

Draft Completion Report

For

**Brookhaven National Laboratory
Building 830 Underground Storage Tanks
Removal Action**

Prepared by

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Environmental Restoration Division**

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1.0 Introduction

1.1 Purpose

The purpose of this closeout report is demonstrating the objectives of the remedial action attained for the Building 830 Underground Storage Tanks (USTs) Removal Action located in Operable Unit III. An evaluation of data collected from the soils in the underground storage tank area is presented in this report. The analysis data included field screening, on site gamma analysis, and the results from off-site laboratory assays. Figure 1 illustrates the location of the USTs at Brookhaven National Laboratory (BNL).

1.2 Remediation Authority

Remediation of the two tanks at Building 830 was authorized within the Building 830 UST Removal Action Memorandum. Methods for demonstrating the attainment of the objectives of the remedial action objectives are described in the Building 830 UST Removal Work Plan (May 1998).

2.0 Site Description

Brookhaven National Laboratory is located in Upton, Suffolk County, New York, near the geographic center of Long Island. Population in this area of Long Island is centered primarily in communities along the two shorelines of the Island, although there are some residential areas closer to BNL. The site was formerly Camp Upton of the U. S. Army during the two World Wars. Between the Wars, the camp was operated by the Civilian Conservation Corporation. The BNL site was acquired by the U. S. Atomic Energy Commission in 1947, and passed to its successors, the Energy Research and Development Administration in 1975, and to the U. S. Department of Energy (DOE) in 1977. BNL is currently operated under contract to the DOE by Brookhaven Science Associates (BSA).

The BNL site is approximately 8.2 square miles in size, most of which is wooded; the main facilities and buildings are concentrated in an area of about 2.6 square miles at the center of the site. Building 830 is located within this developed area, near several other buildings and facilities. The Laboratory site is located over a U. S. Environmental Protection Agency (EPA)-designated, sole-source drinking water aquifer. In November, 1989, EPA included BNL on the National Priorities List of Comprehensive Environmental Response, Compensation, and Liability Act sites.

2.1 Location of the Tanks at Building 830

The two tanks are located in a grassy area near the Environmental Waste Technology Center (Building 830), and are in the corner of a controlled area surrounded by a chain-link fence, as shown in Figure 2.

2.2 Prior Use of Tanks

These underground storage tanks received wastes from the irradiation cells and from the filter backwash at Building 830. The facility used materials such as radioactive cobalt, plutonium, cesium, and americium. The tanks, which were installed in 1961, were 1000-gallon carbon-steel glass-lined vessels with a stainless-steel piping system.

Both tanks were removed from service in 1986 and the piping disconnected and removed from the building to the valve pit (pumping station).

2.3 Contents of Tanks

Two independent samples were taken from the two tanks. The first sample was collected in 1990 by IT Corp. Three years later, the tanks were again sampled, this time by Rust Remedial Services.

During the latter program, Tank 830-1 had approximately 23 gallons of sludge and 364 gallons of liquid. Tank 830-2 had approximately 1 gallon of sludge and 385 gallons of liquid. The liquid was very clear and the sludge was brown, with a texture like that of sand, and appeared to be mostly resin. The liquid levels in these tanks may have increased due to rain water entering uncovered vent pipes.

The radiological analysis showed that the waste in Tanks 830-1 and 830-2 was a low-level radioactive waste, and based on pre-solidified concentrations, it was classified as a listed mixed waste. Polychlorinated biphenyls (PCB) in the form of Aroclor-1232 and Aroclor-1254 were detected at concentrations of 14 and 11 parts per million (ppm), respectively. This material was removed in 1995, all tank openings sealed, and the tanks monitored until their removal.

2.4 Results of Operable Unit III RI Soil Sampling

The soil investigation at the Building 830 pipe leak and UST consisted of a radiological walkover survey, and the collection of 3 surface soil samples from 3 locations and 22 sub-surface soil samples from 10 locations. The soil samples were analyzed for both chemical-and radiological-constituents, as detailed in the OU III Remedial Investigation Report, March 1999.

Cesium-137 was the only radioisotope detected above its screening level of 5.39 pCi/g in 2 of the 3 surface-samples. The first surface-soil sample taken slightly north of the Building 830 UST contained no radionuclides above their screening levels. The second surface sample showed Cs-137 at 56.9 pCi/g at a location south of the UST tanks just outside the Building 830 yard fence. The location of this sample corresponds approximately to that of a tree growing south of the USTs. The third surface-sample had Cs-137 at 67.6 pCi/g just east of the USTs, immediately outside the fence surrounding the Building 830 yard. The location of this third surface soil corresponds to that of the tree east of the USTs. The trees were contaminated with Cs-137 at approximately 100 pCi/g.

More detailed information on the results of the surface-and sub-surface-sampling are contained the OU III Remedial Investigation Report. Figures 4.3-1 and 4.4-1 of that report show the locations and concentrations of surface-and sub-surface soil samples above their screening-level concentrations.

3.0 Objectives and Criteria of the Remedial Action

3.1 Goals of Remedial Action

Remedial Action objectives for this site are derived from the proposed Operable Unit I soil remediation goals for OU II/VII and III. The site-specific radiological clean-up levels to achieve a fifty-year residential use scenario are listed below. The basis for establishing these levels is to limit human exposure to 15 mrem/year at, or before, a fifty-year time horizon. These criteria also are protective of the groundwater.

The remedial-action criteria include the following ones:

1. Meeting NYSDEC Technical Assistance Guidance Memorandum (TAGM) for Target Analyte List (TAL) metals as specified in the work plan.
2. Meeting the 15 mrem/year dose above background for all radioisotopes. Meeting this criterion is demonstrated by calculating the total dose from the isotopic concentrations of the end-point sample modeled as a suburban residential scenario. The RESRAD computer code is used for this modeling.

3.2 Summary

The data were analyzed in a manner consistent with the methods in the work plan. The data needed to demonstrate achievement of the remedial-action objectives are as follows:

1. For metals, the analytic results of each contaminant of concern from the end-point samples was compared to the TAGMs. No single sample exceeded the TAGM cleanup guidelines, as shown in Table 3.

2. For radionuclides, the analytic results of the end-point soil samples were modeled for a fifty-year future residential use scenario; the value used was the average of all sixteen results and was input into the RESRAD model. Figure 5 is a Graphic presentation of the RESRAD model. The model demonstrates that the 15 mrem/yr objective will be met in 21 years and in year 50 the dose equivalent to the public will be approximately 5.24 mrem/yr.

3.3 Narrative of Removal Action

The planning phase for the Building 830 UST Removal Project was completed May 1998 with the submission of final work plans to the DOE, USEPA, NYSDEC, and SCDHS.

Work commenced on June 25, 1998 with the removal of existing the fencing, and continued through July 2, 1998 with removal of the contaminated trees and topsoil and the installation of new chain-link fencing to define the radiologic work area (see work-plan drawing 9223-M2).

Excavation of soils above the tanks and piping began on July 7, 1998; this material was stockpiled and held for analysis to determine its suitability as backfill. Analytic results obtained from sampling showed this material was satisfactory for backfill as its radionuclide content was below the residential use scenario. These data are shown in Table 5.

As the excavation work progressed, hand-held radiation meters indicated where the soil needed to be segregated into contaminated and non-contaminated stockpiles. As both of these piles grew, a decision was made to contain all the contaminated soil. Customized containers were used that held approximately 10 cubic yards of soil. This decision, while increasing cost due to the price of the containers, was invaluable as the level of Americium 241 in the vicinity of the storm-drain piping created a high-contamination zone requirement. This contamination, along with high levels of Cs-137, was found to come from the piping above the storm drain. Furthermore, a "belly" in the piping at this point added to the contamination, as a leak had developed there. After of the upper pipes had been removed, excavation of the soil continued until the lower piping was exposed. This piping also had leaked though not as severely as the upper section. The leakage from the lower piping came from the tank-to-piping flange connection. Once all piping was removed, the tanks were rigged and a 20-ton crane was used to hoist them up; this action, on July 24, 1998, was witnessed by Suffolk County Department of Health Services. A dynamometer on the crane showed the tanks each weighed approximately 4500 lbs. The tanks were visually inspected, and other than some pitting, they were in satisfactory condition.

**OU I
PRELIMINARY SOIL REMEDIATION GOALS (PCI/G)
FOR RADIONUCLIDES IN
A FUTURE RESIDENTIAL USE**

RADIONUCLIDE	OU II/VII/III
	50 Yrs
Cesium-137	23
Strontium-90	15
Tritium	NA
Cobalt-60	1300
Americium-241	40
Plutonium-238	66
Plutonium-239	40
Plutonium-240	40
Uranium-235	9
Uranium-238	9
Radium-226	5

Excavation work continued until all disposal boxes on hand were filled. A second order for 10 cubic yard boxes was placed and the project was delayed until this delivery was made. Restarted in October, the excavation of soils under the storm drain quickly filled the newly delivered 10-cubic yard disposal boxes. Site-screening instruments made it evident that contamination below the storm drain was extensive. The depth of the contamination was 14-16 below the surface, with no expectation of abatement. Geotextile was placed against the bottom of excavation as a barrier, non-contaminated backfill was placed up to the storm drain invert, and a temporary storm drain pipe installed through this section.

Geoprobe sampling to determine the vertical extent of contamination occurred in mid-October 1998; Table 5 shows the analytical results. The minimum depth to reach cleanup goals was determined to be 24 feet below surface.

In mid December of 1998, the 24-inch diameter storm drain was re-routed, as shown in Figure 2. This allowed for the unobstructed removal of the remaining contaminated soil. Work restarted in January 1999 with the focus on the valve vault. Lifting eyes were installed as per the rigging plan (Figure 3). The valve vault was removed on January 25, 1999. Thereafter, excavation of contaminated soils continued, using an extended-reach track excavator. This allowed the safe removal of contaminated soils to 25-feet below land surface. Also in January 1999, a contractor (Afftrex) was hired to cut up the two Building 830 underground storage tanks; this work proceeded from January to mid February 1999. The tanks and piping were cut up and placed in disposal bins: Excavation of the UST area was completed on February 26, 1999 with final end-point samples taken for both on-site gamma analysis and off-site analyses, see Table 7. Backfilling commenced after "clean" results from the on-site laboratory analyses. Due to the instability of the 24-foot-deep excavation, it was prudent to complete backfilling before the off-site results were obtained. Preliminary on site analysis indicated that soil cleanup objectives were obtained, however, upon receipt of offsite analysis location C5 and C13 were slightly above objectives for Cs-137, (41.5 pCi/g and 23.7 pCi/g respectively). Location C-5 is 16 feet below grade and C-13 is 24 feet below grade, both well below the depth of a future residential bldg foundation.

4.0 Sampling and Analytic Results

4.1 Summary of Field Screening and Laboratory Analysis

The tank area was sampled during various phases of the project. End-point samples were collected for some locations after the tanks were removed; the excavation end-point sampling concluded on February 26, 1999. Table 2 cross-references the samples' locations to their identification number (I.D.). Tables 3 and 4 provide the analytic results of the end-point samples. Figure 4 shows the locations where the end-point samples were collected relative to the final excavation. Additional sampling to determine depth of

contamination and for waste-disposal purposes also was performed and details are provided in Tables 5 and 8. Surface sample results at the locations identified in the OU III RI post removal of the trees are as follows: South tree, Cs-137- 2.646 pCi/gr; Co-60 0.8pc/gr, East tree, Cs-137 0.5 pCi/g.

5.0 Statement of Protectiveness

Based upon the end-point analytic data given in the previous sections, the objectives of this Remediation project were met. There are no chemical-or metal-contaminations above regulatory cleanup guidelines. For radiological parameters, the average residual contamination is statistically within the 50-year model for the future residential use scenario of all pathways including groundwater. The remaining low level contamination, specifically the residual Cs-137, found in locations C-5 and C-13 pose no threat. Additionally, concerning groundwater, note that Sr-90 was not detected in any end point sample. The RESRAD model also validates that Co-60 contamination poses no threat to the groundwater.

6.0 Waste Management

6.1 Summary of Laboratory Analysis for Waste Sample

The following table presents the volumes and types of waste generated under this project. The major differences between the actual volumes and the planned volumes was due to greater than expected depth of the contaminated soil. Additionally, instead of sending both tanks off-site as mixed waste, the project included on-site demolition of the two USTs, rendering them to low-level waste status. This was accomplished by thorough wiping of all internal tank surfaces. The sludges removed during this process generated three drums of mixed waste. The disposal analysis of the soils excavated validated the findings of the OU III RI, finding no evidence of listed wastes in the soils and is characterized as low-level radioactive waste.

6.2 Disposition of Waste

BNL is currently obtaining permission to dispose of the waste streams generated by this project at Envirocare in Utah.

Table 2 - Sample Cross-Reference

Brookhaven National Laboratory, Upton, New York
 Building 830 Tank Removal Remedial Action Closure Report

Field and Laboratory Sample Identification	Remedial Action Closure Report Sample Identification	Date Collected	Approximate Depth (feet below grade)
N-TANK01	C-1	10/28/98	8.0
N-TANK02	C-2	10/28/98	8.0
S-TANK01	C-3	10/28/98	8.0
S-TANK02	C-4	10/28/98	8.0
NORTHFACE 02	C-5	02/23/99	16.0
GP10 SS24	C-6	02/23/99	20.0
NORTHFACE 01	C-7	02/26/99	16.0
WESTFACE	C-8	02/23/99	16.0
WEST 01	C-9	02/16/99	12.0
UNDERVAULT	C-10	02/23/99	24.0
PIPE 02	C-11	02/16/99	22.0
EAST 02	C-12	02/16/99	22.0
PIPE 01	C-13	02/16/99	24.0
EASTFACE	C-14	02/23/99	12.0
SOUTHFACE	C-15	02/23/99	12.0
EAST 01	C-16	02/16/99	12.0

Table 3 - Post-Excavation Metals Results (mg/kg) vs. TAGM
 Brookhaven National Laboratory, Upton, New York
 Building 830 Tank Removal Remedial Action Closure Report

NYSDEC TAGMS	Post-Excavation Sample Identification															
	C-1	C-2	C-3	C-4	C-5	C-6	C-7	C-8	C-9	C-10	C-11	C-12	C-13	C-14	C-15	C-16
Mercury	0.036	0.0234J	0.055	0.040	0.0165J	0.060	0.0262	0.042	U	U	0.0002	U	U	45	16.1J	U
Silver	0.130J	0.100J	0.141J	0.127J	0.126J	0.0963J	0.132J	0.123J	U	0.123J	U	U	U	0.112J	0.0896J	U
Aluminum	2.070	1.050	5.930	1.010	850	814	1.030	1.300	1.450	1.060	671	873	876	657	632	692
Arsenic	0.502	U	1.230	U	U	U	2.960	0.350J	0.540	U	0.047	0.700	0.740	U	U	0.500
Barium	5.250	3.890	11.300	3.850	2.570	4.630	4.800	5.350	7.600	3.920	0.0370	3.200	5.800	2.500	1.730	4.100
Beryllium	0.736J	0.331J	0.175J	0.0274J	0.0323J	0.0267J	0.0533J	0.0728J	0.070	0.0703J	0.0004	0.050	0.080	0.0235J	U	0.040
Calcium	77.900	35.000	191.000	16.500	42.800	48.100	88.400	64.400	345.000	62.000	0.102	69.300	112.000	28.800	39.800	69.600
Cadmium	U	U	U	U	U	U	U	U	0.030	U	U	U	U	U	U	U
Cobalt	0.898	0.633	1.890	0.560	0.530	0.510	0.707	1.040	0.780	0.665	0.057	0.570	0.710	0.416J	0.408J	1.900
Chromium	2.310	1.460	5.610	1.540	1.470	1.100	2.230	3.350	2.000	2.080	2.10	2.500	2.100	1.040	1.670	1.700
Copper	2.620	2.240	4.530	2.500	3.190	2.030	4.780	3.400	2.300	2.930	1.80	2.700	2.800	2.150	2.740	1.900
Iron	2.570	1.570	6.260	1.330	1.290	1.210	2.210	2.560	2.080	1.770	1.430	1.610	2.270	1.690	976	1.280
Potassium	141.000	87.800	202.000	107.000	66.900	89.900	88.600	95.600	142.000	92.800	102	81.900	103.000	60.900	51.000	73.900
Magnesium	377	260	717	220	217	197	329	397	448	241	211	236	242	179	168	198
Manganese	51.7	4.18	73.0	34.1	32.5	34.4	40.8	47.5	203.0	43.4	38	33.7	577.0	39.4	25.7	31.3
Sodium	6.930J	5.540J	14.800	5.360J	7.310J	4.980J	12.100	6.560J	8.680	5.260J	10	8.000	10.200	3.690J	U	U
Nickel	1.650	1.280	4.690	1.050	1.010	0.908	1.300	1.520	1.600	1.390	1.10	1.400	1.200	0.838	0.917	0.880
Lead	2.210	0.928	8.390	1.720	1.440	0.738	1.350	1.270	1.700	1.540	1.10	1.400	1.700	0.866	0.600	1.600
Antimony	U	341J	0.363J	0.272J	U	0.208J	U	0.253J	U	U	U	U	U	0.241J	0.167J	U
Selenium	U	U	0.288J	0.156J	U	U	0.231J	0.144J	U	U	U	U	U	U	U	U
Thallium	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
Vanadium	3.870	2.050	9.900	1.970	2.160	1.880	3.170	3.940	3.200	2.460	2.40	2.800	3.800	1.510	1.340	2.100
Zinc	3.910	3.560	10.300	2.520	3.290	2.660	4.680	4.490	4.800	5.110	2.80	2.800	3.600	2.390	2.410	2.400
Total Cyanide	U	U	U	0.209J	U	0.324J	U	U	U	U	NA	NA	NA	U	U	NA

U - undetected J - estimated concentration

Table 4 - Post-Excavation Radiological Results
 Brookhaven National Laboratory, Upton, New York
 Building 830 Tank Removal Remedial Action Closure Report

		Post-Excavation Sample Identification														Arithmetic Mean		
	Units	C-1	C-2	C-3	C-4	C-5	C-6	C-7	C-8	C-9	C-10	C-11	C-12	C-13	C-14	C-15	C-16	Arithmetic Mean
Americium-241	pCi/G	U	U	U	0.28	3.08 J	0.08	U	U	U	U	.348 J	.858 J	.692 J	U	0.30	.199 J	0.37
Cesium-137	pCi/G	0.043	0.16	0.63	U	41.5	0.10	U	U	.241 J	2.88	8.22	19.7	23.7	U	3.10	11.5	6.97
Strontium-90	pCi/G	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
Cobalt-60	pCi/G	0.05	2.84	0.30	13.89	11	2.49	15.28	4.11	3.55	30.42	7.5	9.48	17.4	4.83	34.97	4.26	10.14
Plutonium-238	pCi/G	U	U	U	U	U	U	U	0.44	U	U	U	.237 J	U	U	U	U	0.042
Plutonium-239/240	pCi/G	U	U	U	U	U	U	U	0.64	U	0.19	U	U	.077 J	U	U	U	0.051

Notes:
 U - undetected
 J - estimated concentration

Bldg. 830 UGST Removal
ResRad Dose Assessment Summary

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	active
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	active
Find peak pathway doses	suppressed

Contaminated Zone Dimensions	Initial Soil Concentrations, pCi/g
Area: 1000.00 square meters	Am-241 3.700E-01
Thickness: 14.00 meters	Co-60 1.014E+01
Cover Depth: 0.00 meters	Cs-137 6.970E+00
	Pu-238 4.200E-02
	Pu-239 5.100E-02

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 30 mrem/yr

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years): 0.000E+00 1.000E+00 2.000E+01 4.000E+01 6.000E+01 8.000E+01 1.000E+02
TDOSE(t): 6.863E+01 6.106E+01 9.989E+00 3.951E+00 2.354E+00 1.506E+00 9.833E-01
M(t): 2.288E+00 2.035E+00 3.330E-01 1.317E-01 7.847E-02 5.021E-02 3.278E-02
0Maximum TDOSE(t): 6.863E+01 mrem/yr at t = 0.000E+00 years

Dose/Source Ratios Summed Over All Pathways

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent	Product Branch	Fraction*	t= 0.000E+00	1.000E+00	2.000E+01	4.000E+01	6.000E+01	8.000E+01	1.000E+02
Am-241	Am-241	1.000E+00	2.819E-01	2.814E-01	2.729E-01	2.642E-01	2.558E-01	2.477E-01	2.398E-01
Am-241	Np-237	1.000E+00	0.000E+00	1.150E-06	2.326E-05	4.575E-05	6.748E-05	8.846E-05	1.087E-04
Am-241	U-233	1.000E+00	0.000E+00	3.755E-14	1.163E-11	4.548E-11	1.005E-10	1.758E-10	2.703E-10
Am-241	Th-229	1.000E+00	0.000E+00	2.175E-17	1.667E-13	1.317E-12	4.392E-12	1.029E-11	1.985E-11
Am-241	ΣDSR(j)		2.819E-01	2.814E-01	2.729E-01	2.643E-01	2.559E-01	2.477E-01	2.399E-01
Co-60	Co-60	1.000E+00	5.875E+00	5.149E+00	4.194E-01	2.994E-02	2.137E-03	1.526E-04	1.089E-05
Cs-137	Cs-137	1.000E+00	1.281E+00	1.252E+00	8.054E-01	5.063E-01	3.183E-01	2.001E-01	1.258E-01
Pu-238	Pu-238	1.000E+00	2.338E-01	2.320E-01	1.996E-01	1.704E-01	1.454E-01	1.241E-01	1.060E-01
Pu-238	U-234	1.000E+00	0.000E+00	1.110E-07	2.077E-06	3.826E-06	5.296E-06	6.528E-06	7.556E-06
Pu-238	Th-230	1.000E+00	0.000E+00	6.842E-13	2.505E-10	9.478E-10	2.021E-09	3.409E-09	5.060E-09
Pu-238	Ra-226	1.000E+00	0.000E+00	1.931E-13	1.483E-09	1.136E-08	3.672E-08	8.346E-08	1.564E-07
Pu-238	Pb-210	1.000E+00	0.000E+00	5.289E-17	5.550E-12	7.591E-11	3.332E-10	9.212E-10	1.982E-09
Pu-238	ΣDSR(j)		2.338E-01	2.320E-01	1.996E-01	1.704E-01	1.454E-01	1.241E-01	1.060E-01
Pu-239	Pu-239	1.000E+00	2.585E-01	2.585E-01	2.583E-01	2.581E-01	2.578E-01	2.576E-01	2.574E-01
Pu-239	U-235	1.000E+00	0.000E+00	3.091E-10	6.156E-09	1.224E-08	1.824E-08	2.417E-08	3.003E-08
Pu-239	Pa-231	1.000E+00	0.000E+00	4.136E-14	1.723E-11	6.868E-11	1.539E-10	2.723E-10	4.236E-10
Pu-239	Ac-227	1.000E+00	0.000E+00	3.485E-16	2.121E-12	1.459E-11	4.299E-11	9.005E-11	1.570E-10

Pu-239 Σ DSR(j) 2.585E-01 2.585E-01 2.583E-01 2.581E-01 2.578E-01 2.576E-01
2.574E-01

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j)
= BRF(1)*BRF(2)* ... BRF(j).

The DSR includes contributions from associated (half-life \leq 0.5 yr) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g

Basic Radiation Dose Limit = 30 mrem/yr

Nuclide

(i)	t= 0.000E+00	1.000E+00	2.000E+01	4.000E+01	6.000E+01	8.000E+01	1.000E+02
Am-241	1.064E+02	1.066E+02	1.099E+02	1.135E+02	1.172E+02	1.211E+02	1.251E+02
Co-60	5.106E+00	5.826E+00	7.153E+01	1.002E+03	1.404E+04	1.966E+05	2.754E+06
Cs-137	2.342E+01	2.397E+01	3.725E+01	5.925E+01	9.425E+01	1.499E+02	2.385E+02
Pu-238	1.283E+02	1.293E+02	1.503E+02	1.761E+02	2.063E+02	2.417E+02	2.831E+02
Pu-239	1.161E+02	1.161E+02	1.162E+02	1.163E+02	1.164E+02	1.165E+02	1.166E+02

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)

and Single Radionuclide Soil Guidelines G(i,t) in pCi/g

at tmin = time of minimum single radionuclide soil guideline

and at tmax = time of maximum total dose = 0.000E+00 years

0Nuclide Initial tmin DSR(i,tmin) G(i,tmin) DSR(i,tmax) G(i,tmax)

(i)	pCi/g	(years)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)
Am-241	3.700E-01	0.000E+00	2.819E-01	1.064E+02	2.819E-01	1.064E+02
Co-60	1.014E+01	0.000E+00	5.875E+00	5.106E+00	5.875E+00	5.106E+00
Cs-137	6.970E+00	0.000E+00	1.281E+00	2.342E+01	1.281E+00	2.342E+01
Pu-238	4.200E-02	0.000E+00	2.338E-01	1.283E+02	2.338E-01	1.283E+02
Pu-239	5.100E-02	0.000E+00	2.585E-01	1.161E+02	2.585E-01	1.161E+02

Individual Nuclide Dose Summed Over All Pathways

Parent Nuclide and Branch Fraction Indicated

0Nuclide Parent BRF(i) DOSE(j,t), mrem/yr
 (j) (i) t= 0.000E+00 1.000E+00 2.000E+01 4.000E+01 6.000E+01 8.000E+01
 1.000E+02

Am-241	Am-241	1.000E+00	1.043E-01	1.041E-01	1.010E-01	9.776E-02	9.465E-02	9.163E-02	8.871E-02
Np-237	Am-241	1.000E+00	0.000E+00	4.255E-07	8.605E-06	1.693E-05	2.497E-05	3.273E-05	4.023E-05
U-233	Am-241	1.000E+00	0.000E+00	1.390E-14	4.304E-12	1.683E-11	3.719E-11	6.503E-11	1.000E-10
Th-229	Am-241	1.000E+00	0.000E+00	8.048E-18	6.169E-14	4.874E-13	1.625E-12	3.806E-12	7.345E-12
Co-60	Co-60	1.000E+00	5.958E+01	5.221E+01	4.253E+00	3.036E-01	2.167E-02	1.547E-03	1.104E-04
Cs-137	Cs-137	1.000E+00	8.929E+00	8.725E+00	5.614E+00	3.529E+00	2.219E+00	1.395E+00	8.768E-01
Pu-238	Pu-238	1.000E+00	9.820E-03	9.743E-03	8.383E-03	7.155E-03	6.108E-03	5.214E-03	4.450E-03
U-234	Pu-238	1.000E+00	0.000E+00	4.664E-09	8.721E-08	1.607E-07	2.224E-07	2.742E-07	3.173E-07
Th-230	Pu-238	1.000E+00	0.000E+00	2.873E-14	1.052E-11	3.981E-11	8.487E-11	1.432E-10	2.125E-10
Ra-226	Pu-238	1.000E+00	0.000E+00	8.109E-15	6.229E-11	4.770E-10	1.542E-09	3.505E-09	6.569E-09
Pb-210	Pu-238	1.000E+00	0.000E+00	2.221E-18	2.331E-13	3.188E-12	1.400E-11	3.869E-11	8.323E-11
Pu-239	Pu-239	1.000E+00	1.318E-02	1.318E-02	1.317E-02	1.316E-02	1.315E-02	1.314E-02	1.313E-02
U-235	Pu-239	1.000E+00	0.000E+00	1.577E-11	3.139E-10	6.240E-10	9.303E-10	1.233E-09	1.532E-09
Pa-231	Pu-239	1.000E+00	0.000E+00	2.109E-15	8.787E-13	3.502E-12	7.847E-12	1.389E-11	2.160E-11
Ac-227	Pu-239	1.000E+00	0.000E+00	1.778E-17	1.082E-13	7.440E-13	2.193E-12	4.593E-12	8.008E-12

BRF(i) is the branch fraction of the parent nuclide.

