Prepared in cooperation with the U.S. Environmental Protection Agency

Graphic Products Used in the Evaluation of Traditional and Emerging Remote Sensing Technologies for the Detection of Fugitive Contamination at Selected Superfund Hazardous Waste Sites

By E. Terrence Slonecker and Gary B. Fisher

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Glossary

As	arsenic	Hg	mercury	Sb	antimony
Ag	silver	LOD	level of detection	Se	selenium
Ba	barium	Mo	molybdenum	Sr	strontium
Cd	cadmium	Mn	manganese	U	uranium
Cr	chromium	Ni	nickel	V	vanadium
Cs	cesium	Pb	lead	XRF	x-ray fluorescence
Co	cobalt	ppm	parts per million	Zn	zinc
Cu	copper	RBC	risk-based concentration		

Horizontal coordinate information is referenced to the North American Datum of 1983 (NAD 83).

Graphic Products Used in the Evaluation of Traditional and Emerging Remote Sensing Technologies for the Detection of Fugitive Contamination at Selected Superfund Hazardous Waste Sites

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Introduction

This report presents the overhead imagery and field sampling results used to prepare U.S. Geological Survey Open-File Report 2011–1050, "Evaluation of Traditional and Emerging Remote Sensing Technologies for the Detection of Fugitive Contamination at Selected Superfund Hazardous Waste Sites" (Slonecker and Fisher, 2011). These graphic products were used in the evaluation of remote sensing technology in postclosure monitoring of hazardous waste sites and represent an ongoing research effort.

Soil sampling results presented here were accomplished with field portable x-ray fluorescence (XRF) technology and are used as screening tools only representing the current conditions of metals and other contaminants at selected Superfund hazardous waste sites. A detailed explanation of the methods and significant results of this research can be found in Slonecker and Fisher (2009, 2011).

Location Diagrams and Imagery

Figure 1. Location map of the Mid-Atlantic Wood Preservers, Inc. site in Anne Arundel County, Md.

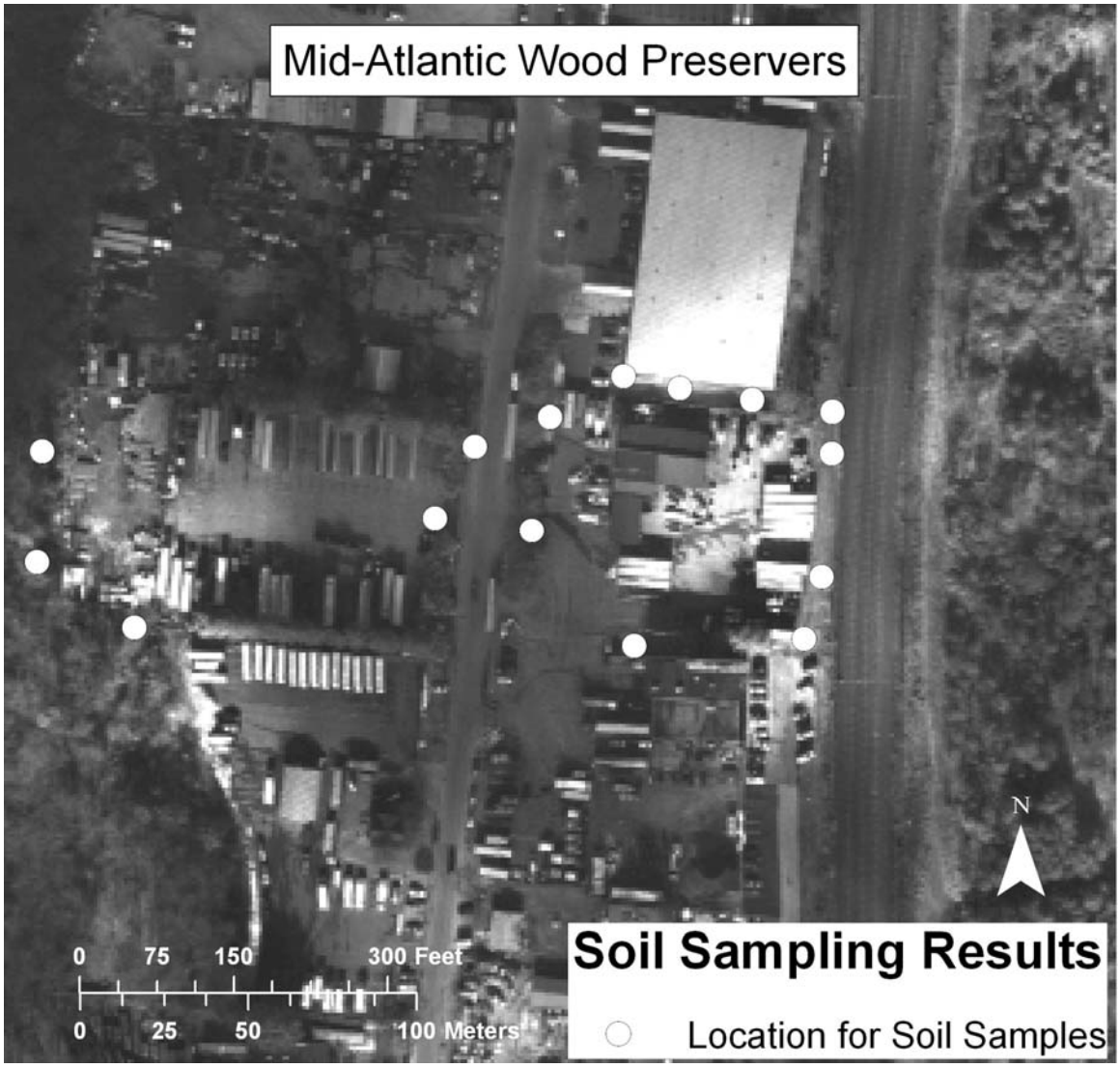

Figure 2. Sampling locations at the Mid-Atlantic Wood Preservers, Inc. site in Anne Arrunder County, Md.

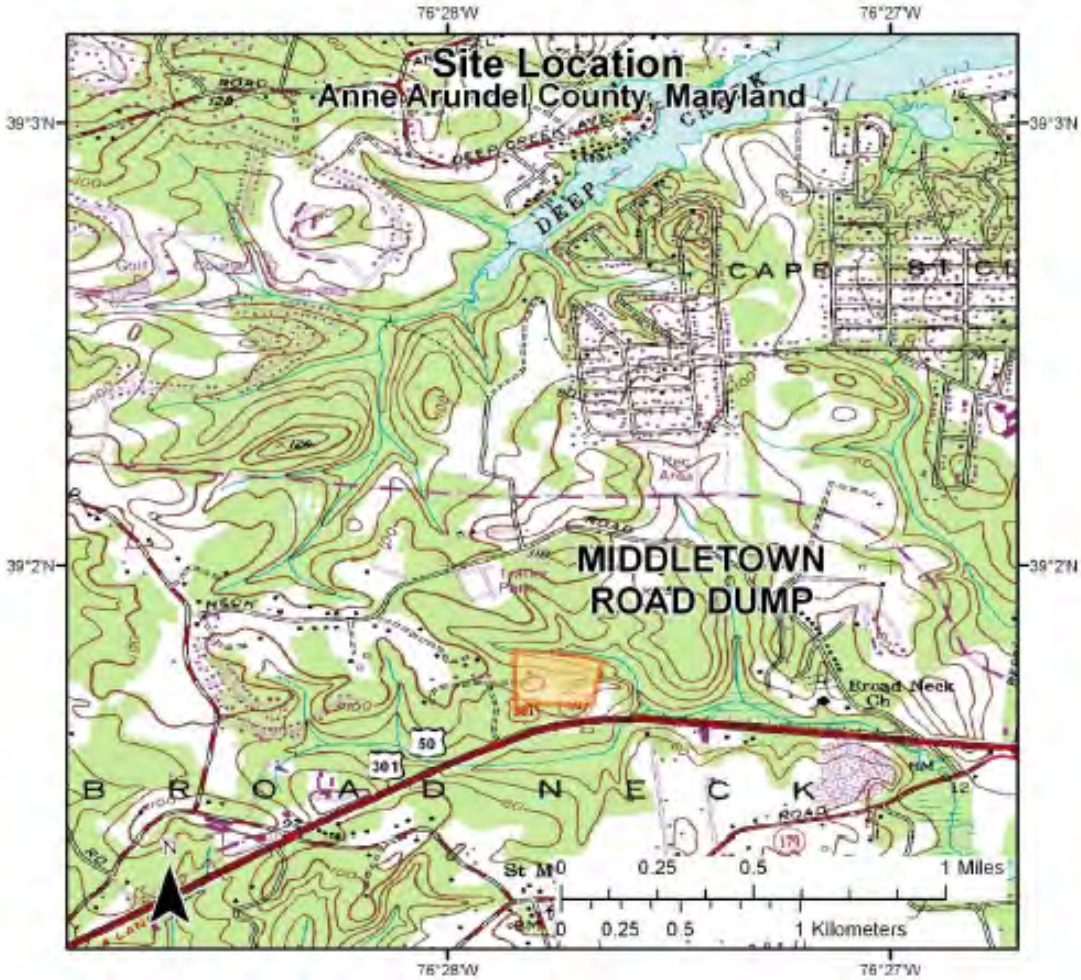

Figure 3. Location map for Middletown Road Dump site in Annapolis, Md.

Figure 4. Imagery of the Middletown Road Dump in Annapolis, Md., showing the area of landfill expansion (brown shading); the imagery, which was generated in 2010, used the Civil Air Patrol's Airborne Real time Cueing Hyperspectral Enhanced Reconnaissance (ARCHER) technology.

