POST-CLOSURE GROUNDWATER MONITORING – ANNUAL REPORT - FINAL

Post-Closure Groundwater Monitoring Report
Coldwater Road Landfill
Flint, Michigan
MID 005 356 860

RACER Trust
Detroit, Michigan

February 2015

O'BRIEN & GERE

15388 | 51440

Post-Closure Groundwater Monitoring
Coldwater Road Landfill
Flint, Michigan
MID 005 356 860

Prepared for RACER Trust
Detroit, Michigan

SCOTT L. CORMIER, P.E.
VICE PRESIDENT
O'BRIEN & GERE ENGINEERS, INC.

February 11, 2015

Mr. Richard Conforti, P.E.
Environmental Engineer
Michigan Department of Environmental Quality
Office of Waste Management and Radiological Protection
P.O. Box 30473
Lansing, Michigan 48909-7973

RE: Post-Closure Groundwater Monitoring 2014 Annual Report
Coldwater Road Landfill, Flint, Michigan
MID 005 356 860

FILE: 15388 /51440/rep

Dear Mr. Conforti:

On behalf of Revitalizing Auto Communities Environmental Response (RACER) Trust, O'Brien & Gere is pleased to present the results of the annual groundwater sampling event conducted in November 2014 for the Coldwater Road Landfill site (Figure 1). The groundwater samples were analyzed for total organic carbon (TOC, Method 415.1), total organic halogen (TOX, Method 9020A), specific conductivity (Method 120.1), and dissolved metals (chromium (Cr), copper (Cu), nickel (Ni), zinc (Zn) Method 200.8).

The event also included field measurements for pH, specific conductivity, dissolved oxygen, oxidation reduction potential, temperature, and turbidity. Groundwater samples were collected using a bladder or peristaltic pump, and low-flow sampling techniques in accordance with O'Brien & Gere procedures and the site-specific Field Method Guide (Appendix A). Samples to be analyzed for dissolved metals were field filtered. Groundwater sampling logs are included in (Appendix B).

Gauging and sampling were conducted on November 18, 2014 through November 20, 2014. The results are presented in two separate tables: Table 1 - Depth to Groundwater Levels in Monitoring Wells; Table 2 - Post-Closure Monitoring - Historical Analytical Results (Physical Parameters, TOC, TOX, and Metals). Laboratory analytical reports are included in (Appendix C).

A site location map (Figure 1) and monitoring well location (*i.e.*, site layout) map (Figure 2) are also included. A groundwater elevation map was completed for the shallow wells (Figure 3) and a groundwater potentiometric surface map was completed for the deeper drift aquifer (Figure 4).

Contours were not plotted for groundwater in the shallow wells because the water level elevations exhibited no pattern and do not necessarily reflect the groundwater flow direction and gradient, as the groundwater is within discontinuous perched zones.

The drift aquifer static water elevations, which were calculated from depth to water measurements collected on November 18, 2014, were consistent with historical data. Groundwater in the drift aquifer flows in a southerly direction as shown on (Figure 4).

For this event groundwater samples were collected from six monitoring wells screened in discontinuous perched zones. Per the revised Post-Closure Care Plan approved on November 7, 2014, samples from the six drift aquifer monitoring wells (B-2D, B-20D, B-21D, B-22D, B-23Dr, and B-27D) were not collected during this event and will be collected on an annual basis during future late spring/early summer sampling events typically conducted in the month of June.

A review of the analytical data presented in the attached tables indicates analytical results similar to previous sampling events, a summary of the data is provided below:

- Chromium concentrations were not detected above the method detection limit of 5 µg/L
- Copper concentrations were not detected above the method detection limit of 5 µg/L in three monitoring wells (B-18A, B-24r, and B-28) and were comparable to previous sample results in the remaining monitoring wells; except in monitoring well B-19Ar (6 µg/L) where the nickel concentration increased from a previous result of <5 µg/L, but remains below historic high concentrations
- Nickel concentrations were not detected above the method detection limit of 5 µg/L in monitoring well B-28 and were comparable to previous sample results in the remaining monitoring wells; except in monitoring well B-24r (11 µg/L) where the nickel concentration increased from a previous result of 7 µg/L, but remains below the background mean established for nickel in this well
- Zinc concentrations were not detected above the method detection limit of 5 µg/L in two monitoring wells (B24r and B-28), and were comparable to previous sample results in the remaining monitoring wells except in monitoring well B-19Ar (10 µg/L) where the zinc concentration increased from a previous result which was not detected above the method detection limit, but remains below the background mean established for zinc in this well
- TOC concentrations were comparable to previous sample results
- TOX concentrations were comparable to previous sample results, except in monitoring well B-19Ar (190 µg/L) where the TOX increased from a previous result of 23 µg/L; however, the other parameters were within historical ranges
- pH concentrations were comparable to previous sample results
- Specific conductivity results were comparable to previous sample results or increased slightly

