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FINAL REPORT PLANT 1 PAD EXPEDITED MAINTENANCE WORK MARCH 1991

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FINAL REPORT

PLANT 1 PAD EXPEDITED MAINTENANCE WORK

Feed Materials Production Center

U. S. Department of Energy

MARCH 1991

PLANT 1 PAD
EXPEDITED MAINTENANCE

Introduction

Plant 1 is the "Sampling Plant" for the FMPC and is therefore involved in the sampling of large amounts of uranium metal process residues and waste materials. The Plant 1 concrete storage pad, which covers approximately 8 acres near the plant, has been used as a drum storage location for low level wastes and recoverable uranium residues to support Plant 1 operations since 1952. The current inventory of the Plant 1 Pad is approximately 45,000 total drums. The inventoried waste materials and process materials contain varying quantities of radionuclides including uranium and thorium. In addition, the drums are undergoing characterization consistent with the requirements of Subtitle C of the Resource Conservation and Recovery Act (RCRA). RCRA hazardous constituents or characteristics have been identified in a small portion of the wastes stored on the Plant 1 Pad which subsequently were removed and placed in RCRA storage. The balance of the drums are being evaluated for appropriate disposition.

Materials containing varying amounts of uranium (U metal, UO_3, UF_2, and UO_2), thorium, and other hazardous substances are stored on the Plant 1 Pad. Some of the carbon steel drums used to store wastes on the pad have deteriorated as a result of extended exposure to the elements, thereby increasing the risk of release of hazardous material to the environment. Additionally, the pad has a number of cracks and control joints which may serve as a route for the migration of released contaminants to the underlying soils. On July 17, 1990 a minor event occurred on Plant 1 Pad related to drum movements. A fork truck, which was routinely moving drums, drove over a deteriorated section of the pad which jolted the drum causing a spill. The material was cleaned up and pad operations were suspended until the conditions of the pad were rectified. The rough surface of the pad has also been the subject of numerous complaints from Waste Operations personnel related to potential back injuries.

Performed Actions

The Proposed Amended Consent Decree, recently negotiated with the State of Ohio, requires that all of the drums on the Plant 1 Pad be arranged to provide adequate aisle space for inspection by September 30, 1990. This commitment required extensive fork truck movement on all areas of the Plant 1 Pad including the transport of drums off the pad to indoor storage. Extensive overpacking of the drums was also required, increasing fork truck traffic on the pad. Due to the fact that the Plant 1 Pad surface was significantly deteriorated, the amount of fork truck traffic required for the work presented a safety hazard. Therefore, an expedited maintenance action to repair the deteriorated concrete areas of Plant 1 Pad was initiated to mitigate potential injury to fork truck drivers caused by jarring or exposure to spilled uranium residues.

The work was broken down as shown in Figure 1 into the following four areas:

Area 1	East Main Aisle on Plant 1 Pad
Area 2A	North of Building 66
Area 2B	West Access Road to Plant 1 Pad
Area 2C	East Access Road to Plant 1 Pad

The work in these areas consisted of removing approximately 4 inches of concrete down to the reinforcing bars, placing the removed concrete/rubble in drums for sampling, and replacing with new concrete.

The following Table 1 shows the quantities involved in each section:

TABLE 1

Section	New Concrete, yd^3	Estimated* Rubble, drums
1	13	98
2A	5	38
2B	19	144
2C	9	68
Total	46	348

* The estimate is based on the replacement concrete volume times an approximately 100% bulking factor which would fit in the available drum volume. This correlates very well with the actual quantity of 348 drums of rubble.

Control Measures

Incidental to doing the work, there are several release pathways to the environment such as:

1) Air - Fugitive dust emissions
2) Surface water - Particles of contamination being carried to the storm sewer
3) Groundwater - Particles of contamination being driven into the soils beneath the pad

Fugitive dust from the maintenance activities was controlled by tent-like containments for "jack-hammering" and periodic sprinkling. The water resulting from the controls was collected in drums for sampling. The potential for material to be carried from the pad by runoff to the surrounding soil and/or the storm sewer system was mitigated by collecting the loose materials and saw cutting water in drums. The potential for groundwater contamination was minimal since only the upper portion of the pad was addressed and the surface water control methods are in place.

During the repairs of the deteriorated pad areas, access to the deteriorated areas was restricted and only balloon tire fork trucks were utilized on the pad to mitigate safety concerns until the repairs were completed. Sampling will be performed on the drummed materials from the pad repairs. All materials removed during the repair were containerized and stored on Plant 1 Pad pending their evaluation for disposition.

The potential threat associated with the existing configuration and waste inventory on the Plant 1 Pad arises from the potential spillage of material during transport or fugitive emissions from the Plant 1 Pad activities. These threats were appropriately minimized through the use of administrative controls for storage and handling of waste material and the implementation of focused maintenance actions to ensure safety in the operation of the pad.

Sampling

Extensive sampling has been completed in the Plant 1 Pad area in support of the proposed Plant 1 Pad Continuing Release removal action, the FMPC Environmental Monitoring program, and the ongoing Remedial Investigation/Feasibility Study. These samples were collected to characterize the existing environmental conditions and to assess the nature and extent of any chemical or radiological contaminants present at that location. This sampling focused on the surface and subsurface soils adjacent to and under the Plant 1 Pad and the groundwater present in the glacial till and the regional aquifer in the vicinity of the pad.