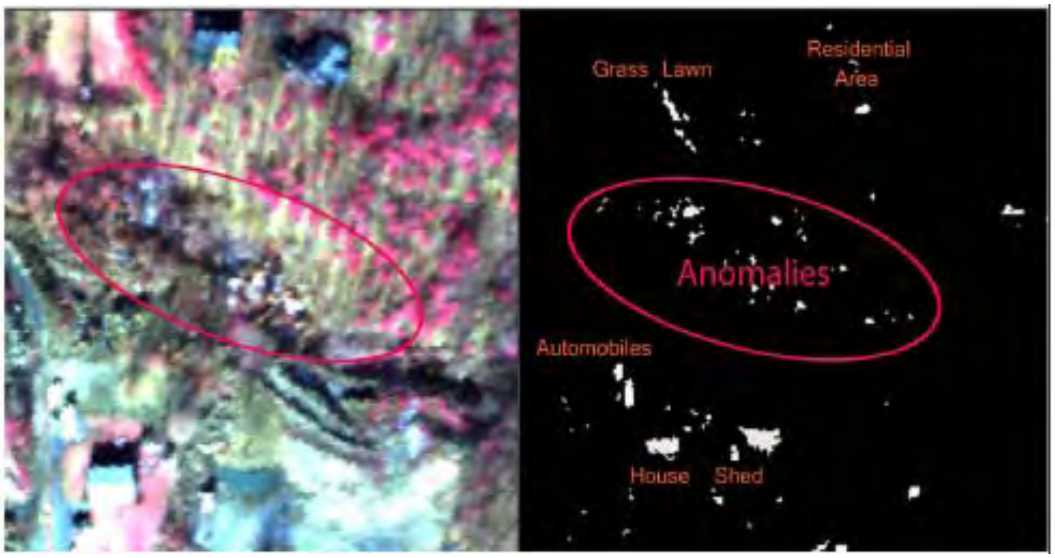

Figure 5. Hyperspectral anomaly detection results that show anomalies along the northern border of the Middletown Road Dump in Annapolis, Md.

Figure 6. Imagery showing elevated concentrations of arsenic, chromium, mercury, lead, antimony and hydrocarbons detected at the Middletown Road Dump site in Annapolis, Md.; the imagery was generated using Civil Air Patrol's Airborne Real time Cueing Hyperspectral Enhanced Reconnaissance (ARCHER) technology.

Figure 7. Laboratory spectra diagram of the soils at the Middletown Road Dump in Annapolis, Md., which shows classic hydrocarbon absorption patterns at 1,730 and 2,310 nanometers.

Figure 8. Location map of the Dixie Caverns Landfill site in Salem, Va.

Figure 9. Clockwise from top left, hyperspectral imagery, anomaly detection image, and photograph of a concrete block at the Dixie Caverns Landfill in Salem, Va.

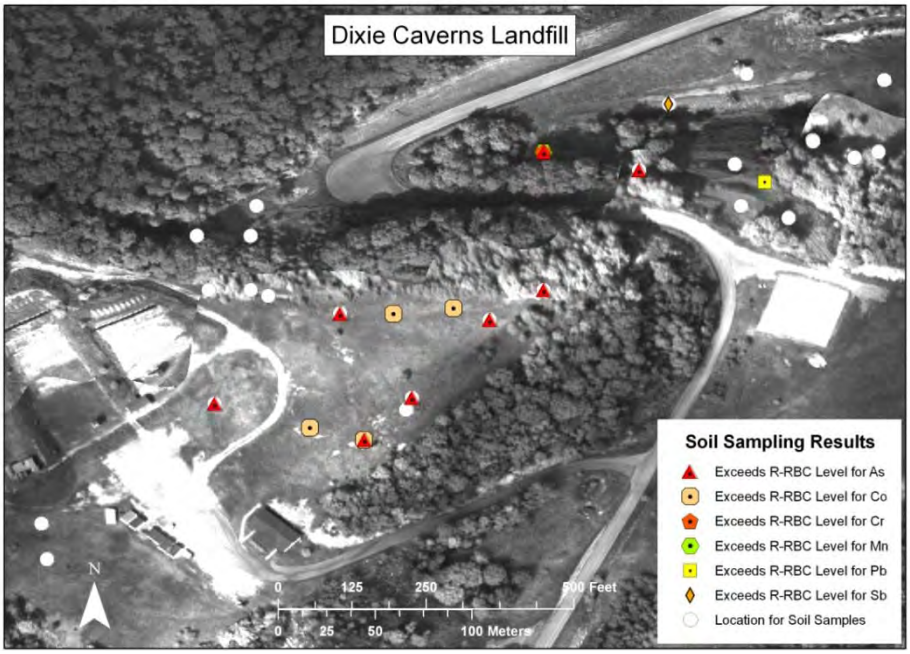

Figure 10. Sampling locations at the Dixie Caverns Landfill in Salem, Va., and sampling results.

Figure 11. Location map of the Matthews Electroplating site in Salem, Va.

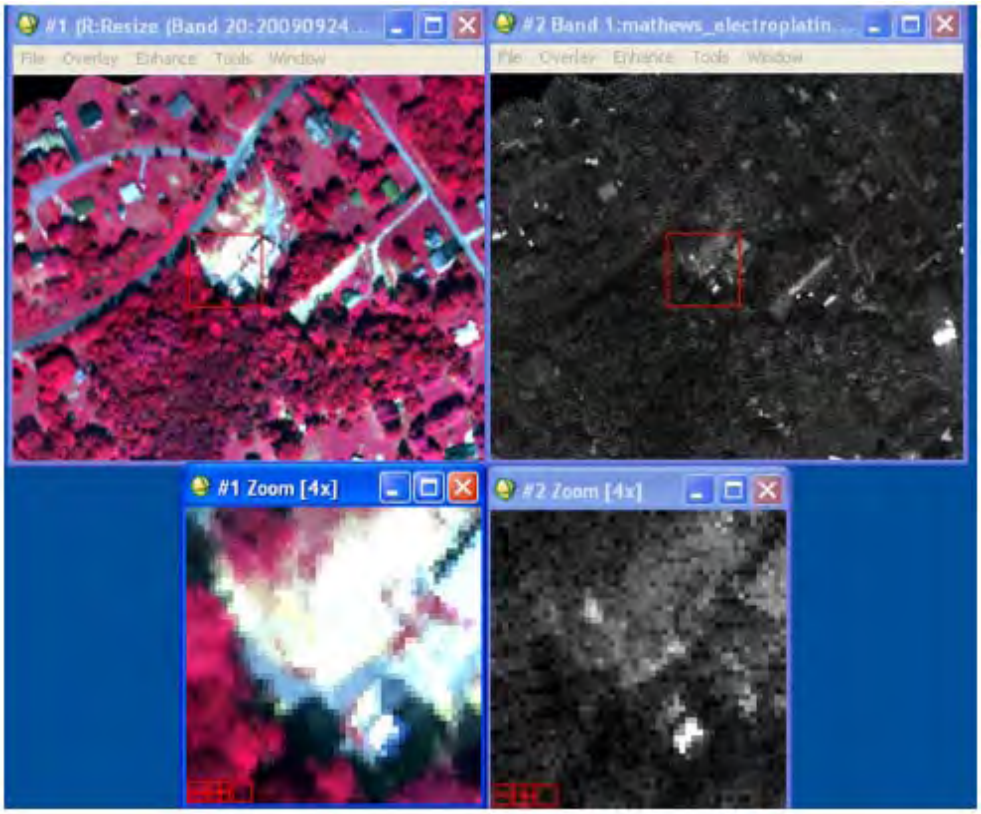

Figure 12. Hyperspectral image and anomaly detection results for the Matthews Electroplating site in Salem, Va.

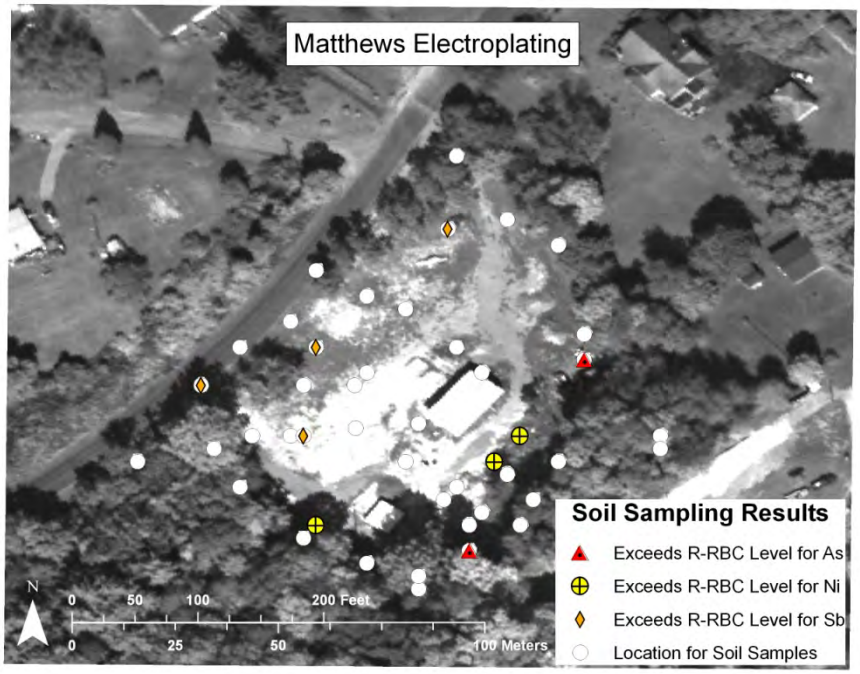

Figure 13. Sampling results for the Matthews Electroplating site in Salem, Va.

