Attachment 1

Radiation Survey Reports

and

ORISE Independent Field

Verification Report

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF SOLID & HAZARDOUS MATERIALS
BUREAU OF RADIATION & HAZARDOUS SITE MANAGEMENT
RADIATION SECTION

Radiation Survey Report

DATE OF SURVEY: **June 22, 2000**

NAME: **Brookhaven National Laboratory (BNL)**
ADDRESS: **P.O. Box 5000**
Upton, NY 11973

COUNTY: **Suffolk** DEC REGION: **1**

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TYPE OF SURVEY: **Post-remediation confirmation survey**

REPORTING STAFF MEMBER: **Robert Rommel**

Robert E. Rommel
Signature

8/16/00
Date of Report

ACCOMPANYING STAFF: **None**

REVIEWED BY: Barbara Youngberg DATE 8/17/00

SUMMARY

On June 22, 2000, in order to confirm that radionuclide soil concentrations met established cleanup goals, two areas of AOC 16 (AOC 16E.2 and 16E.3) which had undergone remediation and one area consisting of soils determined to be below cleanup goals by the Segmented Gate System (SGS) were surveyed using a portable gamma radiation detection instrument, and 11 soil samples were obtained for laboratory analysis. Outside of (but nearby) AOC 16E.2, two areas were discovered that exhibited elevated radioactivity at 6x and 10x background. These zones were not identified by BNL as requiring remediation prior to this survey, even though the largest area was 4.5 feet in diameter (based on readings greater than 3x background). Three of the samples obtained exceeded cleanup goals for cesium-137, which indicates that AOC 16E.2 was not sufficiently remediated as of the date of this survey.

INTRODUCTION

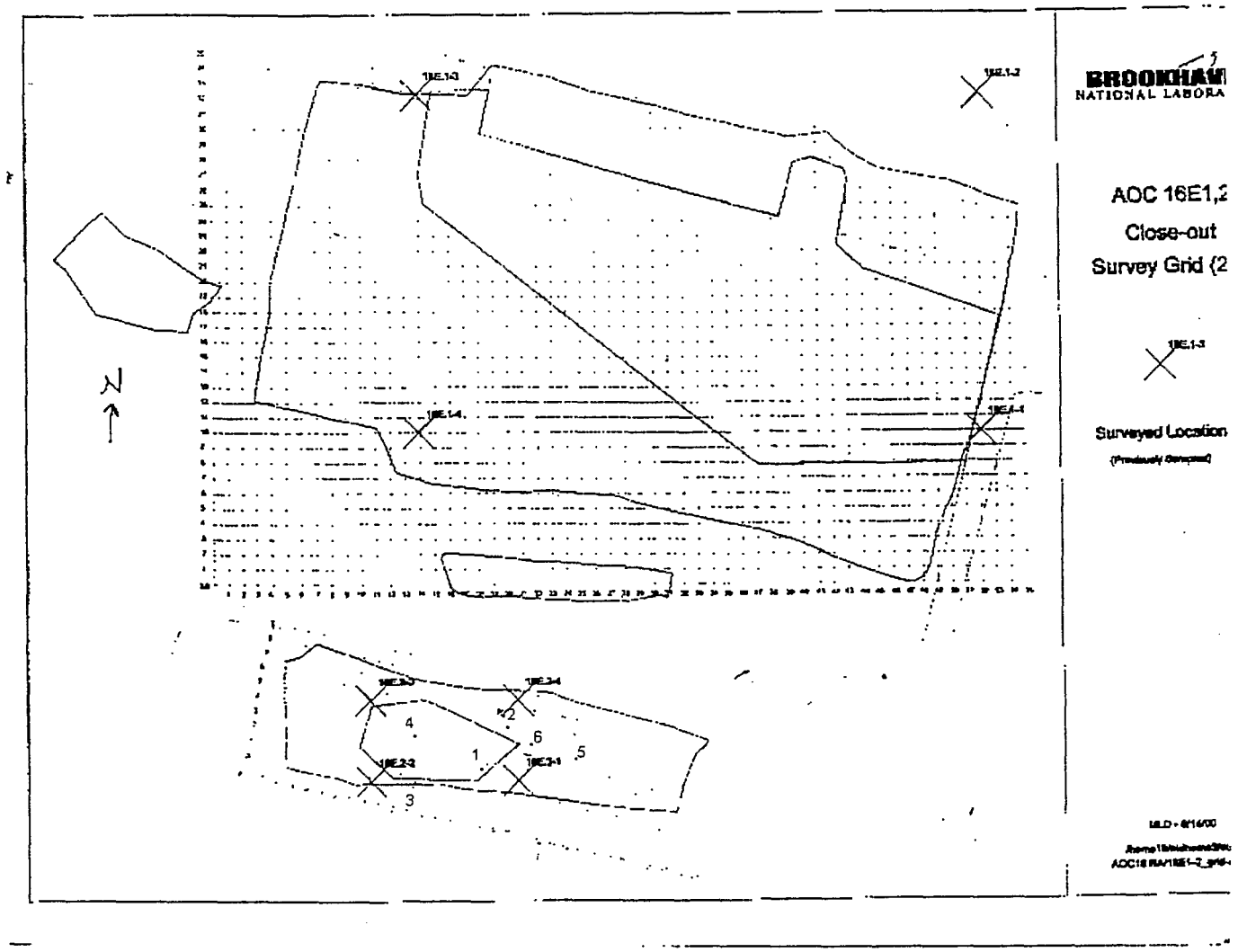
Aerial radiation surveys of BNL performed in 1980 and 1983 identified several unexpected areas on site that exhibited elevated radioactivity. Investigation of these areas identified the source as cesium-137 contaminated soils. These soils are believed to have come from the former Hazardous Waste Management Facility (HWMF), which was used for landscaping purposes throughout the site. Thus, these areas are known as the "Landscape Soils." The areas investigated during this survey were all south of Building 490, the Brookhaven Medical Research Reactor (BMRR).

As part of the AOC16 Final Status Survey, a member of the DEC's Radiation Section obtained confirmatory samples for radionuclide analysis after these areas were remediated. Some samples obtained were splits of samples obtained by this project's independent verification contractor (IVC), the Oak Ridge Institute for Science and Education (ORISE), others were independent based on DEC walkover survey results.

MATERIALS AND METHODS

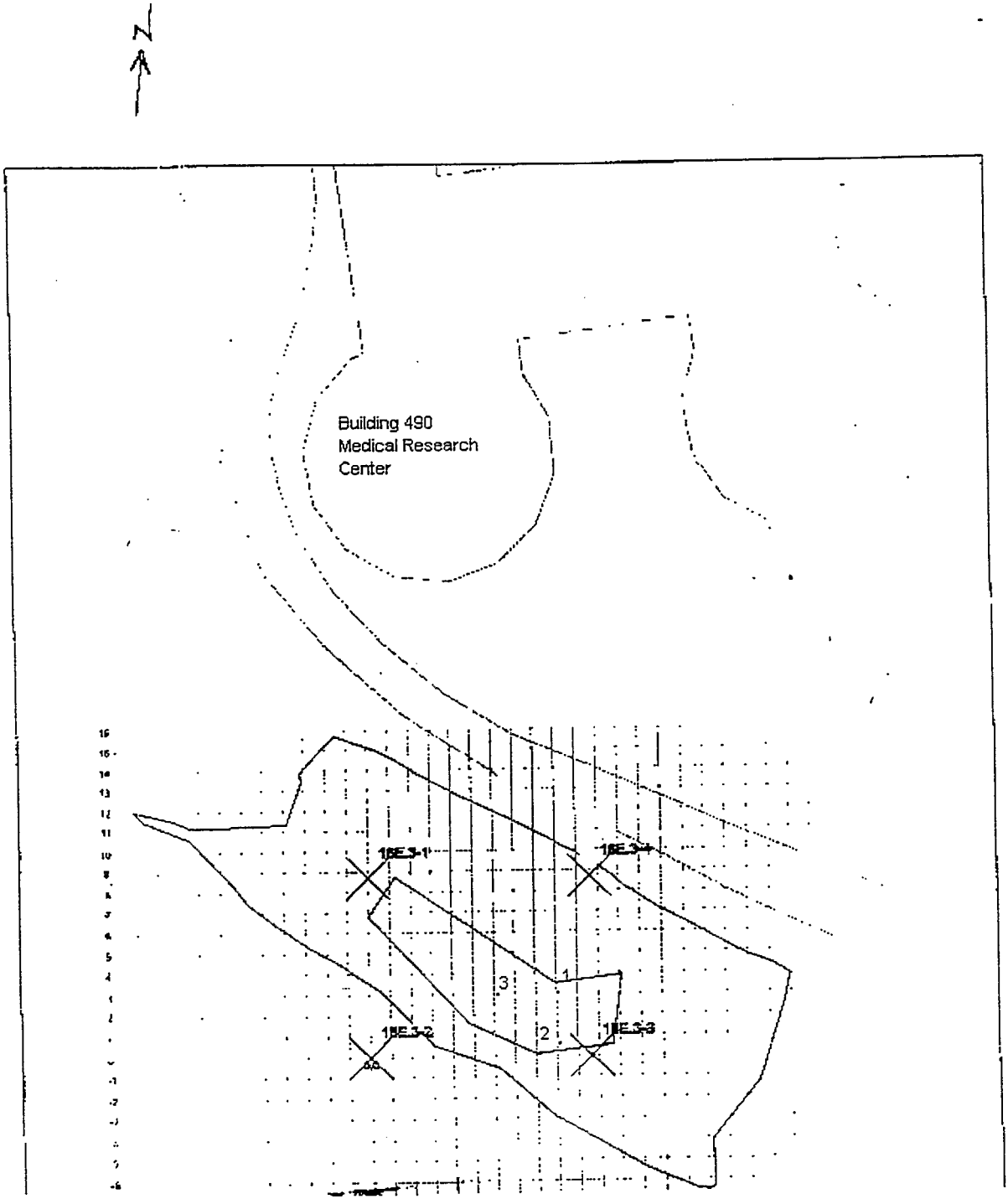
In total, eleven soil samples were taken from within and around the AOC 16E.2 and 16E.3 excavation areas. These were obtained from surface soils of the top 3 inches in all cases, removing any vegetation or large stones. Below are two diagrams showing the approximate sample locations.

Figure 1: Sample Locations in AOC 16E.2



Areas exhibiting elevated radioactivity that were detected outside of AOC 16E.2 are located at approximately sample locations 5 and 6 in Figure 1. The 60,000 CPM survey reading at the surface at the location of AOC 16E.2 sample 6 (NR100 0604S 062209) was small and localized (a few inches across), but the 96,000 CPM reading at AOC 16E.2 sample 5 (NR100 0604S 062208) was the maximum reading found in an area 4.5 feet in diameter (based on survey meter readings of greater than thrice background).

Figure 2: Sample Locations in AOC 16E.3



A gamma radiation detecting survey instrument was used to survey the excavated areas (Class 1 impacted areas in MARSSIM terminology) and the surrounding areas (Class 2 impacted) on June 22. Details of the instrument are provided below. Background was 6500 counts per minute (CPM) in the areas surrounding AOC 16E.2 and 9500 CPM in the areas surrounding AOC 16E.3. This instrument was satisfactorily checked in Albany prior to leaving for BNL on June 19, 2000, and again upon return on June 23, 2000. In addition, checks using a field check source (as opposed to the one used in our offices) was developed on June 21, and the meter checked out properly on June 22, the day of use. No abnormalities were noted in instrument performance.

SURVEY INSTRUMENT: Meter: Ludlum Model 2221 Portable SCA, S/N 132864
Calibrated On: August 2, 1999
Probe: Ludlum Model 44-10 Scintillation Detector,
S/N PR135862
2"×2" NaI(Tl) scintillator

RESULTS

The summary below reports the highest results reported from either of the duplicates for sample 062201, which was the only sample duplicate analyses were performed on. Included in the Appendix to this report is the original laboratory analysis results for these samples. Survey meter readings are provided for each sample location, and are discussed in the "conclusions" section of this report.

Sample Number:	NR100 0604S **062201**			
Location:	Sample grid point (9,3), AOC 16E.3, Sampling Point 1			
Surface Reading:	15000 CPM			
γ Spec:	Cs-137:	14.26 ± 1.51 pCi/g	[MDA = 0.10 pCi/g]	
	Co-60:	Not Detected	[MDA = 0.08 pCi/g]	
	Ra-226:	0.79 ± 0.18 pCi/g	[MDA = 0.19 pCi/g]	
Americium-241:		0.43 ± 0.36 pCi/g	[MDA = 0.35 pCi/g]	**Notes 1 & D**
Plutonium-238:		Not Detected	[MDA = 0.13 pCi/g]	
Plutonium-239/240:		0.10 ± 0.09 pCi/g	[MDA = 0.09 pCi/g]	**Notes 1 & D**
Uranium-234:		1.22 ± 0.41 pCi/g	[MDA = 0.14 pCi/g]	
Uranium-235:		Not Detected	[MDA = 0.15 pCi/g]	
Uranium-238:		1.36 ± 0.62 pCi/g	[MDA = 0.14 pCi/g]	

Sample Number:	NR100 0604S **062202**			
Location:	Sample grid point (9,1), AOC 16E.3, Sampling Point 2			
Surface Reading:	14000 CPM			
γ Spec:	Cs-137:	9.93 ± 1.07 pCi/g	[MDA = 0.10 pCi/g]	
	Co-60:	Not Detected	[MDA = 0.07 pCi/g]	
	Ra-226:	0.61 ± 0.19 pCi/g	[MDA = 0.18 pCi/g]	
Americium-241:		0.67 ± 0.47 pCi/g	[MDA = 0.38 pCi/g]	**Note 1**
Plutonium-238:		Not Detected	[MDA = 0.15 pCi/g]	
Plutonium-239/240:		Not Detected	[MDA = 0.17 pCi/g]	
Uranium-234:		0.83 ± 0.32 pCi/g	[MDA = 0.12 pCi/g]	
Uranium-235:		Not Detected	[MDA = 0.08 pCi/g]	
Uranium-238:		0.94 ± 0.34 pCi/g	[MDA = 0.10 pCi/g]	

Sample Number:	NR100 0604S **062203**		
Location:	Sample grid point (6,3), AOC 16E.3, Sampling Point 3		
Surface Reading:	8400 CPM		
γ Spec:	Cs-137:	0.60 ± 0.13 pCi/g	[MDA = 0.08 pCi/g]
	Co-60:	Not Detected	[MDA = 0.08 pCi/g]
	Ra-226:	0.69 ± 0.16 pCi/g	[MDA = 0.13 pCi/g]
Americium-241:		Not Detected	[MDA = 0.46 pCi/g]
Plutonium-238:		Not Detected	[MDA = 0.17 pCi/g]
Plutonium-239/240:		Not Detected	[MDA = 0.19 pCi/g]
Uranium-234:		0.91 ± 0.37 pCi/g	[MDA = 0.21 pCi/g]
Uranium-235:		Not Detected	[MDA = 0.15 pCi/g]
Uranium-238:		1.16 ± 0.43 pCi/g	[MDA = 0.16 pCi/g]

Sample Number:	NR100 0604S **062204**		
Location:	Sample grid point (8,3), AOC 16E.2, Sampling Point 1		
Surface Reading:	17100 CPM		
γ Spec:	Cs-137:	18.32 ± 1.92 pCi/g	[MDA = 0.09 pCi/g]
	Co-60:	Not Detected	[MDA = 0.07 pCi/g]
	Ra-226:	0.53 ± 0.17 pCi/g	[MDA = 0.20 pCi/g]
Americium-241:		Not Detected	[MDA = 0.97 pCi/g]
Plutonium-238:		Not Detected	[MDA = 0.16 pCi/g]
Plutonium-239/240:		Not Detected	[MDA = 0.12 pCi/g]
Uranium-234:		0.77 ± 0.31 pCi/g	[MDA = 0.14 pCi/g]
Uranium-235:		Not Detected	[MDA = 0.08 pCi/g]
Uranium-238:		0.98 ± 0.36 pCi/g	[MDA = 0.12 pCi/g]

Sample Number:	NR100 0604S **062205**			
Location:	Sample grid point (8,6), AOC 16E.2, Sampling Point 2			
Surface Reading:	15100 CPM			
γ Spec:	Cs-137:	17.92 ± 1.93 pCi/g	[MDA = 0.10 pCi/g]	
	Co-60:	Not Detected	[MDA = 0.08 pCi/g]	
	Ra-226:	0.46 ± 0.17 pCi/g	[MDA = 0.20 pCi/g]	
Americium-241:		0.53 ± 0.45	[MDA = 0.43 pCi/g]	**Note 1**
Plutonium-238:		Not Detected	[MDA = 0.12 pCi/g]	
Plutonium-239/240:		Not Detected	[MDA = 0.06 pCi/g]	
Uranium-234:		0.76 ± 0.32 pCi/g	[MDA = 0.13 pCi/g]	
Uranium-235:		Not Detected	[MDA = 0.14 pCi/g]	
Uranium-238:		0.86 ± 0.34 pCi/g	[MDA = 0.11 pCi/g]	

Sample Number:	NR100 0604S **062206**			
Location:	Sample grid point (3,0.5), AOC 16E.2, Sampling Point 3, North-central edge of building foundation			
Surface Reading:	33000 CPM			
γ Spec:	Cs-137:	53.46 ± 5.51 pCi/g	[MDA = 0.13 pCi/g]	
	Co-60:	Not Detected	[MDA = 0.09 pCi/g]	
	Ra-226:	0.61 ± 0.20 pCi/g	[MDA = 0.28 pCi/g]	
Americium-241:		0.18 ± 0.18 pCi/g	[MDA = 0.18 pCi/g]	**Notes 1 & 2**
Plutonium-238:		Not Detected	[MDA = 0.05 pCi/g]	
Plutonium-239/240:		0.18 ± 0.12 pCi/g	[MDA = 0.05 pCi/g]	**Note 1**
Uranium-234:		0.68 ± 0.25 pCi/g	[MDA = 0.05 pCi/g]	
Uranium-235:		Not Detected	[MDA = 0.06 pCi/g]	
Uranium-238:		0.60 ± 0.24 pCi/g	[MDA = 0.09 pCi/g]	

Sample Number:	NR100 0604S **062207**			
Location:	Sample grid point (2.5,3.5), AOC 16E.2, Sampling Point 4			
Surface Reading:	5500 CPM			
γ Spec:	Cs-137:	0.78 ± 0.14 pCi/g	[MDA = 0.07 pCi/g]	
	Co-60:	Not Detected	[MDA = 0.07 pCi/g]	
	Ra-226:	0.27 ± 0.11 pCi/g	[MDA = 0.13 pCi/g]	
Americium-241:		Not Detected	[MDA = 0.97 pCi/g]	
Plutonium-238:		Not Detected	[MDA = 0.19 pCi/g]	
Plutonium-239/240:		Not Detected	[MDA = 0.10 pCi/g]	
Uranium-234:		0.75 ± 0.33 pCi/g	[MDA = 0.16 pCi/g]	
Uranium-235:		Not Detected	[MDA = 0.17 pCi/g]	
Uranium-238:		0.57 ± 0.29 pCi/g	[MDA = 0.16 pCi/g]	**Note 1**

Sample Number:	NR100 0604S **062208**			
Location:	Sample grid point (15,3), AOC 16E.2, Sampling Point 5, approximately 15 feet East of AOC16E.2			
Surface Reading:	96000 CPM			
γ Spec:	Cs-137:	205.20 ± 21.05 pCi/g	[MDA = 0.24 pCi/g]	
	Co-60:	0.67 ± 0.09 pCi/g	[MDA = 0.07 pCi/g]	
	Ra-226:	Not Detected	[MDA = 0.57 pCi/g]	
Americium-241:		Not Detected	[MDA = 6.15 pCi/g]	
Plutonium-238:		Not Detected	[MDA = 0.91 pCi/g]	
Plutonium-239/240:		12.96 ± 4.06 pCi/g	[MDA = 0.53 pCi/g]	
Uranium-234:		6.74 ± 3.30 pCi/g	[MDA = 1.77 pCi/g]	
Uranium-235:		Not Detected	[MDA = 1.86 pCi/g]	
Uranium-238:		4.11 ± 2.49 pCi/g	[MDA = 1.76 pCi/g]	**Note 1**

Sample Number:	NR100 0604S **062209**			
Location:	Sample grid point (10,5), AOC 16E.~~3~~2, Sampling Point 6, just outside of NE corner of AOC16E.2			
Surface Reading:	60000 CPM			
γ Spec:	Cs-137:	55.85 ± 5.90 pCi/g	[MDA = 0.16 pCi/g]	
	Co-60:	Not Detected	[MDA = 0.09 pCi/g]	
	Ra-226:	0.65 ± 0.21 pCi/g	[MDA = 0.35 pCi/g]	
Americium-241:		Not Detected	[MDA = 0.60 pCi/g]	
Plutonium-238:		Not Detected	[MDA = 0.18 pCi/g]	
Plutonium-239/240:		0.29 ± 0.19 pCi/g	[MDA = 0.13 pCi/g]	**Note 1**
Uranium-234:		0.60 ± 0.28 pCi/g	[MDA = 0.12 pCi/g]	
Uranium-235:		Not Detected	[MDA = 0.17 pCi/g]	
Uranium-238:		0.77 ± 0.33 pCi/g	[MDA = 0.16 pCi/g]	

Sample Number:	NR100 0604S **062210**			
Location:	SGS Soils, Pile 1 (NE area of piles)			
Surface Reading:	15000 CPM			
γ Spec:	Cs-137:	10.45 ± 1.12 pCi/g	[MDA = 0.10 pCi/g]	
	Co-60:	Not Detected	[MDA = 0.08 pCi/g]	
	Ra-226:	0.58 ± 0.17 pCi/g	[MDA = 0.19 pCi/g]	
Americium-241:		0.77 ± 0.57 pCi/g	[MDA = 0.69 pCi/g]	**Note 1**
Plutonium-238:		Not Detected	[MDA = 0.22 pCi/g]	
Plutonium-239/240:		Not Detected	[MDA = 0.18 pCi/g]	
Uranium-234:		0.80 ± 0.34 pCi/g	[MDA = 0.23 pCi/g]	
Uranium-235:		Not Detected	[MDA = 0.22 pCi/g]	
Uranium-238:		0.75 ± 0.33 pCi/g	[MDA = 0.21 pCi/g]	

Sample Number:	NR100 0604S **062211**		
Location:	SGS Soils. Pile 2 (SW area of piles)		
Surface Reading:	13000 CPM		
γ Spec:	Cs-137:	7.01 ± 0.76 pCi/g	[MDA = 0.07 pCi/g]
	Co-60:	Not Detected	[MDA = 0.07 pCi/g]
	Ra-226:	0.44 ± 0.13 pCi/g	[MDA = 0.16 pCi/g]
Americium-241:		Not Detected	[MDA = 1.16 pCi/g]
Plutonium-238:		Not Detected	[MDA = 0.17 pCi/g]
Plutonium-239/240:		Not Detected	[MDA = 0.14 pCi/g]
Uranium-234:		0.90 ± 0.35 pCi/g	[MDA = 0.07 pCi/g]
Uranium-235:		Not Detected	[MDA = 0.08 pCi/g]
Uranium-238:		0.88 ± 0.35 pCi/g	[MDA = 0.17 pCi/g]

Notes on Sample Results

If the analysis result was less than the minimum detectable activity for the analysis, the nuclide is listed as "Not Detected." In the case of duplicate samples, "Not Detected" means that neither sample showed detectable activity for the nuclide in question.

Note 1 - The reported error is at least 50% of the reported activity.
Note 2 - The reported activity is at the detection limit (MDA) of the analytical procedure.
Note D - This nuclide was not detected in the duplicate sample.

INTERPRETATION OF RESULTS

Three of the samples analyzed exceeded the 23 pCi/g primary remediation goal for cesium-137. Determination of whether a site meets remediation goals is more than a matter of ensuring that the primary radionuclide contaminant is below guidelines. It further entails checking that (a) each radionuclide contributing to the dose be below its respective guideline and (b) that the resultant total contribution from all involved nuclides does not exceed the applicable dose limit. Radionuclide concentrations are compared to the cleanup goals developed for radiologically contaminated soils on-site, based on a 15 mrem/year dose limit, specified in the *Record of Decision, Operable Unit I and Radiologically Contaminated Soils* (OU I ROD), dated August 25, 1999. The goals specified in the OU I ROD are 23 pCi/g of cesium-137, 15 pCi/g of strontium-90, and 5 pCi/g of radium-226. For other radionuclides, the concentration goals are those developed for these Landscaping Soils.

In order to determine which of the samples obtained exceed the 15 mrem/year dose limit, a "sum of ratios" was calculated which divides each detected radionuclide concentration by its cleanup goal and then summing all these ratios together. A sum less than one indicates that the combined effect of a large area contaminated with that radionuclide concentration would result in a dose less than 15 mrem/year, a sum equal to one means the dose from a large area with that concentration would equal 15 mrem/year, and a sum greater than one would result in a dose exceeding 15 mrem/year

and thus exceeds the remediation goal. Sums of ratios (SOR) were calculated using the following equation (in which [Cs-137] means "concentration of cesium-137 in pCi/g"):

$$SOR = \frac{[Cs-137]}{23} + \frac{[Sr-90]}{15} + \frac{[Ra-226]}{5} + \frac{[Co-60]}{1160} + \frac{[Am-241]}{40} + \frac{[Pu-238]}{66} + \frac{[Pu-239/240]}{40}$$

Uranium isotopes were ignored in this comparison since none of their concentrations exceeded expected background values for uranium in soil, and it is not desired to remediate areas due to normally present natural isotopes. The sums of ratios for each sample are provided in Table 1, below. Radium-226 results, even though a natural radionuclide whose concentration was detected at expected background levels, is included in Table 1 because a cleanup goal for it is specified in the OU I ROD. However, all of the exceedences of unity for the SOR were due only to high concentrations of cesium-137 in soil.

Table 1: Calculated Sums of Ratios

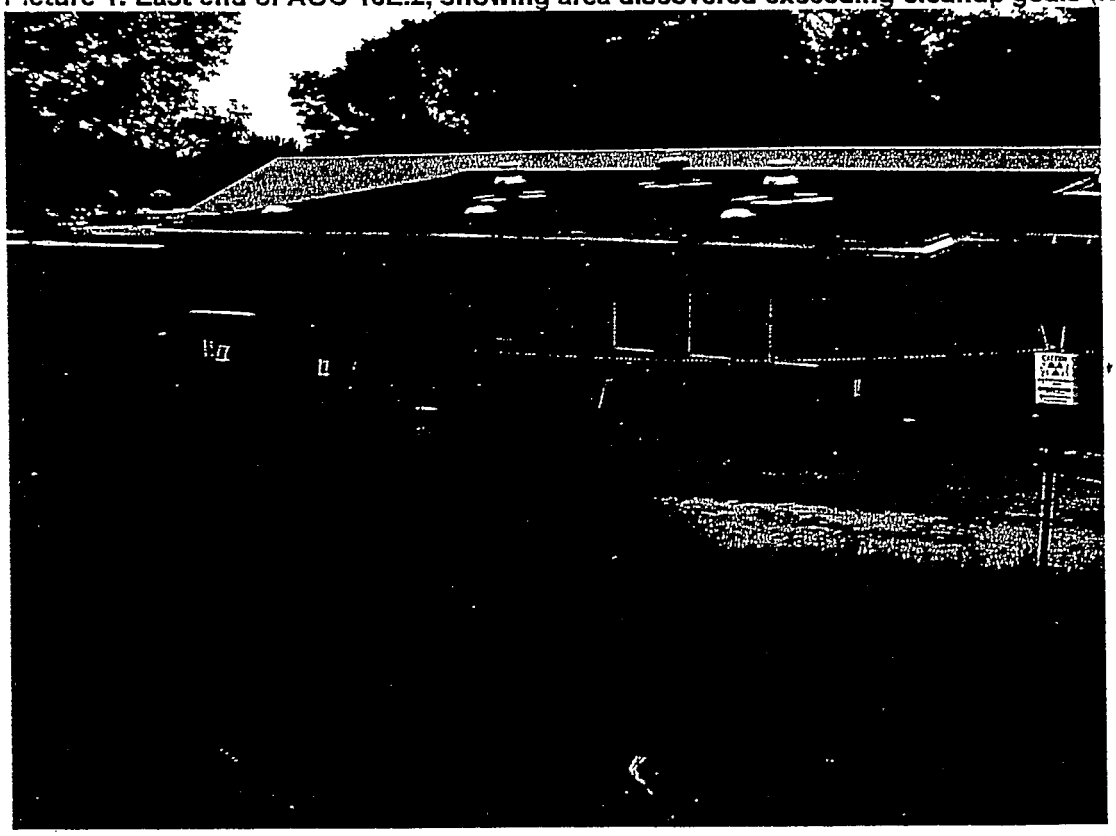
Sample Number	Identified Isotopes	Sum of Ratios (SOR)
062201	Cs-137, Ra-226, Am-241, Pu-239/240	0.794
062202	Cs-137, Ra-226, Am-241	0.568
062203	Cs-137, Ra-226	0.166
062204	Cs-137, Ra-226	0.896
062205	Cs-137, Ra-226, Am-241	0.891
062206	Cs-137, Ra-226, Am-241, Pu-239/240	**2.46**
062207	Cs-137, Ra-226	0.095
062208	Cs-137, Co-60, Pu-239/240	**9.24**
062209	Cs-137, Ra-226, Pu-239/240	**2.58**
062210	Cs-137, Ra-226, Am-241	0.597
062211	Cs-137, Ra-226	0.384

Cesium-137 was detected in all eleven samples obtained, at concentrations ranging from 0.6 to 205 pCi/g. Three samples, 062206, 062208, and 062209, exceeded the cleanup goal set at 23 pCi/g for this isotope. Americium-241 was detected at low concentrations in five samples, but in each case the large relative error of the results (and in one case the additional lack of a confirmed detection in the duplicate analysis) indicates that these detections are false positive results. Cobalt-60 was detected at 0.7 pCi/g in only one sample, 062208. Plutonium-239/240 was detected in four samples, but in three cases the large relative error of the analysis and low concentrations detected (less than 0.3 pCi/g) indicates that these detections are false positive results as well. Only one Pu-239/240 detection, also for sample 062208, significantly exceeded its minimum detection limit and had low enough relative error to indicate an actual detection. The detection of nearly 13 pCi/g of Pu-239/240 in this sample indicates its source is not atmospheric deposition of fallout from weapons tests.

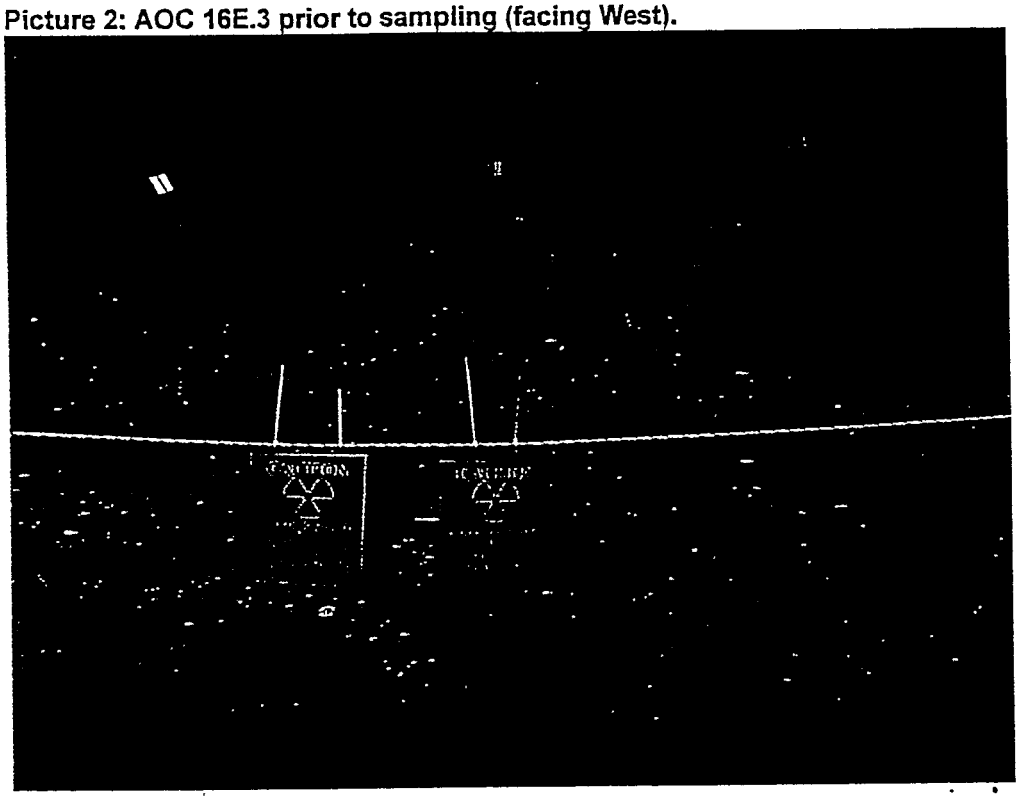
Sample 062208 was taken from the rather large area exhibiting elevated radioactivity to the east of AOC 16E.2 (shown in picture 1, below). In addition to the high concentration of cesium-137 detected, two other aspects of this sample indicate that the source of this material may be something different than the other landscape soils. Sample 062208 was the only detection of cobalt-60 of any of these samples and it also exhibited a high concentration of plutonium-239/240. Although the source of this material is likely the former HWMF (from an area with more cobalt and plutonium contamination than other areas), it is also possible that the source of this contamination is some other event entirely. Although 062208 was taken from the area exhibiting the maximum survey meter reading, the contamination (exceeding 30,000 CPM on the survey meter) extended approximately 2.25 feet in all directions from the maximum reading in a rough circle.