Individual Nuclide Soil Concentration
 Parent Nuclide and Branch Fraction Indicated

0Nuclide Parent	BRF(i)	S(j,t), pCi/g					
(j) (i)	t=	0.000E+00	1.000E+00	2.000E+01	4.000E+01	6.000E+01	8.000E+01
1.000E+02							
Am-241	Am-241	1.000E+00	3.700E-01	3.694E-01	3.582E-01	3.468E-01	3.357E-01
			3.251E-01	3.147E-01			
Np-237	Am-241	1.000E+00	0.000E+00	1.197E-07	2.356E-06	4.631E-06	6.829E-06
			8.951E-06	1.100E-05			
U-233	Am-241	1.000E+00	0.000E+00	2.618E-13	1.032E-10	4.066E-10	9.009E-10
			2.427E-09				1.577E-09
Th-229	Am-241	1.000E+00	0.000E+00	8.243E-18	6.520E-14	5.154E-13	1.719E-12
			7.770E-12				4.026E-12
Co-60	Co-60	1.000E+00	1.014E+01	8.886E+00	7.239E-01	5.167E-02	3.689E-03
			1.880E-05				2.633E-04
Cs-137	Cs-137	1.000E+00	6.970E+00	6.810E+00	4.382E+00	2.755E+00	1.732E+00
			1.089E+00	6.844E-01			
Pu-238	Pu-238	1.000E+00	4.200E-02	4.167E-02	3.585E-02	3.060E-02	2.612E-02
			1.903E-02				2.230E-02
U-234	Pu-238	1.000E+00	0.000E+00	1.186E-07	2.189E-06	4.033E-06	5.582E-06
			7.962E-06				6.879E-06
Th-230	Pu-238	1.000E+00	0.000E+00	5.344E-13	2.027E-10	7.675E-10	1.637E-09
			4.100E-09				2.762E-09
Ra-226	Pu-238	1.000E+00	0.000E+00	7.722E-17	5.921E-13	4.535E-12	1.466E-11
			6.244E-11				3.332E-11
Pb-210	Pu-238	1.000E+00	0.000E+00	5.966E-19	8.231E-14	1.136E-12	5.004E-12
			2.983E-11				1.386E-11
Pu-239	Pu-239	1.000E+00	5.100E-02	5.100E-02	5.096E-02	5.091E-02	5.087E-02
			5.078E-02				5.082E-02
U-235	Pu-239	1.000E+00	0.000E+00	5.021E-11	9.984E-10	1.984E-09	2.958E-09
			4.870E-09				3.920E-09
Pa-231	Pu-239	1.000E+00	0.000E+00	5.312E-16	2.116E-13	8.423E-13	1.886E-12
			5.192E-12				3.338E-12
Ac-227	Pu-239	1.000E+00	0.000E+00	5.591E-18	3.836E-14	2.649E-13	7.815E-13
			2.857E-12				1.638E-12

BRF(i) is the branch fraction of the parent nuclide.

Table 6 - Waste Characterization

Brookhaven National Laboratory, Upton, New York
 Building 830 Tank Removal Remedial Action Closure Report
 Page 1 of 2

Characterization Parameter	EPA Hazardous Waste Code	Regulatory Level	Building 830 Box Disposal Sample
Paint Filter Test			
pH (s.u.)	D002	<2+>12.5	7.86
Cyanide, Reactive			U
Sulfide, Reactive			U
Evaporative Loss at 105°C			6 percent
TCLP Extractable Metals (mg/kg)			
Arsenic	D004	5	0.080
Barium	D005	100	0.115
Cadmium	D006	1	0.0228
Chromium	D007	5	0.0529
Lead	D008	5	0.030
Mercury	D009	0.2	0.0088
Selenium	D10	1	0.0504
Silver	D11	5	0.0172
VOCs (mg/kg)			
Chloroform	D22	66	0.0071 J
Methylene Chloride			0.0020 J
SVOCs (mg/kg)			SVOCs were not detected
Pesticides/herbicides (mg/kg)			
Endosulfan sulfate			0.0014 P
Endrin ketone	D017		0.0049 J
PCBs-Total			PCBs were not detected
Radiological Analyses pCi/g			
Americium-241			24.96
Cesium-137			912
Cobalt-60			35.41

Notes: J - estimated concentration

Table 6 - Waste Characterization

Brookhaven National Laboratory, Upton, New York
 Building 830 Tank Removal Remedial Action Closure Report
 Page 2 of 2

Characterization Parameter	Building 830 Box Disposal Sample
Metals (mg/kg)	
Silver	U
Aluminum	4,740
Arsenic	1.890
Barium	11.700
Beryllium	0.169 J
Calcium	2,300
Cadmium	U
Cobalt	2.290
Chromium	7.780
Copper	6.100
Iron	6,930
Potassium	333
Magnesium	2,000
Manganese	106
Sodium	29
Nickel	5.210
Lead	12.500
Antimony	0.188 J
Selenium	0.476 J
Thallium	U
Vanadium	10.200
Zinc	12.300

Notes:

U - undetected

J - estimated concentration

Table 7 - Back-Fill Concentrations

Brookhaven National Laboratory, Upton, New York
 Building 830 Tank Removal Remedial Action Closure Report

	Back-Fill Sample Identification						Arithmetic Mean
	SP01	SP02	SP03	SP04	SP05		
Americium-241	U	U	U	U	0		0.04
Cesium-137	3	3	3	4	5		5
Strontium-90	U	U	U	U	U		U
Cadmium-109	U	1	U	U	U		0
Cobalt-60	1	0.30	1	3	5		2
Plutonium-238	U	U	U	U	U		U
Plutonium-239/24	U	U	U	U	U		U

Notes:
 U - undetected

Building 830, 650, and Boneyard Soil/Debris Inventory

TABLE 8

	Quantity	Container	Container Dimensions	Content Description	Total		Soil Volume (cyd)	Debris Volume (cyd)	Oversize Debris Volume (cyd)	Envirocare Cost (\$)	Hanford Cost (\$)
					Volume (cft)	Volume (cyd)					
Bldg. 830	6	B-52	3' X 13' X 8'	Soil	1872	69	69		10,714	29,727	
Bldg. 830	2	B-52	5' X 6' X 14'	Soil	840	31	31		4,808	13,339	
Bldg. 830	2	B-52	5 1/2' X 6' X 14'	Soil	924	34	34		5,288	14,673	
Bldg. 830	27	B-52	3' X 13' X 7'	Soil	7371	273	273		42,187	117,051	
Bldg. 830	2	B-52	3' X 13' X 7'	Soil	546	20	20		3,125	8,670	
Bldg. 830	2	B-25	4' X 4' X 6'	Debris	192	7		7	1,099	3,049	
Bldg. 830	5	Drum	55-Gallon	Debris	37	1		1	210	584	
Bldg. 830	4	B-25	4' X 4' X 6'	PPE	384	14		14	2,198	6,098	
Bldg. 830	3	B-25	4' X 4' X 6'	Tree	288	11		11	1,648	4,573	
Bldg. 830	1	Vault	5' X 7' X 12.5' (9" Thick)	Concrete	437.5	16		16	12,829		
Boneyard	23	B-12	2' X 4' X 6'	Soil	1104	41	41		6,319	17,532	
Bldg. 811	1	B-52	3' X 13' X 8'	Debris	312	12		12	1,786	4,955	
Bldg. 811	16	Drum	55-Gallon	Debris	118	4		4	673	1,868	
Bldg. 650	1	Sealand	20' X 8' X 5'	Soil	800	30	30		4,579	12,704	
Bldg. 650	2	B-25	4' X 4' X 6'	Soil	192	7	7		1,099	3,049	
					15,417	571	506	16	\$98,561	\$237,873	
					100%	88.53%	8.63%	2.84%			

Assume: Envirocare soil unit cost is \$ 154.53/cyd, debris unit cost is \$367.24 (in excess of 10% volume of soil), and oversize debris is \$791.74.
 Hanford unit cost is \$ 15.88/cft.

Bldg. 830 UGST Removal
Site-Specific Parameter Summary

Parameter	Input	Default (If different from user input)		
Area of contaminated zone (m**2) AREA	1.000E+03	1.000E+04	---	
Thickness of contaminated zone (m) THICK0	1.400E+01	2.000E+00	---	
Length parallel to aquifer flow (m) LCZPAQ	3.000E+01	1.000E+02	---	
Basic radiation dose limit (mrem/yr) BRDL	3.000E+01	3.000E+01	---	
Time since placement of material (yr) TI	0.000E+00	0.000E+00	---	
Times for calculations (yr) T(2)	1.000E+00	1.000E+00	---	
Times for calculations (yr) T(3)	2.000E+01	3.000E+00	---	
Times for calculations (yr) T(4)	4.000E+01	1.000E+01	---	
Times for calculations (yr) T(5)	6.000E+01	3.000E+01	---	
Times for calculations (yr) T(6)	8.000E+01	1.000E+02	---	
Times for calculations (yr) T(7)	1.000E+02	3.000E+02	---	
Times for calculations (yr) T(8)	not used	1.000E+03	---	
Times for calculations (yr) T(9)	not used	0.000E+00	---	
Times for calculations (yr) T(10)	not used	0.000E+00	---	
Initial principal radionuclide (pCi/g): Am-241 S1(2)	3.700E-01	0.000E+00	---	
Initial principal radionuclide (pCi/g): Co-60 S1(4)	1.014E+01	0.000E+00	---	
Initial principal radionuclide (pCi/g): Cs-137 S1(5)	6.970E+00	0.000E+00	---	
Initial principal radionuclide (pCi/g): Pu-238 S1(12)	4.200E-02	0.000E+00	---	
Initial principal radionuclide (pCi/g): Pu-239 S1(13)	5.100E-02	0.000E+00	---	

Concentration in groundwater (pCi/L): Am-241 W1(2)	not used	0.000E+00	---	
Concentration in groundwater (pCi/L): Co-60 W1(4)	not used	0.000E+00	---	
Concentration in groundwater (pCi/L): Cs-137 W1(5)	not used	0.000E+00	---	
Concentration in groundwater (pCi/L): Pu-238 W1(12)	not used	0.000E+00	---	
Concentration in groundwater (pCi/L): Pu-239 W1(13)	not used	0.000E+00	---	
Cover depth (m) COVER0		0.000E+00 0.000E+00	---	
Density of cover material (g/cm**3) DENS CV	not used	1.500E+00	---	
Cover depth erosion rate (m/yr) VCV	not used	1.000E-03	---	
Density of contaminated zone (g/cm**3) DENS CZ		1.660E+00 1.500E+00	---	
Contaminated zone erosion rate (m/yr) VCZ		1.000E-03 1.000E-03	---	
Contaminated zone total porosity TPCZ		3.300E-01 4.000E-01	---	
Contaminated zone effective porosity EPCZ		2.400E-01 2.000E-01	---	
Contaminated zone hydraulic conductivity (m/yr) HCCZ		1.336E+03 1.000E+01	---	
Contaminated zone b parameter BCZ		4.900E+00 5.300E+00	---	
Average annual wind speed (m/sec) WIND		2.000E+00 2.000E+00	---	
Humidity in air (g/m**3) HUMID		8.000E+00 8.000E+00	---	
Evapotranspiration coefficient EVAPTR		4.600E-01 5.000E-01	---	
Precipitation (m/yr) PRECIP		1.230E+00 1.000E+00	---	
Irrigation (m/yr) RI		2.600E-01 2.000E-01	---	
Irrigation mode IDITCH	overhead	overhead	---	
Runoff coefficient RUNOFF		2.000E-01 2.000E-01	---	
Watershed area for nearby stream or pond (m**2) WAREA		1.000E+06 1.000E+06	---	

Accuracy for water/soil computations EPS	1.000E-03 1.000E-03	---	
Density of saturated zone (g/cm**3) DENSAQ	1.500E+00 1.500E+00	---	
Saturated zone total porosity TPSZ	3.300E-01 4.000E-01	---	
Saturated zone effective porosity EPSZ	2.400E-01 2.000E-01	---	
Saturated zone hydraulic conductivity (m/yr) HCSZ	1.947E+04 1.000E+02	---	
Saturated zone hydraulic gradient HGWT	1.000E-03 2.000E-02	---	
Saturated zone b parameter BSZ	4.900E+00 5.300E+00	---	
Water table drop rate (m/yr) VWT	1.000E-03 1.000E-03	---	
Well pump intake depth (m below water table) DWIBWT	1.800E+01 1.000E+01	---	
Model: Nondispersion (ND) or Mass-Balance (MB) MODEL	ND ND	---	
Well pumping rate (m**3/yr) UW	2.500E+02 2.500E+02	---	
Number of unsaturated zone strata NS	1 1	---	
Unsat. zone 1, thickness (m) H(1)	6.600E+00 4.000E+00	---	
Unsat. zone 1, soil density (g/cm**3) DENSUZ(1)	1.500E+00 1.500E+00	---	
Unsat. zone 1, total porosity TPUZ(1)	3.300E-01 4.000E-01	---	
Unsat. zone 1, effective porosity EPUZ(1)	2.400E-01 2.000E-01	---	
Unsat. zone 1, soil-specific b parameter BUZ(1)	4.900E+00 5.300E+00	---	
Unsat. zone 1, hydraulic conductivity (m/yr) HCUZ(1)	5.000E+03 1.000E+01	---	

Distribution coefficients for Am-241

Contaminated zone (cm**3/g) DCNUCC(2)	1.900E+03 2.000E+01	---	
Unsaturated zone 1 (cm**3/g) DCNUCU(2,1)	1.900E+03 2.000E+01	---	
Saturated zone (cm**3/g) DCNUCS(2)	1.900E+03 2.000E+01	---	
Leach rate (/yr) ALEACH(2)	0.000E+00 0.000E+00	1.521E-05	
Solubility constant SOLUBK(2)	0.000E+00 0.000E+00	not used	

Distribution coefficients for Co-60

Contaminated zone (cm**3/g) DCNUCC(4)	6.000E+01 1.000E+03	---	
Unsaturated zone 1 (cm**3/g) DCNUCU(4,1)	6.000E+01 1.000E+03	---	
Saturated zone (cm**3/g) DCNUCS(4)	6.000E+01 1.000E+03	---	
Leach rate (/yr) ALEACH(4)	0.000E+00 0.000E+00	4.809E-04	
Solubility constant SOLUBK(4)	0.000E+00 0.000E+00	not used	

Distribution coefficients for Cs-137

Contaminated zone (cm**3/g) DCNUCC(5)	2.800E+02 1.000E+03	---	
Unsaturated zone 1 (cm**3/g) DCNUCU(5,1)	2.800E+02 1.000E+03	---	
Saturated zone (cm**3/g) DCNUCS(5)	2.800E+02 1.000E+03	---	
Leach rate (/yr) ALEACH(5)	0.000E+00 0.000E+00	1.032E-04	
Solubility constant SOLUBK(5)	0.000E+00 0.000E+00	not used	

Distribution coefficients for Pu-238

Contaminated zone (cm**3/g) DCNUCC(12)	2.000E+03 2.000E+03	---	
Unsaturated zone 1 (cm**3/g) DCNUCU(12,1)	2.000E+03 2.000E+03	---	
Saturated zone (cm**3/g) DCNUCS(12)	2.000E+03 2.000E+03	---	
Leach rate (/yr) ALEACH(12)	0.000E+00 0.000E+00	1.445E-05	

Solubility constant SOLUBK(12)	0.000E+00 0.000E+00	not used
Distribution coefficients for Pu-239		
Contaminated zone (cm**3/g) DCNUCC(13)	2.000E+03 2.000E+03	---
Unsaturated zone 1 (cm**3/g) DCNUCU(13,1)	2.000E+03 2.000E+03	---
Saturated zone (cm**3/g) DCNUCS(13)	2.000E+03 2.000E+03	---
Leach rate (/yr) ALEACH(13)	0.000E+00 0.000E+00	1.445E-05
Solubility constant SOLUBK(13)	0.000E+00 0.000E+00	not used
Distribution coefficients for daughter Ac-227		
Contaminated zone (cm**3/g) DCNUCC(1)	2.000E+01 2.000E+01	---
Unsaturated zone 1 (cm**3/g) DCNUCU(1,1)	2.000E+01 2.000E+01	---
Saturated zone (cm**3/g) DCNUCS(1)	2.000E+01 2.000E+01	---
Leach rate (/yr) ALEACH(1)	0.000E+00 0.000E+00	1.437E-03
Solubility constant SOLUBK(1)	0.000E+00 0.000E+00	not used
Distribution coefficients for daughter Co-57		
Contaminated zone (cm**3/g) DCNUCC(3)	6.000E+01 1.000E+03	---
Unsaturated zone 1 (cm**3/g) DCNUCU(3,1)	6.000E+01 1.000E+03	---
Saturated zone (cm**3/g) DCNUCS(3)	6.000E+01 1.000E+03	---
Leach rate (/yr) ALEACH(3)	0.000E+00 0.000E+00	4.809E-04
Solubility constant SOLUBK(3)	0.000E+00 0.000E+00	not used
Distribution coefficients for daughter Eu-155		
Contaminated zone (cm**3/g) DCNUCC(6)	-1.000E+00 -1.000E+00	8.249E+02
Unsaturated zone 1 (cm**3/g) DCNUCU(6,1)	-1.000E+00 -1.000E+00	8.249E+02
Saturated zone (cm**3/g)	-1.000E+00 -1.000E+00	8.249E+02

DCNUCS(6)			
Leach rate (/yr)	0.000E+00 0.000E+00		3.504E-05
ALEACH(6)			
Solubility constant	0.000E+00 0.000E+00		not used
SOLUBK(6)			
Distribution coefficients for daughter H-3			
Contaminated zone (cm**3/g)	0.000E+00 0.000E+00	---	
DCNUCC(7)			
Unsaturated zone 1 (cm**3/g)	0.000E+00 0.000E+00	---	
DCNUCU(7,1)			
Saturated zone (cm**3/g)	0.000E+00 0.000E+00	---	
DCNUCS(7)			
Leach rate (/yr)	0.000E+00 0.000E+00		2.632E-01
ALEACH(7)			
Solubility constant	0.000E+00 0.000E+00		not used
SOLUBK(7)			
Distribution coefficients for daughter Mn-54			
Contaminated zone (cm**3/g)	2.000E+02 2.000E+02	---	
DCNUCC(8)			
Unsaturated zone 1 (cm**3/g)	2.000E+02 2.000E+02	---	
DCNUCU(8,1)			
Saturated zone (cm**3/g)	2.000E+02 2.000E+02	---	
DCNUCS(8)			
Leach rate (/yr)	0.000E+00 0.000E+00		1.444E-04
ALEACH(8)			
Solubility constant	0.000E+00 0.000E+00		not used
SOLUBK(8)			
Distribution coefficients for daughter Np-237			
Contaminated zone (cm**3/g)	-1.000E+00 -1.000E+00		2.574E+02
DCNUCC(9)			
Unsaturated zone 1 (cm**3/g)	-1.000E+00 -1.000E+00		2.574E+02
DCNUCU(9,1)			
Saturated zone (cm**3/g)	-1.000E+00 -1.000E+00		2.574E+02
DCNUCS(9)			
Leach rate (/yr)	0.000E+00 0.000E+00		1.122E-04
ALEACH(9)			
Solubility constant	0.000E+00 0.000E+00		not used
SOLUBK(9)			

Distribution coefficients for daughter Pa-231

Contaminated zone (cm**3/g) DCNUCC(10)	5.000E+02 5.000E+01	---	
Unsaturated zone 1 (cm**3/g) DCNUCU(10,1)	5.000E+02 5.000E+01	---	
Saturated zone (cm**3/g) DCNUCS(10)	5.000E+02 5.000E+01	---	
Leach rate (/yr) ALEACH(10)	0.000E+00 0.000E+00	5.780E-05	
Solubility constant SOLUBK(10)	0.000E+00 0.000E+00	not used	

Distribution coefficients for daughter Pb-210

Contaminated zone (cm**3/g) DCNUCC(11)	2.700E+02 1.000E+02	---	
Unsaturated zone 1 (cm**3/g) DCNUCU(11,1)	2.700E+02 1.000E+02	---	
Saturated zone (cm**3/g) DCNUCS(11)	2.700E+02 1.000E+02	---	
Leach rate (/yr) ALEACH(11)	0.000E+00 0.000E+00	1.070E-04	
Solubility constant SOLUBK(11)	0.000E+00 0.000E+00	not used	

Distribution coefficients for daughter Ra-226

Contaminated zone (cm**3/g) DCNUCC(14)	5.000E+02 7.000E+01	---	
Unsaturated zone 1 (cm**3/g) DCNUCU(14,1)	5.000E+02 7.000E+01	---	
Saturated zone (cm**3/g) DCNUCS(14)	5.000E+02 7.000E+01	---	
Leach rate (/yr) ALEACH(14)	0.000E+00 0.000E+00	5.780E-05	
Solubility constant SOLUBK(14)	0.000E+00 0.000E+00	not used	

Distribution coefficients for daughter Ra-228

Contaminated zone (cm**3/g) DCNUCC(15)	5.000E+02 7.000E+01	---	
Unsaturated zone 1 (cm**3/g) DCNUCU(15,1)	5.000E+02 7.000E+01	---	
Saturated zone (cm**3/g) DCNUCS(15)	5.000E+02 7.000E+01	---	
Leach rate (/yr) ALEACH(15)	0.000E+00 0.000E+00	5.780E-05	

Solubility constant SOLUBK(15)	0.000E+00 0.000E+00	not used
Distribution coefficients for daughter Sr-90		
Contaminated zone (cm**3/g) DCNUCC(16)	3.000E+00 3.000E+01	---
Unsaturated zone 1 (cm**3/g) DCNUCU(16,1)	3.000E+00 3.000E+01	---
Saturated zone (cm**3/g) DCNUCS(16)	3.000E+00 3.000E+01	---
Leach rate (/yr) ALEACH(16)	0.000E+00 0.000E+00	9.295E-03
Solubility constant SOLUBK(16)	0.000E+00 0.000E+00	not used
Distribution coefficients for daughter Th-228		
Contaminated zone (cm**3/g) DCNUCC(17)	3.200E+04 6.000E+04	---
Unsaturated zone 1 (cm**3/g) DCNUCU(17,1)	3.200E+04 6.000E+04	---
Saturated zone (cm**3/g) DCNUCS(17)	3.200E+04 6.000E+04	---
Leach rate (/yr) ALEACH(17)	0.000E+00 0.000E+00	9.033E-07
Solubility constant SOLUBK(17)	0.000E+00 0.000E+00	not used
Distribution coefficients for daughter Th-229		
Contaminated zone (cm**3/g) DCNUCC(18)	6.000E+04 6.000E+04	---
Unsaturated zone 1 (cm**3/g) DCNUCU(18,1)	6.000E+04 6.000E+04	---
Saturated zone (cm**3/g) DCNUCS(18)	6.000E+04 6.000E+04	---
Leach rate (/yr) ALEACH(18)	0.000E+00 0.000E+00	4.818E-07
Solubility constant SOLUBK(18)	0.000E+00 0.000E+00	not used
Distribution coefficients for daughter Th-230		
Contaminated zone (cm**3/g) DCNUCC(19)	3.200E+04 6.000E+04	---
Unsaturated zone 1 (cm**3/g) DCNUCU(19,1)	3.200E+04 6.000E+04	---
Saturated zone (cm**3/g)	3.200E+04 6.000E+04	---

DCNUCS(19)				
Leach rate (/yr)	0.000E+00	0.000E+00		9.033E-07
ALEACH(19)				
Solubility constant	0.000E+00	0.000E+00		not used
SOLUBK(19)				
Distribution coefficients for daughter Th-232				
Contaminated zone (cm**3/g)	3.200E+04	6.000E+04		---
DCNUCC(20)				
Unsaturated zone 1 (cm**3/g)	3.200E+04	6.000E+04		---
DCNUCU(20,1)				
Saturated zone (cm**3/g)	3.200E+04	6.000E+04		---
DCNUCS(20)				
Leach rate (/yr)	0.000E+00	0.000E+00		9.033E-07
ALEACH(20)				
Solubility constant	0.000E+00	0.000E+00		not used
SOLUBK(20)				
Distribution coefficients for daughter U-233				
Contaminated zone (cm**3/g)	5.000E+01	5.000E+01		---
DCNUCC(21)				
Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01		---
DCNUCU(21,1)				
Saturated zone (cm**3/g)	5.000E+01	5.000E+01		---
DCNUCS(21)				
Leach rate (/yr)	0.000E+00	0.000E+00		5.768E-04
ALEACH(21)				
Solubility constant	0.000E+00	0.000E+00		not used
SOLUBK(21)				
Distribution coefficients for daughter U-234				
Contaminated zone (cm**3/g)	5.000E+01	5.000E+01		---
DCNUCC(22)				
Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01		---
DCNUCU(22,1)				
Saturated zone (cm**3/g)	5.000E+01	5.000E+01		---
DCNUCS(22)				
Leach rate (/yr)	0.000E+00	0.000E+00		5.768E-04
ALEACH(22)				
Solubility constant	0.000E+00	0.000E+00		not used
SOLUBK(22)				

