

TUESDAY, JULY 26, 1991



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Energy/
Environment
Systems Division

July 26, 1991

Mr. James Wagoner, II
FUSRAP Program Manager
Decontamination and Decommissioning
Division
Office of Environmental Restoration
and Waste Management
U.S. Department of Energy
Washington, DC 20545

Subject: **DRAFT VERIFICATION SURVEY OF PARCEL 1A
ELZA GATE SITE, OAK RIDGE, TENNESSEE**

Dear Mr. Wagoner:

7/26/91 (date added)

Enclosed are five copies of the draft report for the Verification Survey of Parcel 1A, Elza Gate Site for your review and comment.

Should you have any questions, please do not hesitate to contact either Michele Landis at FTS 626-2908 or myself at FTS 626-5073.

Sincerely,

Timothy J. Vitkus
Environmental Project Leader
Environmental Survey and
Site Assessment Program

TJV:jls

cc: A. Mitchell, OTS
D. Adler, DOE/OR
M. Landis, ORAU
Site File: EGS/335

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**DRAFT
VERIFICATION SURVEY
OF PARCEL 1A
ELZA GATE SITE
OAK RIDGE, TENNESSEE**

INTRODUCTION AND SITE HISTORY

The 8.1 hectare (20 acre) Elza Gate Site is located in the southeastern portion of the city of Oak Ridge, Tennessee. In the early 1940's, the Manhattan Engineer District (MED) operated five warehouses on the site. It is known that three of the warehouses were used to store pitchblende (a high-grade uranium ore) as well as sludges and other tailings and residues from the uranium refining process. Historical documentation indicates that some of these materials may have been released when container packaging deteriorated. The resultant contaminants included uranium in natural isotopic abundances, radium and thorium.

In 1946, ownership of the site was transferred to the Atomic Energy Commission (AEC), predecessor organization to the Department of Energy (DOE), who used the site until the early 1970's. During this period, the AEC stored radioactively contaminated materials generated at Oak Ridge National Laboratory and the Oak Ridge Y-12 Plant. DOE discontinued use of the facility and performed radiological surveys and decontamination under guidelines and criteria which were current in 1972. The site was then released for unrestricted use and the property title transferred to the city of Oak Ridge. The property was initially sold to a metal plating company and finally sold to the current owner in 1988. Presently, the site is comprised of nine different parcels. Additionally, Parcel 1 has recently been subdivided into Parcel 1A and 1B. Four of these parcels contain the five concrete foundations from the MED warehouses. Electro-Panel, Inc., a manufacturer of metal boxes for containment of low-level radioactive wastes, occupies the only building on the site and is located on Parcel 1A. The building was constructed over one of the concrete pads previously mentioned.

The DOE has implemented remedial actions for Parcel 1A under the Formerly Utilized Sites Remedial Action Program (FUSRAP) to remove contamination that was a result of the previous MED/AEC activities and release the site for unrestricted use. Future plans call for remediation of the remainder of the site.

It is the policy of the DOE to perform independent verifications of the effectiveness of remedial actions conducted within FUSRAP. The Environmental Survey and Site Assessment Program (ESSAP) of Oak Ridge Associated Universities (ORAU) was designated by the DOE as the organization responsible for this task at the Elza Gate Site. Verification activities were conducted in phases for Parcel 1A during the months of March, April, and May and are the subject of this report.

SITE DESCRIPTION

The Elza Gate Site is located in the eastern portion of the City of Oak Ridge and is bounded by the L & N railroad tracks to the north, Melton Lake Dr. to the east, and the Clinch River to the south and west (Figure 1). The site contains five concrete pads with a single building, occupied by Electro-Panel, Inc., constructed on Pad 1 (Figure 2).

Parcel 1A contains an area of approximately 0.8 hectares (1.9 acres). The Electro-Panel building is a single-story structure with floor space of 1800 m² (20,000 ft²) of which Pad 1 comprises 980 m² (10,500 ft²) of the floor area (Figure 3).

Parcel 1A remedial activities conducted by Bechtel National, Inc., the FUSRAP project management contractor (PMC), included removal of Pad 1 in three phases and excavation of the underlying contaminated soil. The exterior portion of the property required soil excavation from five localized areas of contamination. The concrete rubble created was segregated into releasable and non-releasable piles and stored separately on-site as was the contaminated soil.

PROCEDURES

Objective

The objective of the survey was to confirm that the remedial actions conducted the PMC were successful in meeting DOE guidelines so that Parcel 1A could be released without radiological restrictions.

Document Review

The PMC's Characterization Report and post-remedial action data were reviewed for accuracy, completeness, and compliance with DOE radionuclide surface activity and residual soil concentration guidelines.

Survey Procedures

Between March 25 and May 31, 1991, ORAU personnel conducted independent measurement and sampling activities of Parcel 1A at the Elza Gate Site.

Interior

Reference Grid

1. The existing grid, established by the PMC, was used to reference measurement and sampling locations. The interior grid encompassing Pad 1 consisted of 10 m by 10 m blocks.

Surface Scans

2. As each phase of the pad removal was completed, 100% gamma surface scans of exposed soils were conducted using portable NaI(Tl) gamma scintillation detectors coupled to ratemeters with audible indicators. Areas of elevated contact radiation were marked for further investigation.
3. Exposed edges of the concrete pad were scanned in order to detect any elevated beta-gamma activity, using thin window GM detectors coupled to ratemeter/scalers with audible indicators.

Surface Activity Measurement

4. Twenty (20) randomly selected 1 m² blocks of the concrete rubble, identified by the PMC as releasable without radiological restriction, were surface scanned on the top, bottom, and sides. For each block, five-point direct measurements for total alpha and beta-gamma activity were made on the side which exhibited the highest activity. Scans and measurements were made using ZnS alpha scintillation and thin-window GM detectors coupled to ratemeter/scalers. For each concrete block, smear samples to determine removable activity levels, were collected from the five-point direct measurement location, exhibiting the highest total activity level.

Soil Sampling

5. Surface soil samples were collected from five representative locations within six (6) randomly selected grid-blocks for laboratory analysis. In addition, seven (7) soil samples were collected from areas where gamma scans identified elevated activity greater than 1.5 times that of site background (Figure 4).

Exposure Rates

6. Exposure rate measurements were made at four (4) locations within the excavated area using a pressurized ionization chamber (Figure 4).

Exterior

Reference Grid

1. The PMC's reference grid for the site consisted of 100 ft by 100 ft grid blocks. Where excavation work was conducted, 1 m by 1 m grids were established with main site grid coordinates used to reference south and west boundaries (X and Y axis) of each excavation.

Surface Scans

2. Gamma radiation surface scans were conducted within excavations as well as all of Parcel 1A using NaI(Tl) gamma scintillation detectors coupled to ratemeters with audible indicators. Areas of elevated contact radiation were marked for further investigation.

Soil Sampling

3. Within excavations, either five-point or single-point (from the area exhibiting the highest contact gamma radiation level) soil samples were collected (Figures 5-7).
4. Three (3) soil samples were collected from the surface and subsurface of locations within Parcel 1A identified during gamma scans (Figure 8). A post-remedial action soil sample was collected by the PMC and provided to ORAU for analysis.

