Gravatt, Dan

From: Gravatt, Dan
Sent: Friday, April 05, 2013 2:00 PM
To: Curry, Tim
Subject: West Lake Landfill: soil isotopic results
Attachments: RI Tables.pdf

Tim, as Jeff requested during the call this morning, here are some of the soil isotope results we have from the RI report. Table 6-11 appears most relevant to Jeff's request.

Sincerely,
Daniel R. Gravatt, PG
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Principles and integrity are expensive, but they are among the very few things worth having.

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Tables

Table 4-1: Summary of Site Investigation Activities and Investigative Data Reports

Site Investigation Activity	Investigation Data Report Title
Site reconnaissance	Site Reconnaissance Report (McLaren/Hart, 1996b)
Threatened or endangered species assessment	Threatened or Endangered Species Assessment Report (McLaren/Hart, 1996c)
Overland gamma survey	Overland Gamma Survey Report (McLaren/Hart, 1996a)
Surface and subsurface soil and perched water investigations	Soil Borings/Surface Soil Investigation Report (McLaren/Hart, 1996h), Split Soil and Groundwater Sampling Data Summary Report (McLaren/Hart, 1996f), and Site Characterization Summary Report (EMSI,1997c)
Groundwater investigations	Groundwater Conditions Report (McLaren/Hart, 1996g), Split Soil and Groundwater Sampling Data Summary Report (McLaren/Hart, 1996g) and Site Characterization Summary Report (EMSI,1997c)
Rainwater runoff, surface water and sediment sampling and analyses	Rainwater Runoff, Erosional Sediment, Surface Water, and Leachate Sampling Data Report (McLaren/Hart, 1996e) and Site Characterization Summary Report (EMSI, 1997c)
Ambient air (fugitive dust and soil gas) measurements	Radon Gas, Landfill Gas and Fugitive Dust Report (McLaren/Hart, 1996d)
Evaluation of radiological emissions	Radon Gas, Landfill Gas and Fugitive Dust Report (McLaren/Hart, 1996d) and Site Characterization Summary Report (EMSI, 1997c)

Table 4-2 : Summary of Geotechnical Testing Results

Sample Number	Water Content (%)	Wet Density (pcf)	Dry Density (pcf)	Comments
1	20.3	111.5	92.7	
2	14.2	--	--	Sample disturbed
3	29.1	90.7	70.3	Direct shear test also
4	27.2	95.0	74.7	

-- indicates sample not tested

Table 4-3 : Summary of RI Depth to Water Measurements

Well	Northing	Easting	Reference Point Elevation (Feet, MSL)	Depth to Water (Feet below TOC)																
				1994		1995											1996			
				Nov. 22, 23, 28	December 29	January 30	March 3	March 30	April 28	May 26	June 30	July 28, Aug. 3*	Aug 31	Oct. 2	Oct. 31	Nov. 30	Jan. 5	April 2	July 5	Oct. 2
Shallow Wells																				
S-1	1069685.83	514205.01	446.51	—	—	—	—	—	—	—	—	—	12.26	13.75	14.38	14.88	15.62	16.94	12.01	13.99
S-5	1069155.84	515901.03	468.65	—	—	—	—	—	—	—	—	—	34.2	35.78	36.51	36.84	37.62	38.96	34.02	35.92
S-8	1071064.35	514724.16	444.03	—	—	—	—	—	—	—	—	—	—	—	11.85	12.52	13.19	14.50	9.11	11.51
S-10	1069827.87	514931.35	480.28	—	—	—	—	—	—	—	—	—	—	47.37	48.16	48.61	49.17	50.85	45.71	47.77
S-51	1066161.31	514320.72	449.57	18.77	18.66	17.81	18.22	18.2	17.81	13.38	14.41	14.81	15.54	16.74	17.42	17.46	17.98	19.09	15.43	16.95
S-53	1066871.02	514496.97	447.95	17.27	17.37	16.47	16.93	16.86	16.30	12.57	12.99	13.06	13.77	15.17	15.89	17.97	16.65	18.04	[illegible]	[illegible]
S-61	1070159.98	514580.24	449.78	19.55	19.61	18.73	19.00	18.97	18.51	13.36	13.86	—	15.27	16.76	17.51	18.18	18.93	20.29	15.08	17.25
S-75	1067250.41	514718.75	462.08	29.92	30.05	29.12	29.85	29.42	29.22	25.31	26.61	26.88	27.41	28.91	29.56	29.81	29.90	29.89	27.23	29.20
S-80	1065191.77	513858.35	453.11	19.15	18.97	17.48	16.96	16.17	16.28	12.70	13.91	14.69	14.85	15.82	16.55	17.77	18.87	18.99	[illegible]	[illegible]
S-82	1069311.99	514272.95	450.18	19.82	19.88	19.05	19.35	19.32	18.71	14.19	14.80	15.02	13.91	17.40	18.11	18.43	19.15	20.61	15.69	17.59
S-84	1069633.39	516439.68	456.23	26.59	26.60	25.67	25.92	25.89	25.68	20.37	20.88	21.49	22.26	23.92	24.67	25.21	25.87	27.07	22.15	24.42
S-88	1068398.39	515234.03	462.76	32.18	32.44	31.51	29.41	31.9	31.43	27.23	27.62	27.73	28.60	30.01	30.72	29.95	31.71	33.11	28.43	30.26
MW-F18	1068601.00	515865.35	461.35	31.11	31.00	30.26	30.42	30.42	30.05	25.74	26.05	26.32	27.06	28.52	29.26	29.58	30.31	31.69	26.99	28.86
MW-101	1070830.48	514424.00	446.83	16.68	16.73	15.91	16.13	16.11	15.67	10.51	—	—	12.20	13.91	14.67	15.29	16.04	17.37	12.02	14.34
MW-102	1070905.01	514532.93	448.18	17.95	18.00	17.18	17.41	17.38	16.91	11.64	12.31	12.81	13.70	15.32	16.06	16.88	17.16	18.67	13.47	15.64
MW-103	1068628.17	514134.35	440.31	9.72	9.91	9.01	9.43	9.37	8.79	5.15	5.39	5.34	6.22	7.57	8.25	8.49	9.26	10.61	6.51	7.59
MW-104	1067525.17	514330.01	440.96	10.33	10.43	9.48	9.98	9.93	9.33	5.72	6.11	6.13	6.95	8.27	8.95	9.06	9.71	11.11	6.78	8.39
MW-106	1065955.75	513616.92	443.78	12.85	12.90	12.28	12.45	12.44	12.07	8.39	8.36	8.56*	9.27	[illegible]	NM	NM	NM	NM	NM	NM
MW-107	1064670.74	513601.12	448.14	5.13	5.44	4.53	5.36	5.1	5.26	—	4.71	5.57	6.06	8.39	9.07	6.36	5.99	5.68	6.17	6.46
MW-F3	1070489.80	515819.83	469.23	38.96	38.97	38.09	38.00	38.29	38.06	32.31	32.94	36.62	34.47	36.21	37.02	37.61	38.39	39.60	34.33	36.73
Intermediate Depth Wells																				
I-2	1069698.28	514212.18	446.41	—	—	—	—	—	—	—	—	—	12.03	13.68	14.31	14.76	15.47	16.90	11.92	13.90
I-4	1069148.42	515189.5	468.57	—	—	—	—	—	—	—	—	—	34.19	35.75	36.45	38.85	37.62	38.92	33.96	35.95
I-7	1070743.05	514299.87	446.97	—	—	—	—	—	—	—	—	—	12.41	14.10	14.87	15.43	16.15	17.52	12.18	14.47
I-9	1069329.26	514268.59	450.90	—	—	—	—	—	—	—	—	—	—	—	18.79	19.2	19.98	21.40	16.52	18.40
I-11	1069819.16	514925.06	480.27	—	—	—	—	—	—	—	—	—	—	—	48.14	48.61	49.35	50.75	45.69	47.74
I-50	1065190.32	513831.96	453.66	22.02	22.27	21.26	21.76	21.65	21.13	16.60	17.40	19.96	18.74	20.27	21	21.03	21.57	23.05	[illegible]	[illegible]
I-62	1070938.26	514647.31	440.21	15.99	16.07	15.19	15.47	15.42	15.03	9.87	9.90	10.34*	11.55	13.02	13.78	14.71	15.56	16.71	11.34	13.71
I-65	1070953.26	515333.39	441.82	11.6	11.70	10.81	11.00	11.03	10.66	5.25	7.35	8.12	7.04	8.81	9.66	10.3	11.06	12.31	6.87	9.36
I-66	1070604.09	515851.01	441.91	11.61	11.66	10.78	11.00	10.95	10.61	5.18	5.56	6.26	7.11	8.83	9.69	10.32	11.04	12.28	6.98	9.45
I-67	1070101.57	516244.09	441.90	11.54	11.57	10.63	10.93	10.97	10.65	5.06	5.65	6.31	7.11	8.81	9.61	10.23	10.87	12.16	7.03	9.39
I-68	1069371.40	516686.36	450.50	20.16	20.10	19.05	19.44	19.45	19.24	13.94	14.52	16.16	15.91	17.52	18.29	18.8	19.45	20.64	15.74	18.03
I-73	1067695.45	515570.09	461.39	31.46	31.68	30.80	31.12	31.0	30.69	26.04	27.15	27.25	27.97	29.39	30.12	30.31	31.00	32.35	28.87	29.52
Deep Wells																				
D-3	1069136.26	515871.62	470.32	—	—	—	—	—	—	—	—	—	35.92	37.49	38.21	38.63	39.43	40.70	35.74	37.78
D-6	1070194.31	514549.5	447.6	—	—	—	—	—	—	—	—	—	13.23	14.82	15.5	16.09	16.77	18.16	12.99	15.12
D-12	1069836.29	514936.08	470.91	—	—	—	—	—	—	—	—	—	—	—	48	48.32	48.98	50.42	45.33	47.42
D-13	1070483.74	515601.73	471.1	—	—	—	—	—	—	—	—	—	—	—	38.94	39.48	40.19	41.49	36.21	38.53
D-14	1068947.16	516523.17	487.77	—	—	—	—	—	—	—	—	—	—	—	0	NM	58.62	59.69	56.21	57.79
D-81	1067338.19	514463.68	451.00	20.3	20.39	19.56	19.95	19.95	19.29	15.62	16.08	16.14	16.91	18.26	18.95	19.04	19.71	21.11	16.78	18.37
D-83	1070930.4	514633.64	448.48	18.29	18.40	17.50	17.82	17.76	17.27	12.17	12.16	12.61*	13.88	15.70	16.41	17.01	17.77	19.01	13.72	16.02
D-85	1069026.55	516430.42	457.13	26.82	26.77	25.87	26.12	26.13	25.89	20.60	21.11	21.71	22.48	24.13	24.87	25.42	26.11	27.39	22.39	24.61
D-87	1069211.46	515404.82	463.05	32.81	32.82	31.96	32.19	32.2	31.81	27.10	27.57	27.86	28.60	30.28	30.96	31.36	32.11	33.54	28.00	30.58
D-93	1069317.89	514209.69	448.62	19.66	19.74	18.02	19.22	19.18	18.58	14.02	14.67	14.83	15.79	17.25	18.01	18.34	19.06	20.51	15.59	17.50
MW-F1D	1068608.68	515860.04	461.63	31.42	31.31	30.51	30.70	30.78	30.41	26.04	26.34	26.61	27.36	28.86	29.6	29.88	30.62	32.02	27.29	29.19
Staff Gages																				
1	1071100.73	514883.10	438.57	—	—	—	—	—	—	—	4.2	3.25	2.35	—	1.5	Dry	Dry	Dry	2.30	Dry
2	1071107.71	514878.03	438.84	—	—	—	—	—	—	—	3.95	3.05	2.1	—	1.25	Dry	Dry	Dry	2.25	Dry
3	1071249.28	514645.19	440.73	—	—	—	—	—	—	—	1.98	1.05	< 0.5	—	3.2	Dry	Dry	Dry	Dry	Dry
4	1071253.42	514635.63	441.05	—	—	—	—	—	—	—	1.7	0.80	< 0.5	—	2.95	Dry	Dry	Dry	Dry	Dry
5	1070745.51	515414.94	460.94	—	—	—	—	—	—	—	—	—	—	—	Dry	Dry	Dry	Dry	Dry	Dry
6	1069471.76	514096.61	437.28	—	—	—	—	—	—	—	2.18	2.64	1.55	—	0.25	0.7	Dry	Dry	1.75	0.80
7	1069480.90	514091.25	437.01	—	—	—	—	—	—	—	2.45	2.95	1.8	0.30	0	1	Dry	Dry	2.00	1.00