Distribution coefficients for daughter U-235

Contaminated zone (cm**3/g) DCNUCC(23)	5.000E+01 5.000E+01	---	
Unsaturated zone 1 (cm**3/g) DCNUCU(23,1)	5.000E+01 5.000E+01	---	
Saturated zone (cm**3/g) DCNUCS(23)	5.000E+01 5.000E+01	---	
Leach rate (/yr) ALEACH(23)	0.000E+00 0.000E+00	5.768E-04	
Solubility constant SOLUBK(23)	0.000E+00 0.000E+00	not used	
Inhalation rate (m**3/yr) INHALR	7.300E+03 8.400E+03	---	
Mass loading for inhalation (g/m**3) MLINH	1.000E-04 1.000E-04	---	
Exposure duration ED	3.000E+01 3.000E+01	---	
Shielding factor, inhalation SHF3	4.000E-01 4.000E-01	---	
Shielding factor, external gamma SHF1	3.000E-01 7.000E-01	---	
Fraction of time spent indoors FIND	5.000E-01 5.000E-01	---	
Fraction of time spent outdoors (on site) FOTD	2.500E-01 2.500E-01	---	
Shape factor flag, external gamma AREA. FS	1.000E+00 1.000E+00	>0 shows circular	
Radii of shape factor array (used if FS = -1):			
Outer annular radius (m), ring 1: RAD_SHAPE(1)	not used 5.000E+01	---	
Outer annular radius (m), ring 2: RAD_SHAPE(2)	not used 7.071E+01	---	
Outer annular radius (m), ring 3: RAD_SHAPE(3)	not used 0.000E+00	---	
Outer annular radius (m), ring 4: RAD_SHAPE(4)	not used 0.000E+00	---	
Outer annular radius (m), ring 5: RAD_SHAPE(5)	not used 0.000E+00	---	
Outer annular radius (m), ring 6: RAD_SHAPE(6)	not used 0.000E+00	---	
Outer annular radius (m), ring 7: RAD_SHAPE(7)	not used 0.000E+00	---	
Outer annular radius (m), ring 8: RAD_SHAPE(8)	not used 0.000E+00	---	

Outer annular radius (m), ring 9: RAD_SHAPE(9)	not used	0.000E+00	---	
Outer annular radius (m), ring 10: RAD_SHAPE(10)	not used	0.000E+00	---	
Outer annular radius (m), ring 11: RAD_SHAPE(11)	not used	0.000E+00	---	
Outer annular radius (m), ring 12: RAD_SHAPE(12)	not used	0.000E+00	---	

Fractions of annular areas within AREA:

Ring 1 FRACA(1)	not used	1.000E+00	---	
Ring 2 FRACA(2)	not used	2.732E-01	---	
Ring 3 FRACA(3)	not used	0.000E+00	---	
Ring 4 FRACA(4)	not used	0.000E+00	---	
Ring 5 FRACA(5)	not used	0.000E+00	---	
Ring 6 FRACA(6)	not used	0.000E+00	---	
Ring 7 FRACA(7)	not used	0.000E+00	---	
Ring 8 FRACA(8)	not used	0.000E+00	---	
Ring 9 FRACA(9)	not used	0.000E+00	---	
Ring 10 FRACA(10)	not used	0.000E+00	---	
Ring 11 FRACA(11)	not used	0.000E+00	---	
Ring 12 FRACA(12)	not used	0.000E+00	---	

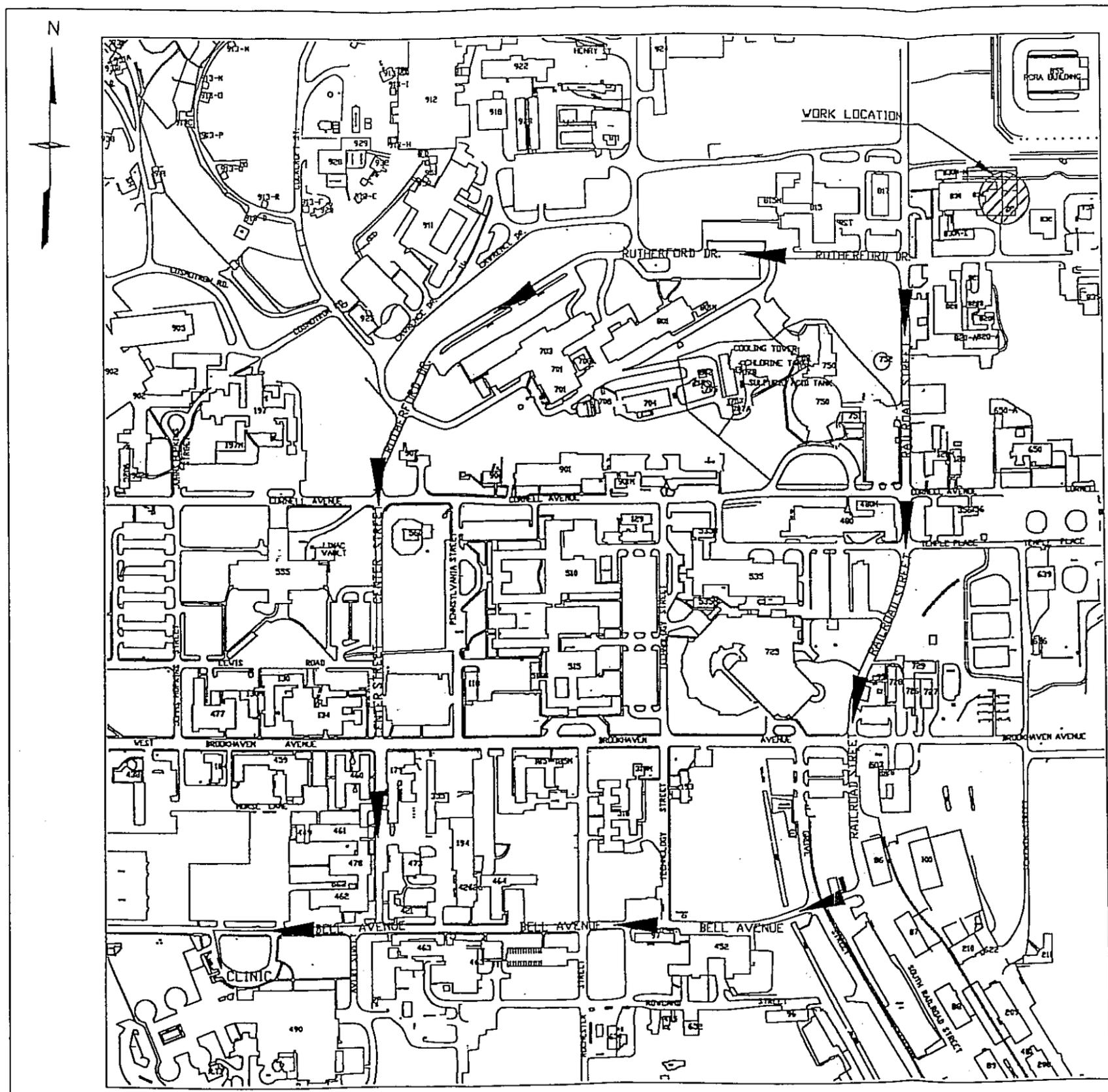
Fruits, vegetables and grain consumption (kg/yr) DIET(1)	1.600E+02	1.600E+02	---	
Leafy vegetable consumption (kg/yr) DIET(2)	1.400E+01	1.400E+01	---	
Milk consumption (L/yr) DIET(3)	not used	9.200E+01	---	
Meat and poultry consumption (kg/yr) DIET(4)	not used	6.300E+01	---	
Fish consumption (kg/yr) DIET(5)	not used	5.400E+00	---	

Other seafood consumption (kg/yr) DIET(6)	not used 9.000E-01	---	
Soil ingestion rate (g/yr) SOIL	4.380E+01 3.650E+01	---	
Drinking water intake (L/yr) DWI	7.000E+02 5.100E+02	---	
Contamination fraction of drinking water FDW	1.000E+00 1.000E+00	---	
Contamination fraction of household water FHHW	1.000E+00 1.000E+00	---	
Contamination fraction of livestock water FLW	not used 1.000E+00	---	
Contamination fraction of irrigation water FIRW	1.000E+00 1.000E+00	---	
Contamination fraction of aquatic food FR9	not used 5.000E-01	---	
Contamination fraction of plant food FPLANT	2.000E-01 -1	---	
Contamination fraction of meat FMEAT	not used -1	---	
Contamination fraction of milk FMLK	not used -1	---	
Livestock fodder intake for meat (kg/day) LFI5	not used 6.800E+01	---	
Livestock fodder intake for milk (kg/day) LFI6	not used 5.500E+01	---	
Livestock water intake for meat (L/day) LWI5	not used 5.000E+01	---	
Livestock water intake for milk (L/day) LWI6	not used 1.600E+02	---	
Livestock soil intake (kg/day) LSI	not used 5.000E-01	---	
Mass loading for foliar deposition (g/m**3) MLFD	1.000E-04 1.000E-04	---	
Depth of soil mixing layer (m) DM	1.500E-01 1.500E-01	---	
Depth of roots (m) DROOT	9.000E-01 9.000E-01	--	
Drinking water fraction from ground water FGWDW	1.000E+00 1.000E+00	---	
Household water fraction from ground water FGWHH	1.000E+00 1.000E+00	---	
Livestock water fraction from ground water FGWLW	1.000E+00 1.000E+00	---	

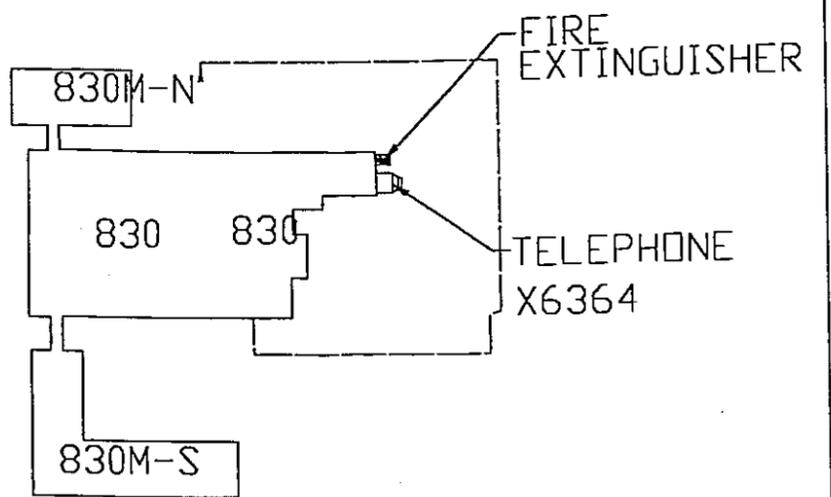
Irrigation fraction from ground water FGWIR	not used 1.000E+00	---	
Wet weight crop yield for Non-Leafy (kg/m**2) YV(1)	7.000E-01 7.000E-01	---	
Wet weight crop yield for Leafy (kg/m**2) YV(2)	1.500E+00 1.500E+00	---	
Wet weight crop yield for Fodder (kg/m**2) YV(3)	not used 1.100E+00	---	
Growing Season for Non-Leafy (years) TE(1)	1.700E-01 1.700E-01	---	
Growing Season for Leafy (years) TE(2)	2.500E-01 2.500E-01	---	
Growing Season for Fodder (years) TE(3)	not used 8.000E-02	---	
Translocation Factor for Non-Leafy TIV(1)	1.000E-01 1.000E-01	---	
Translocation Factor for Leafy TIV(2)	1.000E+00 1.000E+00	---	
Translocation Factor for Fodder TIV(3)	not used 1.000E+00	---	
Dry Foliar Interception Fraction for Non-Leafy RDRY(1)	2.500E-01 2.500E-01	---	
Dry Foliar Interception Fraction for Leafy RDRY(2)	2.500E-01 2.500E-01	---	
Dry Foliar Interception Fraction for Fodder RDRY(3)	not used 2.500E-01	---	
Wet Foliar Interception Fraction for Non-Leafy RWET(1)	2.500E-01 2.500E-01	---	
Wet Foliar Interception Fraction for Leafy RWET(2)	2.500E-01 2.500E-01	---	
Wet Foliar Interception Fraction for Fodder RWET(3)	not used 2.500E-01	---	
Weathering Removal Constant for Vegetation WLAM	2.000E+01 2.000E+01	---	
C-12 concentration in water (g/cm**3) C12WTR	not used 2.000E-05	---	
C-12 concentration in contaminated soil (g/g) C12CZ	not used 3.000E-02	---	
Fraction of vegetation carbon from soil CSOIL	not used 2.000E-02	---	
Fraction of vegetation carbon from air CAIR	not used 9.800E-01	---	
C-14 evasion layer thickness in soil (m) DMC	not used 3.000E-01	---	

C-14 evasion flux rate from soil (1/sec) EVSN	not used	7.000E-07	---	
C-12 evasion flux rate from soil (1/sec) REVSN	not used	1.000E-10	---	
Fraction of grain in beef cattle feed AVFG4	not used	8.000E-01	---	
Fraction of grain in milk cow feed AVFG5	not used	2.000E-01	---	
Storage times of contaminated foodstuffs (days):				
Fruits, non-leafy vegetables, and grain STOR_T(1)	1.400E+01	1.400E+01	---	
Leafy vegetables STOR_T(2)	1.000E+00	1.000E+00	---	
Milk STOR_T(3)	1.000E+00	1.000E+00	---	
Meat and poultry STOR_T(4)	2.000E+01	2.000E+01	---	
Fish STOR_T(5)	7.000E+00	7.000E+00	---	
Crustacea and mollusks STOR_T(6)	7.000E+00	7.000E+00	---	
Well water STOR_T(7)	1.000E+00	1.000E+00	---	
Surface water STOR_T(8)	1.000E+00	1.000E+00	---	
Livestock fodder STOR_T(9)	4.500E+01	4.500E+01	---	
Thickness of building foundation (m) FLOOR	1.500E-01	1.500E-01	---	
Bulk density of building foundation (g/cm**3) DENSFL	2.400E+00	2.400E+00	---	
Total porosity of the cover material TPCV	not used	4.000E-01	---	
Total porosity of the building foundation TPFL	1.000E-01	1.000E-01	---	
Volumetric water content of the cover material PH2OCV	not used	5.000E-02	---	
Volumetric water content of the foundation PH2OFL	3.000E-02	3.000E-02	---	

Diffusion coefficient for radon gas (m/sec): in cover material DIFCV	not used	2.000E-06	---	
in foundation material DIFFL	3.000E-07	3.000E-07	---	
in contaminated zone soil DIFCZ	2.000E-06	2.000E-06	---	
Radon vertical dimension of mixing (m) HMX	2.000E+00	2.000E+00	---	
Average building air exchange rate (1/hr) REXG	5.000E-01	5.000E-01	---	
Height of the building (room) (m) HRM	2.500E+00	2.500E+00	---	
Building interior area factor dependent) FAI	0.000E+00	0.000E+00	code computed (time	
Building depth below ground surface (m) DMFL	1.000E+00	-1.000E+00	---	
Emanating power of Rn-222 gas EMANA(1)	2.500E-01	2.500E-01	---	
Emanating power of Rn-220 gas EMANA(2)	1.500E-01	1.500E-01	---	



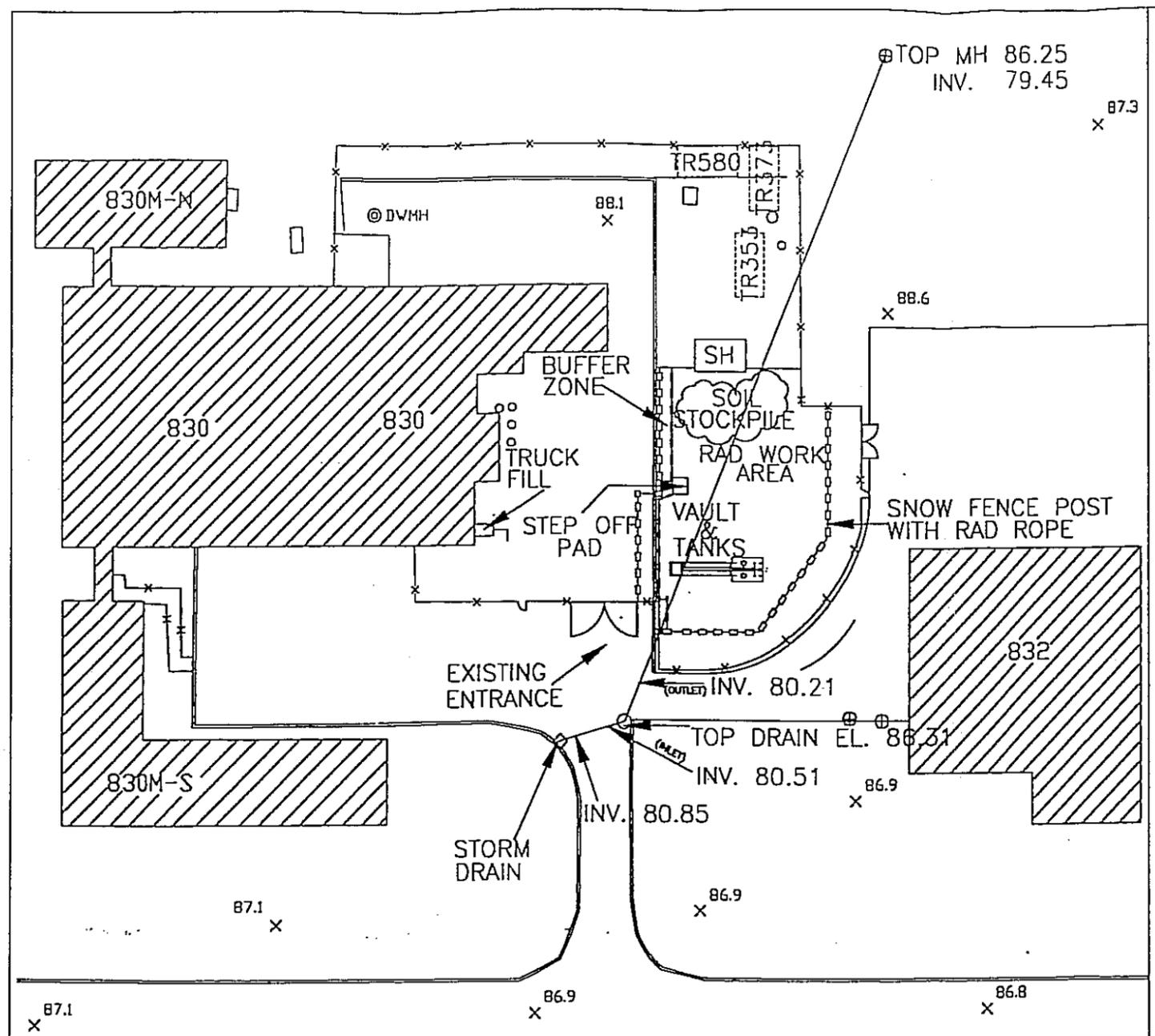
BUILDING 830 UNDERGROUND STORAGE TANK REMOVAL



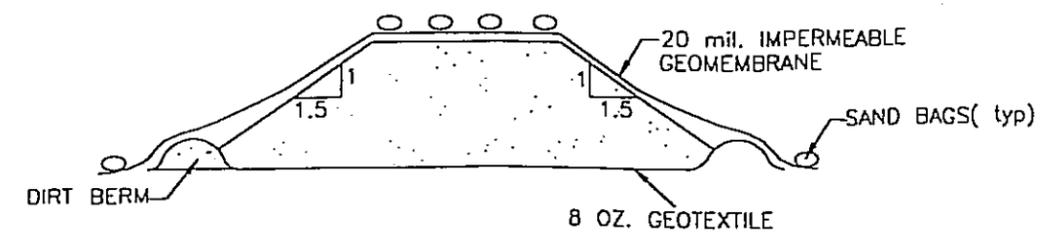
SITE EMERGENCY FACILITY LOCATIONS

EMERGENCY ROUTE

JOB NO. SHEET NO. REVISION		DATE		DWN.	APPR. DA
 BROOKHAVEN NATIONAL LABORATORY PLANT ENGINEERING E&CS DIVISION UPTON, NEW YORK 11973 BROOKHAVEN SCIENCE ASSOCIATES UNDER CONTRACT WITH UNITED STATES DEPARTMENT OF ENERGY					
JOB TITLE BUILDING 830 UST REMOVAL			DWC. TITLE LOCATION PLAN <i>Figure 1</i>		
HR. OPP. LHM. NEM 400048	DATE 3/31/98	ACCT. NO. 07234	SHEET 1 OF 5		
SCALE	DWN. BY O. Lawrence	JOB NO. 9223	DWC. NO.		
PROJ. DA A-4	APPR. BY A. Raphael	BLDG. NO. 830	9223-M1		



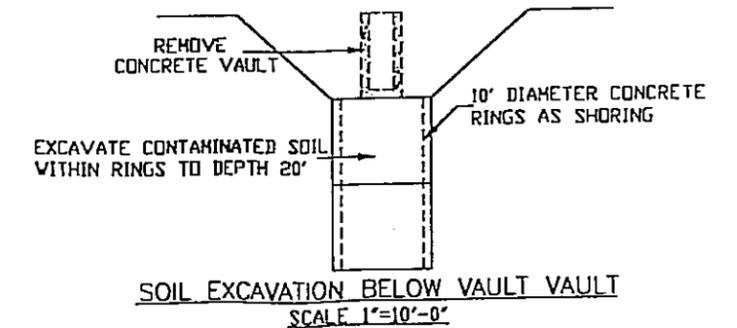
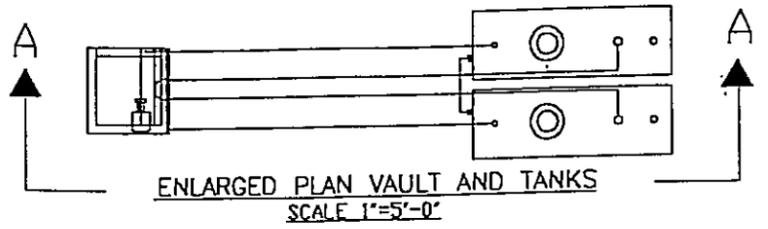
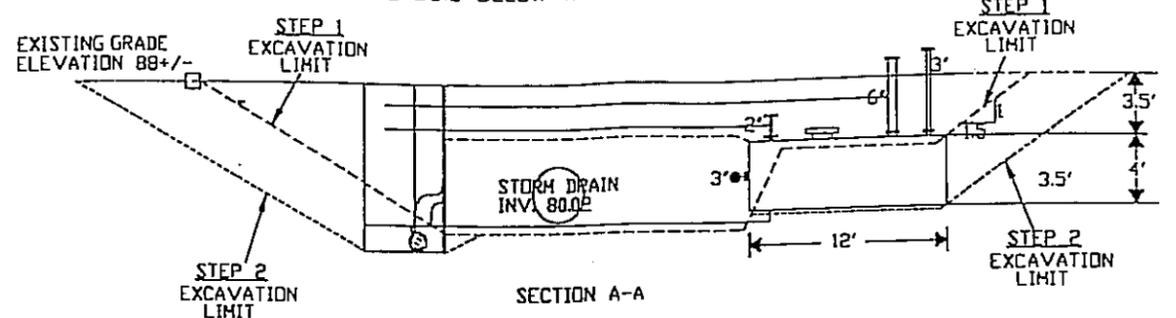
SCALE 1"=25'-0"