Exposure Rates

5. Exposure rate measurements were made at four locations using a pressurized ionization chamber (Figure 5).

DATA INTERPRETATION AND SAMPLE ANALYSIS

Samples and direct measurement data were returned to ORAU's laboratory for analysis and interpretation. Individual soil samples were analyzed by solid-state gamma spectrometry for U-238, Th-232 and Ra-226. For interior locations, equal aliquots of the five samples from selected grid blocks were composited in the laboratory. These composite samples together with selected samples from locations identified during surface scans were analyzed by alpha spectrometry for Th-230. Samples collected from exterior locations were not analyzed for Th-230. Smear samples were analyzed for gross alpha and gross beta activity with a low background proportional counter.

FINDINGS AND RESULTS

Document Review

Review of the characterization report, data and project summary transmitted by the PMC provides adequate support of the success of remedial actions in meeting DOE guidelines. Comments will be provided to the PMC requesting clarification to deficiencies identified in the PMC's data transmittal letter #078999. These deficiencies should be addressed in the PMC's Post-Remedial Action Report.

↓
If ORAU feels deficiencies should be addressed + mentioned it should be attached, otherwise delete comment from this report

Interior

Surface Scans

Gamma scans of the soil beneath Pad 1 detected small areas of elevated activity which were identified to the PMC. The majority of the locations found were the result of small pieces of contaminated concrete scattered within the soils. Upon removal of the concrete by the PMC, activity returned to background levels. One localized area of contaminated soil was found adjacent to one of the concrete footers within the Phase 1 excavation area. At a later time, additional excavation was performed by the PMC and a post-remedial soil sample was provided to ORAU. Gamma scans of the remaining area did not indicate the presence of any additional areas of elevated activity.

Beta-gamma scans of the exposed edges of the remaining concrete pad did not identify any significant elevated activity. Random scans of the concrete blocks, identified for release and disposal at a sanitary landfill, identified elevated activity on several blocks. As a result of these findings, the PMC performed additional surveys of the concrete rubble in order to ensure that the material was releasable and resegregated as necessary. *was this*

Measurement of Surface Activity

Surface activity measurements collected from the 1 m² sections of concrete are summarized in Table 1. Five-point direct measurement activities ranged from < 66 to 150 dpm/100 cm² and < 910 to 6800 dpm/100 cm² for alpha and beta-gamma respectively. The highest average activity over 1 m² sections of concrete were < 83 dpm/100 cm² for alpha and 3400 dpm/100 cm² for beta-gamma.

Removable activity levels were less than the detection limit of the procedure which is < 6 dpm/100 cm² for alpha and < 13 dpm/100 cm² for beta.

Radionuclide Concentrations in Soil

Concentrations of radionuclides found in soils beneath Pad 1 are summarized in Tables 2 and 3. Final concentrations of radionuclides of concern, after additional remediation, are as follow: U-238, 0.2 to 17.7 pCi/g; Ra-226, 0.1 to 4.1 pCi/g; Th-230, 0.91 to 2.53 pCi/g; Th-232, 0.1 to 2.2 pCi/g.

Exposure Rates

Exposure rates at one meter above the surface are summarized in Table 4. Levels for the site ranged from 8 to 10 $\mu\text{R/h}$. Background measurements in the Oak Ridge area are typically in the 7 to 10 $\mu\text{R/h}$ range.

Exterior

Surface Scans

Gamma scans of the exterior portions of Parcel 1A detected one small area of elevated activity on the south side of the building. The location was identified to the PMC. At a later time, additional excavation was performed by the PMC and post-remedial soil samples were provided to ORAU. No other areas of significant elevated activity were identified during the walkover survey.

Radionuclide Concentrations in Soil

Concentrations of radionuclides found in soil samples collected from Parcel 1A are summarized in Tables 5 and 6. Final concentrations, after remediation of the elevated area previously discussed, for radionuclides of concern are as follow: U-238, 1.6 to 8.1 pCi/g; Ra-226, 0.5 to 1.4 pCi/g; Th-232, 0.4 to 1.7 pCi/g.

Exposure Rates

Exposure rate measurements made at four locations on Parcel 1A are summarized in Table 2. Exposure rates at one meter above the surface ranged from 6 to 8 $\mu\text{R/h}$. Background measurements in the Oak Ridge area are typically in the 7 to 10 $\mu\text{R/h}$ range.

COMPARISON OF RESULTS WITH GUIDELINES

The primary contaminant at Elza Gate was natural uranium. Natural uranium emits both alpha and beta radiations in approximately equal proportions; beta levels may therefore be considered representative of uranium surface activity. Because rough, dirty, or damp surfaces may selectively attenuate alpha radiation, beta activity was also measured and used for comparison. Guidelines for residual surface activity for natural uranium are:

Total Activity

5000 α dpm/100 cm^2 , averaged over 1 m^2

15,000 α dpm/100 cm^2 , maximum in a 100 cm^2 area

Removable Activity

1000 α dpm/100 cm^2 , removable

The generic guideline for thorium and radium in soil are as follows:

5 pCi/g averaged over the first 15 cm of soil below the surface

15 pCi/g averaged over 15 cm thick layers of soil more than 15 cm below
the surface

The residual uranium cleanup guideline developed for the Elza Gate Site is 35 pCi/g of U-238.

All final independent measurements and samples collected were within these guidelines and confirmed the data provided by the PMC.

SUMMARY

During the months of March, April and May, representatives from ORAU conducted verification measurements and sampling of Parcel 1A at the Elza Gate Site. The data collected verifies the data provided by the PMC which indicates that the property meets the DOE guidelines for release without radiological controls. However, contamination remains on contiguous properties and proper engineering controls should be implemented during future remedial actions to prevent recontamination of Parcel 1A.