NM = Not Measured

Table 4-4 . Summary of RI Groundwater Elevation Measurements

Well	Northing	Easting	Reference Point Elevation (Feet, MSL)	Groundwater Elevation (Feet, MSL)																
				1994		1995											1996			
				Nov. 22, 23, 28	December 29	January 30	March 3	March 30	April 28	May 26	June 30	July 28, Aug. 5*	Aug 31	Oct. 2	Oct. 31	Nov. 30	Jan. 8	April 2	July 8	Oct. 2
Shallow Wells																				
S-1	1069685.83	514205.01	446.51	—	—	—	—	—	—	—	—	—	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
S-6	1069155.84	515901.03	468.65	—	—	—	—	—	—	—	—	—	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
S-8	1071044.35	514724.16	464.03	—	—	—	—	—	—	—	—	—	—	—	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
S-10	1069827.87	514931.35	480.28	—	—	—	—	—	—	—	—	—	—	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
S-51	1066161.31	514320.72	449.57	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
S-53	1066871.02	514406.97	447.95	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	casing damaged	casing damaged
S-61	1078159.98	514580.24	449.78	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	—	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
S-75	1087250.41	514718.75	462.08	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
S-80	1063191.77	513858.35	453.11	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	abandoned	abandoned
S-82	1069311.99	514272.95	450.18	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
S-84	1069633.39	516439.68	456.23	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
S-88	1068398.39	515234.03	462.76	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
MW-F18	1068603.00	515865.35	461.35	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
MW-101	1070830.48	514424.80	446.83	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	—	—	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
MW-102	1070095.01	514532.93	448.18	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
MW-103	1068628.37	514334.35	440.31	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
MW-104	1067525.17	514339.01	440.96	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
MW-106	1065955.75	513616.92	443.78	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	435.22	#REF!	—	NM	NM	NM	NM	NM	NM
MW-107	1064670.74	513601.12	448.14	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
MW-F3	1070489.80	515819.83	469.23	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Intermediate Depth Wells																				
S-2	1069098.26	514212.18	446.41	—	—	—	—	—	—	—	—	—	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
S-4	1069148.42	515899.5	468.57	—	—	—	—	—	—	—	—	—	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
S-7	1070743.05	514290.87	446.97	—	—	—	—	—	—	—	—	—	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
S-9	1069329.26	514268.59	450.99	—	—	—	—	—	—	—	—	—	—	—	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
S-11	1069819.16	514925.06	480.27	—	—	—	—	—	—	—	—	—	—	—	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
I-50	1065190.32	513831.96	453.66	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	abandoned	abandoned
I-62	1070938.26	514647.31	446.21	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	435.87	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
I-65	1070953.26	515333.39	441.82	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
I-66	1070604.09	515851.01	441.91	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
I-67	1070101.57	516244.09	441.90	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
I-68	1069571.40	516086.36	450.50	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
I-73	1067905.45	515570.09	461.39	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Deep Wells																				
D-3	1069136.26	513871.62	470.32	—	—	—	—	—	—	—	—	—	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
D-6	1070194.31	514549.5	447.6	—	—	—	—	—	—	—	—	—	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
D-12	1069836.29	514936.08	479.91	—	—	—	—	—	—	—	—	—	—	—	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
D-13	1070485.74	515601.73	471.1	—	—	—	—	—	—	—	—	—	—	—	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
D-14	1068947.16	516523.17	487.77	—	—	—	—	—	—	—	—	—	—	—	Dry	NM	#REF!	#REF!	#REF!	#REF!
D-81	1067338.19	514463.68	451.00	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
D-83	1070930.4	514653.64	448.48	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	435.87	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
D-85	1069626.53	516430.42	457.13	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
D-87	1069211.46	515404.82	463.05	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
D-93	1069317.89	514269.69	448.62	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
MW-F1D	1068608.68	515860.04	461.63	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Staff Gages																				
1	1071100.73	514882.10	438.57	—	—	—	—	—	—	—	#REF!	#REF!	#REF!	—	#REF!	—	—	—	#REF!	—
2	1071107.71	514878.03	438.84	—	—	—	—	—	—	—	#REF!	#REF!	#REF!	—	#REF!	—	—	—	#REF!	—
3	1071249.28	514645.19	440.73	—	—	—	—	—	—	—	#REF!	#REF!	—	—	#REF!	—	—	—	—	—
4	1071253.42	514635.83	441.05	—	—	—	—	—	—	—	#REF!	#REF!	—	—	#REF!	—	—	—	—	—
5	1070745.51	515414.94	460.94	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6	1069471.76	514096.61	437.28	—	—	—	—	—	—	—	#REF!	#REF!	#REF!	—	#REF!	#REF!	—	—	#REF!	#REF!
7	1069480.90	514091.25	437.01	—	—	—	—	—	—	—	#REF!	#REF!	#REF!	#REF!	—	#REF!	—	—	#REF!	#REF!

NM = Not Measured

Table 4-5 : Summary of Groundwater Monitoring Wells Sampled as Part of the RI

Well No.	Interval Monitored	Source of Well
S-1	Shallow	New RI well
S-5	Shallow	New RI well
S-8	Shallow	New RI well
S-10	Shallow	New RI well
S-61	Shallow	Existing well
S-80	Shallow	Existing background well
S-82	Shallow	Existing well
S-84	Shallow	Existing well
MW-101	Shallow	Existing well
MW-107	Shallow	Existing background well
MW-F3	Shallow	New landfill well
PZ-114-AS	Shallow	New landfill well
I-2	Intermediate	New RI well
I-4	Intermediate	New RI well
I-7	Intermediate	New RI well
I-9	Intermediate	New RI well
I-11	Intermediate	New RI well
I-62	Intermediate	Existing well
I-65	Intermediate	Existing well
I-66	Intermediate	Existing well
I-67	Intermediate	Existing well
I-68	Intermediate	Existing well
D-3	Deep	New RI well
D-6	Deep	New RI well
D-12	Deep	New RI well
D-13	Deep	New RI well
D-14	Deep	New RI well
D-83	Deep	Existing well
D-85	Deep	Existing well
D-93	Deep	Existing well

Table 4-6
Monitoring Well Construction Summary
West Lake Landfill, Bridgeton, Missouri

Well	Northing	Easting	Elevation		Screened Interval				
			Reference Point Top of Casing (Feet, MSL)	Ground Surface (Feet, MSL)	Length of Screen (Feet)	Depth (Feet Below TOC)		Elevation (Feet, MSL)	
						Top	Bottom	Top	Bottom
Shallow Wells									
S-1	1069685.83	514205.01	446.51	443.3	20	5.21	25.21	441.3	421.3
S-5	1069155.84	515901.03	468.65	465.7	10	32.95	42.95	435.7	425.7
S-8	1071044.35	514724.16	444.03	441.6	20	9.43	29.43	434.6	414.6
S-10	1069827.87	514931.35	480.28	477.5	20	34.78	54.78	445.5	425.5
S-61	1070160	514580	450.17	445.6			21.5		424.1
S-80	1065190	513870	452.55	448.4	10	10	20	418.4	428.4
S-82	1069312	514273	447.7	450.7	10	15.5	25.5	412.2	422.2
S-84	1069685	516455	452.9	455.3	10	20.9	30.9	412.0	422.0
MW-101	NI	NI	447.66	445.36	10	15	25	420.36	430.36
MW-107	NI	NI	449.25	NI	10	5	15	NI	NI
MW-F3	1070380	515880	NI	NI	10	32.8	42.8	NI	NI
PZ-114-AS	1069418.88	516768.25	451.31	449.8	9.8	19.9	29.7	420.08	429.88
Intermediate Depth Wells									
I-2	1069698.26	514212.18	446.41	443.2	10	40.21	50.21	406.2	396.2
I-4	1069148.42	515889.5	468.57	466	10	68.57	78.57	400	390
I-7	1070743.05	514299.87	446.97	444.5	10	39.47	49.47	407.5	397.5
I-9	1069329.26	514268.59	450.99	448.5	10	45.49	55.49	405.5	395.5
I-11	1069819.16	514925.06	480.27	477.6	10	83.67	93.67	396.6	386.6
I-62	1070960	514675	446.08	444.1	10	34	44	420.1	410.1
I-65	1070940	515435	441.8	438.5	10	26	36	422.5	412.5
I-66	1070520	515935	441.8	437.7	10	26.9	36.9	420.8	410.8
I-67	1070090	516260	439.08	436.5	10	25.4	35.4	421.1	411.1
I-68	1069570	516690	448.32	440.9	10	21.2	31.2	429.7	419.7
Deep Wells									
D-3	1069136.26	515871.62	470.32	467.2	10	99.12	109.12	371.2	361.2
D-6	1070194.31	514549.5	447.6	444.4	10	99.2	109.2	348.4	338.4
D-12	1069836.29	514936.08	479.91	477.4	10	136.51	146.51	343.4	333.4
D-13	1070485.74	515601.73	471.1	468.4	10	125.7	135.7	345.4	335.4
D-14	1068947.16	516523.17	487.77	484.5	5	57.27	62.27	430.5	425.5
D-83	1070940	514660	447.70	444.40	20	77	97	367.4	347.4
D-85	1069680	516445	455.65	453.10	20	62	82	391.1	371.1
D-93	1069318	514270	450.70	448.30	20	92	112	356.3	356.3

P:\WESTLAKE\GWELEV\MWCONSTR.XLS

TABLE 4 - 7
SOIL VAPOR METHANE CONCENTRATIONS (%)
RADIOLOGICAL AREAS 1 AND 2
WEST LAKE LANDFILL, BRIDGETON, MISSOURI

Boring	Depth (feet)	% Methane
AREA 1		
WL-101	5	39
	10	38
WL-102	5	18
	10	43
WL-103	5	18
	10	8.7
WL-104	5	5.9
	10	--
WL-105	5	39
	10	--
WL-106	5	9.1
	10	14
WL-107	5	36
	10	--
WL-108	5	45
	10	34
WL-109	5	2.7
	10	0.38
WL-110	5	37
	10	41
WL-111	5	45
	10	45
WL-112	5	BRL
	10	--
WL-113	5	0.52
	10	40
WL-114	5	39
	10	6.8
WL-115	5	12
	10	--
WL-116	5	33
	10	--
WL-117	5	40
	10	27
WL-120	5	33
	10	--
AREA 2		
WL-201	5	--
	10	--
WL-202	5	BRL
	10	BRL
WL-203	5	BRL
	10	BRL
WL-204/205	5	BRL
	10	BRL
WL-206	5	BRL
	10	BRL
WL-207	5	--
	10	--
WL-208	5	18
	10	23

Boring	Depth (feet)	% Methane
AREA 2 (cont.)		
WL-209	5	23
	10	0.48
WL-210	5	25
	10	19
WL-211	5	6.3
	10	0.39
WL-212	5	BRL
	10	--
WL-213	5	21
	10	13
WL-214	5	BRL
	10	BRL
WL-215	5	BRL
	10	--
WL-216	5	23
	10	0.23
WL-217	5	6.6
	10	24
WL-218	5	17
	10	24
WL-219	5	17
	10	22
WL-220	5	24
	10	24
WL-221	5	BRL
	10	4.9
WL-222	5	2.5
	10	--
WL-223	5	0.20
	10	0.21
WL-224	5	19
	10	--
WL-225	5	BRL
	10	BRL
WL-226	5	0.23
	10	--
WL-227	5	20
	10	13
WL-230	5	28
	10	0.21
WL-231	5	0.21
	10	15
WL-233	5	13
	10	23
WL-234	5	19
	10	23
WL-235	5	30
	10	29
WL-236	5	0.39
	10	BRL
WL-239	5	0.49
	10	0.35

' = feet
-- = Sample not collected due to encountering landfill obstructions
BRL = Below Reporting Limit
bls = Below Land Surface

Table 5-1: Summary of Plant Species Present in or Near Areas 1 and 2

Scientific Name	Common Name	Area 1	Area 2	North Flood Control Channel	West Flood Control Channel	Ford Property
			Trees/Shrubs			
Acer negundo	Box elder		X			X
Cercis canadensis	Red bud		X			
Cornus amomum	Silky dogwood		X	X		
Fraxinus spp.	Ash		X	X		
Morus spp.	Mulberry		X			
Populus deltoides	Eastern Cottonwood		X	X		X
Rhus typhina	Staghorn Sumac		X	X		X
Salix amygdaloides	Peached-leaved willow		X			
Salix spp.	Willow		X	X		
			Woody Vines			
Toxicodendron radicans	Poison ivy		X	X		X
Vitis spp.	Grape		X	X		X
			Herbs and Grasses			
Andropogon spp.	Bluestem	X				
Ambrosia spp.	Ragweed					X
Ascelpias syriaca	Common milkweed		X			
Carduus crispus	Nodding thistle	X	X			X
Daucus carota	Wild carrot		X			
Erigeron annuus	Daisy fleabane		X			X
Gallium spp.	Bedstraw		X	X		
Graminae	Unknown grasses	X	X	X	X	X
Impatiens capensis	Jewelweed		X			
Juncus spp.	Rush	X				
Meiilotus alba	White sweet clover		X			
Opuntia compressa	Prickly pear		X			
Phytolacca americana	Pokeweed		X	X		
Plantago major	Common plantian	X				X
Polygonum spp.	Smartweed					X
Rumax crispus	Curled-dock	X	X			X
Solidago spp.	Goldenrod	X	X			X
Setaria spp.	Foxtail	X	X			X
Thlaspi arvense	Field pennycress	X	X			X
Trifolium pratense	Red clover		X			
Trifolium procumbens	Yellow sweet clover		X			X
Typha spp.	Cattails	X	X			
Vicia cracca	Cow vetch		X			X

