cd)	0.5 UJ ⁽⁸⁾	0.5 UJ ⁽⁸⁾	80	0.5 UJ ⁽⁸⁾	0.5 UJ ⁽⁸⁾	80
Total Chromium (Cr)	7	7	400	2	4	400
Total Lead (Pb)	2.7 J ⁽¹⁰⁾	3.4 J ⁽¹⁰⁾	400 ⁽⁵⁾	3.8 J ⁽¹⁰⁾	2.4 J ⁽¹⁰⁾	400 ⁽⁵⁾
Total Mercury (Hg)	0.02 UJ ⁽⁸⁾⁽⁹⁾	0.04 J ⁽⁸⁾⁽⁹⁾	20	0.04	0.02 U	20
Total Thallium (Tl)	20 U	20 U	6 ⁽⁶⁾	20 U	20 U	6 ⁽⁶⁾

mg/kg Milligrams per kilogram

bgs Below ground surface

- 1) Results are presented in mg/kg, wet weight.
- 2) Background upgradient soil concentrations as measured in upgradient holes (Hole #1) for the H-14 and P-1 Mudpits.
- 3) Maximum concentration measured in soil samples collected from within Mudpit H-14 (Holes #3 and #4) and Mudpit P-1 (Hole #3).
- 4) Action levels updated using the most recent toxicological criteria contained in the EPA Integrated Risk Information System (IRIS) database and the equations contained in Appendix E of proposed 40 CFR 264.521(d), FR Vol.55, No. 145, IV A Systemic Toxicants, p. 30871.
- 5) No action levels are included in Subpart S for lead. The action level of 400 mg/kg included in the table is the residential soil cleanup level recommended by the EPA Office of Solid Waste.
- 6) Thallium as thallium chloride.
- 7) The following data qualifiers are used as defined in the USEPA National Functional Guidelines for Organic and Inorganic Data Review (EPA, 1994):
 - J Result should be considered an estimated value
 - U Analyte was not detected; value is the method reporting limit
 - UJ Analyte was not detected; however the reporting limit presented should be considered an estimated value
- 8) The matrix spike (MS) and matrix spike duplicate (MSD) recoveries were slightly below EPA control criteria of 75 percent.
- 9) The laboratory control spike (LCS) recoveries were slightly below EPA control criteria of 80 percent.
- 10) The MS recoveries were above EPA control criteria of 125%.

**Table 8.1: Comparison of Total Metals Results to Action Levels
SWMU # 001k, Mudpit P-4**

Metal Analyte	Background Concentration (mg/kg) ⁽¹⁾⁽²⁾⁽⁷⁾	Maximum SWMU Concentration (mg/kg) ⁽¹⁾⁽²⁾⁽⁷⁾	Subpart S Level (mg/kg) ⁽⁴⁾
12-24 inches bgs			
Total Arsenic (As)	0.6 J ⁽⁸⁾⁽⁹⁾	0.5 J ⁽⁸⁾⁽⁹⁾	20
Total Barium (Ba)	15 J ⁽⁹⁾	13 J ⁽⁹⁾	6000
Total Cadmium (Cd)	0.5 UJ ⁽⁹⁾	0.5 J ⁽⁹⁾	80
Total Chromium (Cr)	4 J ⁽⁹⁾	4 J ⁽⁹⁾	400
Total Lead (Pb)	1.4	1.2	400 ⁽⁵⁾
Total Mercury (Hg)	0.06	0.03 U	20
Total Thallium (Tl)	20.0 U	20.0 U	6 ⁽⁶⁾
60-72 inches bgs			
Total Arsenic (As)	0.7 J ⁽⁸⁾⁽⁹⁾	0.6 J ⁽⁸⁾⁽⁹⁾	20
Total Barium (Ba)	19 J ⁽⁹⁾	14 J ⁽⁹⁾	6000
Total Cadmium (Cd)	0.5 UJ ⁽⁹⁾	0.5 UJ ⁽⁹⁾	80
Total Chromium (Cr)	4 J ⁽⁹⁾	3 J ⁽⁹⁾	400
Total Lead (Pb)	1.4	1.3	400 ⁽⁵⁾
Total Mercury (Hg)	0.03 U	0.05	20
Total Thallium (Tl)	20.0 U	20.0 U	6 ⁽⁶⁾