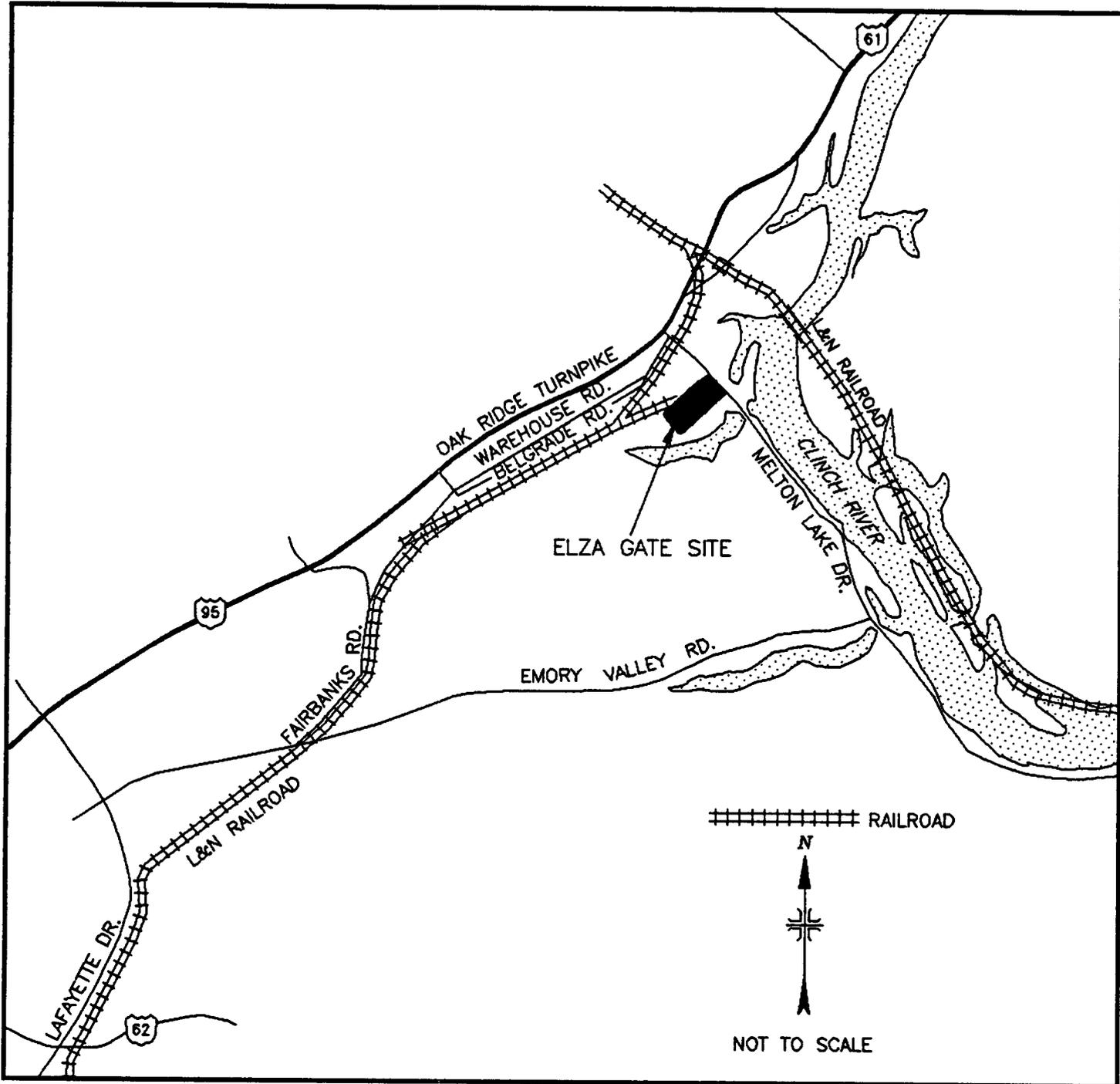
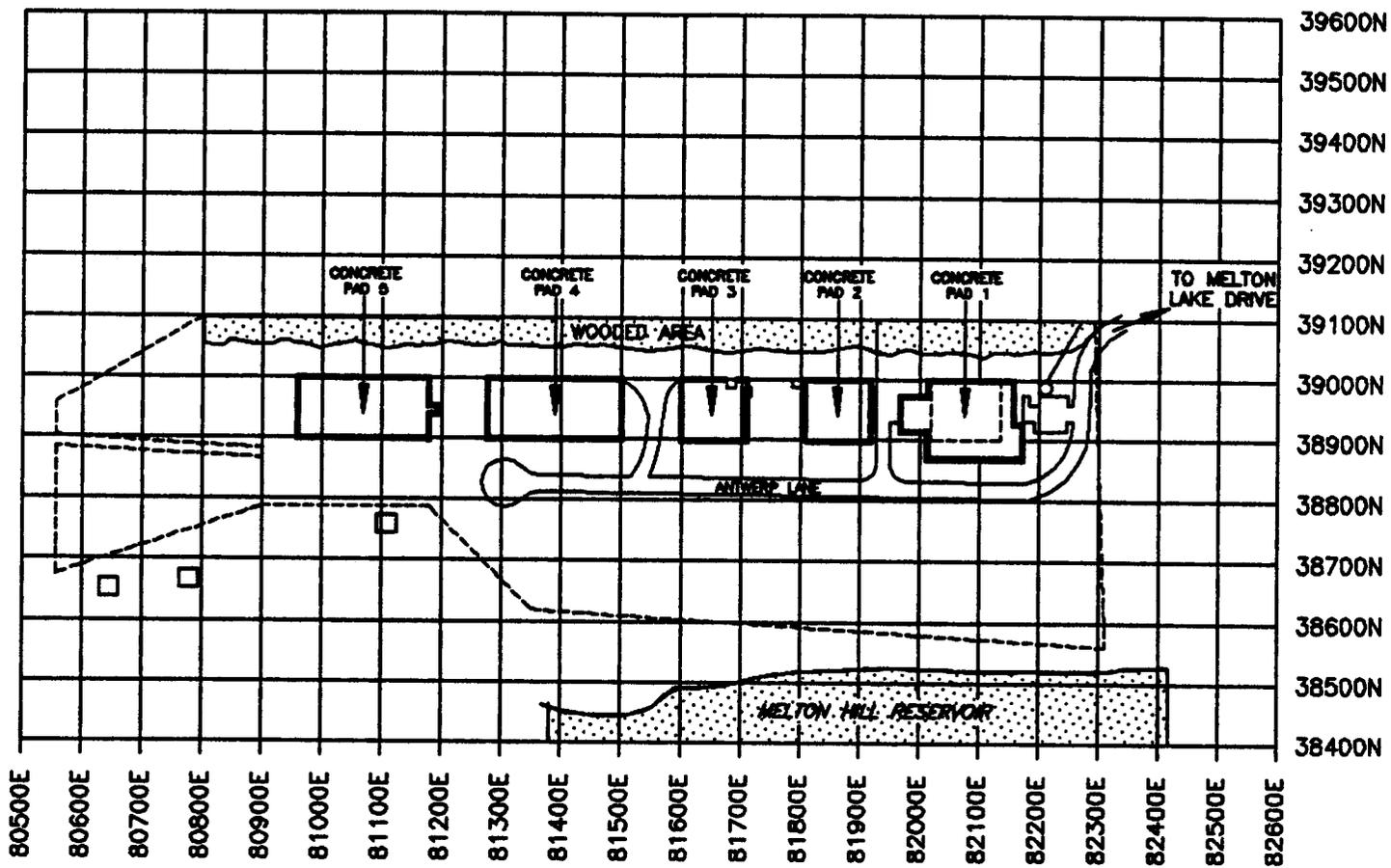


