



**Department of Energy**  
 Los Alamos Area Office  
 Albuquerque Operations Office  
 Los Alamos, New Mexico 87544

**JUL 06 1994**

*Barbara*  
*Ron K* *RAV*  
*file*  
*Benito*  
*Don*  
*WMMU 3-010(a)*  
*OU 1114*

William K. Honker, Chief  
 RCRA Permits Branch  
 U. S. Environmental Protection Agency,  
 Region 6  
 1445 Ross Avenue, Suite 1200  
 Dallas, TX 75202-2733

Dear Mr. Honker:

In a letter received by the Department of Energy (DOE), Los Alamos Area Office (LAAO), on April 29, 1994, your office requested data collected as a result of the investigation conducted in association with the Voluntary Corrective Action (VCA) activities performed at Solid Waste Management Unit (SWMU) 3-010(a), at Operable Unit (OU) 1114. The results of the investigation, which took place during April and May of this year, are now available and are provided with this letter.

Your letter, received on April 29, 1994, also stated that plans sent to Jim Piatt, Surface Water Bureau, New Mexico Environment Department (NMED), on April 12, 1994, did not include a remedy for SWMU 3-010(a) which was acceptable to the U. S. Environmental Protection Agency (EPA). We are therefore currently revising our plans. The revision will include a new proposal for addressing removal of Total Petroleum Hydrocarbons (TPH) to a level that is acceptable to both yourselves and NMED. The proposal will also address the presence of solvents above Screening Action Levels (SAL) that were discovered at the SWMU as a result of confirmatory analyses performed after soil removal. The proposal is currently in preparation. We expect to be sending it to you and the NMED Surface Water Bureau for review sometime in early August 1994.

Results of Sampling

SWMU 3-010(a) was used for the disposal of vacuum pump oil from the pump repair area within TA-3-30 from 1950 to 1957. The disposal area is located approximately 30 feet west of TA-3-30 and is approximately 40 feet long by 15 feet wide. Elemental mercury, along with TPH, lead, plutonium, cesium, and tritium were found in previously collected soil samples.

In April and May 1994, Los Alamos National Laboratory (LANL) removed approximately 120 cubic yards of soil and tuff from the site. Original plans allowed for a three-lift approach to be used to minimize waste generated for low-level disposal at the TA-54, Area G landfill. The first lift removed material that contained free liquid mercury. These soils were drummed (19 total) and taken to the TA-54 Area L mixed waste dome. The second lift was aimed at collecting all remaining radioactive contaminated soil, which was shipped to TA-54, Area G, in bulk. Ten samples were

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collected and analyzed after lift two to confirm that the remaining soil was free of radioactive contaminants. Finally, a third lift was removed. Prior to the removal, plans were made to ship this lift for disposal off-site because it was believed to contain only TPH-contaminated soils with trace amounts of non-TCLP metals. However, during removal it was found to also be rad-contaminated; lift three was therefore treated similarly to lift two for waste management purposes. Further discussion of this finding is presented below.

The excavation is currently 13 to 15 feet wide (north to south) and extends from the east edge of the site approximately 40 feet to the west. The underlying tuff was encountered at a depth of about 14 feet at the east end and at less than 1 foot at the west end. The overburden soils have been removed as well as 6 inches to 1 foot of the tuff across the bottom of the excavation. The surface of the tuff appeared to be weathered and fractured and was easily broken by the front-end loader and the track excavator used for the removal activities. The excavation is currently about 15 feet deep at the east end of the site and is nearly level across the bottom.

#### 1. Findings

The analytical results from lift two (ten samples for radioactive elements) indicate that tritium is bound with the TPH; therefore, all remaining excavated soils went to TA-54, Area G, instead of an off-site landfill.