mg/kg Milligrams per kilogram
bgs Below ground surface

- 1) Results are presented in mg/kg, wet weight.
- 2) Background upgradient soil concentrations as measured in upgradient Hole #2.
- 3) Maximum concentration measured in soil samples collected from within Mudpit P-4 (Holes #3 and #4).
- 4) Action levels updated using the most recent toxicological criteria contained in the EPA Integrated Risk Information System (IRIS) database and the equations contained in Appendix E of proposed 40 CFR 264.521(d), FR Vol.55, No. 145, IV A Systemic Toxicants, p. 30871.
- 5) No action levels are included in Subpart S for lead. The action level of 400 mg/kg included in the table is the residential soil cleanup level recommended by the EPA Office of Solid Waste.
- 6) **Thallium as thallium chloride.**
- 7) The following data qualifiers are used as defined in the USEPA National Functional Guidelines for Organic and Inorganic Data Review (EPA, 1994):
 - J Result should be considered an estimated value
 - U Analyte was not detected; value is the method reporting limit
 - UJ Analyte was not detected; however the reporting limit presented should be considered an estimated value
- 8) The matrix spike (MS) recoveries were slightly below EPA control criteria of 75 percent.
- 9) The laboratory control spike (LCS) recoveries were slightly below EPA control criteria of 80 percent.

Table 9.1: Comparison of Total Metals Results to Action Levels, SWMU #001h

Metal Analyte	SWMU # 001h, H-15			SWMU # 001h, Mudpit P-2		
	Background Concentration (mg/kg) ⁽¹⁾⁽²⁾⁽⁷⁾	Maximum SWMU Concentration (mg/kg) ⁽¹⁾⁽²⁾⁽⁷⁾	Subpart S Level (mg/kg) ⁽⁴⁾	Background Concentration (mg/kg) ⁽¹⁾⁽²⁾⁽⁷⁾	Maximum SWMU Concentration (mg/kg) ⁽¹⁾⁽²⁾⁽⁷⁾	Subpart S Level (mg/kg) ⁽⁴⁾
12-24 inches bgs						
Total Arsenic (As)	0.9	1	20	0.8	1.3	20
Total Barium (Ba)	21	26	6000	19	69	6000
Total Cadmium (Cd)	0.5 U	0.5	80	0.5 U	0.5 U	80
Total Chromium (Cr)	4	5	400	6	5	400
Total Lead (Pb)	2.8 J ⁽⁸⁾	2.2 J ⁽⁸⁾	400 ⁽⁵⁾	2.1	2.3	400 ⁽⁵⁾
Total Mercury (Hg)	0.03 U	0.03 U	20	0.03 U	0.03 U	20
Total Thallium (Tl)	20 U	20 U	6 ⁽⁶⁾	20 U	20 U	6 ⁽⁶⁾
60-72 inches bgs						
Total Arsenic (As)	1.7	2.2	20	1.4	1.9	20
Total Barium (Ba)	33	140	6000	28	150	6000
Total Cadmium (Cd)	0.5 U	0.5 U	80	0.5 U	0.5 U	80
Total Chromium (Cr)	5	7	400	6	6	400
Total Lead (Pb)	2.9 J ⁽⁸⁾	3.1 J ⁽⁸⁾	400 ⁽⁵⁾	2.6	6.5	400 ⁽⁵⁾
Total Mercury (Hg)	0.03	0.03 U	20	0.03 U	0.03 U	20
Total Thallium (Tl)	20 U	20 U	6 ⁽⁶⁾	20 U	20 U	6 ⁽⁶⁾