PHOTOGRAPHS

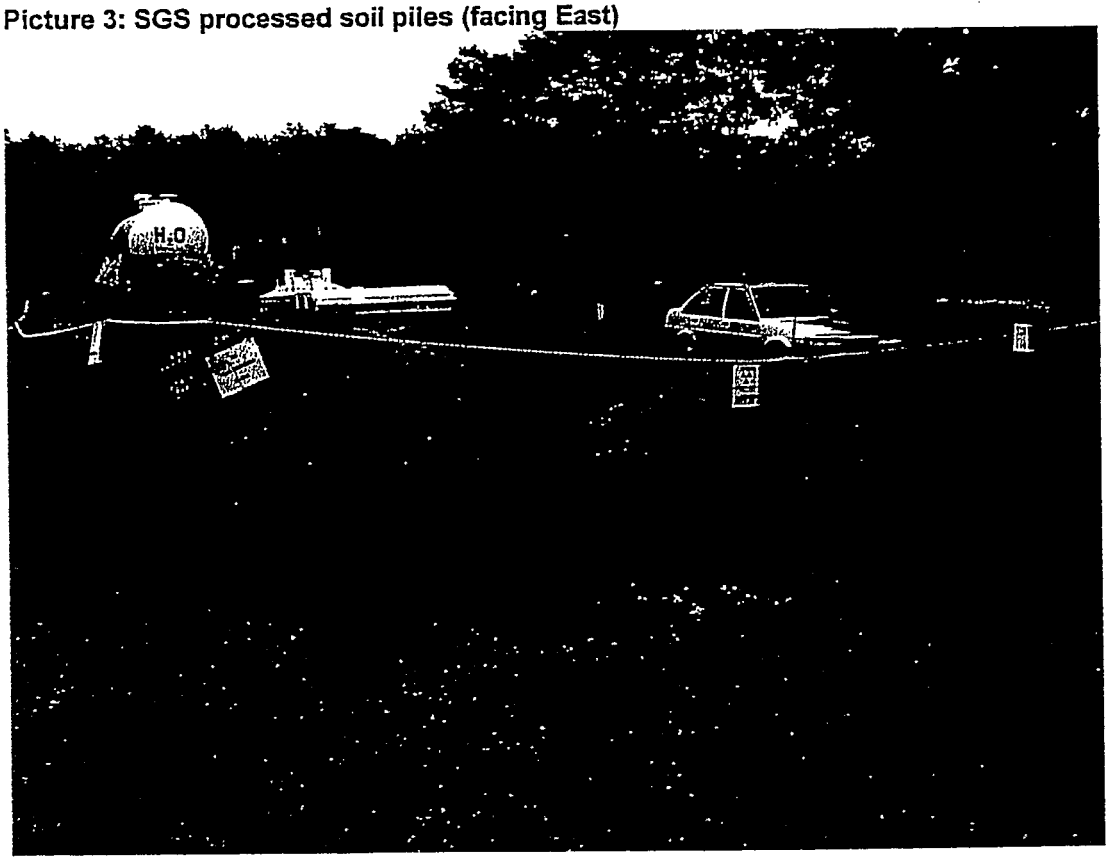
Picture 1: East end of AOC 16E.2, showing area discovered exceeding cleanup goals (facing SE).



Picture 2: AOC 16E.3 prior to sampling (facing West).



Picture 3: SGS processed soil piles (facing East)



CONCLUSION

No concentrations of radionuclides exceeding cleanup goals was detected in or around AOC 16E.3. However, two areas outside of the identified soil contamination area AOC 16E.2 and one area within it were discovered to contain concentrations exceeding cleanup goals. Additional remediation should be conducted in these areas prior to declaring AOC 16E.2's remediation is complete.

Questions must be raised concerning BNL's ability to properly conduct Class 2 Impacted Area surveys in accordance with MARSSIM (NUREG-1575) due to the extent and position of the two areas discovered outside of AOC 16E.2. Neither of these areas were at all difficult to distinguish from background levels and neither of them were found more than a few feet away from the identified soil contamination area.

Because the larger of the previously unidentified areas was along the roadway leading to the side of Building 494, a walkover survey was performed from the edge of the roadway to approximately 30 feet parallel to it. No additional areas of contamination were evident.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF SOLID & HAZARDOUS MATERIALS
BUREAU OF RADIATION & HAZARDOUS SITE MANAGEMENT
RADIATION SECTION

Radiation Survey Report

DATES OF SURVEY: September 5 - 7, 2000 and October 11, 2000

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TYPE OF SURVEY: Post-remediation confirmation survey

REPORTING STAFF MEMBER: Robert Rommel

Robert Rommel
Signature

11/20/00
Date of Report

ACCOMPANYING STAFF: William Varcasio

REVIEWED BY: Barbara Youngberg **DATE** 11/22/00

SUMMARY

Confirmation surveys were performed of all regions of Sub-Areas of Concern (Sub-AOC) 16 selected for remediation as contaminated landscaping soils in BNL's *OU I and Radiologically Contaminated Soils Record of Decision* (ROD), except AOC 16E.3, which was completed during the survey conducted on June 22, 2000. Survey dates in this report are separated by one month due to additional contamination being removed after our initial survey was performed. Significant improvement in soil radionuclide concentrations and radiation readings were noted when comparing the October 11 radiation survey to September's survey.

INTRODUCTION

Aerial radiation surveys of BNL performed in 1980 and 1983 identified several unexpected areas on site that exhibited elevated radioactivity. Investigation of these areas identified the source as cesium-137 contaminated soils. These soils are believed to have come from the former Hazardous Waste Management Facility (HWMF), which was used for landscaping purposes throughout the site. Thus, these areas are known as the "Landscape Soils."

As part of the AOC16 Final Status Survey, staff from DEC's Radiation Section obtained confirmatory samples for radionuclide analysis after these areas were remediated. Some samples obtained were splits of samples obtained by this project's independent verification contractor (IVC), the Oak Ridge Institute for Science and Education (ORISE), others were independent based on DEC walkover survey results. Because widespread residual radioactive contamination greater than cleanup goals was detected by ORISE and DEC staff during the September survey, and because BNL performed additional remediation after the September survey, additional surveying and sampling was performed by DEC staff on October 11, 2000.

In addition to areas described in the OU I ROD, BNL identified and investigated two new sub-AOCs, AOC 16E.4 and AOC 16S.6.f during their remediation of AOC 16. AOC 16E.4 is a small area close to the BMRR, and AOC 16S.6.f is an area near the Linear Accelerator.

MATERIALS AND METHODS

The *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM, NUREG-1575) will be referenced repeatedly in this report.

Areas of AOC 16 known or suspected to contain radioactive contamination greater than cleanup goals (known in MARSSIM terminology as "Impacted Class 1" areas) had 100% walkover surveys performed using hand-held gamma radiation detection instruments. The following sub-AOCs had gamma walkover surveys performed: 16E.1, 16E.2, 16E.4, 16F, 16G, 16S.1-5, 16S.6.a-f. Additional walkover surveys covering about 30% of the total region were performed in areas surrounding these Class 1. These surrounding areas are classified in MARSSIM as "Impacted Class 2" areas.

Based on the results of these walkover surveys, initially 25 soil samples were taken from near and within excavated areas of the following sub-AOCs: 16E.1, 16F, 16G, 16S.5, 16S.6.a, 16S.6.e, 16S.6.f. These were typically obtained from the top three inches of surface soils remaining after remedial activities, after removing any vegetation or large stones. During the first survey, soil samples were collected on two days, September 6 and September 7. These dates are reflected in the last six digits of the sample numbers in Table 1, below. The date is specified first (0906 for September 6, for example) and then the numerical order of that day (01, 02, etc.).

Because of the elevated results of the September survey, additional surveying and sampling took place on October 11, 2000 to verify the completeness of BNL's continuing remediation of AOC16. Eight additional soil samples were obtained on this date, typically from the highest survey meter reading in the area. Areas with concentrations of cesium-137 exceeding the cleanup goal identified during the first survey were re-scanned and re-sampled to determine residual radionuclide levels.

Details of the two gamma radiation detecting survey instruments that were used to survey the excavated and surrounding areas are provided below. Background generally varied between 6000 and 8500 counts per minute (CPM) in the areas outside of the excavated zones. Instruments were satisfactorily checked in Albany prior to leaving for BNL, and again upon return to Albany. No abnormalities were noted in instrument performance. The instrument consistently used inside of the Class 1 areas has serial number 132864.

SURVEY INSTRUMENTS: Meter: Ludlum Model 2221 Portable SCA, S/N 71244
Calibrated On: July 21, 2000
Probe: Ludlum Model 44-10 Scintillation Detector,
S/N PR114338 2"×2" NaI(Tl)

Meter: Ludlum Model 2221 Portable SCA, S/N 132864
Calibrated On: August 14, 2000
Probe: Ludlum Model 44-10 Scintillation Detector,
S/N PR135862 2"×2" NaI(Tl)

Included in Appendix 1 to this report are survey maps and sample locations for the surveyed areas of AOC 16. In the case of one area, AOC 16S.6.f, we were not provided a survey map by BNL, so a simple diagram is included. It does not include the same coordinate system defined for the other sub-AOCs, and no such coordinates are reported in Table 1, on the next page.

RESULTS

Included in Appendix 2 to this report are the original laboratory analysis results for these samples and a summary sheet. The summary sheet provides radionuclide concentrations in picocuries per gram (pCi/g), calculation of the Sum of Ratios (SOR - see next section) and fixed survey meter readings for each sample. Background was not subtracted from these meter readings, in an attempt to provide unaltered "as-read" data, but typical background was in the 7000 - 8000 CPM range (some cases, of course, being slightly lower or higher).

An attempt in Appendix 2 is made to compare survey meter CPM reading to the cesium-137 activity in the sample in the form of a ratio, but this ratio varied greatly from 374 CPM/(pCi/g) to 43294 CPM/(pCi/g). It was noted that generally the higher the soil concentration is, the higher this ratio becomes. This wide variation demonstrates that

survey meter readings cannot reliably predict soil concentrations at this site, and physical samples must be analyzed to provide actual soil concentrations.

Table 1: Sample locations

Sample ID	Location (see maps in Appendix 1)	Coordinate
NR100 0902S 090601	AOC 16F-1, South of Manholes	(23E, 9N)
NR100 0902S 090602	AOC 16F-2, South East of Manholes	(23.5E, 8N)
NR100 0902S 090603	AOC 16F-3, North of Manholes, in excavation	(23E, 11.5N)
NR100 0902S 090604	AOC 16S.5-1, South East of excavation in grass	(11E, 16N)
NR100 0902S 090605	AOC 16S.5-2, South West edge of excavation	(10E, 19N)
NR100 0902S 090606	AOC 16S.5-3, central East side of excavated area	(12E, 24N)
NR100 0902S 090607	AOC 16S.2-1, South East corner by CS-9	(14.5E, 4N)
NR100 0902S 090608	AOC 16S.2-2, North area at CS-10	(5E, 18N)
NR100 0902S 090701	AOC 16E.1-1, center, weeded area	(27E, 21N)
NR100 0902S 090702	AOC 16E.1-2, North boundary with parking lot	(36.5E, 24.5N)
NR100 0902S 090703	AOC 16E.1-3, North West boundary with parking lot	(21E, 29N)
NR100 0902S 090704	AOC 16E.1-4, North central area	(33E, 22.5N)
NR100 0902S 090705	AOC 16E.1-5, South East boundary in grass	(44E, 9N)
NR100 0902S 090706	AOC 16E.1-6, under road cut, North edge	(19E, 33.5N)
NR100 0902S 090707	AOC 16S.6.a-1, outside of excavation in grass	(9E, 18N)
NR100 0902S 090708	AOC 16S.6.e-2, East end of excavation	(17E, 13N)
NR100 0902S 090709	AOC 16S.6.f-1, South West corner of excavation	
NR100 0902S 090710	AOC 16S.6.f-2, center of area, 6-12" depth	
NR100 0902S 090711	AOC 16S.6.f-3, North East corner of excavation	
NR100 0902S 090712	AOC 16S.6.f-4, center of E. boundary of excavation	
NR100 0902S 090713	AOC 16G-1, South East area, by CS-10 flag	(36E, 14.8N)
NR100 0902S 090714	AOC 16G-2, in unexcavated grass on South side	(37E, 14.5N)
NR100 0902S 090715	AOC 16G-3, center of area at CS-25	(36E, 21N)
NR100 0902S 090716	AOC 16G-4, North East corner after re-excavation	(56E, 25.5N)
NR100 0902S 090717	AOC 16G-5, West edge boundary with parking lot	(15E, 17.5N)
NR100 1002S 101101	AOC 16G, elevated re-excavated area	(36E, 15N)
NR100 1002S 101102	AOC 16F, re-sample of NR100 0902S 090601	(23E, 9N)
NR100 1002S 101103	AOC 16F, within expanded excavation	(24E, 12N)
NR100 1002S 101104	AOC 16F, within expanded excavation, under pipe	(23E, 13N)
NR100 1002S 101105	AOC 16S.5, re-sample near NR100 0902S 090605	(10E, 19.5N)
NR100 1002S 101106	AOC 16S.6.e, re-sample of NR100 0902S 090708	(17E, 13N)
NR100 1002S 101107	AOC 16E.1, re-sample near NR100 0902S 090705	(42.5E, 9N)
NR100 1002S 101108	AOC 16E.1 re-sample of NR100 0902S 090704	(33E, 22.5N)

INTERPRETATION OF RESULTS

Fourteen of the samples analyzed exceeded the 23 pCi/g primary remediation goal for cesium-137. Twelve of these samples were obtained during the first survey, which identified localized areas of soil contamination for further remediation. The last two samples (101101 at 36 pCi/g and 101107 at 25 pCi/g) were obtained from small areas exhibiting the maximum survey meter reading of the surrounding environs.

Determination of whether a site meets remediation goals is more than a matter of ensuring that the primary radionuclide contaminant is below guidelines. It further entails

checking that (a) each radionuclide contributing to the dose be below its respective guideline and (b) that the resultant total contribution from all involved nuclides does not exceed the applicable dose limit. Radionuclide concentrations are compared to the cleanup goals developed for radiologically contaminated soils on-site, based on a 15 mrem/year dose limit, specified in the *Record of Decision, Operable Unit I and Radiologically Contaminated Soils* (OU I ROD), dated August 25, 1999. The goals specified in the OU I ROD are 23 pCi/g of cesium-137, 15 pCi/g of strontium-90, and 5 pCi/g of radium-226. For other radionuclides, the concentration goals are those developed for these Landscaping Soils.

In order to determine which of the areas exceed this 15 mrem/year dose limit, a "sum of ratios" was calculated which divides each soil sample's detected radionuclide concentration by its cleanup goal and then summing all these ratios together. A sum less than one indicates that the combined effect of a large area contaminated with that radionuclide concentration would result in a dose less than 15 mrem/year, a sum equal to one means the dose from a large area with that concentration would equal 15 mrem/year, and a sum greater than one would result in a dose exceeding 15 mrem/year and thus exceeds the remediation goal. Sums of Ratios (SOR's) were calculated using the following equation (in which [Cs-137] means "concentration of cesium-137 in pCi/g"):

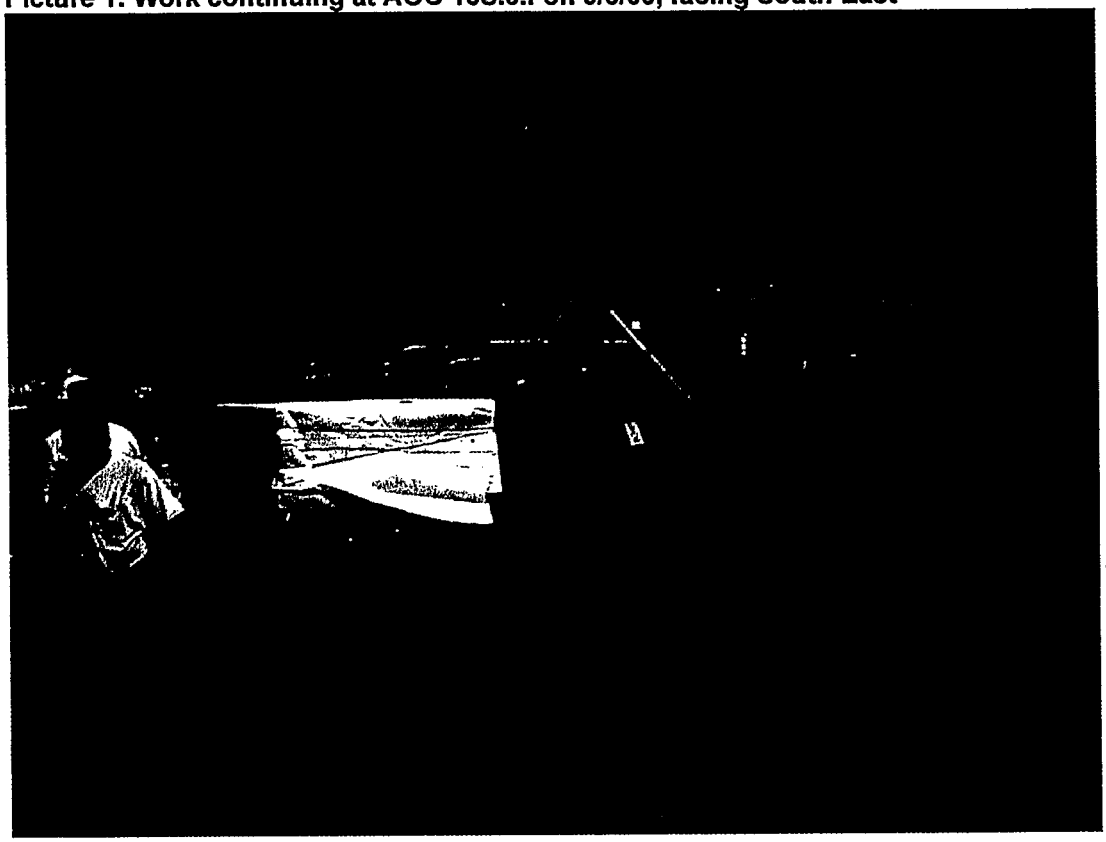
$$SOR = \frac{[Cs-137]}{23} + \frac{[Sr-90]}{15} + \frac{[Ra-226]}{5} + \frac{[Co-60]}{1160} + \frac{[Am-241]}{40} + \frac{[Pu-238]}{66} + \frac{[Pu-239/240]}{40}$$

Uranium and thorium isotopes were ignored in this comparison since none of their concentrations exceeded expected background values for uranium in soil, and it is not desired to remediate areas due to normally present natural isotopes. Strontium-90 was not analyzed for in this investigation because it has not been detected in any significant concentration in AOC 16, and since it was infrequently detected (2 samples of 13) at concentrations below 1 pCi/g during our investigation of the Pile Fan Sump removal (where significant quantities of Sr-90 were present). The sums of ratios for each sample are provided in the "AOC16 Summary Table" in the Appendix 2. Radium-226 results, even though a natural radionuclide whose concentration was detected at expected background levels, is included in the summary table because a cleanup goal for it is specified in the OU I ROD. However, all of the SOR's that exceeded unity were due only to high concentrations of cesium-137 in soil.

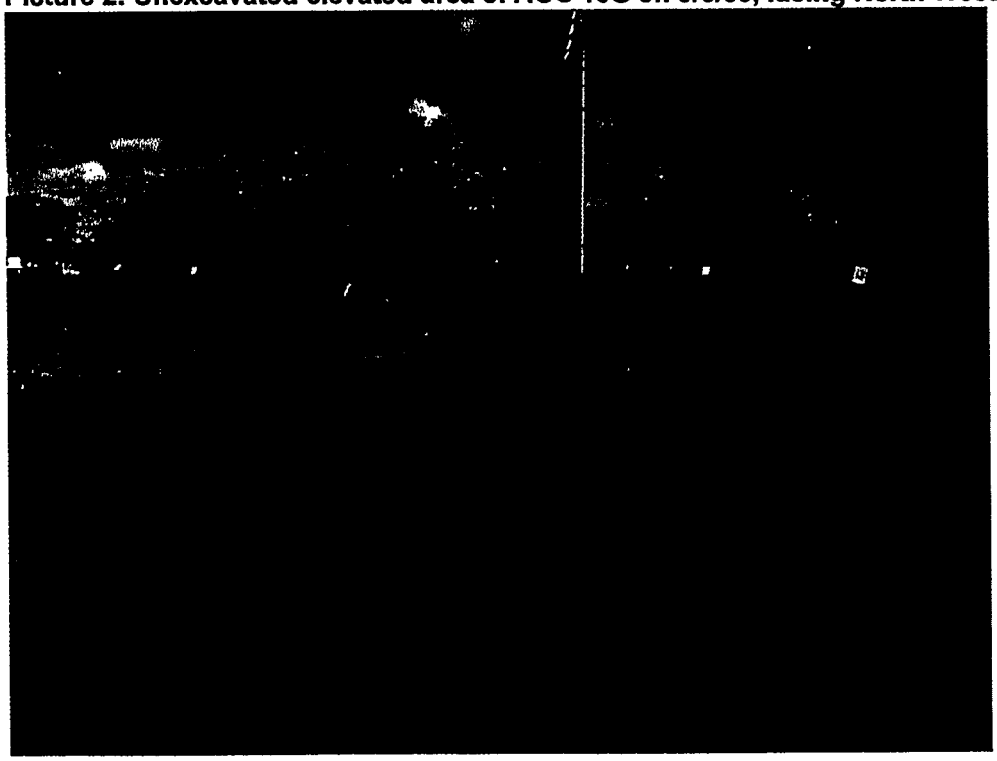
The samples obtained during the September survey showed that numerous locations had soil concentrations exceeding the cleanup goal by a substantial margin. The samples obtained in October showed the continued remediation of AOC 16 was productive and reduced both direct radiation readings and soil radionuclide concentrations. It is not expected that all soil concentrations will be below the cleanup goal in remediated Class 1 areas, and this was shown to be the case even after numerous efforts by BNL. This is the purpose of the elevated measurement comparison explained in MARSSIM, and discussed at the end of this report.

PHOTOGRAPHS

Picture 1: Work continuing at AOC 16S.6.f on 9/5/00, facing South East

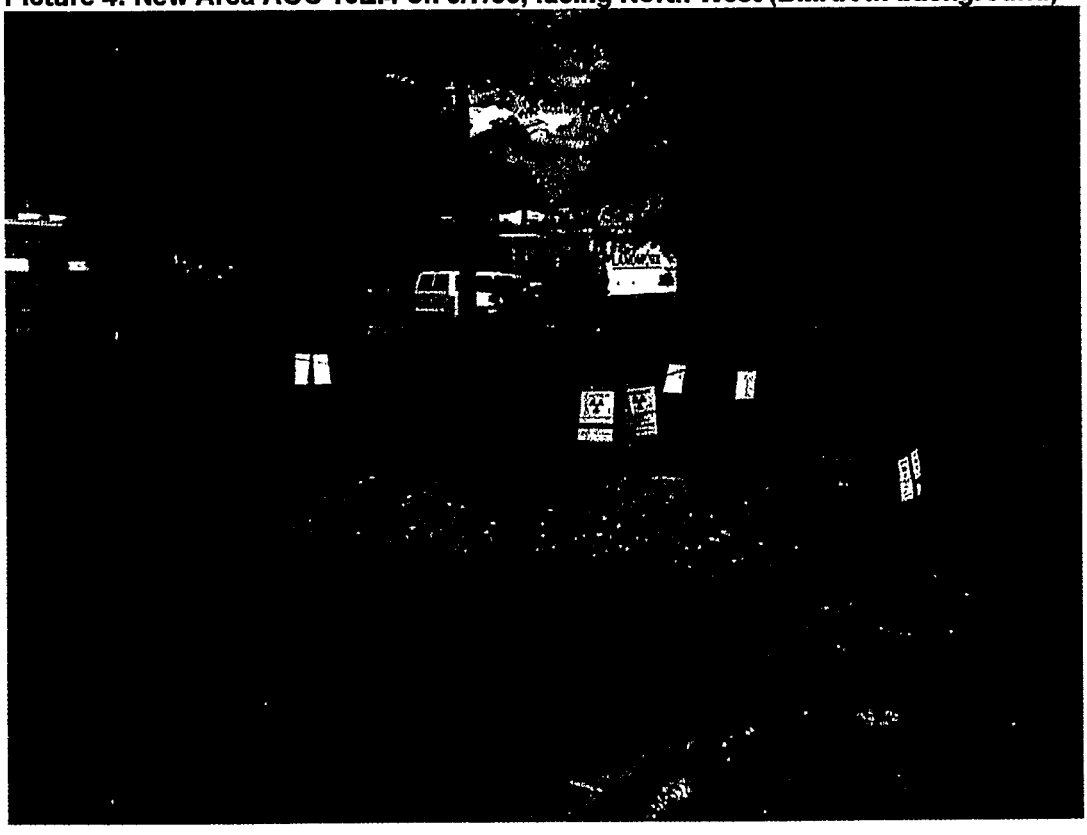


Picture 2: Unexcavated elevated area of AOC 16G on 9/6/00, facing North West



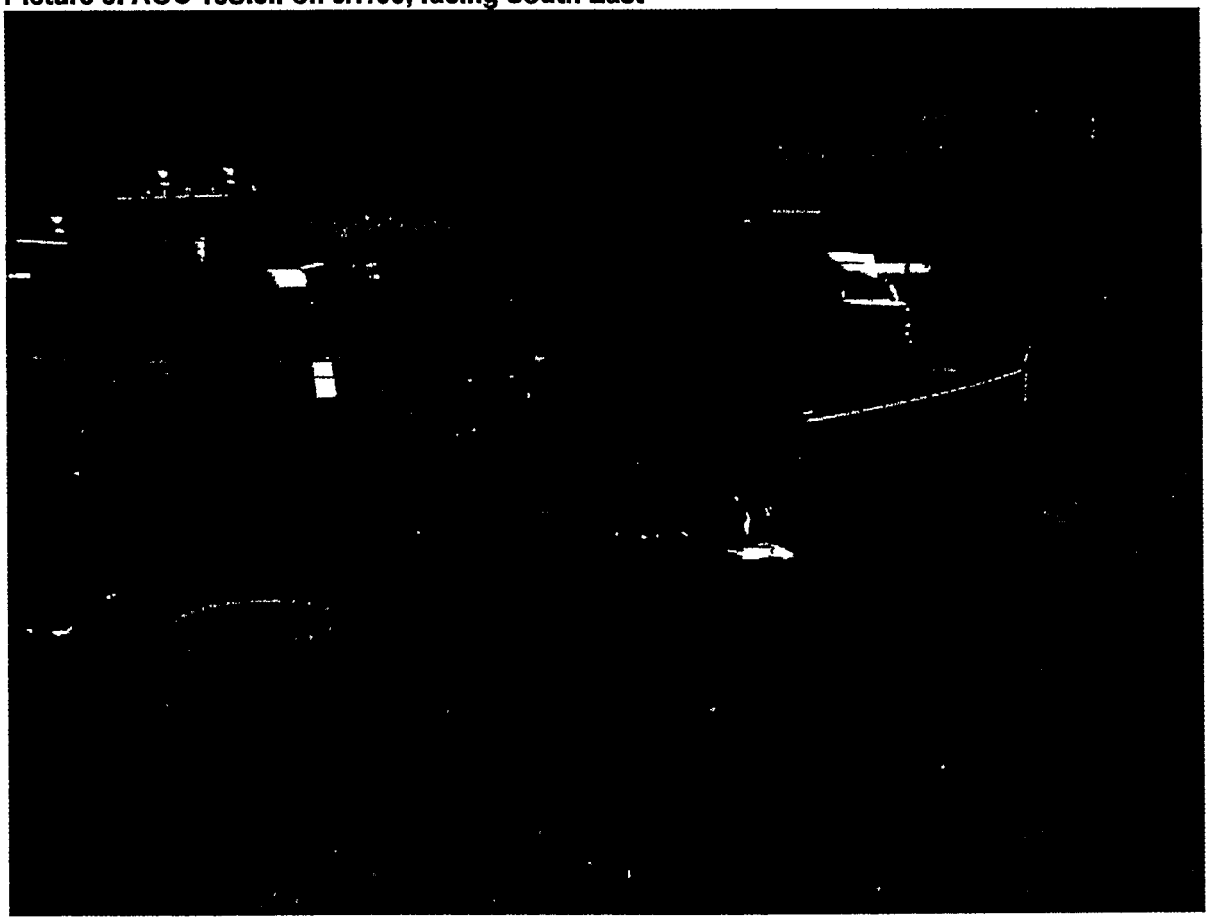
Picture 3: Waste bag remaining in AOC 16S.2 on 9/6/00, facing North East

Picture 4: New Area AOC 16E.4 on 9/7/00, facing North West (BMRR in background)

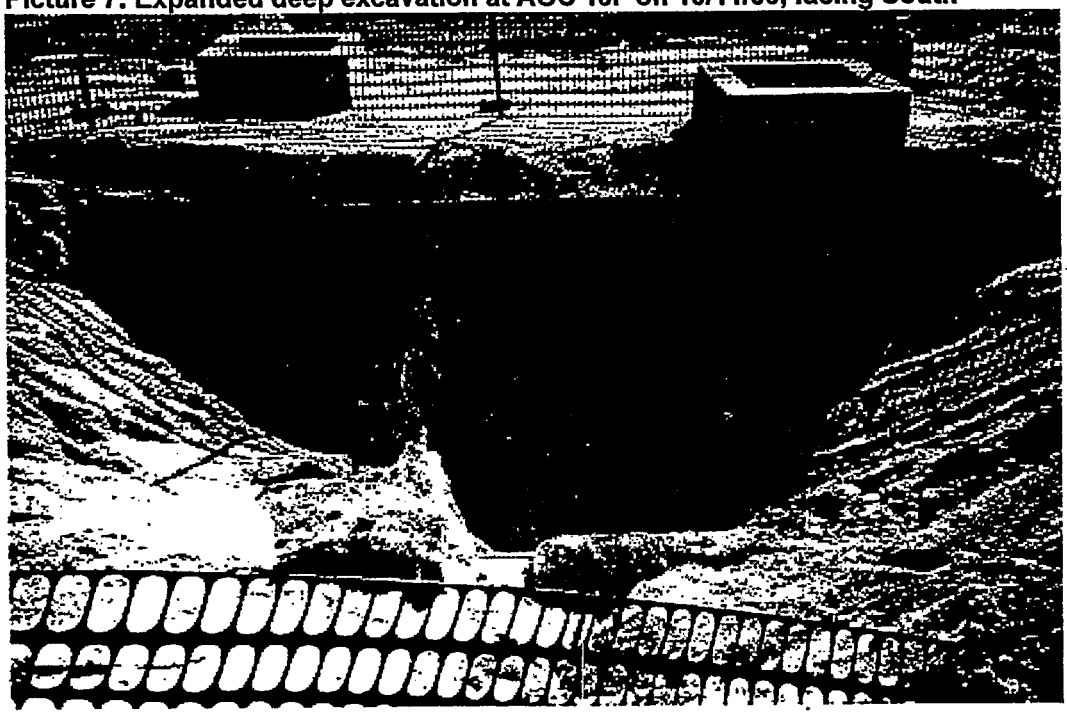


Picture 5: Surveying Road Cut at AOC 16E.1 on 9/7/00, facing South East

Picture 6: AOC 16S.6.f on 9/7/00, facing South East



Picture 7: Expanded deep excavation at AOC 16F on 10/11/00, facing South



Picture 8: Backfill soils stored outside contaminated area at AOC 16E.1 on 10/11/00, facing SW

Picture 9: Backfill soils stored *inside* contaminated area at AOC 16G on 10/11/00, facing SW

CONCLUSION

Based on the survey and sample results of September, numerous small areas of elevated activity remained after the initial remediation attempt by BNL. A few areas with concentrations slightly over the cleanup goal were detected during the second survey in October. It is not necessary to remediate an area so that every conceivable sample will be below the cleanup goal, since this goal is based on a large-area average concentration. However, those areas exceeding the cleanup goal must be compared using area factors and the elevated measurement comparison test in MARSSIM to see if they are statistically significant enough to cause the failure of the survey unit.