FIGURE 1: Location of the Elza Gate Site, Oak Ridge, Tennessee



----- PROPERTY LINE

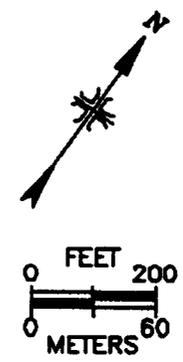


FIGURE 2: Elza Gate Site Showing Plot Plan and Reference Grid

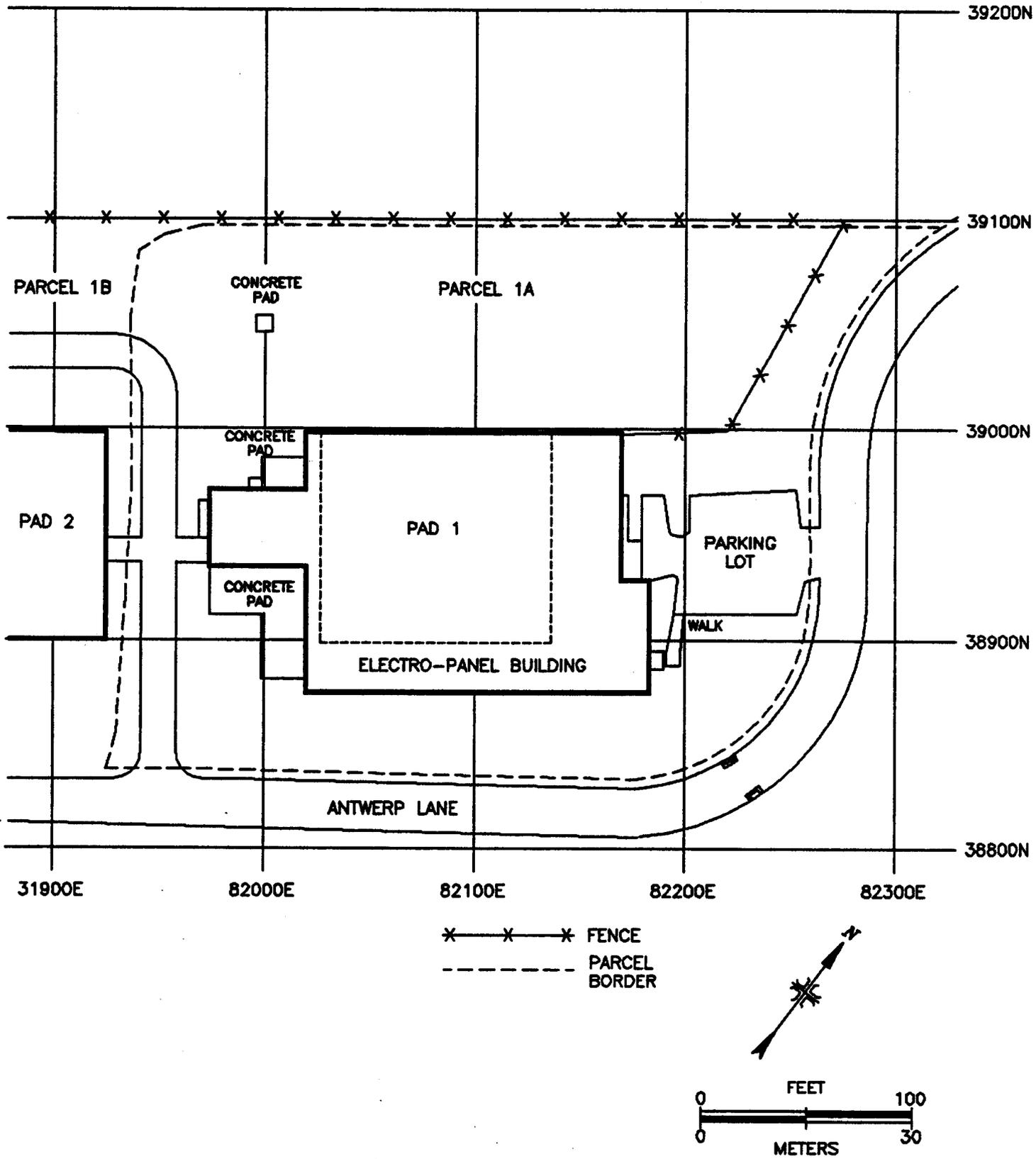


FIGURE 3: Plot Plan of Parcel 1A

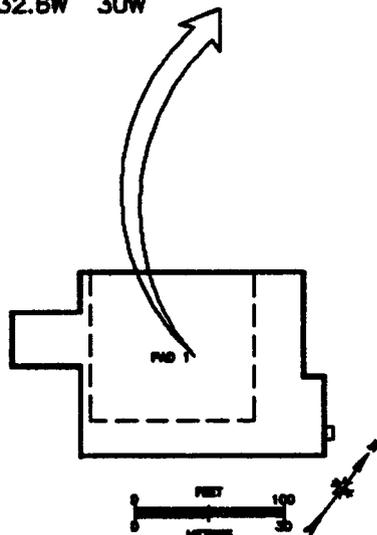
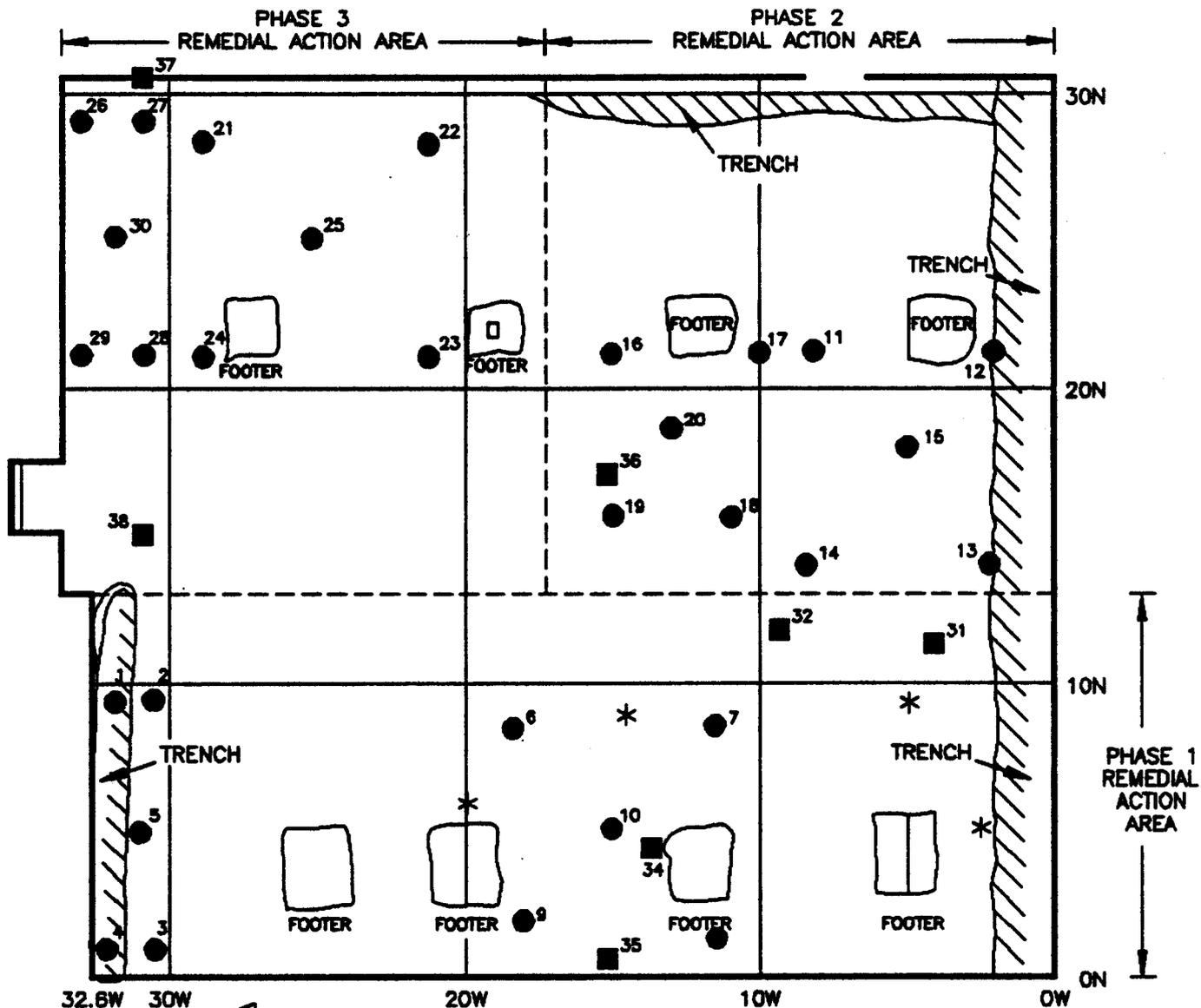
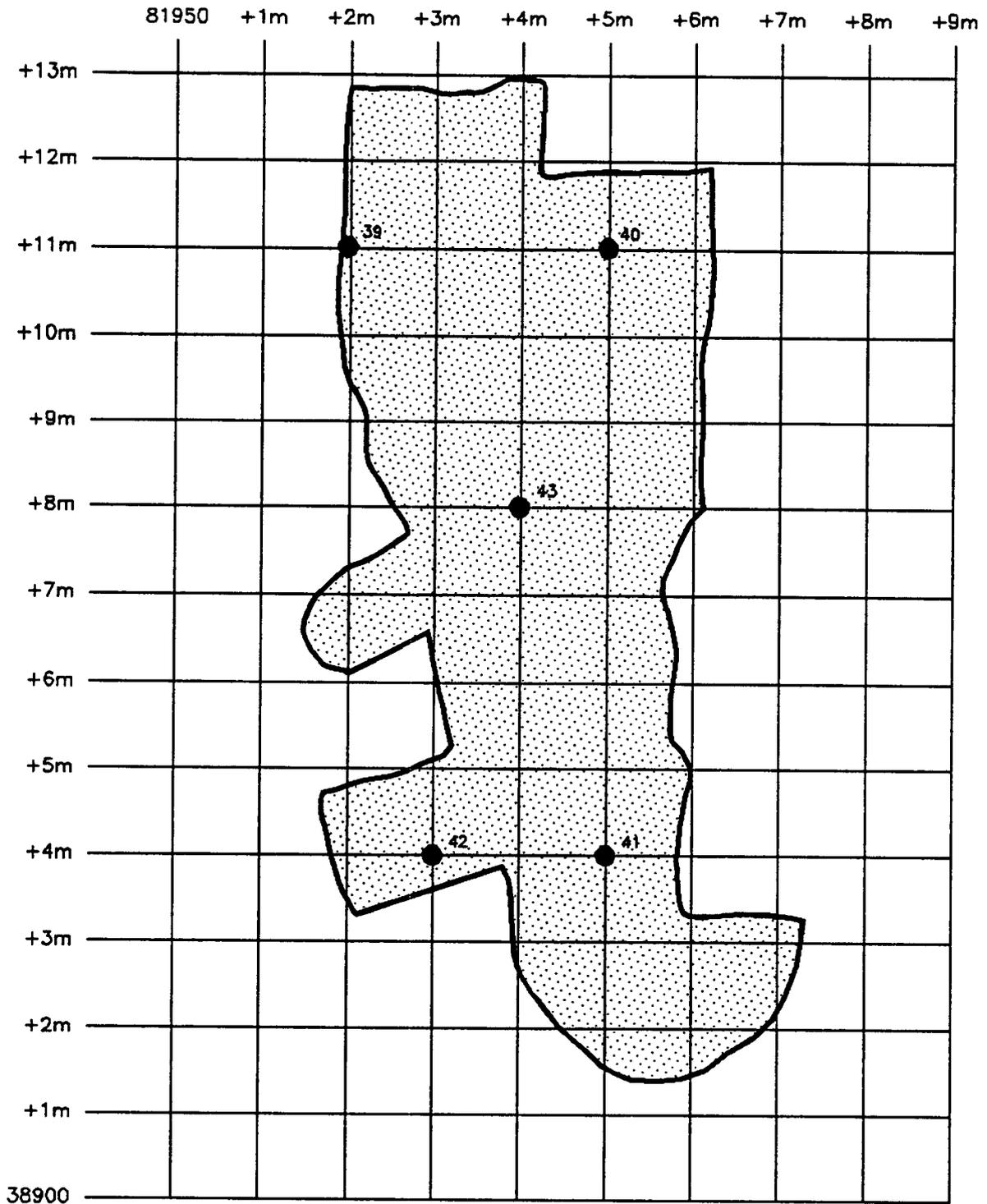