Table 5-2 : Summary of Water Level Measurements from Well Clusters

Well Cluster	Groundwater Elevation (Feet, MSL)																
	1994		1995											1996			
	Nov. 22, 23, 28	December 29	January 30	March 3	March 30	April 28	May 26	June 30	July 28, Aug. 3*	Aug 31	Oct. 2	Oct. 31	Nov. 30	Jan. 5	April 2	July 5	Oct. 2
S-1	---	---	---	---	---	---	---	---	---	434.25	432.76	432.13	431.63	430.89	429.57	434.50	432.52
I-2	---	---	---	---	---	---	---	---	---	434.38	432.73	432.1	431.65	430.94	429.51	434.49	432.51
S-5	---	---	---	---	---	---	---	---	---	434.45	432.87	432.14	431.81	431.03	429.69	434.63	432.73
I-4	---	---	---	---	---	---	---	---	---	434.38	432.82	432.12	429.72	430.95	429.65	434.61	432.62
D-3	---	---	---	---	---	---	---	---	---	434.40	432.83	432.11	431.69	430.89	429.62	434.58	432.54
S-8	---	---	---	---	---	---	---	---	---	---	---	432.18	431.51	430.84	429.53	434.92	432.52
I-62	430.22	430.14	431.02	430.74	430.79	431.18	436.34	436.31	435.87	434.66	433.19	432.43	431.5	430.85	429.5	434.87	432.50
D-83	430.19	430.08	430.98	430.66	430.72	431.21	436.31	436.32	435.87	434.60	432.78	432.07	431.47	430.71	429.47	434.76	432.46
S-10	---	---	---	---	---	---	---	---	---	---	432.91	432.12	431.67	431.11	429.43	434.57	432.51
I-11	---	---	---	---	---	---	---	---	---	---	---	432.13	431.66	430.92	429.52	434.58	432.53
D-12	---	---	---	---	---	---	---	---	---	---	---	431.91	431.59	430.93	429.49	434.58	432.49
S-61	430.23	430.17	431.05	430.78	430.81	431.27	436.42	435.92	---	434.51	433.02	432.27	431.6	430.85	429.49	434.70	432.53
MW-102	430.23	430.18	431.00	430.77	430.8	431.27	436.54	435.87	435.37	434.48	432.86	432.12	429.6	431.02	429.51	434.71	432.54
D-6	---	---	---	---	---	---	---	---	---	434.37	432.78	432.1	431.51	430.83	429.44	434.61	432.48
S-80	433.96	434.14	435.63	436.15	436.94	436.83	440.41	439.20	438.42	438.26	437.29	436.56	435.34	434.24	434.12	abandoned	abandoned
I-50	431.64	431.39	432.40	431.90	432.01	432.53	437.06	436.26	433.70	434.92	433.39	432.66	432.63	432.09	430.61	abandoned	abandoned
S-82	430.36	430.30	431.13	430.83	430.86	431.47	435.99	435.38	435.16	434.27	432.78	432.07	431.75	431.03	429.57	434.49	432.59
I-9	---	---	---	---	---	---	---	---	---	---	---	432.2	431.79	431.01	429.59	434.47	432.59
D-93	428.96	428.88	429.70	429.40	429.44	430.04	434.60	433.95	433.79	432.83	431.37	430.61	430.28	429.56	428.11	433.03	431.12
S-84	429.64	429.63	430.56	430.31	430.34	430.55	435.86	435.35	434.74	433.97	432.31	431.56	431.02	430.36	429.16	434.08	431.81
I-67	430.36	430.33	431.27	430.97	430.93	431.25	436.84	436.25	435.59	434.79	433.09	432.29	431.67	431.03	429.74	434.87	432.51
I-68	430.34	430.40	431.45	431.06	431.05	431.26	436.56	435.98	434.34	434.59	432.98	432.21	431.7	431.05	429.86	434.76	432.47
D-85	430.31	430.36	431.26	431.01	431	431.24	436.53	436.02	435.42	434.65	433.00	432.26	431.71	431.02	429.74	434.74	432.52
MW-F3	430.27	430.26	431.14	431.23	430.94	431.17	436.92	436.29	432.61	434.76	433.02	432.21	431.62	430.84	429.63	434.90	432.50
I-66	430.3	430.25	431.13	430.91	430.96	431.30	436.73	436.35	435.65	434.80	433.08	432.22	431.59	430.87	429.63	434.93	432.46
D-13		---	---	---	---	---	---	---	---	---	---	432.16	431.62	430.91	429.61	434.89	432.57
MW-F1S	430.24	430.35	431.09	430.93	430.93	431.30	435.61	435.30	435.03	434.29	432.83	432.09	431.77	431.04	429.66	434.36	432.49
MW-F1D	430.21	430.32	431.12	430.93	430.85	431.22	435.59	435.29	435.02	434.27	432.77	432.03	431.75	431.01	429.61	434.34	432.44

--- = not measured.

Table 5-3 : Summary of Alluvial Aquifer Hydraulic Conductivity Values

Hydraulic Conductivity K (cm/s) *		
3.78E-03		
8.76E-04	Maximum	3.43E-02
3.43E-02	Minimum	8.76E-04
2.32E-03	Average	8.22E-03
4.17E-03		
3.83E-03		
3.27E-02		
5.41E-02	Maximum	6.68E-02
6.68E-02	Minimum	1.22E-02
5.47E-02	Average	4.45E-02
4.63E-02		
1.22E-02		
3.15E-02		
4.29E-02	Maximum	8.85E-02
4.14E-02	Minimum	4.50E-03
8.85E-02	Average	4.28E-02
4.50E-03		
4.78E-02		

Note: All hydraulic conductivity values were determined using the AQTESOLV™ computer program (Geraghty & Miller, 1989)

Table 6-1 : Summary of Radionuclide Occurrence Above Reference Levels in Area 1 Surface Samples

Radiological Constituents	Background Value (mean + 2 std. dev.)	> Background but < Reference # Detects	Range	Reference Level	> Reference Level # Detects	Range
Uranium – 238 Decay Series						
Uranium-238	2.24	1	2.33+/-0.54	7.24	2	87+/-7.2 to 147+/-38
Thorium-234	2.76	0		7.76	2	55.9+/-13.5 to 180+/-49
Uranium-234	2.73	1	2.94+/-0.65	7.73	2	105+/- 22 to 154+/-40
Thorium-230	2.45	1	2.67+/-0.76	7.45	2	7,850+/-1,470 to 57,000 +/-4,100
Radium-226	1.30	1	1.32+/-0.24	6.3	2	109+/-5 to 910+/-93
Lead-214	1.13	3	1.16+/-0.44 to 1.62+/-0.56	6.13	2	108+/-8 to 1,100+/-99
Bismuth-214	1.61	0		6.61	2	110+/-6 to 1,000+/-57
Lead-210	3.77	0		8.77	3	206+/-26 to 1,040+/-135
Uranium – 235 Decay Series						
Uranium-235/236	1.15	1	5.7+/-1.9	6.15	2	6.86+/-3.99 to 19.5+/-5.9
Proactinium-231	NE	NE	NE	5	2	156+/-27 to 610+/-110
Actinium-227	NE	NE	NE	5	2	118+/-14 to 305+/-33
Radium-223	NE	NE	NE	5	2	113+/-NA to 939+/-76
Thorium – 232 Decay Series						
Thorium-232	1.55	0		6.55	2	18.1+/-4.6 to 40+/-150
Radium-228	2.37	0		7.37	0	
Thorium-228	1.33	1	1.96+/-1.14	6.33	0	
Radium-224	NE	NE	NE	5	1	1,760+/-219
Lead-212	2.26	0		7.26	0	
Bismuth-212	NE	NE	NE	5	0	
Thallium-208	0.71	1	0.79+/-0.83	5.71	1	6.8+/-2.1

All values expressed as pCi/g.
NE = Not established, all background samples below minimum detectable activity. NA = 2 Sigma Error (+/-) is not available.
A total of 8 surface soil samples were collected in Area 1. One of the samples was split and analyzed at two different laboratories. For some of the radionuclides, the results from one of the laboratories were greater than the background or reference levels, while the results from the second laboratory were not.

Table 6-2 : Summary of Radionuclide Occurrence Above Reference Levels in Area 1 Subsurface Samples

Radiological Constituents	Background Value (mean + 2 std. dev.)	> Background but < Reference # Detects	Range	Reference Level	> Reference Level # Detects	Range
Uranium – 238 Decay Series						
Uranium-238	2.24	5	2.89+/-0.56 to 6.94+/-1.28	17.24	2	17.8+/-4.1 to 26.4+/-10.1
Thorium-234	2.76	0		17.76	0	
Uranium-234	2.73	6	2.92+/-1.46 to 15.6+/-3.6	17.73	0	
Thorium-230	2.45	6	2.47+/-1.26 to 7.52+/-1.65	17.45	6	23.2+/-4.9 to 1,500+/-240
Radium-226	1.30	6	1.36+/-0.37 to 6.3+/-1.2	16.3	3	18.4+/-1 to 128+/-6
Lead-214	1.13	12	1.13+/-0.33 to 7.0+/-0.76	16.13	3	19.9+/-1.6 to 110+/-7
Bismuth-214	1.61	3	2.53+/-0.19 to 6.5+/-0.58	16.61	3	18.4+/-1.2 to 128+/-7.00
Lead-210	3.77	2	5.1+/-1.0 to 17+/-4.0	18.77	2	83.4+/-12.4 to 212+/-28
Uranium – 235 Decay Series						
Uranium-235/236	1.15	1	1.46+/-0.57	16.15	0	
Proactinium-231	NE	NE	NE	15	3	26.9+/-7.9 to 73.2+/-14.6
Actinium-227	NE	NE	NE	15	3	15.0+/-2.6 to 43.8+/-5.8
Radium-223	NE	NE	NE	15	3	16.1+/-NA to 44.3+/-NA
Thorium – 232 Decay Series						
Thorium-232	1.55	4	1.64+/-0.56 to 10.3+/-3.5	16.55	0	
Radium-228	2.37	0		17.37	0	
Thorium-228	1.33	1	1.55+/-1.48	16.33	0	
Radium-224	NE	NE	NE	15	1	39.1+/-6.3
Lead-212	2.26	0		17.26	0	
Bismuth-212	NE	NE	NE	15	0	
Thallium-208	0.71	0		15.71	0	

All values expressed as pCi/g.

NE = Not established, all background samples below minimum detectable activity. NA = 2 Sigma Error (+/-) is not available.

A total of 39 subsurface soil samples were collected in Area 1. Field and laboratory duplicates were prepared for several of the samples. Two of the samples were split and analyzed at two different laboratories. For some of the radionuclides, the results from one of the laboratories or from one of the duplicate samples were greater than the background or reference levels, while the results from the original sample or second laboratory were not.

Table 6-3 : Summary of Radionuclide Occurrence Above Reference Levels in Area 2 Surface Samples

Radiological Constituents	Background Value (mean + 2 std. dev.)	> Background but < Reference # Detects	Range	Reference Level	> Reference Level # Detects	Range
Uranium 238 – Decay Series						
Uranium-238	2.24	3	3.1+/-0.7 to 4.17+/-1.04	7.24	2	134+/-42 to 294+/-92
Thorium-234	2.76	0		7.76	0	
Uranium-234	2.73	3	3.18+/-1.06 to 4.05+/-1.02	7.73	2	216+/-67 to 575+/-180
Thorium-230	2.45	4	2.91+/-0.82 to 5.35+/-1.14	7.45	9	8.63+/-2.62 to 29,240+/-5,290
Radium-226	1.30	4	1.54+/-0.22 to 4.78+/-0.44	6.3	4	9.2+/-1.7 to 3,720+/-142
Lead-214	1.13	5	1.28+/-0.28 to 5.26+/-0.49	6.13	4	8.8+/-1.0 to 3,190+/-277
Bismuth-214	1.61	2	3.56+/-0.87 to 4.2+/-0.67	6.61	4	7.3+/-0.69 to 3,690+/-136
Lead-210	3.77	0		8.77	3	9.58+/-2.32 to 1,370+/-162
Uranium – 235 Decay Series						
Uranium-235/236	1.15	0		6.15	2	49.7+/-16.5 to 251+/-79
Proactinium-231	NE	NE	NE	5	4	5.22+/-2.32 to 2,030+/-301
Actinium-227	NE	NE	NE	5	3	6.15+/-1.17 to 1,320+/-179
Radium-223	NE	NE	NE	5	3	6.73+/-NA to 1,097+/-NA
Thorium – 232 Decay Series						
Thorium-232	1.55	0		6.55	4	6.73+/-1.36 to 127+/-23
Radium-228	2.37	0		7.37	0	
Thorium-228	1.33	1	4.97+/-1.04	6.33	0	
Radium-224	NE	NE	NE	5	2	4,330+/-628 to 6,580+/-1090
Lead-212	2.26	0		7.26	0	
Bismuth-212	NE	0		5	0	
Thallium-208	0.71	0		5.71	0	

All values expressed as pCi/g.

NE = Not established, all background samples below minimum detectable activity. NA = 2 Sigma Error (+/-) is not available.

A total of 15 surface soil samples were collected in Area 2. Three of the samples were split and analyzed at two different laboratories. For some of the radionuclides, the results from one of the laboratories were greater than the background or reference levels, while the results from the second laboratory were not.

Table 6-4 : Summary of Radionuclide Occurrence Above Reference Levels in Area 2 Subsurface Samples

Radiological Constituents	Background Value (mean + 2 std. dev.)	Background but < Reference # Detects	Range	Reference Level	> Reference Level # Detects	Range
Uranium – 238 Decay Series						
Uranium-238	2.24	7	2.61+/-0.64 to 11.4+/-3.8	17.24	3	60.7+/-12.4 to 287+/-47
Thorium-234	2.76	1	13.2+/-15.7	17.76	2	24.5+/-15.8 to 140+/-25
Uranium-234	2.73	6	2.9+/-0.4 to 12.5+/-4.0	17.73	3	45.4+/-9.7 to 527+/-87
Thorium-230	2.45	28	2.72+/-1.45 to 17.29+/-3.4	17.45	18	18.2+/-3.3 to 83,000+/-530
Radium-226	1.30	17	1.3+/-0.45 to 12.9+/-0.54	16.3	4	88.4+/-5.2 to 3,140+/-116
Lead-214	1.13	23	1.14+/-0.24 to 12.5+/-0.9	16.13	4	85.9+/-6.4 to 2,200+/-170
Bismuth-214	1.61	10	1.63+/-0.42 to 12.6+/-0.6	16.61	4	93.2+/-5.1 to 3,150+/-111
Lead-210	3.77	7	4.02+/-1.6 to 9.83+/-2.56	18.77	6	22.4+/-3.5 to 1,300+/-157
Uranium – 235 Decay Series						
Uranium-235/236	1.15	0		16.15	3	24+/-27 to 115+/-19
Proactinium-231	NE	NE	NE	15	4	39.3+/-11.1 to 1,930+/-243
Actinium-227	NE	NE	NE	15	4	25.8+/-4.2 to 1,180+/-138
Radium-223	NE	NE	NE	15	4	30.2+/-NA to 5,270+/-359
Thorium – 232 Decay Series						
Thorium-232	1.55	4	1.76+/-1.07 to 3.84+/-0.9	16.55	3	106+/-19 to 180+/-65
Radium-228	2.37	2	14.5+/-7.9 to 16.7+/-9.3	17.37	0	
Thorium-228	1.33	2	1.5+/-0.80 to 4.59+/-0.91	16.33	0	
Radium-224	NE	NE	NE	15	0	
Lead-212	2.26	1	2.49+/-0.94	17.26	1	82+/-35
Bismuth-212	NE	NE	NE	15	0	
Thallium-208	0.71	3	1.13+/-0.78 to 7.9+/-3.7	15.71	0	

All values expressed as pCi/g.