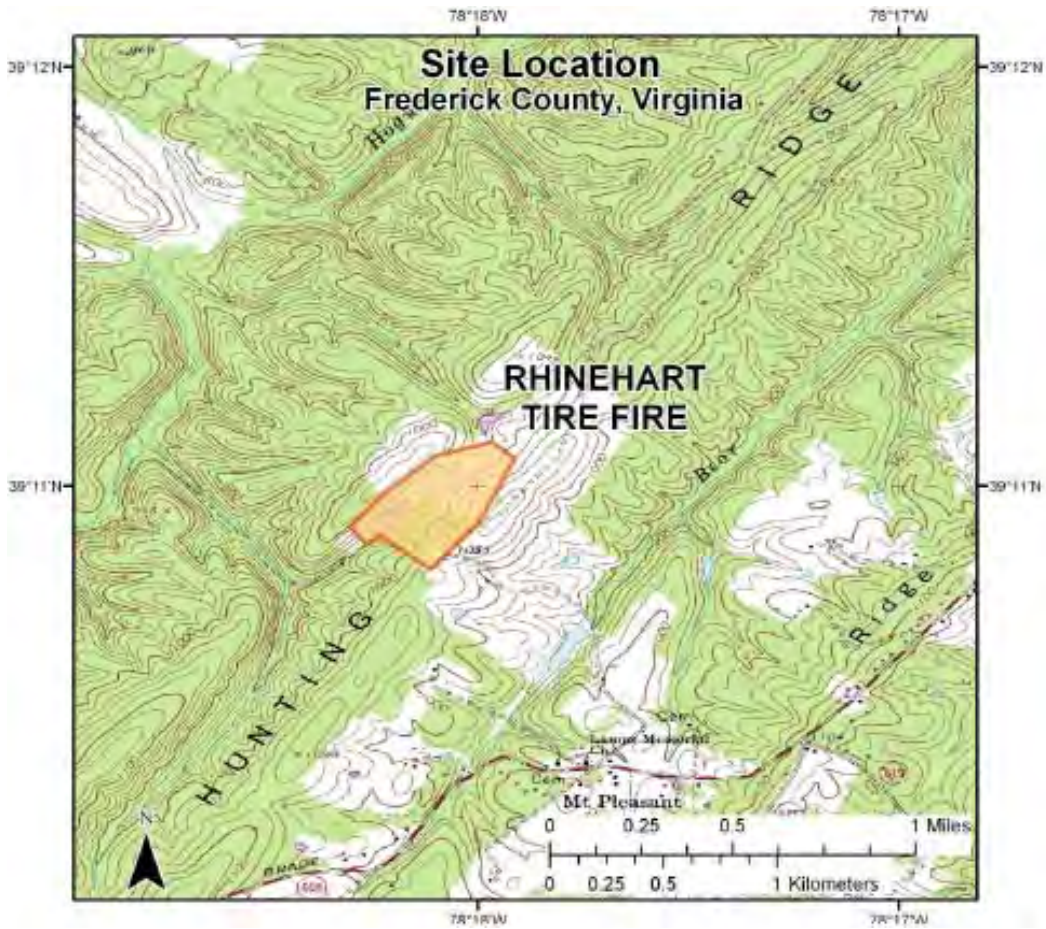

Figure 14. Location Map, Rhinehart Tire Fire Dump site near Winchester, Va.

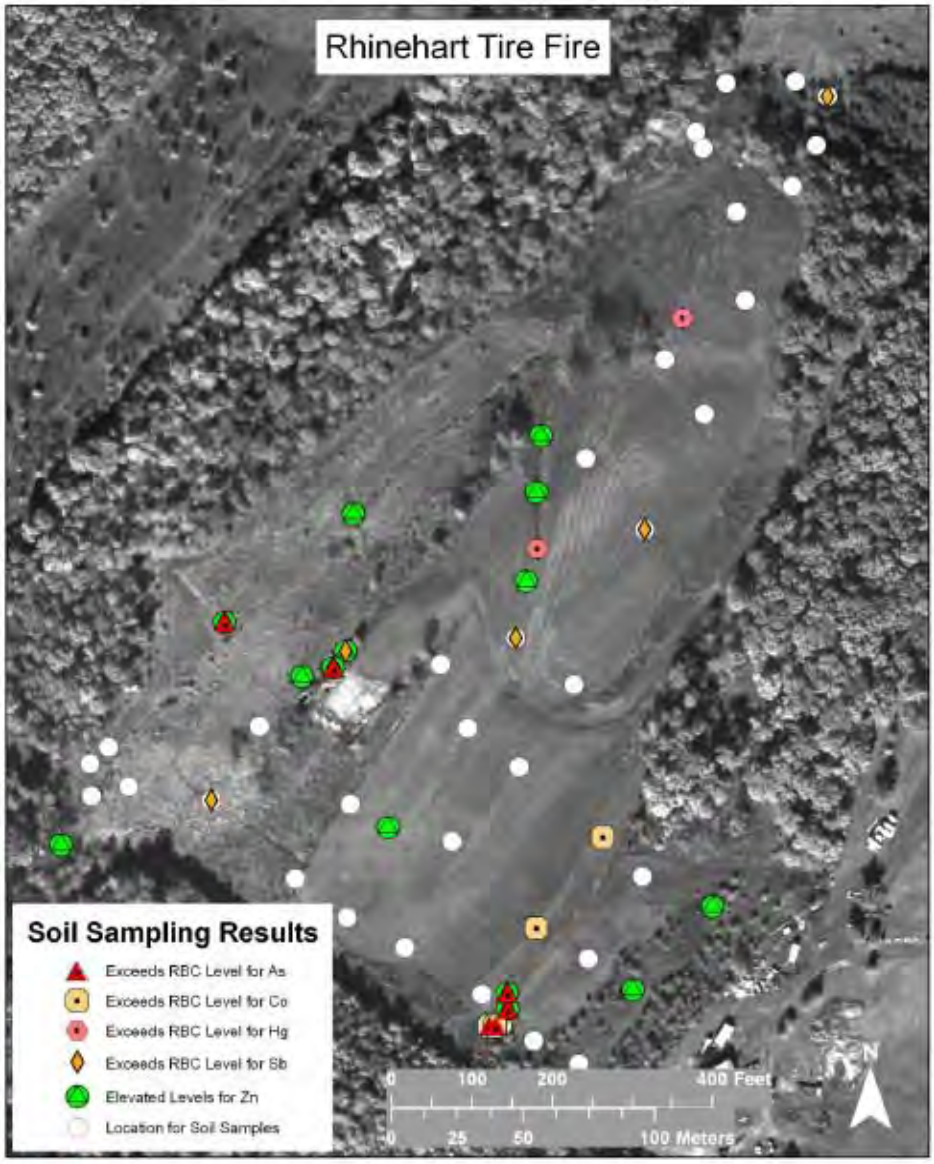

Figure 15. Soil sampling locations and results at the Rhinehart Tire Fire Dump site in Winchester, Va.

References Cited

Slonecker, E.T., and Fisher, G.B., 2009, Research implementation and quality assurance project plan—An evaluation of hyperspectral remote sensing technologies for the detection of fugitive contamination at selected superfund hazardous waste sites: U.S. Geological Survey Open-File Report 2009–1048, 41 p.

Slonecker, E.T., and Fisher, G.B., 2011, The evaluation of traditional and emerging remote sensing technologies for the detection of fugitive contamination at selected superfund hazardous waste sites: U.S. Geological Survey Open-File Report 2011–1050, 23 p.

Appendixes

The following appendixes list the soil sampling results that were accomplished using XRF technology. All samples were processed in the laboratory and screened for a minimum of 180 seconds. All values are listed in parts per million concentration, except for the data in the X and Y columns, which represent the geographic coordinate locations of each sample based on the North American Datum of 1983. The red highlights represent values that equaled or exceeded the relevant risk-based concentration (RBC). The yellow highlights represent values that are significantly higher than natural background concentration but do not exceed the RBC standard for each element. LOD is the level of detection.

Appendix 1. Sampling Results from the Mid-Atlantic Wood Preservers, Inc. site.

SAMPLE	Time	Type	Duration	Mo	Sr	U	Pb	Se	As	Hg	Zn
				390	4,700	230	400	390	22	5.6	23,000
MAWP-1	8/8/2010 13:30	SOIL	182.20	< LOD	35.93	< LOD	27.82	< LOD	9.38	< LOD	52.8
MAWP-2	8/8/2010 13:34	SOIL	180.94	< LOD	25.33	< LOD	37.38	< LOD	17.42	< LOD	52.44
MAWP-3	8/8/2010 13:37	SOIL	181.50	< LOD	28.9	< LOD	36.27	< LOD	21.1	< LOD	65.69
MAWP-4	8/8/2010 13:41	SOIL	181.24	< LOD	17.72	< LOD	16.41	< LOD	< LOD	< LOD	69.99
MAWP-5	8/8/2010 13:44	SOIL	181.24	< LOD	20.08	< LOD	36.25	< LOD	8.76	< LOD	59.16
MAWP-6	8/8/2010 13:48	SOIL	180.94	< LOD	14.88	< LOD	23.34	< LOD	< LOD	< LOD	40.29
MAWP-7	8/8/2010 13:51	SOIL	180.96	< LOD	14.81	< LOD	29.3	< LOD	< LOD	< LOD	36.69
MAWP-8	8/8/2010 13:55	SOIL	180.64	< LOD	30.1	< LOD	19.76	< LOD	20.99	< LOD	388.52
MAWP-9	8/8/2010 13:58	SOIL	181.55	< LOD	29.91	< LOD	18.36	< LOD	6.9	< LOD	50.59
MAWP-10	8/8/2010 14:02	SOIL	182.11	< LOD	35.74	< LOD	20.95	< LOD	< LOD	< LOD	50.93
MAWP-11	8/8/2010 14:05	SOIL	184.87	< LOD	33.1	< LOD	13.53	< LOD	23.05	< LOD	45.95
MAWP-12	8/8/2010 14:08	SOIL	180.68	< LOD	21.32	< LOD	51.8	< LOD	8.3	< LOD	46.15
MAWP-13	8/8/2010 14:12	SOIL	181.25	< LOD	108.66	< LOD	69.14	< LOD	24.1	< LOD	123.1
MAWP-14	8/8/2010 14:15	SOIL	180.87	5.42	52.01	< LOD	21.11	< LOD	23.73	< LOD	86.7
MAWP-15	8/8/2010 14:19	SOIL	181.01	< LOD	83.38	< LOD	26.55	< LOD	15.41	< LOD	132.32