A QA/QC review of the field and analytical data indicates that the data is useable for the intended purpose without deviations from quality assurance standards that would require rejection or further qualification of the data. Details of the data verification results for the groundwater monitoring data are included in Appendix D.

The duplicate sample results collected from monitoring well B-18A were comparable to the original sample; except TOX was detected at 16 µg/L in the original sample, but was not detected (<60 µg/L) in the duplicate sample. The TOX result from B-18A was detected at less than the reporting limit and was considered an estimated or (J) qualified value by the laboratory. Details of the data verification results for the groundwater monitoring data are included in (Appendix D).

There were no exceedances of the Shewart control limits (SCL) during this sampling event. During this sampling event there was a spike of copper in monitoring wells B-19Ar (6 µg/L). The spike for copper was not a confirmed spike (as defined in Section 5.7.2 of the Post-Closure Care Plan, O'Brien & Gere, 2008) and does not suggest there was a release from the landfill. The spike will continue to be monitored during future sampling events. There was a negative (decreasing) trend for pH in monitoring well B-24r. The negative trend does not suggest there was a release from the landfill and will continue to be monitored during future sampling events. No other trends or spikes were observed during this monitoring event. The Shewart control charts are included as (Appendix E).

The next sampling event (semi-annual event) is currently scheduled for June 2015. If you have any questions, please feel free to contact either of us at (248) 477-5701.

Very truly yours,
O'BRIEN & GERE ENGINEERS, INC.

Scott L. Cormier, PE
Vice President

Very truly yours,
O'BRIEN & GERE ENGINEERS, INC.

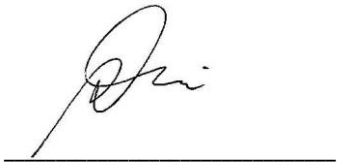
Clifford S. Yantz
Scientist-3

cc: David Favero – RACER Trust
Kevin Schneider – O'Brien & Gere

ENCLOSURES:
Table 1 – Depth to Groundwater Levels
Table 2 – Historical Analytical Results
Figure 1 – Site Location Map
Figure 2 – Site Layout
Figure 3 – Shallow Groundwater Elevation Map
Figure 4 – Drift Aquifer Groundwater Potentiometric Surface Map
Attachment A – Sampling Procedures
Attachment B – Groundwater Sampling Logs
Attachment C – Analytical Laboratory Results
Attachment D – Groundwater Sampling Program QA/QC Summary
Attachment E – Monitoring Well Control Charts

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

On Behalf of RACER Trust



_____

Scott L. Cormier, P.E.
Vice President – O'Brien & Gere Engineers, Inc.

Agent for RACER Trust

February 11, 2015

_____

Date

cc: file

TABLES

Table 1
RACER Trust - Coldwater Road Landfill Facility
Depth to Ground Water Levels in Monitoring Wells
November 18, 2014

Well	Top Of Casing Elev. (ft) *	Depth To Water (ft)	Static Water Elev. (ft)
B-2D	805.18	55.26	749.92
B-7	815.20	20.18	795.02
B-9	809.16	3.52	805.64
B-18A	812.25	23.71	788.54
B-19A	813.89	7.90	805.99
B-19AR	813.15	41.59	771.56
B-20D	816.61	71.36	745.25
B-21D	822.60	81.92	740.68
B-22D	823.73	86.16	737.57
B-23DR	813.72	82.90	730.82
B-24R	817.37	12.59	804.78
B-27D**	814.36	77.62	736.74
B-28	818.07	6.88	811.19

Notes

Casing elevations were provided by Bartow & King Engineers and are in feet relative to National Geodetic Vertical Datum

* - Top of casing elevations were resurveyed in May 2005 after the installation of the replacement wells.