NE = Not established, all background samples below minimum detectable activity. NA = 2 Sigma Error (+/-) is not available.

A total of 73 subsurface soil samples were collected in Area 2. Field and laboratory duplicates were prepared for several of the samples. Four of the samples were split and analyzed at two different laboratories. For some of the radionuclides, the results from one of the laboratories or from one of the duplicate samples were greater than the background or reference levels, while the results from the original sample or second laboratory were not.

Table 6-5 : Summary of Background Radionuclide Levels at the West Lake Landfill

Radionuclide	Detection Frequency	Mean	Standard Deviation	Minimum Value	Maximum Value	Mean Plus 2 Standard Deviations	Mean Plus 3 Standard Deviations	Variance
Uranium-238 Decay Series								
Uranium-238	4/4	1.33	0.46	0.74+/-0.35	1.85+/-0.79	2.24	2.7	0.21
Thorium-234	2/4	1.57	0.59	1.15+/-0.89	1.99+/-1.11	2.76	3.35	0.35
Uranium-234	4/4	1.47	0.63	1.06+/-0.44	2.40+/-0.93	2.73	3.36	0.40
Thorium-230	4/4	1.51	0.47	0.92+/-0.44	2.03+/-0.6	2.45	2.91	0.22
Radium-226	4/4	1.06	0.12	0.95+/-0.22	1.19+/-0.22	1.30	1.41	0.01
Lead-214	4/4	1.01	0.06	0.92+/-0.26	1.07+/-0.24	1.13	1.19	0.004
Bismuth-214	2/4	1.09	0.26	0.90+/-0.31	1.27+/-0.4	1.61	1.87	0.07
Lead-210	3/4	2.48	0.64	1.88+/-1.56	3.16+/-2.18	3.77	4.41	0.41
Uranium-235 Decay Series								
Uranium-235/236	4/4	0.39	0.38	0.02+/-0.08	0.91+/-0.57	1.15	1.54	0.15
Uranium-235	--	--	--	--	--	--	--	--
Protactinium-231	--	--	--	--	--	--	--	--
Actinium-227	--	--	--	--	--	--	--	--
Radium-223	--	--	--	--	--	--	--	--
Thorium-232 Decay Series								
Thorium-232	4/4	0.90	0.33	0.52+/-0.29	1.26+/-0.39	1.55	1.87	0.11
Radium-228	2/4	1.65	0.36	1.39+/-0.4	1.90+/-0.47	2.37	2.73	0.13
Thorium-228	4/4	0.68	0.33	0.43+/-0.27	1.16+/-0.37	1.33	1.66	0.11
Radium-224	--	--	--	--	--	--	--	--
Lead-212	4/4	1.29	0.48	0.80+/-0.31	1.94+/-0.29	2.26	2.74	0.23
Bismuth-212	--	--	--	--	--	--	--	--
Thallium-208	4/4	0.44	0.14	0.32+/-0.16	0.63+/-0.21	0.71	0.84	0.02

All values expressed as pCi/g, except detection frequency.

Four background samples were analyzed. Samples without detections were not used to calculate background statistics.

-- = Radionuclides were not detected above the Minimum Detectable Activity (MDA) in any of the four background samples.

Table 6-6 : Background Gamma and Radionuclide Concentrations in Surface Soil Samples in the State of Missouri

Sample Designation/ Location	Gamma Exposure Rate (uR/hr)	Surface Soil Radionuclide Concentration (pCi/g) U-238	Ra-226	Th-232
West Lake Landfill - McLaren/Hart				
Barrow Pit - loess	13.5	1.3+/-0.50	1.19+/-0.22	0.75+/-0.38
Barrow Pit - shale	16.3	1.85+/-0.79	0.97+/-0.2	1.26+/-0.39
Farmer's Field	13.7	1.41+/-0.5	1.13+/-0.25	1.05+/-0.38
McLaren/Hart Shop	10.1	0.74+/-0.35	0.95+/-0.22	0.52+/-0.29
Mean	13.4	1.3	1.1	0.9
Standard Deviation(S)	2.6	0.5	0.1	0.3
Mean + 2S	18.5	2.2	1.3	1.5
State of Missouri - Bechtel National, Inc				
MO-1	6.0	1.7	1.4	1.3
MO-2	10.0	1.3	1.3	1.2
MO-3	6.7	1.2	1.1	1
MO-4	7.5	1.1	1.3	1.1
MO-5	8.1	1.3	1.2	1.2
MO-6	5.4	0.33	0.31	0.32
MO-7	7.6	1.1	1.1	1.1
MO-8	6.8	0.81	0.83	0.76
MO-9	5.1	1.1	1.1	1.1
MO-10	4.6	0.76	1	0.95
Mean	6.8	1.1	1.1	1.0
Standard Deviation(S)	1.6	0.4	0.3	0.3
Mean + 2S	10.0	1.8	1.7	1.6
5-Mile Radius of Weldon Spring Site - UNC-Geotech				
1	10.0	1	0.8	0.9
2	10.3	0.7	1.1	1.5
3	9.2	0.7	1.2	1.3
4	9.2	0.7	1.1	1.1
5	11.0	1.3	1.3	1.1
6	10.5	1	1.3	1
7	10.7	1.7	1.2	1.4
8	10.5	1.7	1.3	1.1
Mean	10.2	1.1	1.2	1.2
Standard Deviation(S)	0.7	0.4	0.2	0.2
Mean + 2S	11.5	1.9	1.5	1.6

Table 6-6 : Background Gamma and Radionuclide Concentrations in Surface Soil Samples in the State of Missouri (cont.)

Sample Designation/ Location	Gamma Exposure Rate (uR/hr)	Surface Soil Radionuclide Concentration (pCi/g)		
		U-238	Ra-226	Th-232
5-Mile Radius of Weldon Spring Site - Project Management Contractor				
1	9.3	<1.9	0.8	0.8
2	9.0	<1.9	1.1	0.9
3	8.9	<1.8	1.3	0.6
4	9.5	<1.9	0.8	0.8
5	9.2	<2.0	0.9	1
6	9.5	<1.9	1.1	1
Mean	9.2	NA	1.0	0.9
Standard Deviation(S)	0.3	NA	0.2	0.2
Mean + 2S	9.7	NA	1.4	1.2
USING ALL AREAS				
Mean	9.2	1.1	1.1	1.0
Standard Deviation(S)	2.6	0.4	0.2	0.3
Mean + 2S	14.4	1.9	1.5	1.5

< indicates that the sample result is below the Method Detection Activity (MDA), with the number indicating the MDA

Table 6- 7: Summary of Area 1 Downhole Gamma Log Results

Boring No.	Downhole Gamma Peak Depth (ft)	Downhole Gamma Peak Intensity (cpm)	Comments
WL-101	-	-	No peak
WL-102	3	58,000	
WL-103	-	-	No peak
WL-104	-	-	No peak
WL-105	9	180,000	At location of well D-5
Well I-4	6.5	260,000	Adjacent to boring WL-105
Well S-5	3.5	387,000	Adjacent to boring WL-105
WL-106	4	25,000	Poorly defined peak
WL-107	-	-	No peak
WL-108	-	-	No peak
WL-109	-	-	No peak
WL-110	-	-	No peak
WL-111	-	-	No peak
WL-112	6	10,000	Poorly defined peak
WL-113	4	13,000	Poorly defined peak
WL-114	5	15,000	Poorly defined peak
WL-115	-	-	No peak
WL-116	-	-	No peak
WL-117	6.5	16,000	Poorly defined peak
WL-118	0	12,000	Poorly defined peak
WL-119	-	-	No peak
WL-120	-	-	No peak
PVC-24	-	-	No peak
PVC-25	9	70,000	
PVC-26	5	85,000	
PVC-27	-	-	No peak
PVC-28	14	130,000	
PVC-36	8	15,000	Poorly defined peak
PVC-37	-	-	No peak
PVC-38	10	1,298,000	
PVC-41	-	-	No peak

cpm – counts per minute

Table 6-8: Summary of Estimated Thicknesses of Subsurface Radiologically Impacted Materials in Area 1

Boring	Estimated Total Thickness of Radiologically Impacted Materials (ft)	Surface Materials Present ?	Subsurface Thickness (Adjusted for Surface Thickness) (ft)
WL-102	2	no	2
WL-105	10	yes	9.5
Well S-5	4	no	4
Well I-4	4	no	4
WL-106	3	no	3
WL-112	2	no	2
WL-113	2	no	2
WL-114	1	no	1
WL-117	1	no	1
WL-118	1.5	yes	1
PVC-25	2	no	2
PVC-26	2	no	2
PVC-28	2	no	2
PVC-36	2	no	2
PVC-38	12	yes	11.5
Average	3.37		3.27
Std. Dev.	3.13		2.99

Table 6-9: Summary of Area 2 Downhole Gamma Log Results

Boring No.	Gamma Peak Depth (ft)	Gamma Peak Intensity (cpm)	Comments
WL-207	-	-	No peak
WL-208	-	-	No peak
WL-209	1	740,000	
WL-210	0 and 48?	506,000 and 90,000?	Note 1
WL-211	1	330,000	
WL-212	-	-	No peak
WL-213	-	-	No peak
WL-214	-	-	No peak
WL-216	3.5	24,000	Poorly defined peak
WL-217	-	-	No peak
WL-218	-	-	No peak
WL-219	-	-	No peak
WL-220	-	-	No peak
WL-222	-	-	No peak
WL-223	4	15,000	Poorly defined peak
WL-224	-	-	No peak
WL-225	-	-	No peak
WL-226	11	370,000	
WL-227	-	-	No peak
WL-228	-	-	No peak
WL-229	-	-	No peak
WL-230	1.5	10,000	Poorly defined peak
WL-231	5.5	27,000	
WL-232	-	-	No peak
WL-233	22	89,000	
WL-234	7	1,104,000	
WL-235	22.5 ?	20,000	Note 2
WL-236	-	-	No peak
WL-237	-	-	No peak
WL-238	6	130,000	
WL-239	-	-	No peak
WL-240	-	-	No peak
WL-241	5.5	45,000	
PVC-4	1	1,290,000	
PVC-5	6 and 11	15,000 ?	Very poorly defined peaks
PVC-6	9.5 and 11	346,000 and 369,000	Overall one peak w/ 2 sub-peaks
PVC-7	2 and 19.5	1,385,000 and 21,000	Note 2
PVC-8	1	23,000	
PVC-9	5	22,000	Very poorly defined peak
PVC-10	3 and 10	753,000 and 152,000	
PVC-11	3	2,288,000	
PVC-12	2.5	57,000	
PVC-13	-	-	No peak
PVC-18	-	-	No peak
PVC-19	8	330,000	
PVC-20	1.5	126,000	
PVC-33	2.5	10,000	No peak? - very poorly defined
PVC-34	1	22,000	Very poorly defined peak
PVC-35	4	745,000	
PVC-39	2.5	14,000	Poorly defined peak
PVC-40	2.5 and 7	120,000 and 46,000	

Note 1: Lower peak due to material knocked down hole during drilling/logging
Note 2: Lower peak at bottom of hole possibly from material knocked down hole during drilling/lggging

Table 6-10: Summary of Estimated Thicknesses of Subsurface Radiologically Impacted Materials in Area 2

Boring	Estimated Total Thickness of Radiologically Impacted Materials (ft)	Surface Materials Present ?	Subsurface Thickness (Adjusted for Surface Thickness) (ft)
WL-209	5	yes	4.5
WL-210	6	yes	5.5
WL-211	3	yes	2.5
WL-216	4	no	4
WL-223	3	no	3
WL-226	1	no	1
WL-226	8	no	8
WL-230	3	yes	2.5
WL-231	5	no	5
WL-233	4	no	4
WL-234	10	no	10
WL-235	3	no	3
WL-238	4	no	4
WL-241	4.5	no	4.5
PVC-4	4.5	yes	4
PVC-5	1	no	1
PVC-6	5	no	5
PVC-7	6	no	6
PVC-7	1	no	1
PVC-8	1	yes	0.5
PVC-9	1.5	no	1.5
PVC-10	5.5	no	5.5
PVC-10	2	no	2
PVC-11	5.5	yes	5
PVC-12	3	no	3
PVC-19	4	no	4
PVC-20	3	no	3
PVC-33	1	no	1
PVC-34	3	yes	2.5
PVC-35	5	no	5
PVC-39	2.5	no	2.5
PVC-40	2.5	no	2.5
PVC-40	2.5	no	2.5
Average	3.73		3.61
Std. Dev.	2.03		2.03

Table 6-11 : Occurrences of Peak Gamma Levels and Radionuclides above Reference Levels and Descriptions of Material