Elevated measurement comparisons (EMC's) were provided by BNL and will be included in the Completion Report for AOC 16. The two elevated samples obtained in October, samples 101101 and 101107, meet these tests for remaining contaminated areas up to 16 square meters in size. Neither of these samples were obtained from contaminated areas of that extent, in fact, the contamination was only identified in one or two square meters. Therefore, AOC 16 was found to meet cleanup goals within the statistical boundaries identified in MARSSIM.

The verification surveys performed for AOC 16 underscore the importance of 100% walkover surveys in identifying small but elevated zones of soil contamination. Once the actual soil concentrations are obtained by analysis, areas with concentrations exceeding the cleanup goal need to be compared using the EMC test in MARSSIM to determine if any additional action is required. The boundaries for this comparison should be established within the Sample and Analysis Plan for the project.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
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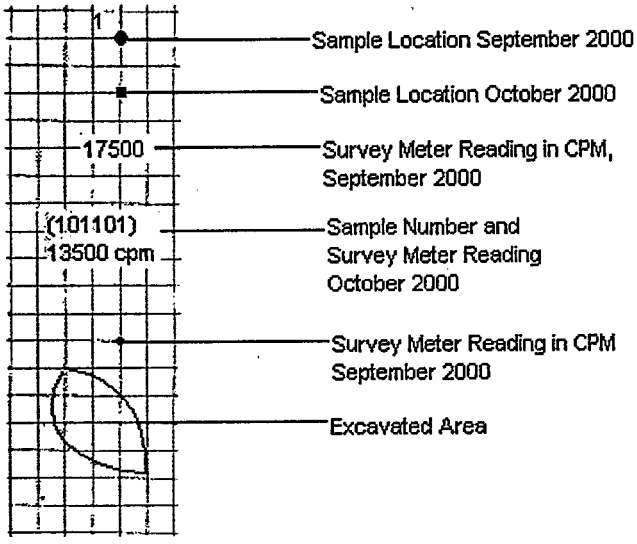
BUREAU OF RADIATION & HAZARDOUS SITE MANAGEMENT
RADIATION SECTION

Appendix 1

SURVEY MAPS

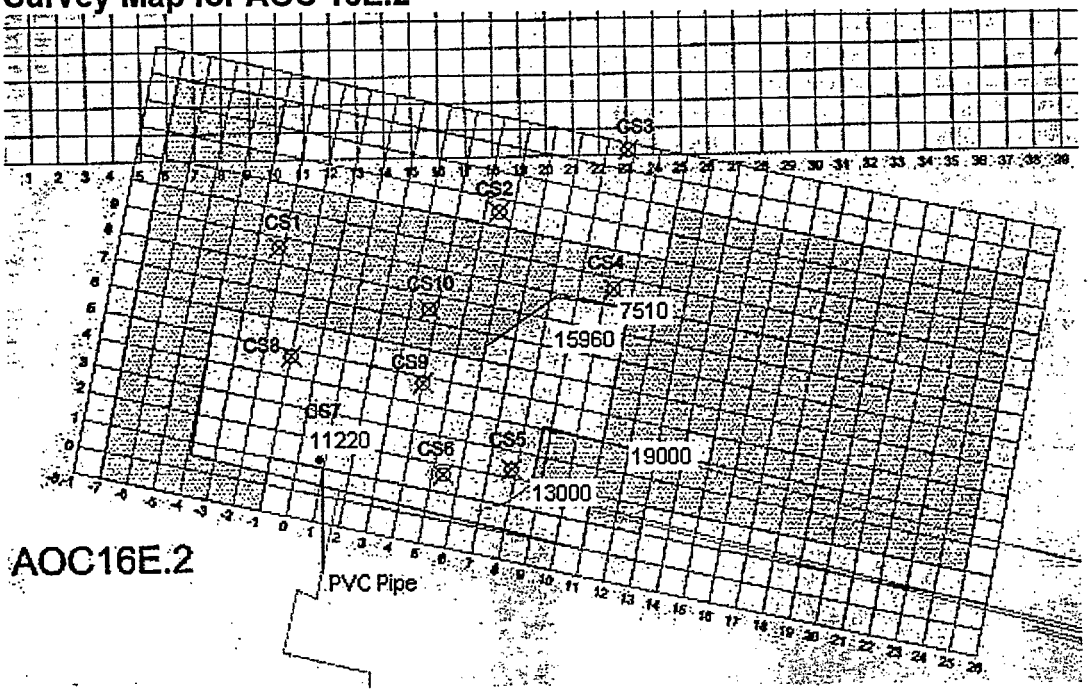
Key to Survey Maps



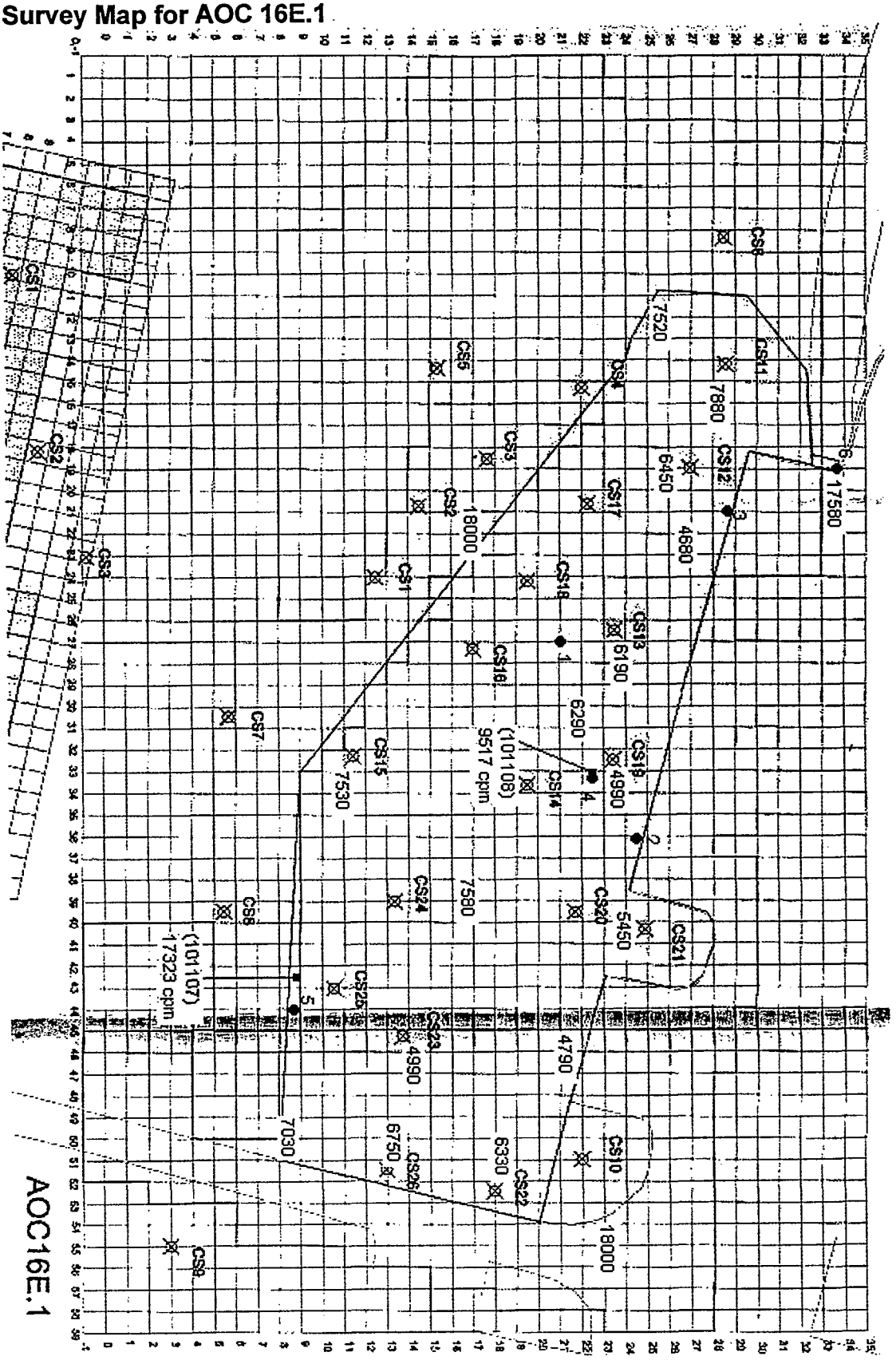
Note: North is toward the top of the page for most maps, except for AOC 16E.1 and AOC 16G, where north is to the right (due to the alignment of the picture).

CS 4 These symbols designate where BNL used their ISOCs system. They were included in some of the survey maps provided by BNL.

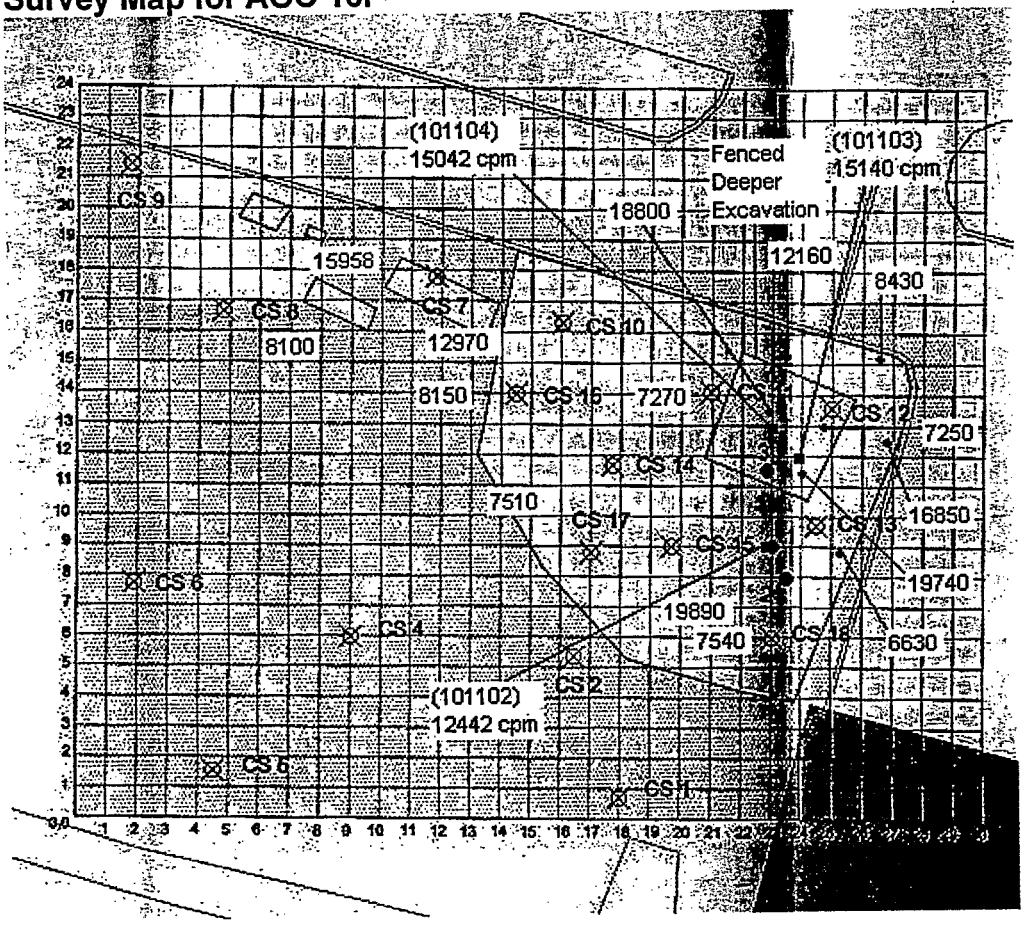
Survey Map for AOC 16E.2



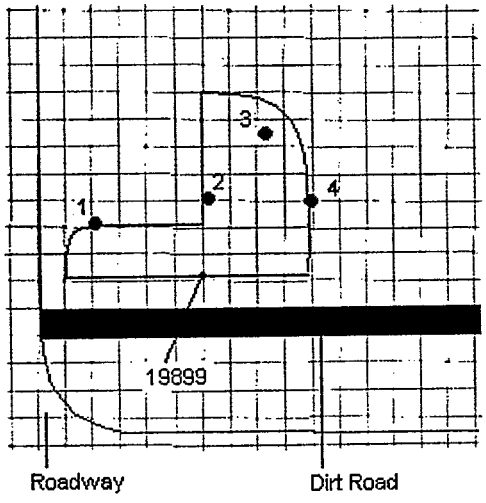
Survey Map for AOC 16E.1

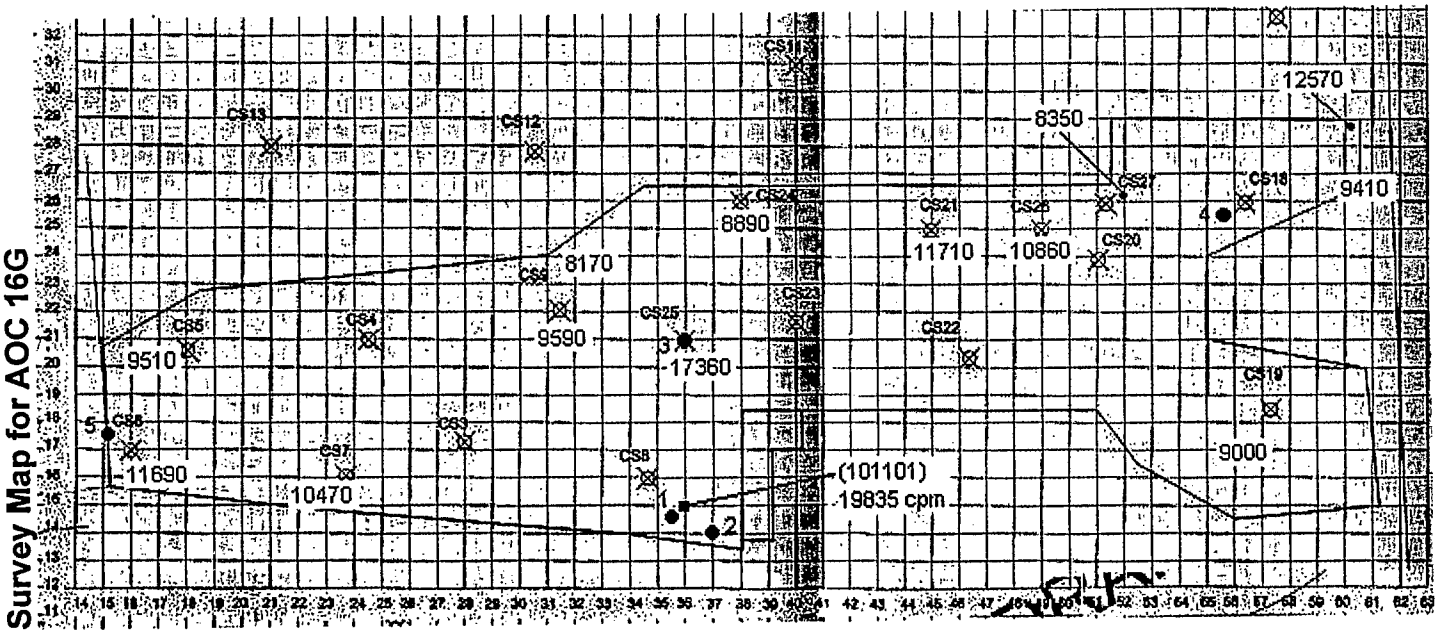


Survey Map for AOC 16F

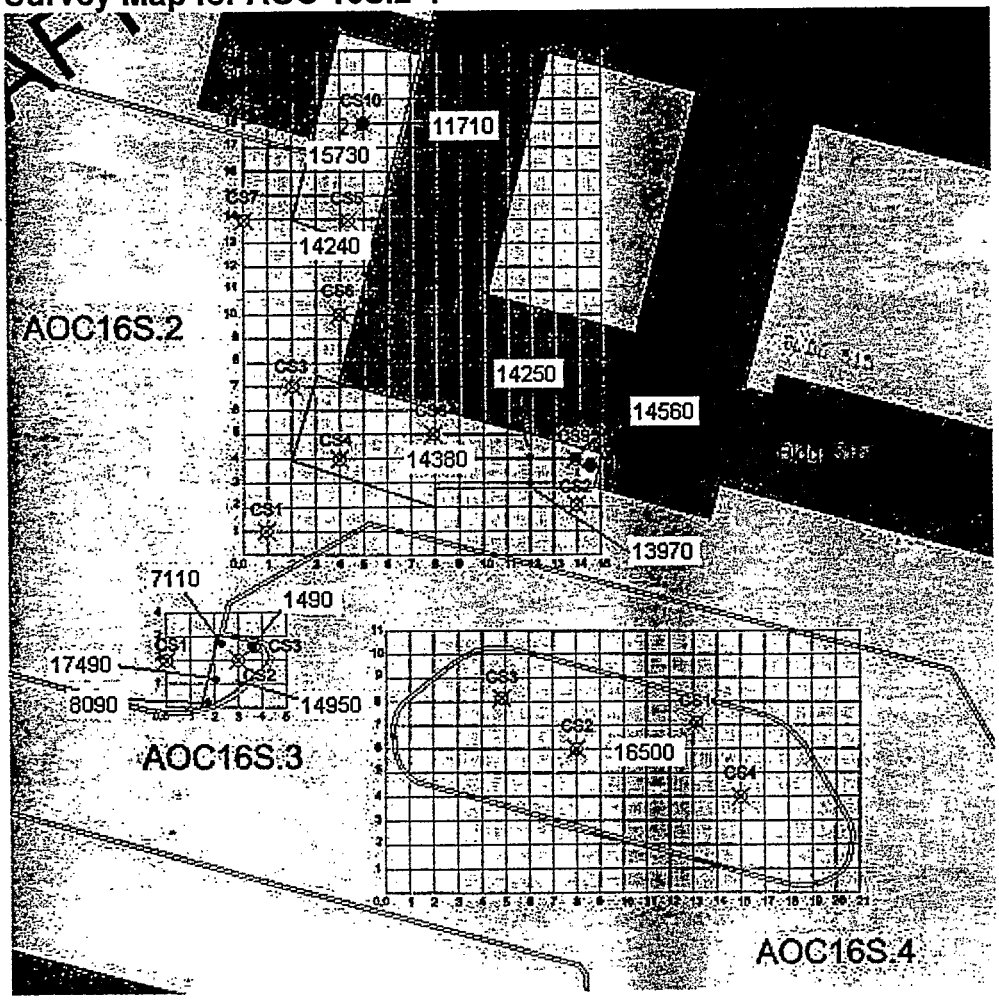


Survey Map for AOC 16S.6.f

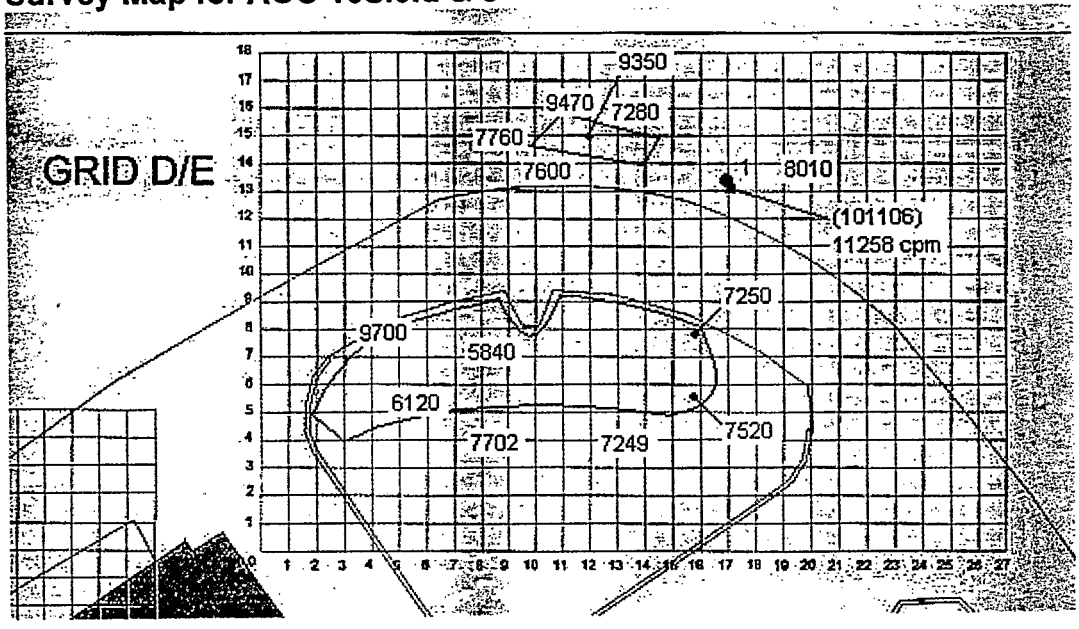



Survey Map for AOC 16G
CS1
CS13
CS12
CS24
8890
8350
12570
CS27
CS18
9410
CS21
CS26
CS20
11710
10860
4
CS9
8170
CS5
CS4
9510
9590
CS25
3
17360
CS22
CS19
5
CS6
CS3
CS7
11690
10470
CS8
9000
1
2
(101101)
19835 cpm

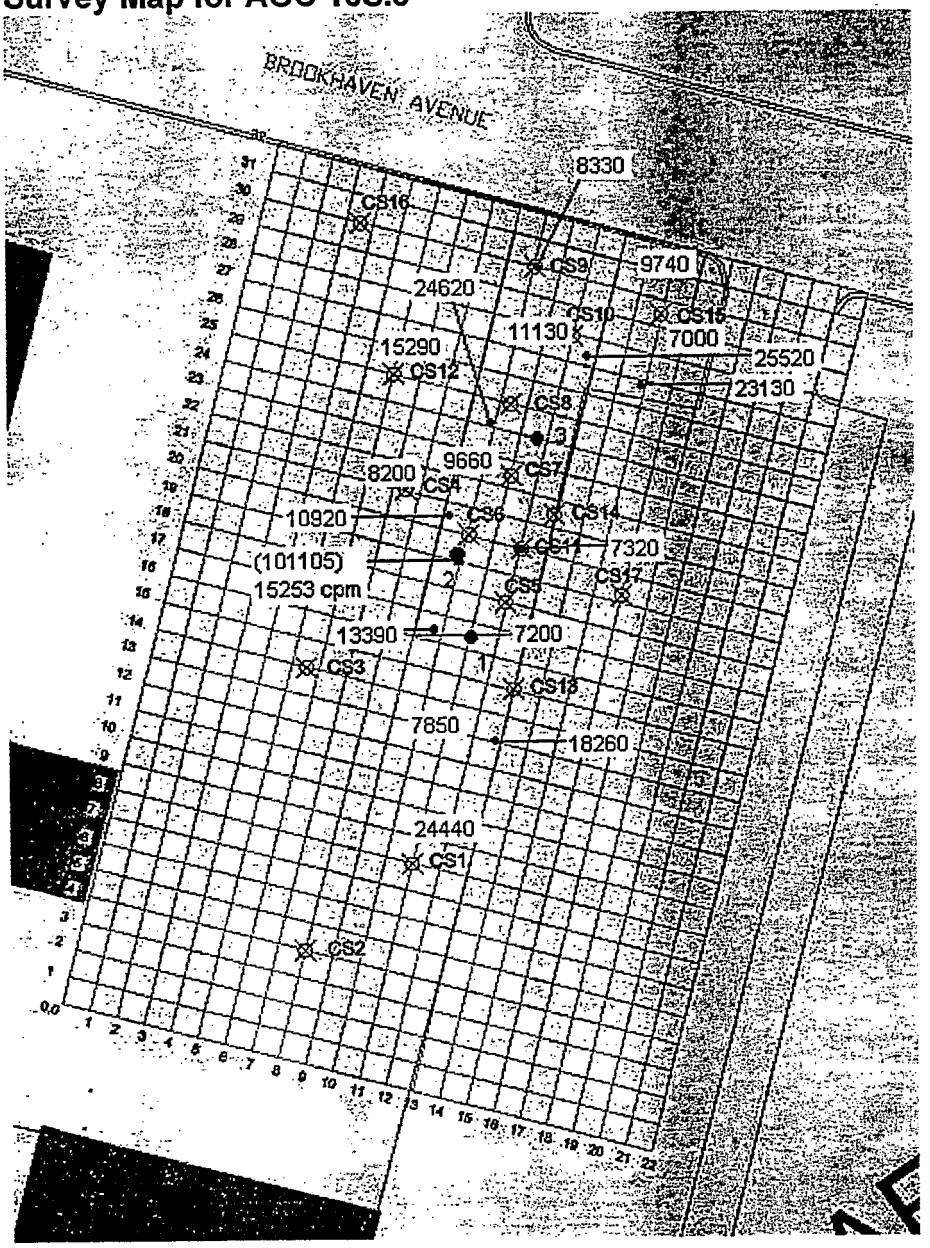
Survey Map for AOC 16S.2-4



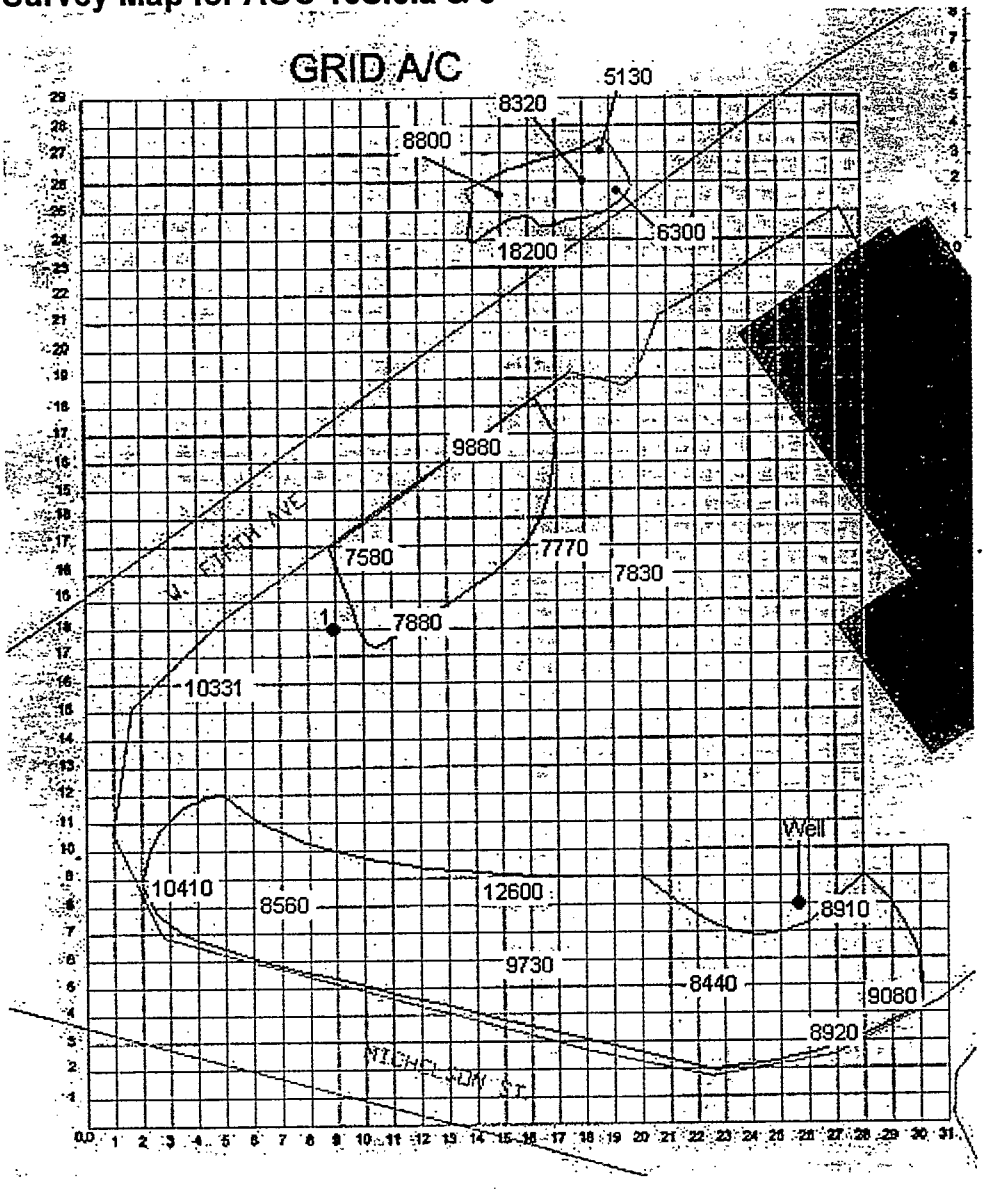
Survey Map for AOC 16S.6.d & e



Survey Map for AOC 16S.5



Survey Map for AOC 16S.6.a & c



Note: The survey map provided for AOC 16S.6.a & c is numbered incorrectly on the North axis. It lists numbers 15 through 18 three times, then continues and ends in number 29. The correct numbering would end in 37.

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Appendix 2

SUMMARY TABLE

&

SAMPLE ANALYSIS REPORTS

AOC16 Summary Table

Sample	Co-60	Cs-137	K-40	Ra-226	Th-232	Am 241	Pu-238	Pu-239/240	U-234	U-235	U-238	SOR	CPM	CPM/(pCi/g)
090601	0	139.00	3.66	0.45	0.57	0.50	0	0.43	1.93	0.43	1.31	**6.2**	43294	311.5
090602	0	72.07	5.68	0.56	0.72	0	0.17	0.48	1.04	0.15	0.85	**3.3**	27587	382.8
090603	0	32.53	6.70	0.53	1.37	0.53	0	0.32	1.11	0	1.11	**1.5**	61503	1890.7
090604	0	20.32	4.73	0.38	0.62	0	0	0.20	1.00	0.10	0.93	1.0	24162	1189.1
090605	0	93.88	6.19	0.59	1.02	*0.55*	0	0.19	1.37	0	0.79	**4.2**	35116	374.1
090606	0	4.95	4.07	0.25	0.43	0.46	0	0	0.49	0	0.51	0.3	7946	1605.3
090607	0	11.19	7.63	0.44	0.81	0.54	0	0	1.03	0	0.89	0.6	18140	1621.1
090608	0	4.85	5.70	0.43	0.74	0	0	*0.11*	1.97	0.43	0.75	0.3	11710	2414.4
090701	0	7.71	4.46	0.48	0.54	0.67	0	*0.18*	0.78	*0.14*	0.57	0.5	10414	1350.7
090702	0	6.36	12.01	0.53	1.09	0	0	*0.14*	1.05	0	0.87	0.4	11307	1777.8
090703	0	12.98	4.22	0.29	0.65	1.97	0	0	1.12	0	0.47	0.7	15684	1208.3
090704	0	67.08	4.12	0.48	0.57	0.32	0	0	0.73	0	0.57	**3.0**	34257	510.7
090705	0	31.26	5.55	0.56	0.64	0.50	0	0	0.84	0.28	0.96	**1.5**	19552	625.5
090706	0	14.10	8.11	0.50	1.00	0	0.27	0.51	1.21	0	1.06	0.7	17580	1246.8
090707	0	12.64	5.66	0.53	0.77	0	0	0	0.79	0	1.16	0.7	20368	1611.4
090708	0	61.61	4.24	0.53	0.63	0.78	0	0	1.20	0	1.18	**2.8**	25036	406.4
090709	0	15.49	5.52	0.38	0.69	0.58	0	0	1.26	0	1.24	0.8	27444	1771.7
090710	0	37.97	8.56	0.73	0.77	0	0	0	0.90	0	0.73	**1.8**		
090711	0	45.40	7.19	0.64	1.05	0.35	0	0.18	1.44	0	1.08	**2.1**	20855	459.4
090712	0	19.19	4.42	0.54	0.72	0	0	0	0.80	0	1.32	0.9	19582	1020.4
090713	0	76.46	5.35	0.50	0.70	0.77	0	0.18	2.32	*0.16*	0.79	**3.4**	31199	408.0
090714	0	23.46	4.86	0.42	0.47	0	0	0.26	1.03	0	0.90	**1.1**	26340	1122.8
090715	0	23.10	8.24	0.78	1.08	0.91	0.15	0.23	1.00	*0.21*	0.79	**1.2**	17360	751.5
090716	0	1.53	5.51	0.56	0.83	0.42	1.06	1.21	1.31	0	0.64	0.2	10000	6535.9
090717	0	3.13	5.69	0.71	1.12	3.06	0	0	2.30	0.63	1.71	0.4	11690	3734.8
101101	0	35.58	6.55	0.49	0.74	0	0	0.33	0.89	0	1.14	**1.7**	19835	557.5
101102	0	10.87	3.50	0.32	0.38	0	0	0	1.24	0	0.57	0.5	12442	1144.6
101103	0	6.37	3.30	0.30	0.30	0	0	0	0.88	0	0.55	0.3	15140	2376.8
101104	0	5.62	3.17	0.33	0	0	0	0	0.77	0	0.47	0.3	15042	2676.5
101105	0	3.69	5.79	0.38	0.62	2.28	0	0	0.79	0	0.94	0.3	15253	4133.6
101106	0	0.75	3.49	0.32	0.69	*0.20*	0	0	1.16	0	0.55	0.1	11258	15010.7
101107	0	24.73	6.16	0.48	0.81	0	0	0	0.80	0.16	1.03	**1.2**	17323	700.5
101108	0	1.38	1.25	0.19	0	0	0	0	0.58	0	0.42	0.1	9517	6896.4

Note: Data reported in italics is within 0.01 pCi/g of the Minimum Detectable Activity (MDA)

All soil concentration data reported in units of pCi/g.