R - Indicates a replacement well location.

** - Top of casing elevation was surveyed in December 2005 after the installation of the new well.

Table 2
RACER Trust - Coldwater Road Landfill Facility
Post-Closure Monitoring - Historical Analytical Results
Physical Parameters, TOC, TOX, Metals, Chloride, Cyanide, Phenols, and Sulfate

Well ID	Sample Date	Indicator Parameters					Dissolved Metals (µg/L)							Inorganics (mg/L)			
		TOC (mg/L)	TOX (µg/L)	pH	SpC	T	Cr	Cu	Ni	Zn	Fe	Mn	Na	Chloride	Cyanide	Phenols	Sulfate
		MDEQ Residential Drinking Water Criteria					100 (A)	1,000 (A)	100 (A)	2,400							
	6/21/1995	8.7	23	7.48	1509	13.80	<20	<20	<30	<20	--	--	--	--	--	--	--
	8/31/1995	--	--	--	--	--	<20	<20	<40	<20	--	--	--	--	--	--	--
	2/9/1996	14.0	120	--	--	--	<20	<20	<40	22	--	--	--	--	--	--	--
	6/19/1996	20.0	<100	6.91	1,508	13.20	<20	<20	<20	20	--	--	--	--	--	--	--
B-7	8/21/1996	55.0	26	7.59	1,567	17.10	<20	<20	<20	60	--	--	--	--	--	--	--
	11/13/1996	27.0	<5	7.95	1,960	7.20	<20	<20	<20	50	--	--	--	--	--	--	--
	5/6/1997	16.0	<100	7.20	780	11.00	<10	10	14	10	--	--	--	--	--	--	--
	11/6/1997	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	5/4/1998	6.0	<5	6.61	1,270	10.70	<10	<10	<5	20	--	--	--	--	--	--	--
	11/5/1998	4.0	<10	4.60	1,240	11.20	<10	<10	8	30	10	424	31,000	--	--	--	--
	12/23/1998	--	--	--	--	--		--	--	--	--	--	--	58	<0.005	<0.020	161
	4/26/1999	3.9	<100	7.50	1,413	14.20	<10	<10	10	<10	--	--	--	--	--	--	--
	11/5/1999	5.1	<100	6.50	1,230	14.20	<10	<10	8	30	260	313	41,800	64	<0.005	<0.020	301
	4/26/2000	4.8	<100	7.58	1,450	10.20	<10	<10	<5	<10	--	--	--	--	--	--	--
Dup.	4/26/2000	5.9	<100	NS	NS	NS	<10	<10	6	10	--	--	--	--	--	--	--
	12/8/2000	4.2	<10	7.05	1,180	9.50	<10	<10	20	10	50	--	58,900	79	<0.005	<0.020	227
	5/16/2001	5.0	<100	7.30	1,330	13.00	<10	<10	7	<10	--	--	--	--	--	--	--
	10/18/2001	5.3	<100	7.19	1,210	12.50	<10	<10	5	<10	330	--	60,800	81	<0.005	NA	205
	5/16/2002	3.9	<100	7.19	1,850	11.90	<10	<10	<5	10	--	--	--	--	--	--	--
	11/7/2002	NR	NR	7.35	1,120	10.28	<5	<5	5	5	250	<5	65,500	NA	NA	NA	NA
	6/4/2003	3.3	<30	6.90	1,460	12.60	<5	<5	<5	<5	--	--	--	--	--	--	--
	11/13/2003	3.9	<30	6.90	1,590	9.60	<5	<5	<5	5	190	<5	--	85	<0.005	<0.010	279
	6/30/2004	4.3	43	7.13	1,353	16.00	<5	<5	9	7	--	--	--	--	--	--	--
	12/9/2004	4.0	<30	5.32	1,290	10.80	<5	<5	7	14	180	74	71,200	78	<0.005	<0.010	251
	6/8/2005	7.0	86	7.36	1,121	10.88	5	<5	9	13	170	31	81,900	80	<0.005	<0.010	254
	12/7/2005	7.5	<30	8.70	1,430	12.24	10	<4	6	20	150	50	85,300	--	--	--	--
	6/29/2006	4.3	<30	7.19	1,470	11.70	5	<4	9	18	190	150	76,900	73	<0.005	<0.010	270
	11/29/2006	4.4	<30	6.88	1,380	15.30	<5	<4	9	11	--	--	--	--	--	--	--
	6/7/2007	3.9	23.7	6.87	1,400	13.39	11	27	5	14	130	42	87,300	72	<0.005	<0.010	208
	11/14/2007	3.5	<30	6.85	1,350	13.38	14	6	16	20	--	--	--	--	--	--	--
	6/25/2008	3.8	72.9	6.90	1,410	20.69	<5	3	6	<5	350	10	94,800	68	<0.005	<0.010	222
	11/17/2008	4.6	20.5	6.80	1,258	5.47	<5	3	5	17	--	--	--	--	--	--	--
	6/24/2009	4.5	<30	6.90	1,184	20.04	<5	3	<5	14	67	36	84,500	40	<0.005	<0.010	154
	11/17/2009	8	25.3	7.31	1,090	10.29	<5	<4	<5	<5	--	--	--	--	--	--	--
	6/17/2010	5	<30	7.04	1,290	16.31	<5	<4	<5	<5	<20	47	86,000	61	<0.005	<0.020	160
	11/8/2010	8	103	7.16	997	13.86	17	<4	<5	<5	--	--	--	--	--	--	--
	6/22/2011	4.3	25	7.25	910	13.74	10	<4	5	6	220	6	55,200	26	<0.005	<0.010	88
Replicate	6/22/2011	--	--	--	--	--	<5	--	--	--	--	--	--	--	--	--	--
	11/16/2011	5	28	7.04	974	12.75	<5	6	8	11	--	--	--	--	--	--	--
	6/27/2012	3.7	97	6.77	1,082	15.02	<5	<4	<5	<5	<20	58	64,900	40	<0.005	<0.02	134
	12/6/2012	7.9	<40	7.12	825	8.66	<5	4	<5	9	--	--	--	--	--	--	--
	6/5/2013	4.5	6	7.24	921	13.98	<5	<4	<5	24	30	13	27,500	32	<0.005	<0.02	106
	11/4/2013	8.7	16	7.10	733	11.63	14	6	<5	<5	--	--	--	--	--	--	--
	6/25/2014	--	--	7.10	--	13.30	--	--	--	--	--	--	--	--	--	--	--
	11/18/2014	**6.5**	**28**	**7.31**	**896**	**4.82**	**<5**	**6**	**6**	**6**	**--**	**--**	**--**	**--**	**--**	**--**	**--**