mg/kg Milligrams per kilogram

bgs Below ground surface

- 1) Results are presented in mg/kg, wet weight.
- 2) Background upgradient soil concentrations as measured in upgradient holes (Hole #1) at the H-15 and P-2 Mudpits.
- 3) Maximum concentration measured in soil samples collected from within Mudpit H-15 (Holes #3 and #4) and Mudpit P-2 (Holes #2 and #3).
- 4) Action levels updated using the most recent toxicological criteria contained in the EPA Integrated Risk Information System (IRIS) database and the equations contained in Appendix E of proposed 40 CFR 264.521(d), FR Vol.55, No. 145, IV A Systemic Toxicants, p. 30871.
- 5) No action levels are included in Subpart S for lead. The action level of 400 mg/kg included in the table is the residential soil cleanup level recommended by the EPA Office of Solid Waste.
- 6) Thallium as thallium chloride.
- 7) The following data qualifiers are used as defined in the USEPA National Functional Guidelines for Organic and Inorganic Data Review (EPA, 1994):

J Result should be considered an estimated value

U Analyte was not detected; value is the method reporting limit

UJ Analyte was not detected; however the reporting limit presented should be considered an estimated value

- 8) The laboratory control sample (LCS) recoveries were slightly below EPA control criteria of 80 percent.

Table 10.1: Comparison of Total Metals Results to Action Levels, SWMU #001L

Metal Analyte	SWMU # 001L, Mudpit P-5			SWMU # 001L, WIPP-12		
	Background Concentration (mg/kg) ⁽¹⁾⁽²⁾⁽⁷⁾	Maximum SWMU Concentration (mg/kg) ⁽¹⁾⁽²⁾⁽⁷⁾	Subpart S Level (mg/kg) ⁽⁴⁾	Background Concentration (mg/kg) ⁽¹⁾⁽²⁾⁽⁷⁾	Maximum SWMU Concentration (mg/kg) ⁽¹⁾⁽²⁾⁽⁷⁾	Subpart S Level (mg/kg) ⁽⁴⁾
12-24 inches bgs						
Total Arsenic (As)	1.5 J ⁽⁸⁾	2.3 J ⁽⁸⁾	20	1.5 J ⁽⁸⁾	1.3 J ⁽⁸⁾	20
Total Barium (Ba)	120	490	6000	120	1700	6000
Total Cadmium (Cd)	0.5 UJ ⁽⁸⁾	0.5 UJ ⁽⁸⁾	80	0.5 UJ ⁽⁸⁾	0.5 UJ ⁽⁸⁾	80
Total Chromium (Cr)	3	7	400	3	6	400
Total Lead (Pb)	2.2 J ⁽¹⁰⁾	4.2 J ⁽¹⁰⁾	400 ⁽⁵⁾	2.2 J ⁽⁹⁾	2.2 J ⁽⁹⁾	400 ⁽⁵⁾
Total Mercury (Hg)	0.02 U	0.02 U	20	0.02 U	0.02 U	20
Total Thallium (Tl)	20 U	20 U	6 ⁽⁶⁾	20 U	20 U	6 ⁽⁶⁾
60-72 inches bgs						
Total Arsenic (As)	0.9 J ⁽⁸⁾	2.5 J ⁽⁸⁾	20	0.9 J ⁽⁸⁾	1.4 J ⁽⁸⁾	20
Total Barium (Ba)	62	400	6000	62	860	6000
Total Cadmium (Cd)	0.5 UJ ⁽⁸⁾	0.5 UJ ⁽⁸⁾	80	0.5 UJ ⁽⁸⁾	0.5 UJ ⁽⁸⁾	80
Total Chromium (Cr)	4	6	400	4	5	40
Total Lead (Pb)	3.6 J ⁽⁸⁾	5.1 J ⁽⁸⁾	400 ⁽⁵⁾	3.6 J ⁽⁹⁾	1.8 J ⁽⁹⁾	400 ⁽⁵⁾
Total Mercury (Hg)	0.03	0.02 U	20	0.03	0.02 U	20
Total Thallium (Tl)	20 U	20 U	6 ⁽⁶⁾	20 U	20 U	6 ⁽⁶⁾