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TNU-OR-13614

October 6, 2000

Ms. Judy Stone
RECRA Environmental, Inc.
208 Welsh Pool Road
Lionville, PA 19341-1313

00091699

CASE NARRATIVE
Work Order # 00-09109-OR

SAMPLE RECEIPT

This work order contains thirteen soil samples received 09/13/00. All samples were analyzed for Americium-241, Isotopic Plutonium, Isotopic Uranium and by Gamma Spectroscopy.

CLIENT ID	LAB ID
NR1000902S090601	00-09109-04
NR1000902S090602	00-09109-05
NR1000902S090603	00-09109-06
NR1000902S090604	00-09109-07
NR1000902S090605	00-09109-08
NR1000902S090606	00-09109-09
NR1000902S090607	00-09109-10
NR1000902S090608	00-09109-11
NR1000902S090701	00-09109-12
NR1000902S090702	00-09109-13
NR1000902S090703	00-09109-14
NR1000902S090704	00-09109-15
NR1000902S090705	00-09109-16

ANALYTICAL METHODS

Americium-241 was analyzed using Method EML Am-01 modified. Isotopic Plutonium was analyzed using Method EML Pu-02 modified. Isotopic Uranium was analyzed using Method EML U-02 modified. Gamma Spectroscopy was performed using Method LANL ER-130 modified.

PROBLEMS OR UNUSUAL CIRCUMSTANCES

No problems or unusual circumstances were noted during the analytical process.

CERTIFICATION OF ACCURACY

I certify that this data report is in compliance with the terms and conditions of the Purchase Order, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the cognizant project manager or his/her designee to be accurate as verified by the following signature.

M.R. McDougall
Laboratory Manager

Date: 10/6/2000

Judy Stone
RECRA Environmental, Inc.
208 Welsh Pool Road
Lionville, PA 19341-1313

SDG: 0009109
MATRIX: Soil

Lab ID		Client ID	Sample Date	Receipt Date	Analysis Date	Report Date	Batch ID	Analyte	Method	Result	Error	MDA	Units
00-09109-01	K	KNOWN	09/13/00	09/13/00	09/25/00	10/06/00	0009109	Americium-241	EML Am-01 Modified	5.50	0.17		pCi/g
00-09109-01	S	SPIKE	09/13/00	09/13/00	09/25/00	10/06/00	0009109	Americium-241	EML Am-01 Modified	5.16	1.09	0.08	pCi/g
00-09109-02	B	BLANK	09/13/00	09/13/00	09/25/00	10/06/00	0009109	Americium-241	EML Am-01 Modified	0.17	0.13	0.12	pCi/g
00-09109-03	D	NR1000902S090601	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Americium-241	EML Am-01 Modified	0.14	0.18	0.28	pCi/g
00-09109-04		NR1000902S090601	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Americium-241	EML Am-01 Modified	0.50	0.40	0.46	pCi/g
00-09109-05		NR1000902S090602	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Americium-241	EML Am-01 Modified	0.26	0.27	0.35	pCi/g
00-09109-06		NR1000902S090603	09/06/00	09/13/00	10/02/00	10/06/00	0009109	Americium-241	EML Am-01 Modified	0.53	0.39	0.47	pCi/g
00-09109-07		NR1000902S090604	09/06/00	09/13/00	10/02/00	10/06/00	0009109	Americium-241	EML Am-01 Modified	0.14	0.20	0.35	pCi/g
00-09109-08		NR1000902S090605	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Americium-241	EML Am-01 Modified	0.55	0.42	0.55	pCi/g
00-09109-09		NR1000902S090606	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Americium-241	EML Am-01 Modified	0.46	0.31	0.12	pCi/g
00-09109-10		NR1000902S090607	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Americium-241	EML Am-01 Modified	0.54	0.39	0.48	pCi/g
00-09109-11		NR1000902S090608	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Americium-241	EML Am-01 Modified	0.13	0.18	0.32	pCi/g
00-09109-12		NR1000902S090701	09/07/00	09/13/00	09/25/00	10/06/00	0009109	Americium-241	EML Am-01 Modified	0.67	0.44	0.29	pCi/g
00-09109-13		NR1000902S090702	09/07/00	09/13/00	09/25/00	10/06/00	0009109	Americium-241	EML Am-01 Modified	0.19	0.21	0.32	pCi/g
00-09109-14		NR1000902S090703	09/07/00	09/13/00	09/25/00	10/06/00	0009109	Americium-241	EML Am-01 Modified	1.97	0.66	0.28	pCi/g
00-09109-15		NR1000902S090704	09/07/00	09/13/00	09/25/00	10/06/00	0009109	Americium-241	EML Am-01 Modified	0.32	0.27	0.30	pCi/g
00-09109-16		NR1000902S090705	09/07/00	09/13/00	09/25/00	10/06/00	0009109	Americium-241	EML Am-01 Modified	0.50	0.30	0.34	pCi/g
00-09109-01	K	KNOWN	09/13/00	09/13/00	09/14/00	10/06/00	0009109	Cobalt-60	LANL ER-130 Modified	126.78	5.58		pCi/g
00-09109-01	K	KNOWN	09/13/00	09/13/00	09/14/00	10/06/00	0009109	Cesium-137	LANL ER-130 Modified	73.33	3.37		pCi/g
00-09109-01	S	SPIKE	09/13/00	09/13/00	09/14/00	10/06/00	0009109	Cobalt-60	LANL ER-130 Modified	130.10	9.17	0.61	pCi/g
00-09109-01	S	SPIKE	09/13/00	09/13/00	09/14/00	10/06/00	0009109	Cesium-137	LANL ER-130 Modified	76.64	7.89	0.54	pCi/g
00-09109-02	B	BLANK	09/13/00	09/13/00	09/14/00	10/06/00	0009109	Cobalt-60	LANL ER-130 Modified	0.00	0.02	0.04	pCi/g
00-09109-02	B	BLANK	09/13/00	09/13/00	09/14/00	10/06/00	0009109	Cesium-137	LANL ER-130 Modified	0.01	0.02	0.04	pCi/g
00-09109-02	B	BLANK	09/13/00	09/13/00	09/14/00	10/06/00	0009109	Potassium-40	LANL ER-130 Modified	0.15	0.19	0.23	pCi/g
00-09109-02	B	BLANK	09/13/00	09/13/00	09/14/00	10/06/00	0009109	Lead-212	LANL ER-130 Modified	0.02	0.06	0.05	pCi/g
00-09109-02	B	BLANK	09/13/00	09/13/00	09/14/00	10/06/00	0009109	Lead-214	LANL ER-130 Modified	0.05	0.06	0.08	pCi/g
00-09109-02	B	BLANK	09/13/00	09/13/00	09/14/00	10/06/00	0009109	Radium-226	LANL ER-130 Modified	-0.02	0.05	0.08	pCi/g
00-09109-02	B	BLANK	09/13/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-228	LANL ER-130 Modified	0.06	0.08	0.17	pCi/g
00-09109-02	B	BLANK	09/13/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-232	LANL ER-130 Modified	0.06	0.08	0.17	pCi/g
00-09109-02	B	BLANK	09/13/00	09/13/00	09/14/00	10/06/00	0009109	Thallium-208	LANL ER-130 Modified	-0.01	0.06	0.11	pCi/g
00-09109-02	B	BLANK	09/13/00	09/13/00	09/14/00	10/06/00	0009109	Uranium-238	LANL ER-130 Modified	-0.38	0.39	0.76	pCi/g

K=Known,S=Spike,B=Blank,D=Duplicate,MS=Matrix Spike

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208 Welsh Pool Road
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SDG: 0009109
MATRIX: Soil

Lab ID	Client ID	Sample Date	Receipt Date	Analysis Date	Report Date	Batch ID	Analyte	Method	Result	Error	MDA	Units
00-09109-03 D	NR1000902S090601	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Cobalt-60	LANL ER-130 Modified	0.02	0.03	0.06	pCi/g
00-09109-03 D	NR1000902S090601	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Cesium-137	LANL ER-130 Modified	139.00	14.60	0.12	pCi/g
00-09109-03 D	NR1000902S090601	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Potassium-40	LANL ER-130 Modified	3.66	0.82	0.42	pCi/g
00-09109-03 D	NR1000902S090601	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Lead-212	LANL ER-130 Modified	0.67	1.51	0.37	pCi/g
00-09109-03 D	NR1000902S090601	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Lead-214	LANL ER-130 Modified	0.67	1.21	0.55	pCi/g
00-09109-03 D	NR1000902S090601	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Radium-226	LANL ER-130 Modified	0.45	0.14	0.35	pCi/g
00-09109-03 D	NR1000902S090601	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-228	LANL ER-130 Modified	0.56	0.14	0.16	pCi/g
00-09109-03 D	NR1000902S090601	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-232	LANL ER-130 Modified	0.56	0.14	0.16	pCi/g
00-09109-03 D	NR1000902S090601	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Thallium-208	LANL ER-130 Modified	0.56	0.15	0.55	pCi/g
00-09109-03 D	NR1000902S090601	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Uranium-238	LANL ER-130 Modified	-0.23	1.62	2.77	pCi/g
00-09109-04	NR1000902S090601	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Cobalt-60	LANL ER-130 Modified	-0.03	0.03	0.04	pCi/g
00-09109-04	NR1000902S090601	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Cesium-137	LANL ER-130 Modified	138.80	14.58	0.16	pCi/g
00-09109-04	NR1000902S090601	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Potassium-40	LANL ER-130 Modified	3.60	0.84	0.40	pCi/g
00-09109-04	NR1000902S090601	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Lead-212	LANL ER-130 Modified	0.52	1.19	0.37	pCi/g
00-09109-04	NR1000902S090601	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Lead-214	LANL ER-130 Modified	1.36	2.35	0.56	pCi/g
00-09109-04	NR1000902S090601	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Radium-226	LANL ER-130 Modified	0.34	0.16	0.35	pCi/g
00-09109-04	NR1000902S090601	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-228	LANL ER-130 Modified	0.57	0.16	0.18	pCi/g
00-09109-04	NR1000902S090601	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-232	LANL ER-130 Modified	0.57	0.16	0.18	pCi/g
00-09109-04	NR1000902S090601	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Thallium-208	LANL ER-130 Modified	0.49	0.15	0.56	pCi/g
00-09109-04	NR1000902S090601	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Uranium-238	LANL ER-130 Modified	-0.21	1.62	2.77	pCi/g
00-09109-05	NR1000902S090602	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Cobalt-60	LANL ER-130 Modified	0.01	0.04	0.08	pCi/g
00-09109-05	NR1000902S090602	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Cesium-137	LANL ER-130 Modified	72.07	7.60	0.21	pCi/g
00-09109-05	NR1000902S090602	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Potassium-40	LANL ER-130 Modified	5.68	1.36	0.68	pCi/g
00-09109-05	NR1000902S090602	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Lead-212	LANL ER-130 Modified	0.89	0.43	0.45	pCi/g
00-09109-05	NR1000902S090602	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Lead-214	LANL ER-130 Modified	0.90	0.56	0.68	pCi/g
00-09109-05	NR1000902S090602	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Radium-226	LANL ER-130 Modified	0.56	0.25	0.45	pCi/g
00-09109-05	NR1000902S090602	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-228	LANL ER-130 Modified	0.72	0.26	0.26	pCi/g
00-09109-05	NR1000902S090602	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-232	LANL ER-130 Modified	0.72	0.26	0.26	pCi/g
00-09109-05	NR1000902S090602	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Thallium-208	LANL ER-130 Modified	1.00	0.36	0.68	pCi/g
00-09109-05	NR1000902S090602	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Uranium-238	LANL ER-130 Modified	-0.10	2.35	3.88	pCi/g

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Lab ID	Client ID	Sample Date	Receipt Date	Analysis Date	Report Date	Batch ID	Analyte	Method	Result	Error	MDA	Units
00-09109-06	NR1000902S090603	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Cobalt-60	LANL ER-130 Modified	0.01	0.04	0.07	pCi/g
00-09109-06	NR1000902S090603	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Cesium-137	LANL ER-130 Modified	32.53	3.47	0.09	pCi/g
00-09109-06	NR1000902S090603	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Potassium-40	LANL ER-130 Modified	6.70	1.14	0.57	pCi/g
00-09109-06	NR1000902S090603	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Lead-212	LANL ER-130 Modified	1.26	0.23	0.20	pCi/g
00-09109-06	NR1000902S090603	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Lead-214	LANL ER-130 Modified	0.64	0.23	0.28	pCi/g
00-09109-06	NR1000902S090603	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Radium-226	LANL ER-130 Modified	0.53	0.14	0.20	pCi/g
00-09109-06	NR1000902S090603	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-228	LANL ER-130 Modified	1.37	0.23	0.21	pCi/g
00-09109-06	NR1000902S090603	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-232	LANL ER-130 Modified	1.37	0.23	0.21	pCi/g
00-09109-06	NR1000902S090603	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Thallium-208	LANL ER-130 Modified	1.12	0.21	0.30	pCi/g
00-09109-06	NR1000902S090603	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Uranium-238	LANL ER-130 Modified	1.24	1.20	1.58	pCi/g
00-09109-07	NR1000902S090604	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Cobalt-60	LANL ER-130 Modified	-0.01	0.02	0.03	pCi/g
00-09109-07	NR1000902S090604	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Cesium-137	LANL ER-130 Modified	20.32	2.17	0.07	pCi/g
00-09109-07	NR1000902S090604	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Potassium-40	LANL ER-130 Modified	4.73	0.78	0.21	pCi/g
00-09109-07	NR1000902S090604	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Lead-212	LANL ER-130 Modified	0.53	0.15	0.14	pCi/g
00-09109-07	NR1000902S090604	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Lead-214	LANL ER-130 Modified	0.46	0.16	0.20	pCi/g
00-09109-07	NR1000902S090604	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Radium-226	LANL ER-130 Modified	0.38	0.09	0.13	pCi/g
00-09109-07	NR1000902S090604	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-228	LANL ER-130 Modified	0.62	0.14	0.13	pCi/g
00-09109-07	NR1000902S090604	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-232	LANL ER-130 Modified	0.62	0.14	0.13	pCi/g
00-09109-07	NR1000902S090604	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Thallium-208	LANL ER-130 Modified	0.36	0.11	0.21	pCi/g
00-09109-07	NR1000902S090604	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Uranium-238	LANL ER-130 Modified	0.63	0.72	1.13	pCi/g
00-09109-08	NR1000902S090605	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Cobalt-60	LANL ER-130 Modified	-0.04	0.05	0.08	pCi/g
00-09109-08	NR1000902S090605	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Cesium-137	LANL ER-130 Modified	93.88	9.88	0.22	pCi/g
00-09109-08	NR1000902S090605	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Potassium-40	LANL ER-130 Modified	6.19	1.50	0.83	pCi/g
00-09109-08	NR1000902S090605	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Lead-212	LANL ER-130 Modified	0.87	0.52	0.51	pCi/g
00-09109-08	NR1000902S090605	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Lead-214	LANL ER-130 Modified	0.91	0.52	0.76	pCi/g
00-09109-08	NR1000902S090605	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Radium-226	LANL ER-130 Modified	0.59	0.26	0.50	pCi/g
00-09109-08	NR1000902S090605	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-228	LANL ER-130 Modified	1.02	0.39	0.62	pCi/g
00-09109-08	NR1000902S090605	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-232	LANL ER-130 Modified	1.02	0.39	0.62	pCi/g
00-09109-08	NR1000902S090605	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Thallium-208	LANL ER-130 Modified	0.90	0.39	0.80	pCi/g
00-09109-08	NR1000902S090605	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Uranium-238	LANL ER-130 Modified	6.41	3.51	4.24	pCi/g

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Lab ID	Client ID	Sample Date	Receipt Date	Analysis Date	Report Date	Batch ID	Analyte	Method	Result	Error	MDA	Units
00-09109-09	NR1000902S090606	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Cobalt-60	LANL ER-130 Modified	-0.01	0.02	0.04	pCi/g
00-09109-09	NR1000902S090606	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Cesium-137	LANL ER-130 Modified	4.95	0.53	0.06	pCi/g
00-09109-09	NR1000902S090606	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Potassium-40	LANL ER-130 Modified	4.07	0.80	0.42	pCi/g
00-09109-09	NR1000902S090606	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Lead-212	LANL ER-130 Modified	0.49	0.13	0.11	pCi/g
00-09109-09	NR1000902S090606	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Lead-214	LANL ER-130 Modified	0.24	0.11	0.15	pCi/g
00-09109-09	NR1000902S090606	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Radium-226	LANL ER-130 Modified	0.25	0.08	0.11	pCi/g
00-09109-09	NR1000902S090606	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-228	LANL ER-130 Modified	0.43	0.12	0.14	pCi/g
00-09109-09	NR1000902S090606	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-232	LANL ER-130 Modified	0.43	0.12	0.14	pCi/g
00-09109-09	NR1000902S090606	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Thallium-208	LANL ER-130 Modified	0.38	0.12	0.16	pCi/g
00-09109-09	NR1000902S090606	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Uranium-238	LANL ER-130 Modified	0.03	0.90	1.21	pCi/g
00-09109-10	NR1000902S090607	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Cobalt-60	LANL ER-130 Modified	-0.03	0.04	0.06	pCi/g
00-09109-10	NR1000902S090607	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Cesium-137	LANL ER-130 Modified	11.19	1.21	0.08	pCi/g
00-09109-10	NR1000902S090607	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Potassium-40	LANL ER-130 Modified	7.63	1.37	0.60	pCi/g
00-09109-10	NR1000902S090607	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Lead-212	LANL ER-130 Modified	0.90	2.01	0.14	pCi/g
00-09109-10	NR1000902S090607	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Lead-214	LANL ER-130 Modified	0.57	0.88	0.21	pCi/g
00-09109-10	NR1000902S090607	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Radium-226	LANL ER-130 Modified	0.44	0.15	0.16	pCi/g
00-09109-10	NR1000902S090607	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-228	LANL ER-130 Modified	0.81	0.18	0.19	pCi/g
00-09109-10	NR1000902S090607	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-232	LANL ER-130 Modified	0.81	0.18	0.19	pCi/g
00-09109-10	NR1000902S090607	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Thallium-208	LANL ER-130 Modified	0.72	0.17	0.25	pCi/g
00-09109-10	NR1000902S090607	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Uranium-238	LANL ER-130 Modified	1.43	1.31	1.30	pCi/g
00-09109-11	NR1000902S090608	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Cobalt-60	LANL ER-130 Modified	0.02	0.05	0.10	pCi/g
00-09109-11	NR1000902S090608	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Cesium-137	LANL ER-130 Modified	4.85	0.57	0.09	pCi/g
00-09109-11	NR1000902S090608	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Potassium-40	LANL ER-130 Modified	5.70	1.34	0.66	pCi/g
00-09109-11	NR1000902S090608	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Lead-212	LANL ER-130 Modified	1.13	0.29	0.16	pCi/g
00-09109-11	NR1000902S090608	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Lead-214	LANL ER-130 Modified	0.39	0.17	0.21	pCi/g
00-09109-11	NR1000902S090608	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Radium-226	LANL ER-130 Modified	0.43	0.15	0.18	pCi/g
00-09109-11	NR1000902S090608	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-228	LANL ER-130 Modified	0.74	0.26	0.24	pCi/g
00-09109-11	NR1000902S090608	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-232	LANL ER-130 Modified	0.74	0.26	0.24	pCi/g
00-09109-11	NR1000902S090608	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Thallium-208	LANL ER-130 Modified	0.65	0.22	0.26	pCi/g
00-09109-11	NR1000902S090608	09/06/00	09/13/00	09/14/00	10/06/00	0009109	Uranium-238	LANL ER-130 Modified	1.17	1.70	1.73	pCi/g

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SDG: 0009109
MATRIX: Soil

Lab ID	Client ID	Sample Date	Receipt Date	Analysis Date	Report Date	Batch ID	Analyte	Method	Result	Error	MDA	Units
00-09109-12	NR1000902S090701	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Cobalt-60	LANL ER-130 Modified	0.02	0.04	0.07	pCi/g
00-09109-12	NR1000902S090701	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Cesium-137	LANL ER-130 Modified	7.71	0.83	0.08	pCi/g
00-09109-12	NR1000902S090701	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Potassium-40	LANL ER-130 Modified	4.46	1.06	0.62	pCi/g
00-09109-12	NR1000902S090701	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Lead-212	LANL ER-130 Modified	0.71	0.15	0.15	pCi/g
00-09109-12	NR1000902S090701	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Lead-214	LANL ER-130 Modified	0.19	0.17	0.20	pCi/g
00-09109-12	NR1000902S090701	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Radium-226	LANL ER-130 Modified	0.48	0.15	0.15	pCi/g
00-09109-12	NR1000902S090701	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-232	LANL ER-130 Modified	0.54	0.17	0.23	pCi/g
00-09109-12	NR1000902S090701	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Thallium-208	LANL ER-130 Modified	0.49	0.17	0.22	pCi/g
00-09109-12	NR1000902S090701	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Uranium-238	LANL ER-130 Modified	1.67	1.34	1.46	pCi/g
00-09109-13	NR1000902S090702	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Cobalt-60	LANL ER-130 Modified	-0.02	0.04	0.06	pCi/g
00-09109-13	NR1000902S090702	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Cesium-137	LANL ER-130 Modified	6.36	0.68	0.07	pCi/g
00-09109-13	NR1000902S090702	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Potassium-40	LANL ER-130 Modified	12.01	1.77	0.44	pCi/g
00-09109-13	NR1000902S090702	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Lead-212	LANL ER-130 Modified	1.08	0.22	0.14	pCi/g
00-09109-13	NR1000902S090702	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Lead-214	LANL ER-130 Modified	0.50	0.15	0.19	pCi/g
00-09109-13	NR1000902S090702	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Radium-226	LANL ER-130 Modified	0.53	0.13	0.14	pCi/g
00-09109-13	NR1000902S090702	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-228	LANL ER-130 Modified	1.09	0.21	0.17	pCi/g
00-09109-13	NR1000902S090702	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-232	LANL ER-130 Modified	1.09	0.21	0.17	pCi/g
00-09109-13	NR1000902S090702	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Thallium-208	LANL ER-130 Modified	0.91	0.17	0.19	pCi/g
00-09109-13	NR1000902S090702	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Uranium-238	LANL ER-130 Modified	0.27	1.33	1.55	pCi/g
00-09109-14	NR1000902S090703	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Cobalt-60	LANL ER-130 Modified	-0.02	0.04	0.06	pCi/g
00-09109-14	NR1000902S090703	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Cesium-137	LANL ER-130 Modified	12.98	1.41	0.11	pCi/g
00-09109-14	NR1000902S090703	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Potassium-40	LANL ER-130 Modified	4.22	1.06	0.71	pCi/g
00-09109-14	NR1000902S090703	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Lead-212	LANL ER-130 Modified	1.03	0.31	0.20	pCi/g
00-09109-14	NR1000902S090703	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Lead-214	LANL ER-130 Modified	0.14	0.17	0.31	pCi/g
00-09109-14	NR1000902S090703	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Radium-226	LANL ER-130 Modified	0.29	0.19	0.28	pCi/g
00-09109-14	NR1000902S090703	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-228	LANL ER-130 Modified	0.65	0.23	0.23	pCi/g
00-09109-14	NR1000902S090703	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-232	LANL ER-130 Modified	0.65	0.23	0.23	pCi/g
00-09109-14	NR1000902S090703	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Thallium-208	LANL ER-130 Modified	0.45	0.21	0.34	pCi/g
00-09109-14	NR1000902S090703	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Uranium-238	LANL ER-130 Modified	0.89	1.71	1.85	pCi/g

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MATRIX: Soil

Lab ID		Client ID	Sample Date	Receipt Date	Analysis Date	Report Date	Batch ID	Analyte	Method	Result	Error	MDA	Units
00-09109-15		NR1000902S090704	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Cobalt-60	LANL ER-130 Modified	-0.02	0.04	0.06	pCi/g
00-09109-15		NR1000902S090704	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Cesium-137	LANL ER-130 Modified	67.08	6.91	0.14	pCi/g
00-09109-15		NR1000902S090704	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Potassium-40	LANL ER-130 Modified	4.12	0.99	0.53	pCi/g
00-09109-15		NR1000902S090704	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Lead-212	LANL ER-130 Modified	0.50	0.33	0.35	pCi/g
00-09109-15		NR1000902S090704	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Lead-214	LANL ER-130 Modified	0.56	0.35	0.50	pCi/g
00-09109-15		NR1000902S090704	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Radium-226	LANL ER-130 Modified	0.48	0.18	0.34	pCi/g
00-09109-15		NR1000902S090704	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-228	LANL ER-130 Modified	0.57	0.23	0.20	pCi/g
00-09109-15		NR1000902S090704	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-232	LANL ER-130 Modified	0.57	0.23	0.20	pCi/g
00-09109-15		NR1000902S090704	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Thallium-208	LANL ER-130 Modified	0.57	0.22	0.52	pCi/g
00-09109-15		NR1000902S090704	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Uranium-238	LANL ER-130 Modified	0.31	2.16	2.88	pCi/g
00-09109-16		NR1000902S090705	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Cobalt-60	LANL ER-130 Modified	0.00	0.03	0.06	pCi/g
00-09109-16		NR1000902S090705	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Cesium-137	LANL ER-130 Modified	31.26	3.22	0.06	pCi/g
00-09109-16		NR1000902S090705	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Potassium-40	LANL ER-130 Modified	5.55	1.03	0.46	pCi/g
00-09109-16		NR1000902S090705	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Lead-212	LANL ER-130 Modified	0.94	0.26	0.24	pCi/g
00-09109-16		NR1000902S090705	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Lead-214	LANL ER-130 Modified	0.71	0.26	0.32	pCi/g
00-09109-16		NR1000902S090705	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Radium-226	LANL ER-130 Modified	0.56	0.14	0.21	pCi/g
00-09109-16		NR1000902S090705	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-228	LANL ER-130 Modified	0.64	0.15	0.15	pCi/g
00-09109-16		NR1000902S090705	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Thorium-232	LANL ER-130 Modified	0.64	0.15	0.15	pCi/g
00-09109-16		NR1000902S090705	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Thallium-208	LANL ER-130 Modified	0.58	0.18	0.33	pCi/g
00-09109-16		NR1000902S090705	09/07/00	09/13/00	09/14/00	10/06/00	0009109	Uranium-238	LANL ER-130 Modified	0.96	1.41	2.27	pCi/g
00-09109-01	K	KNOWN	09/13/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-238	EML Pu-02 Modified	5.06	0.14		pCi/g
00-09109-01	S	SPIKE	09/13/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-238	EML Pu-02 Modified	4.26	1.05	0.21	pCi/g
00-09109-02	B	BLANK	09/13/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-238	EML Pu-02 Modified	0.07	0.09	0.12	pCi/g
00-09109-03	D	NR1000902S090601	09/06/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-238	EML Pu-02 Modified	0.01	0.05	0.13	pCi/g
00-09109-04		NR1000902S090601	09/06/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-238	EML Pu-02 Modified	0.10	0.11	0.15	pCi/g
00-09109-05		NR1000902S090602	09/06/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-238	EML Pu-02 Modified	0.17	0.13	0.12	pCi/g
00-09109-06		NR1000902S090603	09/06/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-238	EML Pu-02 Modified	0.02	0.06	0.16	pCi/g
00-09109-07		NR1000902S090604	09/06/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-238	EML Pu-02 Modified	0.13	0.11	0.18	pCi/g
00-09109-08		NR1000902S090605	09/06/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-238	EML Pu-02 Modified	0.12	0.12	0.17	pCi/g
00-09109-09		NR1000902S090606	09/06/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-238	EML Pu-02 Modified	0.00	0.05	0.17	pCi/g
00-09109-10		NR1000902S090607	09/06/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-238	EML Pu-02 Modified	0.01	0.06	0.17	pCi/g
00-09109-11		NR1000902S090608	09/06/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-238	EML Pu-02 Modified	0.01	0.05	0.12	pCi/g
00-09109-12		NR1000902S090701	09/07/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-238	EML Pu-02 Modified	0.03	0.07	0.17	pCi/g
00-09109-13		NR1000902S090702	09/07/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-238	EML Pu-02 Modified	0.03	0.07	0.16	pCi/g
00-09109-14		NR1000902S090703	09/07/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-238	EML Pu-02 Modified	0.07	0.11	0.22	pCi/g
00-09109-15		NR1000902S090704	09/07/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-238	EML Pu-02 Modified	0.07	0.08	0.07	pCi/g
00-09109-16		NR1000902S090705	09/07/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-238	EML Pu-02 Modified	0.02	0.06	0.13	pCi/g

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00-09109-01	K	KNOWN	09/13/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-239/240	EML Pu-02 Modified	5.90	0.18		pCi/g
00-09109-01	S	SPIKE	09/13/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-239/240	EML Pu-02 Modified	6.59	1.51	0.14	pCi/g
00-09109-02	B	BLANK	09/13/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-239/240	EML Pu-02 Modified	0.15	0.13	0.07	pCi/g
00-09109-03	D	NR1000902S090601	09/06/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-239/240	EML Pu-02 Modified	0.43	0.21	0.12	pCi/g
00-09109-04		NR1000902S090601	09/06/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-239/240	EML Pu-02 Modified	0.43	0.22	0.14	pCi/g
00-09109-05		NR1000902S090602	09/06/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-239/240	EML Pu-02 Modified	0.48	0.22	0.10	pCi/g
00-09109-06		NR1000902S090603	09/06/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-239/240	EML Pu-02 Modified	0.32	0.16	0.11	pCi/g
00-09109-07		NR1000902S090604	09/06/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-239/240	EML Pu-02 Modified	0.20	0.13	0.13	pCi/g
00-09109-08		NR1000902S090605	09/06/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-239/240	EML Pu-02 Modified	0.19	0.13	0.12	pCi/g
00-09109-09		NR1000902S090606	09/06/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-239/240	EML Pu-02 Modified	0.06	0.08	0.12	pCi/g
00-09109-10		NR1000902S090607	09/06/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-239/240	EML Pu-02 Modified	0.05	0.08	0.13	pCi/g
00-09109-11		NR1000902S090608	09/06/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-239/240	EML Pu-02 Modified	0.11	0.10	0.10	pCi/g
00-09109-12		NR1000902S090701	09/07/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-239/240	EML Pu-02 Modified	0.18	0.15	0.17	pCi/g
00-09109-13		NR1000902S090702	09/07/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-239/240	EML Pu-02 Modified	0.14	0.13	0.13	pCi/g
00-09109-14		NR1000902S090703	09/07/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-239/240	EML Pu-02 Modified	0.03	0.06	0.08	pCi/g
00-09109-15		NR1000902S090704	09/07/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-239/240	EML Pu-02 Modified	0.13	0.12	0.15	pCi/g
00-09109-16		NR1000902S090705	09/07/00	09/13/00	09/22/00	10/06/00	0009109	Plutonium-239/240	EML Pu-02 Modified	0.02	0.06	0.15	pCi/g
00-09109-01	K	KNOWN	09/13/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-234	EML U-02 Modified	8.51	0.31		pCi/g
00-09109-01	S	SPIKE	09/13/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-234	EML U-02 Modified	9.79	2.64	0.41	pCi/g
00-09109-02	B	BLANK	09/13/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-234	EML U-02 Modified	0.20	0.15	0.19	pCi/g
00-09109-03	D	NR1000902S090601	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-234	EML U-02 Modified	1.12	0.40	0.30	pCi/g
00-09109-04		NR1000902S090601	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-234	EML U-02 Modified	1.93	0.59	0.20	pCi/g
00-09109-05		NR1000902S090602	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-234	EML U-02 Modified	1.04	0.39	0.24	pCi/g
00-09109-06		NR1000902S090603	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-234	EML U-02 Modified	1.11	0.40	0.22	pCi/g
00-09109-07		NR1000902S090604	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-234	EML U-02 Modified	1.00	0.38	0.16	pCi/g
00-09109-08		NR1000902S090605	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-234	EML U-02 Modified	1.37	0.49	0.19	pCi/g
00-09109-09		NR1000902S090606	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-234	EML U-02 Modified	0.49	0.24	0.23	pCi/g
00-09109-10		NR1000902S090607	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-234	EML U-02 Modified	1.03	0.38	0.19	pCi/g
00-09109-11		NR1000902S090608	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-234	EML U-02 Modified	1.97	0.54	0.14	pCi/g
00-09109-12		NR1000902S090701	09/07/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-234	EML U-02 Modified	0.78	0.30	0.16	pCi/g
00-09109-13		NR1000902S090702	09/07/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-234	EML U-02 Modified	1.05	0.39	0.18	pCi/g
00-09109-14		NR1000902S090703	09/07/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-234	EML U-02 Modified	1.12	0.40	0.22	pCi/g
00-09109-15		NR1000902S090704	09/07/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-234	EML U-02 Modified	0.73	0.30	0.18	pCi/g
00-09109-16		NR1000902S090705	09/07/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-234	EML U-02 Modified	0.84	0.38	0.25	pCi/g