The sampling performed as part of this maintenance action focused only the soils beneath the areas where the pad was repaired. The maintenance project exposed soils beneath the pad and provided an opportunity to collect and analyze samples. Figure 1 shows the sampling locations and the relationship to the Sections of the maintenance. Soil samples were collected at the surface (beneath the pad), and at a depth of one foot, at each location as shown in Table 4. Sequence numbers 10, 16, and 17 were planned for sampling, but without the opportunity for collection. In addition, five rinseate samples, from the sampling tools, were also collected. The drums containing the rubble were not sampled as indicated in the commitment due to schedule constraints in sampling requirements for the Proposed Amended Consent Decree.

The surface soils were extensively analyzed. Soil was analyzed for trace metals including:

Arsenic	Lead
Barium	Selenium
Cadmium	Silver
Chromium	Mercury

In addition, each of these samples was tested for TCLP concentrations for each of these metals. Each surface soil sample was also analyzed for

Total Uranium	Plutonium-238
Total Thorium	Plutonium-239,40
Isotopic Uranium	Cesium-137
Isotopic Thorium	Neptunium-237
Radium-226	Ruthenium-106
Radium-228	Technetium-99
Strontium-90	

The soil samples collected at a depth of one foot were analyzed for total uranium and total thorium.

The old concrete which was removed from the pad is now stored in containers, on the pad, and is identified as Lot. No. W050-100-P003-5434. Analytical results of samples from these drums will identify the contaminants present for proper final disposition of the removed material.

Analytical Results

Table 2 shows the summary results for the trace metals analyses and the TCLP extraction concentrations. None of the metals concentrations are outside of the range of expected background concentrations [1,2]. None of the TCLP concentrations exceeded the limits. The higher metals concentrations are shown only to aid comparison. Table 5 and Table 6 show the individual results for the trace metals analyses and the TCLP extraction concentrations.

Table 3 summarizes the surface soil radionuclide concentration results. The principle contaminant found is uranium. Ten of the 20 samples had uranium concentrations in excess of the NRC Branch Technical Position guidance for uncontrolled land use (35 pCi/g for depleted uranium). A greater fraction of the locations could exceed the BTP criteria; samples were not analyzed for uranium 234 and 235 concentrations. All locations exceeded typical and expected background concentrations. At one foot depth, however, only Location 24 exceeded the BTP concentrations. Table 7 lists the individual surface soil radionuclide concentrations.

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1 Shacklette, H.T., and Boerngen, J.A., "Elemental Concentrations in Soils and Other Surficial Materials of the Conterminous United States", U.S. Geological Survey Professional Paper 1270, 1984.

2 Logan, T.J., and Miller, R.H., "Background Levels of Heavy Metals in Ohio Farm Soils", Research Circular 275, Ohio State University, February, 1983.

Thorium-230 and radium-226 results were in the background range with one exception for each isotope. These were:

Thorium-230	8.62 ± 1.32 pCi/g at Location 19
Radium-226	5.31 ± 0.48 pCi/g at Location 21

The radium-226 concentration at Location 21 is essentially equal to the guidance for uncontrolled land use (5 pCi/g). The similar limit for thorium is 10 pCi/g. Other than in the two exceptions, thorium-230 and radium-226 were present in statistically equivalent concentrations. This demonstrated secular equilibrium is evidence that the two radionuclides are present as daughters of background concentrations of the uranium-238 series. The data imply an ambient background concentration of approximately 2 pCi/g of uranium-238.

Thoriums 232, 228, and radium-228 concentrations are within the range of expected background for the thorium series. Within the statistics of the analyses, secular equilibrium is demonstrated and provides evidence of natural occurrence. Concentrations are within the limits for uncontrolled land use.

Concentrations of plutonium-239,40, plutonium-238, and neptunium-237 in the soil samples are nearly equivalent to the analytical sensitivity for each radionuclide. There is low-level world-wide distribution of these man-made isotopes. There is non-uniform distribution because of the very low concentrations and, along with the analytical sensitivity, there is no distinction possible of any FMPC contribution. The concentrations are, however, low in relation to potential radiation dose and risk.

Similarly, it is not possible to distinguish any FMPC contribution compared to world-wide fallout levels of cesium-137, ruthenium-106, and strontium-90.

Gaseous diffusion separation of reprocessed uranium can enhance concentrations of technetium-99. The concentrations present beneath the pad are likely due to FMPC activities. The concentration ranges are not of concern because of the relatively low potential dose commitment at those levels.

Beyond the previous discussions, there are no additional conclusions to be made through a focus on the sample locations and the attendant radionuclide concentrations. For example, Locations 20 and 21 had more consistently elevated concentrations of the various isotopes. However, the thorium-232 series (with radium-228 and thorium-228) concentrations are not distinct from background. The man made radionuclide concentrations cannot be differentiated from the world-wide distribution of these isotopes.

Conclusion

The repairs were successfully completed and the threat was minimized. An evaluation of the analytical results would indicate that similar concentrations could be expected in other areas under the pad, although the repaired areas probably would have had the greatest potential for prior releases to the soils beneath. The completion of drum sampling for characterization and final disposition will complete the work.