Cu	Ni	Co	Mn	Cr	V	Ba	Cs	Sb	Cd	Ag	X	Y
3,100	1,600	23	18,000	230	390	21,000		31	70		Exceeds R-RBC Level	
< LOD	< LOD	< LOD	137.4	85.34	107.12	276.48	66.72	26.87	< LOD	< LOD	-76.6981	39.16131
19.03	< LOD	< LOD	69.12	126.86	< LOD	200.9	53.87	29.81	< LOD	< LOD	-76.6975	39.16150
25.25	60.01	< LOD	107.72	123.26	< LOD	202.8	51.85	22.26	< LOD	< LOD	-76.6975	39.16183
19.11	< LOD	< LOD	< LOD	< LOD	< LOD	189.04	47.47	34.52	9.16	< LOD	-76.6975	39.16194
< LOD	< LOD	< LOD	< LOD	48.09	< LOD	225.78	49.98	23.35	< LOD	< LOD	-76.6984	39.16192
< LOD	< LOD	< LOD	57.37	33.95	< LOD	280.5	70.45	29.37	< LOD	< LOD	-76.6985	39.16161
< LOD	< LOD	< LOD	< LOD	44.23	< LOD	234.33	53.67	33.58	< LOD	< LOD	-76.6976	39.16133
< LOD	43.39	< LOD	164.82	67.75	107.48	163.17	30.51	< LOD	< LOD	< LOD	-76.6982	39.16203
< LOD	< LOD	< LOD	238.89	37.58	< LOD	236.37	41.89	21.31	< LOD	< LOD	-76.6980	39.16200
< LOD	< LOD	< LOD	290.71	42.4	< LOD	213.12	45.21	17.78	< LOD	< LOD	-76.6978	39.16197
22.72	< LOD	< LOD	69.01	87.06	< LOD	259.16	61.88	35.58	9.69	< LOD	-76.6988	39.16164
< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	98.76	19.94	< LOD	< LOD	< LOD	-76.6999	39.16133
19.63	< LOD	< LOD	136.43	153.88	95.11	< LOD	< LOD	< LOD	< LOD	< LOD	-76.7002	39.16150
23.49	< LOD	< LOD	69.47	127.95	101.96	< LOD	< LOD	< LOD	< LOD	< LOD	-76.7002	39.16180
< LOD	177.23	< LOD	183.39	285.76	< LOD	267.83	66.19	37.36	< LOD	7.2	-76.6987	39.16183

Appendix 2. Sampling Results from the Middletown Road Dump Site.

SAMPLE	Time	Type	Duration	Mo	Sr	U	Pb	Se	As	Hg	Zn
				390	4,700	230	400	390	22	5.6	23,000
MRD-1	5/11/2010 10:50	SOIL	183.7	< LOD	69.95	< LOD	19.33	< LOD	7.89	< LOD	98.94
MRD-2	5/11/2010 10:55	SOIL	184.0	< LOD	111.9	< LOD	16.62	< LOD	< LOD	< LOD	54.77
MRD-3	5/11/2010 10:59	SOIL	181.2	< LOD	84.23	< LOD	24.58	< LOD	93.65	< LOD	60.44
MRD-4	5/11/2010 11:02	SOIL	181.7	< LOD	57.6	< LOD	28.11	< LOD	12.75	< LOD	48.09
MRD-5	5/11/2010 11:06	SOIL	181.2	< LOD	148.06	< LOD	10.32	< LOD	< LOD	< LOD	44.12
MRD-6	5/11/2010 13:20	SOIL	180.7	< LOD	257.7	< LOD	< LOD	< LOD	< LOD	< LOD	38.86
MRD-7	5/11/2010 13:23	SOIL	181.1	< LOD	80.65	< LOD	12.34	< LOD	< LOD	< LOD	36.43
MRD-8	5/11/2010 13:27	SOIL	181.3	< LOD	45.87	< LOD	24.75	< LOD	< LOD	< LOD	32.78
MRD-9	5/11/2010 13:30	SOIL	181.0	< LOD	49.94	< LOD	13.90	< LOD	10.37	< LOD	28.7
MRD-10	5/11/2010 13:34	SOIL	181.9	< LOD	58.65	< LOD	21.86	< LOD	< LOD	< LOD	42.83
MRD-11	5/11/2010 13:37	SOIL	181.1	< LOD	124.39	< LOD	20.94	< LOD	8.01	< LOD	70.72
MRD-12	5/11/2010 13:41	SOIL	181.5	< LOD	36.06	< LOD	35.28	< LOD	< LOD	< LOD	33.05
MRD-13	5/11/2010 13:44	SOIL	180.6	< LOD	57.07	< LOD	28.28	< LOD	9.37	< LOD	50.11
MRD-14	5/11/2010 13:48	SOIL	181.2	< LOD	26.49	< LOD	18.11	< LOD	9.63	< LOD	42.81
MRD-15	5/11/2010 13:51	SOIL	181.9	< LOD	71.85	< LOD	38.60	< LOD	11.17	< LOD	58.54
MRD-16	5/11/2010 13:55	SOIL	181.2	< LOD	89.18	< LOD	8.63	< LOD	8.88	< LOD	23.4
MRD-17	5/11/2010 13:58	SOIL	180.8	< LOD	40.09	< LOD	28.56	< LOD	11.2	< LOD	23.75
MRD-18	5/11/2010 14:02	SOIL	181.6	7.18	50.47	< LOD	23.84	< LOD	13.21	< LOD	207.13
MRD-21	5/11/2010 14:05	SOIL	181.4	6.73	54.24	< LOD	34.38	< LOD	10.67	7.24	267.93
MRD-28	5/11/2010 14:09	SOIL	181.1	< LOD	22.07	< LOD	26.94	< LOD	< LOD	< LOD	32.9
MRD-30	5/11/2010 14:13	SOIL	182.5	< LOD	61.2	< LOD	8.44	< LOD	8.04	< LOD	35.43
MRD-31	5/11/2010 14:16	SOIL	181.8	< LOD	31.62	< LOD	31.82	< LOD	17.58	< LOD	52.61
MRD-32	5/11/2010 14:20	SOIL	180.9	< LOD	31.49	< LOD	27.66	3.95	16.12	9.67	47.11

Cu	Ni	Co	Mn	Cr	V	Sc	Ba	Cs	Sb	Cd	X	Y
3,100	1,600	23	18,000	230	390		21,000		31	70	Exceeds R-RBC Level	
< LOD	< LOD	< LOD	148.38	40.75	< LOD	78.72	339.7	93.62	37.65	< LOD	-76.46197	39.02950
< LOD	< LOD	< LOD	116.13	40.69	< LOD	< LOD	303.46	61.8	22.45	< LOD	-76.46192	39.029611
124.28	< LOD	< LOD	330.68	423.24	< LOD	< LOD	243.8	33.65	< LOD	< LOD	-76.4620	39.029694
< LOD	< LOD	< LOD	382.28	< LOD	141.93	< LOD	428.03	68.78	26.9	< LOD	-76.4620	39.02975
< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	446.99	61.92	30.05	< LOD	-76.46178	39.02950
< LOD	< LOD	< LOD	< LOD	29.13	< LOD	< LOD	329.09	50.36	22.09	< LOD	-76.46169	39.029611
< LOD	< LOD	< LOD	107.15	109.62	< LOD	< LOD	242.96	45.53	19.55	< LOD	-76.46175	39.029722
< LOD	49.39	< LOD	< LOD	80.9	120.67	< LOD	349.3	83.61	35.98	< LOD	-76.46169	39.029944
< LOD	< LOD	< LOD	173.14	75.79	119.5	< LOD	381.23	102.08	40.34	12.27	-76.46167	39.029972
< LOD	< LOD	< LOD	105.75	64.8	91.55	< LOD	346.07	74.64	29.75	< LOD	-76.46183	39.030111
< LOD	< LOD	< LOD	133.29	48.35	< LOD	< LOD	289.87	39.29	< LOD	< LOD	-76.46153	39.029833
< LOD	< LOD	< LOD	161.4	49.21	< LOD	< LOD	326.71	59.72	24.46	< LOD	-76.46161	39.029722
< LOD	< LOD	< LOD	142.42	56.52	123.58	< LOD	396.85	62.84	28.22	< LOD	-76.46153	39.029667
< LOD	< LOD	< LOD	98.71	54.44	< LOD	< LOD	223.66	46.39	19.83	< LOD	-76.46161	39.029444
< LOD	165.47	< LOD	263.85	185.53	163.52	51.45	282.75	58.61	21.26	< LOD	-76.46114	39.029361
< LOD	65.64	< LOD	119.1	150.74	136.24	< LOD	373.37	89.53	48.45	13.58	-76.46114	39.029528
< LOD	< LOD	< LOD	296.35	< LOD	108.89	< LOD	318.37	49.65	< LOD	< LOD	-76.46114	39.029778
< LOD	< LOD	< LOD	281.66	39.17	88.17	< LOD	< LOD	< LOD	< LOD	< LOD	-76.4610	39.03000
< LOD	< LOD	< LOD	245.65	66.76	86.41	< LOD	45.14	< LOD	< LOD	< LOD	-76.46106	39.030056
< LOD	< LOD	< LOD	91.71	65.71	93.57	< LOD	232.27	52.05	< LOD	< LOD	-76.46167	39.030306
< LOD	< LOD	< LOD	78.28	59.07	178.93	< LOD	296.94	78.98	35.37	< LOD	-76.46308	39.030278
24.93	< LOD	< LOD	211.89	92.03	< LOD	< LOD	233.55	44.12	17.93	< LOD	-76.46278	39.030417
< LOD	< LOD	< LOD	223.32	108.06	184.7	< LOD	323.47	76.17	30.56	< LOD	-76.46294	39.030444

Appendix 3. Sampling Results from the Dixie Caverns Landfill Site.