During excavation, analyses of samples from tuff were performed on-site during excavation activities using field test kits. The approximate locations of the tuff samples are shown in Figure 1. BiMelyze field test kits were used for mercury analysis. TPH was measured by both the Hanby HNu field test kits, which have a detection limit of 100 ppm, and a field Infrared instrument, which has a detection limit of 1 ppm. The results of the field analyses are shown in Tables 1 and 2. In addition, the TPH data are distributed variably yet at discrete points in the subsurface, a pattern suggesting transport associated with fractures. Field analyses of samples taken in the sidewalls of the excavation indicate that lateral migration has been limited.

Confirmatory samples to be analyzed for Hg and BTEX were taken at the upper and lower biased locations<sup>1</sup> and the east vertical wall location. BTEX analysis was also chosen to support evidence for archival research that the source of TPH was from mineral oil as opposed to motor oil. A

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<sup>1</sup>Confirmatory samples were collected approximately 1 foot below the soil/tuff interface in bedrock.

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determination of volatile organic compounds was performed along with the BTEX analysis<sup>2</sup>.

Enclosed are the results in table form from the field and laboratory confirmatory analyses conducted on samples during VCA activities. The results are reported below. Supporting figures are provided to indicate the sample collection locations. The results are now complete, but have not yet been validated. We recommend the results be treated as somewhat tentative until validation is completed.

## 2. Mercury Data

The mercury results in Tables 1 and 3 indicate that mercury detected using both field kit and laboratory analyses are less than the 20 ppm target level. See figure 2 for sample locations.

## 3. TPH Data

Analytical results for TPH are reported in Tables 1 and 2. The TPH IR mobile field laboratory instrument results in Table 1 indicate the maximum value found for TPH is 15,000 ppm; this sample was collected directly below the highest TPH value in the surface soils collected last year (see Figure 1 "upper biased sample")<sup>3</sup>. Figure 3 shows the sample locations for the hand auger samples collected under lift two. The results for these samples are reported in Table 2. Comparison of these sample results with those reported in Table 1 indicates that the TPH levels are greater in the tuff than in the soil above the tuff.

## 4. BTEX and Volatile Organic Analysis Data

The results for BTEX and volatile organic analyses (Method 8260) conducted on the confirmatory samples are reported in Table 3. See Figure 1 for the sample locations associated with the above analyses. The Method 8260 results reported in Table 3 indicate volatile halogenated compounds are present in the upper biased sample at levels above the SAL.

BTEX was not found in the soil. However, the following compounds were detected above SALs in the upper biased sample: 1,1-dichloroethene at 60 mg/kg (SAL = 0.59 ppm), 1,2-dichloroethane at 0.9 mg/kg (SAL = 0.2 mg/kg) and trichloroethane at 8.6 mg/kg, (SAL = 3.2 mg/kg). Twelve other volatile organics were also detected. Four volatile organics were

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<sup>2</sup>These confirmatory samples were sent to an off-site laboratory instead of CST-9. CST-9 contracts with off-site laboratories to provide for BTEX determination via SW-846 Method 8260 instead of Method 8020. BTEX is determined as a subset of Method 8260 which is a more complete determination of volatile organic compounds.

<sup>3</sup>This data was submitted to EPA on March 1, 1994, with the Notice of Deficiency (NOD) Response for the OU 1114 RFI Work Plan.

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detected in the lower biased sample and three in the east vertical wall sample (Figure 1). Levels for the lower-biased sample were all below SALs.

Because of the unexpected results in the upper biased sample, the laboratory was asked to analyze the additional sample bottle that was collected from this location. The results from the second analysis confirmed the presence of volatile organics in the soil. We recommend that data reported be validated prior to public release in order to provide the confidence in the results needed to make decisions appropriate for the site.

#### 5. Radionuclide Data

Figure 2 shows the subsurface sample locations collected after the second lift. The radionuclide results for these samples are reported in Tables 4 and 5.

#### 6. Tritium

The tritium results indicate the tritium associated with the TPH (bound to the oil) accounts for about 80 percent of the tritium concentration, and soil moisture the remaining 20 percent. While the majority of the tritium is associated with the TPH, it remains six to seven orders of magnitude below the SAL.

#### 7. Plutonium

The plutonium results indicate that the three of the ten samples are over the plutonium background level of 0.025 pCi/g. These results are from areas where the least amount of soil was excavated prior to sampling.