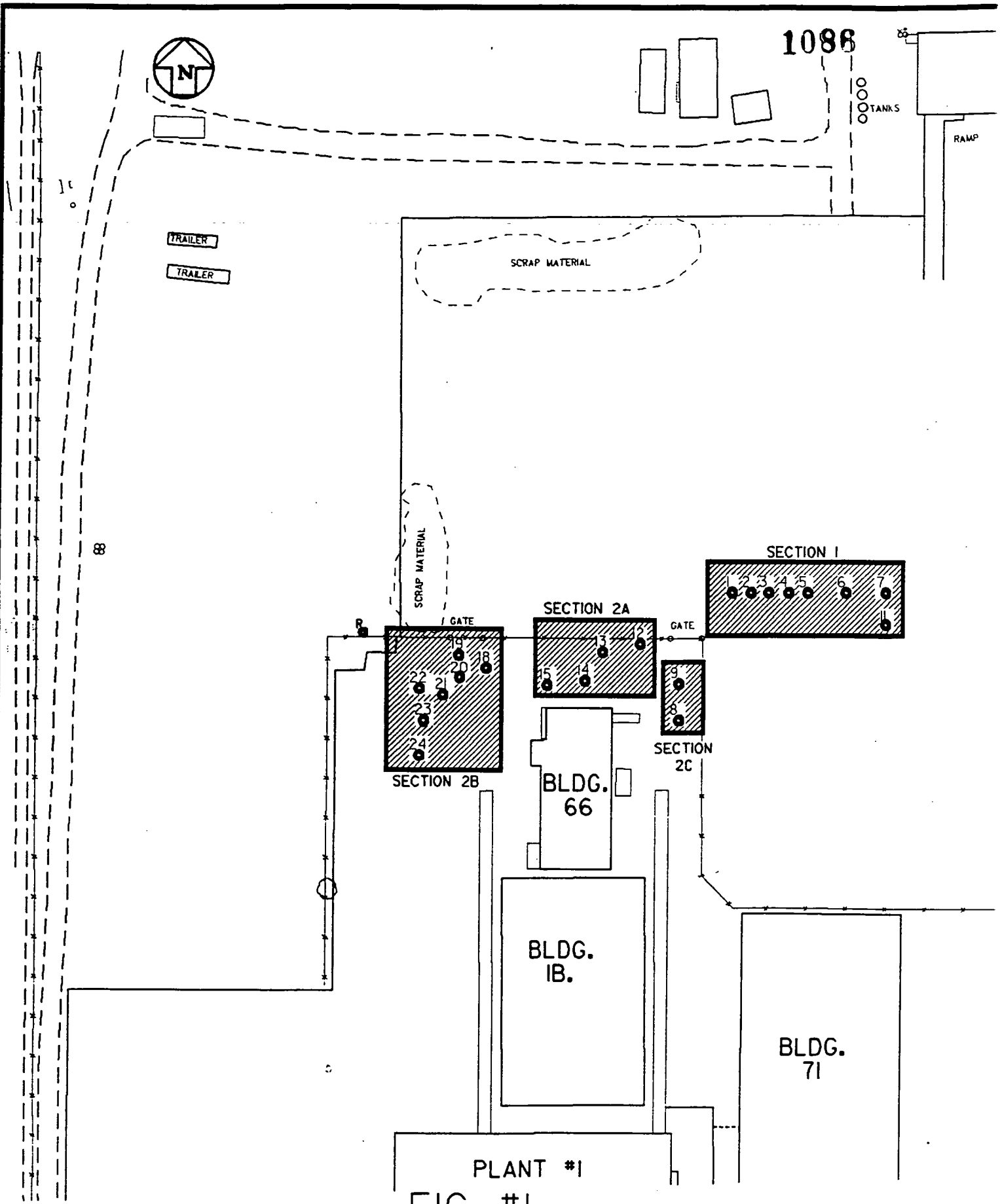

FIG. #1
PLANT #1 PAD MAINTENANCE PROJECT
SOIL SAMPLING LOCATIONS
BENEATH THE PAD.

TIME-13:38:16
DATE-Mar. 20, 1991

TABLE 2
PLANT 1 PAD EXPEDITED MAINTENANCE
Summary
Metals in Surface Soils and TCLP Extracts

		Arsenic	Barium	Cadmium	Chromium	Lead	Selenium	Silver	Mercury
SOILS (ug/g)									
Analytical Sensitivity		12	(<50)	0.5	2.5	1.0	20	0.7	0.20
Fraction Detectable	[1]	(0/20)	(20/20)	(16/20)	(20/20)	(19/20)	(0/20)	(1/20)	(0/20)
Mean + 1 Std. Dev.	[2]	-	94.0+31.1	0.81+0.21	12.8+3.9	23.3+5.1		5.0 (21)	
High	[3]	-	186 (11)	1.14 (4)	22.4 (24)	34.5 (4)			
Low	[3]	-	54.3 (15)	<0.5 (20-22)	5.3 (15)	11.7 (24)			
Concentrations Greater Than Mean + 1 Std. Dev.	[3]		127 (8) 186 (11)	1.1 (1) 1.1 (3) 1.14 (4) 1.1 (14)	20 (3) 18 (23) 22.4 (24)	34.5 (4) 32.9 (11) 30.1 (19)			
TCLP Extract (ug/L)									
Analytical Sensitivity		200	200	100	500	200	200	50	15
Fraction Detectable	[1]	(0/20)	(18/19)	(0/19)	(0/19)	(0/19)	(2/19)	(6/19)	(0/19)
Mean + 1 Std. Dev.	[2]	-	802+324					88.7+25.0	
High	[3]	-	1870 (11)				427 (4)	128 (2)	
Low	[3]	-	<200 (4)						
Concentrations Greater Than Mean + 1 Std. Dev.	[3]	-	1120 (8) 1870 (11)				427 (4) 391 (19)	128 (2)	

[1] Detected / Total Samples
[2] + = Tolerance, plus or minus with 68% confidence
[3] Sample location in parenthesis