Sample	Time	Type	Duration	Mo	Sr	U	Pb	Se	As	Hg	Zn
				390	*4,700*	*230*	*400*	*390*	*22*	*5.6*	*23,000*
DCL-1	5/18/2010 13:11	SOIL	181.24	< LOD	82.2	< LOD	54.5	< LOD	42.1	< LOD	95.8
DCL-2	5/18/2010 13:16	SOIL	180.97	< LOD	81.8	< LOD	32.6	< LOD	19.2	< LOD	34.9
DCL-3	5/18/2010 13:20	SOIL	180.90	< LOD	77.6	< LOD	39.7	< LOD	12.6	< LOD	37.0
DCL-4	5/18/2010 13:24	SOIL	180.99	< LOD	91.4	< LOD	28.9	< LOD	27.4	< LOD	15.8
DCL-5	5/18/2010 13:27	SOIL	180.79	< LOD	85.6	< LOD	21.7	< LOD	22.9	< LOD	32.3
DCL-6	5/18/2010 13:31	SOIL	180.71	< LOD	91.1	< LOD	54.6	< LOD	26.6	< LOD	38.1
DCL-7	5/18/2010 13:34	SOIL	181.01	< LOD	84.1	< LOD	17.2	< LOD	20.0	< LOD	41.9
DCL-8	5/18/2010 13:38	SOIL	180.76	< LOD	81.0	< LOD	12.7	< LOD	36.8	< LOD	46.6
DCL-9	5/18/2010 13:41	SOIL	180.12	< LOD	31.0	< LOD	27.5	< LOD	18.9	8.71	36.6
DCL-10	5/18/2010 13:45	SOIL	181.03	< LOD	63.5	< LOD	26.8	< LOD	26.0	< LOD	71.4
DCL-11	5/18/2010 13:48	SOIL	180.93	< LOD	97.9	< LOD	26.4	< LOD	16.2	< LOD	88.0
DCL-12	5/18/2010 13:52	SOIL	180.63	< LOD	55.7	< LOD	28.7	< LOD	10.1	< LOD	76.5
DCL-13	5/18/2010 13:55	SOIL	181.16	< LOD	60.8	< LOD	25.7	< LOD	17.0	< LOD	38.1
DCL-14	5/18/2010 13:59	SOIL	181.12	< LOD	81.1	< LOD	42.8	< LOD	19.0	< LOD	58.6
DCL-15	5/18/2010 14:02	SOIL	180.46	< LOD	86.1	< LOD	40.5	< LOD	17.2	< LOD	77.3
DCL-16	5/18/2010 14:05	SOIL	180.56	< LOD	107.8	14.29	50.5	< LOD	11.0	< LOD	94.8
DCL-17	5/18/2010 14:09	SOIL	181.37	< LOD	75.9	< LOD	40.6	< LOD	17.6	< LOD	63.6
DCL-18	5/18/2010 14:13	SOIL	180.85	< LOD	73.6	< LOD	28.2	< LOD	17.7	< LOD	54.9
DCL-19	5/18/2010 14:16	SOIL	181.07	< LOD	85.0	18.87	178.3	< LOD	19.4	< LOD	736.2
DCL-20	5/18/2010 14:20	SOIL	181.60	< LOD	77.5	13.16	119.7	< LOD	15.7	< LOD	472.1
DCL-21	5/18/2010 14:23	SOIL	180.62	< LOD	83.0	< LOD	510.6	< LOD	< LOD	< LOD	1885.2
DCL-22	5/18/2010 14:27	SOIL	181.30	< LOD	75.0	15.38	178.3	< LOD	21.7	< LOD	602.1
DCL-23	5/18/2010 14:31	SOIL	180.86	< LOD	83.7	11.84	216.4	< LOD	25.7	< LOD	978.2
DCL-24	5/18/2010 14:34	SOIL	180.88	< LOD	118.3	< LOD	250.0	< LOD	26.5	< LOD	1186.5
DCL-25	5/18/2010 14:38	SOIL	180.69	< LOD	147.1	21.44	106.1	< LOD	17.9	< LOD	441.4
DCL-26	5/18/2010 14:41	SOIL	180.79	< LOD	95.7	16.94	333.9	< LOD	21.3	< LOD	1251.4
DCL-27	5/18/2010 14:45	SOIL	180.74	< LOD	76.8	13.41	156.1	< LOD	17.4	< LOD	598.9
DCL-28	5/18/2010 14:48	SOIL	179.67	< LOD	97.2	12.97	262.4	< LOD	< LOD	< LOD	909.6
DCL-30	5/18/2010 14:52	SOIL	180.87	< LOD	82.4	12.71	285.4	< LOD	20.8	< LOD	1324.8
DCL-40	5/18/2010 14:56	SOIL	181.81	< LOD	94.2	18.95	27.4	< LOD	9.5	< LOD	78.7
DCL-41	5/18/2010 15:00	SOIL	180.94	< LOD	83.9	22.62	16.1	< LOD	12.7	< LOD	68.4

Cu	Ni	Co	Mn	Cr	V	Sc	Ba	Cs	Sb	Cd	X	Y
3,100	*1,600*	*23*	*18,000*	*230*	*390*		*21,000*		*31*	*70*	*Exceeds R-RBC Level*	
41.0	< LOD	< LOD	456.7	116.9	103.1	40.2	219.6	< LOD	< LOD	< LOD	-80.1928	37.26031
< LOD	< LOD	202.5	200.7	49.7	134.9	< LOD	375.6	47.5	< LOD	< LOD	-80.1926	37.26031
< LOD	< LOD	154.0	242.0	49.1	114.0	< LOD	346.2	41.8	< LOD	< LOD	-80.1923	37.26033
< LOD	< LOD	< LOD	111.7	55.0	116.4	< LOD	492.5	69.4	21.9	< LOD	-80.1919	37.26042
< LOD	< LOD	< LOD	220.6	71.4	196.9	< LOD	398.9	55.4	18.1	< LOD	-80.1921	37.26028
26.9	< LOD	< LOD	315.4	82.7	131.2	< LOD	244.4	16.2	< LOD	< LOD	-80.1925	37.25992
< LOD	< LOD	< LOD	275.5	68.8	134.2	< LOD	292.8	33.7	< LOD	< LOD	-80.1925	37.25986
< LOD	< LOD	149.8	288.2	74.8	145.3	< LOD	447.8	59.1	< LOD	< LOD	-80.1927	37.25972
< LOD	< LOD	153.1	205.7	45.3	158.1	< LOD	361.3	72.5	26.5	< LOD	-80.1929	37.25978
34.5	< LOD	< LOD	530.2	< LOD	101.7	< LOD	396.0	49.4	16.2	< LOD	-80.1934	37.25989
< LOD	< LOD	< LOD	191.8	39.3	140.8	< LOD	448.6	54.1	23.2	< LOD	-80.1942	37.25933
< LOD	< LOD	< LOD	355.2	62.9	150.8	< LOD	341.2	50.2	< LOD	< LOD	-80.1942	37.25917
< LOD	< LOD	< LOD	166.0	39.6	< LOD	< LOD	326.7	40.1	< LOD	< LOD	-80.1932	37.26042
< LOD	< LOD	< LOD	980.0	41.9	111.6	< LOD	390.9	36.4	< LOD	< LOD	-80.1934	37.26042
< LOD	< LOD	< LOD	533.6	45.2	148.7	< LOD	431.4	51.3	< LOD	< LOD	-80.1931	37.26039
< LOD	< LOD	< LOD	498.1	51.3	142.9	< LOD	379.4	39.0	< LOD	< LOD	-80.1935	37.26067
< LOD	< LOD	< LOD	214.2	54.1	136.5	< LOD	204.2	< LOD	< LOD	< LOD	-80.1932	37.26067
< LOD	< LOD	< LOD	248.1	50.4	< LOD	< LOD	461.4	75.8	26.2	< LOD	-80.1932	37.26081
< LOD	< LOD	< LOD	394.8	71.0	138.9	< LOD	409.7	53.5	25.0	< LOD	-80.1907	37.26075
< LOD	< LOD	< LOD	361.8	63.7	155.8	< LOD	209.8	< LOD	< LOD	< LOD	-80.1909	37.26081
< LOD	< LOD	< LOD	630.1	58.0	121.7	< LOD	410.2	62.7	28.7	15.6	-80.1908	37.26092
< LOD	< LOD	< LOD	461.0	68.5	171.8	< LOD	413.6	59.5	26.8	< LOD	-80.1910	37.26100
< LOD	< LOD	< LOD	1224.5	103.0	125.8	78.6	197.6	< LOD	< LOD	< LOD	-80.1914	37.26097
< LOD	< LOD	< LOD	2456.5	249.4	114.8	< LOD	440.5	61.7	20.9	12.2	-80.1919	37.26106
< LOD	< LOD	< LOD	1507.2	118.3	165.8	< LOD	524.4	82.5	31.8	10.6	-80.1913	37.26128
32.8	< LOD	< LOD	1087.8	142.3	< LOD	< LOD	429.6	55.4	29.1	13.7	-80.1909	37.26142
< LOD	< LOD	< LOD	462.9	54.1	< LOD	< LOD	246.2	18.4	< LOD	< LOD	-80.1903	37.26139
29.8	< LOD	< LOD	398.6	37.0	< LOD	< LOD	361.5	27.9	< LOD	< LOD	-80.1903	37.26106
< LOD	< LOD	< LOD	484.9	< LOD	< LOD	< LOD	290.3	< LOD	< LOD	< LOD	-80.1904	37.26103
< LOD	< LOD	< LOD	175.1	61.3	131.6	< LOD	399.8	43.5	16.8	< LOD	-80.1906	37.26111
< LOD	< LOD	< LOD	173.7	66.9	165.0	< LOD	441.2	49.0	21.6	< LOD	-80.1906	37.26111