FIGURE 4: Pad 1 Excavation Showing Sampling and Measurement Locations



EXCAVATED AREA
SAMPLING LOCATIONS

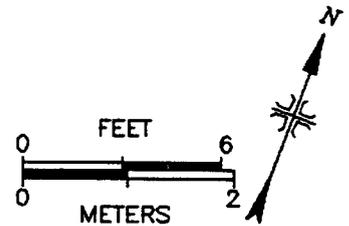


FIGURE 5: West Excavation Showing Soil Sampling Locations

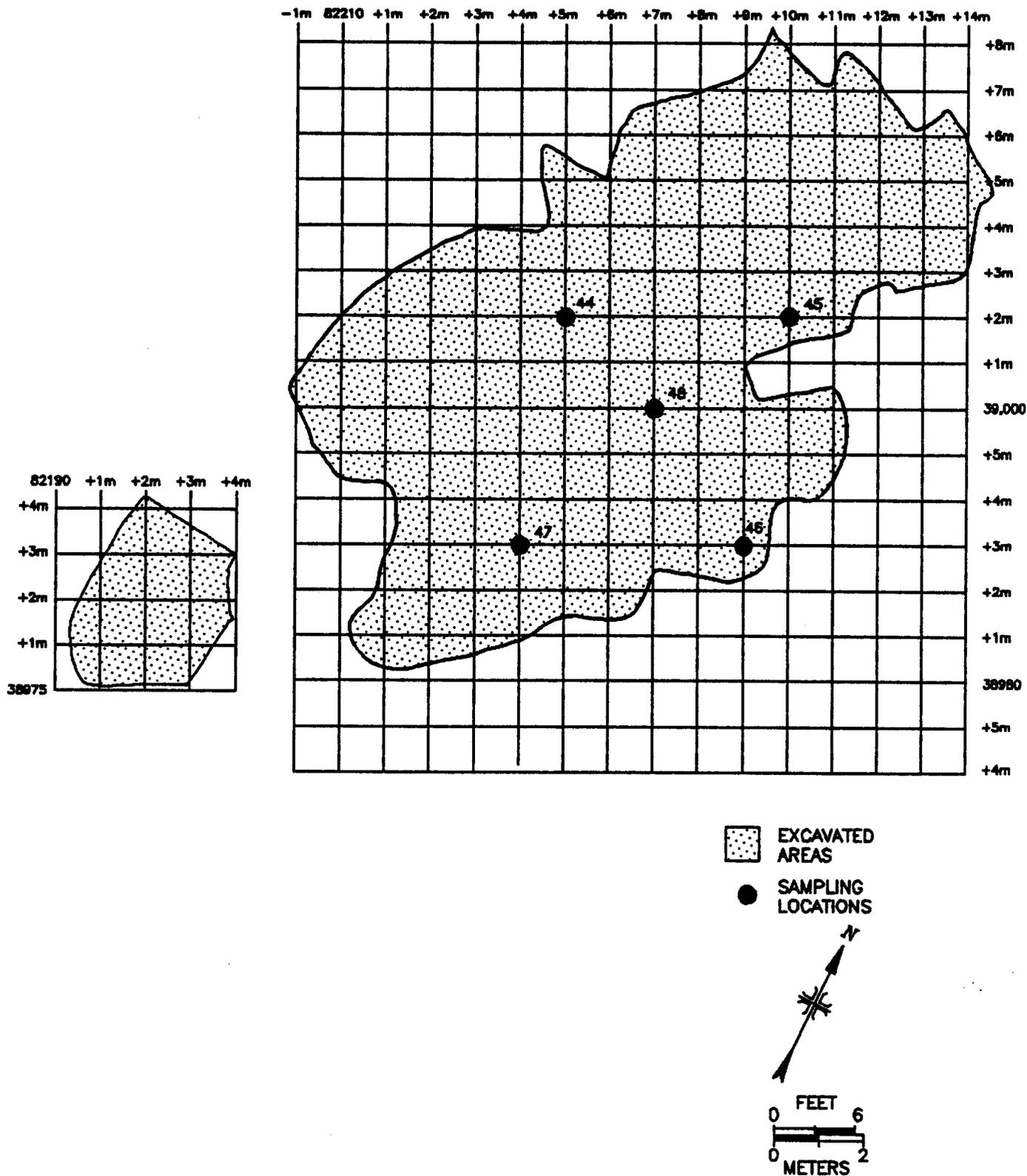


FIGURE 6: East Excavations Showing Sampling Locations

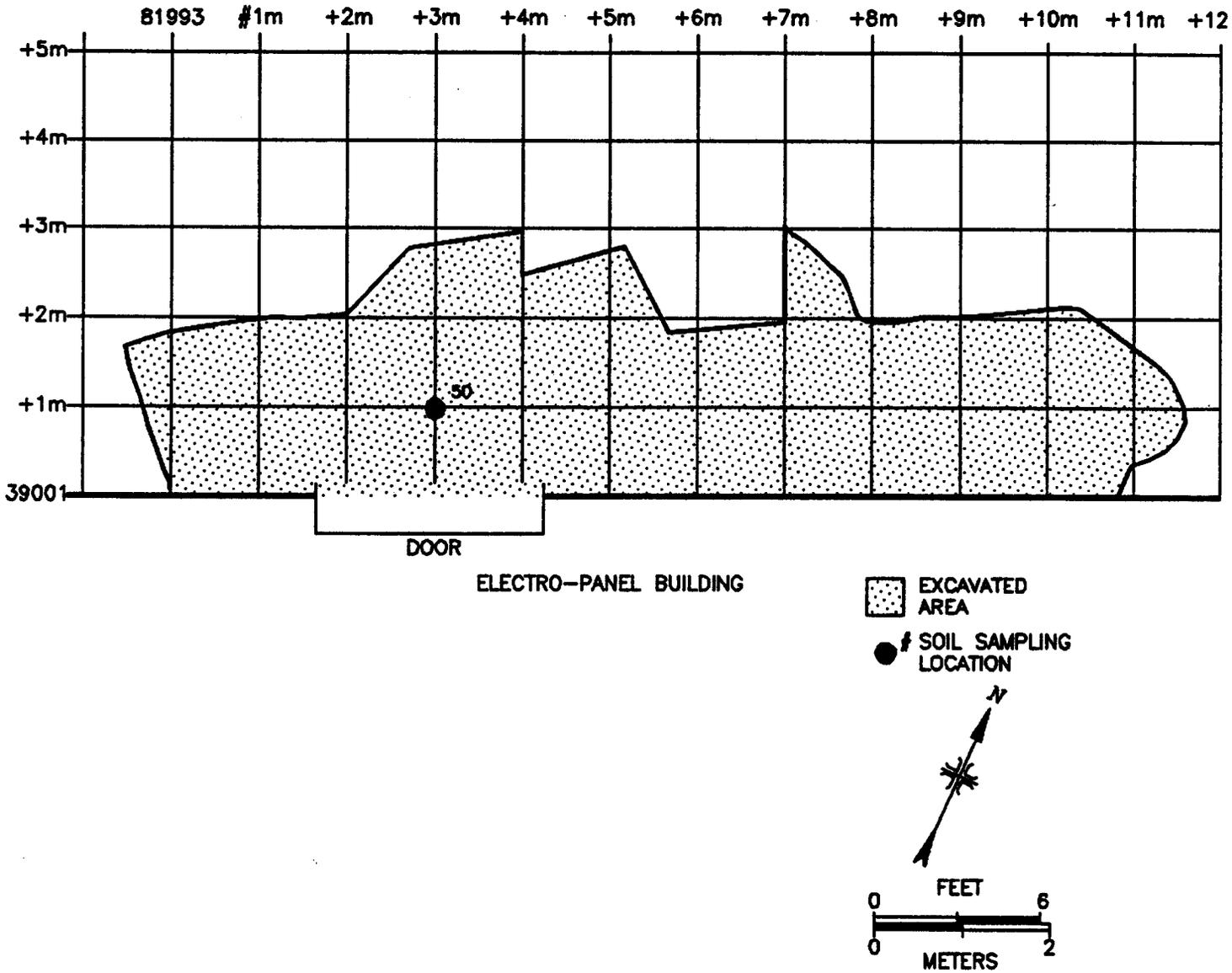


FIGURE 7: North Excavation Showing Sampling Location

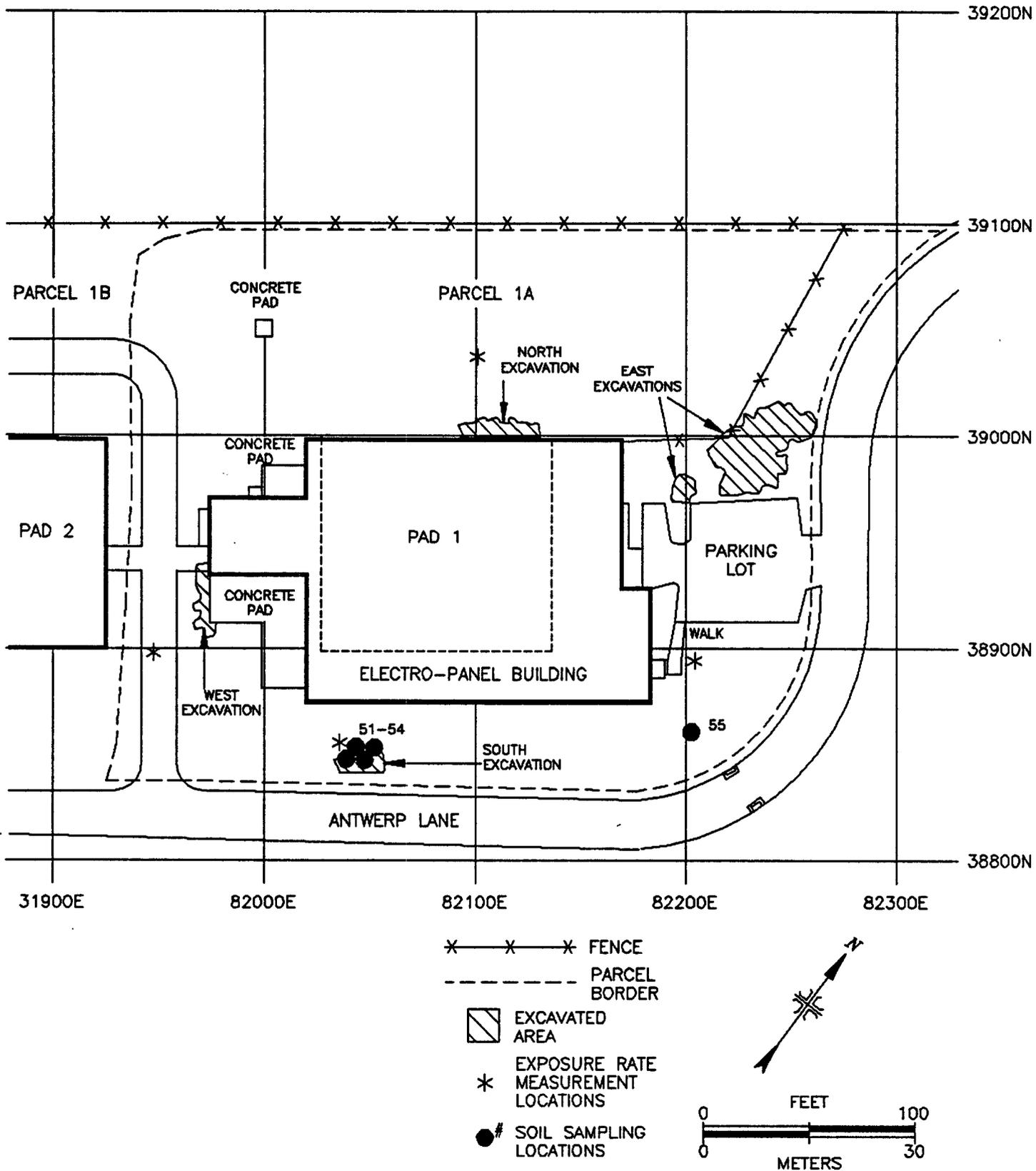


FIGURE 8: Parcel 1A Showing Excavated Areas and Measurement and Sampling Locations

TABLE 1

SUMMARY OF SURFACE ACTIVITY MEASUREMENTS
 PAD 1, CONCRETE RUBBLE
 ELZA GATE SITE, PARCEL 1A
 OAK RIDGE, TN

PAD REMOVAL PHASE	# OF FIVE-POINT MEASUREMENTS	HIGHEST GRID BLOCK AVERAGE dpm/100 cm ²		TOTAL ACTIVITY dpm/100 cm ²		REMOVABLE ACTIVITY dpm/100 cm ²	
		α	β	α range	β - γ range	α range	β range
Phase I	16	< 66	3,400	< 66 - 150	< 910 - 6,800	< 6	< 13
Phase II	5	< 83	1,500	< 83 - 120	< 960 - 3,900	< 6	< 13
Phase III	5	< 83	1,500	< 83	< 960 - 2,900	< 6	< 13

TABLE 2

RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES BENEATH PAD 1
 ELZA GATE SITE, PARCEL 1A
 OAK RIDGE, TN

SAMPLE NO.	GRID BLOCK LOCATION*	RADIONUCLIDE CONCENTRATION (pCi/g)			
		U-238	Ra-226	Th-230	Th-232