TABLE 3
PLANT 1 PAD EXPEDITED MAINTENANCE
Summary
Radioanalytical Results (pCi/g)

		Uranium-238	Thorium-230	Radium-226	Thorium-232
Analytical Sensitivity		0.5	0.5	0.3	0.5
Fraction Detectable	[1]	(20/20)	(20/20)	(19/20)	(20/20)
Mean + 1 Std. Dev.	[2]	63 + 55	2.6 + 1.7	1.4 + 1.0	0.91 + 0.30
High	[3]	247 + 35 (15)	8.62 + 1.32 (19)	5.31 + 0.48 (21)	1.68 + 0.35 (19)
Low	[3]	10.3 + 1.2 (9)	0.99 + 0.31 (7)	<0.3 (12)	0.60 + 0.18 (13)
Concentrations Greater Than Mean + 1 Std. Dev.	[3]	247 + 35 (15)	8.62 + 1.32 (19)	5.31 + 0.48 (21)	1.68 + 0.35 (19)
		148 + 21 (13)			1.44 + 0.38 (21)
					1.44 + 0.28 (20)

		Radium-228	Thorium-228	Plutonium 239,40	Plutonium 238
Analytical Sensitivity		0.5	0.5	0.1	0.1
Fraction Detectable	[1]	(18/20)	(20/20)	(5/20)	(8/20)
Mean + 1 Std. Dev.	[2]	0.84 + 0.21	0.95 + 0.28	0.078 + 0.019	0.092 + 0.057
High	[3]	1.21 + 0.22 (23)	1.49 + 0.33 (19)	0.0998 + 0.0718 (3)	0.225 + 0.096 (20)
Low	[3]	<0.51 (12)	0.53 + 0.16 (9)	<0.02 (8)	<0.027 (8)
Concentrations Greater Than Mean + 1 Std. Dev.	[3]	1.21 + 0.22 (23)	1.49 + 0.33 (19)	0.0998 + 0.0718 (3)	0.225 + 0.096 (20)
		1.13 + 0.22 (8)	1.42 + 0.38 (21)		
		1.13 + 0.14 (20)	1.33 + 0.26 (20)		
		1.08 + 0.17 (21)	1.26 + 0.38 (6)		

		Neptunium-237	Cesium-137	Technetium-99	Strontium-90
Analytical Sensitivity		0.4	0.1	0.75	0.15
Fraction Detectable	[1]	(6/20)	(11/20)	(19/20)	(20/20)
Mean + 1 Std. Dev.	[2]	0.062 + 0.040	0.114 + 0.061	3.47 + 3.51	0.323 + 0.177
High	[3]	0.145 + 0.022 (4)	0.218 + 0.060 (3)	11.8 + 1.5 (1)	0.691 + 0.091 (12)
Low	[3]	<0.026 (18)	<0.031 (9)	<0.75 (2)	0.118 + 0.047 (9)
Concentrations Greater Than Mean + 1 Std. Dev.	[3]	0.145 + 0.022 (4)	0.218 + 0.060 (3)	11.8 + 1.5 (1)	0.691 + 0.091 (12)
			0.212 + 0.056 (21)	9.0 + 1.2 (15)	0.670 + 0.090 (13)
				9.0 + 1.2 (18)	0.643 + 0.087 (23)
				8.5 + 1.2 (23)	

[1] Detected / Total Samples
[2] + = Tolerance, plus or minus with 68% confidence
[3] Sample location in parenthesis

TABLE 4
PLANT 1 PAD EXPEDITED MAINTENANCE
Sampling

Location	Sample No.	Coordinates North	Coordinates East	Analyses Requested	Analyses Actual testing
Reference		481364.0	1380045.0		
1-0	1486	481389.7	1380279.0	A	A
1-1	1487	481389.7	1380279.0	B	B
2-0	1490	481389.7	1380290.7	A	A
2-1	1491	481389.7	1380290.7	B	B
3-0	1494	481389.7	1380302.3	A	A
3-1	1495	481389.7	1380302.3	B	B
4-0	1498	481389.7	1380315.0	A	A
4-1	1499	481389.7	1380315.0	B	B
5-0	1502	481389.7	1380326.7	A	A
5-1	1503	481389.7	1380326.7	B	B
6-0	1506	481389.7	1380353.3	A	A
6-1	1507	481389.7	1380353.3	B	B
7-0	1509	481389.7	1380376.3	A	A
Rns	1510	-	-	A	B
7-1	1511	481389.7	1380376.3	B	B
8-0	1518	481309.4	1380245.0	A	A
8-1	1519	481309.4	1380245.0	B	B
9-0	1522	481332.3	1380245.0	A	A
9-1	1523	481332.3	1380245.0	B	B
Rns	1525	-	-	A	B
11-0	1514	481369.7	1380376.3	A	A
11-1	1515	481369.7	1380376.3	B	B
12-0	1526	481357.0	1380220.0	A	A
12-1	1527	481357.0	1380220.0	B	B
Rns	1530	-	-	A	B
13-0	1531	481351.5	1380196.0	A	A
13-1	1532	481351.5	1380196.0	B	B
14-0	1535	481333.5	1380185.0	A	A
14-1	1536	481333.5	1380185.0	B	B
15-0	1539	481331.0	1380163.0	A	A
15-1	1540	481331.0	1380163.0	B	B
18-0	1543	481342.0	1380122.0	A	A
18-1	1544	481342.0	1380122.0	B	B
19-0	1548	481350.3	1380125.0	A	A
19-1	1549	481350.3	1380125.0	B	B
20-0	1552	481345.7	1380125.0	A	A
20-1	1553	481345.7	1380125.0	B	B
21-0	1556	481325.4	1380095.0	A	A
21-1	1557	481325.4	1380095.0	B	B
22-0	1560	481329.3	1380080.0	A	A
22-1	1561	481329.3	1380080.0	B	B
23-0	1564	481309.3	1380083.0	A	A
23-1	1565	481309.3	1380083.0	B	B
Rns	1568	-	-	A	B
24-0	1569	481287.0	1380080.0	A	A
24-1	1570	481287.0	1380080.0	B	B
Rns	1676	-	-	B	NR