If you have any questions or concerns, please call me at (505) 665-7203, or Court Fesmire at (505) 665-4718.

Sincerely,



*for* Theodore J. Taylor  
Program Manager  
Environmental Restoration Program

LESH:4TT-016

Enclosures:  
Figures 1-3  
Tables 1-5

cc:  
See page 5

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cc w/enclosures:

K. Sisneros, NMED  
1190 St. Francis Drive  
P. O. Box 26110  
Santa Fe, NM 87502  
W. Spurgeon, EM-452, HQ  
T. Taylor, ES&H, LAAO  
C. Fesmire, ES&H, LAAO  
B. Swanton, NMED, AIP, LANL,  
MS-J993  
K. Boardman, ERPO, AL  
J. Levings, ERPO, AL

cc w/o enclosures:

K. Schenck, Scientech, LAAO  
B. Koch, Scientech, LAAO  
D. McInroy, EM/ER, LANL, MS-M992  
J. Jansen EM/ER, LANL, MS-M992  
G. Allen, CST-6, LANL, MS-E525

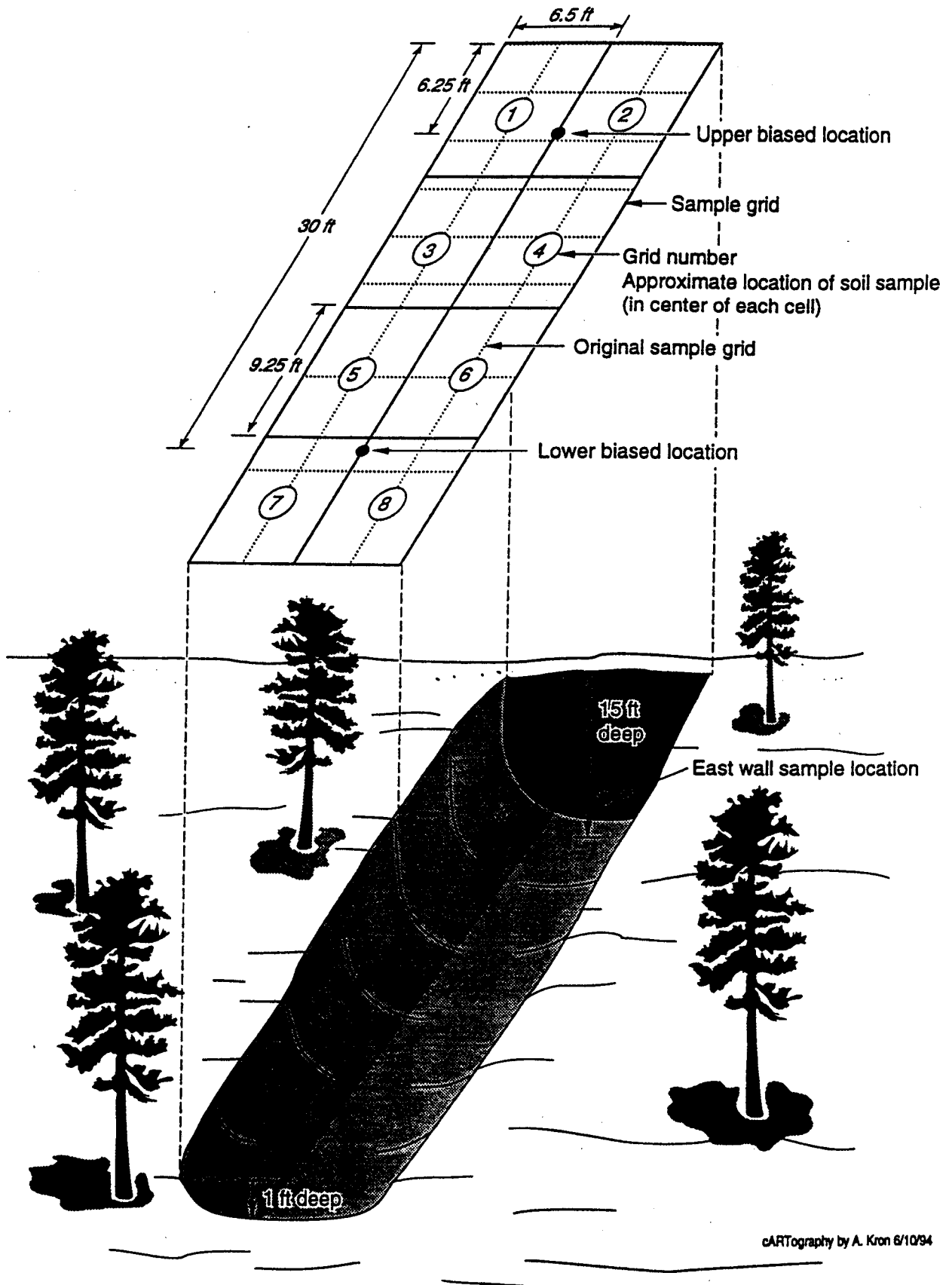


Figure 1. Sample locations after excavation of Lift 3.