K=Known,S=Spike,B=Blank,D=Duplicate,MS=Matrix Spike

Judy Stone
RECRA Environmental, Inc.
208 Welsh Pool Road
Lionville, PA 19341-1313

SDG: 0009109
MATRIX: Soil

Lab ID		Client ID	Sample Date	Receipt Date	Analysis Date	Report Date	Batch ID	Analyte	Method	Result	Error	MDA	Units
00-09109-01	K	KNOWN	09/13/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-235	EML U-02 Modified	0.39	0.01		pCi/g
00-09109-01	S	SPIKE	09/13/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-235	EML U-02 Modified	0.25	0.26	0.34	pCi/g
00-09109-02	B	BLANK	09/13/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-235	EML U-02 Modified	0.00	0.01	0.13	pCi/g
00-09109-03	D	NR1000902S090601	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-235	EML U-02 Modified	0.04	0.08	0.18	pCi/g
00-09109-04		NR1000902S090601	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-235	EML U-02 Modified	0.43	0.25	0.20	pCi/g
00-09109-05		NR1000902S090602	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-235	EML U-02 Modified	0.15	0.14	0.14	pCi/g
00-09109-06		NR1000902S090603	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-235	EML U-02 Modified	0.00	0.01	0.13	pCi/g
00-09109-07		NR1000902S090604	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-235	EML U-02 Modified	0.10	0.11	0.09	pCi/g
00-09109-08		NR1000902S090605	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-235	EML U-02 Modified	0.20	0.18	0.22	pCi/g
00-09109-09		NR1000902S090606	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-235	EML U-02 Modified	0.00	0.01	0.13	pCi/g
00-09109-10		NR1000902S090607	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-235	EML U-02 Modified	0.06	0.09	0.15	pCi/g
00-09109-11		NR1000902S090608	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-235	EML U-02 Modified	0.43	0.22	0.07	pCi/g
00-09109-12		NR1000902S090701	09/07/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-235	EML U-02 Modified	0.14	0.13	0.14	pCi/g
00-09109-13		NR1000902S090702	09/07/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-235	EML U-02 Modified	0.11	0.12	0.16	pCi/g
00-09109-14		NR1000902S090703	09/07/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-235	EML U-02 Modified	0.04	0.08	0.17	pCi/g
00-09109-15		NR1000902S090704	09/07/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-235	EML U-02 Modified	0.11	0.12	0.13	pCi/g
00-09109-16		NR1000902S090705	09/07/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-235	EML U-02 Modified	0.28	0.22	0.11	pCi/g
00-09109-01	K	KNOWN	09/13/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-238	EML U-02 Modified	8.29	0.30		pCi/g
00-09109-01	S	SPIKE	09/13/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-238	EML U-02 Modified	8.91	2.43	0.38	pCi/g
00-09109-02	B	BLANK	09/13/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-238	EML U-02 Modified	0.17	0.13	0.15	pCi/g
00-09109-03	D	NR1000902S090601	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-238	EML U-02 Modified	0.92	0.34	0.18	pCi/g
00-09109-04		NR1000902S090601	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-238	EML U-02 Modified	1.31	0.45	0.15	pCi/g
00-09109-05		NR1000902S090602	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-238	EML U-02 Modified	0.85	0.34	0.16	pCi/g
00-09109-06		NR1000902S090603	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-238	EML U-02 Modified	1.11	0.39	0.13	pCi/g
00-09109-07		NR1000902S090604	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-238	EML U-02 Modified	0.93	0.36	0.19	pCi/g
00-09109-08		NR1000902S090605	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-238	EML U-02 Modified	0.79	0.35	0.14	pCi/g
00-09109-09		NR1000902S090606	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-238	EML U-02 Modified	0.51	0.24	0.14	pCi/g
00-09109-10		NR1000902S090607	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-238	EML U-02 Modified	0.89	0.35	0.20	pCi/g
00-09109-11		NR1000902S090608	09/06/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-238	EML U-02 Modified	0.75	0.29	0.20	pCi/g
00-09109-12		NR1000902S090701	09/07/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-238	EML U-02 Modified	0.57	0.24	0.11	pCi/g
00-09109-13		NR1000902S090702	09/07/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-238	EML U-02 Modified	0.87	0.35	0.23	pCi/g
00-09109-14		NR1000902S090703	09/07/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-238	EML U-02 Modified	0.47	0.24	0.23	pCi/g
00-09109-15		NR1000902S090704	09/07/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-238	EML U-02 Modified	0.57	0.27	0.21	pCi/g
00-09109-16		NR1000902S090705	09/07/00	09/13/00	09/25/00	10/06/00	0009109	Uranium-238	EML U-02 Modified	0.96	0.42	0.25	pCi/g

K=Known,S=Spike,B=Blank,D=Duplicate,MS=Matrix Spike

ThermoRetec
Smart Solutions, Positive Outcomes.

Nuclear Services
A Thermo Electron Company

601 Scarboro Road
Oak Ridge, TN 37830
(865) 481-0683 Phone
(865) 483-4621 Lab Fax
(865) 481-0121 Adm. Fax
www.thermoretec.com

TNU-OR-13567

September 29, 2000

Ms. Judy Stone
RECRA Environmental, Inc.
208 Welsh Pool Road
Lionville, PA 19341-1313

CASE NARRATIVE
Work Order # 00-09110-OR

000926699

SAMPLE RECEIPT

This work order contains twelve soil samples received 09/13/00. All samples were analyzed for Americium-241, Isotopic Plutonium, Isotopic Uranium and by Gamma Spectroscopy.

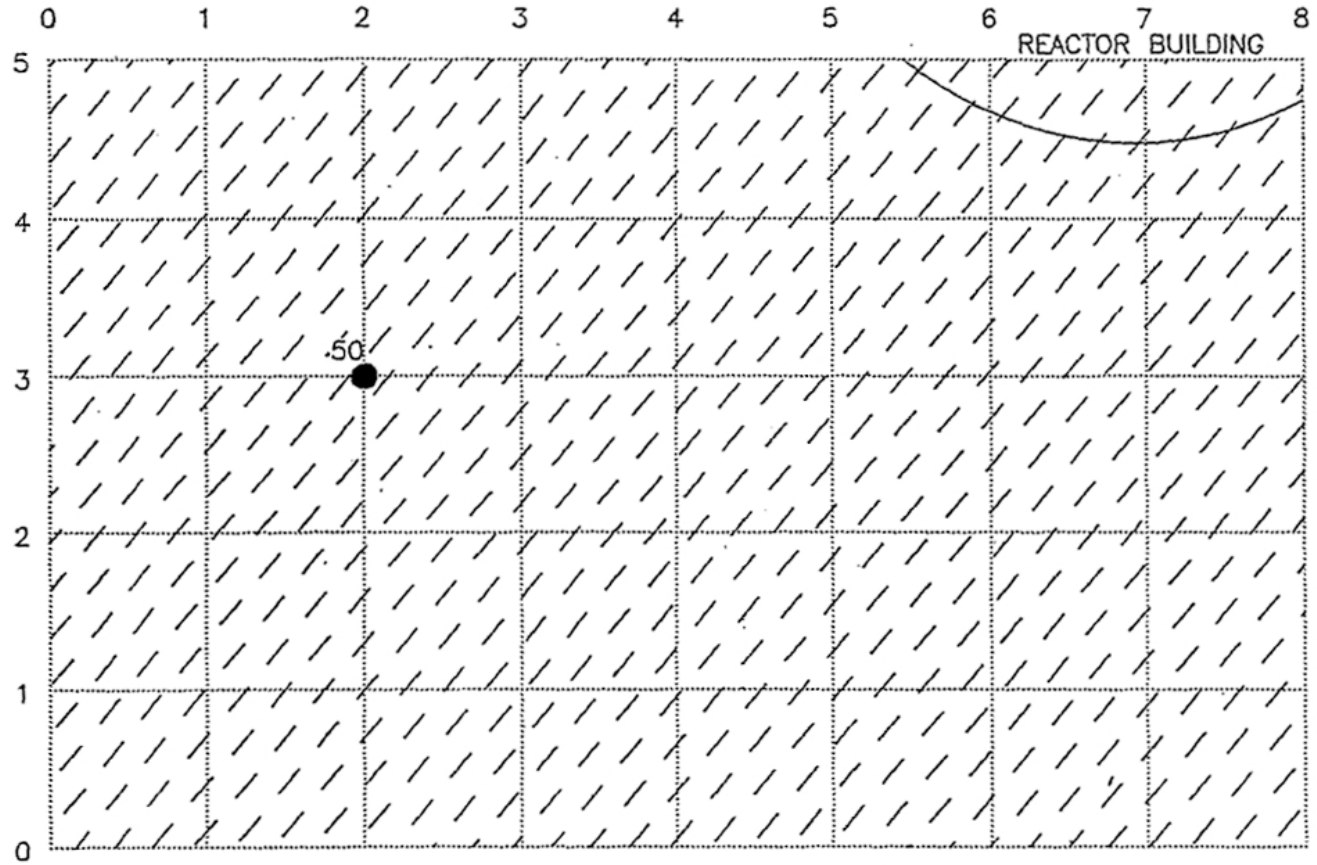
CLIENT ID	LAB ID
NR1000902S090706	00-09110-04
NR1000902S090707	00-09110-05
NR1000902S090708	00-09110-06
NR1000902S090709	00-09110-07
NR1000902S090710	00-09110-08
NR1000902S090711	00-09110-09
NR1000902S090712	00-09110-10
NR1000902S090713	00-09110-11
NR1000902S090714	00-09110-12
NR1000902S090715	00-09110-13
NR1000902S090716	00-09110-14
NR1000902S090717	00-09110-15

ANALYTICAL METHODS

Americium-241 was analyzed using Method EML Am-01 modified. Isotopic Plutonium was analyzed using Method EML Pu-02 modified. Isotopic Uranium was analyzed using Method EML U-02 modified. Gamma Spectroscopy was performed using Method LANL ER-130 modified.

PROBLEMS OR UNUSUAL CIRCUMSTANCES

No problems or unusual circumstances were noted during the analytical process.



SAMPLING LOCATIONS

● # SYSTEMATIC/RANDOM

EXCAVATED AREA

N

FEET

0 6

0 2

METERS

FIGURE 8: AOC 16 – 16E.4 BMRR – Sampling Locations

CERTIFICATION OF ACCURACY

I certify that this data report is in compliance with the terms and conditions of the Purchase Order, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the cognizant project manager or his/her designee to be accurate as verified by the following signature.

M.R. McDougall
Laboratory Manager

Date: 9/29/2000

Judy Stone
RECRA Environmental, Inc.
208 Welsh Pool Road
Lionville, PA 19341-1313

SDG: 0009110
MATRIX: Soil

Lab ID		Client ID	Sample Date	Receipt Date	Analysis Date	Report Date	Batch ID	Analyte	Method	Result	Error	MDA	Units
00-09110-01	K	KNOWN	09/13/00	09/13/00	09/26/00	09/29/00	0009110	Americium-241	EML Am-01 Modified	5.26	0.16		pCi/g
00-09110-01	S	SPIKE	09/13/00	09/13/00	09/26/00	09/29/00	0009110	Americium-241	EML Am-01 Modified	3.87	1.17	0.34	pCi/g
00-09110-02	B	BLANK	09/13/00	09/13/00	09/26/00	09/29/00	0009110	Americium-241	EML Am-01 Modified	0.00	0.07	0.20	pCi/g
00-09110-03	D	NR1000902S090706	09/07/00	09/13/00	09/26/00	09/29/00	0009110	Americium-241	EML Am-01 Modified	0.19	0.45	1.04	pCi/g
00-09110-04		NR1000902S090706	09/07/00	09/13/00	09/26/00	09/29/00	0009110	Americium-241	EML Am-01 Modified	0.30	0.51	1.04	pCi/g
00-09110-05		NR1000902S090707	09/07/00	09/13/00	09/26/00	09/29/00	0009110	Americium-241	EML Am-01 Modified	0.26	0.28	0.31	pCi/g
00-09110-06		NR1000902S090708	09/07/00	09/13/00	09/26/00	09/29/00	0009110	Americium-241	EML Am-01 Modified	0.78	0.54	0.44	pCi/g
00-09110-07		NR1000902S090709	09/07/00	09/13/00	09/26/00	09/29/00	0009110	Americium-241	EML Am-01 Modified	0.58	0.40	0.37	pCi/g
00-09110-08		NR1000902S090710	09/07/00	09/13/00	09/26/00	09/29/00	0009110	Americium-241	EML Am-01 Modified	0.24	0.34	0.61	pCi/g
00-09110-09		NR1000902S090711	09/07/00	09/13/00	09/26/00	09/29/00	0009110	Americium-241	EML Am-01 Modified	0.35	0.29	0.32	pCi/g
00-09110-10		NR1000902S090712	09/07/00	09/13/00	09/26/00	09/29/00	0009110	Americium-241	EML Am-01 Modified	0.61	0.62	0.90	pCi/g
00-09110-11		NR1000902S090713	09/07/00	09/13/00	09/26/00	09/29/00	0009110	Americium-241	EML Am-01 Modified	0.77	0.51	0.39	pCi/g
00-09110-12		NR1000902S090714	09/07/00	09/13/00	09/26/00	09/29/00	0009110	Americium-241	EML Am-01 Modified	0.31	0.40	0.75	pCi/g
00-09110-13		NR1000902S090715	09/07/00	09/13/00	09/26/00	09/29/00	0009110	Americium-241	EML Am-01 Modified	0.91	0.54	0.48	pCi/g
00-09110-14		NR1000902S090716	09/07/00	09/13/00	09/26/00	09/29/00	0009110	Americium-241	EML Am-01 Modified	0.42	0.39	0.23	pCi/g
00-09110-15		NR1000902S090717	09/07/00	09/13/00	09/26/00	09/29/00	0009110	Americium-241	EML Am-01 Modified	3.06	0.93	0.33	pCi/g
00-09110-01	K	KNOWN	09/13/00	09/13/00	09/15/00	09/29/00	0009110	Cobalt-60	LANL ER-130 Modified	126.78	5.58		pCi/g
00-09110-01	K	KNOWN	09/13/00	09/13/00	09/15/00	09/29/00	0009110	Cesium-137	LANL ER-130 Modified	73.33	3.37		pCi/g
00-09110-01	S	SPIKE	09/13/00	09/13/00	09/15/00	09/29/00	0009110	Cobalt-60	LANL ER-130 Modified	127.40	9.11	0.70	pCi/g
00-09110-01	S	SPIKE	09/13/00	09/13/00	09/15/00	09/29/00	0009110	Cesium-137	LANL ER-130 Modified	77.30	8.02	0.61	pCi/g
00-09110-02	B	BLANK	09/13/00	09/13/00	09/15/00	09/29/00	0009110	Cobalt-60	LANL ER-130 Modified	0.00	0.01	0.03	pCi/g
00-09110-02	B	BLANK	09/13/00	09/13/00	09/15/00	09/29/00	0009110	Cesium-137	LANL ER-130 Modified	0.00	0.02	0.03	pCi/g
00-09110-02	B	BLANK	09/13/00	09/13/00	09/15/00	09/29/00	0009110	Potassium-40	LANL ER-130 Modified	0.15	0.16	0.29	pCi/g
00-09110-02	B	BLANK	09/13/00	09/13/00	09/15/00	09/29/00	0009110	Lead-212	LANL ER-130 Modified	0.05	0.04	0.04	pCi/g
00-09110-02	B	BLANK	09/13/00	09/13/00	09/15/00	09/29/00	0009110	Lead-214	LANL ER-130 Modified	-0.02	0.04	0.06	pCi/g
00-09110-02	B	BLANK	09/13/00	09/13/00	09/15/00	09/29/00	0009110	Radium-226	LANL ER-130 Modified	0.02	0.04	0.07	pCi/g
00-09110-02	B	BLANK	09/13/00	09/13/00	09/15/00	09/29/00	0009110	Thorium-228	LANL ER-130 Modified	-0.01	0.05	0.10	pCi/g
00-09110-02	B	BLANK	09/13/00	09/13/00	09/15/00	09/29/00	0009110	Thorium-232	LANL ER-130 Modified	-0.01	0.05	0.10	pCi/g
00-09110-02	B	BLANK	09/13/00	09/13/00	09/15/00	09/29/00	0009110	Thallium-208	LANL ER-130 Modified	0.02	0.05	0.09	pCi/g
00-09110-02	B	BLANK	09/13/00	09/13/00	09/15/00	09/29/00	0009110	Uranium-238	LANL ER-130 Modified	0.05	0.33	0.40	pCi/g

K=Known,S=Spike,B=Blank,D=Duplicate,MS=Matrix Spike

Judy Stone
RECRA Environmental, Inc.
208 Welsh Pool Road
Lionville, PA 19341-1313

SDG: 0009110
MATRIX: Soil

Lab ID		Client ID	Sample Date	Receipt Date	Analysis Date	Report Date	Batch ID	Analyte	Method	Result	Error	MDA	Units
00-09110-03	D	NR1000902S090706	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Cobalt-60	LANL ER-130 Modified	0.01	0.02	0.04	pCi/g
00-09110-03	D	NR1000902S090706	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Cesium-137	LANL ER-130 Modified	9.10	0.98	0.05	pCi/g
00-09110-03	D	NR1000902S090706	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Potassium-40	LANL ER-130 Modified	5.13	0.75	0.26	pCi/g
00-09110-03	D	NR1000902S090706	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Lead-212	LANL ER-130 Modified	0.87	0.14	0.11	pCi/g
00-09110-03	D	NR1000902S090706	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Lead-214	LANL ER-130 Modified	0.42	0.12	0.14	pCi/g
00-09110-03	D	NR1000902S090706	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Radium-226	LANL ER-130 Modified	0.32	0.08	0.10	pCi/g
00-09110-03	D	NR1000902S090706	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thorium-228	LANL ER-130 Modified	0.58	0.11	0.14	pCi/g
00-09110-03	D	NR1000902S090706	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thorium-232	LANL ER-130 Modified	0.58	0.11	0.14	pCi/g
00-09110-03	D	NR1000902S090706	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thallium-208	LANL ER-130 Modified	0.45	0.10	0.16	pCi/g
00-09110-03	D	NR1000902S090706	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Uranium-238	LANL ER-130 Modified	-0.28	0.60	1.03	pCi/g
00-09110-04		NR1000902S090706	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Cobalt-60	LANL ER-130 Modified	0.01	0.03	0.06	pCi/g
00-09110-04		NR1000902S090706	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Cesium-137	LANL ER-130 Modified	14.10	1.47	0.07	pCi/g
00-09110-04		NR1000902S090706	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Potassium-40	LANL ER-130 Modified	8.11	1.32	0.49	pCi/g
00-09110-04		NR1000902S090706	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Lead-212	LANL ER-130 Modified	1.07	0.24	0.17	pCi/g
00-09110-04		NR1000902S090706	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Lead-214	LANL ER-130 Modified	0.53	0.19	0.23	pCi/g
00-09110-04		NR1000902S090706	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Radium-226	LANL ER-130 Modified	0.50	0.13	0.16	pCi/g
00-09110-04		NR1000902S090706	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thorium-228	LANL ER-130 Modified	1.00	0.20	0.18	pCi/g
00-09110-04		NR1000902S090706	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thorium-232	LANL ER-130 Modified	1.00	0.20	0.18	pCi/g
00-09110-04		NR1000902S090706	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thallium-208	LANL ER-130 Modified	0.91	0.20	0.26	pCi/g
00-09110-04		NR1000902S090706	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Uranium-238	LANL ER-130 Modified	0.39	1.29	1.85	pCi/g
00-09110-05		NR1000902S090707	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Cobalt-60	LANL ER-130 Modified	-0.01	0.03	0.05	pCi/g
00-09110-05		NR1000902S090707	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Cesium-137	LANL ER-130 Modified	12.64	1.36	0.07	pCi/g
00-09110-05		NR1000902S090707	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Potassium-40	LANL ER-130 Modified	5.66	0.92	0.36	pCi/g
00-09110-05		NR1000902S090707	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Lead-212	LANL ER-130 Modified	0.79	0.13	0.12	pCi/g
00-09110-05		NR1000902S090707	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Lead-214	LANL ER-130 Modified	0.67	0.17	0.17	pCi/g
00-09110-05		NR1000902S090707	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Radium-226	LANL ER-130 Modified	0.53	0.11	0.14	pCi/g
00-09110-05		NR1000902S090707	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thorium-228	LANL ER-130 Modified	0.77	0.15	0.15	pCi/g
00-09110-05		NR1000902S090707	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thorium-232	LANL ER-130 Modified	0.77	0.15	0.15	pCi/g
00-09110-05		NR1000902S090707	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thallium-208	LANL ER-130 Modified	0.75	0.13	0.20	pCi/g
00-09110-05		NR1000902S090707	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Uranium-238	LANL ER-130 Modified	0.65	0.95	1.12	pCi/g

K=Known,S=Spike,B=Blank,D=Duplicate,MS=Matrix Spike

Lab ID	Client ID	Sample Date	Receipt Date	Analysis Date	Report Date	Batch ID	Analyte	Method	Result	Error	MDA	Units
00-09110-06	NR1000902S090708	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Cobalt-60	LANL ER-130 Modified	0.00	0.03	0.05	pCi/g
00-09110-06	NR1000902S090708	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Cesium-137	LANL ER-130 Modified	61.61	6.54	0.11	pCi/g
00-09110-06	NR1000902S090708	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Potassium-40	LANL ER-130 Modified	4.24	0.77	0.41	pCi/g
00-09110-06	NR1000902S090708	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Lead-212	LANL ER-130 Modified	0.83	0.22	0.23	pCi/g
00-09110-06	NR1000902S090708	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Lead-214	LANL ER-130 Modified	0.62	0.26	0.34	pCi/g
00-09110-06	NR1000902S090708	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Radium-226	LANL ER-130 Modified	0.53	0.11	0.22	pCi/g
00-09110-06	NR1000902S090708	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thorium-228	LANL ER-130 Modified	0.63	0.15	0.14	pCi/g
00-09110-06	NR1000902S090708	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thorium-232	LANL ER-130 Modified	0.63	0.15	0.14	pCi/g
00-09110-06	NR1000902S090708	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thallium-208	LANL ER-130 Modified	0.75	0.16	0.36	pCi/g
00-09110-06	NR1000902S090708	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Uranium-238	LANL ER-130 Modified	1.06	1.31	1.74	pCi/g
00-09110-07	NR1000902S090709	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Cobalt-60	LANL ER-130 Modified	0.02	0.03	0.05	pCi/g
00-09110-07	NR1000902S090709	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Cesium-137	LANL ER-130 Modified	15.49	1.66	0.06	pCi/g
00-09110-07	NR1000902S090709	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Potassium-40	LANL ER-130 Modified	5.52	0.88	0.29	pCi/g
00-09110-07	NR1000902S090709	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Lead-212	LANL ER-130 Modified	0.63	0.13	0.13	pCi/g
00-09110-07	NR1000902S090709	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Lead-214	LANL ER-130 Modified	0.43	0.12	0.18	pCi/g
00-09110-07	NR1000902S090709	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Radium-226	LANL ER-130 Modified	0.38	0.10	0.12	pCi/g
00-09110-07	NR1000902S090709	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thorium-228	LANL ER-130 Modified	0.69	0.13	0.11	pCi/g
00-09110-07	NR1000902S090709	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thorium-232	LANL ER-130 Modified	0.69	0.13	0.11	pCi/g
00-09110-07	NR1000902S090709	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thallium-208	LANL ER-130 Modified	0.52	0.11	0.20	pCi/g
00-09110-07	NR1000902S090709	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Uranium-238	LANL ER-130 Modified	0.53	0.77	1.02	pCi/g
00-09110-08	NR1000902S090710	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Cobalt-60	LANL ER-130 Modified	-0.03	0.05	0.08	pCi/g
00-09110-08	NR1000902S090710	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Cesium-137	LANL ER-130 Modified	37.97	4.03	0.14	pCi/g
00-09110-08	NR1000902S090710	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Potassium-40	LANL ER-130 Modified	8.56	1.70	0.71	pCi/g
00-09110-08	NR1000902S090710	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Lead-212	LANL ER-130 Modified	1.08	0.41	0.33	pCi/g
00-09110-08	NR1000902S090710	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Lead-214	LANL ER-130 Modified	0.79	0.36	0.48	pCi/g
00-09110-08	NR1000902S090710	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Radium-226	LANL ER-130 Modified	0.73	0.19	0.32	pCi/g
00-09110-08	NR1000902S090710	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thorium-228	LANL ER-130 Modified	0.77	0.27	0.29	pCi/g
00-09110-08	NR1000902S090710	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thorium-232	LANL ER-130 Modified	0.77	0.27	0.29	pCi/g
00-09110-08	NR1000902S090710	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thallium-208	LANL ER-130 Modified	0.91	0.31	0.51	pCi/g
00-09110-08	NR1000902S090710	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Uranium-238	LANL ER-130 Modified	1.08	2.30	2.89	pCi/g

K=Known,S=Spike,B=Blank,D=Duplicate,MS=Matrix Spike

Judy Stone
RECRA Environmental, Inc.
208 Welsh Pool Road
Lionville, PA 19341-1313

SDG: 0009110
MATRIX: Soil

Lab ID	Client ID	Sample Date	Receipt Date	Analysis Date	Report Date	Batch ID	Analyte	Method	Result	Error	MDA	Units
00-09110-09	NR1000902S090711	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Cobalt-60	LANL ER-130 Modified	0.00	0.04	0.06	pCi/g
00-09110-09	NR1000902S090711	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Cesium-137	LANL ER-130 Modified	45.40	4.67	0.11	pCi/g
00-09110-09	NR1000902S090711	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Potassium-40	LANL ER-130 Modified	7.19	1.24	0.47	pCi/g
00-09110-09	NR1000902S090711	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Lead-212	LANL ER-130 Modified	1.02	0.29	0.29	pCi/g
00-09110-09	NR1000902S090711	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Lead-214	LANL ER-130 Modified	0.81	0.29	0.38	pCi/g
00-09110-09	NR1000902S090711	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Radium-226	LANL ER-130 Modified	0.64	0.15	0.24	pCi/g
00-09110-09	NR1000902S090711	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thorium-228	LANL ER-130 Modified	1.05	0.22	0.17	pCi/g
00-09110-09	NR1000902S090711	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thorium-232	LANL ER-130 Modified	1.05	0.22	0.17	pCi/g
00-09110-09	NR1000902S090711	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thallium-208	LANL ER-130 Modified	0.99	0.24	0.37	pCi/g
00-09110-09	NR1000902S090711	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Uranium-238	LANL ER-130 Modified	0.26	1.83	2.54	pCi/g
00-09110-10	NR1000902S090712	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Cobalt-60	LANL ER-130 Modified	0.02	0.03	0.05	pCi/g
00-09110-10	NR1000902S090712	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Cesium-137	LANL ER-130 Modified	19.19	2.06	0.07	pCi/g
00-09110-10	NR1000902S090712	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Potassium-40	LANL ER-130 Modified	4.42	0.89	0.50	pCi/g
00-09110-10	NR1000902S090712	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Lead-212	LANL ER-130 Modified	0.77	0.14	0.15	pCi/g
00-09110-10	NR1000902S090712	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Lead-214	LANL ER-130 Modified	0.52	0.17	0.22	pCi/g
00-09110-10	NR1000902S090712	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Radium-226	LANL ER-130 Modified	0.54	0.12	0 16	pCi/g
00-09110-10	NR1000902S090712	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thorium-228	LANL ER-130 Modified	0.72	0.15	0.18	pCi/g
00-09110-10	NR1000902S090712	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thorium-232	LANL ER-130 Modified	0.72	0.15	0.18	pCi/g
00-09110-10	NR1000902S090712	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thallium-208	LANL ER-130 Modified	0.48	0.13	0.23	pCi/g
00-09110-10	NR1000902S090712	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Uranium-238	LANL ER-130 Modified	-0.02	0.78	1.27	pCi/g
00-09110-11	NR1000902S090713	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Cobalt-60	LANL ER-130 Modified	0 02	0.04	0.08	pCi/g
00-09110-11	NR1000902S090713	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Cesium-137	LANL ER-130 Modified	76 46	7.87	0.15	pCi/g
00-09110-11	NR1000902S090713	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Potassium-40	LANL ER-130 Modified	5.35	1.24	0.66	pCi/g
00-09110-11	NR1000902S090713	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Lead-212	LANL ER-130 Modified	0.94	0.28	0.34	pCi/g
00-09110-11	NR1000902S090713	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Lead-214	LANL ER-130 Modified	0.66	0.39	0.51	pCi/g
00-09110-11	NR1000902S090713	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Radium-226	LANL ER-130 Modified	0.50	0.20	0.32	pCi/g
00-09110-11	NR1000902S090713	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thorium-228	LANL ER-130 Modified	0.70	0.23	0.24	pCi/g
00-09110-11	NR1000902S090713	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thorium-232	LANL ER-130 Modified	0.70	0.23	0.24	pCi/g
00-09110-11	NR1000902S090713	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thallium-208	LANL ER-130 Modified	0.81	0.21	0.53	pCi/g
00-09110-11	NR1000902S090713	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Uranium-238	LANL ER-130 Modified	1.59	2.29	3.01	pCi/g

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Judy Stone
RECRA Environmental, Inc.
208 Welsh Pool Road
Lionville, PA 19341-1313