Appendix 4. Sampling Results from the Matthews Electroplating Site

SAMPLE	Time	Type	Duration	Mo	Sr	U	Pb	Se	As	Hg	Zn	Cu
				390	*4,700*	230	*400*	*390*	*22*	*5.6*	*23,000*	*3,100*
ME-1	5/11/2010 7:08	SOIL	183.03	< LOD	40.94	< LOD	40.97	< LOD	< LOD	< LOD	108.42	< LOD
ME-2	5/11/2010 7:13	SOIL	182.47	< LOD	44.4	< LOD	166.75	< LOD	< LOD	< LOD	160.84	< LOD
ME-3	5/11/2010 7:16	SOIL	184.07	< LOD	58.69	< LOD	45.43	< LOD	12.45	< LOD	76.26	44.36
ME-4	5/11/2010 7:20	SOIL	181.86	5.43	28	< LOD	39.28	< LOD	9.47	< LOD	45.55	< LOD
ME-5	5/11/2010 7:24	SOIL	182.58	11.98	17.38	< LOD	59.24	< LOD	25.53	< LOD	429.94	37.2
ME-6	5/11/2010 7:29	SOIL	181.25	< LOD	30.2	< LOD	35.29	< LOD	12.07	< LOD	80.26	< LOD
ME-7	5/11/2010 7:33	SOIL	180.95	< LOD	35.92	< LOD	80.31	< LOD	< LOD	< LOD	226.95	< LOD
ME-8	5/11/2010 7:37	SOIL	180.99	< LOD	27.33	< LOD	57.17	4.09	< LOD	< LOD	199.79	41.61
ME-9	5/11/2010 7:40	SOIL	180.66	< LOD	34.04	< LOD	227.46	< LOD	< LOD	< LOD	379.51	156.97
ME-10	5/11/2010 7:44	SOIL	180.98	< LOD	31.88	< LOD	72.6	< LOD	12.45	< LOD	191	31.01
ME-11	5/11/2010 7:47	SOIL	180.66	< LOD	34.32	< LOD	55.75	< LOD	11.82	< LOD	102.7	44.61
ME-12	5/11/2010 7:51	SOIL	181.94	< LOD	25.59	< LOD	21.05	< LOD	14.7	< LOD	30.91	< LOD
ME-13	5/11/2010 7:54	SOIL	180.65	< LOD	36.04	< LOD	27.32	< LOD	12.67	< LOD	48.06	< LOD
ME-14	5/11/2010 7:58	SOIL	181.32	< LOD	40.28	< LOD	46.59	< LOD	13.79	< LOD	95.77	< LOD
ME-15	5/11/2010 8:01	SOIL	181.28	< LOD	32.78	< LOD	43.88	< LOD	12.08	< LOD	69.67	26.45
ME-16	5/11/2010 8:05	SOIL	181.72	< LOD	36.73	10.96	25.82	< LOD	10.68	< LOD	42.74	< LOD
ME-17	5/11/2010 8:08	SOIL	180.73	< LOD	25.79	11.8	28.83	< LOD	8.74	< LOD	42.9	< LOD
ME-18	5/11/2010 8:11	SOIL	120.35	< LOD	30.98	11.04	31.29	< LOD	11.43	< LOD	55.89	< LOD
ME-18	5/11/2010 8:18	SOIL	181.26	< LOD	28.67	< LOD	32.28	< LOD	11.55	< LOD	55.09	< LOD
ME-19	5/11/2010 8:21	SOIL	181.72	< LOD	30.6	< LOD	44.85	< LOD	< LOD	< LOD	199.45	565.02
ME-20	5/11/2010 8:25	SOIL	180.95	< LOD	27.83	10.1	25.38	< LOD	< LOD	< LOD	69.41	< LOD
ME-21	5/11/2010 8:28	SOIL	180.67	< LOD	26.7	10.48	20.16	< LOD	< LOD	< LOD	29.27	< LOD
ME-22	5/11/2010 8:32	SOIL	180.73	< LOD	38.43	11.46	49.6	< LOD	< LOD	< LOD	63.01	< LOD
ME-23	5/11/2010 8:35	SOIL	180.87	< LOD	31.67	13.51	28.8	< LOD	8.67	< LOD	65.11	< LOD
ME-24	5/11/2010 8:39	SOIL	181.59	< LOD	27.48	< LOD	26.36	< LOD	9.02	< LOD	34.86	27.24
ME-25	5/11/2010 8:42	SOIL	181.6	< LOD	28.18	9.67	35.54	< LOD	< LOD	< LOD	96.13	101.7
ME-26	5/11/2010 8:46	SOIL	182.91	< LOD	33.23	13.7	33.16	< LOD	< LOD	< LOD	212.58	130.57
ME-27	5/11/2010 8:52	SOIL	180.89	< LOD	28.4	10.84	27.74	< LOD	< LOD	< LOD	41.66	< LOD
ME-28	5/11/2010 8:56	SOIL	179.72	< LOD	26.62	10.02	16.93	< LOD	9.62	< LOD	29.25	< LOD
ME-29	5/11/2010 8:59	SOIL	181.68	< LOD	31.05	< LOD	50.4	< LOD	< LOD	< LOD	64.47	< LOD
ME-30	5/11/2010 9:03	SOIL	181.32	< LOD	34.96	10.55	39.78	< LOD	9.55	< LOD	65.17	< LOD
ME-31	5/11/2010 9:06	SOIL	181.13	< LOD	26.83	17.54	35.59	< LOD	8.71	< LOD	60.22	< LOD
ME-32	5/11/2010 9:10	SOIL	180.95	< LOD	27.25	16.29	29.09	< LOD	8.22	< LOD	73.94	140.33
ME-34	5/11/2010 9:14	SOIL	181.04	< LOD	27.3	10.61	29.6	< LOD	< LOD	< LOD	63.87	54.07
ME-35	5/11/2010 9:18	SOIL	181.16	< LOD	25.19	< LOD	31.45	< LOD	11.74	< LOD	87.51	40.77
ME-36	5/11/2010 9:22	SOIL	182.3	< LOD	19.84	18.96	40.69	< LOD	26.52	< LOD	61.44	< LOD
ME-37	5/11/2010 9:26	SOIL	180.81	< LOD	25.26	10.4	26.14	< LOD	< LOD	< LOD	38.13	< LOD
ME-38	5/11/2010 9:30	SOIL	181.19	< LOD	22.52	8.9	27.46	< LOD	< LOD	< LOD	51.31	< LOD
ME-39	5/11/2010 9:33	SOIL	181.78	< LOD	22.03	10.01	17.05	< LOD	< LOD	9.29	33.51	< LOD
ME-40	5/11/2010 9:37	SOIL	180.7	< LOD	27.32	< LOD	43.38	< LOD	< LOD	< LOD	136.09	592.39
ME-41	5/11/2010 9:40	SOIL	181.54	< LOD	38.45	13.32	11.92	< LOD	14.04	< LOD	26.69	< LOD
ME-42	5/11/2010 9:44	SOIL	182.01	< LOD	36.81	< LOD	16.46	< LOD	8.68	< LOD	36.93	< LOD
ME-43	5/11/2010 9:47	SOIL	181.22	< LOD	34.58	12.73	35.79	< LOD	9.5	< LOD	54.63	61.55
ME-44	5/11/2010 9:51	SOIL	181.31	< LOD	26.62	14.95	26.48	< LOD	9.93	< LOD	56.59	36.87