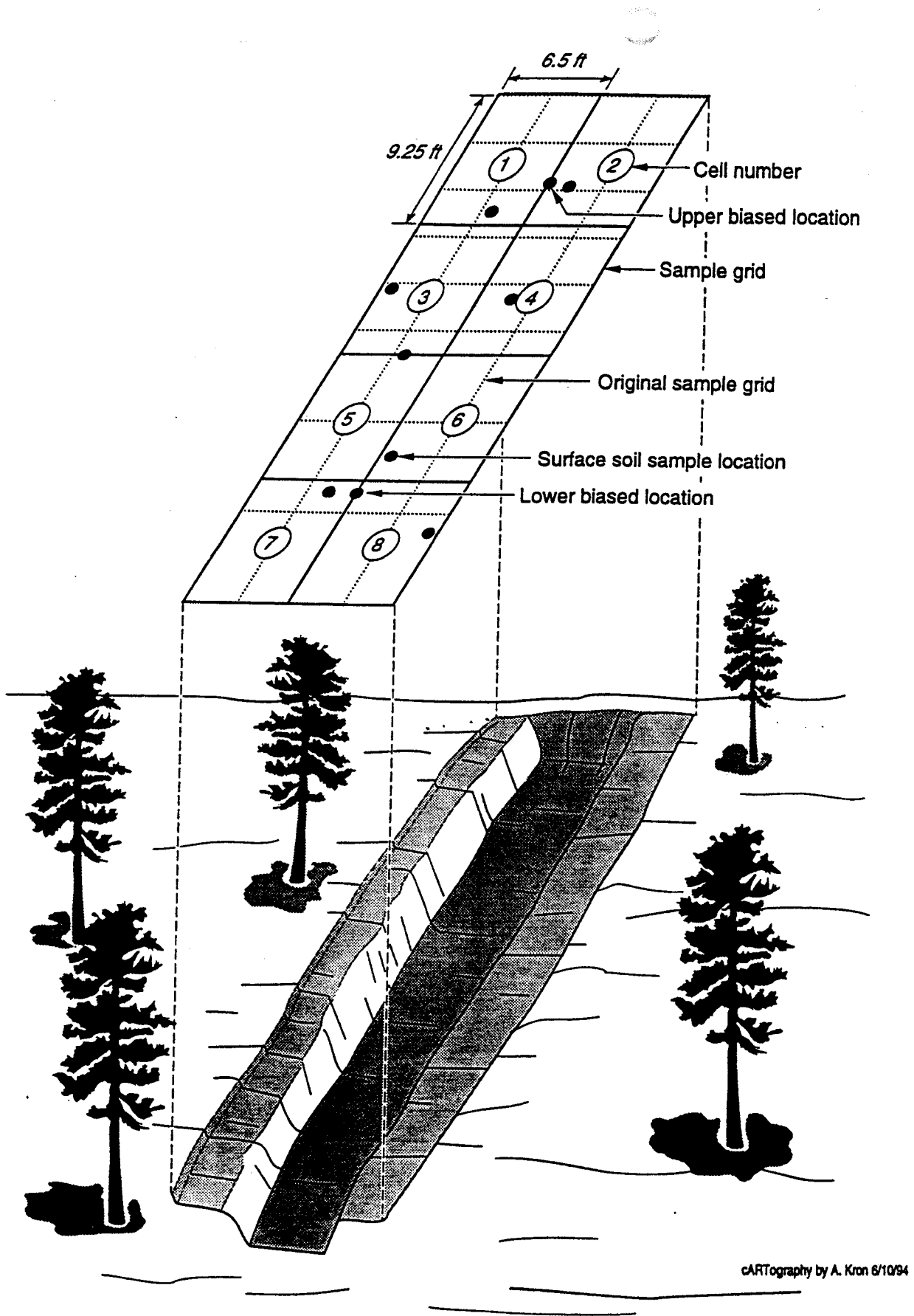


Figure 2. Lift 2 sample locations.