A = Total Th
Total U
Ra-228
Ra-226
Total Pu
TCLP Metals
Total Metals
Cs-137
Np-237
Tc-99
Sr-90
Ru-106
Isotopic U if total U >45 ppm
Isotopic Th if total Th >18 ppm

B = Total Th and Total U

TABLE 5
Trace Metal Analytical Data

SECTION**	SITE ID #	#	SAMPLE TYPE	LOC'N	Arsenic	Barium	Cadmium	Chromium	Lead	Selenium	Silver	Mercury	Thorium+	Uranium+
1	900813-022	1486	S	1-0	<12	76	1.1	11	22.9	<20	<0.70	<0.20	-	-
1	900814-007	1487	S	1-1	-	-	-	-	-	-	-	-	<18	16
1	900813-023	1490	S	2-0	<12	72	.71	12	20.4	<20	<0.70	<0.20	-	-
1	900814-008	1491	S	2-1	-	-	-	-	-	-	-	-	<18	13
1	900813-024	1494	S	3-0	<12	114	1.1	20	27.6	<20	<0.70	<0.20	-	-
1	900814-009	1495	S	3-1	-	-	-	-	-	-	-	-	<18	15
1	900813-032	1498	S	4-0	<12	77.6	1.14	11.2	34.5	<20	<0.70	<0.20	-	-
1	900814-010	1499	S	4-1	-	-	-	-	-	-	-	-	<18	13
1	900813-025	1502	S	5-0	<12	60.5	.68	8	16.8	<20	<0.70	<0.20	-	-
1	900814-011	1503	S	5-1	-	-	-	-	-	-	-	-	<18	11
1	900813-026	1506	S	6-0	<12	60.5	.68	8	16.8	<20	<0.70	<0.20	-	-
1	900814-012	1507	S	6-1	-	-	-	-	-	-	-	-	<18	25
1	900813-027	1509	S	7-0	NR	NR	NR	NR	NR	NR	NR	NR	-	-
1	900814-034	1510	W	Rns	-	-	-	-	-	-	-	-	<40*	<10*
1	900814-013	1511	S	7-1	-	-	-	-	-	-	-	-	<18	11
1	900813-029	1514	S	11-0	<12	186	.68	11.9	32.9	<20	<0.70	<0.20	-	-
1	900814-016	1515	S	11-1	-	-	-	-	-	-	-	-	<18	97
2A	900814-035	1525	W	Rns	-	-	-	-	-	-	-	-	<40*	<10*
2A	900813-030	1526	S	12-0	<12	124	.61	13.3	17.1	<20	<0.70	<0.20	-	-
2A	900814-017	1527	S	12-1	-	-	-	-	-	-	-	-	<18	<11
2A	900814-036	1530	W	Rns	-	-	-	-	-	-	-	-	<40*	<10*
2A	900813-034	1531	S	13-0	<12	123	.88	15.1	20.4	<20	<0.70	<0.20	-	-
2A	900814-018	1532	S	13-1	-	-	-	-	-	-	-	-	<18	18
2A	900813-031	1535	S	14-0	<12	96.6	1.10	12.8	25.8	<20	<0.70	<0.20	-	-
2A	900814-019	1536	S	14-1	-	-	-	-	-	-	-	-	<18	<11
2A	900813-037	1539	S	15-0	<12	54.3	.71	5.3	16.8	<20	<0.70	<0.20	-	-
2A	900814-020	1540	S	15-1	-	-	-	-	-	-	-	-	<18	14
2B	900813-038	1543	S	18-0	<12	68.3	.93	12.2	24.4	<20	<0.70	<0.20	-	-
2B	900814-021	1544	S	18-1	-	-	-	-	-	-	-	-	<18	30
2B	900813-035	1548	S	19-0	12.7	86.6	.60	11.7	30.1	<20	<0.70	<0.20	-	-
2B	900814-022	1549	S	19-1	-	-	-	-	-	-	-	-	<18	17
2B	900813-039	1552	S	20-0	<12	87.1	<.50	11.7	23.2	<20	<0.70	<0.20	-	-
2B	900814-023	1553	S	20-1	-	-	-	-	-	-	-	-	<18	19
2B	900813-040	1556	S	21-0	<12	83.9	<.50	11.6	24.1	<20	<0.70	<0.20	-	-
2B	900814-024	1557	S	21-1	-	-	-	-	-	-	-	-	<18	31
2B	900813-041	1560	S	22-0	<12	80.9	<.50	13.3	21.4	<20	<0.70	<0.20	-	-
2B	900814-025	1561	S	22-1	-	-	-	-	-	-	-	-	<18	47
2B	900813-036	1564	S	23-0	<12	124	.75	18.0	19.6	<20	<0.70	<0.20	-	-
2B	900814-026	1565	S	23-1	-	-	-	-	-	-	-	-	<18	<11
2B	900814-037	1568	W	Rns	-	-	-	-	-	-	-	-	<40*	<10*
2B	900822-044	1569	S	24-0	7.85	88.2	<1.94	22.4	<11.7	NES	.971	<1.94	-	-
2B	900822-042	1570	S	24-1	-	-	-	-	-	-	-	-	<18	110
2B	-	1676	W	Rns	-	-	-	-	-	-	-	-	NR	NR
2C	900813-033	1518	S	8-0	<12	127	.60	15.1	25.4	<20	<0.70	<0.20	-	-
2C	900814-014	1519	S	8-1	-	-	-	-	-	-	-	-	<18	18
2C	900813-028	1522	S	9-0	<12	85.5	.71	9.6	20.2	<20	<0.70	<0.20	-	-
2C	900814-015	1523	S	9-1	-	-	-	-	-	-	-	-	<18	<11