Ni	Co	Mn	Cr	V	Sc	Ba	Cs	Sb	Cd	X	Y
1,600	*23*	*18,000*	*230*	*390*		*21,000*		*31.0*	*70*	*Exceeds R-RBC Level*	
50.47	< LOD	252.3	< LOD	< LOD	92.61	< LOD	183.8	< LOD	< LOD	-80.16711	37.257667
< LOD	< LOD	319.0	< LOD	136.63	< LOD	< LOD	250.0	19.7	< LOD	-80.1670	37.257528
92.58	< LOD	248.5	< LOD	< LOD	78.78	< LOD	231.2	< LOD	< LOD	-80.16689	37.257472
< LOD	< LOD	413.8	< LOD	110.05	< LOD	< LOD	327.6	26.6	< LOD	-80.16683	37.257278
< LOD	< LOD	167.1	< LOD	128.14	< LOD	< LOD	243.5	< LOD	< LOD	-80.16683	37.257222
< LOD	< LOD	283.5	< LOD	98.67	< LOD	< LOD	76.7	< LOD	< LOD	-80.16667	37.257056
85.77	< LOD	351.7	< LOD	< LOD	< LOD	< LOD	178.9	< LOD	< LOD	-80.16667	37.257028
175.55	< LOD	389.8	< LOD	< LOD	< LOD	< LOD	184.1	< LOD	< LOD	-80.16689	37.25700
3104	< LOD	303.8	156.3	< LOD	< LOD	< LOD	179.7	< LOD	17.83	-80.1670	37.257056
189.23	< LOD	277.8	< LOD	116.72	< LOD	< LOD	401.4	27.7	< LOD	-80.16706	37.257194
237.06	< LOD	502.0	48.22	< LOD	< LOD	18326	363.4	29.3	< LOD	-80.16711	37.25725
< LOD	< LOD	188.5	< LOD	100.95	< LOD	< LOD	360.0	26.2	< LOD	-80.16722	37.257333
57.48	< LOD	913.6	61.69	139.69	< LOD	< LOD	378.3	29.8	< LOD	-80.16731	37.257361
< LOD	< LOD	653.2	< LOD	< LOD	66.1	< LOD	328.7	18.8	< LOD	-80.16742	37.257417
82.38	< LOD	600.3	< LOD	133.41	< LOD	< LOD	373.9	28.5	< LOD	-80.16747	37.257306
< LOD	< LOD	769.7	< LOD	130.94	< LOD	< LOD	399.2	42.9	< LOD	-80.16742	37.25725
< LOD	< LOD	229.8	35.44	< LOD	< LOD	< LOD	376.4	27.4	< LOD	-80.16731	37.257194
85.84	< LOD	324.8	< LOD	< LOD	< LOD	< LOD	380.4	22.7	< LOD	-80.16719	37.257083
101.87	< LOD	259.3	43.01	< LOD	< LOD	< LOD	372.6	20.6	< LOD	-80.1670	37.25700
1828.5	< LOD	246.1	79.53	< LOD	< LOD	< LOD	299.0	26.1	< LOD	-80.1670	37.256972
< LOD	< LOD	444.5	< LOD	< LOD	< LOD	< LOD	106.2	< LOD	< LOD	-80.16694	37.256917
< LOD	< LOD	181.8	38.82	< LOD	< LOD	< LOD	225.5	< LOD	< LOD	-80.16758	37.25725
95.81	< LOD	884.6	61.99	109.53	< LOD	< LOD	358.3	26.4	< LOD	-80.16744	37.257167
104.81	< LOD	506.9	40.74	< LOD	< LOD	< LOD	354.0	26.2	11.26	-80.16739	37.25825
< LOD	< LOD	196.3	< LOD	106.89	< LOD	< LOD	349.4	41.1	10.4	-80.16722	37.25700
562.15	< LOD	210.1	< LOD	< LOD	< LOD	< LOD	293.2	17.8	< LOD	-80.16711	37.256944
883.11	< LOD	263.3	51.71	< LOD	< LOD	< LOD	328.0	26.3	< LOD	-80.16706	37.256889
< LOD	< LOD	155.0	< LOD	< LOD	< LOD	< LOD	319.6	18.7	< LOD	-80.1670	37.256861
< LOD	< LOD	246.7	< LOD	< LOD	< LOD	< LOD	183.0	< LOD	< LOD	-80.16767	37.257167
< LOD	< LOD	644.6	39.25	115.99	45.42	< LOD	415.3	32.2	< LOD	-80.16756	37.257056
209.61	< LOD	390.9	56.07	< LOD	< LOD	< LOD	386.3	< LOD	< LOD	-80.16747	37.257056
78.71	< LOD	158.8	36.11	< LOD	< LOD	< LOD	343.2	23.1	< LOD	-80.16744	37.257056
391.33	< LOD	148.7	< LOD	< LOD	< LOD	< LOD	401.6	38.6	< LOD	-80.16733	37.257167
224.48	< LOD	180.8	61.98	< LOD	< LOD	< LOD	279.5	24.9	< LOD	-80.16714	37.256917
179.1	< LOD	200.8	39.24	< LOD	< LOD	< LOD	278.6	< LOD	< LOD	-80.16708	37.256861
73.58	< LOD	216.2	47.93	183.09	< LOD	< LOD	380.6	28.1	< LOD	-80.16708	37.256806
< LOD	< LOD	129.3	< LOD	< LOD	< LOD	< LOD	85.5	< LOD	< LOD	-80.16719	37.256722
79.12	< LOD	183.4	< LOD	< LOD	< LOD	< LOD	225.7	< LOD	< LOD	-80.16719	37.25675
47.25	< LOD	205.2	60.49	< LOD	< LOD	< LOD	251.6	23.2	< LOD	-80.16731	37.256778
1928.4	< LOD	201.9	115.65	< LOD	< LOD	< LOD	355.2	21.6	< LOD	-80.16742	37.256861
< LOD	< LOD	< LOD	< LOD	154.78	< LOD	< LOD	237.9	18.7	< LOD	-80.16758	37.256944
46.42	< LOD	159.5	42.15	< LOD	< LOD	< LOD	281.9	26.4	< LOD	-80.16764	37.257028
261.84	< LOD	298.0	109.83	126.6	< LOD	< LOD	268.1	< LOD	< LOD	-80.16781	37.25700
228.04	< LOD	280.6	88.1	< LOD	< LOD	< LOD	263.5	< LOD	< LOD	-80.16744	37.256833

Appendix 5. Sampling Results from the Rhinehart Tire Fire Dump Site

SAMPLE	Time	Type	Duration	Mo	Sr	U	Pb	Se	As	Hg	Zn
				3.95	*600*	*13.5*	*85*	*2.25*	*14.7*	*2.9*	*260*
				390	*4,700*	*230*	*400*	*390*	*22*	*5.6*	*23,000*
RTF-1	5/24/10 7:35	SOIL	181.66	< LOD	44.5	< LOD	16.8	< LOD	6.9	< LOD	43.2
RTF-2	5/24/10 7:38	SOIL	180.69	< LOD	50.2	< LOD	11.9	< LOD	9.4	< LOD	2843.8
RTF-3	5/24/10 7:48	SOIL	181.50	< LOD	43.7	< LOD	16.1	< LOD	7.5	< LOD	53.6
RTF-4	5/24/10 7:51	SOIL	181.71	< LOD	49.7	< LOD	13.7	< LOD	7.2	< LOD	205.2
RTF-5	5/24/10 7:55	SOIL	180.77	< LOD	42.6	< LOD	11.3	< LOD	8.2	< LOD	65.6
RTF-6	5/24/10 7:58	SOIL	181.21	< LOD	46.1	< LOD	16.3	< LOD	< LOD	< LOD	419.4
RTF-7	5/24/10 8:02	SOIL	180.44	< LOD	41.3	< LOD	27.2	< LOD	8.3	< LOD	39.0
RTF-8	5/24/10 8:06	SOIL	180.84	< LOD	45.5	10.6	30.1	< LOD	< LOD	< LOD	99.4
RTF-9	5/24/10 8:09	SOIL	181.06	< LOD	43.1	< LOD	19.1	< LOD	9.1	< LOD	70.4
RTF-10	5/24/10 8:13	SOIL	180.71	< LOD	86.8	< LOD	61.9	< LOD	26.4	< LOD	5989.6
RTF-11	5/24/10 8:16	SOIL	180.06	< LOD	94.8	< LOD	26.0	< LOD	26.4	< LOD	3318.3
RTF-12	5/24/10 8:20	SOIL	180.60	< LOD	78.7	< LOD	100.1	< LOD	26.7	< LOD	14394.0
RTF-13	5/24/10 8:23	SOIL	180.29	< LOD	72.7	13.2	109.0	< LOD	27.3	< LOD	17592.6
RTF-15	5/24/10 8:27	SOIL	181.21	< LOD	47.7	13.2	20.0	< LOD	< LOD	< LOD	39.5
RTF-16	5/24/10 8:30	SOIL	180.33	< LOD	64.7	< LOD	20.1	< LOD	8.6	< LOD	142.7
RTF-17	5/24/10 8:34	SOIL	180.66	< LOD	47.6	12.3	18.8	< LOD	9.6	< LOD	38.7
RTF-18	5/24/10 8:37	SOIL	180.86	< LOD	46.0	< LOD	21.0	< LOD	7.4	< LOD	38.1
RTF-19	5/24/10 8:41	SOIL	180.90	< LOD	50.1	< LOD	21.5	< LOD	8.4	< LOD	977.9
RTF-20	5/24/10 8:44	SOIL	180.41	< LOD	46.6	< LOD	14.5	< LOD	9.3	< LOD	126.0
RTF-21	5/24/10 8:58	SOIL	180.89	< LOD	59.0	< LOD	20.9	< LOD	8.4	< LOD	74.7
RTF-22	5/24/10 9:01	SOIL	180.95	< LOD	49.7	8.6	16.6	< LOD	< LOD	< LOD	53.8
RTF-23	5/24/10 9:05	SOIL	180.71	< LOD	135.1	< LOD	< LOD	< LOD	7.2	< LOD	33.5
RTF-24	5/24/10 9:08	SOIL	180.89	< LOD	93.1	11.9	45.1	< LOD	14.2	< LOD	1820.4
RTF-25	5/24/10 9:12	SOIL	180.39	< LOD	93.4	< LOD	325.0	< LOD	46.2	< LOD	11675.1
RTF-26	5/24/10 9:15	SOIL	180.97	< LOD	51.2	< LOD	22.9	< LOD	7.4	< LOD	56.2
RTF-27	5/24/10 9:19	SOIL	180.13	< LOD	53.3	< LOD	15.1	< LOD	10.0	< LOD	41.0
RTF-28	5/24/10 9:22	SOIL	180.45	< LOD	49.2	12.3	17.9	< LOD	< LOD	< LOD	52.2
RTF-29	5/24/10 9:26	SOIL	179.73	< LOD	47.8	13.1	21.7	< LOD	< LOD	< LOD	43.2
RTF-30	5/24/10 9:29	SOIL	180.53	< LOD	49.9	14.2	19.8	< LOD	9.2	< LOD	61.2
RTF-31	5/24/10 9:33	SOIL	180.55	< LOD	66.6	16.5	19.8	< LOD	8.9	< LOD	30.5
RTF-32	5/24/10 9:36	SOIL	180.87	< LOD	73.9	14.4	21.6	< LOD	13.2	< LOD	45.9
RTF-33	5/24/10 9:40	SOIL	180.47	< LOD	71.3	17.7	19.2	< LOD	10.2	< LOD	25.5
RTF-34	5/24/10 9:43	SOIL	180.44	< LOD	79.4	< LOD	20.0	< LOD	17.1	< LOD	48.9
RTF-35	5/24/10 9:47	SOIL	182.05	< LOD	89.5	11.4	26.6	< LOD	20.1	< LOD	87.0
RTF-36	5/24/10 9:50	SOIL	180.45	< LOD	78.1	16.6	30.4	< LOD	16.4	< LOD	100.1
RTF-37	5/24/10 9:54	SOIL	180.33	< LOD	60.9	12.6	18.3	< LOD	9.3	< LOD	62.9
RTF-38	5/24/10 9:57	SOIL	180.42	< LOD	82.2	15.8	12.2	< LOD	7.7	9.5	131.9
RTF-39	5/24/10 10:01	SOIL	180.50	< LOD	48.1	12.3	26.9	< LOD	< LOD	< LOD	51.5
RTF-40	5/24/10 10:04	SOIL	180.51	< LOD	55.5	< LOD	13.0	< LOD	6.9	< LOD	169.6
RTF-41	5/24/10 10:08	SOIL	180.89	< LOD	90.1	17.9	21.3	< LOD	14.0	9.2	93.4
RTF-42	5/24/10 10:11	SOIL	181.07	< LOD	106.1	12.3	18.3	< LOD	< LOD	< LOD	72.8
RTF-43	5/24/10 10:15	SOIL	180.23	< LOD	62.7	13.8	23.0	< LOD	9.9	< LOD	291.3
RTF-44	5/24/10 10:18	SOIL	180.49	< LOD	65.6	12.3	25.8	< LOD	8.8	< LOD	90.7
RTF-45	5/24/10 10:21	SOIL	180.69	< LOD	48.0	13.0	19.5	< LOD	7.2	< LOD	43.2
RTF-46	5/24/10 10:25	SOIL	182.85	< LOD	46.1	18.0	25.9	< LOD	< LOD	< LOD	85.5
RTF-47	5/24/10 10:28	SOIL	181.01	< LOD	65.2	10.7	24.2	< LOD	12.8	< LOD	650.0
RTF-49	5/24/10 10:32	SOIL	180.91	< LOD	63.1	12.1	15.9	< LOD	9.3	< LOD	179.8
RTF-51	5/24/10 10:36	SOIL	180.89	< LOD	92.9	16.1	64.2	< LOD	22.5	< LOD	394.2
RTF-52	5/24/10 10:39	SOIL	181.15	< LOD	115.2	18.8	20.0	< LOD	10.9	< LOD	613.9
RTF-53	5/24/10 10:43	SOIL	181.21	< LOD	60.7	9.8	33.0	< LOD	12.6	< LOD	1017.9
RTF-54	5/24/10 10:47	SOIL	180.54	< LOD	66.3	12.7	20.2	< LOD	< LOD	< LOD	4253.6
RTF-55	5/24/10 10:50	SOIL	180.67	< LOD	73.5	19.1	24.8	< LOD	< LOD	< LOD	1866.8