1	ON, 32.6W	4.1 ± 2.3 ^b	0.7 ± 0.3		1.4 ± 0.3
2		1.9 ± 1.5	0.6 ± 0.2		1.3 ± 0.3
3		1.7 ± 1.4	0.7 ± 0.2		0.9 ± 0.4
4		1.7 ± 1.4	0.6 ± 0.2		1.3 ± 0.4
5		< 2.4	0.5 ± 0.2		1.2 ± 0.5
Composite Sample (1 - 5)				0.91 ± 0.16	
6	ON, 20W	14 ± 3.0	0.5 ± 0.2		1.1 ± 0.5
7		4.7 ± 1.7	0.7 ± 0.2		1.0 ± 0.4
8		2.9 ± 1.7	0.8 ± 0.2		1.7 ± 0.5
9		3.3 ± 1.7	0.9 ± 0.2		0.8 ± 0.3
10		0.8 ± 0.8	0.3 ± 0.1		0.1 ± 0.2
Composite Sample (6 - 10)				1.16 ± 0.16	

TABLE 2 (Cont'd)

RADIONUCLIDE CONCENTRATIONS IN SOIL BENEATH PAD 1
ELZA GATE SITE, PARCEL 1A
OAK RIDGE, TN

SAMPLE NO.	GRID BLOCK LOCATION*	RADIONUCLIDE CONCENTRATION (pCi/g)			
		U-238	Ra-226	Th-230	Th-232
11	13N, 10W	14 ± 2.1	0.9 ± 0.2		1.8 ± 0.2
12		4.5 ± 1.3	1.1 ± 0.3		1.8 ± 0.5
13		1.3 ± 1.0	1.1 ± 0.2		1.4 ± 0.4
14		3.7 ± 1.0	1.1 ± 0.2		1.4 ± 0.4
15		2.3 ± 0.9	0.9 ± 0.2		1.3 ± 0.4
15 QC		2.2 ± 1.1	0.9 ± 0.2		1.7 ± 0.4
Composite Sample (11 - 15)				1.16 ± 0.17	
16	13N, 17W	11.9 ± 2.0	0.9 ± 0.2		1.1 ± 0.3
17		1.9 ± 1.1	0.8 ± 0.2		1.0 ± 0.5
18		2.7 ± 1.0	0.7 ± 0.2		1.0 ± 0.4
19		3.6 ± 1.1	0.8 ± 0.1		1.4 ± 0.4
20		7.7 ± 1.0	1.2 ± 0.2		1.0 ± 0.4
Composite Sample (16 - 20)				1.55 ± 0.18	

TABLE 2 (Cont'd)

RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES
ELZA GATE SITE, PARCEL 1A
OAK RIDGE, TN