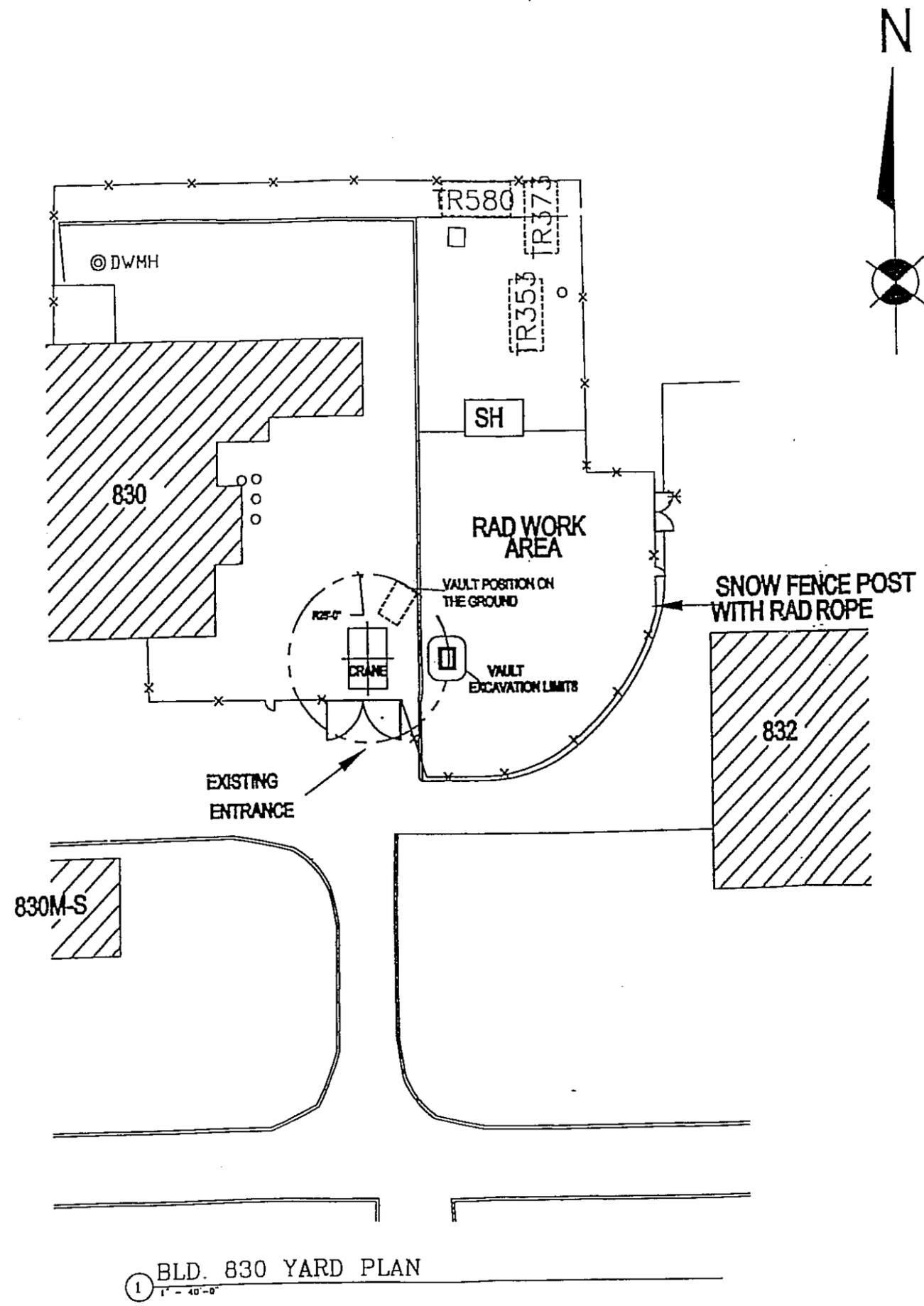
STOCKPILE DETAIL

NOTES

1. ERECT RAD ROPE BARRIER TO ESTABLISH RAD WORK AREA AND BUFFER ZONE
2. EXCAVATE STEP 1 AS SHOWN TO ALLOW FOR PIPING REMOVAL
3. CUT AND REMOVE PIPING BETWEEN TANKS AND VAULT
4. CAP PIPING AT VAULT WITH FERNCO CAPS
5. INSTALL BLANK FLANGES AT TANKS
6. EXCAVATE STEP 2 AS INDICATED TO BOTTOM OF TANKS AND VAULT
7. REMOVE TANKS AND VAULT
8. EXCAVATE SOIL BELOW VAULT USING CONCRETE RINGS AS SHORING



JOB NO. SHEET NO. REVISION		DATE	DWNL.	APPR.	DA.
BROOKHAVEN NATIONAL LABORATORY PLANT ENGINEERING E&CS DIVISION UPTON, NEW YORK 11973 BROOKHAVEN SCIENCE ASSOCIATES UNDER CONTRACT WITH UNITED STATES DEPARTMENT OF ENERGY					
JOB TITLE BUILDING 830 UST REMOVAL			DWG. TITLE EXCAVATION AND REMOVAL PLAN figure 2		
REV. OR. LVL. RECD. 400048	DATE 3/31/98	ACCT. NO. 07234	SHEET OF 3 5		
SCALE AS NOTED	DWNL. BY O. Lawrence	JOB NO. 9223	DWG. NO. 9223-M3		
PROJ. DA. A-4	APPR. BY A. Raphael	BLDG. NO. 830			

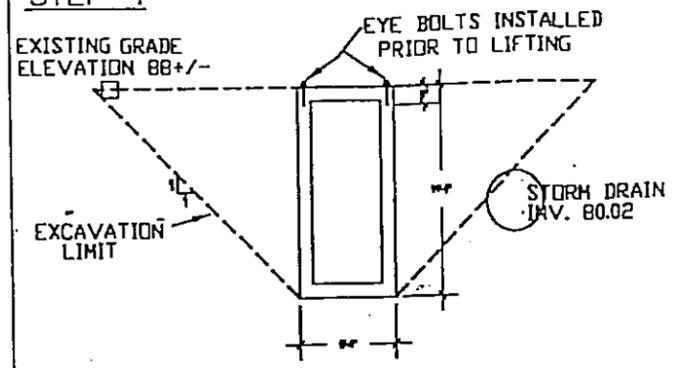


① BLD. 830 YARD PLAN
1" = 40'-0"

RIGGING NOTES:

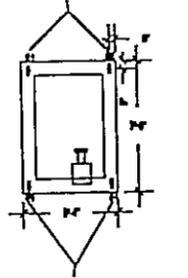
1. 1 1/4" MACHINERY EYE BOLTS (SHOULDER PATTERN) SHOULD BE INSTALLED IN THE FOUR CORNERS OF THE VAULT SURFACE.
2. ATTACH THE BOX SPREADER TO THE EYE BOLTS
3. VAULT IS TO BE LIFTED VERTICALLY AND MOVED TO INDICATED LOCATION.
4. REMOVE ALL SLINGS.
5. WRAP A SINGLE CHOKER HITCH AROUND THE VAULT.
6. LIFT THE VAULT WHILE TILTING IT OVER TO HORIZONTAL POSITION.

STEP 1



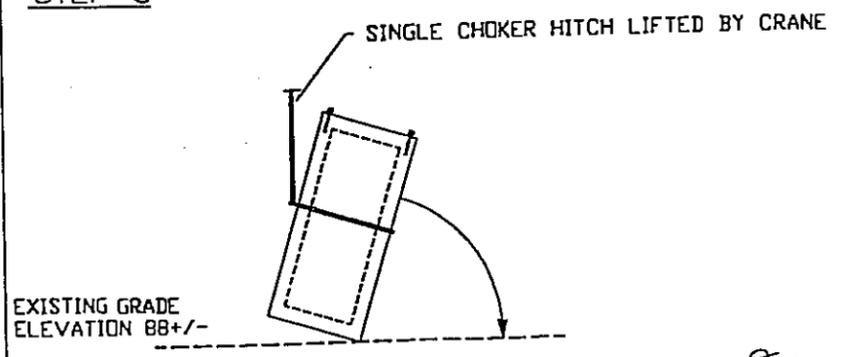
② VAULT SECTION
1" = 10'-0"

EYE BOLTS INSTALLED PRIOR TO LIFTING



③ VAULT PLAN
1" = 10'-0"

STEP 5



④ VAULT - ROTATION
1" = 10'-0"

Figure 3

JOB NO.	SHEET NO.	REVISOR	DATE	DWNL.	APP.
BROOKHAVEN NATIONAL LABORATORY					
PLANT ENGINEERING E&CS DIVISION UPTON, NEW YORK 11973					
BNSA BROOKHAVEN SCIENCE ASSOCIATION					
UNDER CONTRACT WITH					
UNITED STATES DEPARTMENT OF ENERGY					
JOB TITLE BUILDING 830 UST REMOVAL			DWG. TITLE VAULT RIGGING PLAN		
ILR, CPP, LH, IHM	DATE	ACCT. NO.	SHEET OF		
	08/06/98		1		
SCALE	DWN. BY	JOB NO.	DWG. NO.		
AS NOTED	MS				
PROJ. DA	APP'D. BY	BLDG. NO.			
A-4	A. Raphael	830			

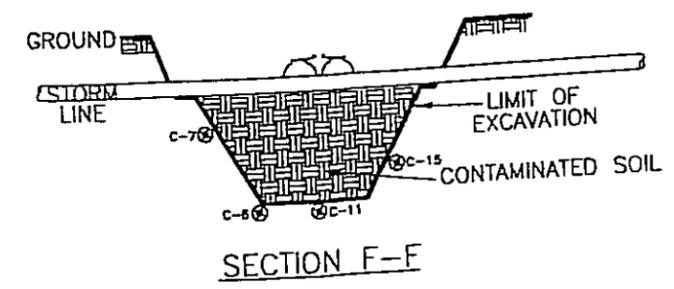
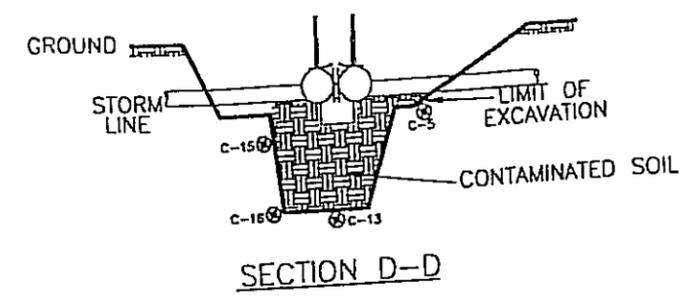
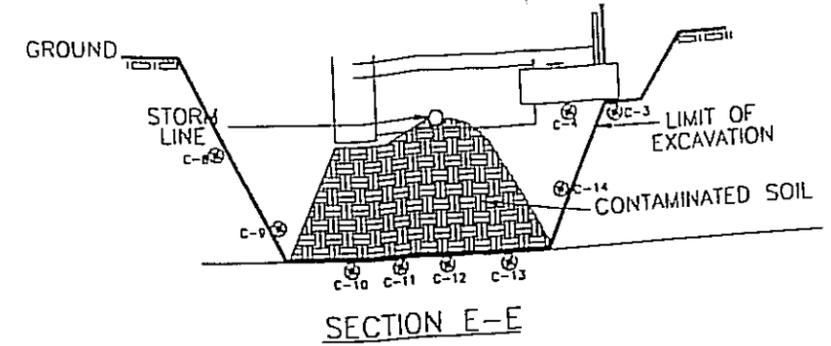
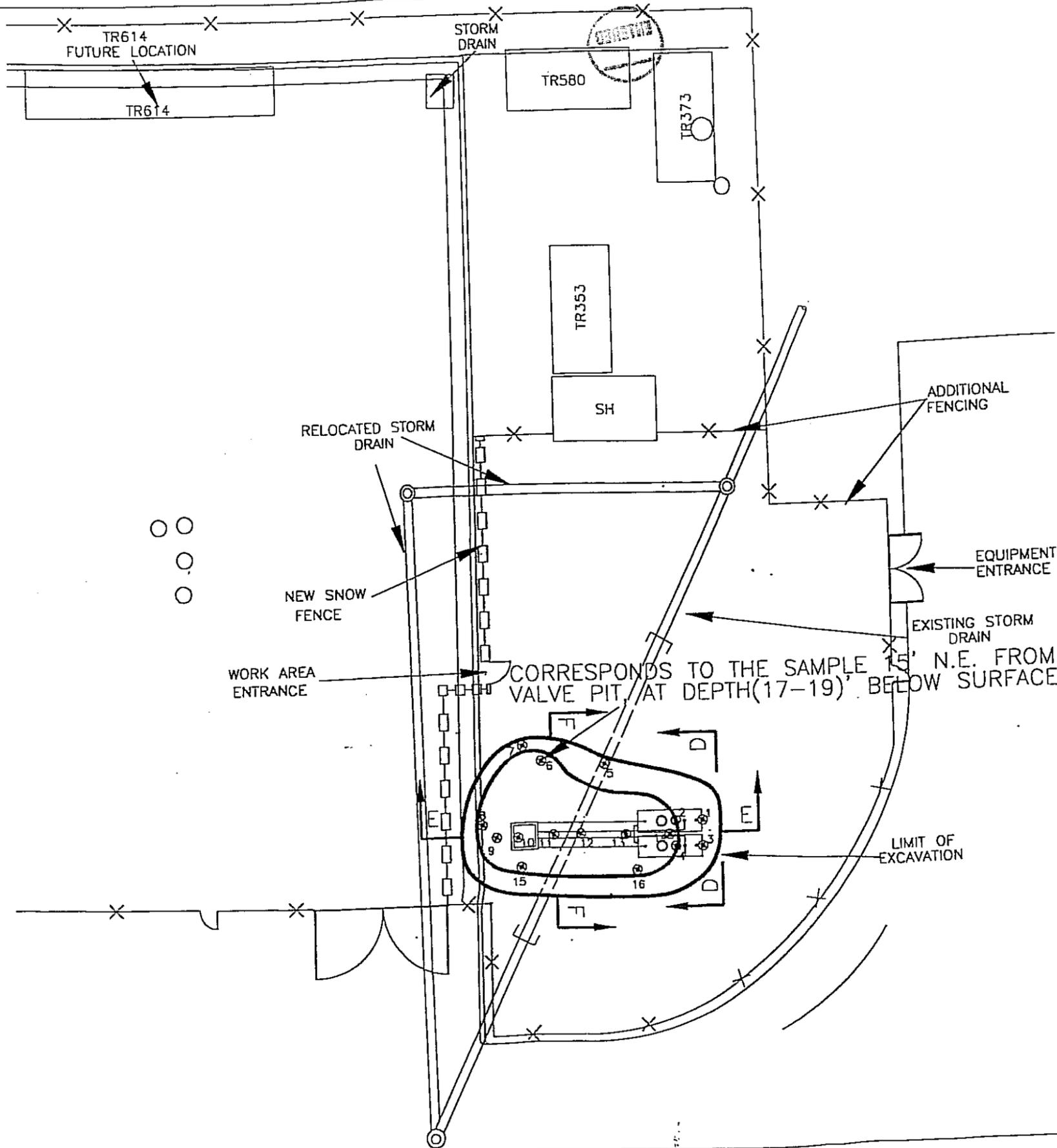
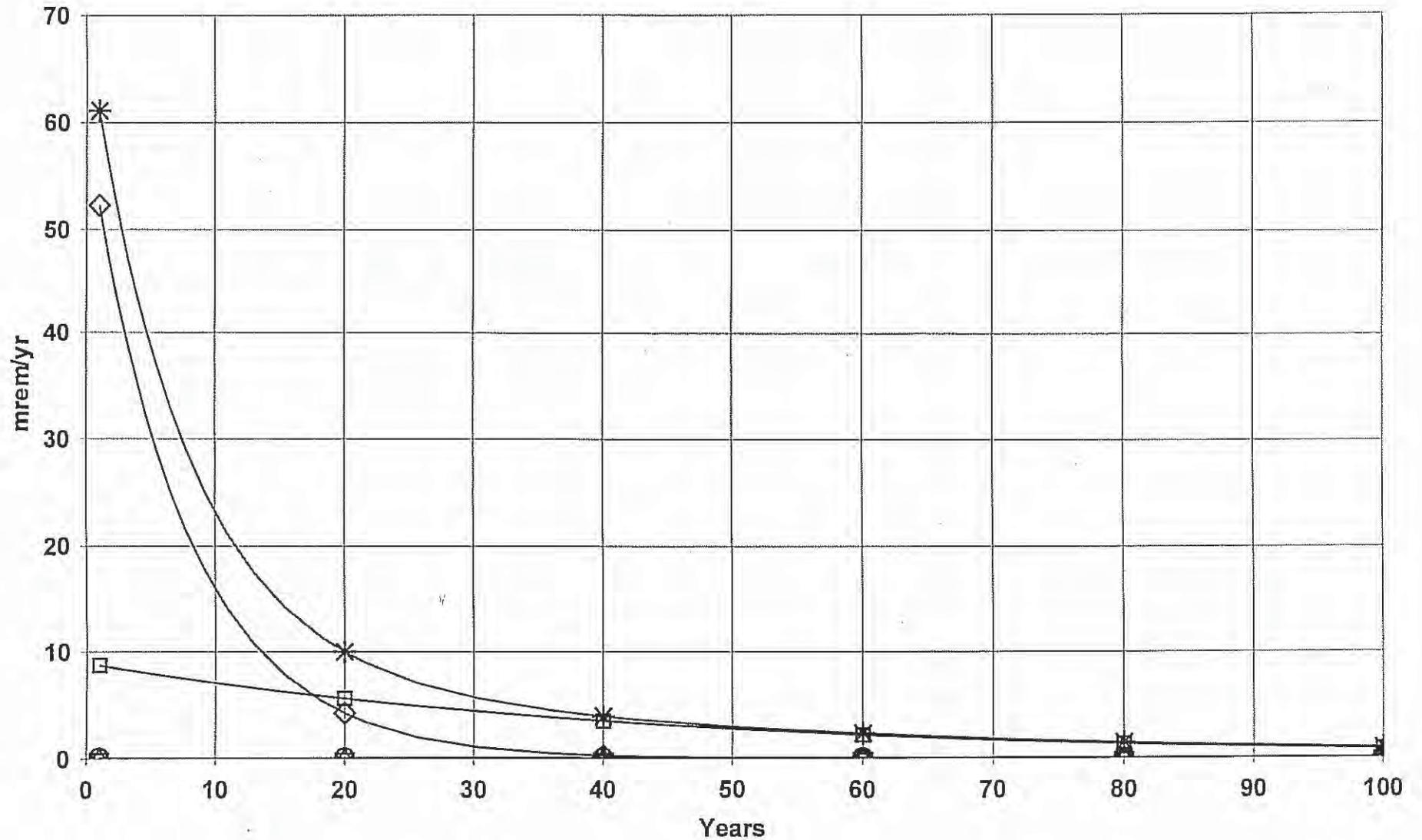


Figure 4

JOB NO. SHEET NO. REVISION		DATE	DWG.	APPR.	DR.
BROOKHAVEN NATIONAL LABORATORY PLANT ENGINEERING E&CS DIVISION UPTON, NEW YORK 11973 BROOKHAVEN SCIENCE ASSOCIATES UNDER CONTRACT WITH UNITED STATES DEPARTMENT OF ENERGY					
JOB TITLE BUILDING E30 UST REMOVAL			DWG. TITLE END POINT SAMPLE LOCATIONS		
P.R. DPT. LINE NEM 400048	DATE 4/15/89	ACCT. NO. 07234	SHEET 5		OF 5
SCALE AS NOTED	DWGN. BY D.J.	JOB NO. 8223	DWG. NO. 8223-45		
PROJ. QA A-4	APPR. BY A.R.	BLDG. NO. E30			

DOSE: All Nuclides Summed, All Pathways Summed



○ Am-241 ◇ Co-60 □ Cs-137 △ Pu-238 ▽ Pu-239 * Total

RAD /



GENERAL ENGINEERING LABORATORIES

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Certificate of Analysis

Sample ID: BLDG830 N-TANK-01 C-1 Lab ID: 9903499-04

Chain of Custody: 1305 Received Date: 3/12/99

Sample Date: 10/28/98 Sample Time: 0910

Parameter	Result	Accuracy	Qualifier	DL	Units	DOA	Batch
Americium-241	-0.0059	0.0577	UJ-K	0.1078	pCi/G	3/18/99	144786
Beryllium-7	-0.2071	0.5181	UJ-K	0.8972	pCi/G	3/18/99	144786
Cesium-134	-0.0118	0.0157	U	0.0221	pCi/G	3/18/99	144786
Cesium-137	0.0430	0.0196		0.0204	pCi/G	3/18/99	144786
Cobalt-57	0.0020	0.0124	U	0.0224	pCi/G	3/18/99	144786
Cobalt-60	0.0512	0.0288		0.022	pCi/G	3/18/99	144786
Europium-152	-0.0264	0.0305	UJ-K	0.0526	pCi/G	3/18/99	144786
Europium-154	-0.0286	0.0373	U	0.0603	pCi/G	3/18/99	144786
Europium-155	0.0222	0.0391	UJ-K	0.0725	pCi/G	3/18/99	144786
Gross Alpha	3.476	1.6234		1.8216	pCi/G	3/18/99	144759
Manganese-54	0	0.0152	U	0.0273	pCi/G	3/18/99	144786
Nonvolatile Beta	5.613	2.4167		4.5714	pCi/G	3/18/99	144759
Plutonium-238	-0.0700	0.207	U	0.7	pCi/G	3/18/99	144754
Plutonium-239/240	-0.0299	0.0426	U	0.387	pCi/G	3/18/99	144754
Sodium-22	-0.0132	0.0145	U	0.023	pCi/G	3/18/99	144786
Strontium-90	0.2060	0.814	UJ-K	1.91	pCi/G	3/19/99	144756
Vanadium-48	0	4.518	J-K	0	pCi/G	3/18/99	144786
Zinc-65	0.0112	0.0454	U	0.071	pCi/G	3/18/99	144786

This data has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures.

[Handwritten signature]



GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

Certificate of Analysis

Sample ID: BLDG830 N-TANK-02 ^{C-2} ~~02~~

Lab ID: 9903499-05

Chain of Custody: 1305

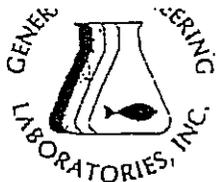
Received Date: 3/12/99

Sample Date: 10/28/98

Sample Time: 0840

Parameter	Result	Accuracy	Qualifier	DL	Units	DOA	Batch
Americium-241	0.0878	0.1034	UJ-K	0.1829	pCi/G	3/18/99	144786
Beryllium-7	0.1176	0.7101	UJ-K	1.346	pCi/G	3/18/99	144786
Cesium-134	-0.0224	0.0186	U	0.0317	pCi/G	3/18/99	144786
Cesium-137	0.1593	0.0389	U	0.034	pCi/G	3/18/99	144786
Cobalt-57	0.0012	0.013	U	0.0252	pCi/G	3/18/99	144786
Cobalt-60	2.838	0.3049	U	0.0339	pCi/G	3/18/99	144786
Europium-152	0.0264	0.0452	UJ-K	0.0832	pCi/G	3/18/99	144786
Europium-154	-0.0050	0.0467	U	0.0863	pCi/G	3/18/99	144786
Europium-155	0.0040	0.0406	UJ-K	0.0798	pCi/G	3/18/99	144786
Gross Alpha	2.342	1.2949	U	1.5089	pCi/G	3/18/99	144759
Manganese-54	-0.0092	0.0292	U	0.0508	pCi/G	3/18/99	144786
Nonvolatile Beta	5.262	2.1402	U	3.9406	pCi/G	3/18/99	144759
Plutonium-238	-0.0455	0.298	U	0.896	pCi/G	3/18/99	144754
Plutonium-239/240	-0.0181	0.0364	U	0.399	pCi/G	3/18/99	144754
Sodium-22	-0.0018	0.0179	U	0.033	pCi/G	3/18/99	144786
Strontium-90	0.0115	0.828	UJ-K	1.99	pCi/G	3/19/99	144756
Vanadium-48	0	11.01	J-K	0	pCi/G	3/18/99	144786
Zinc-65	-0.0934	0.0865	U	0.1374	pCi/G	3/18/99	144786

This data has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures.



GENERAL ENGINEERING LABORATORIES

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Certificate of Analysis

Sample ID: BLDG830 S-TANK-01 ^{C-3} ~~XXXX~~

Lab ID: 9903499-01

Chain of Custody: 1305

Received Date: 3/12/99

Sample Date: 10/28/98

Sample Time: 0745

Parameter	Result	Accuracy	Qualifier	DL	Units	DOA	Batch
Americium-241	0.0051	0.0669	UJ-K	0.1158	pCi/G	3/18/99	144786
Beryllium-7	-0.0650	0.7552	UJ-K	1.37	pCi/G	3/18/99	144786
Cesium-134	-0.0043	0.0198	U	0.0304	pCi/G	3/18/99	144786
Cesium-137	0.6280	0.0797		0.0324	pCi/G	3/18/99	144786
Cobalt-57	0.0013	0.0148	U	0.0273	pCi/G	3/18/99	144786
Cobalt-60	0.3013	0.0579		0.032	pCi/G	3/18/99	144786
Europium-152	-0.0145	0.0531	UJ-K	0.0796	pCi/G	3/18/99	144786
Europium-154	0.0034	0.0609	U	0.0974	pCi/G	3/18/99	144786
Europium-155	-0.0052	0.0464	UJ-K	0.0856	pCi/G	3/18/99	144786
Gross Alpha	9.448	2.5961		2.2936	pCi/G	3/18/99	144759
Manganese-54	-0.0053	0.0252	U	0.0433	pCi/G	3/18/99	144786
Nonvolatile Beta	9.794	2.4451		3.9909	pCi/G	3/18/99	144759
Plutonium-238	-0.1070	0.227	U	0.789	pCi/G	3/18/99	144754
Plutonium-239/240	-0.0479	0.056	U	0.462	pCi/G	3/18/99	144754
Sodium-22	0.0011	0.0233	U	0.0372	pCi/G	3/18/99	144786
Strontium-90	-0.4890	0.828	UJ-K	2.12	pCi/G	3/19/99	144756
Vanadium-48	0	7.09	J-K	0	pCi/G	3/18/99	144786
Zinc-65	0.0130	0.0597	U	0.0982	pCi/G	3/18/99	144786

This data has been prepared and reviewed in accordance with
General Engineering Laboratories standard operating procedures.

P O Box 30712 • Charleston, SC 29417 • 2040 Savage Road • 29407

(843) 556-8171 • Fax (843) 766-1178



GENERAL ENGINEERING LABORATORIES

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Certificate of Analysis

Sample ID: BLDG830 S-TANK-02 **C-4** Lab ID: 9903499-02
 Chain of Custody: 1305 Received Date: 3/12/99
 Sample Date: 10/28/98 Sample Time: 0810

Parameter	Result	Accuracy	Qualifier	DL	Units	DOA	Batch
Americium-241	0.2778	0.2128		0.1949	pCi/G	3/18/99	144786
Beryllium-7	0.8168	1.401	UJ-K	2.574	pCi/G	3/18/99	144786
Cesium-134	-0.0441	0.0417	U	0.0612	pCi/G	3/18/99	144786
Cesium-137	0.0521	0.0565	UJ	0.0651	pCi/G	3/18/99	144786
Cobalt-57	-0.0121	0.0235	U	0.0382	pCi/G	3/18/99	144786
Cobalt-60	13.89	1.381		0.0545	pCi/G	3/18/99	144786
Europium-152	-0.0405	0.0826	UJ-K	0.1392	pCi/G	3/18/99	144786
Europium-154	-0.0350	0.0732	U	0.1274	pCi/G	3/18/99	144786
Europium-155	-0.0567	0.0649	UJ-K	0.1176	pCi/G	3/18/99	144786
Gross Alpha	4.709	1.8955		2.3019	pCi/G	3/18/99	144759
Manganese-54	-0.0517	0.0631	U	0.1047	pCi/G	3/18/99	144786
Nonvolatile Beta	27.6483	3.3774		4.2601	pCi/G	3/18/99	144759
Plutonium-238	0.0498	0.314	U	0.847	pCi/G	3/18/99	144754
Plutonium-239/240	0.1260	0.242	U	0.515	pCi/G	3/18/99	144754
Sodium-22	-0.0134	0.028	U	0.0487	pCi/G	3/18/99	144786
Strontium-90	-0.7000	0.872	UJ-K	2.3	pCi/G	3/19/99	144756
Vanadium-48	0	25.48	J-K	0	pCi/G	3/18/99	144786
Zinc-65	-0.0808	0.1684	U	0.2918	pCi/G	3/18/99	144786

This data has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures.