Measurements in (ug/g)
* = (ug/l)
\+ = (ppm)

S = SOIL
W = WATER

NES = Not enough sample for analysis
NR = Not reported

Fraction Detectable	(0/21)	(16/21)
Mean + 1 Std. Dev.		31 + 30
Concentration Greater Than Mean + 1 Std. Dev.		110 (24)
		97 (11)

** = Section 1 location: East Main Aisle
Section 2B location: West Access Road
Section 2A location: North of Bldg. 66
Section 2C location: East Access Road

TABLE 6
TCLP Analytical Data

SECTION**	SITE ID #	#	SAMPLE TYPE	LOC'N	Arsenic	Barium	Cadmium	Chromium	Lead	Selenium	Silver	Mercury	
1	900813-022	1486	S	1-0	<12E03	54E03	1.1E03	8.3E03	20.4E03	<20E03	<0.70E03	<0.20E03	Note 1
1	900814-007	1487	S	1-1	-	-	-	-	-	-	-	-	
1	900813-023	1490	S	2-0	<200	602	<100	<500	<200	<200	128	<0.20	
1	900814-008	1491	S	2-1	-	-	-	-	-	-	-	-	
1	900813-024	1494	S	3-0	<200	786	<100	<500	<200	<200	94	<0.20	
1	900814-009	1495	S	3-1	-	-	-	-	-	-	-	-	
1	900813-032	1498	S	4-0	<200	<200	<100	<500	<200	427	< 50	<0.20	
1	900814-010	1499	S	4-1	-	-	-	-	-	-	-	-	
1	900813-025	1502	S	5-0	<200	880	<100	<500	<200	<200	94	<0.20	
1	900814-011	1503	S	5-1	-	-	-	-	-	-	-	-	
1	900813-026	1506	S	6-0	<200	692	<100	<500	<200	<200	< 50	0.23	
1	900814-012	1507	S	6-1	-	-	-	-	-	-	-	-	
1	900813-027	1509	S	7-0	<200	656	<100	<500	<200	<200	< 50	<0.20	
1	900814-034	1510	W	Rns	-	-	-	-	-	-	-	-	
1	900814-013	1511	S	7-1	-	-	-	-	-	-	-	-	
1	900813-029	1514	S	11-0	<200	1870	<100	<500	<200	<200	50	<0.20	
1	900814-016	1515	S	11-1	-	-	-	-	-	-	-	-	
2A	900814-035	1525	W	Rns	-	-	-	-	-	-	-	-	
2A	900813-030	1526	S	12-0	<200	1010	<100	<500	<200	<200	80	<0.20	
2A	900814-017	1527	S	12-1	-	-	-	-	-	-	-	-	
2A	900814-036	1530	W	Rns	-	-	-	-	-	-	-	-	
2A	900813-034	1531	S	13-0	<200	719	<100	<500	<200	<200	< 50	<0.20	
2A	900814-018	1532	S	13-1	-	-	-	-	-	-	-	-	
2A	900813-031	1535	S	14-0	<200	1010	<100	<500	<200	<200	< 50	<0.20	
2A	900814-019	1536	S	14-1	-	-	-	-	-	-	-	-	
2A	900813-037	1539	S	15-0	<200	806	<100	<500	<200	<200	< 50	<0.20	
2A	900814-020	1540	S	15-1	-	-	-	-	-	-	-	-	
2B	900813-038	1543	S	18-0	<200	499	<100	<500	<200	<200	< 50	0.20	
2B	900814-021	1544	S	18-1	-	-	-	-	-	-	-	-	
2B	900813-035	1548	S	19-0	<200	670	<100	<500	<200	391	< 50	<0.20	
2B	900814-022	1549	S	19-1	-	-	-	-	-	-	-	-	
2B	900813-039	1552	S	20-0	<200	710	<100	<500	<200	<200	< 50	<0.20	
2B	900814-023	1553	S	20-1	-	-	-	-	-	-	-	-	
2B	900813-040	1556	S	21-0	<200	763	<100	<500	<200	<200	< 50	0.20	
2B	900814-024	1557	S	21-1	-	-	-	-	-	-	-	-	
2B	900813-041	1560	S	22-0	<200	516	<100	<500	<200	<200	< 50	<0.20	
2B	900814-025	1561	S	22-1	-	-	-	-	-	-	-	-	
2B	900813-036	1564	S	23-0	<200	402	<100	<500	<200	<200	< 50	<0.20	
2B	900814-026	1565	S	23-1	-	-	-	-	-	-	-	-	
2B	900814-037	1568	W	Rns	-	-	-	-	-	-	-	-	
2B	900822-044	1569	S	24-0	NR	NR	NR	NR	NR	NR	NR	NR	
2B	900822-042	1570	S	24-1	-	-	-	-	-	-	-	-	
2B	-	1676	W	Rns	-	-	-	-	-	-	-	-	
2C	900813-033	1518	S	8-0	<200	1120	<100	<500	<200	<200	< 50	<0.20	
2C	900814-014	1519	S	8-1	-	-	-	-	-	-	-	-	
2C	900813-028	1522	S	9-0	<200	722	<100	<500	<200	<200	86	<0.20	
2C	900814-015	1523	S	9-1	-	-	-	-	-	-	-	-	