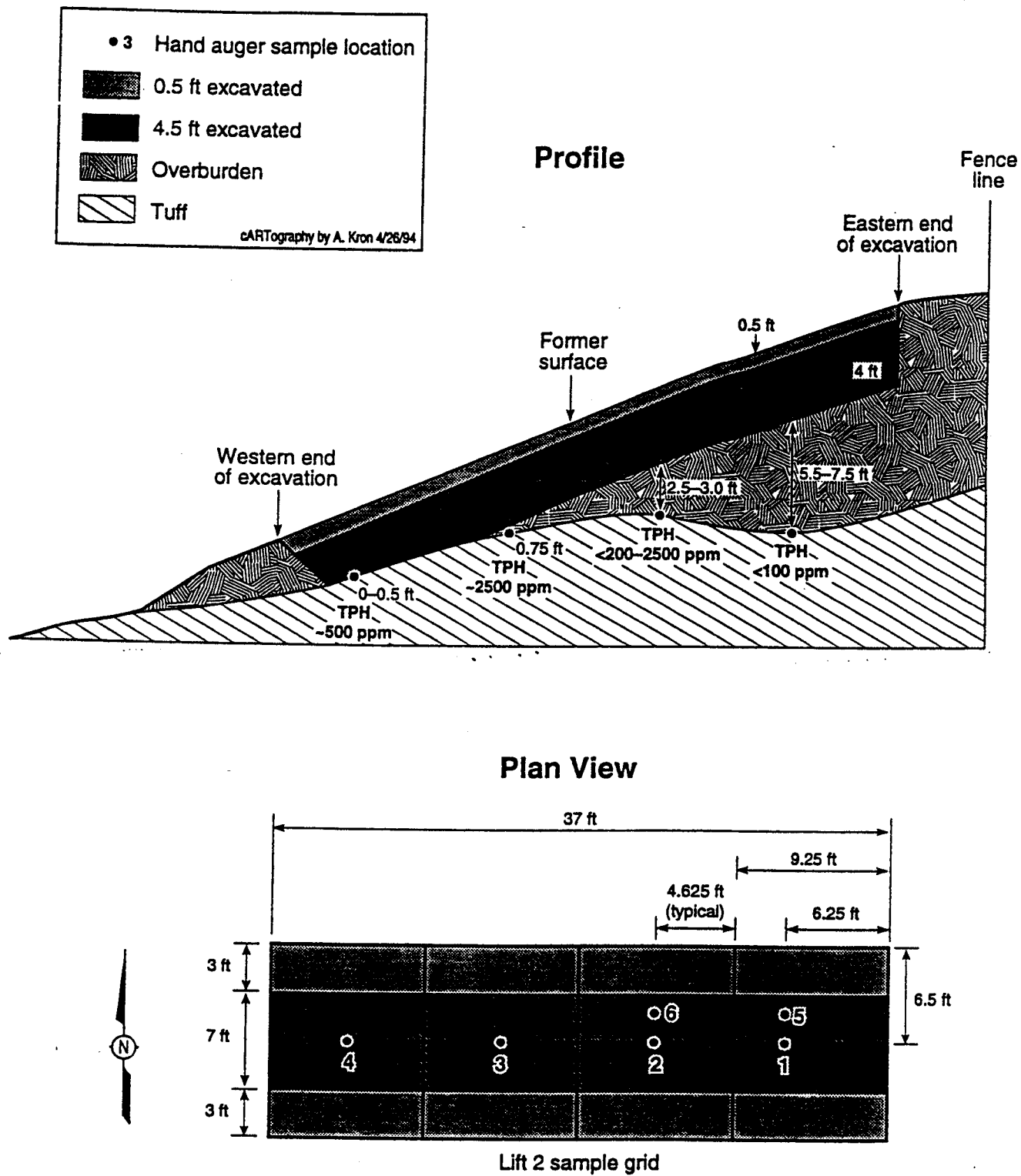


Figure 3. Hand auger sample locations, tuff interface, and TPH field test kit results.



**TABLE 1**  
**Analytical Results from Hg Field Test Kits**  
**and a TPH Field Laboratory IR Instrument**

Location	Hg (ppm)	TPH at 12 feet BLS* (ppm)	TPH at 13 feet BLS* (ppm)	TPH at 14 feet BLS* (ppm)	TPH at 15 feet BLS* (ppm)
Cell 1	<1	N/A	240	210	830
Cell 2	3.6	N/A	6500	144	4400
Cell 3	5.0	N/A	4200	2582	2200
Cell 4	4.1	N/A	7000	7671	12000
Cell 5	3.9	1200	1500	8114	5700
Cell 6	<1	16	7700	9205	7700
Cell 7	3.6	150	460	1031	210
Cell 8	<1	750	130	15	10
Upper biased	6.4	N/A	N/A	N/A	15000
Lower biased	3.7	N/A	N/A	N/A	2000
East Vertical Wall	<1	N/A	N/A	N/A	10

N/A = Not Applicable; sample not taken at this location.  
 \* BLS = below land surface at east end of site; base of excavation is nearly level.

**TABLE 2****Field Kit TPH Results at OU 1114 PRS 3-010(a)  
Sampling on 4/18/94 after lift 2**

Sample Location (Location/FIMAD#)	Depth (feet)	Concentration (ppm)	Description
#1 (03-1261)	1.5-2	<500	first sample
#1 (03-1261)	3.5-4	2,500	second sample
#1 (03-1261)	5-5.5	<100	Tuff?
#2 (03-1271)	1.5-2	10,000	first sample
#2 (03-1271)	2.5-3	2,500	Tuff?