Cu	Ni	Co	Mn	Cr	V	Sc	Ba	Cs	Sb	Cd	X	Y
110	*90*	*16.1*	*3,200*	*141*	*228*	*40*	*15,000*	*380*	*3.8*	*35*	*Elevated Levels*	
3,100	*1,600*	*23*	*18,000*	*230*	*390*		*21,000*		*31*	*70*	*Exceeds R-RBC Level*	
< LOD	< LOD	< LOD	394.4	< LOD	< LOD	< LOD	190.5	28.0	< LOD	< LOD	-78.3024	39.18042
< LOD	< LOD	< LOD	470.3	< LOD	< LOD	< LOD	279.9	52.3	20.8	< LOD	-78.3020	39.18058
< LOD	< LOD	< LOD	333.3	< LOD	< LOD	< LOD	284.2	51.2	19.4	< LOD	-78.3023	39.18033
< LOD	< LOD	< LOD	505.0	< LOD	< LOD	< LOD	345.5	63.2	28.2	< LOD	-78.3022	39.18069
< LOD	< LOD	< LOD	315.0	31.6	< LOD	< LOD	321.0	61.4	24.1	< LOD	-78.3019	39.18097
< LOD	< LOD	< LOD	377.9	< LOD	< LOD	< LOD	326.9	68.9	25.6	< LOD	-78.3016	39.18086
< LOD	< LOD	116.7	835.9	34.9	106.9	< LOD	371.9	46.8	17.4	< LOD	-78.3021	39.18111
< LOD	< LOD	122.4	780.6	47.9	< LOD	< LOD	396.0	53.1	< LOD	< LOD	-78.3024	39.18081
< LOD	< LOD	< LOD	795.4	47.5	125.9	< LOD	333.0	39.3	22.8	< LOD	-78.3027	39.18058
69.3	< LOD	< LOD	552.4	< LOD	123.3	< LOD	558.4	89.3	58.0	< LOD	-78.3026	39.18053
< LOD	< LOD	< LOD	411.0	42.7	153.1	< LOD	595.4	91.9	34.6	< LOD	-78.3026	39.18058
174.8	< LOD	675.7	872.2	< LOD	< LOD	< LOD	424.9	51.5	32.0	< LOD	-78.3026	39.18047
146.2	< LOD	290.5	666.1	< LOD	< LOD	< LOD	359.1	36.4	22.9	< LOD	-78.3026	39.18047
< LOD	< LOD	< LOD	773.1	47.7	< LOD	< LOD	487.8	57.9	28.4	< LOD	-78.3030	39.18075
< LOD	< LOD	< LOD	353.7	46.1	< LOD	< LOD	388.7	40.7	21.4	< LOD	-78.3033	39.18086
< LOD	< LOD	< LOD	930.0	40.9	111.9	< LOD	471.6	56.6	< LOD	< LOD	-78.3035	39.18100
< LOD	< LOD	< LOD	1231.7	< LOD	< LOD	< LOD	511.1	66.4	25.9	< LOD	-78.3032	39.18125
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< LOD	< LOD	< LOD	598.7	< LOD	< LOD	< LOD	328.3	33.0	< LOD	< LOD	-78.3025	39.18136
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< LOD	< LOD	< LOD	406.7	< LOD	< LOD	124.7	458.1	94.7	28.7	< LOD	-78.3028	39.18172
< LOD	< LOD	< LOD	504.1	< LOD	< LOD	< LOD	506.4	91.0	41.8	10.8	-78.3032	39.18178
107.1	< LOD	< LOD	1815.0	< LOD	104.8	< LOD	452.0	74.0	45.0	< LOD	-78.3033	39.18172
< LOD	< LOD	< LOD	729.9	53.5	97.9	< LOD	506.5	58.4	23.2	< LOD	-78.3022	39.18164
< LOD	< LOD	< LOD	654.7	< LOD	< LOD	< LOD	544.4	73.7	35.1	< LOD	-78.3019	39.18217
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< LOD	< LOD	< LOD	655.9	42.8	< LOD	< LOD	486.8	60.2	23.1	< LOD	-78.3014	39.18294
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< LOD	< LOD	< LOD	94.6	45.4	118.8	< LOD	383.4	66.5	31.1	< LOD	-78.3010	39.18364
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< LOD	< LOD	< LOD	105.1	40.2	< LOD	< LOD	335.0	56.3	29.3	< LOD	-78.3014	39.18325
25.9	< LOD	< LOD	1123.6	< LOD	112.4	< LOD	683.1	89.4	31.2	< LOD	-78.3017	39.18289
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< LOD	< LOD	< LOD	357.5	44.3	< LOD	< LOD	395.9	68.5	24.5	< LOD	-78.3021	39.18242
< LOD	< LOD	< LOD	374.6	59.2	< LOD	< LOD	531.4	82.4	39.0	< LOD	-78.3024	39.18211
< LOD	< LOD	< LOD	432.5	41.1	105.0	< LOD	516.7	90.8	37.5	< LOD	-78.3025	39.18181
< LOD	< LOD	< LOD	604.9	< LOD	< LOD	< LOD	501.9	65.3	27.0	< LOD	-78.3034	39.18169
< LOD	< LOD	< LOD	515.4	49.4	101.8	28.5	467.3	66.1	21.2	< LOD	-78.3036	39.18153
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< LOD	< LOD	< LOD	757.8	< LOD	< LOD	< LOD	465.7	73.7	20.4	< LOD	-78.3045	39.18114
< LOD	< LOD	< LOD	357.1	< LOD	< LOD	< LOD	288.1	37.7	18.6	< LOD	-78.3044	39.18142
< LOD	75.7	< LOD	2349.2	< LOD	124.9	< LOD	721.7	122.4	54.8	< LOD	-78.3038	39.18189
< LOD	< LOD	< LOD	550.9	34.3	< LOD	138.54	436.5	70.2	27.7	< LOD	-78.3032	39.18225
< LOD	< LOD	< LOD	452.9	60.1	< LOD	< LOD	261.3	29.3	< LOD	< LOD	-78.3023	39.18250
< LOD	< LOD	< LOD	1050.0	50.2	< LOD	< LOD	261.9	31.4	< LOD	< LOD	-78.3024	39.18231
< LOD	< LOD	< LOD	462.7	48.7	112.6	< LOD	389.0	42.0	21.5	< LOD	-78.3024	39.18200