mg/kg Milligrams per kilogram

bgs Below ground surface

- 1) Results are presented in mg/kg, wet weight.
- 2) Background upgradient soil concentrations as measured in Hole #1 (Mudpit P-5).
- 3) Maximum concentration measured in soil samples collected from within Mudpit P-5 (Holes #2 and #3) and WIPP-12 (Holes #5 and #6).
- 4) Action levels updated using the most recent toxicological criteria contained in the EPA Integrated Risk Information System (IRIS) database and the equations contained in Appendix E of proposed 40 CFR 264.521(d), FR Vol.55, No. 145, IV A Systemic Toxicants, p. 30871.
- 5) No action levels are included in Subpart S for lead. The action level of 400 mg/kg included in the table is the residential soil cleanup level recommended by the EPA Office of Solid Waste.
- 6) Thallium as thallium chloride.
- 7) The following data qualifiers are used as defined in the USEPA National Functional Guidelines for Organic and Inorganic Data Review (EPA, 1994):

J Result should be considered an estimated value

U Analyte was not detected; value is the method reporting limit

UJ Analyte was not detected; however the reporting limit presented should be considered an estimated value

- 8) The matrix spike (MS) recoveries were slightly below EPA control criteria of 75 percent.
- 9) The laboratory control spike (LCS) recoveries were slightly below EPA control criteria of 80 percent.
- 10) The MS recoveries were above EPA control criteria of 125%.

**Table 11.1: Comparison of Total Metals Results to Action Levels
SWMU # 001s ERDA-9**

Metal Analyte	Background Concentration (mg/kg) ⁽¹⁾⁽²⁾⁽⁷⁾	Maximum SWMU Concentration (mg/kg) ⁽¹⁾⁽²⁾⁽⁷⁾	Subpart S Level (mg/kg) ⁽⁴⁾
12-24 inches bgs			
Total Arsenic (As)	1.4 J ⁽⁸⁾	1.1 J ⁽⁸⁾	20
Total Barium (Ba)	110 J ⁽⁹⁾	71	6000
Total Cadmium (Cd)	0.5 UJ ⁽⁹⁾	0.6 J ⁽⁹⁾	80
Total Chromium (Cr)	4 J ⁽⁹⁾	8	400
Total Lead (Pb)	1.9	2.1	400 ⁽⁵⁾
Total Mercury (Hg)	0.03	0.03 U	20
Total Thallium (Tl)	20 U	20 U	6 ⁽⁶⁾
60-72 inches bgs			
Total Arsenic (As)	0.5 J ⁽⁸⁾	0.6 J ⁽⁸⁾	20
Total Barium (Ba)	15 J ⁽⁹⁾	19	6000
Total Cadmium (Cd)	0.5 U	0.5 U	80
Total Chromium (Cr)	4	3	400
Total Lead (Pb)	1.8	1.4	400 ⁽⁵⁾
Total Mercury (Hg)	0.03 U	0.03 U	20
Total Thallium (Tl)	20 U	20 U	6 ⁽⁶⁾

mg/kg Milligrams per kilogram

bgs Below ground surface

- 1) Results are presented in mg/kg, wet weight.
- 2) Background upgradient soil concentrations as measured in upgradient Hole #1.
- 3) Maximum concentration measured in soil samples collected from within ERDA-9 (Holes #3 and #4).
- 4) Action levels updated using the most recent toxicological criteria contained in the EPA Integrated Risk Information System (IRIS) database and the equations contained in Appendix E of proposed 40CFR 264.521(d), FR Vol.55, No. 145, IV A Systemic Toxicants, p. 30871.
- 5) No action levels are included in Subpart S for lead. The action level of 400 mg/kg included in the table is the residential soil cleanup level recommended by the EPA Office of Solid Waste.
- 6) Thallium as thallium chloride.
- 7) The following data qualifiers are used as defined in the USEPA National Functional Guidelines for Organic and Inorganic Data Review (EPA, 1994):