SDG: 0009110
MATRIX: Soil

Lab ID	Client ID	Sample Date	Receipt Date	Analysis Date	Report Date	Batch ID	Analyte	Method	Result	Error	MDA	Units
00-09110-12	NR1000902S090714	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Cobalt-60	LANL ER-130 Modified	0.01	0.03	0.05	pCi/g
00-09110-12	NR1000902S090714	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Cesium-137	LANL ER-130 Modified	23.46	2.51	0.07	pCi/g
00-09110-12	NR1000902S090714	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Potassium-40	LANL ER-130 Modified	4.86	0.86	0.27	pCi/g
00-09110-12	NR1000902S090714	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Lead-212	LANL ER-130 Modified	0.49	0.16	0.15	pCi/g
00-09110-12	NR1000902S090714	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Lead-214	LANL ER-130 Modified	0.33	0.17	0.22	pCi/g
00-09110-12	NR1000902S090714	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Radium-226	LANL ER-130 Modified	0.42	0.10	0.14	pCi/g
00-09110-12	NR1000902S090714	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Thorium-228	LANL ER-130 Modified	0.47	0.15	0.14	pCi/g
00-09110-12	NR1000902S090714	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Thorium-232	LANL ER-130 Modified	0.47	0.15	0.14	pCi/g
00-09110-12	NR1000902S090714	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Thallium-208	LANL ER-130 Modified	0.52	0.13	0.23	pCi/g
00-09110-12	NR1000902S090714	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Uranium-238	LANL ER-130 Modified	0.04	1.05	1.21	pCi/g
00-09110-13	NR1000902S090715	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Cobalt-60	LANL ER-130 Modified	0.07	0.05	0.10	pCi/g
00-09110-13	NR1000902S090715	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Cesium-137	LANL ER-130 Modified	23.10	2.48	0.14	pCi/g
00-09110-13	NR1000902S090715	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Potassium-40	LANL ER-130 Modified	8.24	1.61	0.74	pCi/g
00-09110-13	NR1000902S090715	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Lead-212	LANL ER-130 Modified	1.16	0.40	0.26	pCi/g
00-09110-13	NR1000902S090715	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Lead-214	LANL ER-130 Modified	0.86	0.36	0.38	pCi/g
00-09110-13	NR1000902S090715	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Radium-226	LANL ER-130 Modified	0.78	0.22	0.28	pCi/g
00-09110-13	NR1000902S090715	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thorium-228	LANL ER-130 Modified	1.08	0.31	0.28	pCi/g
00-09110-13	NR1000902S090715	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thorium-232	LANL ER-130 Modified	1.08	0.31	0.28	pCi/g
00-09110-13	NR1000902S090715	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Thallium-208	LANL ER-130 Modified	1.03	0.33	0.43	pCi/g
00-09110-13	NR1000902S090715	09/07/00	09/13/00	09/14/00	09/29/00	0009110	Uranium-238	LANL ER-130 Modified	0.11	1.63	2.73	pCi/g
00-09110-14	NR1000902S090716	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Cobalt-60	LANL ER-130 Modified	-0.01	0.04	0.06	pCi/g
00-09110-14	NR1000902S090716	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Cesium-137	LANL ER-130 Modified	1.53	0.21	0.07	pCi/g
00-09110-14	NR1000902S090716	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Potassium-40	LANL ER-130 Modified	5.51	1.13	0.61	pCi/g
00-09110-14	NR1000902S090716	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Lead-212	LANL ER-130 Modified	0.97	0.17	0.12	pCi/g
00-09110-14	NR1000902S090716	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Lead-214	LANL ER-130 Modified	0.42	0.15	0.15	pCi/g
00-09110-14	NR1000902S090716	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Radium-226	LANL ER-130 Modified	0.56	0.14	0.12	pCi/g
00-09110-14	NR1000902S090716	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Thorium-228	LANL ER-130 Modified	0.83	0.23	0.21	pCi/g
00-09110-14	NR1000902S090716	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Thorium-232	LANL ER-130 Modified	0.83	0.23	0.21	pCi/g
00-09110-14	NR1000902S090716	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Thallium-208	LANL ER-130 Modified	0.94	0.19	0.19	pCi/g
00-09110-14	NR1000902S090716	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Uranium-238	LANL ER-130 Modified	3.59	1.32	1.48	pCi/g

K=Known,S=Spike,B=Blank,D=Duplicate,MS=Matrix Spike

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Lionville, PA 19341-1313

SDG: 0009110
MATRIX: Soil

Lab ID		Client ID	Sample Date	Receipt Date	Analysis Date	Report Date	Batch ID	Analyte	Method	Result	Error	MDA	Units
00-09110-15		NR1000902S090717	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Cobalt-60	LANL ER-130 Modified	0.07	0.04	0.09	pCi/g
00-09110-15		NR1000902S090717	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Cesium-137	LANL ER-130 Modified	3.13	0.37	0.08	pCi/g
00-09110-15		NR1000902S090717	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Potassium-40	LANL ER-130 Modified	5.69	1.23	0.57	pCi/g
00-09110-15		NR1000902S090717	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Lead-212	LANL ER-130 Modified	1.06	0.18	0.14	pCi/g
00-09110-15		NR1000902S090717	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Lead-214	LANL ER-130 Modified	0.30	0.14	0.18	pCi/g
00-09110-15		NR1000902S090717	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Radium-226	LANL ER-130 Modified	0.71	0.13	0.14	pCi/g
00-09110-15		NR1000902S090717	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Thorium-228	LANL ER-130 Modified	1.12	0.21	0.24	pCi/g
00-09110-15		NR1000902S090717	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Thorium-232	LANL ER-130 Modified	1.12	0.21	0.24	pCi/g
00-09110-15		NR1000902S090717	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Thallium-208	LANL ER-130 Modified	0.81	0.20	0.24	pCi/g
00-09110-15		NR1000902S090717	09/07/00	09/13/00	09/15/00	09/29/00	0009110	Uranium-238	LANL ER-130 Modified	3.16	1.60	1.55	pCi/g
00-09110-01	K	KNOWN	09/13/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-238	EML Pu-02 Modified	4.99	0.14		pCi/g
00-09110-01	S	SPIKE	09/13/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-238	EML Pu-02 Modified	5.04	1.19	0.13	pCi/g
00-09110-02	B	BLANK	09/13/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-238	EML Pu-02 Modified	0.02	0.05	0.13	pCi/g
00-09110-03	D	NR1000902S090706	09/07/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-238	EML Pu-02 Modified	0.01	0.06	0.16	pCi/g
00-09110-04		NR1000902S090706	09/07/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-238	EML Pu-02 Modified	0.27	0.18	0.21	pCi/g
00-09110-05		NR1000902S090707	09/07/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-238	EML Pu-02 Modified	0.03	0.08	0.20	pCi/g
00-09110-06		NR1000902S090708	09/07/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-238	EML Pu-02 Modified	0.03	0.07	0.18	pCi/g
00-09110-07		NR1000902S090709	09/07/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-238	EML Pu-02 Modified	0.03	0.08	0.18	pCi/g
00-09110-08		NR1000902S090710	09/07/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-238	EML Pu-02 Modified	0.05	0.08	0.15	pCi/g
00-09110-09		NR1000902S090711	09/07/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-238	EML Pu-02 Modified	0.03	0.07	0.17	pCi/g
00-09110-10		NR1000902S090712	09/07/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-238	EML Pu-02 Modified	0.02	0.07	0.19	pCi/g
00-09110-11		NR1000902S090713	09/07/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-238	EML Pu-02 Modified	-0.02	0.02	0.15	pCi/g
00-09110-12		NR1000902S090714	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Plutonium-238	EML Pu-02 Modified	0.01	0.06	0.17	pCi/g
00-09110-13		NR1000902S090715	09/07/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-238	EML Pu-02 Modified	0.15	0.13	0.12	pCi/g
00-09110-14		NR1000902S090716	09/07/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-238	EML Pu-02 Modified	1.06	0.37	0.13	pCi/g
00-09110-15		NR1000902S090717	09/07/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-238	EML Pu-02 Modified	0.09	0.12	0.21	pCi/g

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Lab ID		Client ID	Sample Date	Receipt Date	Analysis Date	Report Date	Batch ID	Analyte	Method	Result	Error	MDA	Units
00-09110-01	K	KNOWN	09/13/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-239/240	EML Pu-02 Modified	6.00	0.19		pCi/g
00-09110-01	S	SPIKE	09/13/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-239/240	EML Pu-02 Modified	7.32	1.64	0.14	pCi/g
00-09110-02	B	BLANK	09/13/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-239/240	EML Pu-02 Modified	0.07	0.08	0.16	pCi/g
00-09110-03	D	NR1000902S090706	09/07/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-239/240	EML Pu-02 Modified	0.15	0.13	0.14	pCi/g
00-09110-04		NR1000902S090706	09/07/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-239/240	EML Pu-02 Modified	0.51	0.24	0.10	pCi/g
00-09110-05		NR1000902S090707	09/07/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-239/240	EML Pu-02 Modified	0.01	0.05	0.15	pCi/g
00-09110-06		NR1000902S090708	09/07/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-239/240	EML Pu-02 Modified	0.08	0.09	0.07	pCi/g
00-09110-07		NR1000902S090709	09/07/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-239/240	EML Pu-02 Modified	0.07	0.09	0.13	pCi/g
00-09110-08		NR1000902S090710	09/07/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-239/240	EML Pu-02 Modified	0.01	0.05	0.13	pCi/g
00-09110-09		NR1000902S090711	09/07/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-239/240	EML Pu-02 Modified	0.18	0.14	0.16	pCi/g
00-09110-10		NR1000902S090712	09/07/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-239/240	EML Pu-02 Modified	0.02	0.05	0.13	pCi/g
00-09110-11		NR1000902S090713	09/07/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-239/240	EML Pu-02 Modified	0.18	0.14	0.16	pCi/g
00-09110-12		NR1000902S090714	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Plutonium-239/240	EML Pu-02 Modified	0.26	0.18	0.18	pCi/g
00-09110-13		NR1000902S090715	09/07/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-239/240	EML Pu-02 Modified	0.23	0.16	0.07	pCi/g
00-09110-14		NR1000902S090716	09/07/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-239/240	EML Pu-02 Modified	1.21	0.40	0.14	pCi/g
00-09110-15		NR1000902S090717	09/07/00	09/13/00	09/22/00	09/29/00	0009110	Plutonium-239/240	EML Pu-02 Modified	0.12	0.12	0.14	pCi/g
00-09110-01	K	KNOWN	09/13/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-234	EML U-02 Modified	8.02	0.29		pCi/g
00-09110-01	S	SPIKE	09/13/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-234	EML U-02 Modified	10.97	2.71	0.30	pCi/g
00-09110-02	B	BLANK	09/13/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-234	EML U-02 Modified	0.35	0.26	0.40	pCi/g
00-09110-03	D	NR1000902S090706	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-234	EML U-02 Modified	1.21	0.44	0.21	pCi/g
00-09110-04		NR1000902S090706	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-234	EML U-02 Modified	1.20	0.46	0.28	pCi/g
00-09110-05		NR1000902S090707	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-234	EML U-02 Modified	0.79	0.35	0.26	pCi/g
00-09110-06		NR1000902S090708	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-234	EML U-02 Modified	1.20	0.44	0.17	pCi/g
00-09110-07		NR1000902S090709	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-234	EML U-02 Modified	1.26	0.46	0.19	pCi/g
00-09110-08		NR1000902S090710	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-234	EML U-02 Modified	0.90	0.39	0.29	pCi/g
00-09110-09		NR1000902S090711	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-234	EML U-02 Modified	1.44	0.48	0.19	pCi/g
00-09110-10		NR1000902S090712	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-234	EML U-02 Modified	0.80	0.54	0.47	pCi/g
00-09110-11		NR1000902S090713	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-234	EML U-02 Modified	2.32	0.65	0.19	pCi/g
00-09110-12		NR1000902S090714	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-234	EML U-02 Modified	1.03	0.40	0.28	pCi/g
00-09110-13		NR1000902S090715	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-234	EML U-02 Modified	1.00	0.41	0.26	pCi/g
00-09110-14		NR1000902S090716	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-234	EML U-02 Modified	1.31	0.43	0.17	pCi/g
00-09110-15		NR1000902S090717	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-234	EML U-02 Modified	2.30	0.69	0.23	pCi/g

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Lab ID		Client ID	Sample Date	Receipt Date	Analysis Date	Report Date	Batch ID	Analyte	Method	Result	Error	MDA	Units
00-09110-01	K	KNOWN	09/13/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-235	EML U-02 Modified	0.36	0.01		pCi/g
00-09110-01	S	SPIKE	09/13/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-235	EML U-02 Modified	0.49	0.32	0.21	pCi/g
00-09110-02	B	BLANK	09/13/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-235	EML U-02 Modified	0.05	0.10	0.23	pCi/g
00-09110-03	D	NR1000902S090706	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-235	EML U-02 Modified	0.00	0.07	0.24	pCi/g
00-09110-04		NR1000902S090706	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-235	EML U-02 Modified	0.07	0.10	0.16	pCi/g
00-09110-05		NR1000902S090707	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-235	EML U-02 Modified	0.03	0.07	0.15	pCi/g
00-09110-06		NR1000902S090708	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-235	EML U-02 Modified	0.10	0.12	0.09	pCi/g
00-09110-07		NR1000902S090709	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-235	EML U-02 Modified	0.09	0.13	0.22	pCi/g
00-09110-08		NR1000902S090710	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-235	EML U-02 Modified	0.14	0.15	0.20	pCi/g
00-09110-09		NR1000902S090711	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-235	EML U-02 Modified	0.09	0.12	0.15	pCi/g
00-09110-10		NR1000902S090712	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-235	EML U-02 Modified	0.18	0.25	0.24	pCi/g
00-09110-11		NR1000902S090713	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-235	EML U-02 Modified	0.16	0.15	0.16	pCi/g
00-09110-12		NR1000902S090714	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-235	EML U-02 Modified	0.04	0.09	0.21	pCi/g
00-09110-13		NR1000902S090715	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-235	EML U-02 Modified	0.21	0.19	0.21	pCi/g
00-09110-14		NR1000902S090716	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-235	EML U-02 Modified	0.16	0.15	0.17	pCi/g
00-09110-15		NR1000902S090717	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-235	EML U-02 Modified	0.63	0.32	0.20	pCi/g
00-09110-01	K	KNOWN	09/13/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-238	EML U-02 Modified	7.82	0.28		pCi/g
00-09110-01	S	SPIKE	09/13/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-238	EML U-02 Modified	8.68	2.20	0.20	pCi/g
00-09110-02	B	BLANK	09/13/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-238	EML U-02 Modified	0.05	0.10	0.23	pCi/g
00-09110-03	D	NR1000902S090706	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-238	EML U-02 Modified	1.06	0.40	0.16	pCi/g
00-09110-04		NR1000902S090706	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-238	EML U-02 Modified	0.73	0.33	0.19	pCi/g
00-09110-05		NR1000902S090707	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-238	EML U-02 Modified	1.16	0.43	0.14	pCi/g
00-09110-06		NR1000902S090708	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-238	EML U-02 Modified	1.18	0.43	0.20	pCi/g
00-09110-07		NR1000902S090709	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-238	EML U-02 Modified	1.24	0.46	0.13	pCi/g
00-09110-08		NR1000902S090710	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-238	EML U-02 Modified	0.73	0.34	0.21	pCi/g
00-09110-09		NR1000902S090711	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-238	EML U-02 Modified	1.08	0.40	0.21	pCi/g
00-09110-10		NR1000902S090712	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-238	EML U-02 Modified	1.32	0.75	0.69	pCi/g
00-09110-11		NR1000902S090713	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-238	EML U-02 Modified	0.79	0.31	0.14	pCi/g
00-09110-12		NR1000902S090714	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-238	EML U-02 Modified	0.90	0.36	0.23	pCi/g
00-09110-13		NR1000902S090715	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-238	EML U-02 Modified	0.79	0.36	0.29	pCi/g
00-09110-14		NR1000902S090716	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-238	EML U-02 Modified	0.64	0.28	0.19	pCi/g
00-09110-15		NR1000902S090717	09/07/00	09/13/00	09/25/00	09/29/00	0009110	Uranium-238	EML U-02 Modified	1.71	0.56	0.23	pCi/g

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NYSDEC
0010L978

TNU-OR-13850

October 30, 2000

Ms. Judy Stone
RECRA Environmental, Inc.
208 Welsh Pool Road
Lionville, PA 19341-1313

CASE NARRATIVE
Work Order #00-10136-OR

SAMPLE RECEIPT

This work order contains eight soil samples received 10/16/2000. These samples were analyzed for Americium-241, Isotopic Plutonium, Isotopic Uranium and by Gamma Spectroscopy.

CLIENT ID	LAB ID	CLIENT ID	LAB ID
NR1001002S101101	00-10136-04	NR1001002S101105	00-10136-08
NR1001002S101102	00-10136-05	NR1001002S101106	00-10136-09
NR1001002S101103	00-10136-06	NR1001002S101107	00-10136-10
NR1001002S101104	00-10136-07	NR1001002S101108	00-10136-11

ANALYTICAL METHODS

Americium-241 was analyzed using Method EML Am-01 Modified. Isotopic Plutonium was performed using Method EML Pu-02 Modified. Isotopic Uranium was analyzed using Method EML U-02 Modified. Gamma Spectroscopy was performed using Method LANL ER-130 modified.

PROBLEMS OR UNUSUAL CIRCUMSTANCES

No problems or unusual circumstances were noted during the analytical process.

CERTIFICATION OF ACCURACY

I certify that this data report is in compliance with the terms and conditions of the Purchase Order, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the cognizant project manager or his/her designee to be accurate as verified by the following signature.

M.R. McDougall
Laboratory Manager

Date:

Judy Stone
RECRA Environmental, Inc.
208 Welsh Pool Road
Lionville, PA 19341-1313

SDG: 0010136
MATRIX: Soil

Lab ID		Client ID	Sample Date	Receipt Date	Analysis Date	Report Date	Batch ID	Analyte	Method	Result	Error	MDA	Units
00-10136-01	K	KNOWN	10/16/00	10/16/00	10/23/00	10/30/00	0010136	Americium-241	EML Am-01 Modified	5.51	0.17		pCi/g
00-10136-01	S	SPIKE	10/16/00	10/16/00	10/23/00	10/30/00	0010136	Americium-241	EML Am-01 Modified	5.53	1.68	0.44	pCi/g
00-10136-02	B	BLANK	10/16/00	10/16/00	10/23/00	10/30/00	0010136	Americium-241	EML Am-01 Modified	0.08	0.11	0.21	pCi/g
00-10136-03	D	NR1001002S101101	10/11/00	10/16/00	10/23/00	10/30/00	0010136	Americium-241	EML Am-01 Modified	0.30	0.35	0.51	pCi/g
00-10136-04		NR1001002S101101	10/11/00	10/16/00	10/23/00	10/30/00	0010136	Americium-241	EML Am-01 Modified	0.28	0.25	0.38	pCi/g
00-10136-05		NR1001002S101102	10/11/00	10/16/00	10/23/00	10/30/00	0010136	Americium-241	EML Am-01 Modified	0.17	0.24	0.43	pCi/g
00-10136-06		NR1001002S101103	10/11/00	10/16/00	10/23/00	10/30/00	0010136	Americium-241	EML Am-01 Modified	0.19	0.27	0.46	pCi/g
00-10136-07		NR1001002S101104	10/11/00	10/16/00	10/23/00	10/30/00	0010136	Americium-241	EML Am-01 Modified	0.09	0.14	0.27	pCi/g
00-10136-08		NR1001002S101105	10/11/00	10/16/00	10/23/00	10/30/00	0010136	Americium-241	EML Am-01 Modified	2.28	0.74	0.38	pCi/g
00-10136-09		NR1001002S101106	10/11/00	10/16/00	10/23/00	10/30/00	0010136	Americium-241	EML Am-01 Modified	0.20	0.19	0.19	pCi/g
00-10136-10		NR1001002S101107	10/11/00	10/16/00	10/23/00	10/30/00	0010136	Americium-241	EML Am-01 Modified	0.26	0.23	0.35	pCi/g
00-10136-11		NR1001002S101108	10/11/00	10/16/00	10/23/00	10/30/00	0010136	Americium-241	EML Am-01 Modified	0.20	0.22	0.35	pCi/g
00-10136-01	K	KNOWN	10/16/00	10/16/00	10/23/00	10/30/00	0010136	Plutonium-238	EML Pu-02 Modified	5.01	0.14		pCi/g
00-10136-01	S	SPIKE	10/16/00	10/16/00	10/23/00	10/30/00	0010136	Plutonium-238	EML Pu-02 Modified	4.35	1.16	0.25	pCi/g
00-10136-02	B	BLANK	10/16/00	10/16/00	10/23/00	10/30/00	0010136	Plutonium-238	EML Pu-02 Modified	1.04	0.37	0.19	pCi/g
00-10136-03	D	NR1001002S101101	10/11/00	10/16/00	10/23/00	10/30/00	0010136	Plutonium-238	EML Pu-02 Modified	0.14	0.14	0.19	pCi/g
00-10136-04		NR1001002S101101	10/11/00	10/16/00	10/23/00	10/30/00	0010136	Plutonium-238	EML Pu-02 Modified	-0.02	0.06	0.23	pCi/g
00-10136-05		NR1001002S101102	10/11/00	10/16/00	10/23/00	10/30/00	0010136	Plutonium-238	EML Pu-02 Modified	0.07	0.10	0.17	pCi/g
00-10136-06		NR1001002S101103	10/11/00	10/16/00	10/23/00	10/30/00	0010136	Plutonium-238	EML Pu-02 Modified	0.07	0.09	0.14	pCi/g
00-10136-07		NR1001002S101104	10/11/00	10/16/00	10/23/00	10/30/00	0010136	Plutonium-238	EML Pu-02 Modified	0.02	0.13	0.39	pCi/g
00-10136-08		NR1001002S101105	10/11/00	10/16/00	10/23/00	10/30/00	0010136	Plutonium-238	EML Pu-02 Modified	0.08	0.14	0.29	pCi/g
00-10136-09		NR1001002S101106	10/11/00	10/16/00	10/23/00	10/30/00	0010136	Plutonium-238	EML Pu-02 Modified	-0.01	0.02	0.18	pCi/g
00-10136-10		NR1001002S101107	10/11/00	10/16/00	10/23/00	10/30/00	0010136	Plutonium-238	EML Pu-02 Modified	0.03	0.11	0.27	pCi/g
00-10136-11		NR1001002S101108	10/11/00	10/16/00	10/23/00	10/30/00	0010136	Plutonium-238	EML Pu-02 Modified	0.09	0.12	0.20	pCi/g
00-10136-01	K	KNOWN	10/16/00	10/16/00	10/23/00	10/30/00	0010136	Plutonium-239/240	EML Pu-02 Modified	6.00	0.19		pCi/g
00-10136-01	S	SPIKE	10/16/00	10/16/00	10/23/00	10/30/00	0010136	Plutonium-239/240	EML Pu-02 Modified	6.12	1.54	0.17	pCi/g
00-10136-02	B	BLANK	10/16/00	10/16/00	10/23/00	10/30/00	0010136	Plutonium-239/240	EML Pu-02 Modified	0.66	0.28	0.06	pCi/g
00-10136-03	D	NR1001002S101101	10/11/00	10/16/00	10/23/00	10/30/00	0010136	Plutonium-239/240	EML Pu-02 Modified	0.33	0.22	0.17	pCi/g
00-10136-04		NR1001002S101101	10/11/00	10/16/00	10/23/00	10/30/00	0010136	Plutonium-239/240	EML Pu-02 Modified	0.19	0.15	0.17	pCi/g
00-10136-05		NR1001002S101102	10/11/00	10/16/00	10/23/00	10/30/00	0010136	Plutonium-239/240	EML Pu-02 Modified	0.05	0.10	0.21	pCi/g
00-10136-06		NR1001002S101103	10/11/00	10/16/00	10/23/00	10/30/00	0010136	Plutonium-239/240	EML Pu-02 Modified	0.04	0.07	0.14	pCi/g
00-10136-07		NR1001002S101104	10/11/00	10/16/00	10/23/00	10/30/00	0010136	Plutonium-239/240	EML Pu-02 Modified	0.04	0.12	0.32	pCi/g
00-10136-08		NR1001002S101105	10/11/00	10/16/00	10/23/00	10/30/00	0010136	Plutonium-239/240	EML Pu-02 Modified	0.00	0.06	0.21	pCi/g
00-10136-09		NR1001002S101106	10/11/00	10/16/00	10/23/00	10/30/00	0010136	Plutonium-239/240	EML Pu-02 Modified	0.02	0.07	0.18	pCi/g
00-10136-10		NR1001002S101107	10/11/00	10/16/00	10/23/00	10/30/00	0010136	Plutonium-239/240	EML Pu-02 Modified	0.11	0.12	0.16	pCi/g
00-10136-11		NR1001002S101108	10/11/00	10/16/00	10/23/00	10/30/00	0010136	Plutonium-239/240	EML Pu-02 Modified	0.04	0.08	0.17	pCi/g

K=Known,S=Spike,B=Blank,D=Duplicate,MS=Matrix Spike

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MATRIX: Soil

Lab ID		Client ID	Sample Date	Receipt Date	Analysis Date	Report Date	Batch ID	Analyte	Method	Result	Error	MDA	Units
00-10136-01	K	KNOWN	10/16/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-233/234	EML U-02 Modified	8.05	0.29		pCi/g
00-10136-01	S	SPIKE	10/16/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-233/234	EML U-02 Modified	7.99	1.90	0.18	pCi/g
00-10136-02	B	BLANK	10/16/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-233/234	EML U-02 Modified	0.18	0.14	0.14	pCi/g
00-10136-03	D	NR1001002S101101	10/11/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-233/234	EML U-02 Modified	0.84	0.31	0.16	pCi/g
00-10136-04		NR1001002S101101	10/11/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-233/234	EML U-02 Modified	0.89	0.32	0.17	pCi/g
00-10136-05		NR1001002S101102	10/11/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-233/234	EML U-02 Modified	1.24	0.40	0.21	pCi/g
00-10136-06		NR1001002S101103	10/11/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-233/234	EML U-02 Modified	0.88	0.32	0.19	pCi/g
00-10136-07		NR1001002S101104	10/11/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-233/234	EML U-02 Modified	0.77	0.30	0.16	pCi/g
00-10136-08		NR1001002S101105	10/11/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-233/234	EML U-02 Modified	0.79	0.30	0.21	pCi/g
00-10136-09		NR1001002S101106	10/11/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-233/234	EML U-02 Modified	1.16	0.44	0.23	pCi/g
00-10136-10		NR1001002S101107	10/11/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-233/234	EML U-02 Modified	0.80	0.31	0.20	pCi/g
00-10136-11		NR1001002S101108	10/11/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-233/234	EML U-02 Modified	0.58	0.23	0.13	pCi/g
00-10136-01	K	KNOWN	10/16/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-235	EML U-02 Modified	0.37	0.01		pCi/g
00-10136-01	S	SPIKE	10/16/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-235	EML U-02 Modified	0.22	0.17	0.15	pCi/g
00-10136-02	B	BLANK	10/16/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-235	EML U-02 Modified	0.02	0.05	0.12	pCi/g
00-10136-03	D	NR1001002S101101	10/11/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-235	EML U-02 Modified	0.02	0.05	0.13	pCi/g
00-10136-04		NR1001002S101101	10/11/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-235	EML U-02 Modified	0.07	0.08	0.11	pCi/g
00-10136-05		NR1001002S101102	10/11/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-235	EML U-02 Modified	0.04	0.07	0.14	pCi/g
00-10136-06		NR1001002S101103	10/11/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-235	EML U-02 Modified	0.04	0.07	0.13	pCi/g
00-10136-07		NR1001002S101104	10/11/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-235	EML U-02 Modified	0.02	0.05	0.11	pCi/g
00-10136-08		NR1001002S101105	10/11/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-235	EML U-02 Modified	0.06	0.10	0.19	pCi/g
00-10136-09		NR1001002S101106	10/11/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-235	EML U-02 Modified	0.05	0.10	0.21	pCi/g
00-10136-10		NR1001002S101107	10/11/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-235	EML U-02 Modified	0.16	0.13	0.07	pCi/g
00-10136-11		NR1001002S101108	10/11/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-235	EML U-02 Modified	0.01	0.04	0.14	pCi/g
00-10136-01	K	KNOWN	10/16/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-238	EML U-02 Modified	7.84	0.28		pCi/g
00-10136-01	S	SPIKE	10/16/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-238	EML U-02 Modified	7.62	1.82	0.17	pCi/g
00-10136-02	B	BLANK	10/16/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-238	EML U-02 Modified	0.15	0.12	0.12	pCi/g
00-10136-03	D	NR1001002S101101	10/11/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-238	EML U-02 Modified	1.14	0.37	0.15	pCi/g
00-10136-04		NR1001002S101101	10/11/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-238	EML U-02 Modified	0.74	0.28	0.17	pCi/g
00-10136-05		NR1001002S101102	10/11/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-238	EML U-02 Modified	0.57	0.25	0.22	pCi/g
00-10136-06		NR1001002S101103	10/11/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-238	EML U-02 Modified	0.55	0.24	0.19	pCi/g
00-10136-07		NR1001002S101104	10/11/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-238	EML U-02 Modified	0.47	0.22	0.15	pCi/g
00-10136-08		NR1001002S101105	10/11/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-238	EML U-02 Modified	0.94	0.33	0.18	pCi/g
00-10136-09		NR1001002S101106	10/11/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-238	EML U-02 Modified	0.55	0.28	0.20	pCi/g
00-10136-10		NR1001002S101107	10/11/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-238	EML U-02 Modified	1.03	0.36	0.16	pCi/g
00-10136-11		NR1001002S101108	10/11/00	10/16/00	10/26/00	10/30/00	0010136	Uranium-238	EML U-02 Modified	0.42	0.19	0.17	pCi/g

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SDG: 0010136
MATRIX: Soil

Lab ID		Client ID	Sample Date	Receipt Date	Analysis Date	Report Date	Batch ID	Analyte	Method	Result	Error	MDA	Units
00-10136-01	K	KNOWN	10/16/00	10/16/00	10/18/00	10/30/00	0010136	Cobalt-60	LANL ER-130 Modified	126.78	5.58		pCi/g
00-10136-01	K	KNOWN	10/16/00	10/16/00	10/18/00	10/30/00	0010136	Cesium-137	LANL ER-130 Modified	73.33	3.37		pCi/g
00-10136-01	S	SPIKE	10/16/00	10/16/00	10/18/00	10/30/00	0010136	Cobalt-60	LANL ER-130 Modified	127.60	8.97	0.70	pCi/g
00-10136-01	S	SPIKE	10/16/00	10/16/00	10/18/00	10/30/00	0010136	Cesium-137	LANL ER-130 Modified	78.98	8.25	0.56	pCi/g
00-10136-02	B	BLANK	10/16/00	10/16/00	10/18/00	10/30/00	0010136	Cobalt-60	LANL ER-130 Modified	0.00	0.02	0.03	pCi/g
00-10136-02	B	BLANK	10/16/00	10/16/00	10/18/00	10/30/00	0010136	Cesium-137	LANL ER-130 Modified	0.00	0.01	0.03	pCi/g
00-10136-02	B	BLANK	10/16/00	10/16/00	10/18/00	10/30/00	0010136	Potassium-40	LANL ER-130 Modified	0.02	0.15	0.33	pCi/g
00-10136-02	B	BLANK	10/16/00	10/16/00	10/18/00	10/30/00	0010136	Lead-212	LANL ER-130 Modified	-0.02	0.02	0.05	pCi/g
00-10136-02	B	BLANK	10/16/00	10/16/00	10/18/00	10/30/00	0010136	Lead-214	LANL ER-130 Modified	0.02	0.04	0.06	pCi/g
00-10136-02	B	BLANK	10/16/00	10/16/00	10/18/00	10/30/00	0010136	Radium-226	LANL ER-130 Modified	0.03	0.06	0.07	pCi/g
00-10136-02	B	BLANK	10/16/00	10/16/00	10/18/00	10/30/00	0010136	Thorium-228	LANL ER-130 Modified	-0.03	0.04	0.07	pCi/g
00-10136-02	B	BLANK	10/16/00	10/16/00	10/18/00	10/30/00	0010136	Thorium-232	LANL ER-130 Modified	-0.03	0.04	0.07	pCi/g
00-10136-02	B	BLANK	10/16/00	10/16/00	10/18/00	10/30/00	0010136	Thallium-208	LANL ER-130 Modified	0.04	0.04	0.05	pCi/g
00-10136-02	B	BLANK	10/16/00	10/16/00	10/18/00	10/30/00	0010136	Uranium-238	LANL ER-130 Modified	0.13	0.32	0.62	pCi/g
00-10136-03	D	NR1001002S101101	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Cobalt-60	LANL ER-130 Modified	0.01	0.03	0.05	pCi/g
00-10136-03	D	NR1001002S101101	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Cesium-137	LANL ER-130 Modified	35.58	3.66	0.08	pCi/g
00-10136-03	D	NR1001002S101101	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Potassium-40	LANL ER-130 Modified	6.55	1.10	0.34	pCi/g
00-10136-03	D	NR1001002S101101	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Lead-212	LANL ER-130 Modified	0.90	0.24	0.21	pCi/g
00-10136-03	D	NR1001002S101101	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Lead-214	LANL ER-130 Modified	0.51	0.23	0.29	pCi/g
00-10136-03	D	NR1001002S101101	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Radium-226	LANL ER-130 Modified	0.49	0.14	0.17	pCi/g
00-10136-03	D	NR1001002S101101	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Thorium-228	LANL ER-130 Modified	0.67	0.17	0.17	pCi/g
00-10136-03	D	NR1001002S101101	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Thorium-232	LANL ER-130 Modified	0.67	0.17	0.17	pCi/g
00-10136-03	D	NR1001002S101101	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Thallium-208	LANL ER-130 Modified	0.84	0.21	0.29	pCi/g
00-10136-03	D	NR1001002S101101	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Uranium-238	LANL ER-130 Modified	4.19	2.22	1.83	pCi/g
00-10136-04		NR1001002S101101	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Cobalt-60	LANL ER-130 Modified	0.02	0.03	0.06	pCi/g
00-10136-04		NR1001002S101101	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Cesium-137	LANL ER-130 Modified	35.21	3.62	0.08	pCi/g
00-10136-04		NR1001002S101101	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Potassium-40	LANL ER-130 Modified	6.52	1.09	0.38	pCi/g
00-10136-04		NR1001002S101101	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Lead-212	LANL ER-130 Modified	1.10	0.27	0.21	pCi/g
00-10136-04		NR1001002S101101	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Lead-214	LANL ER-130 Modified	0.67	0.23	0.28	pCi/g
00-10136-04		NR1001002S101101	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Radium-226	LANL ER-130 Modified	0.44	0.13	0.19	pCi/g
00-10136-04		NR1001002S101101	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Thorium-228	LANL ER-130 Modified	0.74	0.17	0.15	pCi/g
00-10136-04		NR1001002S101101	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Thorium-232	LANL ER-130 Modified	0.74	0.17	0.15	pCi/g
00-10136-04		NR1001002S101101	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Thallium-208	LANL ER-130 Modified	0.72	0.18	0.29	pCi/g
00-10136-04		NR1001002S101101	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Uranium-238	LANL ER-130 Modified	0.82	1.45	1.94	pCi/g