SAMPLE NO.	GRID BLOCK LOCATION ^a	RADIONUCLIDE CONCENTRATION (pCi/g)			
		U-238	Ra-226	Th-230	Th-232
21	20N, 30W	2.0 ± 1.3	1.0 ± 0.3	---	1.4 ± 0.5
22		2.7 ± 1.1	1.3 ± 0.3	---	1.3 ± 0.4
23		7.9 ± 2.1	0.9 ± 0.2	---	1.3 ± 0.4
24		3.4 ± 1.3	0.9 ± 0.2	---	1.6 ± 0.5
25		2.1 ± 1.2	0.7 ± 0.3	---	2.2 ± 0.5
26	20N, 33W	1.3 ± 1.4	1.0 ± 0.3	---	1.4 ± 0.4
27		0.2 ± 0.1	0.10 ± 0.03	---	0.13 ± 0.03
28		1.5 ± 1.3	0.7 ± 0.2	---	2.2 ± 0.5
29		1.6 ± 1.6	0.7 ± 0.2	---	1.5 ± 0.5
30		1.3 ± 1.4	1.0 ± 0.3	---	1.4 ± 0.5
30 QC		2.0 ± 1.1	0.5 ± 0.2	---	1.5 ± 0.4

^aRefer to Figure 4.

^bUncertainties represent the 95% confidence level, based only on counting statistics; additional laboratory uncertainties of ± 6 to 10% have not been propagated into these data.

---No analysis performed.

TABLE 3

**RADIONUCLIDE CONCENTRATIONS IN SOIL BENEATH PAD 1
FROM LOCATIONS OF ELEVATED ACTIVITY IDENTIFIED BY SURFACE SCANS
ELZA GATE SITE, PARCEL 1A
OAK RIDGE, TN**

SAMPLE NO.	GRID BLOCK LOCATION*	RADIONUCLIDE CONCENTRATION (pCi/g)			
		U-238	Ra-226	Th-230	Th-232
31	11N, 4W	6.7 ± 1.9 ^b	1.6 ± 0.3	1.67 ± 0.20	1.4 ± 0.4
32	12N, 9.5W	14 ± 1.0	1.6 ± 0.3	2.53 ± 0.29	1.6 ± 0.5
33	4.5N, 13W	77 ± 5	1.0 ± 0.3	---	1.3 ± 0.5
34	4.5N, 13W Post Remedial Action	7.6 ± 2.9	1.1 ± 0.6	---	1.8 ± 1.0
35	3N, 15W	7.8 ± 1.6	4.1 ± 0.4	1.08 ± 0.06	1.2 ± 0.5
36	17N, 15W	17.7 ± 2.4	1.1 ± 0.2	---	1.6 ± 0.4
37	30.4N, 31W	2.7 ± 1.2	1.3 ± 0.1	---	1.5 ± 0.4
38	6.0 ± 1.3	3.4 ± 0.4	3.4 ± 0.4	---	0.8 ± 0.4

*Refer to Figure 4.

^bUncertainties represent the 95% confidence level, based only on counting statistics; additional laboratory uncertainties of ± 6 to 10% have not been propagated into these data.

---No analysis performed.

TABLE 4
EXPOSURE RATES
ELZA GATE SITE, PARCEL 1A
OAK RIDGE, TN

LOCATION ^a	μ R/h
Interior	
5N, 2W	8
9N, 5W	8
12.5N, 14W	10
6N, 20W	8
Exterior	
38900N, 81950E	6
38900N, 82200E	8
38849N, 82040E	8
39040N, 82100E	7

^aRefer to Figures 4 and 8.

TABLE 5

**RADIONUCLIDE CONCENTRATIONS IN SOIL, EXTERIOR EXCAVATIONS
ELZA GATE SITE, PARCEL 1A
OAK RIDGE, TN**

SAMPLE NO.	GRID BLOCK LOCATION ^a	RADIONUCLIDE CONCENTRATION (pCi/g)			
		U-238	Ra-226	Th-230	Th-232
	West Excavation				
39	N38990 + 11m, E81950 + 2m	4.4 ± 1.9	1.0 ± 0.3	---	1.5 ± 0.4
40	N38990 + 11.5m, E81950 + 5m	1.6 ± 1.1	1.4 ± 0.3	---	1.2 ± 0.4
41	N38990 + 4m, E81950 + 5m	4.8 ± 2.3	0.7 ± 0.3	---	1.5 ± 0.6
42	N38990 + 4m, E81950 + 3m	2.4 ± 1.1	1.1 ± 0.3	---	1.2 ± 0.4
43	N38990 + 8m, E81950 + 4m	1.8 ± 2.0	0.5 ± 0.2	---	1.1 ± 0.3
	East Excavation				
44	N38880 + 8m, E82200 + 5m	2.4 ± 1.3	1.0 ± 0.2	---	0.9 ± 0.4
45	N38880 + 8m, E82200 + 10m	8.1 ± 2.3	1.0 ± 0.3	---	1.1 ± 0.4
46	N38880 + 3m, E82200 + 10m	2.0 ± 0.9	1.1 ± 0.3	---	0.9 ± 0.2
47	N38880 + 3m, E82200 + 5m	2.3 ± 1.5	1.0 ± 0.2	---	1.1 ± 0.4
48	N38880 + 6m, E82200 + 7m	2.6 ± 1.9	0.9 ± 0.3	---	1.2 ± 0.4
49	N38880 + 6m, E82200 + 7m, QC	1.7 ± 0.8	0.9 ± 0.2	---	1.4 ± 0.4
	North Excavation				
50	N39001 + 1m, E81993 + 3m	< 1.7	0.7 ± 0.1	---	1.7 ± 0.4

^aRefer to Figures 5-7.

^bUncertainties represent the 95% confidence level, based only on counting statistics; additional laboratory uncertainties of ± 6 to 10% have not been propagated into these data.

---No analysis performed.

TABLE 6

RADIONUCLIDE CONCENTRATIONS IN EXTERIOR SOIL
 FROM LOCATIONS OF ELEVATED ACTIVITY IDENTIFIED BY SURFACE SCANS
 ELZA GATE SITE, PARCEL 1A
 OAK RIDGE, TN

SAMPLE NO.	GRID BLOCK LOCATION*	RADIONUCLIDE CONCENTRATION (pCi/g)			
		U-238	Ra-226	Th-230	Th-232
51	38849N, 82041E	3.4 ± 1.7 ^b	1.0 ± 0.2	---	0.4 ± 0.3
52	38849N, 82041E	22 ± 3.8	15.8 ± 0.8	---	0.5 ± 0.8
53	38849N, 82040E	19 ± 3	26.9 ± 0.3	---	< 1.0
54	Post Remedial Action 38849N, 82040E	1.6 ± 0.8	1.2 ± 0.2	---	0.6 ± 0.3
55	38861N, 82201E	2.0 ± 1.0	1.0 ± 0.3	---	0.6 ± 0.4

*Refer to Figure 8.

^bUncertainties represent the 95% confidence level, based only on counting statistics;
 additional laboratory uncertainties of ± 6 to 10% have not been propagated into these data.

---No analysis performed.