					Soil Analytical Data																			
					U-238 Decay Series								U-235 Decay Series					Th-232 Decay Series						
Boring No.	Peak Gamma Log Depth (ft)	Gamma Log Reading (CPM)	Soil Sample Depth (ft)	Description of Material at Depth of Concern from Soil Boring Log	U-238	Th-234	U-234	Th-230	Ra-226	Pb-214	Bi-214	Lead-210	U-235/236	U-235	Pa-231	Ac-227	Ra-223	Th-232	Ra-228	Th-228	Ra-224	Pb-212	Bi-212	Tl-208
WL-102	3.5	60,000		Landfill Debris: trashy debris consisting of wood, plastic,																				
		8,000	5	glass, and wire; soil consisting of olive gray silt and dark gray,	0.88	<1.16	1.06	4.18	1.17	1.56	<0.63	1.49	<0.16	<0.49	<3.79	<0.74	<8.77	0.9	<0.99	1.05	3.0	0.97	<1.53	<0.28
				silty, plastic clay to grayish brown, silty sand and crushed rock;																				
				dry to moist.																				
WL-105	9	180,000		Landfill Debris: trashy debris consisting of cloth, wood,																				
WL-105D	9	52,000		rope, and plastic; soil consisting of brown and gray silt, and																				
		28,000	10	and crushed rock; dry to moist.	6.94	<5.05	6.64	522	40.8	40	40.2	83.4	0.55	3.95	26.9	18.8	16.8	4.34	<1.59	<2.18	<11.75	<0.73	<2.82	<0.39
WL-106		<6,000	0	Landfill Debris: trashy debris consisting of wood, plastic,	105	<12.75	108	9,700	906	660	900	1040	4.86	78.5	844	308	293	38.2	<5.86	<7.80	1,700	<2.9	<10.2	<1.32
	4	25,000		glass, and wire; soil consisting of dark gray silt to clayey silt,																				
		10,000	5	and crushed rock; dry to moist	6.69	<2.76	11.5	731	18.8	19.1	18.1	47.5	<3.87	21	11.1	6.3	6.67	3.22	1.42	0.29	<7.3	0.77	<1.99	0.42
		10,000	5 DUP(F)		26.4	<8.02	<35.3	766	128	110	128	212	<25.3	12.1	73.2	43.8	44.3	4.71	<2.69	0.39	<20.49	<1.17	4.5	<0.63
WL-112		8,000	5	Landfill Debris: trashy debris consisting of yard waste,	3.44	<2.55	2.92	84.4	4.66	5.14	4.35	11.2	0.24	<0.85	<5.45	<1.32	<16.78	<1.56	<1.2	1.55	<6.16	1.08	<2.02	0.43
	6.5	10,000		wood, plastic, cloth, paper, wire, and metal; soil consisting of																				
				grayish brown to dark gray silt, dark gray to grayish brown																				
				clayey silt, and very fine-grained sand; dry to wet.																				
WL-113	4	14,000		Landfill Debris: trashy debris consisting of yard waste,																				
		7,000	5	wood, plastic, cloth, paper, wire, and metal; soil consisting of	1.25	0.58	1.4	0.33	0.97	0.88	1.06	<1.26	0.6	<0.23	<1.01	<0.32	<3.26	0.19	1.06	0.21	3.49	1.04	0.80	0.36
		7,000	5 DUP(F)	dark gray to grayish brown silty clay and very fine to medium-	0.62	0.83	0.76	0.58	1.06	1.05	1.06	1.41	<0.19	<0.17	<0.72	<0.17	<2.88	0.15	0.98	<0.14	2.86	1.00	1.06	0.31
				grained sand; dry to wet.																				
WL-114		<6,000	0	Landfill Debris: trashy debris consisting of yard waste,	147	88.9	184	7,883	109	108	110	286	19.8	17.6	186	118	113	18.1	<2.5	1.96	<12.42	<1.85	<3.9	0.79
	5	16,000	5	wood, plastic, cloth, paper, insulation, wire, and metal; soil	3.54	<0.73	3.43	23.2	2.59	2.52	2.6	3.29	0.82	0.32	1.93	1.2	<4.77	<0.26	0.39	0.33	6.15	0.43	<0.35	0.16
				consisting of dark gray to grayish brown clayey silt and very																				
				fine to medium-grained sand; dry to wet.																				
WL-117	6.5	16,000		Landfill Debris: trashy debris consisting of yard waste,																				
		<6,000	10	wood, wire, insulation, plastic, cloth, paper, and metal; soil	2.91	1.44	1.72	36.58	3.15	2.92	3.22	5.82	<0.25	0.3	<1.45	0.79	1.03	1	0.64	0.47	6.48	0.58	<0.4	0.16
				consisting of dark gray silty clay; dry to wet.																				
WL-118		<6,000	5	Landfill Debris: trashy debris consisting of plastic, cloth,	17.8	<5.05	15.6	425	18.4	19.8	18.4	<40.3	1.46	2.4	28.3	18.8	16.1	10.3	<0.73	<1.99	39.1	<0.55	<1.33	<0.17
				paper, glass, and metal; soil consisting of light brown to dark																				
				gray, silty, plastic clay; dry to moist.																				
WL-206		<6,000	0	Native Alluvium: olive brown clayey silt grading to	4.17	<2.53	4.05	429	17.2	18.0	17.4	49.6	<0.33	1.7	7.93	6.18	6.73	11.2	<1.21	1.01	<7.31	1.09	<2.44	0.34
				grayish brown, coarse-grained sand and gravel; dry to wet.																				
WL-208		<6,000	5	Landfill Debris: trashy debris consisting of wood, brick,	1.6	<3.92	2.05	123	3.26	3.39	3.05	<26.9	0.16	<1.18	<5.9	<1.22	<10.24	1.43	0.68	0.96	<5.15	0.48	<1.21	<0.27
		<6,000	5 DUP(L)	paper, concrete, insulation, metal, plastic, glass, and wire; soil	2.82	2.64	2.27	94.8	3.40	3.29	3.36	7.37	0.03	<1.04	<5.56	1.40	<7.64	0.82	<1.03	0.7	<4.77	0.84	<1.75	0.38
				consisting of dark gray silty clay to medium-grained sand, and																				
				rock; dry to moist																				
WL-209	0.5	744,000	0	Landfill Debris: trashy debris consisting of rubber, brick,	294	<93.3	578	29,240	3,720	3,190	3,400	<1170	251	243	2,030	1,320	1,097	127	<21.34	4.97	6,800	<13.8	<40.36	<5.77
		44,000	5	concrete, insulation, metal, wood, plastic, glass, and wire; soil	240	<66.82	338	38,280	2,970	685	3,800	<810	72.4	74.8	1,030	1,180	900	138	<16.34	<40.1	<123.9	<8.56	<30.1	<4.28
		44,000	5 DUP(F)	consisting of dark gray clayey silt to fine-grained sand, and	287	49.4	527	32,400	3,140	1,800	3,150	1,170	115	62.6	1,200	1,070	982	180	16.7	<61.7	<93.04	<3.83	<20.68	4.27
		<6,000	25	rock; dry to moist.	0.58	<3.07	0.46	26.9	0.85	0.91	0.78	<26.9	<0.17	<0.84	<4.81	<0.86	<8.56	0.71	<0.92	0.38	<3.79	0.52	<1.41	0.22
		<6,000	25 DUP(F)		0.61	<1.28	0.59	12.85	0.62	0.61	<0.90	2.94	<0.12	<0.70	<3.65	<1.06	<7.65	<0.84	<0.85	<1.26	2.68	0.52	<1.15	0.19
WL-210^		420,000	0	Landfill Debris: trashy debris consisting of wood, plastic,	134	<29.51	216	10,190	2,280	1,450	2,300	1,370	49.7	182	830	732	640	80.2	<9.55	<13.5	4,330	<4.7	<17.29	<2.34
	0.25	509,000		paper, shredded tires, yard waste, cloth, metal, glass, and wire;																				
		88,000	5	soil consisting of dark gray to brown silt and fine grained sand,	68.8	<32.11	148	12,400	520	546	512	<372	15.5	<10.12	348	220	171	108	<6.72	3.88	<0.52	<3.64	<12.76	<1.78
		88,000	5 DUP(F)	and crushed rock; dry to wet.	128	13.2	267	15,610	458	368	460	603	43.8	27.2	164	186	147	120	<4.66	4.59	<36.13	2.49	<7.93	1.13
	11.5	25,000																						
		<6,000	40		0.91	<1.25	0.69	18.2	0.68	0.8	0.62	<1.9	<0.15	<0.78	<4.2	<1.07	<8.18	0.37	<0.83	0.65	3.00	0.61	<1.19	<0.15
		<6,000	40 DUP(F)		0.54	<3.94	0.93	10.8	1.66	1.82	1.4	<57.9	0.25	<1.5	<8.24	<1.73	<13.95	0.82	<1.45	0.4	<5.84	0.43	<2.27	<0.4
WL-211	0.75	330,000		Landfill Debris: trashy debris consisting of wood, plastic,																				
		20,000	5	paper, rubber, metal, and concrete; soil consisting of grayish-	2.61	<1.98	2.3	64.11	8.52	8.47	8.01	22.4	0.22	<0.75	<5.46	2.48	<9.08	1.38	<1.15	0.66	<5.48	0.99	<1.73	<0.21
	9.5	15,000		brown sandy and silty clay to coarse-grained sand; dry to wet.																				
WL-212		<6,000	10	Landfill Debris: trashy debris consisting of wood, plastic,	1.77	<1.19	1.86	116	1.77	1.95	1.63	4.02	<0.16	<0.56	<3.71	<0.78	<8.69	0.9	<0.90	0.55	3.66	0.47	<1.6	<0.16
				brick, paper, rubber, insulation; soil consisting of dark gray																				
				silty clay, silt, and very fine-grained sand, and crushed rock;																				
				dry to moist.																				
WL-213		<6,000	0	Landfill Debris: trashy debris consisting of wood, plastic,	1.53	2.05	1.64	34.2	1.00	1.28	<0.70	2.36	0.45	<0.88	<5.11	<1.03	<18.42	1.11	<0.9	0.79	<4.00	<0.37	<1.54	<0.22
		<6,000	5	brick, cardboard, paper, wire, rubber, metal; soil consisting of	1.53	<3.50	1.00	17.29	1.26	1.32	<0.63	<28.9	<0.15	<0.83	<4.84	<1.01	<9.36	0.89	<0.92	0.67	<4.14	0.63	<1.48	<1.65
		<6,000	25	dark gray silty clay and black, sandy, clayey silt to dark gray,	0.45	<3.63	1.06	3.13	0.93	1.06	<0.85	<50.3	<0.17	<1.35	<7.02	<1.59	<15.23	0.52	<1.49	0.64	<5.23	<0.4	<2.76	0.37
				silty very fine-grained sand and crushed rock; dry to moist.																				
WL-214		<6,000	5	Landfill Debris: trashy debris consisting of shingles,	0.81	1.14	1.09	44.4	0.95	1.01	<0.62	<1.23	0.81	<0.52	<3.52	<0.55	<7.54	0.41	<0.81	0.5	<2.31	0.62	<1.34	0.34
		<6,000	25	carpeting, glass wood, plastic, brick, paper, wire, and metal;	0.67	<3.23	0.97	12.8	<0.52	0.74	<0.52	<26.9	<0.15	<0.89	<4.33	<0.99	<9.51	0.36	<0.89	0.48	<4.23	0.80	<1.37	0.32
				soil consisting of dark gray clayey silt to fine-grained sand;																				
				dry to moist.																				

Table 6-11 : Occurrences of Peak Gamma Levels and Radionuclides above Reference Levels and Descriptions of Material