[Handwritten Signature]

C-5
~~##~~
 Re-analysis

Client: Brookhaven National Laboratory
 OER
 Building 51M
 Upton, New York 11973-5000
 Contact: Ms. Anna Bou

cc: BRKL00297

Report Date: May 20, 1999

Page 1 of 2

Sample ID : BLDG830-NF02
 Lab ID : 9905492-02
 Matrix : Soil
 Date Collected : 02/23/99
 Date Received : 05/14/99
 Priority : Rush
 Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological											
<i>Gamma PHA - 13 items</i>											
Americium-241	J	3.08 +/- 0.524	0.227	4.00	pCi/g	1.0	EJB	05/19/99	0856	149495	1
Beryllium-7	U	0.00 +/- 2.71	2.29	1.00	pCi/g	1.0					
Cesium-134	U	0.0191 +/- 0.0474	0.0732	0.100	pCi/g	1.0					
Cesium-137		41.5 +/- 4.01	0.0757	2.30	pCi/g	1.0					
Cobalt-57	U	0.00165 +/- 0.0306	0.0511	0.100	pCi/g	1.0					
Cobalt-60		11.0 +/- 1.14	0.0457	0.100	pCi/g	1.0					
Europium-152	U	-0.0820 +/- 0.129	0.233	4.80	pCi/g	1.0					
Europium-154	U	-0.0169 +/- 0.0815	0.141	17.0	pCi/g	1.0					
Europium-155	U	0.00473 +/- 0.0911	0.172	0.200	pCi/g	1.0					
Manganese-54	U	-0.0308 +/- 0.0479	0.0838	0.100	pCi/g	1.0					
Sodium-22	U	-0.00645 +/- 0.0302	0.0521	0.700	pCi/g	1.0					
Vanadium-48	U	-1.05 +/- 1.89	3.24	1.00	pCi/g	1.0					
Zinc-65	U	0.0490 +/- 0.129	0.225	0.200	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

Notes:

The qualifiers in this report are defined as follows:
 ND indicates that the analyte was not detected at a concentration greater than the detection limit.
 J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
 U indicates that the analyte was not detected at a concentration greater than the detection limit.
 * indicates that a quality control analyte recovery is outside of specified acceptance criteria.



9905492-02



GENERAL ENGINEERING LABORATORIES

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Certificate of Analysis

Sample ID: BLDG830-GPIDSS24

C-6

Lab ID: 9903088-07

Chain of Custody: 1304

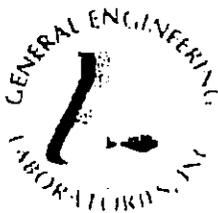
Received Date: 3/2/99

Sample Date: 2/23/99

Sample Time: 1515

Parameter	Result	Accuracy	Qualifier	DL	Units	DOA	Batch
Americium-241	0.0787	0.0428		0.0323	pCi/G	3/4/99	143796
Beryllium-7	-0.0055	0.1385	U	0.256	pCi/G	3/4/99	143796
Cesium-134	-0.0057	0.0176	UJ-K	0.0275	pCi/G	3/4/99	143796
Cesium-137	0.0988	0.0429		0.0377	pCi/G	3/4/99	143796
Cobalt-57	0.0043	0.0082	U	0.0157	pCi/G	3/4/99	143796
Cobalt-60	2.494	0.2429		0.0317	pCi/G	3/4/99	143796
Europium-152	0.0024	0.0396	UJ-K	0.0703	pCi/G	3/4/99	143796
Europium-154	0.0406	0.0429	UJ-K	0.0882	pCi/G	3/4/99	143796
Europium-155	-0.0238	0.0291	UJ-K	0.0533	pCi/G	3/4/99	143796
Gross Alpha	3.996	0.3531		0.6903	pCi/G	3/12/99	144009
Manganese-54	0.0184	0.0161	UJ-K	0.0398	pCi/G	3/4/99	143796
Nonvolatile Beta	5.548	1.3924		2.1409	pCi/G	3/12/99	144009
Plutonium-238	0.0525	0.105	U	0.157	pCi/G	3/12/99	144042
Plutonium-239/240	0.0525	0.105	UJ-K	0.157	pCi/G	3/12/99	144042
Sodium-22	0.0144	0.0153	UJ-K	0.0314	pCi/G	3/4/99	143796
Strontium-90	-0.0242	0.515	UJ-K	1.32	pCi/G	3/9/99	144014
Vanadium-48	0.0067	0.0358	UJ-K	0.0632	pCi/G	3/4/99	143796
Zinc-65	-0.0105	0.0615	U	0.0909	pCi/G	3/4/99	143796

This data has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures.



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Certificate of Analysis

Sample ID: BLDG830-NORTHFACE01



Lab ID: 9903088-11

Chain of Custody: 1304

Received Date: 3/2/99

Sample Date: 2/26/99

Sample Time: 1330

Parameter	Result	Accuracy	Qualifier	DL	Units	DOA	Batch
Americium-241	0.1294	0.1121	UJ	0.2022	pCi/G	3/4/99	143796
Beryllium-7	-0.0406	0.2618	U	0.4716	pCi/G	3/4/99	143796
Cesium-134	-0.0328	0.0336	UJ-K	0.0575	pCi/G	3/4/99	143796
Cesium-137	0.0530	0.0644	UJ-K	0.0702	pCi/G	3/4/99	143796
Cobalt-57	0.0002	0.0156	U	0.029	pCi/G	3/4/99	143796
Cobalt-60	15.28	1.515		0.0499	pCi/G	3/4/99	143796
Europium-152	0.0221	0.0829	UJ-K	0.1444	pCi/G	3/4/99	143796
Europium-154	0.0621	0.0833	UJ-K	0.1556	pCi/G	3/4/99	143796
Europium-155	0.0234	0.0633	UJ-K	0.12	pCi/G	3/4/99	143796
Gross Alpha	2.050	0.626		0.6239	pCi/G	3/11/99	144009
Manganese-54	0.0186	0.0503	UJ-K	0.0869	pCi/G	3/4/99	143796
Nonvolatile Beta	6.779	1.2019		1.7317	pCi/G	3/11/99	144009
Plutonium-238	0.1250	0.179	UJ	0.188	pCi/G	3/12/99	144042
Plutonium-239/240	0.0627	0.126	UJ-K	0.188	pCi/G	3/12/99	144042
Sodium-22	0.0222	0.0296	UJ-K	0.0555	pCi/G	3/4/99	143796
Strontium-90	0.4020	0.793	UJ-K	1.84	pCi/G	3/9/99	144014
Vanadium-48	-0.0331	0.0792	UJ-K	0.1317	pCi/G	3/4/99	143796
Zinc-65	0.0015	0.1371	U	0.2106	pCi/G	3/4/99	143796

This data has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures.



GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow

Certificate of Analysis

Sample ID: BLDGS30-WESTFACE *CS*

Lab ID: 9903083-04

Chain of Custody: 1304

Received Date: 3/2/99

Sample Date: 2/23/99

Sample Time: 1440

Parameter	Result	Accuracy	Qualifier	DL	Units	DOA	Batch
Americium-241	0.1910	0.1737	UJ	0.2189	pCi/G	3/4/99	143796
Beryllium-7	0.0176	0.4554	U	0.7984	pCi/G	3/4/99	143796
Cesium-134	-0.0264	0.0564	UJ-K	0.0956	pCi/G	3/4/99	143796
Cesium-137	0.0937	0.0882	UJ-K	0.118	pCi/G	3/4/99	143796
Cobalt-57	0.0077	0.0235	U	0.0431	pCi/G	3/4/99	143796
Cobalt-60	4.13	4.201		0.0918	pCi/G	3/4/99	143796
Europium-152	-0.0108	0.1291	UJ-K	0.2324	pCi/G	3/4/99	143796
Europium-154	-0.0188	0.1518	UJ-K	0.2569	pCi/G	3/4/99	143796
Europium-155	-0.1043	0.0945	UJ-K	0.1701	pCi/G	3/4/99	143796
Gross Alpha	1.530	0.5711		0.6616	pCi/G	3/11/99	144009
Manganese-54	0.0575	0.0815	UJ-K	0.1435	pCi/G	3/4/99	143796
Nonvolatile Beta	20.3379	1.4833		1.6576	pCi/G	3/11/99	144009
Plutonium-238	0.4410	0.375		0.428	pCi/G	3/12/99	144042
Plutonium-239/240	0.5420	0.43		0.521	pCi/G	3/12/99	144042
Sodium-22	-0.0065	0.0542	UJ-K	0.0917	pCi/G	3/4/99	143796
Strontium-90	-0.1320	0.599	UJ-K	1.59	pCi/G	3/9/99	144042
Vanadium-48	-0.0475	0.1447	UJ-K	0.2471	pCi/G	3/4/99	143796
Zinc-65	0.1614	0.2373	U	0.347	pCi/G	3/4/99	143796

This data was generated and checked in accordance with General Engineering Laboratories standard operating procedures.

Client: Brookhaven National Laboratory
 OER
 Building 51M
 Upton, New York 11973-5000
 Contact: Ms. Anna Bou

cc: BRKL(X)297

Report Date: March 04, 1999

Page 1 of 2

Sample ID : BLDG830-WEST01
 Lab ID : 9902706-02
 Matrix : Soil
 Date Collected : 02/16/99
 Date Received : 02/18/99
 Priority : Routine
 Collector : Client

C-9

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
<i>Gross Alpha - 2 items</i>												
Gross Alpha		2.93	+/- 1.24	1.45	1.00	pCi/g	1.0	NCJ	02/24/99	2006	142828	1
Weight of Sample, A&B		10.6				mg						
<i>Nonvolatile Beta - 2 items</i>												
Nonvolatile Beta		5.27	+/- 1.62	2.75	1.00	pCi/g	1.0					
Weight of Sample, A&B		10.6				mg						
<i>Alpha Spectroscopy Plutonium - 2 items</i>												
Plutonium-238	U	0.0762	+/- 0.125	0.229	6.60	pCi/g	1.0	BKD	02/25/99	0956	143068	2
Plutonium-239/240	U	0.0762	+/- 0.125	0.228	4.00	pCi/g	1.0					
<i>Gamma PHA - 13 items</i>												
Americium-241	U	0.0283	+/- 0.0366	0.0440	4.00	pCi/g	1.0	EJB	02/21/99	1530	142906	2
Beryllium-7	U	0.0880	+/- 0.169	0.313	1.00	pCi/g	1.0					
Cesium-134	U	-0.0172	+/- 0.0240	0.0354	0.100	pCi/g	1.0					
Cesium-137	J	0.241	+/- 0.0647	0.0425	2.30	pCi/g	1.0					
Cobalt-57	U	0.00193	+/- 0.00951	0.0184	0.100	pCi/g	1.0					
Cobalt-60		3.55	+/- 0.330	0.0391	0.100	pCi/g	1.0					
Europium-152	U	-0.0500	+/- 0.0559	0.0878	4.80	pCi/g	1.0					
Europium-154	U	-0.0112	+/- 0.0591	0.103	17.0	pCi/g	1.0					
Europium-155	U	0.0253	+/- 0.0365	0.0721	0.200	pCi/g	1.0					
Manganese-54	U	-0.00765	+/- 0.0272	0.0484	0.100	pCi/g	1.0					
Sodium-22	U	-0.00409	+/- 0.0210	0.0365	0.700	pCi/g	1.0					
Vanadium-48	U	-0.00814	+/- 0.0427	0.0648	1.00	pCi/g	1.0					
Zinc-65	U	-0.0420	+/- 0.0797	0.116	0.200	pCi/g	1.0					
Strontium-90	U	-0.0900	+/- 0.400	0.990	7.50	pCi/g	1.0	AAK	02/23/99	2037	142924	3

M = Method

Method-Description

M 1

EPA 900.0



9902706-02



GENERAL ENGINEERING LABORATORIES

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Certificate of Analysis

Sample ID: BLDG830-UNDERVAULT **C-10**

Lab ID: 9903088-06

Chain of Custody: 1304

Received Date: 3/2/99

Sample Date: 2/23/99

Sample Time: 1450

Parameter	Result	Accuracy	Qualifier	DL	Units	DOA	Batch
Americium-241	0.1340	0.1214	UJ	0.2037	pCi/G	3/4/99	143796
Beryllium-7	0.0223	0.3928	U	0.7025	pCi/G	3/4/99	143796
Cesium-134	-0.0057	0.0445	UJ-K	0.0777	pCi/G	3/4/99	143796
Cesium-137	2.979	0.3226		0.0966	pCi/G	3/4/99	143796
Cobalt-57	0.0086	0.0215	U	0.04	pCi/G	3/4/99	143796
Cobalt-60	30.42	3.321		0.0717	pCi/G	3/4/99	143796
Europium-152	-0.0271	0.1189	UJ-K	0.2018	pCi/G	3/4/99	143796
Europium-154	-0.0430	0.1167	UJ-K	0.201	pCi/G	3/4/99	143796
Europium-155	0.0433	0.0843	UJ-K	0.1583	pCi/G	3/4/99	143796
Gross Alpha	1.167	0.4841		0.5321	pCi/G	3/11/99	144109
Manganese-54	-0.0160	0.069	UJ-K	0.1162	pCi/G	3/4/99	143796
Nonvolatile Beta	10.0073	1.2448		1.6471	pCi/G	3/11/99	144109
Plutonium-238	-0.0326	0.0654	U	0.407	pCi/G	3/12/99	144142
Plutonium-239/240	0.1930	0.226		0.193	pCi/G	3/12/99	144142
Sodium-22	-0.0154	0.0417	UJ-K	0.0717	pCi/G	3/4/99	143796
Strontium-90	-0.4810	0.696	UJ-K	1.94	pCi/G	3/9/99	144114
Vanadium-48	0.0001	0.1237	UJ-K	0.2057	pCi/G	3/4/99	143796
Zinc-65	0.0284	0.1662	U	0.29	pCi/G	3/4/99	143796

General Engineering Laboratories, Inc. is not responsible for the accuracy of the results if the sample was not analyzed in accordance with the standard operating procedures.

Client: Brookhaven National Laboratory
 OER
 Building 51M
 Upton, New York 11973-5000
 Contact: Ms. Anna Bou

cc: BRK1,00297

Report Date: March 04, 1999

Page 1 of 2

Sample ID : BLDG830-PIPE02
 Lab ID : 9902706-05
 Matrix : Soil
 Date Collected : 02/17/99
 Date Received : 02/18/99
 Priority : Routine
 Collector : Client

C-11

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological											
<i>Gross Alpha - 2 items</i>											
Gross Alpha		1.81	+/- 0.445	0.457	1.00	pCi/g	1.0	NCJ	03/02/99	0707	142828 1
Weight of Sample, A&B		13.2				mg					
<i>Nonvolatile Beta - 2 items</i>											
Nonvolatile Beta		10.0	+/- 0.863	1.09	1.00	pCi/g	1.0				
Weight of Sample, A&B		13.2				mg					
<i>Alpha Spectroscopy Plutonium - 2 items</i>											
Plutonium-238	U	0.0302	+/- 0.0818	0.209	6.60	pCi/g	1.0	BKD	02/25/99	0956	143068 2
Plutonium-239/240	U	0.140	+/- 0.163	0.247	4.00	pCi/g	1.0				
<i>Gamma PHA - 13 items</i>											
Americium-241	J	0.349	+/- 0.0646	0.0549	4.00	pCi/g	1.0	EJB	02/22/99	0622	142906 2
Beryllium-7	U	0.154	+/- 0.283	0.509	1.00	pCi/g	1.0				
Cesium-134	U	-0.00138	+/- 0.0333	0.0506	0.100	pCi/g	1.0				
Cesium-137		8.22	+/- 1.01	0.0635	2.30	pCi/g	1.0				
Cobalt-57	U	0.0124	+/- 0.0221	0.0257	0.100	pCi/g	1.0				
Cobalt-60		7.50	+/- 0.673	0.0528	0.100	pCi/g	1.0				
Europium-152	U	-0.0410	+/- 0.0763	0.138	4.80	pCi/g	1.0				
Europium-154	U	0.0353	+/- 0.0735	0.132	17.0	pCi/g	1.0				
Europium-155	U	0.0625	+/- 0.0821	0.0948	0.200	pCi/g	1.0				
Manganese-54	U	0.0143	+/- 0.0362	0.0650	0.100	pCi/g	1.0				
Sodium-22	U	0.0124	+/- 0.0262	0.0470	0.700	pCi/g	1.0				
Vanadium-48	U	0.0147	+/- 0.0532	0.0934	1.00	pCi/g	1.0				
Zinc-65	U	-0.0766	+/- 0.0919	0.153	0.200	pCi/g	1.0				
Strontium-90	U	0.0278	+/- 0.260	0.618	7.50	pCi/g	1.0	AAK	02/23/99	2141	142924 3

M = Method

Method-Description

M 1

EPA 900.0



9902706-015

Client: Brookhaven National Laboratory
 OER
 Building 51M
 Upton, New York 11973-5000
 Contact: Ms. Anna Bou

cc: BRKL00297

Report Date: March 04, 1999

Page 1 of 2

Sample ID : BLDG830-EAST02
 Lab ID : 9902706-06
 Matrix : Soil
 Date Collected : 02/17/99
 Date Received : 02/18/99
 Priority : Routine
 Collector : Client

C-12

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M	C
Radiological												
<i>Gross Alpha - 2 items</i>												
Gross Alpha		2.50	+/- 1.25	1.87	1.00	pCi/g	1.0	NCJ	02/24/99	2016	142828	1 N
Weight of Sample, A&B		14.0				mg						
<i>Nonvolatile Beta - 2 items</i>												
Nonvolatile Beta		20.3	+/- 2.17	2.22	1.00	pCi/g	1.0					
Weight of Sample, A&B		14.0				mg						
<i>Alpha Spectroscopy Plutonium - 2 items</i>												
Plutonium-238	J	0.237	+/- 0.199	0.119	6.60	pCi/g	1.0	BKD	02/25/99	0956	143068	2 N
Plutonium-239/240	U	0.149	+/- 0.162	0.209	4.00	pCi/g	1.0					
<i>Gamma PHA - 13 items</i>												
Americium-241	J	0.858	+/- 0.261	0.200	4.00	pCi/g	1.0	EJB	02/21/99	1531	142906	2 1
Beryllium-7	U	-0.158	+/- 0.267	0.462	1.00	pCi/g	1.0					
Cesium-134	U	0.00851	+/- 0.0261	0.0396	0.100	pCi/g	1.0					
Cesium-137		19.7	+/- 1.91	0.0448	2.30	pCi/g	1.0					
Cobalt-57	U	-0.00449	+/- 0.0170	0.0308	0.100	pCi/g	1.0					
Cobalt-60		9.48	+/- 1.03	0.0308	0.100	pCi/g	1.0					
Europium-152	U	-0.0185	+/- 0.0766	0.138	4.80	pCi/g	1.0					
Europium-154	U	-0.0493	+/- 0.0610	0.0836	17.0	pCi/g	1.0					
Eurpium-155	U	-0.0168	+/- 0.0681	0.125	0.200	pCi/g	1.0					
Manganese-54	U	0.00262	+/- 0.0253	0.0447	0.100	pCi/g	1.0					
Sodium-22	U	-0.0158	+/- 0.0215	0.0298	0.700	pCi/g	1.0					
Vanadium-48	U	-0.0144	+/- 0.0370	0.0633	1.00	pCi/g	1.0					
Zinc-65	U	0.000845	+/- 0.0661	0.113	0.200	pCi/g	1.0					
Strontium-90	U	0.202	+/- 0.380	0.877	7.50	pCi/g	1.0	AAK	02/24/99	1425	142924	3 1

M = Method

Method-Description

M I

EPA 900.0



9902706-06

- Client: Brookhaven National Laboratory
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 Building 51M
 Upton, New York 11973-5000
 Contact: Ms. Anna Bou

cc: BRKL00297

Report Date: March 04, 1999

Page 1 of 2

Sample ID : BLDG830-PIPE01
 Lab ID : 9902706-04
 Matrix : Soil
 Date Collected : 02/17/99
 Date Received : 02/18/99
 Priority : Routine
 Collector : Client

C-13

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological											
<i>Gross Alpha - 2 items</i>											
Gross Alpha		4.45	+/- 1.48	1.36	1.00	pCi/g	1.0	NCI	02/24/99	2006	142828 1
Weight of Sample, A&B		14.8				mg					
<i>Nonvolatile Beta - 2 items</i>											
Nonvolatile Beta		18.2	+/- 2.30	2.54	1.00	pCi/g	1.0				
Weight of Sample, A&B		14.8				mg					
<i>Alpha Spectroscopy Plutonium - 2 items</i>											
Plutonium-238	U	0.0577	+/- 0.0825	0.148	6.60	pCi/g	1.0	BKD	02/25/99	1753	143068 2
Plutonium-239/240	J	0.0772	+/- 0.0781	0.0579	4.00	pCi/g	1.0				
<i>Gamma PHA - 13 items</i>											
Americium-241	J	0.692	+/- 0.168	0.129	4.00	pCi/g	1.0	EJB	02/21/99	1531	142906 2
Beryllium-7	U	0.261	+/- 0.366	0.571	1.00	pCi/g	1.0				
Cesium-134	U	-0.0144	+/- 0.0562	0.0539	0.100	pCi/g	1.0				
Cesium-137		23.7	+/- 2.70	0.0612	2.30	pCi/g	1.0				
Cobalt-57	U	-0.0100	+/- 0.0188	0.0330	0.100	pCi/g	1.0				
Cobalt-60		17.4	+/- 2.09	0.0467	0.100	pCi/g	1.0				
Europium-152	U	0.00105	+/- 0.102	0.173	4.80	pCi/g	1.0				
Europium-154	U	0.0406	+/- 0.0792	0.138	17.0	pCi/g	1.0				
Europium-155	U	-0.00333	+/- 0.0714	0.128	0.200	pCi/g	1.0				
Manganese-54	U	-0.00316	+/- 0.0395	0.0675	0.100	pCi/g	1.0				
Sodium-22	U	0.0142	+/- 0.0282	0.0492	0.700	pCi/g	1.0				
Vanadium-48	U	-0.0651	+/- 0.0680	0.0939	1.00	pCi/g	1.0				
Zinc-65	U	0.0291	+/- 0.115	0.169	0.200	pCi/g	1.0				
Strontium-90	U	-0.131	+/- 0.465	1.15	7.50	pCi/g	1.0	AAK	02/23/99	2037	142924 3

M = Method

Method-Description

M I

EPA 90X.0



9902706-04



GENERAL ENGINEERING LABORATORIES

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Certificate of Analysis

Sample ID: BLDG830-EASTFACE **C-14**

Lab ID: 9903088-05

Chain of Custody: 1304

Received Date: 3 2 99

Sample Date: 2.23.99

Sample Time: 1453

Parameter	Result	Accuracy	Qualifier	DL	Units	DOA	Batch
Americium-241	0.0213	0.0699	U	0.1169	pCi/G	3/4/99	143796
Beryllium-7	-0.0618	0.2086	U	0.3116	pCi/G	3/4/99	143796
Cesium-134	0.0066	0.0224	UJ-K	0.036	pCi/G	3/4/99	143796
Cesium-137	0.0076	0.0251	UJ-K	0.0457	pCi/G	3/4/99	143796
Cobalt-57	0.0021	0.012	U	0.0214	pCi/G	3/4/99	143796
Cobalt-60	2.628	0.4898	U	0.0378	pCi/G	3/4/99	143796
Europium-152	0.0353	0.0553	UJ-K	0.1012	pCi/G	3/4/99	143796
Europium-154	0.0184	0.0553	UJ-K	0.1043	pCi/G	3/4/99	143796
Europium-155	-0.0118	0.0474	UJ-K	0.084	pCi/G	3/4/99	143796
Gross Alpha	1.119	0.737	UJ	1.1374	pCi/G	3/11/99	144009
Manganese-54	0.0023	0.0291	UJ-K	0.0514	pCi/G	3/4/99	143796
Nonvolatile Beta	6.299	1.5519	U	2.0367	pCi/G	3/11/99	144009
Plutonium-238	0.0728	0.146	U	0.218	pCi/G	3/12/99	144042
Plutonium-239/240	0.0727	0.146	UJ-K	0.218	pCi/G	3/12/99	144042
Sodium-22	0.0076	0.0197	UJ-K	0.0373	pCi/G	3/4/99	143796
Strontium-90	-0.0747	0.49	UJ-K	1.27	pCi/G	3/9/99	144042
Vanadium-48	0.0064	0.0502	UJ-K	0.0873	pCi/G	3/4/99	143796
Zinc-65	-0.0389	0.0756	U	0.1261	pCi/G	3/4/99	143796

This data was generated, analyzed and reviewed in accordance with General Engineering Laboratories standard operating procedures.



GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

Certificate of Analysis

Sample ID: BLDG830-SOUTHFACE C-15

Lab ID: 9903088-10

Chain of Custody: 1304

Received Date: 3/2/99

Sample Date: 2/23/99

Sample Time: 1430

Parameter	Result	Accuracy	Qualifier	DL	Units	DOA	Batch
Americium-241	0.3010	0.2068		0.2175	pCi/G	3/4/99	143796
Beryllium-7	0.1207	0.4091	U	0.7323	pCi/G	3/4/99	143796
Cesium-134	0.0029	0.0469	UJ-K	0.0817	pCi/G	3/4/99	143796
Cesium-137	1.102	0.3408		0.102	pCi/G	3/4/99	143796
Cobalt-57	-0.0082	0.0218	U	0.0401	pCi/G	3/4/99	143796
Cobalt-60	34.97	3.478		0.0725	pCi/G	3/4/99	143796
Europium-152	-0.0850	0.1216	UJ-K	0.2036	pCi/G	3/4/99	143796
Europium-154	0.0375	0.1283	UJ-K	0.225	pCi/G	3/4/99	143796
Europium-155	0.0958	0.1052	UJ-K	0.1618	pCi/G	3/4/99	143796
Gross Alpha	0.6554	0.6519	UJ	1.0654	pCi/G	3/11/99	144009
Manganese-54	-0.0370	0.074	UJ-K	0.123	pCi/G	3/4/99	143796
Nonvolatile Beta	14.7158	1.54		2.0373	pCi/G	3/11/99	144009
Plutonium-238	-0.0276	0.19	U	0.546	pCi/G	3/12/99	144042
Plutonium-239-240	-0.0266	0.0533	UJ-K	0.332	pCi/G	3/12/99	144042
Sodium-22	0.0135	0.0458	UJ-K	0.0803	pCi/G	3/4/99	143796
Strontium-90	-0.1510	0.621	UJ-K	1.64	pCi/G	3/9/99	144044
Vanadium-48	-0.0674	0.1247	UJ-K	0.2154	pCi/G	3/4/99	143796
Zinc-65	-0.0557	0.1779	U	0.3051	pCi/G	3/4/99	143796

This data has been prepared and reviewed in accordance with General Engineering Laboratories standard testing procedures.

C-15

Client: Brookhaven National Laboratory
 OER
 Building 51M
 Upton, New York 11973-5000
 Contact: Ms. Anna Bou

cc: BRKLO0297

Report Date: March 04, 1999

Page 1 of 2

Sample ID : BLDG830-EAST01
 Lab ID : 9902706-03
 Matrix : Soil
 Date Collected : 02/16/99
 Date Received : 02/18/99
 Priority : Routine
 Collector : Client

C-16

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radlological											
<i>Gross Alpha - 2 items</i>											
Gross Alpha		3.35 +/- 1.29	1.28	1.00	pCi/g	1.0	NCL	02/24/99	2006	142828	1
Weight of Sample, A&B		9.70			mg						
<i>Nonvolatile Beta - 2 items</i>											
Nonvolatile Beta		12.6 +/- 2.04	2.63	1.00	pCi/g	1.0					
Weight of Sample, A&B		9.70			mg						
<i>Alpha Spectroscopy Plutonium - 2 items</i>											
Plutonium-238	U	0.0222 +/- 0.0904	0.266	6.60	pCi/g	1.0	BKD	02/25/99	0956	143068	2
Plutonium-239/240	U	-0.0103 +/- 0.0206	0.226	4.00	pCi/g	1.0					
<i>Gamma PHA - 13 items</i>											
Americium-241	J	0.199 +/- 0.0682	0.0561	4.00	pCi/g	1.0	EJB	02/21/99	1530	142906	2
Beryllium-7	U	0.302 +/- 0.377	0.543	1.00	pCi/g	1.0					
Cesium-134	U	-0.00919 +/- 0.0288	0.0428	0.100	pCi/g	1.0					
Cesium-137		11.5 +/- 1.48	0.0521	2.30	pCi/g	1.0					
Cobalt-57	U	0.0230 +/- 0.0299	0.0255	0.100	pCi/g	1.0					
Cobalt-60		4.26 +/- 0.406	0.0398	0.100	pCi/g	1.0					
Europium-152	U	0.0377 +/- 0.0798	0.146	4.80	pCi/g	1.0					
Europium-154	U	0.0150 +/- 0.0639	0.102	17.0	pCi/g	1.0					
Europium-155	U	0.0467 +/- 0.109	0.0974	0.200	pCi/g	1.0					
Manganese-54	U	-0.0101 +/- 0.0295	0.0518	0.100	pCi/g	1.0					
Sodium-22	U	0.00535 +/- 0.0228	0.0363	0.700	pCi/g	1.0					
Vanadium-48	U	-0.0196 +/- 0.0415	0.0713	1.00	pCi/g	1.0					
Zinc-65	U	0.0178 +/- 0.0736	0.129	0.200	pCi/g	1.0					
Strontium-90	U	-0.0181 +/- 0.440	1.07	7.50	pCi/g	1.0	AAK	02/23/99	2037	142924	3

M = Method

Method-Description

M 1

EPA 900.0



9902706-03



GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

Certificate of Analysis

Sample ID: BLDG830 S-TREE

Lab ID: 9903499-07

Chain of Custody: 1305

Received Date: 3/12/99

Sample Date: 10/28/98

Sample Time: 1100

Parameter	Result	Accuracy	Qualifier	DL	Units	DOA	Batch
Americium-241	0.0096	0.0789	UJ-K	0.1348	pCi/G	3/18/99	144786
Beryllium-7	0.6517	1.085	UJ-K	2.008	pCi/G	3/18/99	144786
Cesium-134	-0.0137	0.0245	U	0.0366	pCi/G	3/18/99	144786
Cesium-137	2.646	0.2729		0.0416	pCi/G	3/18/99	144786
Cobalt-57	0.0046	0.0177	U	0.0324	pCi/G	3/18/99	144786
Cobalt-60	0.8045	0.1138		0.0391	pCi/G	3/18/99	144786
Europium-152	0.0344	0.0635	UJ-K	0.1115	pCi/G	3/18/99	144786
Europium-154	-0.0451	0.0602	U	0.1015	pCi/G	3/18/99	144786
Europium-155	0.0973	0.0881	UJ-K	0.0974	pCi/G	3/18/99	144786
Gross Alpha	4.939	1.8183		1.6976	pCi/G	3/18/99	144759
Manganese-54	0.0187	0.0287	U	0.0528	pCi/G	3/18/99	144786
Nonvolatile Beta	10.2832	2.2558		3.4774	pCi/G	3/18/99	144759
Plutonium-238	-0.1200	0.188	U	0.77	pCi/G	3/18/99	144754
Plutonium-239/240	0.0378	0.154	U	0.452	pCi/G	3/18/99	144754
Sodium-22	-0.0172	0.023	U	0.0388	pCi/G	3/18/99	144786
Strontium-90	0.2850	1.12	UJ-K	2.61	pCi/G	3/19/99	144756
Vanadium-48	0	10.69	J-K	0	pCi/G	3/18/99	144786
Zinc-65	0.0291	0.0833	U	0.1372	pCi/G	3/18/99	144786

This data has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures.



GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

Certificate of Analysis

Sample ID: BLDG830 E-TREE

Lab ID: 9903499-09

Chain of Custody: 1305

Received Date: 3/12/99

Sample Date: 10/28/98

Sample Time: 1115

Parameter	Result	Accuracy	Qualifier	DL	Units	DOA	Batch
Americium-241	0.1062	0.1313	UJ-K	0.1549	pCi/G	3/18/99	144786
Beryllium-7	0.3894	0.865	UJ-K	1.613	pCi/G	3/18/99	144786
Cesium-134	0.0008	0.0214	U	0.0339	pCi/G	3/18/99	144786
Cesium-137	0.5074	0.0737		0.0357	pCi/G	3/18/99	144786
Cobalt-57	0.0033	0.017	U	0.0306	pCi/G	3/18/99	144786
Cobalt-60	0.0205	0.0218	U	0.0415	pCi/G	3/18/99	144786
Europium-152	0.0007	0.0504	UJ-K	0.0864	pCi/G	3/18/99	144786
Europium-154	-0.0095	0.0498	U	0.0916	pCi/G	3/18/99	144786
Europium-155	0.0195	0.054	UJ-K	0.0987	pCi/G	3/18/99	144786
Gross Alpha	7.564	1.1436		0.7728	pCi/G	3/20/99	144759
Manganese-54	-0.0013	0.0267	U	0.0469	pCi/G	3/18/99	144786
Nonvolatile Beta	9.141	1.4936		2.1666	pCi/G	3/20/99	144759
Plutonium-238	0.1010	0.234	U	0.539	pCi/G	3/18/99	144754
Plutonium-239/240	0.0831	0.16	U	0.34	pCi/G	3/18/99	144754
Sodium-22	-0.0037	0.019	U	0.035	pCi/G	3/18/99	144786
Strontium-90	0.6620	1.02	UJ-K	2.27	pCi/G	3/19/99	144756
Vanadium-48	0	8.546	J-K	0	pCi/G	3/18/99	144786
Zinc-65	-0.0217	0.0604	U	0.0926	pCi/G	3/18/99	144786

This data has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures.

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C-1

Client: Brookhaven National Laboratory
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Contact: Ms. Anna Bou

cc: BRKL00297

Report Date: April 12, 1999

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Sample ID : BLDG830-N-TANK-01
Lab ID : 9904132-04
Matrix : Soil
Date Collected : 10/28/99
Date Received : 04/06/99
Priority : Urgent
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Metals Analysis											
Mercury		36.0	14.4	28.8	ug/kg	1.0	RMJ	04/08/99	1543	146136	1
Silver	J	130	57.9	467	ug/kg	2.0	MBL	04/08/99	1128	146137	2
Aluminum		2070000	3510	4670	ug/kg	2.0	MBL	04/08/99	1128	146137	3
Arsenic		502	279	467	ug/kg	2.0	MBL	04/08/99	1128	146137	2
Barium		5250	31.0	467	ug/kg	2.0					
Beryllium	J	73.6	20.8	467	ug/kg	2.0	MBL	04/08/99	1128	146137	3
Calcium		77900	1440	9340	ug/kg	2.0	MBL	04/08/99	1128	146137	4
Cadmium	U	-1.77	19.4	467	ug/kg	2.0	MBL	04/08/99	1128	146137	2
Cobalt		898	62.7	467	ug/kg	2.0	MBL	04/08/99	1128	146137	3
Chromium		2310	68.1	467	ug/kg	2.0	MBL	04/08/99	1128	146137	2
Copper		2620	124	467	ug/kg	2.0					
Iron		2570000	806	4670	ug/kg	2.0	MBL	04/08/99	1128	146137	3
Potassium		141000	548	9340	ug/kg	2.0	MBL	04/08/99	1128	146137	4
Magnesium		377000	311	934	ug/kg	2.0					
Manganese		51700	84.3	934	ug/kg	2.0	MBL	04/08/99	1128	146137	2
Sodium	J	6930	2720	9340	ug/kg	2.0	MBL	04/08/99	1128	146137	4
Nickel		1650	212	467	ug/kg	2.0	MBL	04/08/99	1128	146137	2
Lead		2210	63.3	467	ug/kg	2.0					
Antimony	U	90.8	153	934	ug/kg	2.0	MBL	04/08/99	1128	146137	3
Selenium	U	62.3	131	467	ug/kg	2.0	MBL	04/08/99	1128	146137	2
Thallium	U	-298	245	934	ug/kg	2.0	MBL	04/08/99	1128	146137	3
Vanadium		3870	39.9	467	ug/kg	2.0	MBL	04/08/99	1128	146137	4
Zinc		3910	90.2	467	ug/kg	2.0	MBL	04/08/99	1128	146137	2
General Chemistry											
Cyanid-, Total	U	0.148	0.166	0.498	mg/kg	1.0	HSC	04/09/99	1541	146288	5

The following prep procedures were performed:
Mercury

RMJ 04/06/99 1815 146136 6



9904132-04

C-2

Client: Brookhaven National Laboratory
OER
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Contact: Ms. Anna Bou

cc: BRKL00297

Report Date: April 12, 1999

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Sample ID : BLDG830N-TANK02
Lab ID : 9904132-05
Matrix : Soil
Date Collected : 10/28/99
Date Received : 04/06/99
Priority : Urgent
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Metals Analysis											
Mercury	J	23.4	14.9	29.8	ug/kg	1.0	RMJ	04/08/99	1544	146136	1
Silver	J	100	59.6	481	ug/kg	2.0	MBL	04/08/99	1134	146137	2
Aluminum		1050000	3620	4810	ug/kg	2.0	MBL	04/08/99	1134	146137	3
Arsenic	U	247	287	481	ug/kg	2.0	MBL	04/08/99	1134	146137	2
Barium		3890	31.9	481	ug/kg	2.0	MBL	04/08/99	1134	146137	3
Beryllium	J	33.1	21.5	481	ug/kg	2.0	MBL	04/08/99	1134	146137	4
Calcium		35000	1480	9620	ug/kg	2.0	MBL	04/08/99	1134	146137	2
Cadmium	U	-8.68	20.0	481	ug/kg	2.0	MBL	04/08/99	1134	146137	3
Cobalt		633	64.6	481	ug/kg	2.0	MBL	04/08/99	1134	146137	2
Chromium		1460	70.1	481	ug/kg	2.0	MBL	04/08/99	1134	146137	2
Copper		2240	127	481	ug/kg	2.0	MBL	04/08/99	1134	146137	3
Iron		1570000	830	4810	ug/kg	2.0	MBL	04/08/99	1134	146137	4
Potassium		87800	565	9620	ug/kg	2.0	MBL	04/08/99	1134	146137	4
Magnesium		260000	320	962	ug/kg	2.0	MBL	04/08/99	1134	146137	2
Manganese		41800	86.9	962	ug/kg	2.0	MBL	04/08/99	1134	146137	2
Sodium	J	5540	2800	9620	ug/kg	2.0	MBL	04/08/99	1134	146137	4
Nickel		1280	218	481	ug/kg	2.0	MBL	04/08/99	1134	146137	2
Lead		928	65.2	481	ug/kg	2.0	MBL	04/08/99	1134	146137	3
Antimony	J	341	157	962	ug/kg	2.0	MBL	04/08/99	1134	146137	2
Selenium	U	82.8	134	481	ug/kg	2.0	MBL	04/08/99	1134	146137	2
Thallium	U	-235	253	962	ug/kg	2.0	MBL	04/08/99	1134	146137	3
Vanadium		2050	41.1	481	ug/kg	2.0	MBL	04/08/99	1134	146137	4
Zinc		3560	92.9	481	ug/kg	2.0	MBL	04/08/99	1134	146137	2
General Chemistry											
Cyanide, Total	U	0.135	0.167	0.499	mg/kg	1.0	HSC	04/09/99	1543	146288	5

The following prep procedures were performed:
Mercury

RMJ 04/06/99 1815 146136 6



9904132-05

C-3

Client: Brookhaven National Laboratory
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 Contact: Ms. Anna Bou

cc: BRKL00297

Report Date: April 12, 1999

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Sample ID : BLDG830-STANK01
 Lab ID : 9904132-01
 Matrix : Soil
 Date Collected : 10/28/99
 Date Received : 04/06/99
 Priority : Urgent
 Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Metals Analysis											
Mercury		55.2	15.6	31.2	ug/kg	1.0	RMJ	04/08/99	1538	146136	1
Silver	J	141	59.0	476	ug/kg	2.0	MBL	04/08/99	1110	146137	2
Aluminum		5930000	3580	4760	ug/kg	2.0	MBL	04/08/99	1110	146137	3
Arsenic		1230	284	476	ug/kg	2.0	MBL	04/08/99	1110	146137	2
Barium		11300	31.6	476	ug/kg	2.0					
Beryllium	J	175	21.2	476	ug/kg	2.0	MBL	04/08/99	1110	146137	3
Calcium		191000	1470	9520	ug/kg	2.0	MBL	04/08/99	1110	146137	4
Cadmium	U	-7.20	19.8	476	ug/kg	2.0	MBL	04/08/99	1110	146137	2
Cobalt		1890	63.9	476	ug/kg	2.0	MBL	04/08/99	1110	146137	3
Chromium		5610	69.4	476	ug/kg	2.0	MBL	04/08/99	1110	146137	2
Copper		4530	126	476	ug/kg	2.0					
Iron		6260000	821	4760	ug/kg	2.0	MBL	04/08/99	1110	146137	3
Potassium		202000	559	9520	ug/kg	2.0	MBL	04/08/99	1110	146137	4
Magnesium		717000	317	952	ug/kg	2.0					
Manganese		73000	86.0	952	ug/kg	2.0	MBL	04/08/99	1110	146137	2
Sodium		14800	2770	9520	ug/kg	2.0	MBL	04/08/99	1110	146137	4
Nickel		4690	216	476	ug/kg	2.0	MBL	04/08/99	1110	146137	2
Lead		8590	64.5	476	ug/kg	2.0					
Antimony	J	363	156	952	ug/kg	2.0	MBL	04/08/99	1110	146137	3
Selenium	J	288	133	476	ug/kg	2.0	MBL	04/08/99	1110	146137	2
Thallium	U	-431	250	952	ug/kg	2.0	MBL	04/08/99	1110	146137	3
Vanadium		9900	40.7	476	ug/kg	2.0	MBL	04/08/99	1110	146137	4
Zinc		10300	92.0	476	ug/kg	2.0	MBL	04/08/99	1110	146137	2
General Chemistry											
Cyanide, Total	U	0.161	0.166	0.497	mg/kg	1.0	HSC	04/09/99	1537	146288	5

The following prep procedures were performed:
 Mercury

RMJ 04/06/99 1815 146136 6



9904132-01

C-4

Client: Brookhaven National Laboratory
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 Contact: Ms. Anna Bou

cc: BRKL00297

Report Date: April 12, 1999

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Sample ID : BLDG830-S-TANK02
 Lab ID : 9904132-02
 Matrix : Soil
 Date Collected : 10/28/99
 Date Received : 04/06/99
 Priority : Urgent
 Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	MS
Metals Analysis											
Mercury		40.1	15.8	31.6	ug/kg	1.0	RMJ	04/08/99	1539	146136	1
Silver	J	127	57.4	463	ug/kg	2.0	MBL	04/08/99	1116	146137	2
Aluminum		1010000	3480	4630	ug/kg	2.0	MBL	04/08/99	1116	146137	3
Arsenic	U	106	276	463	ug/kg	2.0	MBL	04/08/99	1116	146137	2
Barium		3850	30.7	463	ug/kg	2.0					
Beryllium	J	27.4	20.6	463	ug/kg	2.0	MBL	04/08/99	1116	146137	3
Calcium		16500	1430	9260	ug/kg	2.0	MBL	04/08/99	1116	146137	4
Cadmium	U	-9.22	19.3	463	ug/kg	2.0	MBL	04/08/99	1116	146137	2
Cobalt		560	62.1	463	ug/kg	2.0	MBL	04/08/99	1116	146137	3
Chromium		1540	67.5	463	ug/kg	2.0	MBL	04/08/99	1116	146137	2
Copper		2500	123	463	ug/kg	2.0					
Iron		1330000	799	4630	ug/kg	2.0	MBL	04/08/99	1116	146137	3
Potassium		107000	544	9260	ug/kg	2.0	MBL	04/08/99	1116	146137	4
Magnesium		220000	308	926	ug/kg	2.0					
Manganese		34100	83.6	926	ug/kg	2.0	MBL	04/08/99	1116	146137	2
Sodium	J	5360	2700	9260	ug/kg	2.0	MBL	04/08/99	1116	146137	4
Nickel		1050	210	463	ug/kg	2.0	MBL	04/08/99	1116	146137	2
Lead		1720	62.8	463	ug/kg	2.0					
Antimony	J	272	152	926	ug/kg	2.0	MBL	04/08/99	1116	146137	3
Selenium	J	156	129	463	ug/kg	2.0	MBL	04/08/99	1116	146137	2
Thallium	U	-347	243	926	ug/kg	2.0	MBL	04/08/99	1116	146137	3
Vanadium		1970	39.5	463	ug/kg	2.0	MBL	04/08/99	1116	146137	4
Zinc		2520	89.5	463	ug/kg	2.0	MBL	04/08/99	1116	146137	2
General Chemistry											
Cyanide, Total	J	0.209	0.166	0.497	mg/kg	1.0	HSC	04/09/99	1538	146288	5

The following prep procedures were performed:
 Mercury

RMJ 04/06/99 1815 146136 6



9904132-02

C-5

Client: Brookhaven National Laboratory
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 Contact: Ms. Anna Bou

cc: BRKLO0297

Report Date: April 12, 1999

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Sample ID : BLDG830-NORTHFACE02
 Lab ID : 9904130-06
 Matrix : Soil
 Date Collected : 02/23/99
 Date Received : 04/06/99
 Priority : Urgent
 Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Metals Analysis											
Mercury	J	16.5	13.6	27.2	ug/kg	1.0	RMJ	04/08/99	1529	146136	1
Silver	J	126	56.9	459	ug/kg	2.0	MBL	04/08/99	1040	146137	2
Aluminum		850000	3450	4590	ug/kg	2.0	MBL	04/08/99	1040	146137	3
Arsenic	U	147	274	459	ug/kg	2.0	MBL	04/08/99	1040	146137	2
Barium		2570	30.5	459	ug/kg	2.0					
Beryllium	J	32.3	20.5	459	ug/kg	2.0	MBL	04/08/99	1040	146137	3
Calcium		42800	1420	9180	ug/kg	2.0	MBL	04/08/99	1040	146137	4
Cadmium	U	-18.9	19.1	459	ug/kg	2.0	MBL	04/08/99	1040	146137	2
Cobalt		530	61.6	459	ug/kg	2.0	MBL	04/08/99	1040	146137	3
Chromium		1470	66.9	459	ug/kg	2.0	MBL	04/08/99	1040	146137	2
Copper		3190	121	459	ug/kg	2.0					
Iron		1290000	792	4590	ug/kg	2.0	MBL	04/08/99	1040	146137	3
Potassium		66900	539	9180	ug/kg	2.0	MBL	04/08/99	1040	146137	4
Magnesium		217000	305	918	ug/kg	2.0					
Manganese		32500	82.9	918	ug/kg	2.0	MBL	04/08/99	1040	146137	2
Sodium	J	7310	2670	9180	ug/kg	2.0	MBL	04/08/99	1040	146137	4
Nickel		1010	208	459	ug/kg	2.0	MBL	04/08/99	1040	146137	2
Lead		1440	62.2	459	ug/kg	2.0					
Antimony	U	129	150	918	ug/kg	2.0	MBL	04/08/99	1040	146137	3
Selenium	U	116	128	459	ug/kg	2.0	MBL	04/08/99	1040	146137	2
Thallium	U	-350	241	918	ug/kg	2.0	MBL	04/08/99	1040	146137	3
Vanadium		2160	39.2	459	ug/kg	2.0	MBL	04/08/99	1040	146137	4
Zinc		3290	88.7	459	ug/kg	2.0	MBL	04/08/99	1040	146137	2
General Chemistry											
Cyanide, Total	U	0.123	0.166	0.498	mg/kg	1.0	HSC	04/09/99	1528	146288	5

The following prep procedures were performed:

Mercury

RMJ 04/06/99 1815 146136 6



9904130-06

C-6

Client: Brookhaven National Laboratory
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 Contact: Ms. Anna Bou

cc: BRKL00297

Report Date: April 12, 1999

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Sample ID : BLDG830-GP1DSS24
 Lab ID : 9904130-04
 Matrix : Soil
 Date Collected : 02/23/99
 Date Received : 04/06/99
 Priority : Urgent
 Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Metals Analysis											
Mercury		60.1	15.1	30.2	ug/kg	1.0	RMJ	04/08/99	1525	146136	1
Silver	J	98.3	57.9	467	ug/kg	2.0	MBL	04/08/99	1028	146137	2
Aluminum		814000	3510	4670	ug/kg	2.0	MBL	04/08/99	1028	146137	3
Arsenic	U	229	279	467	ug/kg	2.0	MBL	04/08/99	1028	146137	2
Barium		4630	31.0	467	ug/kg	2.0					
Beryllium	J	26.7	20.8	467	ug/kg	2.0	MBL	04/08/99	1028	146137	3
Calcium		48100	1440	9340	ug/kg	2.0	MBL	04/08/99	1028	146137	4
Cadmium	U	-5.99	19.4	467	ug/kg	2.0	MBL	04/08/99	1028	146137	2
Cobalt		510	62.7	467	ug/kg	2.0	MBL	04/08/99	1028	146137	3
Chromium		1100	68.1	467	ug/kg	2.0	MBL	04/08/99	1028	146137	2
Copper		2030	124	467	ug/kg	2.0					
Iron		1230000	806	4670	ug/kg	2.0	MBL	04/08/99	1028	146137	3
Potassium		89900	548	9340	ug/kg	2.0	MBL	04/08/99	1028	146137	4
Magnesium		197000	311	934	ug/kg	2.0					
Manganese		34400	84.3	934	ug/kg	2.0	MBL	04/08/99	1028	146137	2
Sodium	J	4980	2720	9340	ug/kg	2.0	MBL	04/08/99	1028	146137	4
Nickel		908	212	467	ug/kg	2.0	MBL	04/08/99	1028	146137	2
Lead		738	63.3	467	ug/kg	2.0					
Antimony	J	208	153	934	ug/kg	2.0	MBL	04/08/99	1028	146137	3
Selenium	U	120	131	467	ug/kg	2.0	MBL	04/08/99	1028	146137	2
Thallium	U	-268	245	934	ug/kg	2.0	MBL	04/08/99	1028	146137	3
Vanadium		1880	39.9	467	ug/kg	2.0	MBL	04/08/99	1028	146137	4
Zinc		2660	90.2	467	ug/kg	2.0	MBL	04/08/99	1028	146137	2
General Chemistry											
Cyanide, Total	J	0.324	0.166	0.497	mg/kg	1.0	HSC	04/09/99	1525	146288	5

The following prep procedures were performed:

Mercury

RMJ 04/06/99 1815 146136 6



9904130-04

C-7

Client: Brookhaven National Laboratory
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 Upton, New York 11973-5000
 Contact: Ms. Anna Bou

cc: BRKL00297

Report Date: April 12, 1999

Page 1 of 2

Sample ID : BLDG830-NORTHFACE01
 Lab ID : 9904130-08
 Matrix : Soil
 Date Collected : 02/23/99
 Date Received : 04/06/99
 Priority : Urgent
 Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Metals Analysis											
Mercury	J	26.2	15.9	31.8	ug/kg	1.0	RMJ	04/08/99	1532	146136	1
Silver	J	132	57.9	467	ug/kg	2.0	MBL	04/08/99	1052	146137	2
Aluminum		1030000	3510	4670	ug/kg	2.0	MBL	04/08/99	1052	146137	3
Arsenic		2960	279	467	ug/kg	2.0	MBL	04/08/99	1052	146137	2
Barium		4800	31.0	467	ug/kg	2.0					
Beryllium	J	53.3	20.8	467	ug/kg	2.0	MBL	04/08/99	1052	146137	3
Calcium		88400	1440	9340	ug/kg	2.0	MBL	04/08/99	1052	146137	4
Cadmium	U	-4.61	19.4	467	ug/kg	2.0	MBL	04/08/99	1052	146137	2
Cobalt		707	62.7	467	ug/kg	2.0	MBL	04/08/99	1052	146137	3
Chromium		2230	68.1	467	ug/kg	2.0	MBL	04/08/99	1052	146137	2
Copper		4780	124	467	ug/kg	2.0					
Iron		2210000	806	4670	ug/kg	2.0	MBL	04/08/99	1052	146137	3
Potassium		88600	548	9340	ug/kg	2.0	MBL	04/08/99	1052	146137	4
Magnesium		329000	311	934	ug/kg	2.0					
Manganese		40800	84.3	934	ug/kg	2.0	MBL	04/08/99	1052	146137	2
Sodium		12100	2720	9340	ug/kg	2.0	MBL	04/08/99	1052	146137	4
Nickel		1390	212	467	ug/kg	2.0	MBL	04/08/99	1052	146137	2
Lead		1350	63.3	467	ug/kg	2.0					
Antimony	U	103	153	934	ug/kg	2.0	MBL	04/08/99	1052	146137	3
Selenium	J	231	131	467	ug/kg	2.0	MBL	04/08/99	1052	146137	2
Thallium	U	-512	245	934	ug/kg	2.0	MBL	04/08/99	1052	146137	3
Vanadium		3170	39.9	467	ug/kg	2.0	MBL	04/08/99	1052	146137	4
Zinc		4680	90.2	467	ug/kg	2.0	MBL	04/08/99	1052	146137	2
General Chemistry											
Cyanide, Total	U	0.161	0.167	0.499	mg/kg	1.0	HSC	04/09/99	1531	146288	5

The following prep procedures were performed:
 Mercury

RMJ 04/06/99 1815 146136 6



9904130-08

Client: Brookhaven National Laboratory
 OER
 Building 51M
 Upton, New York 11973-5000
 Contact: Ms. Anna Bou

cc: BRKL00297

Report Date: April 12, 1999

Page 1 of 2

Sample ID : BLDG830-WESTFACE
 Lab ID : 9904130-01
 Matrix : Soil
 Date Collected : 02/23/99
 Date Received : 04/06/99
 Priority : Urgent
 Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Metals Analysis											
Mercury		41.5	16.4	32.8	ug/kg	1.0	RMJ	04/08/99	1520	146136	1
Silver	J	123	59.6	481	ug/kg	2.0	MBL	04/08/99	1010	146137	2
Aluminum		1300000	3620	4810	ug/kg	2.0	MBL	04/08/99	1010	146137	3
Arsenic	J	350	287	481	ug/kg	2.0	MBL	04/08/99	1010	146137	2
Barium		5350	31.9	481	ug/kg	2.0					
Beryllium	J	72.8	21.5	481	ug/kg	2.0	MBL	04/08/99	1010	146137	3
Calcium		64400	1480	9620	ug/kg	2.0	MBL	04/08/99	1010	146137	4
Cadmium	U	-11.8	20.0	481	ug/kg	2.0	MBL	04/08/99	1010	146137	2
Cobalt		1040	64.6	481	ug/kg	2.0	MBL	04/08/99	1010	146137	3
Chromium		3350	70.1	481	ug/kg	2.0	MBL	04/08/99	1010	146137	2
Copper		3400	127	481	ug/kg	2.0					
Iron		2560000	830	4810	ug/kg	2.0	MBL	04/08/99	1010	146137	3
Potassium		95600	565	9620	ug/kg	2.0	MBL	04/08/99	1010	146137	4
Magnesium		397000	320	962	ug/kg	2.0					
Manganese		47500	86.9	962	ug/kg	2.0	MBL	04/08/99	1010	146137	2
Sodium	J	6560	2800	9620	ug/kg	2.0	MBL	04/08/99	1010	146137	4
Nickel		1520	218	481	ug/kg	2.0	MBL	04/08/99	1010	146137	2
Lead		1270	65.2	481	ug/kg	2.0					
Antimony	J	253	157	962	ug/kg	2.0	MBL	04/08/99	1010	146137	3
Selenium	J	144	134	481	ug/kg	2.0	MBL	04/08/99	1010	146137	2
Thallium	U	-228	253	962	ug/kg	2.0	MBL	04/08/99	1010	146137	3
Vanadium		3940	41.1	481	ug/kg	2.0	MBL	04/08/99	1010	146137	4
Zinc		4490	92.9	481	ug/kg	2.0	MBL	04/08/99	1010	146137	2
General Chemistry											
Cyanide, Total	U	0.140	0.166	0.497	mg/kg	1.0	HSC	04/09/99	1521	146288	5

The following prep procedures were performed:

Mercury

RMJ 04/06/99 1815 146136 6



9904130-01

Form 1: Inorganic Analyses Data Sheet

SDG No.: 95158

Method Type: Total Metals

Sample ID: 9905158-02

Client ID: BLDG830-WEST01

Contract: BRKL00297

Lab Code: GEL

Case No.:

SAS No.:

Matrix: SOIL

Date Received: 5/6/99

Level: LOW

% Solids: 100.00

C-9

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7429-90-5	Aluminum	1450	mg/kg			P	0.73	TJA61 Trace2 ICPAES	990512-1
7440-36-0	Antimony	0.19	mg/kg	U		P	0.19	TJA61 Trace2 ICPAES	990512-1
7440-38-2	Arsenic	0.54	mg/kg			P	0.26	TJA61 Trace2 ICPAES	990512-1
7440-39-3	Barium	7.6	mg/kg			P	0.01	TJA61 Trace2 ICPAES	990512-1
7440-41-7	Beryllium	0.07	mg/kg	B		P	0.01	TJA61 Trace2 ICPAES	990512-1
7440-43-9	Cadmium	0.03	mg/kg	U		P	0.03	TJA61 Trace2 ICPAES	990512-1
7440-70-2	Calcium	345	mg/kg	B		P	0.77	TJA61 Trace2 ICPAES	990512-1
7440-47-3	Chromium	2.0	mg/kg			P	0.04	TJA61 Trace2 ICPAES	990512-1
7440-48-4	Cobalt	0.78	mg/kg	B		P	0.04	TJA61 Trace2 ICPAES	990512-1
7440-50-8	Copper	2.3	mg/kg			P	0.07	TJA61 Trace2 ICPAES	990512-1
7439-89-6	Iron	2080	mg/kg			P	0.83	TJA61 Trace2 ICPAES	990512-1
7439-92-1	Lead	1.7	mg/kg			P	0.13	TJA61 Trace2 ICPAES	990512-1
7439-95-4	Magnesium	448	mg/kg	B		P	0.52	TJA61 Trace2 ICPAES	990512-1
7439-96-5	Manganese	203	mg/kg			P	0.04	TJA61 Trace2 ICPAES	990512-1
7439-97-6	Mercury	0.02	mg/kg	U		AV	0.02	PE CVAA	990512sp-1
7440-02-0	Nickel	1.6	mg/kg			P	0.10	TJA61 Trace2 ICPAES	990512-1
7440-09-7	Potassium	142	mg/kg	B		P	2.5	TJA61 Trace2 ICPAES	990512-1
7782-49-2	Selenium	0.19	mg/kg	U		P	0.19	TJA61 Trace2 ICPAES	990512-1
7440-22-4	Silver	0.09	mg/kg	U		P	0.09	TJA61 Trace2 ICPAES	990512-1
7440-23-5	Sodium	8.6	mg/kg	B		P	7.2	TJA61 Trace2 ICPAES	990512-1
7440-28-0	Thallium	0.56	mg/kg	U		P	0.56	TJA61 Trace2 ICPAES	990512-1
7440-62-2	Vanadium	3.2	mg/kg	B		P	0.05	TJA61 Trace2 ICPAES	990512-1
7440-66-6	Zinc	4.8	mg/kg			P	0.05	TJA61 Trace2 ICPAES	990512-1

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

C-10

Client: Brookhaven National Laboratory
 OER
 Building 51M
 Upton, New York 11973-5000
 Contact: Ms. Anna Bou

cc: BRKL00297

Report Date: April 12, 1999

Page 1 of 2

Sample ID : BLDG830-UNDERVAULT
 Lab ID : 9904130-03
 Matrix : Soil
 Date Collected : 02/23/99
 Date Received : 04/06/99
 Priority : Urgent
 Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Metals Analysis											
Mercury	U	-7.94	13.4	26.8	ug/kg	1.0	RMJ	04/08/99	1524	146136	1
Silver	J	123	57.9	467	ug/kg	2.0	MBL	04/08/99	1022	146137	2
Aluminum		1080000	3510	4670	ug/kg	2.0	MBL	04/08/99	1022	146137	3
Arsenic	U	275	279	467	ug/kg	2.0	MBL	04/08/99	1022	146137	2
Barium		3920	31.0	467	ug/kg	2.0					
Beryllium	J	70.3	20.8	467	ug/kg	2.0	MBL	04/08/99	1022	146137	3
Calcium		62000	1440	9340	ug/kg	2.0	MBL	04/08/99	1022	146137	4
Cadmium	U	1.14	19.4	467	ug/kg	2.0	MBL	04/08/99	1022	146137	2
Cobalt		665	62.7	467	ug/kg	2.0	MBL	04/08/99	1022	146137	3
Chromium		2090	68.1	467	ug/kg	2.0	MBL	04/08/99	1022	146137	2
Copper		2930	124	467	ug/kg	2.0					
Iron		1770000	806	4670	ug/kg	2.0	MBL	04/08/99	1022	146137	3
Potassium		92800	548	9340	ug/kg	2.0	MBL	04/08/99	1022	146137	4
Magnesium		241000	311	934	ug/kg	2.0					
Manganese		43400	84.3	934	ug/kg	2.0	MBL	04/08/99	1022	146137	2
Sodium	J	5260	2720	9340	ug/kg	2.0	MBL	04/08/99	1022	146137	4
Nickel		1390	212	467	ug/kg	2.0	MBL	04/08/99	1022	146137	2
Lead		1540	63.3	467	ug/kg	2.0					
Antimony	U	78.3	153	934	ug/kg	2.0	MBL	04/08/99	1022	146137	3
Selenium	U	102	131	467	ug/kg	2.0	MBL	04/08/99	1022	146137	2
Thallium	U	401	245	934	ug/kg	2.0	MBL	04/08/99	1022	146137	3
Vanadium		2460	39.9	467	ug/kg	2.0	MBL	04/08/99	1022	146137	4
Zinc		5110	90.2	467	ug/kg	2.0	MBL	04/08/99	1022	146137	2
General Chemistry											
Cyanide, Total	U	0.144	0.167	0.500	mg/kg	1.0	HSC	04/09/99	1524	146288	5

The following prep procedures were performed:

Mercury

RMJ 04/06/99 1815 146136 6



9904130-03

Form 1: Inorganic Analyses Data Sheet

SDG No.: 95158

Method Type: Total Metals

Sample ID: 9905158-05

Client ID: BLDG830-PIPE2

Contract: BRKL00297

Lab Code: GEL

Case No.:

SAS No.:

Matrix: SOIL

Date Received: 5/6/99

Level: LOW

% Solids: 100.00

C-11

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7429-90-5	Aluminum	671	mg/kg			P	0.72	TJA61 Trace2 ICPAES	990512-1
7440-36-0	Antimony	0.18	mg/kg	U		P	0.18	TJA61 Trace2 ICPAES	990512-1
7440-38-2	Arsenic	0.47	mg/kg	B		P	0.26	TJA61 Trace2 ICPAES	990512-1
7440-39-3	Barium	3.7	mg/kg			P	0.01	TJA61 Trace2 ICPAES	990512-1
7440-41-7	Beryllium	0.04	mg/kg	B		P	0.01	TJA61 Trace2 ICPAES	990512-1
7440-43-9	Cadmium	0.03	mg/kg	U		P	0.03	TJA61 Trace2 ICPAES	990512-1
7440-70-2	Calcium	102	mg/kg	B		P	0.76	TJA61 Trace2 ICPAES	990512-1
7440-47-3	Chromium	2.1	mg/kg			P	0.04	TJA61 Trace2 ICPAES	990512-1
7440-48-4	Cobalt	0.57	mg/kg	B		P	0.04	TJA61 Trace2 ICPAES	990512-1
7440-50-8	Copper	1.8	mg/kg			P	0.07	TJA61 Trace2 ICPAES	990512-1
7439-89-6	Iron	1430	mg/kg			P	0.82	TJA61 Trace2 ICPAES	990512-1
7439-92-1	Lead	1.1	mg/kg			P	0.12	TJA61 Trace2 ICPAES	990512-1
7439-95-4	Magnesium	211	mg/kg	B		P	0.51	TJA61 Trace2 ICPAES	990512-1
7439-96-5	Manganese	37.5	mg/kg			P	0.04	TJA61 Trace2 ICPAES	990512-1
7439-97-6	Mercury	0.02	mg/kg	B		AV	0.02	PE CVAA	990512sp-1
7440-02-0	Nickel	1.1	mg/kg			P	0.10	TJA61 Trace2 ICPAES	990512-1
7440-09-7	Potassium	102	mg/kg	B		P	2.5	TJA61 Trace2 ICPAES	990512-1
7782-49-2	Selenium	0.19	mg/kg	U		P	0.19	TJA61 Trace2 ICPAES	990512-1
7440-22-4	Silver	0.09	mg/kg	U		P	0.09	TJA61 Trace2 ICPAES	990512-1
7440-23-5	Sodium	10.4	mg/kg	B		P	7.1	TJA61 Trace2 ICPAES	990512-1
7440-28-0	Thallium	0.55	mg/kg	U		P	0.55	TJA61 Trace2 ICPAES	990512-1
7440-62-2	Vanadium	2.4	mg/kg	B		P	0.05	TJA61 Trace2 ICPAES	990512-1
7440-66-6	Zinc	2.8	mg/kg			P	0.05	TJA61 Trace2 ICPAES	990512-1

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

Form 1: Inorganic Analyses Data Sheet

DG No.: 95158

Method Type: Total Metals

Sample ID: 9905158-06

Client ID: BLDG830-EAST02

Contract: BRKL00297

Lab Code: GEL

Case No.:

SAS No.:

Matrix: SOIL

Date Received: 5/6/99

Level: LOW

% Solids: 100.00

C-12

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7429-90-5	Aluminum	873	mg/kg			P	0.73	TJA61 Trace2 ICPAES	990512-1
7440-36-0	Antimony	0.18	mg/kg	U		P	0.18	TJA61 Trace2 ICPAES	990512-1
7440-38-2	Arsenic	0.70	mg/kg			P	0.26	TJA61 Trace2 ICPAES	990512-1
7440-39-3	Barium	3.2	mg/kg			P	0.01	TJA61 Trace2 ICPAES	990512-1
7440-41-7	Beryllium	0.05	mg/kg	B		P	0.01	TJA61 Trace2 ICPAES	990512-1
7440-43-9	Cadmium	0.03	mg/kg	U		P	0.03	TJA61 Trace2 ICPAES	990512-1
7440-70-2	Calcium	69.3	mg/kg	B		P	0.76	TJA61 Trace2 ICPAES	990512-1
7440-47-3	Chromium	2.5	mg/kg			P	0.04	TJA61 Trace2 ICPAES	990512-1
7440-48-4	Cobalt	0.57	mg/kg	B		P	0.04	TJA61 Trace2 ICPAES	990512-1
7440-50-8	Copper	2.7	mg/kg			P	0.07	TJA61 Trace2 ICPAES	990512-1
7439-89-6	Iron	1610	mg/kg			P	0.83	TJA61 Trace2 ICPAES	990512-1
7439-92-1	Lead	1.4	mg/kg			P	0.13	TJA61 Trace2 ICPAES	990512-1
7439-95-4	Magnesium	236	mg/kg	B		P	0.51	TJA61 Trace2 ICPAES	990512-1
7439-96-5	Manganese	33.7	mg/kg			P	0.04	TJA61 Trace2 ICPAES	990512-1
7439-97-6	Mercury	0.02	mg/kg	U		AV	0.02	FE CVAA	990512sp-1
7440-02-0	Nickel	1.4	mg/kg			P	0.10	TJA61 Trace2 ICPAES	990512-1
7440-09-7	Potassium	81.9	mg/kg	B		P	2.5	TJA61 Trace2 ICPAES	990512-1
7782-49-2	Selenium	0.19	mg/kg	U		P	0.19	TJA61 Trace2 ICPAES	990512-1
7440-22-4	Silver	0.09	mg/kg	U		P	0.09	TJA61 Trace2 ICPAES	990512-1
7440-23-5	Sodium	8.0	mg/kg	B		P	7.2	TJA61 Trace2 ICPAES	990512-1
7440-28-0	Thallium	0.55	mg/kg	U		P	0.55	TJA61 Trace2 ICPAES	990512-1
7440-62-2	Vanadium	2.8	mg/kg	B		P	0.05	TJA61 Trace2 ICPAES	990512-1
7440-66-6	Zinc	2.8	mg/kg			P	0.05	TJA61 Trace2 ICPAES	990512-1

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

Form 1: Inorganic Analyses Data Sheet

SDG No.: 95158

Method Type: Total Metals

Sample ID: 9905158-04

Client ID: BLDG830-PIPE01

Contract: BRKL00297

Lab Code: GEL

Case No.:

SAS No.:

Matrix: SOIL

Date Received: 5/6/99

Level: LOW

% Solids: 100.00

C-13

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7429-90-5	Aluminum	876	mg/kg			P	0.71	TJA61 Trace2 ICPAES	990512-1
7440-36-0	Antimony	0.18	mg/kg	U		P	0.18	TJA61 Trace2 ICPAES	990512-1
7440-38-2	Arsenic	0.74	mg/kg			P	0.26	TJA61 Trace2 ICPAES	990512-1
7440-39-3	Barium	5.8	mg/kg			P	0.01	TJA61 Trace2 ICPAES	990512-1
7440-41-7	Beryllium	0.08	mg/kg	B		P	0.01	TJA61 Trace2 ICPAES	990512-1
7440-43-9	Cadmium	0.03	mg/kg	U		P	0.03	TJA61 Trace2 ICPAES	990512-1
7440-70-2	Calcium	112	mg/kg	B		P	0.75	TJA61 Trace2 ICPAES	990512-1
7440-47-3	Chromium	2.1	mg/kg			P	0.04	TJA61 Trace2 ICPAES	990512-1
7440-48-4	Cobalt	0.71	mg/kg	B		P	0.04	TJA61 Trace2 ICPAES	990512-1
7440-50-8	Copper	2.8	mg/kg			P	0.07	TJA61 Trace2 ICPAES	990512-1
7439-89-6	Iron	2270	mg/kg			P	0.81	TJA61 Trace2 ICPAES	990512-1
7439-92-1	Lead	1.7	mg/kg			P	0.12	TJA61 Trace2 ICPAES	990512-1
7439-95-4	Magnesium	242	mg/kg	B		P	0.50	TJA61 Trace2 ICPAES	990512-1
7439-96-5	Manganese	57.7	mg/kg			P	0.04	TJA61 Trace2 ICPAES	990512-1
7439-97-6	Mercury	0.02	mg/kg	U		AV	0.02	PE CVAA	990512sp-1
7440-02-0	Nickel	1.2	mg/kg			P	0.10	TJA61 Trace2 ICPAES	990512-1
7440-09-7	Potassium	103	mg/kg	B		P	2.4	TJA61 Trace2 ICPAES	990512-1
7782-49-2	Selenium	0.18	mg/kg	U		P	0.18	TJA61 Trace2 ICPAES	990512-1
7440-22-4	Silver	0.09	mg/kg	U		P	0.09	TJA61 Trace2 ICPAES	990512-1
7440-23-5	Sodium	10.2	mg/kg	B		P	7.0	TJA61 Trace2 ICPAES	990512-1
7440-28-0	Thallium	0.54	mg/kg	U		P	0.54	TJA61 Trace2 ICPAES	990512-1
7440-62-2	Vanadium	3.8	mg/kg	B		P	0.05	TJA61 Trace2 ICPAES	990512-1
7440-66-6	Zinc	3.6	mg/kg			P	0.04	TJA61 Trace2 ICPAES	990512-1

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

Client: Brookhaven National Laboratory
 OER
 Building 51M
 Upton, New York 11973-5000
 Contact: Ms. Anna Bou

cc: BRKL00297

Report Date: April 12, 1999

Page 1 of 2

Sample ID : BLDG830-EASTFACE
 Lab ID : 9904130-02
 Matrix : Soil
 Date Collected : 02/23/99
 Date Received : 04/06/99
 Priority : Urgent
 Collector : Client

C-14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Metals Analysis											
Mercury		45.2	14.2	28.4	ug/kg	1.0	RMJ	04/08/99	1522	146136	1
Silver	J	112	56.4	455	ug/kg	2.0	MBL	04/08/99	1016	146137	2
Aluminium		657000	3420	4550	ug/kg	2.0	MBL	04/08/99	1016	146137	3
Arsenic	U	257	271	455	ug/kg	2.0	MBL	04/08/99	1016	146137	2
Barium		2500	30.2	455	ug/kg	2.0					
Beryllium	J	22.5	20.3	455	ug/kg	2.0	MBL	04/08/99	1016	146137	3
Calcium		28800	1400	9100	ug/kg	2.0	MBL	04/08/99	1016	146137	4
Cadmium	U	-16.1	18.9	455	ug/kg	2.0	MBL	04/08/99	1016	146137	2
Cobalt	J	416	61.1	455	ug/kg	2.0	MBL	04/08/99	1016	146137	3
Chromium		1040	66.3	455	ug/kg	2.0	MBL	04/08/99	1016	146137	2
Copper		2150	120	455	ug/kg	2.0					
Iron		1090000	785	4550	ug/kg	2.0	MBL	04/08/99	1016	146137	3
Potassium		60900	534	9100	ug/kg	2.0	MBL	04/08/99	1016	146137	4
Magnesium		179000	303	910	ug/kg	2.0					
Manganese		29400	82.2	910	ug/kg	2.0	MBL	04/08/99	1016	146137	2
Sodium	J	3690	2650	9100	ug/kg	2.0	MBL	04/08/99	1016	146137	4
Nickel		838	206	455	ug/kg	2.0	MBL	04/08/99	1016	146137	2
Lead		866	61.7	455	ug/kg	2.0					
Antimony	J	241	149	910	ug/kg	2.0	MBL	04/08/99	1016	146137	3
Selenium	U	123	127	455	ug/kg	2.0	MBL	04/08/99	1016	146137	2
Thallium	U	-386	239	910	ug/kg	2.0	MBL	04/08/99	1016	146137	3
Vanadium		1510	38.9	455	ug/kg	2.0	MBL	04/08/99	1016	146137	4
Zinc		2390	87.9	455	ug/kg	2.0	MBL	04/08/99	1016	146137	2
General Chemistry											
Cyanide, Total	U	0.128	0.166	0.498	mg/kg	1.0	HSC	04/09/99	1523	146288	5

The following prep procedures were performed:

Mercury

RMJ 04/06/99 1515 146136 6



9904130-02

C-15

Client: Brookhaven National Laboratory
 OER
 Building 51M
 Upton, New York 11973-5000
 Contact: Ms. Anna Bou

cc: BRKLO0297

Report Date: April 12, 1999

Page 1 of 2

Sample ID : BLDG830-SOUTHFACE
 Lab ID : 9904130-07
 Matrix : Soil
 Date Collected : 02/23/99
 Date Received : 04/06/99
 Priority : Urgent
 Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Metals Analysis											
Mercury	J	16.1	12.6	25.2	ug/kg	1.0	RMJ	04/08/99	1531	146136	1
Silver	J	89.6	60.8	490	ug/kg	2.0	MBL	04/08/99	1046	146137	2
Aluminum		632000	3690	4900	ug/kg	2.0	MBL	04/08/99	1046	146137	3
Arsenic	U	224	292	490	ug/kg	2.0	MBL	04/08/99	1046	146137	2
Barium		1730	32.5	490	ug/kg	2.0					
Beryllium	U	14.1	21.9	490	ug/kg	2.0	MBL	04/08/99	1046	146137	3
Calcium		39800	1510	9800	ug/kg	2.0	MBL	04/08/99	1046	146137	4
Cadmium	U	1.90	20.4	490	ug/kg	2.0	MBL	04/08/99	1046	146137	2
Cobalt	J	408	65.8	490	ug/kg	2.0	MBL	04/08/99	1046	146137	3
Chromium		1670	71.4	490	ug/kg	2.0	MBL	04/08/99	1046	146137	2
Copper		2740	130	490	ug/kg	2.0					
Iron		976000	846	4900	ug/kg	2.0	MBL	04/08/99	1046	146137	3
Potassium		53000	575	9800	ug/kg	2.0	MBL	04/08/99	1046	146137	4
Magnesium		168000	326	980	ug/kg	2.0					
Manganese		25700	88.5	980	ug/kg	2.0	MBL	04/08/99	1046	146137	2
Sodium	U	2230	2850	9800	ug/kg	2.0	MBL	04/08/99	1046	146137	4
Nickel		917	222	490	ug/kg	2.0	MBL	04/08/99	1046	146137	2
Lead		600	66.4	490	ug/kg	2.0					
Antimony	J	167	160	980	ug/kg	2.0	MBL	04/08/99	1046	146137	3
Selenium	U	64.0	137	490	ug/kg	2.0	MBL	04/08/99	1046	146137	2
Thallium	U	-372	258	980	ug/kg	2.0	MBL	04/08/99	1046	146137	3
Vanadium		1340	41.8	490	ug/kg	2.0	MBL	04/08/99	1046	146137	4
Zinc		2410	94.7	490	ug/kg	2.0	MBL	04/08/99	1046	146137	2
General Chemistry											
Cyanide, Total	U	0.0579	0.167	0.499	mg/kg	1.0	HSC	04/09/99	1529	146288	5