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00-10136-05	NR1001002S101102	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Cobalt-60	LANL ER-130 Modified	-0.01	0.02	0.04	pCi/g
00-10136-05	NR1001002S101102	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Cesium-137	LANL ER-130 Modified	10.87	1.16	0.06	pCi/g
00-10136-05	NR1001002S101102	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Potassium-40	LANL ER-130 Modified	3.50	0.83	0.46	pCi/g
00-10136-05	NR1001002S101102	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Lead-212	LANL ER-130 Modified	0.62	0.16	0.13	pCi/g
00-10136-05	NR1001002S101102	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Lead-214	LANL ER-130 Modified	0.27	0.14	0.19	pCi/g
00-10136-05	NR1001002S101102	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Radium-226	LANL ER-130 Modified	0.32	0.11	0.12	pCi/g
00-10136-05	NR1001002S101102	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Thorium-228	LANL ER-130 Modified	0.38	0.15	0.15	pCi/g
00-10136-05	NR1001002S101102	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Thorium-232	LANL ER-130 Modified	0.38	0.15	0.15	pCi/g
00-10136-05	NR1001002S101102	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Thallium-208	LANL ER-130 Modified	0.49	0.15	0.21	pCi/g
00-10136-05	NR1001002S101102	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Uranium-238	LANL ER-130 Modified	0.46	1.07	1.16	pCi/g
00-10136-06	NR1001002S101103	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Cobalt-60	LANL ER-130 Modified	0.00	0.03	0.05	pCi/g
00-10136-06	NR1001002S101103	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Cesium-137	LANL ER-130 Modified	6.37	0.69	0.07	pCi/g
00-10136-06	NR1001002S101103	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Potassium-40	LANL ER-130 Modified	3.30	0.80	0.49	pCi/g
00-10136-06	NR1001002S101103	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Lead-212	LANL ER-130 Modified	0.59	0.12	0.12	pCi/g
00-10136-06	NR1001002S101103	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Lead-214	LANL ER-130 Modified	0.43	0.15	0.18	pCi/g
00-10136-06	NR1001002S101103	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Radium-226	LANL ER-130 Modified	0.30	0.11	0.14	pCi/g
00-10136-06	NR1001002S101103	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Thorium-228	LANL ER-130 Modified	0.30	0.16	0.20	pCi/g
00-10136-06	NR1001002S101103	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Thorium-232	LANL ER-130 Modified	0.30	0.16	0.20	pCi/g
00-10136-06	NR1001002S101103	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Thallium-208	LANL ER-130 Modified	0.42	0.14	0.19	pCi/g
00-10136-06	NR1001002S101103	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Uranium-238	LANL ER-130 Modified	0.88	1.46	1.40	pCi/g
00-10136-07	NR1001002S101104	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Cobalt-60	LANL ER-130 Modified	-0.02	0.03	0.04	pCi/g
00-10136-07	NR1001002S101104	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Cesium-137	LANL ER-130 Modified	5.62	0.61	0.05	pCi/g
00-10136-07	NR1001002S101104	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Potassium-40	LANL ER-130 Modified	3.17	0.70	0.24	pCi/g
00-10136-07	NR1001002S101104	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Lead-212	LANL ER-130 Modified	0.33	0.10	0.11	pCi/g
00-10136-07	NR1001002S101104	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Lead-214	LANL ER-130 Modified	0.16	0.12	0.15	pCi/g
00-10136-07	NR1001002S101104	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Radium-226	LANL ER-130 Modified	0.33	0.12	0.11	pCi/g
00-10136-07	NR1001002S101104	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Thorium-228	LANL ER-130 Modified	0.26	0.14	0.27	pCi/g
00-10136-07	NR1001002S101104	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Thorium-232	LANL ER-130 Modified	0.26	0.14	0.27	pCi/g
00-10136-07	NR1001002S101104	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Thallium-208	LANL ER-130 Modified	0.46	0.14	0.17	pCi/g
00-10136-07	NR1001002S101104	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Uranium-238	LANL ER-130 Modified	0.24	0.62	1.09	pCi/g

K=Known,S=Spike,B=Blank,D=Duplicate,MS=Matrix Spike

Judy Stone
RECRA Environmental, Inc.
208 Welsh Pool Road
Lionville, PA 19341-1313

SDG: 0010136
MATRIX: Soil

Lab ID	Client ID	Sample Date	Receipt Date	Analysis Date	Report Date	Batch ID	Analyte	Method	Result	Error	MDA	Units
00-10136-08	NR1001002S101105	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Cobalt-60	LANL ER-130 Modified	-0.01	0.02	0.04	pCi/g
00-10136-08	NR1001002S101105	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Cesium-137	LANL ER-130 Modified	3.69	0.40	0.05	pCi/g
00-10136-08	NR1001002S101105	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Potassium-40	LANL ER-130 Modified	5.79	0.98	0.38	pCi/g
00-10136-08	NR1001002S101105	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Lead-212	LANL ER-130 Modified	1.15	0.22	0.10	pCi/g
00-10136-08	NR1001002S101105	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Lead-214	LANL ER-130 Modified	0.43	0.12	0.12	pCi/g
00-10136-08	NR1001002S101105	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Radium-226	LANL ER-130 Modified	0.38	0.09	0.09	pCi/g
00-10136-08	NR1001002S101105	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Thorium-228	LANL ER-130 Modified	0.62	0.15	0.13	pCi/g
00-10136-08	NR1001002S101105	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Thorium-232	LANL ER-130 Modified	0.62	0.15	0.13	pCi/g
00-10136-08	NR1001002S101105	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Thallium-208	LANL ER-130 Modified	0.64	0.13	0.14	pCi/g
00-10136-08	NR1001002S101105	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Uranium-238	LANL ER-130 Modified	0.85	0.96	1.08	pCi/g
00-10136-09	NR1001002S101106	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Cobalt-60	LANL ER-130 Modified	-0.03	0.03	0.05	pCi/g
00-10136-09	NR1001002S101106	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Cesium-137	LANL ER-130 Modified	0.75	0.12	0.06	pCi/g
00-10136-09	NR1001002S101106	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Potassium-40	LANL ER-130 Modified	3.49	0.91	0.38	pCi/g
00-10136-09	NR1001002S101106	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Lead-212	LANL ER-130 Modified	0.79	0.14	0.10	pCi/g
00-10136-09	NR1001002S101106	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Lead-214	LANL ER-130 Modified	0.53	0.12	0.13	pCi/g
00-10136-09	NR1001002S101106	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Radium-226	LANL ER-130 Modified	0.32	0.12	0.12	pCi/g
00-10136-09	NR1001002S101106	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Thorium-228	LANL ER-130 Modified	0.69	0.18	0.20	pCi/g
00-10136-09	NR1001002S101106	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Thorium-232	LANL ER-130 Modified	0.69	0.18	0.20	pCi/g
00-10136-09	NR1001002S101106	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Thallium-208	LANL ER-130 Modified	0.72	0.15	0.17	pCi/g
00-10136-09	NR1001002S101106	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Uranium-238	LANL ER-130 Modified	0.31	0.87	1.54	pCi/g
00-10136-10	NR1001002S101107	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Cobalt-60	LANL ER-130 Modified	0.03	0.03	0.06	pCi/g
00-10136-10	NR1001002S101107	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Cesium-137	LANL ER-130 Modified	24.73	2.60	0.09	pCi/g
00-10136-10	NR1001002S101107	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Potassium-40	LANL ER-130 Modified	6.16	1.16	0.51	pCi/g
00-10136-10	NR1001002S101107	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Lead-212	LANL ER-130 Modified	0.90	0.20	0.20	pCi/g
00-10136-10	NR1001002S101107	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Lead-214	LANL ER-130 Modified	0.66	0.24	0.30	pCi/g
00-10136-10	NR1001002S101107	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Radium-226	LANL ER-130 Modified	0.48	0.15	0.21	pCi/g
00-10136-10	NR1001002S101107	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Thorium-228	LANL ER-130 Modified	0.81	0.19	0.22	pCi/g
00-10136-10	NR1001002S101107	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Thorium-232	LANL ER-130 Modified	0.81	0.19	0.22	pCi/g
00-10136-10	NR1001002S101107	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Thallium-208	LANL ER-130 Modified	0.80	0.21	0.30	pCi/g
00-10136-10	NR1001002S101107	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Uranium-238	LANL ER-130 Modified	0.44	1.50	1.66	pCi/g

K=Known,S=Spike,B=Blank,D=Duplicate,MS=Matrix Spike

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RECRA Environmental, Inc.
208 Welsh Pool Road
Lionville, PA 19341-1313

SDG: 0010136
MATRIX: Soil

Lab ID	Client ID	Sample Date	Receipt Date	Analysis Date	Report Date	Batch ID	Analyte	Method	Result	Error	MDA	Units
00-10136-11	NR1001002S101108	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Cobalt-60	LANL ER-130 Modified	-0.03	0.03	0.04	pCi/g
00-10136-11	NR1001002S101108	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Cesium-137	LANL ER-130 Modified	1.38	0.19	0.06	pCi/g
00-10136-11	NR1001002S101108	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Potassium-40	LANL ER-130 Modified	1.25	0.61	0.55	pCi/g
00-10136-11	NR1001002S101108	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Lead-212	LANL ER-130 Modified	0.10	0.09	0.09	pCi/g
00-10136-11	NR1001002S101108	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Lead-214	LANL ER-130 Modified	0.13	0.11	0.12	pCi/g
00-10136-11	NR1001002S101108	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Radium-226	LANL ER-130 Modified	0.19	0.10	0.11	pCi/g
00-10136-11	NR1001002S101108	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Thorium-228	LANL ER-130 Modified	0.17	0.13	0.26	pCi/g
00-10136-11	NR1001002S101108	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Thorium-232	LANL ER-130 Modified	0.17	0.13	0.26	pCi/g
00-10136-11	NR1001002S101108	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Thallium-208	LANL ER-130 Modified	0.28	0.16	0.24	pCi/g
00-10136-11	NR1001002S101108	10/11/00	10/16/00	10/18/00	10/30/00	0010136	Uranium-238	LANL ER-130 Modified	0.24	0.68	1.25	pCi/g

K=Known,S=Spike,B=Blank,D=Duplicate,MS=Matrix Spike

ORISE
OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

January 31, 2001

Ms. Caroline Polanish
BNL Decommissioning Project
Brookhaven Group
U.S. Department of Energy
Building 464
P.O. Box 5000
Upton, NY 11973-5000

SUBJECT: DOE CONTRACT NO. DE-AC05-00OR22750
FINAL LETTER REPORT—VERIFICATION SURVEY OF AOC-16 LANDSCAPE SOIL, BROOKHAVEN NATIONAL LABORATORY, UPTON, NEW YORK

Dear Ms. Polanish:

The Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE) performed independent verification activities of contaminated landscape soil areas at the Brookhaven National Laboratory (BNL) in Upton, New York. Verification activities included independent data reviews, and during the periods of June 20 to 22 and September 5 to 7, 2000, ESSAP performed independent measurements and sampling at the site. Survey procedures were in accordance with a site-specific survey plan, submitted to and approved by the U.S. Department of Energy (DOE), and ESSAP Survey Procedures and Quality Assurance Manuals (ORISE 2000a, 1998, and 2000b).

Established in 1947, BNL (Figure 1) designed, built, and operated many research facilities for the scientific community, some of which involved radioactive materials. In 1980 and 1983, aerial surveys of BNL identified several land areas where unanticipated external dose rates exceeded background levels. Further investigations of these areas identified Cs-137 contamination in the soil. Based on site historical reviews, the areas of contamination could not be directly related to past activities for those particular areas. BNL determined that the source of the contamination was from the spills of aged fission products that had been stored at the Hazardous Waste Management Facility (HWMF). During the period 1954 through the mid-1960's, it had been a practice of the site to use on-site soils from other locations as backfill and landscape soil. It was determined that soils from the HWMF area had been scraped to a depth of 15 to 20 centimeters (cm) and later used as fill and landscape soil at several on-site locations. The field instrumentation available at that time did not indicate levels of residual radioactive contamination above acceptable levels. Buildings 30 (Brookhaven Center), 355 (Contracts and Procurement), 490 (Medical), 515 (Applied Math), 555 (Chemistry), and 930 (Linear Accelerator - LINAC) were included in this use of contaminated fill (CDM 2000). These locations are collectively referred to as Areas of Concern (AOC) 16.

BNL recently remediated the AOC-16 areas by excavating radiologically-contaminated soil, transporting the soil to a remote area of the BNL site (AOC 2C, Former Glass Holes area), and processing the soil using a Segmented Gate System (SGS). Soil determined to be below the site-specific Cs-137 guideline of 23 pCi/g, after processing with the SGS, was to be returned back to the site excavations and used as backfill material—soil exceeding the site Cs-137 guideline was shipped off-site for disposal. Once remediation was completed, BNL conducted final status measurements and sampling consisting of *in situ* gamma spectroscopy, gamma radiation measurements, and soil sampling and laboratory analysis.

ESSAP's verification of the AOC-16 areas included data reviews of BNL's gamma radiation measurements and analytical data. On two separate visits, ESSAP also performed independent gamma radiation surface scans using NaI detectors coupled to ratemeters with audible indicators and collected random and judgmental soil samples for analysis.

Two of the 16 areas (16E.2 and 16E.3) were completed and available for verification during the June 20, 2000 site visit. BNL's analytical results were not available for ESSAP to review at that time. ESSAP performed gamma scans over 100% of areas 16E.2 and 16E.3 and a portion of the "clean" segmented spoil piles adjacent to 16E.1. Scans identified three locations of elevated direct gamma radiation associated with 16E.2. One was within the excavation and the remaining two locations were outside of the excavation area, with one being adjacent to the north side of the road. All other gamma scans were comparable to background levels. Five surface (0 to 15 cm) soil samples were collected from area 16E.3, nine were collected from 16E.2, and two from the spoils pile (Figures 2 and 3).

ESSAP's review of BNL's final status data for those areas addressed during the second verification survey indicated that all sample results were less than the Cs-137 guideline, with the exception of BNL sample CS10 which had a Cs-137 concentration of 28 pCi/g. During the second visit, ESSAP performed 100% gamma scans of the fourteen remaining areas: AOC 16E.1, 16G, 16F, 16S.1, S.2, S.3, S.4, and 16S.5, and 16S.6a, b, c, d, e, and f (Figures 4 through 11). ESSAP also performed follow-up gamma scans of AOC 16E.2 as BNL had performed additional remediation to remove the contamination identified during the initial verification survey.

Surface scans identified elevated gamma radiation levels at several locations in or near the following areas: 16G, 16E.1, 16S.3, and 16S.6a through f (Figures 6, 7, 9, 10, and 11). All remaining gamma scans were at or near background. A total of 52 systematic/random or judgmental surface soil samples were collected from these areas (Figures 4 through 11).

Soil samples were returned ESSAP's Oak Ridge, Tennessee laboratory for analysis. Samples were analyzed by gamma spectroscopy in accordance with the ESSAP Laboratory Procedures Manual (ORISE 2000c). Spectra were reviewed for Cs-137 and any other identifiable photopeaks. The analytical results are provided in Table 1. The only gamma-emitting radionuclide of concern identified was Cs-137. Concentrations ranged from 0.3 to 9.7 pCi/g for 16E.3, less than 0.1 to 173.9 pCi/g for 16E.2, 0.8 to 163.0 pCi/g for 16F, 2.5 to 97.6 pCi/g for 16S.5, 18.1 pCi/g for 16S.3, 18.3 pCi/g for 16E.4, 1.8 to 11.4 pCi/g for 16S.2, 0.1 to 105.8 pCi/g for 16E.1, 0.4 to 16.5 pCi/g for 16S.6a and c, 0.8 to 83.0 pCi/g for 16S.6d, e and f, 2.8 to 139.4 pCi/g for 16G, and 5.0 to 12.3 pCi/g for the segmented spoil piles.

The data were compared with the survey unit site-specific area average Cs-137 guideline of 23 pCi/g. Twenty-five of the 69 verification samples collected exceeded this guideline. The affected areas were in or adjacent to16E.2, 16F, 16S.5, 16E.1, 16G, and 16S.6f.

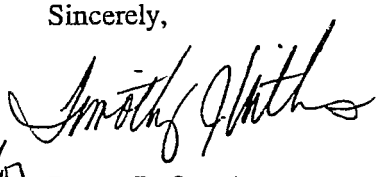
After review of ESSAP's draft report, DOE determined that additional walk-over scan surveys were to be performed by BNL in those areas where ESSAP identified elevated residual activity and that BNL should establish areas factors for "hot spots". BNL provided area factors and reported the results of the DOE-requested additional surveys in the draft completion report (BNL 2000). BNL's final walkover surveys consisted of 100% gamma scans of the excavated Class 1 areas and gamma scans of 10% of the Class 2 areas using NaI detectors.

BNL reported additional areas of elevated Cs-137 concentration levels in 16F, 16G, 16E2-3, 16Sa-f, and 16S1-5. BNL addressed each area of residual contamination by either excavating and resampling or performing an elevated measurement comparison. For the elevated measurement comparison (EMC), the Cs-137 concentrations together with the size of each area of elevated activity was determined. BNL then compared these results with two criteria—the EMC criteria, which are calculated area factors for small locations of elevated activity, and the average Cs-137 guideline of 23 pCi/g—and reported that both criteria were satisfied (BNL 2000).

Based on the results of BNL's gamma surface scans that were reperformed, analytical results, and statistical analysis of that data, ESSAP concurs with BNL that the radiological status of the AOC-16 landscape soil areas satisfy the Cs-137 cleanup criteria.

Should you have any additional questions on this letter report, please contact me at (865) 576-3355 or Timothy J. Vitkus at (865) 576-5073.

Sincerely,



for Duane R. Quayle
Health Physicist/Project Leader
Environmental Survey and
Site Assessment Program

DRQ:ar

cc: S. Mallette, DOE/Brookhaven Group
G. Penny, DOE/Brookhaven Group
J. Brower, DOE/Brookhaven Group
W. Beck, ORISE/ESSAP
E. Abelquist, ORISE/ESSAP
T. Vitkus, ORISE/ESSAP
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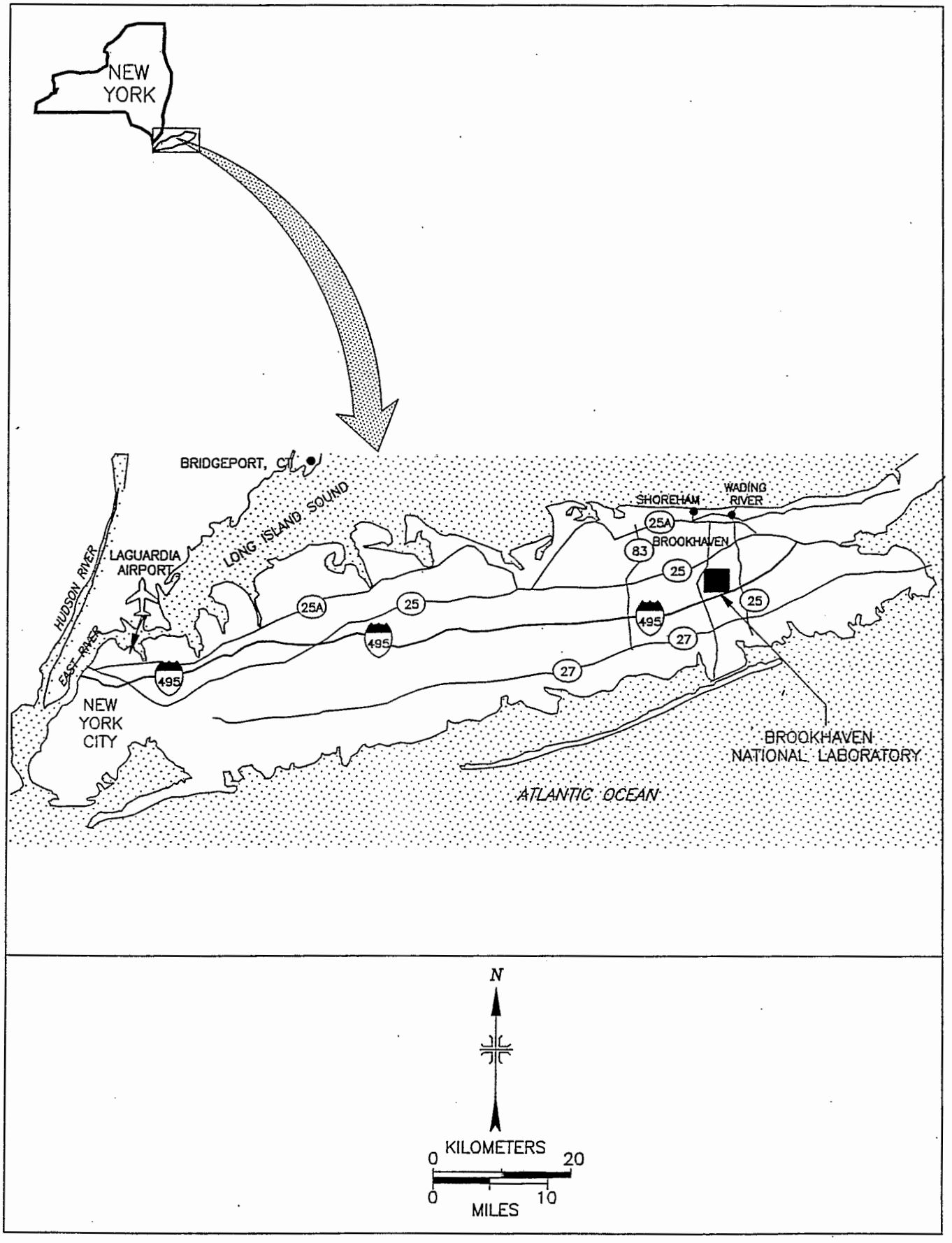


FIGURE 1: Location of Brookhaven National Laboratory, Upton, New York

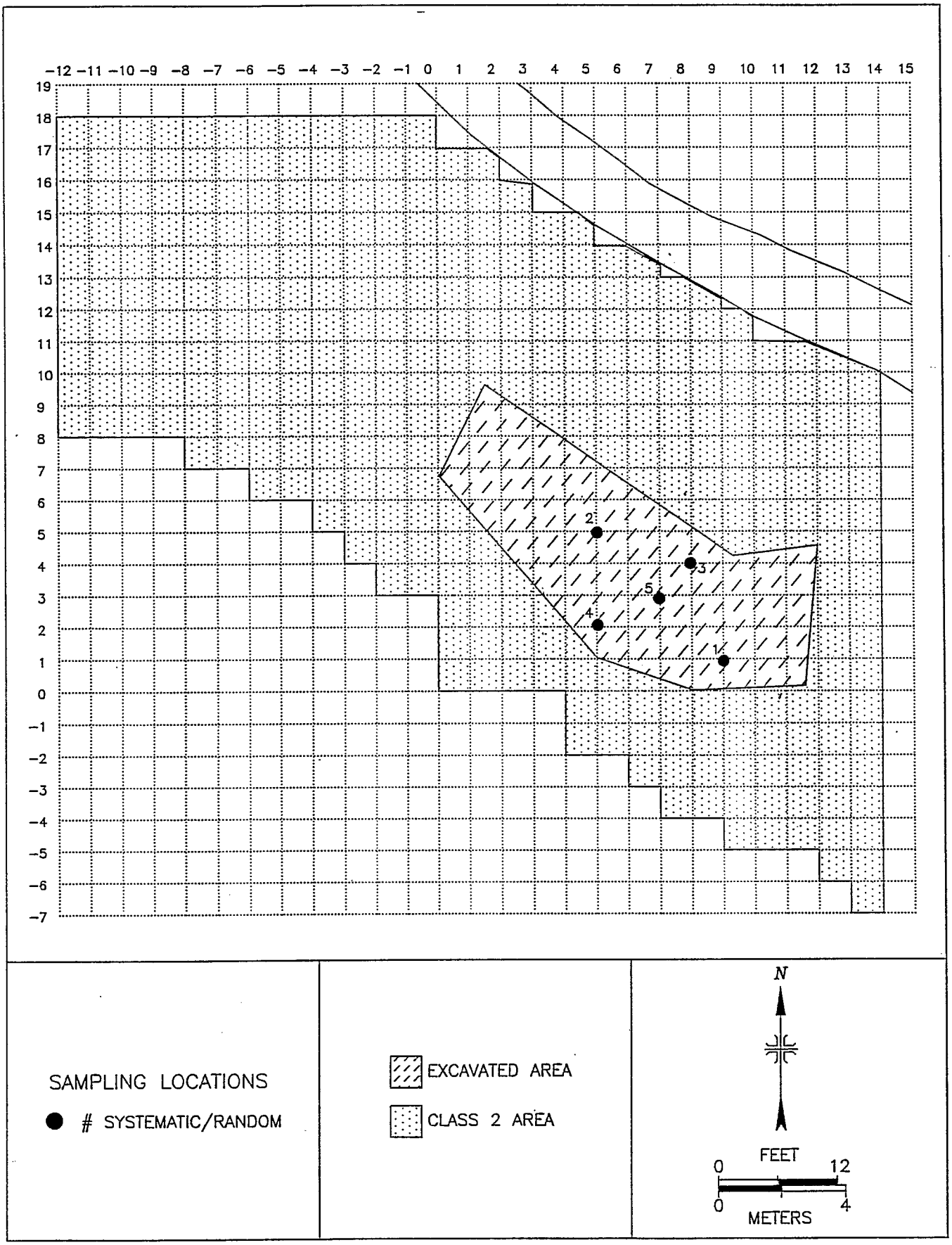
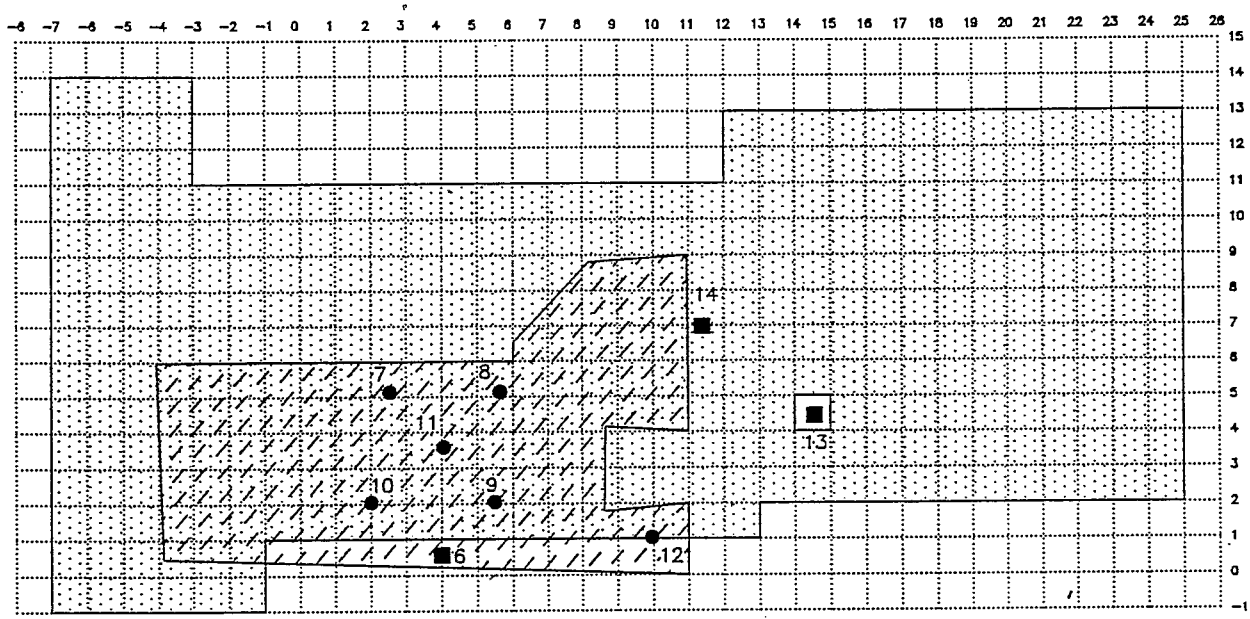