#3 (03-1272)	0-0.75	2,500	Tuff?
#4 (03-1273)	0-0.5	500	Tuff
#5 (03-1274)	7-7.5	<100	Tuff?
#6 (03-1275)	2-2.5	<200	Tuff?
#7 (03-1276)	0-0.5	<100	background

TUFF? indicates sample was collected at auger refusal, which is assumed to be the soil tuff interface.

**TABLE 3**  
**VOA and Mercury Confirmatory Sample Results**

Analyte	Upper Biased Sample* (mg/kg)	Lower Biased Sample (mg/kg)	East Vertical Wall Sample (mg/kg)	SAL (mg/kg)
Mercury	0.90	6.90	ND (0.11)	24.00
Chloromethane	0.13	ND(0.012)	ND(0.012)	6.40
1,1-Dichloroethene	<b>60.00</b>	0.04	0.003J	0.59
1,1-Dichloroethane	0.21	ND(0.006)	ND(0.006)	410.00
Chloroform	0.07	ND(0.006)	ND(0.006)	0.21
1,1,1-Trichloroethane	820.00	0.51	0.30	1,000.00
1,2-Dichloroethane	<b>0.90</b>	ND(0.006)	ND(0.006)	0.20
Benzene	0.38	ND(0.006)	ND(0.006)	0.67
Trichloroethene	<b>8.60</b>	0.004J	ND(0.006)	3.20
cis-1,3-Dichloropropene	0.06	ND(0.006)	ND(0.006)	0.17
1,1,2-Trichloroethane	0.14	ND(0.006)	ND(0.006)	6.30
Tetrachloroethane	0.02J	ND(0.006)	ND(0.006)	5.90
Ethylbenzene	0.025J	ND(0.006)	ND(0.006)	3,100.00
Isopropylbenzene	0.05	ND(0.006)	ND(0.006)	NA
1,3,5-Trimethylbenzene	0.015J	ND(0.006)	ND(0.006)	NA
1,2,4-Trimethylbenzene	0.02J	ND(0.006)	ND(0.006)	NA