J Result should be considered an estimated value

U Analyte was not detected; value is the method reporting limit

UJ Analyte was not detected; however the reporting limit presented should be considered an estimated value

8) The matrix spike (MS) and matrix spike duplicate (MSD) recoveries were slightly below EPA control criteria of 75 percent.

9) The laboratory control spike (LCS) recoveries were slightly below EPA control criteria of 80 percent.

**Table 12.1: Comparison of Total Metals Results to Action Levels
SWMU # 004a, Portacamp**

Metal Analyte	Background Concentration (mg/kg) ⁽¹⁾⁽²⁾⁽⁷⁾	Maximum SWMU Concentration (mg/kg) ⁽¹⁾⁽³⁾⁽⁷⁾	Subpart S Level (mg/kg) ⁽⁴⁾
12-24 inches bgs			
Total Arsenic (As)	0.7 J ⁽⁸⁾	0.7 J ⁽⁸⁾	20
Total Barium (Ba)	14	59	6000
Total Cadmium (Cd)	0.5 U	0.5 U	80
Total Chromium (Cr)	2	140	400
Total Lead (Pb)	1.4	4.2	400 ⁽⁵⁾
Total Mercury (Hg)	0.03 U	0.03 U	20
Total Nickel (Ni)	2 U	66	2000
Total Selenium (Se)	0.4 U	0.5 U	400
Total Silver (Ag)	1 U	1 U	200
Total Thallium (Tl)	30	20 U	6 ⁽⁶⁾
36-48 inches bgs			
Total Arsenic (As)	0.7 J ⁽⁸⁾	1.1 J ⁽⁸⁾	20
Total Barium (Ba)	14	43	6000
Total Cadmium (Cd)	0.5 U	0.5 U	80
Total Chromium (Cr)	4	120	400
Total Lead (Pb)	1.5	4.8	400 ⁽⁵⁾
Total Mercury (Hg)	0.03 U	0.03 U	20
Total Nickel (Ni)	2 U	54	2000
Total Selenium (Se)	0.4 U	0.4 U	400
Total Silver (Ag)	1 U	1 U	200
Total Thallium (Tl)	20 U	20 U	6 ⁽⁶⁾

mg/kg Milligrams per kilogram

bgs Below ground surface

- 1) Results are presented in mg/kg, wet weight.
- 2) Background upgradient soil concentrations as measured in Hole #5.
- 3) Maximum concentration measured in soil samples collected from within the Portacamp (Holes #1, #2, #3, and #4).
- 4) Action levels updated using the most recent toxicological criteria contained in the EPA Integrated Risk Information System (IRIS) database and the equations contained in Appendix E of proposed 40 CFR 264.521(d), FR Vol.55, No. 145, IV A Systemic Toxicants, p. 30871.
- 5) No action levels are included in Subpart S for lead. The action level of 400 mg/kg included in the table is the residential soil cleanup level recommended by the EPA Office of Solid Waste.
- 6) Thallium as thallium chloride.
- 7) The following data qualifiers are used as defined in the USEPA National Functional Guidelines for Organic and Inorganic Data Review (EPA, 1994):
 - J Result should be considered an estimated value
 - U Analyte was not detected; value is the method reporting limit
 - UJ Analyte was not detected; however the reporting limit presented should be considered an estimated value
- 8) The matrix spike (MS) and matrix spike duplicate (MSD) recoveries were slightly below EPA control criteria of 75 percent.