Boring No.	Peak Gamma Log Depth (ft)	Gamma Log Reading (CPM)	Soil Sample Depth (ft)	Description of Material at Depth of Concern from Soil Boring Log	Soil Analytical Data: U-238 Decay Series: U-238	Th-234	U-234	Th-230	Ra-226	Pb-214	Bi-214	Lead-210	U-235/236	U-235 Decay Series: U-235	Pa-231	Ac-227	Ra-223	Th-232 Decay Series: Th-232	Ra-228	Th-228	Ra-224	Pb-212	Bi-212	Tl-208
WL-216	1.5	48,000		Landfill Debris: trashy debris consisting of plastic, cloth,																				
		11,000	5	and glass; soil consisting of grayish brown to olive brown silty	11.4	<7.06	12.5	1,131	88.4	88.9	93.3	176	<2.36	<3.07	39.3	25.8	36.2	3.05	<2.21	<1.14	<18.28	<1.07	<4.26	<0.55
				clay to gray, very fine-grained sand, and limestone rock; dry																				
				to moist.																				
WL-222		<6,000	0	Landfill Debris: trashy debris consisting of plastic, cloth,	3.36	<5.69	2.26	131	2.94	2.41	3.56	<69.0	0.69	<1.99	<11.4	<2.48	<44.46	1.31	<1.75	0.97	<8.22	<0.53	<2.91	<0.43
		<6,000	5	paper, carpeting, wood, and metal; soil consisting of dark gray	1.21	1.41	1.46	81.4	1.80	1.85	1.81	4.45	<0.12	<0.04	<4.19	0.69	<20.40	1.3	0.83	0.89	4.71	0.78	<1.73	<0.16
				to black clay and silty clay to dark gray, silty, fine-grained																				
				sand; dry to moist.																				
WL-223	4	15,000		Landfill Debris: trashy debris consisting of wire, wood,																				
		14,000	5	plastic, cloth, rubber and paper; soil consisting of brownish	1.22	<1.82	1.44	9.16	1.73	1.77	1.82	<2.15	<0.14	<0.75	<5.18	<1.33	<17.03	0.64	<1.14	0.36	<4.57	0.83	<1.64	0.31
				yellow silt to dark gray silty clay and silty fine-grained sand,																				
				dry to moist.																				
WL-226	3	20,000		Landfill Debris: trashy debris consisting of wood, rubber,																				
		200,000	10	wire, plastic, cloth, and paper; soil consisting of dark gray,	1.63	<2.17	1.38	14.1	1.4	1.4	1.25	4.35	0.39	<0.8	<5.14	<1.2	<21.54	<0.85	0.95	<1.12	<4.82	1.38	<1.85	0.30
	10.5	370,000		slightly sandy, clayey silt to fine-grained sand; dry to moist.																				
		<6,000	20		6.32	2.55	6.02	179	3.26	3.26	<1.21	5.93	<1.19	<0.87	<7.51	<1.47	<28.91	<0.85	<1.12	<0.99	<5.32	<0.39	<2.05	<0.25
WL-227		<6,000	5	Landfill Debris: trashy debris consisting of wood, rubber,	2.01	<1.53	1.68	28.4	1.32	1.38	0.92	2.35	<0.63	<0.66	<3.96	<0.72	<16.05	<0.53	1.35	<0.84	3.48	1.03	<1.76	0.23
				plastic, cloth, glass, carpeting, metal, and paper; soil consisting																				
				of brown and dark gray silty clay to dark gray fine-grained sand;																				
				dry to wet.																				
WL-230	1.5	10,000		Landfill Debris: trashy debris consisting of plastic, cloth,																				
		<6,000	5	wire, glass, carpeting, metal, and paper; soil consisting of olive	0.92	<2.05	2.23	26.8	1.67	1.56	1.93	2.26	0.48	<0.63	<4.86	<0.92	<17.88	<0.87	<1.16	<1.29	<3.92	0.88	<2.00	0.31
				brown silt, dark gray clayey silt, and dark gray, silty, fine-																				
				grained sand; dry to wet.																				
WL-231		18,000	5	Landfill Debris: trashy debris consisting of plastic, cloth,	3.86	2.48	6.97	94.5	4.06	3.96	4.18	5.59	<3.37	<0.73	<4.56	1.86	<19.43	1.11	<1.02	<1.26	<3.95	0.70	<1.60	<0.28
	5.5	29,000		glass, and paper; soil consisting of brownish gray silt, dark gray																				
				and black clayey silt to dark gray, silty, fine-grained sand, and																				
				crushed rock; dry to wet.																				
WL-233	22	90,000		Landfill Debris: trashy debris consisting of wood, plastic,																				
		<6,000	27	cloth, wire, limestone, rubber, metal, and paper; soil consisting	4.48	2.03	4.58	627	4.44	4.36	4.43	9.83	<2.32	<1.02	<6.54	1.44	<20.81	1.19	<1.11	<1.02	7.35	<2.87	<1.80	<0.34
				of gray clay, dark gray to black silt, and dark gray, silty, fine-																				
				grained sand; dry to moist.																				
WL-234	7	1,194,000																						
		132000	10	Landfill Debris: trashy debris consisting of wood, plastic,	138	24.5	128	97,300	3,060	1,100	3,000	1,300	10.9	774	1,000	952	891	<240	14.5	<196	<87.47	10.8	<18.63	3.09
		132,000	10 DUP(F)	and glass; soil consisting of brown silt, dark gray clayey silt	66.7	<14.65	45.4	12,000	1,360	592	1,200	859	9.55	97.6	400	397	380	<98.7	<0.62	<132	<56.24	<2.19	<11.82	<1.51
				and silty clay to dark gray silty, fine-grained sand and crushed																				
				rock; dry to moist.																				
WL-235		<6,000	0	Landfill Debris: trashy debris consisting of wood, metal,	0.77	<1.82	0.97	12.4	0.90	0.94	<0.61	1.56	<0.49	<0.56	<3.60	<0.70	<17.28	1.03	1.19	0.60	3.40	1.09	<1.76	0.46
		<6,000	5	paper, wire, cloth, insulation, plastic, and glass; soil consisting	0.91	<4.87	1.47	3.21	0.74	<0.86	-0.92	<50.3	<0.92	<1.63	<8.84	<2.28	<29.14	<0.83	<1.58	1.2	<7.2	1.10	<2.99	0.00
	22.5	20,000		of dark gray silty clay to clayey and silty, fine-grained sand;																				
	No gamma log		30	dry to wet.	1.31	<2.09	1.25	3.15	1.09	1.18	1.00	<2.06	<0.3	<0.84	<4.89	<1.2	<15.87	<0.94	<0.93	<0.87	3.11	0.75	<1.68	<0.28
WL-238	6	130,000	no data	Landfill Debris: trashy debris consisting of wood, shredded																				
				tires, and wire; soil consisting of brown silt and dark gray fine-																				
				grained sand; dry to moist.																				
TTWL-241		31,000	5	Landfill Debris: trashy debris consisting of glass, insulation,	3.9	<0.94	4.51	343	12.9	12.5	12.6	26.7	0.23	<0.38	4.09	4.22	<5.35	3.84	<0.24	0.39	<2.14	<0.88	<0.42	0.28
	5.5	45,000		wood, cardboard, paper, wire, rubber, plastic, and wood; soil																				
				consisting of dark gray clay and silty clay to silty fine-grained																				
				sand, and crushed rock; dry to wet.																				
WL-242	No gamma log		0		1.63	<3.85	1.83	8.63	1.57	1.59	1.48	<29.8	0.4	--	<5.12	<1.34	<31.72	<0.34	<0.77	<1.1	<4.25	<0.28	<1.63	<0.24
	Surface sample		2		0.75	<4.91	1.35	21.3	2.42	2.45	<1.24	<66.3	0.56	--	<9.23	<2.36	<52.37	<0.75	<1.57	<1.19	<7.62	0.51	<2.73	<0.43
WL-243	No gamma log		0		3.63	<1.94	3.99	366	4.78	5.26	4.2	8.88	0.58	--	8.32	3.58	<25.10	6.73	1.13	1.11	<4.33	1.04	<1.8	0.46
	Surface sample																							
WL-244	No gamma log		0		1.65	<1.34	0.88	28.8	1.54	1.58	1.31	2.02	0.09	--	<4.57	0.81	<26.64	0.78	<1.05	<1.23	<2.34	0.86	<1.43	0.23
	Surface sample																							
FVC-4	1	1,290,000	1		530				2,600	2,100	1,700						900							
			10						2.5	2.7	2.8						0.83							
	11.5	14,000																						
			14						1.7	1.7	1.6						0.7							
FVC-5			4						3.4	3.7	3.1													
	5.5	13,000																						
			6						1.5	1.5	1.9											0.92		
			10						4.3	4.3	4.3											2.0		
	11.5	14,000																						

Table 6-11 : Occurrences of Peak Gamma Levels and Radionuclides above Reference Levels and Descriptions of Material

	Peak Gamma Log	Gamma Log Reading	Soil Sample		Soil Analytical Data																			
					U-238 Decay Series								U-235 Decay Series					Th-232 Decay Series						
Boring No.	Depth (ft)	(CPM)	Depth (ft)	Description of Material at Depth of Concern from Soil Boring Log	U-238	Th-234	U-234	Th-230	Ra-226	Pb-214	Bi-214	Lead-210	U-235/236	U-235	Pa-231	Ac-227	Ra-223	Th-232	Ra-228	Th-228	Ra-224	Pb-212	Bi-212	Tl-208
			12						2.1	1.9	2.3													
PVC-6			0						40	40	41						34							
	9.5	348,000																						
			10						63	58	63						41							
	11	367,000	11						250	360	280						280							
			12		44				110	99	91						39							
	20.5	23,000																						
PVC-7	3	1,386,000	--																					
	19.5	22,000	--																					
PVC-8			0						3.4	3.7	4.0						1.5					0.49		
	0.5	24,000																						
			2						1.3	1.4	1.5													
PVC-9			2		46				55	56	50						35							
			3						6.5	5.4	4.2													
			4						1.4	1.3	1.3													
	5	22,000																						
			6						0.56	0.7	0.84													
PVC-10	3	752,000	3						520	480	440													
			8						15	13	11											0.34		
	9.5	152,000																						
			10		73				100	120	130						70							
PVC-11			2		3,900				13,000		12,000													
PVC-11A	2.5	2,286,000																						
PVC-11B	2.5	2,146,000																						
			3						1,700	1,100	280													
PVC-12	2.5	58,000	--																					
PVC-19	8	332,000	8		42				340	340	340						230							
PVC-20			1						76	72	68						43							
	1.5	127,000																						
			2						17	14	9.9						2.9							
PVC-25	9	72,000	--																					
PVC-26	5	86,000	--																					
PVC-28	14	132,000	--																					
PVC-33	2.5	10,000	--																					
PVC-34	1	22,000	--																					
PVC-35	4	745,000	--																					
PVC-36	8	17,000	--																					
PVC-38	10	1,298,000	--																					
PVC-39	2.5	14,000	--																					
PVC-40	2.5	120,000	--																					
	7	46,000	--																					

Notes: Soil analytical data expressed as pCi/g. 2 Sigma Errors associated with these data are included in Appendix B.
< indicates sample result is below specific Method Detection Activity (MDA).
Red indicates an activity above the reference level.
A represents results of second downhole gamma survey, after soil that was accidently kicked into the boring was extracted.
-- indicates not reported.
Results shown on this table for the PVC borings include downhole gamma log results collected by McLaren/Hart in 1995 and radionuclide analytical data from Table 5 of the report "Radiological Survey of the West Lake Landfill", May 1982, Radiation Management Corp (RMC). The PVC borings were drilled, gamma-logged, and sampled in 1982 by RMC and re-logged in 1995 by McLaren/Hart. Some settling may have occurred in the PVC borings, potentially resulting in a shift in the gamma peak relative to the soil sample results.

Table 6-12 : Summary of Estimated Areal Extent and Volume of Radiologically Impacted Materials at the West Lake Landfill

Location	Areal Extent (ft^2)	Areal Extent (acres)	Volume (yd^3)
Area 1			
Surface	50,659	1.16	940
Subsurface	193,915	4.45	23,490
Area 1 Total	194,000	4.5	24,400
Area 2			
Surface	468,709	10.76	8,680
Subsurface	817,052	18.76	109,240
Northeast area	17,159	0.39	320
Area 2 Total	834,000	19.2	118,200
Ford Property	196,000	4.5	3,600
Totals	**1,224,000**	**28.2**	**146,000**

Note: The thickness values used to calculate volumes were as follows:

Area 1 Surface	0.5 ft
Area 1 Subsurface	3.27 ft
Area 2 Surface	0.5 ft
Area 2 Subsurface	3.61 ft
Northeast area	0.5 ft
Ford Property	0.5 ft

Table 6-13: February 2000 Analytical Results for Surface Soil Samples from the Buffer Zone and Crossroads Properties

Location	Depth (feet)	Uranium-238		Thorium-234		Uranium-234		Thorium-230		Radium-226		Lead-214		Bismuth-214		Lead-210	
		Result	MDA	Result	MDA	Result	MDA	Result	MDA	Result	MDA	Result	MDA	Result	MDA	Result	MDA
Site Specific Background(Mean+2 Std Dev)		2.24		2.76		2.73		2.45		1.30		1.13		1.61		3.77	
Surface Soil Reference Levels		7.24		7.76		7.73		7.45		6.30		6.13		6.61		8.77	
RC-01	0 - 0.25	0.92	0.10	<MDA	1.48	1.00	0.15	2.75	0.09	<MDA	0.15	0.82	0.27	0.62	0.56	3.20	1.60
RC-02	0 - 0.25	1.08	0.05	<MDA	1.70	1.06	0.05	30.6	0.10	<MDA	0.13	1.55	0.25	1.55	0.70	5.90	1.30
RC-03	0 - 0.25	0.89	0.08	<MDA	1.38	0.80	0.11	6.30	0.20	<MDA	0.14	0.71	0.18	0.71	0.46	2.94	1.60
RC-04	0 - 0.25	0.94	0.05	<MDA	1.50	0.93	0.14	2.60	0.18	<MDA	0.13	0.56	0.24	0.87	0.56	2.70	1.50
RC-05	0 - 0.25	0.69	0.09	<MDA	1.63	0.91	0.16	2.48	0.08	<MDA	0.10	0.86	0.23	0.63	0.52	2.60	1.10
RC-06	0 - 0.25	0.96	0.05	<MDA	1.56	0.97	0.13	4.60	0.10	<MDA	0.12	0.91	0.24	0.62	0.57	3.70	1.50
RC-07	0 - 0.25	0.90	0.32	<MDA	1.51	0.83	0.13	2.84	0.16	<MDA	0.12	0.76	0.26	0.87	0.54	1.75	1.60

Location	Depth (feet)	Uranium-235		Protactinium-231		Actinium-227		Radium-223	
		Result	MDA	Result	MDA	Result	MDA	Result	MDA
Site Specific Background(Mean+2 Std Dev)		NE		NE		NE		NE	
Surface Soil Reference Levels		5.00		5.00		5.00		5.00	
RC-01	0 - 0.25	<MDA	0.13	<MDA	3.70	<MDA	0.63	<MDA	0.28
RC-02	0 - 0.25	0.14	0.10	<MDA	3.80	<MDA	0.80	<MDA	0.29
RC-03	0 - 0.25	<MDA	0.12	<MDA	2.60	<MDA	0.57	<MDA	0.21
RC-04	0 - 0.25	0.06	0.06	<MDA	3.40	<MDA	0.67	<MDA	0.26
RC-05	0 - 0.25	0.14	0.14	<MDA	3.10	<MDA	0.56	<MDA	0.24
RC-06	0 - 0.25	<MDA	0.18	<MDA	4.00	<MDA	0.69	<MDA	0.30
RC-07	0 - 0.25	<MDA	0.05	<MDA	3.20	<MDA	0.62	<MDA	0.22

Location	Depth (feet)	Thorium-232		Radium-228		Thorium-228		Radium-224		Lead-212		Bismuth-212		Thallium 208	
		Result	MDA	Result	MDA	Result	MDA	Result	MDA	Result	MDA	Result	MDA	Result	MDA
Site Specific Background(Mean+2 Std Dev)		1.55		2.37		1.33		NE		2.26		NE		0.71	
Surface Soil Reference Levels		6.55		7.37		6.33		5.00		7.26		5.00		5.71	
RC-01	0 - 0.25	1.40	0.07	1.83	0.71	1.41	0.09	<MDA	3.58	0.85	0.39	<MDA	2.70	0.35	0.26
RC-02	0 - 0.25	1.28	0.14	1.47	0.68	1.33	0.12	<MDA	2.83	0.76	0.38	<MDA	2.70	0.31	0.27
RC-03	0 - 0.25	0.97	0.23	1.67	0.68	1.36	0.20	<MDA	2.22	0.94	0.32	<MDA	2.00	0.27	0.21
RC-04	0 - 0.25	1.25	0.07	1.92	0.69	1.27	0.15	<MDA	1.88	0.96	0.38	<MDA	2.50	0.38	0.25
RC-05	0 - 0.25	1.21	0.09	1.59	0.66	1.04	0.08	<MDA	2.54	1.13	0.37	<MDA	2.70	0.25	0.23
RC-06	0 - 0.25	1.18	0.04	1.26	0.72	1.33	0.12	<MDA	2.11	0.97	0.40	<MDA	2.40	0.30	0.25
RC-07	0 - 0.25	1.56	0.08	0.96	0.68	1.44	0.13	<MDA	2.47	1.05	0.37	<MDA	2.50	0.34	0.27

Note: The data presented on this table are based on preliminary unvalidated results.