FIGURE 2: AOC 16E.3 – Sampling Locations



SAMPLING LOCATIONS

■ # ELEVATED

● # SYSTEMATIC/RANDOM

EXCAVATED AREA

CLASS 2 AREA

N

FEET

0 12

0 4

METERS

FIGURE 3: AOC 16E.2 – Sampling Locations

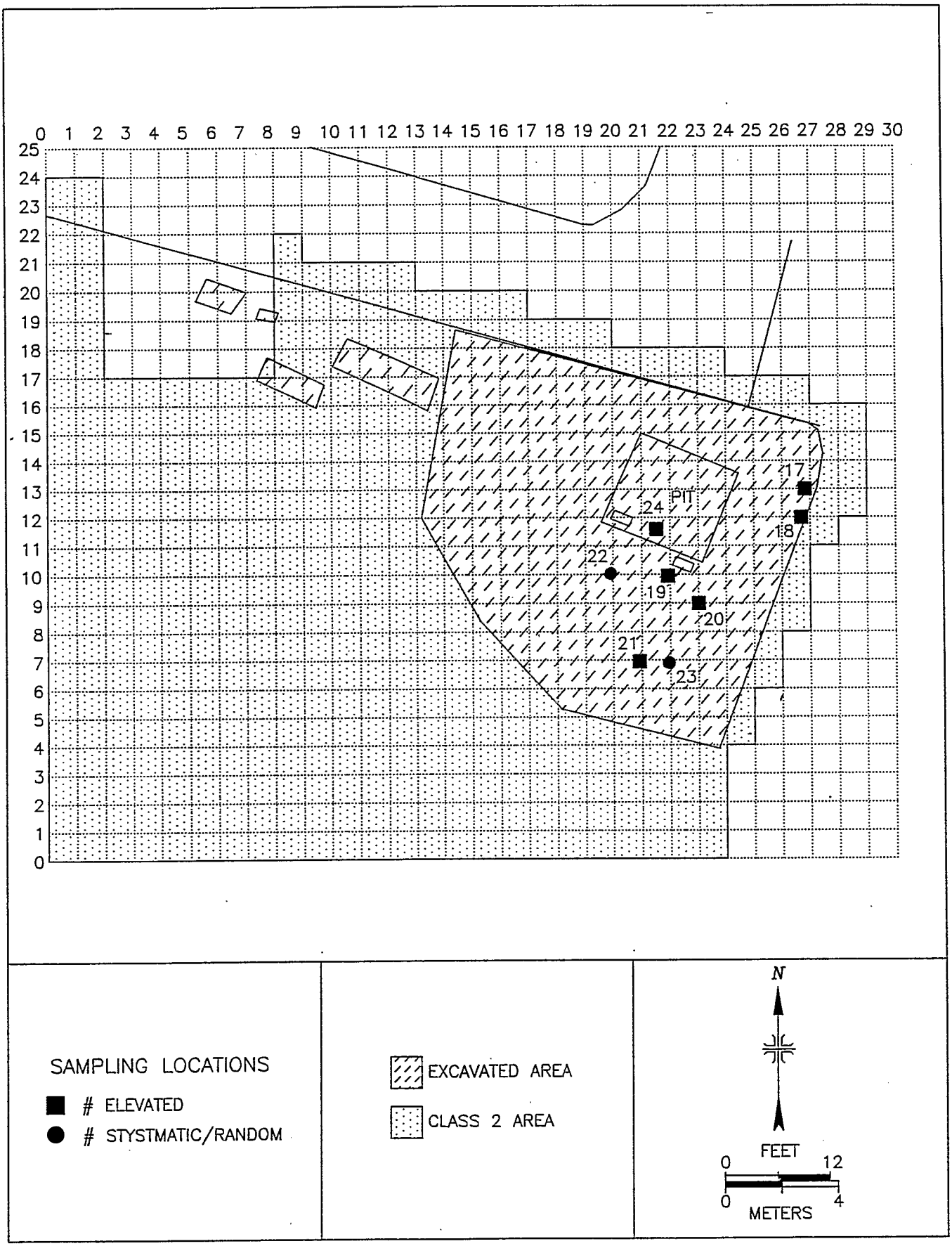


FIGURE 4: AOC 16F – Sampling Locations

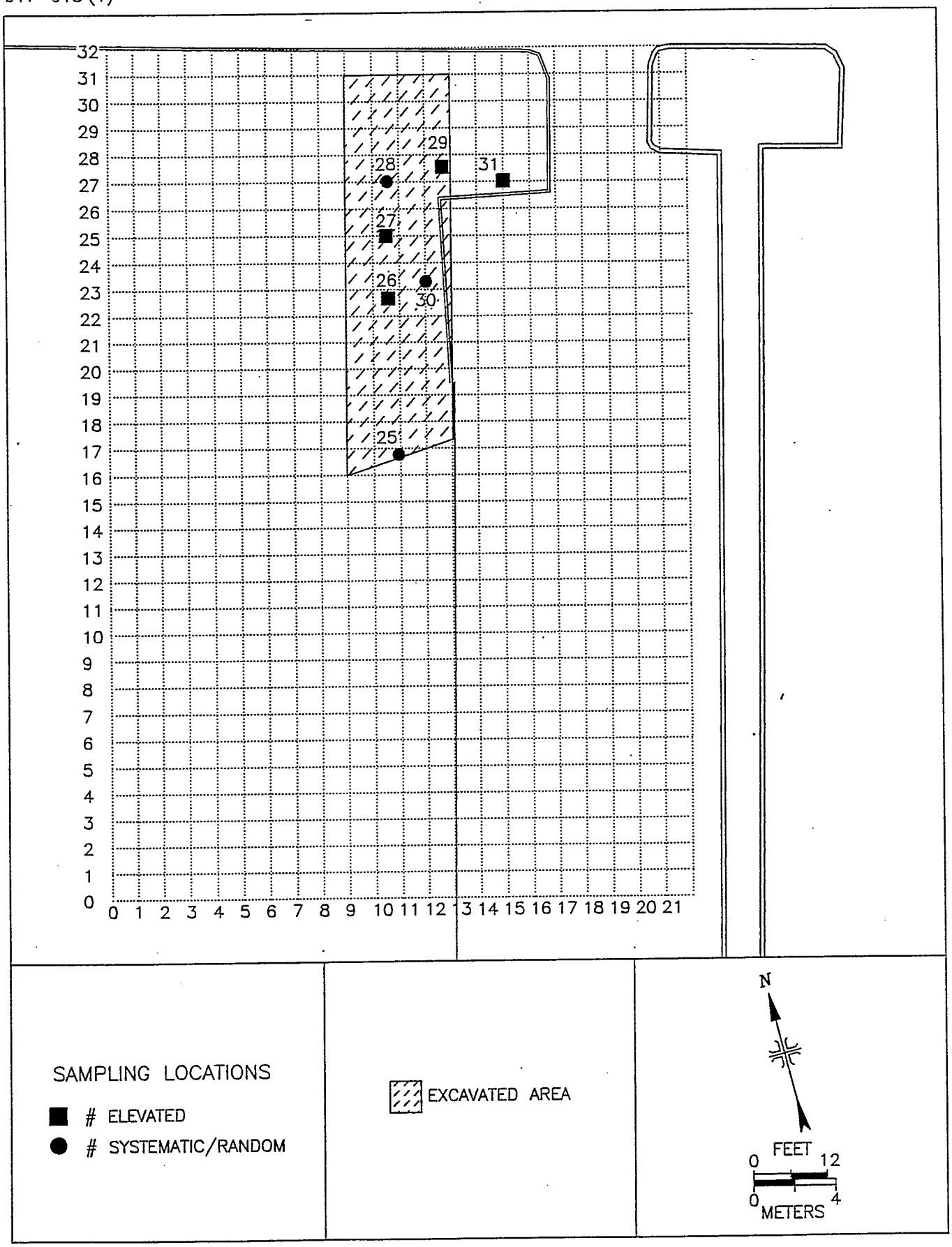


FIGURE 5: AOC 16S.5 – Sampling Locations

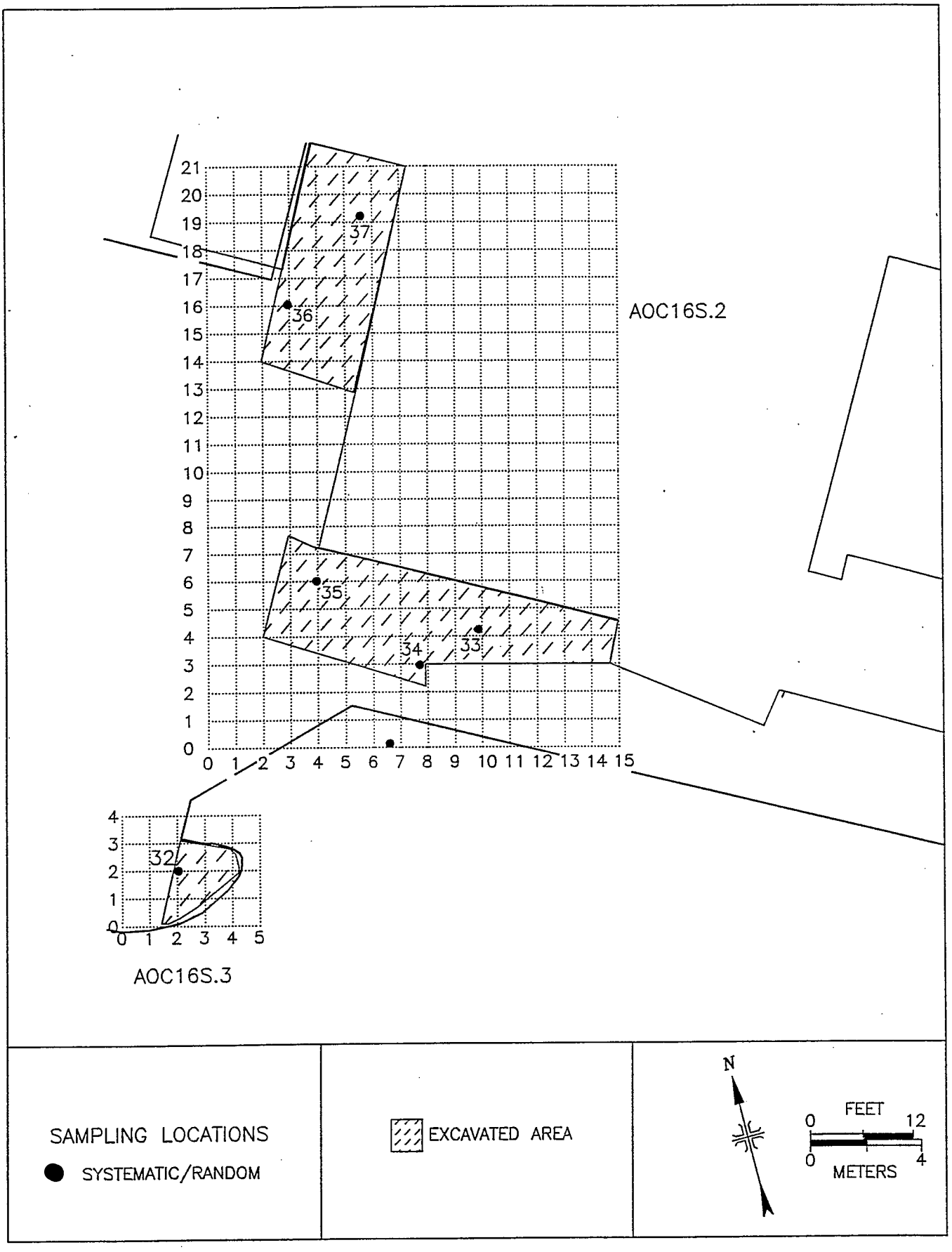


FIGURE 6: AOC 16S.2 and 16S.3 – Sampling Locations

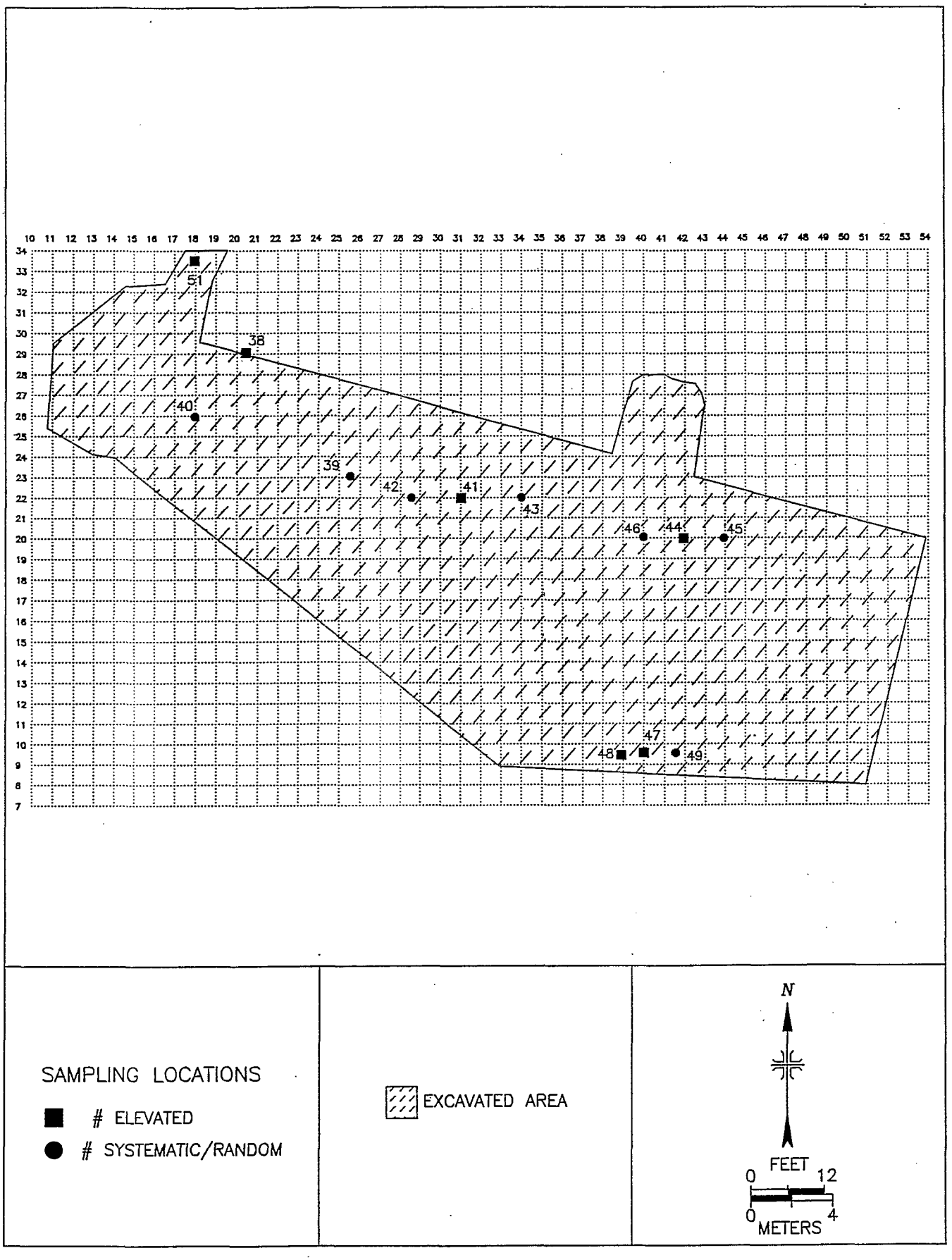


FIGURE 7: AOC 16E.1 – Sampling Locations

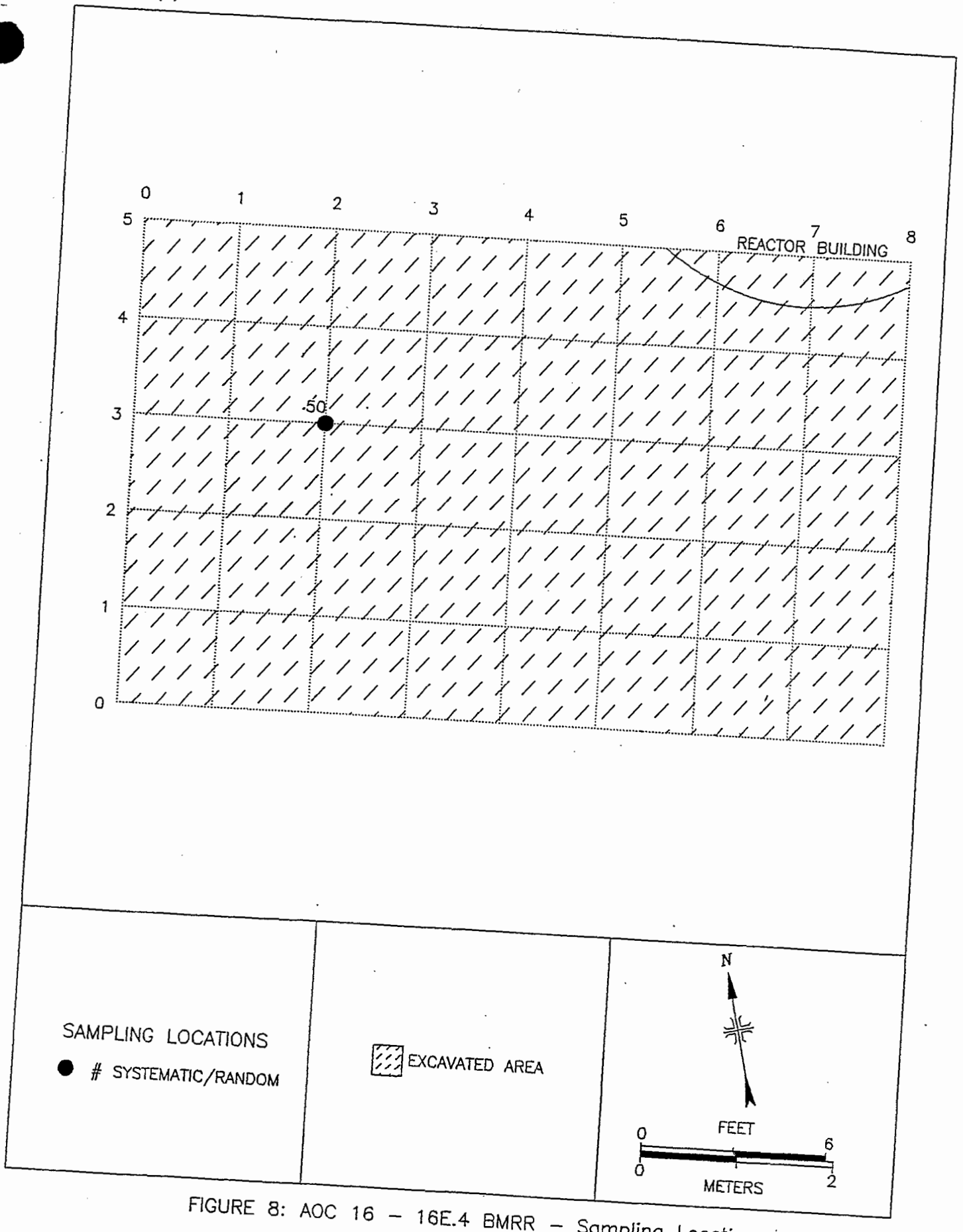


FIGURE 8: AOC 16 – 16E.4 BMRR – Sampling Locations

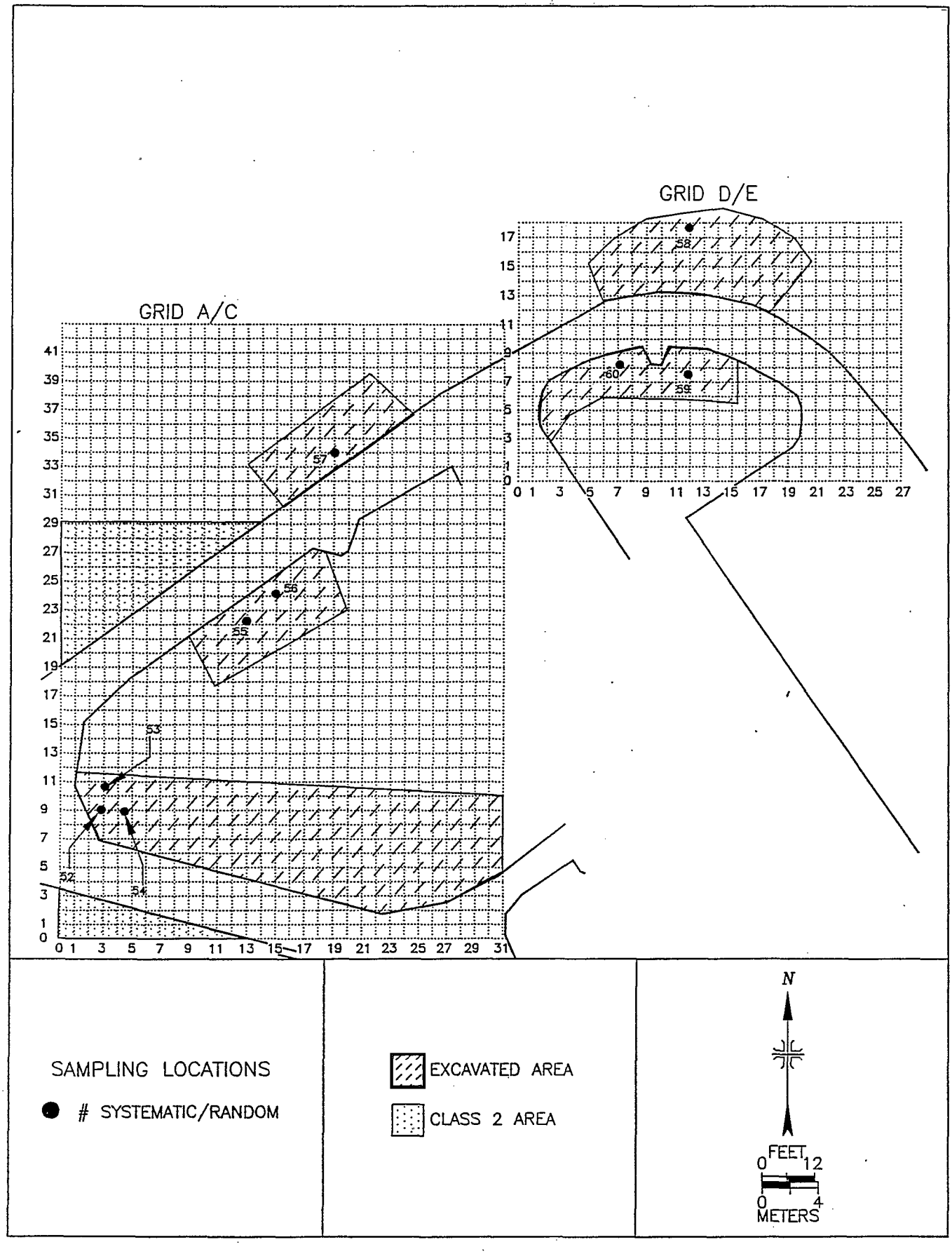


FIGURE 9: AOCs 16S.6a-e – Sampling Locations

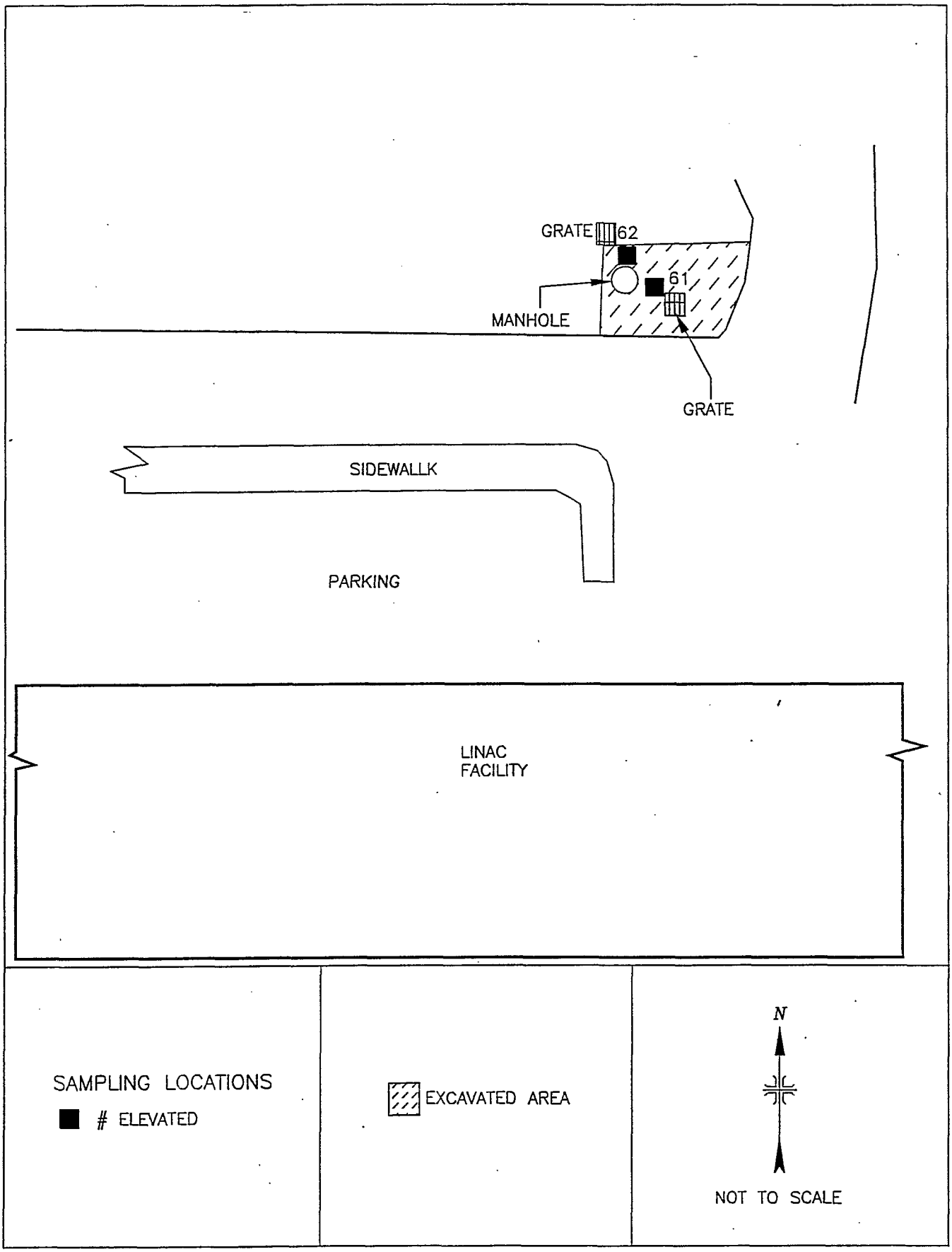


FIGURE 10: AOC 16S.6f – Sampling Locations

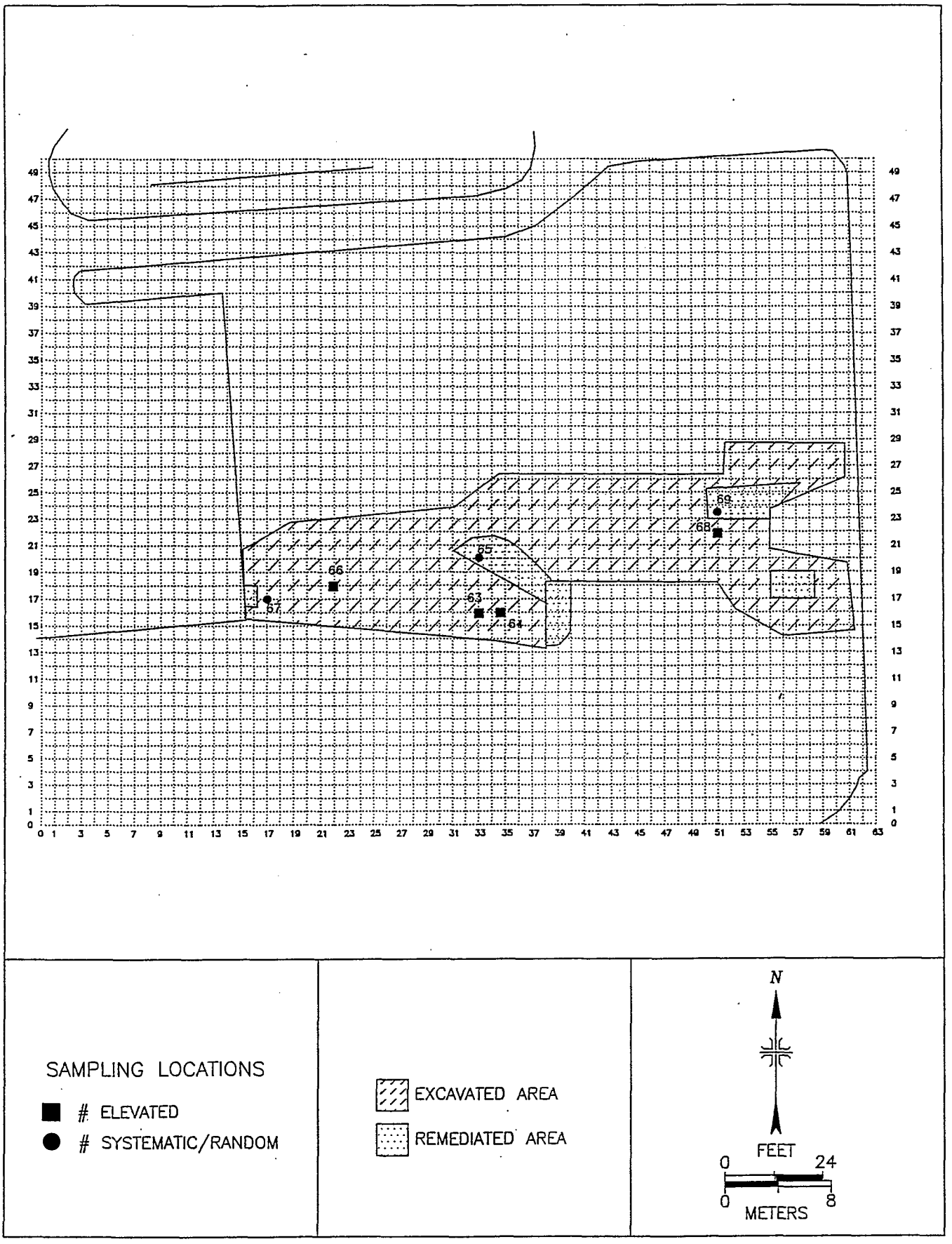


FIGURE 11: AOC 16G – Sampling Locations

TABLE 1

RADIONUCLIDE CONCENTRATIONS IN SOIL
AOC 16 LANDSCAPE SOIL
BROOKHAVEN NATIONAL LABORATORY
UPTON, NEW YORK

Sample ID	Location [a]	Cs-137 Concentration (pCi/g)
Excavation 16E.3		
1	1N, 9E	9.7 ± 0.5 [b]
2	5N, 5E	0.5 ± 0.1
3	4N, 8E	4.5 ± 0.2
4	2N, 5E	0.3 ± 0.1
5	3N, 7E	0.4 ± 0.1
Excavation 16E.2		
6	0.5N, 4E	87.2 ± 4.0
7	5N, 2.5E	0.1 ± 0.1
8	5N, 5.5E	0.3 ± 0.1
9	2N, 5.5E	0.1 ± 0.1
10	2N, 2E	0.1 ± 0.1
11	3.5N, 4E	< 0.1
12	1N, 10E	19.1 ± 0.9
13	4.5N, 14.5E	173.9 ± 7.8
14	7N, 11.5E	61.0 ± 2.8
Segmented Soil Piles [c]		
15	15	5.0 ± 0.3
16	16	12.3 ± 0.6
Excavation 16F		
17	13N, 27W	83.8 ± 3.8
18	12N, 27W	86.4 ± 3.9
19	10N, 22W	163.0 ± 7.3

TABLE 1 (Continued)

RADIONUCLIDE CONCENTRATIONS IN SOIL
AOC 16 LANDSCAPE SOILS
BROOKHAVEN NATIONAL LABORATORY
UPTON, NEW YORK

Sample ID	Location	Cs-137 Concentration (pCi/g)
Excavation 16F (continued)		
20	9N, 23W	43.5 ± 2.0
21	7N, 21W	26.6 ± 1.2
22	10N, 20W	0.8 ± 0.1
23	7N, 22W	1.7 ± 0.1
24	11.5N, 21.5W	46.0 ± 2.1
Excavation 16S.5		
25	16.5N, 11E	15.6 ± 0.7
26	22.8N, 10.5E	97.6 ± 4.4
27	25N, 10.5E	71.2 ± 3.2
28	27N, 10.5E	17.3 ± 0.8
29	27.5N, 12.8E	40.0 ± 1.8
30	23.3N, 12E	2.5 ± 0.1
31	27N, 15E	31.9 ± 1.5
Excavation 16S.3		
32	2N, 2E	18.1 ± 0.9
Excavation 16S.2		
33	4N, 10E	6.5 ± 0.3
34	3N, 7.8E	11.4 ± 0.5
35	6N, 4E	7.5 ± 0.4
36	16N, 3E	1.8 ± 0.1
37	19N, 5.5E	1.8 ± 0.1

TABLE 1 (Continued)

RADIONUCLIDE CONCENTRATIONS IN SOIL
AOC 16 LANDSCAPE SOILS
BROOKHAVEN NATIONAL LABORATORY
UPTON, NEW YORK

Sample ID	Location	Cs-137 Concentration (pCi/g)
Excavation 16E.1		
38	29N, 20.5E	24.5 ± 1.1
39	23N, 25.5E	0.6 ± 0.1
40	26N, 18E	1.6 ± 0.1
41	22N, 31E	105.8 ± 4.8
42	22N, 28.5N	0.2 ± 0.1
43	22N, 34E	0.4 ± 0.1
44	20N, 42E	44.8 ± 2.0
45	20N, 44E	4.8 ± 0.3
46	20N, 40E	0.1 ± 0.1
47	9.5N, 40E	33.3 ± 1.5
48	9.5N, 39E	56.8 ± 2.6
49	9.5N, 41.5E	21.4 ± 1.0
51	N edge of road excavation	25.8 ± 1.2
Excavation 16E.4		
50	NW Corner	18.3 ± 0.8
Excavation 16S.6a and c		
52	8N, 3E	16.5 ± 0.8
53	10.5N, 3E	0.4 ± 0.1
54	8N, 4.5E	5.3 ± 0.3
55	22N, 13E	1.9 ± 0.1

TABLE 1 (Continued)

RADIONUCLIDE CONCENTRATIONS IN SOIL
AOC 16 LANDSCAPE SOILS
BROOKHAVEN NATIONAL LABORATORY
UPTON, NEW YORK

Sample ID	Location	Cs-137 Concentration (pCi/g)
Excavation 16S.6a and c (continued)		
56	24N, 15E	1.6 ± 0.1
57	34N, 19E	0.9 ± 0.1
Excavation 16S.6d and e		
58	18N, 12E	3.3 ± 0.2
59	8N, 12E	3.3 ± 0.2
60	8.5N, 7.5E	0.8 ± 0.1
Excavation 16S.6f		
61	61	45.0 ± 2.1
62	62	83.0 ± 3.7
Excavation 16G		
63	16N, 33E	126.6 ± 5.7
64	16N, 34.5E	31.4 ± 1.5
65	20N, 33E	2.8 ± 0.2
66	18N, 22E	139.4 ± 6.3
67	17N, 17E	9.6 ± 0.5
68	22N, 51E	62.9 ± 2.8
69	23.5N, 51E	20.7 ± 1.0

[a] Refer to Figures 2 through 11.
[b] Uncertainties are total propagated uncertainties at the 95% confidence level.
[c] No figure provided.

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