The following prep procedures were performed:
 Mercury

RMJ 04/06/99 1815 146136 6



9904130-07

Form 1: Inorganic Analyses Data Sheet

DG No.: 95158

Method Type: Total Metals

Sample ID: 9905158-03

Client ID: BLDG830-EAST01

Contract: BRKLO0297

Lab Code: GEL

Case No.:

SAS No.:

Matrix: SOIL

Date Received: 5/6/99

Level: LOW

C-16

% Solids: 100.00

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7429-90-5	Aluminum	692	mg/kg			P	0.72	TJA61 Trace2 ICPAES	990512-1
7440-36-0	Antimony	0.18	mg/kg	U		P	0.18	TJA61 Trace2 ICPAES	990512-1
7440-38-2	Arsenic	0.50	mg/kg			P	0.26	TJA61 Trace2 ICPAES	990512-1
7440-39-3	Barium	4.1	mg/kg			P	0.01	TJA61 Trace2 ICPAES	990512-1
7440-41-7	Beryllium	0.04	mg/kg	B		P	0.01	TJA61 Trace2 ICPAES	990512-1
7440-43-9	Cadmium	0.03	mg/kg	U		P	0.03	TJA61 Trace2 ICPAES	990512-1
7440-70-2	Calcium	69.6	mg/kg	B		P	0.76	TJA61 Trace2 ICPAES	990512-1
7440-47-3	Chromium	1.7	mg/kg			P	0.04	TJA61 Trace2 ICPAES	990512-1
7440-48-4	Cobalt	0.41	mg/kg	B		P	0.04	TJA61 Trace2 ICPAES	990512-1
7440-50-8	Copper	1.9	mg/kg			P	0.07	TJA61 Trace2 ICPAES	990512-1
7439-89-6	Iron	1230	mg/kg			P	0.82	TJA61 Trace2 ICPAES	990512-1
7439-92-1	Lead	1.6	mg/kg			P	0.12	TJA61 Trace2 ICPAES	990512-1
7439-95-4	Magnesium	198	mg/kg	B		P	0.51	TJA61 Trace2 ICPAES	990512-1
7439-96-5	Manganese	31.3	mg/kg			P	0.04	TJA61 Trace2 ICPAES	990512-1
7439-97-6	Mercury	0.02	mg/kg	U		AV	0.02	PE CVAA	990512sp-1
7440-02-0	Nickel	0.88	mg/kg			P	0.10	TJA61 Trace2 ICPAES	990512-1
7440-09-7	Potassium	73.9	mg/kg	B		P	2.5	TJA61 Trace2 ICPAES	990512-1
7782-49-2	Selenium	0.19	mg/kg	U		P	0.19	TJA61 Trace2 ICPAES	990512-1
7440-22-4	Silver	0.09	mg/kg	U		P	0.09	TJA61 Trace2 ICPAES	990512-1
7440-23-5	Sodium	7.1	mg/kg	U		P	7.1	TJA61 Trace2 ICPAES	990512-1
7440-28-0	Thallium	0.55	mg/kg	U		P	0.55	TJA61 Trace2 ICPAES	990512-1
7440-62-2	Vanadium	2.1	mg/kg	B		P	0.05	TJA61 Trace2 ICPAES	990512-1
7440-66-6	Zinc	2.4	mg/kg			P	0.05	TJA61 Trace2 ICPAES	990512-1

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:



GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

Certificate of Analysis

Sample ID: BLDG830-SP03

Lab ID: 9903088-01

Chain of Custody: 1304

Received Date: 3/2/99

Sample Date: 2/23/99

Sample Time: 1030

Parameter	Result	Accuracy	Qualifier	DL	Units	DOA	Batch
Americium-241	0.0196	0.0351	U	0.0496	pCi/G	3/4/99	143796
Beryllium-7	-0.0190	0.2342	U	0.4024	pCi/G	3/4/99	143796
Cesium-134	-0.0054	0.0252	UJ-K	0.0369	pCi/G	3/4/99	143796
Cesium-137	2.252	0.3074		0.045	pCi/G	3/4/99	143796
Cobalt-57	0.0010	0.0136	U	0.0234	pCi/G	3/4/99	143796
Cobalt-60	0.7870	0.1025		0.0287	pCi/G	3/4/99	143796
Europium-152	-0.0132	0.0655	UJ-K	0.1141	pCi/G	3/4/99	143796
Europium-154	0.0671	0.0624	UJ-K	0.1211	pCi/G	3/4/99	143796
Europium-155	0.0550	0.0667	UJ-K	0.0929	pCi/G	3/4/99	143796
Gross Alpha	6.687	2.4404		1.9979	pCi/G	3/9/99	144009
Manganese-54	-0.0240	0.0288	UJ-K	0.0404	pCi/G	3/4/99	143796
Nonvolatile Beta	9.605	2.7426		4.6729	pCi/G	3/9/99	144009
Plutonium-238	0.1210	0.274	U	0.509	pCi/G	3/12/99	144042
Plutonium-239/240	0	0	UJ-K	0.242	pCi/G	3/12/99	144042
Sodium-22	0.0240	0.0222	UJ-K	0.0414	pCi/G	3/4/99	143796
Strontium-90	0.6610	0.848	UJ-K	1.87	pCi/G	3/9/99	144014
Vanadium-48	0.0443	0.0393	UJ-K	0.0751	pCi/G	3/4/99	143796
Zinc-65	-0.0213	0.0541	U	0.0919	pCi/G	3/4/99	143796

This data has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures.



GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

Certificate of Analysis

Sample ID: BLDG830-SP04

Lab ID: 9903088-02

Chain of Custody: 1304

Received Date: 3/2/99

Sample Date: 2/23/99

Sample Time: 1045

Parameter	Result	Accuracy	Qualifier	DL	Units	DOA	Batch
Americium-241	-0.0012	0.1239	U	0.1927	pCi/G	3/4/99	143796
Beryllium-7	-0.0914	0.2477	U	0.3596	pCi/G	3/4/99	143796
Cesium-134	0.0233	0.0216	UJ-K	0.0363	pCi/G	3/4/99	143796
Cesium-137	3.659	0.382	U	0.0412	pCi/G	3/4/99	143796
Cobalt-57	-0.0017	0.0137	U	0.0247	pCi/G	3/4/99	143796
Cobalt-60	2.592	0.3085	UJ-K	0.0381	pCi/G	3/4/99	143796
Europium-152	0.0030	0.0639	UJ-K	0.1094	pCi/G	3/4/99	143796
Europium-154	0.0164	0.0631	UJ-K	0.1122	pCi/G	3/4/99	143796
Europium-155	0.0158	0.0564	UJ-K	0.1036	pCi/G	3/4/99	143796
Gross Alpha	4.900	2.1523	UJ-K	2.062	pCi/G	3/9/99	144009
Manganese-54	-0.0077	0.0242	UJ-K	0.0414	pCi/G	3/4/99	143796
Nonvolatile Beta	56.8542	4.8731	U	4.1826	pCi/G	3/9/99	144009
Plutonium-238	0.1670	0.317	U	0.645	pCi/G	3/12/99	144042
Plutonium-239/240	0.0840	0.169	UJ-K	0.252	pCi/G	3/12/99	144042
Sodium-22	0.0058	0.0225	UJ-K	0.04	pCi/G	3/4/99	143796
Strontium-90	0.4490	0.672	UJ-K	1.51	pCi/G	3/9/99	144014
Vanadium-48	0.0009	0.0406	UJ-K	0.0702	pCi/G	3/4/99	143796
Zinc-65	0.0294	0.068	U	0.1055	pCi/G	3/4/99	143796

This data has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures.

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GENERAL ENGINEERING LABORATORIES

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Certificate of Analysis

Sample ID: BLDG830-SP05

Lab ID: 9903088-03

Chain of Custody: 1304

Received Date: 3/2/99

Sample Date: 2/23/99

Sample Time: 1100

Parameter	Result	Accuracy	Qualifier	DL	Units	DOA	Batch
Americium-241	0.2222	0.1345		0.1412	pCi/G	3/4/99	143796
Beryllium-7	-0.1765	0.2453	U	0.4324	pCi/G	3/4/99	143796
Cesium-134	0.0049	0.0261	UJ-K	0.0416	pCi/G	3/4/99	143796
Cesium-137	5.359	0.5419		0.0487	pCi/G	3/4/99	143796
Cobalt-57	-0.0098	0.0135	U	0.0244	pCi/G	3/4/99	143796
Cobalt-60	4.765	0.4805		0.0382	pCi/G	3/4/99	143796
Europium-152	0.0014	0.0736	UJ-K	0.1274	pCi/G	3/4/99	143796
Europium-154	0.0420	0.0573	UJ-K	0.1125	pCi/G	3/4/99	143796
Europium-155	0.0157	0.0549	UJ-K	0.1032	pCi/G	3/4/99	143796
Gross Alpha	3.938	0.824		0.675	pCi/G	3/11/99	144009
Manganese-54	0.0098	0.0296	UJ-K	0.0525	pCi/G	3/4/99	143796
Nonvolatile Beta	9.755	1.3364		1.8679	pCi/G	3/11/99	144009
Plutonium-238	0	0	U	0.164	pCi/G	3/12/99	144042
Plutonium-239/240	0.0546	0.11	UJ-K	0.164	pCi/G	3/12/99	144042
Sodium-22	0.0151	0.0205	UJ-K	0.0402	pCi/G	3/4/99	143796
Strontium-90	-0.0379	0.537	UJ-K	1.39	pCi/G	3/9/99	144014
Vanadium-48	-0.0176	0.0545	UJ-K	0.092	pCi/G	3/4/99	143796
Zinc-65	0.0454	0.0814	U	0.1264	pCi/G	3/4/99	143796

This data has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures.

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BLDG 830 BOX DISPOS

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 8A625

Matrix: (soil/water) TCLP Lab Sample ID: 9810625-01

Sample wt/vol: 20.00 (g/mL) mL Lab File ID: 076B7601

% Moisture: _____ decanted: (Y/N) _____ Date Received: 10/16/98

Extraction: (SepF/Cont/Sonc) SEPF Date Extracted: 10/23/98

Concentrated Extract Volume: 1.00 (uL) ^B Date Analyzed: 10/28/98

Injection Volume: 1.0 (uL) ^{3/2/98} Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0 Sulfur Cleanup: (Y/N) N

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO. COMPOUND Q

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
58-89-9	gamma-BHC (Lindane)	1.0	U
76-44-8	Heptachlor	1.0	U
1024-57-3	Heptachlor epoxide	1.0	U
72-20-8	Endrin	2.0	U
72-43-5	Methoxychlor	10.0	U
8001-35-2	Toxaphene	50.0	U
57-74-9	Chlordane (tech.)	12.5	U

General Engineering Laboratories

Form 1: Inorganic Analyses Data Sheet

SDG No.: 8A625T

Method Type: Total Metals

Sample ID: 9810625-01

Client ID: BLDG 830 BOX DISPOSAL

Contract: BRKL00297

Lab Code: GEL

Case No.:

SAS No.:

Matrix: TCLP

Date Received: 10/16/98

Level: LOW

% Solids: 0.00

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7440-38-2	Arsenic	80.0	µg/L	U		P	80.0	TJA61 Trace ICPAES	981026-1
7440-39-3	Barium	115	µg/L	B		P	5.0	TJA61 Trace ICPAES	981026-1
7440-43-9	Cadmium	22.8	µg/L	U		P	22.8	TJA61 Trace ICPAES	981026-1
7440-47-3	Chromium	52.9	µg/L	B		P	14.0	TJA61 Trace ICPAES	981026-1
7439-92-1	Lead	30.0	µg/L	U		P	30.0	TJA61 Trace ICPAES	981026-1
7439-97-6	Mercury	8.8	µg/L	B		AV	1.0	PE CVAA	981023bp-1
7782-49-2	Selenium	50.4	µg/L	U		P	50.4	TJA61 Trace ICPAES	981026-1
7440-22-4	Silver	17.2	µg/L	U		P	17.2	TJA61 Trace ICPAES	981026-1

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BLDG 830 BOX DISPOS

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 8A625

Matrix: (soil/water) TCLP Lab Sample ID: 9810625-01

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: PEST-35

% Moisture: _____ decanted: (Y/N) _____ Date Received: 10/16/98

Extraction: (SepF/Cont/Sonc) SEPF Date Extracted: 10/23/98

Concentrated Extract Volume: 1.00 (mL) Date Analyzed: 10/27/98

Injection Volume: 1.0 (uL) Dilution Factor: 10.0

GPC Cleanup: (Y/N) N pH: 7.0 Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
---------	----------	--	---

1928-38-7-----	2,4-D	20.0	U
93-72-1-----	2,4,5-TP	20.0	U

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BLDG830-
DISPOSAL

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 92706

Matrix: (soil/water) SOIL Lab Sample ID: 9902706-01

Sample wt/vol: 30.0 (g/mL) G Lab File ID: 030F3001

% Moisture: 4 decanted: (Y/N) N Date Received: 02/18/99

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 02/23/99

Concentrated Extract Volume: 1.00 (mL) Date Analyzed: 03/03/99

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0 Sulfur Cleanup: (Y/N) N

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NO. COMPOUND UG/KG Q

2051-24-3	alpha-BHC	0.69	U
319-85-7	beta-BHC	0.69	U
319-86-8	delta-BHC	0.69	U
58-89-9	gamma-BHC (Lindane)	0.69	U
76-44-8	Heptachlor	0.69	U
309-00-2	Aldrin	0.69	U
1024-57-3	Heptachlor epoxide	0.69	U
959-98-8	Endosulfan I	0.69	U
60-57-1	Dieldrin	1.4	U
72-55-9	4,4'-DDE	1.4	U
72-20-8	Endrin	1.4	U
33213-65-9	Endosulfan II	1.4	U
72-54-8	4,4'-DDD	1.4	U
1031-07-8	Endosulfan sulfate	1.4	U
50-29-3	4,4'-DDT	1.4	P
72-43-5	Methoxychlor	6.9	U
53494-70-5	Endrin ketone	0.49	J
8001-35-2	Toxaphene	34.7	U
12674-11-2	Aroclor-1016	3.5	U
11104-28-2	Aroclor-1221	3.5	U
1114-16-5	Aroclor-1232	3.5	U
53469-21-9	Aroclor-1242	3.5	U
12672-29-6	Aroclor-1248	3.5	U
11097-69-1	Aroclor-1254	3.5	U
11096-82-5	Aroclor-1260	3.5	U
57-74-9	Chlordane (tech.)	8.7	U

Data File: /chem/VOA1.i/022499.b/1X313.d
 Report Date: 04-Mar-1999 09:49

General Engineering Laboratories, Inc.

TARGET COMPOUNDS

Client Name: Brookhaven National 18-FEB-1999 Client SDG: 92706
 Lab Smp Id: 9902706-01 Client Smp ID: BLDG830-DISPOSAL
 Sample Location: Sample Point:
 Sample Date: 02/16/99 Date Received: 02/18/99
 Sample Matrix: Soil Quant Type: ISTD
 Analysis Type: VOA Level: LOW
 Data Type: MS DATA Operator: RMB SUPER GRP.
 Misc Info: |9902706-01|143127|1|VOA8260/4|||

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/KG) ug/Kg	Q
74-87-3	chloromethane	10.0	U
75-01-4	vinyl chloride	10.0	U
74-83-9	bromomethane	10.0	U
75-00-3	chloroethane	10.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-dichloroethene	5.0	U
67-64-1	acetone	5.0	U
75-15-0	carbon disulfide	5.0	U
75-09-2	methylene chloride	2.0	U
156-60-5	trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-dichloroethane	5.0	U
108-05-4	Vinyl Acetate	5.0	U
78-93-3	2-butanone	5.0	U
67-66-3	chloroform	0.71	U
71-55-6	1,1,1-trichloroethane	5.0	U
56-23-5	carbon tetrachloride	5.0	U
107-06-2	1,2-dichloroethane	5.0	U
71-43-2	benzene	5.0	U
79-01-6	trichloroethene	5.0	U
78-87-5	1,2-dichloropropane	5.0	U
75-27-4	bromodichloromethane	5.0	U
110-75-8	2-Chloroethylvinyl ether	5.0	U
10061-01-5	cis-1,3-dichloropropene	5.0	U
108-10-1	4-methyl-2-pentanone	5.0	U
108-88-3	toluene	5.0	U
10061-02-6	trans-1,3-dichloropropene	5.0	U
79-00-5	1,1,2-trichloroethane	5.0	U
591-78-6	2-hexanone	5.0	U
127-18-4	tetrachloroethene	5.0	U
124-48-1	dibromochloromethane	5.0	U
108-90-7	chlorobenzene	5.0	U
100-41-4	ethylbenzene	5.0	U
75-25-2	bromoform	5.0	U
79-34-5	1,1,2,2-tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U

Data File: /chem/VOA1.i/022499.b/1X313.d
Report Date: 04-Mar-1999 09:49

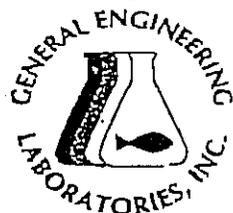
Page 2

General Engineering Laboratories, Inc.

TARGET COMPOUNDS

Client Name: Brookhaven National	18-FEB-1999	Client SDG: 92706
Lab Smp Id: 9902706-01		Client Smp ID: BLDG830-DISPOSAL
Sample Location:		Sample Point:
Sample Date: 02/16/99		Date Received: 02/18/99
Sample Matrix: Soil		Quant Type: ISTD
Analysis Type: VOA		Level: LOW
Data Type: MS DATA		Operator: RMB
Misc Info: 9902706-01 143127 1 VOA8260/4		SUPER GRP.

CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		(ug/L or ug/Kg)	ug/Kg
106-46-7-----	1,4-Dichlorobenzene	5.0	U
95-50-1-----	1,2-Dichlorobenzene	5.0	U



GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	ES7156/87294	ES7472/87458
NC	233	
NJ	79002	79002
SC	10120	10582
TN	02934	02934

Client: Brookhaven National Laboratory
 OER
 Building 51M
 Upton, New York 11973-5000

Contact: Ms. Anna Bou

cc: BRKLO0297

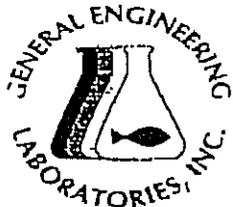
Report Date: May 19, 1999

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Sample ID : BLDG830 Box Disposal
 Lab ID : 9905144-01
 Matrix : Soil
 Date Collected : 07/16/98
 Date Received : 05/06/99
 Priority : Routine
 Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Metals Analysis											
<i>(CP Scan for 23 Metals - 23 items)</i>											
Aluminum		4740000	3810	5070	ug/kg	2.0	MBL	05/10/99	1511	148650	1
Antimony	J	188	166	1010	ug/kg	2.0					
Arsenic		1890	302	507	ug/kg	2.0					
Barium		11700	33.7	507	ug/kg	2.0					
Beryllium	J	169	22.6	507	ug/kg	2.0					
Cadmium	U	ND	21.1	507	ug/kg	2.0					
Calcium		2300000	1560	10100	ug/kg	2.0					
Chromium		7780	73.9	507	ug/kg	2.0					
Cobalt		2290	68.0	507	ug/kg	2.0					
Copper		6100	134	507	ug/kg	2.0					
Iron		6930000	875	5070	ug/kg	2.0					
Lead		12500	68.7	507	ug/kg	2.0					
Magnesium		2000000	337	1010	ug/kg	2.0					
Manganese		106000	91.6	1010	ug/kg	2.0					
Nickel		5210	230	507	ug/kg	2.0					
Potassium		3330000	595	10100	ug/kg	2.0					
Selenium	J	476	142	507	ug/kg	2.0					
Silver	U	ND	62.9	507	ug/kg	2.0					
Sodium		29800	2950	10100	ug/kg	2.0					
Thallium	U	ND	266	1010	ug/kg	2.0	MBL	05/12/99	0923	148650	1
Tin	J	976	298	1010	ug/kg	2.0	MBL	05/10/99	1511	148650	1
Vanadium		10200	43.3	507	ug/kg	2.0					
Zinc		12300	98.0	507	ug/kg	2.0					
General Chemistry											
Cyanide, Reactive	U	ND	0.0147	250	mg/kg	1.0	JLP	05/12/99	1135	148905	2
Sulfide, Reactive	U	ND	0.0159	529	mg/kg	1.0	JEN	05/12/99	1515	148814	3
Paint Filter Test		pass					JBK	05/11/99	1245	148824	4
Evaporative Loss @ 105 C		6.00	1.00	1.00	wt%	1.0	GJ	05/17/99	1655	149343	5
<i>pH - 2 items</i>											





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Laboratory Certifications

STATE	GEL	EPI
FL	E871568/194	E8747287458
NC	233	
NJ	79002	79002
SC	10120	10582
TN	02934	02934

Client: Brookhaven National Laboratory
 OER
 Building 51M
 Upton, New York 11973-5000
 Contact: Ms. Anna Bou

cc: BRKL00297

Report Date: May 19, 1999

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Sample ID : BLDG830 Box Disposal

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
pH		7.86	0.0100	0.100	SU	1.0	LAA	05/18/99	1736	149462	6
pH Temperature		23.3	0.100	0.100	C	1.0	LAA	05/18/99	1736	149462	6

The following prep procedures were performed:

TRACE

FGD 05/10/99 1000 148650 7

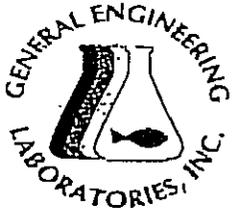
M = Method	Method-Description
M 1	EPA 6010A
M 2	SW-846 Chapter 7-7.3.3
M 3	SW-846 Chapter 7.7.3.4.2
M 4	EPA 9095
M 5	EPA 3550
M 6	SW846 9045 C
M 7	EPA 3050

Notes:

The qualifiers in this report are defined as follows:

- ND indicates that the analyte was not detected at a concentration greater than the detection limit.
- J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
- U indicates that the analyte was not detected at a concentration greater than the detection limit.
- * indicates that a quality control analyte recovery is outside of specified acceptance criteria.

Data reported in mass/mass units is reported as 'dry weight'.



GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
NJ	79002	79002
SC	10120	10382
TN	02934	02934

Client: Brookhaven National Laboratory
OER
Building 51M
Upton, New York 11973-5000
Contact: Ms. Anna Bou

cc: BRKL00297

Report Date: May 19, 1999

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Sample ID : BLDG830 Box Disposal

M = Method

Method-Description

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Nancy Slater at (843) 556-8171.

Wanda Chivers Jones

Reviewed By

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BLDG 830 BOX

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 8A625

Matrix: (soil/water) WATER Lab Sample ID: 9810625-01

Sample wt/vol: 5.000 (g/ml) ML Lab File ID: 8G418

Level: (low/med) LOW Date Received: 10/16/98

% Moisture: not dec. _____ Date Analyzed: 10/29/98

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 10.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		(ug/L or ug/Kg)	UG/L
75-01-4	vinyl chloride	20.0	U
75-35-4	1,1-dichloroethene	70.0	U
67-66-3	chloroform	600	U
107-06-2	1,2-dichloroethane	50.0	U
78-93-3	2-butanone	20000	U
56-23-5	carbon tetrachloride	50.0	U
79-01-6	trichloroethene	50.0	U
71-43-2	benzene	50.0	U
127-18-4	tetrachloroethene	70.0	U
108-90-7	chlorobenzene	10000	U
106-46-7	1,4-Dichlorobenzene	750	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BLDG 830 BOX

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 8A625

Matrix: (soil/water) TCLP Lab Sample ID: 9810625-01

Sample wt/vol: 100.0 (g/mL) ML Lab File ID: 1Q511

Level: (low/med) LOW Date Received: 10/16/98

% Moisture: _____ decanted: (Y/N) _____ Date Extracted: 10/21/98

Concentrated Extract Volume: 1.00 (mL) Date Analyzed: 10/23/98

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
110-86-1	pyridine	100	U
106-46-7	1,4-dichlorobenzene	100	U
95-48-7	o-cresol	100	U
106-44-5	m,p-cresol	100	U
67-72-1	hexachloroethane	100	U
98-95-3	nitrobenzene	100	U
87-68-3	hexachlorobutadiene	100	U
88-06-2	2,4,6-trichlorophenol	100	U
95-95-4	2,4,5-trichlorophenol	100	U
121-14-2	2,4-dinitrotoluene	100	U
118-74-1	hexachlorobenzene	100	U
87-86-5	pentachlorophenol	100	U



GENERAL ENGINEERING LABORATORIES

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Certificate of Analysis

Sample ID: 9810625-02

Lab ID: QCS54825

Chain of Custody:

Received Date: 10/24/98

Sample Date: 10/24/98

Sample Time:

Parameter	Result	Accuracy	Qualifier	DL	Units	DOA	Batch
Americium-241	24.96	3.37		0.6507	pCi/G	10/26/98	134401
Beryllium-7	-4.042	5.203	UJ-K	9.113	pCi/G	10/26/98	134401
Cesium-134	-0.1246	0.103	UJ-K	0.1753	pCi/G	10/26/98	134401
Cesium-137	912	87.82		0.1646	pCi/G	10/26/98	134401
Cobalt-57	0.0923	0.0887	UJ-K	0.163	pCi/G	10/26/98	134401
Cobalt-60	35.41	3.798		0.0525	pCi/G	10/26/98	134401
Europium-152	0.1682	0.4699	UJ-K	0.7038	pCi/G	10/26/98	134401
Europium-154	0.0032	0.0914	UJ-K	0.1572	pCi/G	10/26/98	134401
Europium-155	0.0701	0.279	DL	0.519	pCi/G	10/26/98	134401
Manganese-54	-0.0150	0.0639	UJ-K	0.1068	pCi/G	10/26/98	134401
Sodium-22	0.0009	0.0342	UJ-K	0.0588	pCi/G	10/26/98	134401
Vanadium-48	1.593	4.944	UJ-K	8.639	pCi/G	10/26/98	134401
Zinc-65	-0.1650	0.164	U	0.2767	pCi/G	10/26/98	134401

This data has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures.

Vaneta W. Judd