All concentrations are in mg/kg

J = Result is an estimate below the method quantitation limit

ND(##) = Result is not detected, value in parentheses is the quantitation limit

NA = Screening Action Level is not defined for these analytes

**Results in bold are above the SAL**

\* Results for the upper biased sample are from several different analyses in order to get the appropriate dilution for all analytes in the sample.

**TABLE 4**  
**Radionuclide Laboratory Analyses from SWMU 3-010(a)**  
**Samples Collected After 2nd Lift**

Sample ID#	Cell Location	H3 (pCi/ml)	Plutonium-238 (pCi/g of dry soil)	Plutonium-239 (pCi/g of dry soil)	Cs-137 Gamma Spectroscopy (pCi/g of dry soil)
94.06580	lower biased	42.91	0.010	0.589	<1.19
94.06581	#1	59.22	0.003	0.020	<1.26
94.06582	#2	85.44	0.003	0.011	<1.1
94.06583	#3	9.72	0.005	0.118	<0.72
94.06584	#4	43.71	0.001	0.020	<0.78
94.06585	#5	90.42	0.003	0.017	<0.98
94.06586	#6	93.76	0.002	0.013	<0.78
94.06587	#7	44.23	0.004	0.189	<0.83
94.06588	#8	0.56	0.001	0.005	1.00
94.06589	upper biased	44.29	0.001	0.010	1.76
94.06579**	upper biased duplicate	NA	0.003	0.007	<1.03

**\*\*Lab results require confirmation**

<b>SAL</b>	
Tritium	1.5 E 7 pCi/g
Plutonium	27 pCi/g
Gamma	Depends on isotope

**TABLE 5**  
**Tritium Laboratory Analyses from SWMU 3-010(a)**  
 Samples collected after 2nd Lift

Sample ID#	Cell Location	H3 (pCi/ml)	Soil Moisture (%)	H3 In TPH (pCi/g of dry soil)	Total H3 In water (pCi/g of soil)	Total H3 (pCi/g of soil)	Total H3 (mCi/m3)	% Total H3 In water	% Total H3 In TPH
94.06580	lower biased	42.91	14.0%	84.82	6.0	90.8	0.182	7%	93%
94.06581	#1	59.22	15.5%	18.74	9.2	27.9	0.056	33%	67%
94.06582	#2	85.44	15.9%	66.46	13.6	80.0	0.160	17%	83%
94.06583	#3	9.72	15.1%	6.24	1.5	7.7	0.015	19%	81%
94.06584	#4	43.71	11.3%	2.46	4.9	7.4	0.015	67%	33%
94.06585	#5	90.42	14.8%	32.28	13.4	45.7	0.091	29%	71%
94.06586	#6	93.76	12.2%	31.55	11.4	43.0	0.086	27%	73%
94.06587	#7	44.23	12.3%	72.24	5.4	77.7	0.155	7%	93%
94.06588	#8	0.56	16.9%	0.28	0.1	0.4	0.001	25%	75%
94.06589	upper biased	44.29	17.2%	24.02	7.6	31.6	0.063	24%	76%
94.06579**	upper biased duplicate	NA	NA	38.86	NA	NA	NA	NA	NA
<b>**Lab results require confirmation</b>									
NA = Not Applicable									