Measurements in (ug/l)

S = SOIL
W = WATER

NES = Not enough sample for analysis
NR = Not reported

Note 1 Laboratory reporting appears to be in error

** = Section 1 location: East Main Aisle
Section 2B location: West Access Road

Section 2A location: North of Bldg. 66
Section 2C location: East Access Road

TABLE 7
PLANT 1 PAD EXPEDITED MAINTENANCE
Isotopic Analyses

LOCATION	Th-230 (pCi/g)	Ra-226 (pCi/g)	Total U (ug/g)	U-238 (pCi/g)*	Th-232 (pCi/g)	Th-228 (pCi/g)	Ra-228 (pCi/g)	Total Th (ug/g)
1-0	1.85 + 0.36E+00	1.37 + 0.11E+00	1.35 + 0.14E+02	4.50 + 0.50E+01	8.49 + 2.16E-01	7.68 + 2.04E-01	8.23 + 1.22E-01	7.66 + 1.95E+00
2-0	1.75 + 0.38E+00	1.14 + 0.12E+00	5.24 + 0.78E+01	1.75 + 0.26E+01	6.26 + 2.00E-01	7.69 + 2.24E-01	5.59 + 1.00E-01	5.65 + 1.81E+00
3-0	1.86 + 0.49E+00	1.27 + 0.12E+00	1.50 + 0.16E+02	5.00 + 0.53E+01	7.31 + 2.85E-01	1.06 + 0.35E+00	8.96 + 1.57E-01	6.59 + 2.57E+00
4-0	2.44 + 0.48E+00	1.12 + 0.13E+00	7.47 + 1.13E+01	2.49 + 0.38E+01	9.26 + 2.49E-01	1.12 + 0.28E+00	8.66 + 1.49E-01	8.35 + 2.24E+00
5-0	1.43 + 0.32E+00	1.05 + 0.12E+00	6.97 + 0.82E+01	2.32 + 0.27E+01	7.98 + 2.21E-01	8.60 + 2.31E-01	7.06 + 1.77E-01	7.21 + 2.00E+00
6-0	3.26 + 0.72E+00	9.90 + 1.15E-01	1.48 + 0.18E+02	4.93 + 0.60E+01	1.00 + 0.33E+00	1.26 + 0.38E+00	8.31 + 1.71E-01	9.06 + 3.01E+00
7-0	9.92 + 3.05E-01	1.11 + 0.12E+00	5.49 + 0.83E+01	1.83 + 0.28E+01	5.80 + 2.30E-01	6.26 + 2.38E-01	7.02 + 1.21E-01	5.24 + 2.07E+00
8-0	2.13 + 0.44E+00	1.57 + 0.16E+00	1.84 + 0.19E+02	6.13 + 0.63E+01	1.04 + 0.27E+00	1.13 + 0.29E+00	1.13 + 0.22E+00	9.35 + 2.44E+00
9-0	2.37 + 0.43E+00	6.97 + 0.68E-01	3.10 + 0.37E+01	1.03 + 0.12E+01	7.46 + 1.97E-01	5.29 + 1.62E-01	6.73 + 0.97E-01	6.74 + 1.78E+00
11-0	1.41 + 0.33E+00	1.42 + 0.17E+00	1.96 + 0.30E+02	6.50 + 0.10E+01	7.62 + 2.23E-01	8.50 + 2.38E-01	6.86 + 2.04E-01	6.88 + 2.02E+00
12-0	1.44 + 0.33E+00	< 2.90E-01	6.60 + 1.00E+01	2.20 + 0.33E+01	8.54 + 2.41E-01	8.43 + 2.39E-01	< 5.10E-01	7.71 + 2.18E+00
13-0	2.92 + 0.51E+00	2.07 + 0.20E+00	4.45 + 0.64E+02	1.48 + 0.21E+02	6.04 + 1.77E-01	5.78 + 1.72E-01	6.29 + 1.34E-01	5.46 + 1.59E+00
14-0	1.26 + 0.30E+00	7.12 + 1.10E-01	1.67 + 0.26E+02	5.57 + 0.87E+01	8.01 + 2.23E-01	9.57 + 2.48E-01	5.52 + 1.72E-01	7.23 + 2.02E+00
15-0	2.97 + 0.56E+00	1.30 + 0.14E+00	7.41 + 1.05E+02	2.47 + 0.35E+02	7.81 + 2.26E-01	7.92 + 2.28E-01	9.47 + 1.52E-01	7.05 + 2.04E+00
18-0	3.06 + 0.66E+00	1.05 + 0.12E+00	3.11 + 0.45E+02	1.04 + 0.15E+02	8.24 + 2.81E-01	6.81 + 2.54E-01	6.96 + 1.31E-01	7.43 + 2.53E+00
19-0	8.62 + 1.32E+00	1.31 + 0.11E+00	2.45 + 0.25E+02	8.17 + 0.83E+01	1.68 + 0.35E+00	1.49 + 0.33E+00	1.04 + 0.14E+00	1.52 + 0.32E+01
20-0	3.36 + 0.53E+00	9.89 + 1.03E-01	1.02 + 0.15E+02	3.40 + 0.50E+01	1.44 + 0.28E+00	1.33 + 0.26E+00	1.13 + 0.14E+00	1.30 + 0.25E+01
21-0	2.92 + 0.62E+00	5.31 + 0.48E+00	1.98 + 0.28E+02	6.60 + 0.93E+01	1.44 + 0.38E+00	1.42 + 0.38E+00	1.08 + 0.17E+00	1.30 + 0.35E+01
22-0	1.41 + 0.38E+00	1.07 + 0.17E+00	2.70 + 0.41E+02	9.00 + 1.37E+01	6.82 + 2.54E-01	7.61 + 2.69E-01	< 5.60E-01	6.15 + 2.29E+00
23-0	4.15 + 0.81E+00	1.06 + 0.13E+00	1.61 + 0.17E+02	5.37 + 0.57E+01	1.11 + 0.32E+00	1.14 + 0.32E+00	1.21 + 0.22E+00	1.00 + 0.29E+01