Table 7-1 : Radon Flux Measurement Results

Area 1		Area 2	
Boring Location	Radon Flux (pCi/m^2s)	Boring Location	Radon Flux (pCi/m^2s)
WL-101	0.3	WL-201	0.5
WL-102	245.9	WL-202	0.3
WL-103	0.6	WL-203	0.4
WL-104	0.2	WL-204/205	0.3
WL-105	0.2	WL-206	0.9
WL-106	22.3	WL-207	0.5
WL-107	0.2	WL-208	3.2
WL-108	0.5	WL-209	513.1
WL-109	0.1	WL-210	14.2
WL-110	0.2	WL-211	0.1
WL-111	0.3	WL-212	0
WL-112	1.9	WL-213	0.1
WL-113	0.5	WL-214	0.2
WL-114	8	WL-215	0.3
WL-115	1.4	WL-216	0.1
WL-116	0.2	WL-217	0.2
WL-117	1.3	WL-218	1.6
WL-120	0.3	WL-219	0.3
WL-121	0.3	WL-220	0.1
WL-122	0.5	WL-221	0.8
WL-123	0.1	WL-222	1.3
WL-124	0.2	WL-223	350.2
		WL-224	0.2
		WL-225	0.3
		WL-226	0.2
		WL-227	0.5
		WL-230	0.2
		WL-231	0.2
		WL-233	0.1
		WL-234	0.6
		WL-236	0.1
		WL-239	0.4
Averages	13		28

Table 7-2 : Surface Soil Radionuclide Analytical Results at the Fugitive Dust Sampling Locations

Uranium - 238 Decay Series

Boring	Uranium-238	Thorium-234	Uranium-234	Thorium-230	Radium-226	Lead-214	Bismuth-214	Lead-210
WL-114	147+/-38	55.9+/-13.5	154+/-40	7,850+/-1,470	109+/-5	108+/-8	110+/-6	206+/-26
WL-210	134+/-42	<29.51+/-NA	216+/-67	18,190+/-3,510	2,280+/-89	1,450+/-179	2,300+/-84	1,370+/-162

Uranium - 235 Decay Series

	Uranium-235/236	Uranium-235	Protactinium -231	Actinium-227	Radium-223
WL-114	19.5+/-5.9	17.6+/-2.1	156+/-27	118+/-14	113+/-NA
WL-210	49.7+/-16.5	182+/-22	838+/-148	732+/-87	660+/-NA

Thorium - 232 Decay Series

	Thorium-232	Radium-228	Thorium-228	Radium-224	Lead-212	Bismuth-212	Thallium-208
WL-114	18.1+/-4.6	<2.50+/-NA	1.96+/-1.14	<12.42+/-NA	<1.85+/-NA	<3.9+/-NA	0.79+/-0.83
WL-210	59.2+/-23.2	<9.55+/-NA	<13.5+/-8.6	4,330+/-628	<4.7+/-NA	<17.29+/-NA	<2.34+/-NA

All values expressed as pCi/g.
< indicates that the sample result is below the Method Detection Activity (MDA), with the number indicating the MDA.
NA indicates Not Applicable or Not Available.

Table 7-3 : Fugutive Dust Analytical Results

Uranium - 238 Decay Series

Sample	Uranium-238			Uranium-234			Thorium-230			Radium-226		
	Result	MDA	+/- Sigma Error	Result	MDA	+/- Sigma Error	Result	MDA	+/- Sigma Error	Result	MDA	+/- Sigma Error
Area 1												
Upwind	< MDA	0.00164	NA	< MDA	0.00148	NA	0.00256	0.00042	0.00087	0.00043	0.00037	0.00027
Downwind	0.00071	0.00020	0.00038	0.00079	0.00024	0.00040	0.00071	0.00034	0.00033	< MDA	0.00049	NA
Area 2												
Upwind	0.00005	0.00004	0.00004	0.00007	0.00004	0.00005	0.00011	0.00006	0.00006	0.00011	0.00006	0.00005
Downwind	< MDA	0.00056	NA	< MDA	0.00049	NA	0.00055	0.00023	0.00027	< MDA	0.00035	NA

Uranium - 235 Decay Series

Sample	Uranium-235/236		
	Result	MDA	+/- Sigma Error
Area 1			
Upwind	< MDA	0.00237	NA
Downwind	< MDA	0.00030	NA
Area 2			
Upwind	< MDA	0.00007	NA
Downwind	< MDA	0.00068	NA

Thorium - 232 Decay Series

Sample	Thorium-232			Radium-228			Thorium-228		
	Result	MDA	+/- Sigma Error	Result	MDA	+/- Sigma Error	Result	MDA	+/- Sigma Error
Area 1									
Upwind	< MDA	0.00027	NA	< MDA	0.00113	NA	0.00270	0.00044	0.00090
Downwind	< MDA	0.00024	NA	< MDA	0.00097	NA	0.00191	0.00017	0.00058
Area 2									
Upwind	< MDA	0.00004	NA	< MDA	0.00017	NA	0.00037	0.00007	0.00013
Downwind	< MDA	0.00026	NA	0.00091	0.00090	0.00056	0.00154	0.00029	0.00049

All values expressed as picocuries per liter (pCi/L)
MDA = Minimum Detectable Activity
NA= Not applicable

Table 7-4 : Comparison of 1995, 1996, and 1997 Radium-226 Results in Groundwater Samples

Well	Date	Filtered	Radium-226
S-82	Nov-95	Filtered	--
S-82	Nov-95	unfiltered	--
S-82	Feb-96	Filtered	--
S-82	Feb-96	unfiltered	1.09+/-
S-82	May-96	Filtered	0.88+/-
S-82	May-96	unfiltered	1.39+/-
S-82	May-97	Filtered	1.07+/-0.14
S-82	May-97	unfiltered	1.06+/-0.17
S-82	May-97	unfiltered	0.76+/-0.14
I-2	Nov-95	Filtered	--
I-2	Nov-95	unfiltered	--
I-2	Feb-96	Filtered	--
I-2	Feb-96	unfiltered	1.69+/-
I-2	May-96	Filtered	1.17+/-
I-2	May-96	unfiltered	1.44+/-
I-2	May-97	Filtered	0.98+/-0.13
I-2	May-97	unfiltered	1.05+/-0.13
I-2-DUP	May-97	Filtered	0.82+/-0.11
I-2-DUP	May-97	unfiltered	1.09+/-0.14
I-4	Feb-96	Filtered	--
I-4	Feb-96	unfiltered	2.41+/-
I-4	May-96	Filtered	0.87+/-
I-4	May-96	unfiltered	1.5+/-
I-4	May-97	Filtered	0.81+/-0.11
I-4	May-97	unfiltered	1.04+/-0.14
D-3	Nov-95	Filtered	--
D-3	Nov-95	unfiltered	--
D-3	Feb-96	Filtered	--
D-3	Feb-96	unfiltered	2.7+/-
D-3	May-96	Filtered	0.78+/-
D-3	May-96	unfiltered	1.19+/-
D-3 DUP (F)	May-96	Filtered	1.17+/-
D-3 DUP (F)	May-96	unfiltered	1.21+/-
D-3	May-97	Filtered	0.75+/-0.11
D-3	May-97	unfiltered	1.5+/-0.19

Table 7-4 : Comparison of 1995, 1996, and 1997 Radium-226 Results in Groundwater Samples (cont.)

Well	Date	Filtered	Radium-226
D-6	Nov-95	Filtered	--
D-6	Nov-95	unfiltered	--
D-6	Feb-96	Filtered	--
D-6	Feb-96	unfiltered	1.78+/-
D-6	May-96	Filtered	1.66+/-
D-6	May-96	unfiltered	1.88+/-
D-6	May-97	Filtered	1.8+/-0.21
D-6	May-97	unfiltered	2.05+/-0.23
D-12	Nov-95	Filtered	--
D-12	Nov-95	unfiltered	--
D-12	Feb-96	Filtered	--
D-12	Feb-96	unfiltered	0.5+/-
D-12	May-96	Filtered	0.36+/-
D-12	May-96	unfiltered	0.73+/-
D-12	May-97	Filtered	0.49+/-0.12
D-12	May-97	Filtered	0.26+/-0.09
D-12	May-97	unfiltered	0.54+/-0.09
D-93	Nov-95	Filtered	--
D-93	Nov-95	unfiltered	--
D-93	Feb-96	Filtered	--
D-93	Feb-96	unfiltered	1.43+/-
D-93 DUP (F)	Feb-96	Filtered	--
D-93 DUP (F)	Feb-96	unfiltered	1.21+/-
D-93	May-96	Filtered	0.95+/-
D-93	May-96	unfiltered	2.09+/-
D-93	May-97	Filtered	1.18+/-0.15
D-93	May-97	unfiltered	1.34+/-0.16

Notes:

All units are pCi/l
- indicates not analyzed
1997 values are highlighted (bold)
< indicates sample results is below the specific minimum detectable activity (MDA)

Table 8-1: Priority Pollutant Metals Summary for Soil Samples

Area 1 Soil Samples

Constituent	Number Samples	Number of Detections	Frequency Detection	Minimum Detection Value	Maximum Detection Value	Sample Exhibiting the Maximum Value	Background Range
Arsenic	13	10	0.77	0.76	220	WL 114 @0'	<0.5-5.2
Beryllium	13	8	0.62	0.25	3.3	WL 114 @0'	<0.25-.5
Cadmium	13	2	0.15	4.2	7.9	WL 114 @0'	<0.5
Chromium	13	13	1	3.1	280	WL 115 @5'	8.6-12
Copper	13	13	1	2.3	2300	WL 114 @0'	11-16
Lead	13	13	1	2.8	900	WL 115 @5'	7.5-32
Mercury	13	1	0.08	0.17	0.17	WL 114 @0'	<0.1
Nickel	13	13	1	4.7	3600	WL 114 @0'	3.6-16
Selenium	13	4	0.31	0.36	250	WL 114 @0'	<0.25
Zinc	13	13	1	16	560	WL 115 @38' WL-119 @50' (dup)	2.1-48

Area 2 Soil Samples

Constituent	Number Samples	Number of Detections	Frequency Detection	Minimum Detection Value	Maximum Detection Value	Sample Exhibiting the Maximum Value	Background Range
Arsenic	24	23	0.96	0.7	35	WL-209@0'	<0.5-5.2
Beryllium	24	12	0.50	0.27	2.2	WL-206@0'	<0.25-.5
Cadmium	24	9	0.38	0.54	6.3	WL-208@20'	<0.5
Chromium	24	24	1.00	2	890	WL-206@0'	8.6-12
Copper	24	24	1.00	1	360	WL-209@0'	11-16
Lead	24	23	0.96	3	2200	WL-210@0'	7.5-32
Mercury	24	3	0.13	0.18	0.27	WL-209@0'	<0.1
Nickel	24	24	1.00	1.3	680	WL-209@0'	3.6-16
Selenium	24	6	0.25	0.25	38	WL-210@0'	<0.25
Zinc	24	23	0.96	7.3	1100	WL-208@20'	2.1-48

Note: All units are mg/kg (ppm)

Table 8-2: Total Petroleum Hydrocarbons Summary for Soil Samples

Area 1 Soil Samples

Constituent	Number Samples	Number of Detections	Frequency Detection	Minimum Detection Value	Maximum Detection Value	Sample Exhibiting the Maximum Value
Gasoline Range	17	1	0.06	120	120	WL-115 @5'
Diesel Range	17	1	0.06	110	110	WL-101 @5'
Motor Oil Range	17	3	0.18	76	130	WL-114 @0'

Area 2 Soil Samples

Constituent	Number Samples	Number of Detections	Frequency Detection	Minimum Detection Value	Maximum Detection Value	Sample Exhibiting the Maximum Value
Gasoline Range	24	4	0.17	24	5000	WL-208 @20'
Diesel Range	24	3	0.13	31	1200	WL-210 @15'
Motor Oil Range	24	11	0.46	11	16000	WL-208 @20'

Note: All units are mg/kg (ppm)

Table 8-3: Volatile Organic Compounds Summary for Soil Samples

Area 1 Soil Samples

Constituent	Number Samples	Number of Detections	Frequency Detection	Minimum Detection Value	Maximum Detection Value	Sample Exhibiting the Maximum Value
Toluene	19	3	0.16	0.008	29	WL -115 @5'
Ethyl benzene	19	3	0.16	0.005	20	WL -115 @5'
m & p Xylene	19	5	0.26	0.002	200	WL -115 @5'
o-Xylene	19	3	0.16	0.0027	26	WL -115 @5'
Chlorobenzene	19	6	0.32	0.002	0.94	WL-104 @25'
1,4-Dichlorobenzene	19	7	0.37	0.002	0.042	WL-114 @0'
2-Butanone	15	2	0.13	0.013	0.02	WL-106 @30' (dup)
Acetone	15	7	0.47	0.019	0.09	WL-106 @30' (dup)
Methylene Chloride	19	0	0	0	0	None Detected

Area 2 Soil Samples

Constituent	Number Samples	Number of Detections	Frequency Detection	Minimum Detection Value	Maximum Detection Value	Sample Exhibiting the Maximum Value
Toluene	24	4	0.17	0.13	8300	WL-208 @20'
Ethyl benzene	24	8	0.33	0.004	300	WL-208 @20'
m & p Xylene	24	9	0.38	0.012	1800	WL-208 @20'
o-Xylene	24	6	0.25	0.007	500	WL-208 @20'
Chlorobenzene	24	5	0.21	0.003	180	WL-230 @16'
1,4-Dichlorobenzene	24	6	0.25	0.0065	2100	WL-230 @16'
2-Butanone	24	2	0.08	8.4	52	WL-208 @15'
Acetone	24	5	0.21	0.026	62	WL-230 @35'
Methylene Chloride	24	8	0.33	0.004	240	WL-208 @20'

Note: All units are mg/kg (ppm)

Table 8-4: Semi-Volatile Organic Compounds Summary for Soil Samples

Area 1 Soil Samples

Constituent	Number Samples	Number of Detections	Frequency Detection	Minimum Detection Value	Maximum Detection Value	Sample Exhibiting the Maximum Value
Benzoic Acid	15	0	0	0	0	No Detects
1,4-Dichlorobenzene	17	1	0.06	0.039	0.039	WL-113 @45'
Pyrene	17	3	0.18	0.034	0.7	WL-115 @5'
Naphthalene	17	2	0.12	0.13	4.7	WL-115 @5'
2-Methylnaphthalene	15	2	0.13	0.097	4.4	WL-115 @5'
Fluoranthene	17	3	0.18	0.035	0.73	WL-115 @5'
Phenanthrene	17	2	0.12	0.044	0.91	WL-115 @5'
Phenol	17	0	0.00	0	0	No Detects
4-Methylphenol	15	0	0.00	0	0	No Detects
Butyl benzyl phthalate	17	5	0.29	0.069	180	WL-115 @5'
Diethylphalate	17	1	0.06	0.033	0.033	WL-114 @0'
Di-n-butylphthalate	17	2	0.12	0.3	10	WL-113 @45'
Di-n-octylphthalate	17	4	0.24	0.17	3.7	WL-115 @5'
Bis(2-Ethylhexyl)phthalate	17	10	0.59	0.12	25	WL-113 @45'

Note: All units are mg/kg (ppm)

Table 8-4: Semi-Volatile Organic Compounds Summary for Soil Samples (cont.)