LOCATION	Pu-239,240(pCi/g)	Pu-238 (pCi/g)	Np-237 (pCi/g)	Cs-137 (pCi/g)	Ru-106 (pCi/g)	Tc-99 (pCi/g)	Sr-90 (pCi/g)
1-0	< 4.10E-02	< 1.10E-01	< 4.10E-02	9.83 + 3.54E-02	< 3.90E-01	1.18 + 0.15E+01	3.32 + 0.61E-01
2-0	< 2.20E-02	< 2.90E-02	4.99 + 3.71E-02	6.86 + 2.93E-02	< 2.50E-01	< 7.50E-01	1.78 + 0.46E-01
3-0	9.98 + 7.18E-02	1.10 + 0.70E-01	4.58 + 3.41E-02	2.18 + 0.60E-01	< 5.60E-01	2.56 + 0.64E+00	2.30 + 0.52E-01
4-0	< 2.80E-02	5.68 + 4.76E-02	1.45 + 0.22E-01	1.56 + 0.46E-01	< 4.10E-01	9.98 + 5.23E-01	3.46 + 0.62E-01
5-0	< 1.10E-01	< 4.30E-02	< 4.20E-02	< 1.10E-01	< 7.20E-01	1.66 + 0.56E+00	2.64 + 0.54E-01
6-0	< 3.30E-02	5.52 + 5.05E-02	< 4.20E-02	1.59 + 0.58E-01	< 5.00E-01	2.92 + 0.68E+00	2.02 + 0.75E-01
7-0	< 2.50E-02	< 3.30E-02	< 6.80E-02	6.29 + 3.06E-02	< 3.40E-01	6.23 + 5.06E-01	1.24 + 0.47E-01
8-0	< 2.00E-02	< 2.70E-02	4.15 + 3.31E-02	< 9.00E-02	< 7.40E-01	6.97 + 4.92E-01	1.85 + 0.56E-01
9-0	< 5.20E-02	5.43 + 3.94E-02	< 1.30E-01	< 3.10E-02	< 2.50E-01	1.42 + 0.57E+00	1.18 + 0.47E-01
11-0	< 3.10E-02	< 3.10E-02	3.79 + 2.89E-02	< 1.00E-01	< 9.70E-01	3.95 + 0.77E+00	2.88 + 0.57E-01
12-0	8.28 + 6.49E-02	< 3.60E-02	< 3.80E-02	< 9.20E-02	< 5.40E-01	1.74 + 0.56E+00	6.91 + 0.91E-01
13-0	< 2.70E-02	7.30 + 5.34E-02	< 4.90E-02	6.25 + 4.06E-02	< 4.90E-01	3.18 + 0.72E+00	6.70 + 0.90E-01
14-0	< 3.50E-02	6.69 + 5.86E-02	5.24 + 3.67E-02	< 7.80E-02	< 5.60E-01	5.29 + 5.22E-01	3.10 + 0.62E-01
15-0	4.65 + 4.25E-02	< 2.80E-02	< 3.00E-02	5.37 + 4.47E-02	< 4.70E-01	9.00 + 1.24E+00	2.15 + 0.53E-01
18-0	< 3.10E-02	< 3.10E-02	< 2.60E-02	< 5.20E-02	< 5.10E-01	9.00 + 1.24E+00	4.58 + 0.71E-01
19-0	8.01 + 6.27E-02	9.16 + 6.74E-02	< 4.10E-02	7.27 + 3.49E-02	< 4.50E-01	4.83 + 0.85E+00	2.13 + 0.61E-01
20-0	8.34 + 5.48E-02	2.25 + 0.96E-01	< 3.10E-01	8.84 + 3.13E-02	< 2.60E-01	7.44 + 5.15E-01	1.71 + 0.85E-01
21-0	< 3.90E-02	< 9.90E-02	< 3.90E-01	2.12 + 0.56E-01	< 4.50E-01	1.21 + 0.57E+00	4.53 + 0.74E-01
22-0	< 4.00E-02	< 1.00E-01	< 6.70E-02	< 1.20E-01	< 1.10E+00	5.57 + 4.95E-01	3.78 + 0.66E-01
23-0	< 3.00E-02	< 3.00E-02	< 1.60E-01	< 1.10E-01	< 8.30E-01	8.53 + 1.19E+00	6.43 + 0.87E-01

* - Calculated from Total U Concentrations
\+ - Tolerances are plus or minus with 95% confidence