Area 2 Soil Samples

Constituent	Number Samples	Number of Detections	Frequency Detection	Minimum Detection Value	Maximum Detection Value	Sample Exhibiting the Maximum Value
Benzoic Acid	24	3	0.13	0.15	0.79	WL-235 @0'
1,4-Dichlorobenzene	24	3	0.13	0.062	530	WL-230 @16'
Pyrene	24	0	0.00	0	0	No Detects
Naphthalene	24	8	0.33	0.034	10	WL-218@25'
2-Methylnaphthalene	24	2	0.08	0.19	2.9	WL-210 @15'
Fluoranthene	24	1	0.04	0.92	0.92	WL-218 @0'
Phenanthrene	24	1	0.04	0.073	0.073	WL-208 @15'
Phenol	24	4	0.17	0.41	9	WL-210 @15'
4-Methylphenol	24	4	0.17	0.078	9.8	WL-213 @25'
Butyl benzyl phthalate	24	2	0.08	0.52	5100	WL-208 @20'
Diethylphalate	24	2	0.08	0.053	0.082	WL-208 @15'
Di-n-butylphthalate	24	1	0.04	0.2	0.2	WL-208 @15'
Di-n-octylphthalate	24	2	0.08	0.15	12	WL-215 @25'
Bis(2-Ethylhexyl)phthalate	24	18	0.75	0.11	180	WL-208 @20'

Note: All units are mg/kg (ppm)

Table 8-5: Pesticides and Polychlorinated Biphenyls Summary for Soil Samples

Area 1 Soil Samples

Constituent	Number Samples	Number of Detections	Frequency Detection	Minimum Detection Value	Maximum Detection Value	Sample Exhibiting the Maximum Value
4,4'-DDD	18	3	0.17	0.00079	0.015	WL-115@5'
4,4'-DDE	18	2	0.11	0.00072	0.00088	WL-113@45'
4,4'-DDT	18	3	0.17	0.0018	0.063	WL-115@5'
Aldrin	18	2	0.11	0.0011	0.16	WL-115@5'
beta-BHC	18	1	0.06	0.017	0.017	WL-115@5'
Dieldrin	18	5	0.28	0.00092	0.042	WL-115@5'
Endosulfan I	18	1	0.06	0.0011	0.0011	WL-101@5'
Endrin	18	2	0.11	0.0039	0.0093	WL-115@5'
Aroclor 1242	18	2	0.11	0.033	2.6	WL-115@5'
Aroclor 1248	18	0	0.00	0	0	No Detects
Aroclor 1254	18	1	0.06	1.1	1.1	WL-115@5'

Note: All units are mg/kg (ppm)

Table 8-5: Pesticides and Polychlorinated Biphenyls Summary for Soil Samples (cont.)

Area 2 Soil Samples

Constituent	Number Samples	Number of Detections	Frequency Detection	Minimum Detection Value	Maximum Detection Value	Sample Exhibiting the Maximum Value
4,4'-DDD	20	2	0.10	0.00078	0.0076	WL-235@0'
4,4'-DDE	20	2	0.10	0.0021	0.0078	WL-214@25'
4,4'-DDT	20	6	0.30	0.00087	0.018	WL-230@16'
Aldrin	20	9	0.45	0.00044	0.47	WL-218@25'
beta-BHC	20	2	0.10	0.0044	0.028	WL-218@25'
Dieldrin	20	1	0.05	0.0012	0.0012	WL-230@35'
Endosulfan I	20	1	0.05	0.011	0.011	WL-214@25'
Endrin	20	2	0.10	0.0027	0.18	WL-218@25'
Aroclor 1242	24	3	0.13	0.067	1	WL-230@16'
Aroclor 1248	24	3	0.13	0.017	18	WL-218@25'
Aroclor 1254	24	3	0.13	0.18	1.6	WL-209@0' WL-210@0'

Note: All units are mg/kg (ppm)

Table 8-6: Priority Pollutant Metals Summary for Groundwater Samples

Constituent	Sampling Date	Type of Sample	Number Samples	Number of Detections	Frequency Detection	Minimum Detection Value	Maximum Detection Value	Sample Exhibiting the Maximum Value
Arsenic	November 1995	Unfiltered	33	14	0.42424	18	420	MW-F3
		Filtered	33	13	0.39394	11	400	MW-F3
	February 1996	Filtered	33	12	0.36364	10	260	MW-F3
Chromium	November 1995	Unfiltered	33	9	0.27273	10	62	S-80
		Filtered	33	1	0.0303	11	11	S-10
	February 1996	Filtered	33	2	0.06061	15	22	S-5
Copper	November 1995	Unfiltered	33	6	0.18182	23	76	S-80
		Filtered	33	0	0	0	0	No Detects
	February 1996	Filtered	33	0	0	0	0	No Detects
Lead	November 1995	Unfiltered	33	23	0.69697	3.1	70	MW-F3
		Filtered	33	1	0.0303	4.1	4.1	I-4
	February 1996	Filtered	33	1	0.0303	7.9	7.9	S-5
Nickel	November 1995	Unfiltered	33	9	0.27273	23	93	S-5
		Filtered	33	5	0.15152	21	99	S-5
	February 1996	Filtered	33	4	0.12121	20	110	S-5
Zinc	November 1995	Unfiltered	33	19	0.57576	22	330	D-14
		Filtered	33	3	0.09091	28	77	D-83
	February 1996	Filtered	33	4	0.12121	20	49	I-11

Note: All units are ug/L (ppb)

Table 8-7: Total Petroleum Hydrocarbons Summary for Groundwater Samples

Constituent	Sampling Date	Number Samples	Number of Detections	Frequency Detection	Minimum Detection Value	Maximum Detection Value	Sample Exhibiting the Maximum Value
Diesel Range	November 1995	33	3	0.09	0.59	3.5	S-5
	February 1996	33	1	0.03	0.53	0.53	D-14
Motor Oil Range	November 1995	33	3	0.09	0.65	2.3	I-11
	February 1996	33	0	0	0	0	Not Detected

Note: All units are mg/L (ppm)

Table 8-8: Volatile Organic Compounds Summary for Groundwater Samples

Constituent	Sampling Date	Number Samples	Number of Detections	Frequency Detection	Minimum Detection Value	Maximum Detection Value	Sample Exhibiting the Maximum Value
Benzene	November 1995	33	2	0.06	9.3	11	I-2
	February 1996	33	4	0.12	5.6	7.4	I-9
Chlorobenzene	November 1995	33	5	0.15	5.3	170	D-14
	February 1996	33	4	0.12	9.6	150	D-14
1,4-Dichlorobenzene	November 1995	33	3	0.09	12	50	D-14
	February 1996	33	3	0.09	9.9	46	D-14
cis-1,2-Dichloroethene	November 1995	33	3	0.09	7.2	26	S-82
	February 1996	33	3	0.09	8.6	34	S-82
Acetone	November 1995	33	3	0.09	37	68	D-12
	February 1996	33	0	0	0	0	No Detects

Note: All units are ug/L (ppb)

Table 8-9: Semi-Volatile Organic Compounds Summary for Groundwater Samples

Constituent	Sampling Date	Number Samples	Number of Detections	Frequency Detection	Minimum Detection Value	Maximum Detection Value	Sample Exhibiting the Maximum Value
1,4-Dichlorobenzene	November 1995	33	2	0.06	12	18	D-14
	February 1996	33	1	0.03	38	38	D-14
4-Methylphenol	November 1995	33	2	0.06	67	290	I-11
	February 1996	33	0	0.00			Not Detected
Di-n-octylphthalate	November 1995	33	1	0.03	13	13	I-62
	February 1996	33	0	0.00			Not Detected
Bis(2-Ethylhexyl)phthalate	November 1995	33		0.00			Not Detected
	February 1996	33	0	0.00			Not Detected

Note: All units are ug/L (ppb)

Table 8-10: Pesticides and Polychlorinted Biphenyls Summary for Groundwater Samples

Constituent	Sampling Date	Number Samples	Number of Detections	Frequency Detection	Minimum Detection Value	Maximum Detection Value	Sample Exhibiting the Maximum Value
4,4'-DDD	November 1995	33	1	0.03	0.11	0.11	S-5
	February 1996	33	0	0.00			Not Detected
Aldrin	November 1995	33	1	0.03	0.02	0.02	D-6
	February 1996	33	0	0.00			Not Detected
gamma-BHC (Lindane)	November 1995	33	1	0.03	0.011	0.011	D-85
	February 1996	33	0	0.00			Not Detected

Note: All units are ug/L (ppb)

Table 9-1 : Chemicals of Potential Concern (CoPCs) for Human Health Risk Assessment

Radiological CoPCs

Uranium-238 (for uranium-238 and 2 daughters)
Uranium–234
Thorium-230
Radium-226
Lead-210

Uranium-238 + Uranium-234 / 2 * 0.05 (for Uranium-235 and one daughter)
Protactinium-231

Thorium-232

Non-Radiological CoPCs

Arsenic
Lead
Uranium

Aroclor 1254

Table 9-2: Summary of Calculated Risks for Current and Future Potential Receptors

Potential Receptor	Location	Radionuclide Cancer Risk	Chemical Cancer Risk	Total Cancer Risks	Hazard Quotient
Current Scenarios					
Grounds keeper adjacent to Area 1	Onsite	1×10^{-5}	NE	1×10^{-5}	NE
Grounds keeper adjacent to Area 2	Onsite	4×10^{-5}	NE	4×10^{-5}	NE
Ford property grounds keeper	Onsite	6×10^{-7}	NE	6×10^{-7}	NE
Future Scenarios					
Area 1 grounds keeper	Onsite	6×10^{-5}	2×10^{-7}	6×10^{-5}	0.0059
Area 2 grounds keeper	Onsite	2×10^{-4}	3×10^{-8}	2×10^{-4}	0.0022
Area 1 Adjacent Building User	Onsite	1×10^{-5}	NE	1×10^{-5}	NE
Area 2 Adjacent Building User	Onsite	4×10^{-5}	NE	4×10^{-5}	NE
Area 1 Storage Yard Worker	Onsite	1×10^{-4}	NE	1×10^{-4}	NE
Area 2 Storage Yard Worker	Onsite	4×10^{-4}	NE	4×10^{-4}	NE
Ford property grounds keeper	Offsite	2×10^{-6}	NE	2×10^{-6}	NE

NE = No exposure anticpated because a complete exposure pathway does not exist.

Table 9-3: Uncertainties Associated with Estimated Human Health Risks for OU-1

Source of Uncertainty	Potential Impact on Estimated Risks	Impact on Health Protectiveness
Extent of OU-1 areas	Low	Increases Protectiveness
Heterogeneity of waste form	High	Increases Protectiveness
Bias in sampling	High	Increases Protectiveness
Inclusion of natural background	Low to moderate	Increases Protectiveness
Calculation of 95% UCL	Moderate	Increases Protectiveness
Current and future land use as commercial/industrial	None	None
Current and future receptors as occupational	None	None
Source release and environmental transport mechanisms	Low	None
Radon release model	Low	Increases Protectiveness
Future receptor exposure mechanisms at points of contamination	Low	None
Approximating exposure with simplified expressions	Moderate to high	Increases Protectiveness
Change in individual parameter values	Low to moderate	Generally increases Protectiveness
Slope factors and reference doses	High	Increases Protectiveness
No reference doses for some contaminants	Moderate to high	Decreases Protectiveness
External exposure source geometry	Moderate	Increases Protectiveness
Representative contaminant concentrations	Moderate	Increases Protectiveness

Table 9-4: Summary of Estimated Ecological Risks for Operable Unit 1

Receptor	Hazard Quotients[1]	Primary Contributors[2]
Area 1		
Plants	547	Selenium and nickel
Invertebrates	152	Arsenic, chromium, copper, mercury, nickel and selenium
White-footed mouse	3,320	Selenium, arsenic and copper
Cottontail rabbit	5,750	Selenium, arsenic and copper
American Robin	16,000	Selenium, copper and cadmium
Area 2		
Plants	347	Uranium, chromium and lead
Invertebrates	144	Chromium
White-footed mouse	647	Selenium, lead and arsenic
Cottontail rabbit	1,700	Selenium and arsenic
American Robin	15,300	Selenium, lead, cadmium and chromium
Areas 1 and 2		
Red fox	154	Cadmium, selenium and arsenic
American woodcock	442	Lead and selenium
Red-tailed hawk	12.2	Selenium

1. As discussed in the text, the hazard quotients presented above are considered over-estimates of the potential risks.

2. These compounds were identified in the Baseline Risk Assessment as the primary contributors of risk to each of the potential receptor scenarios identified above. Occurrences of other chemicals present in OU-1 and 2 may also result in potential risks greater than the threshold values.