See notes on page 16.

Table 2
RACER Trust - Coldwater Road Landfill Facility
Post-Closure Monitoring - Historical Analytical Results
Physical Parameters, TOC, TOX, Metals, Chloride, Cyanide, Phenols, and Sulfate

Well ID	Sample Date	Indicator Parameters					Dissolved Metals (µg/L)							Inorganics (mg/L)			
		TOC (mg/L)	TOX (µg/L)	pH	SpC	T	Cr	Cu	Ni	Zn	Fe	Mn	Na	Chloride	Cyanide	Phenols	Sulfate
		MDEQ Residential Drinking Water Criteria					100 (A)	1,000 (A)	100 (A)	2,400							
	6/21/1995	3.5	34	7.68	2,400	14.60	<20	<20	<30	<20	--	--	--	--	--	--	--
	8/31/1995	3.9	<10	7.72	1,829	14.80	37	43	<40	<20	--	--	--	--	--	--	--
	2/9/1996	3.1	<10	7.34	2,860	8.00	<20	<20	<40	<20	--	--	--	--	--	--	--
	6/19/1996	2.1	<100	6.81	2,550	11.50	<20	<20	<20	<20	--	--	--	--	--	--	--
B-9	8/21/1996	2.3	<5	8.04	2,310	16.40	<20	<20	<20	70	--	--	--	--	--	--	--
	11/13/1996	71.0	<5	6.79	3,280	9.20	<20	<20	<20	40	--	--	--	--	--	--	--
	5/6/1997	3.0	<100	6.80	2,600	10.00	<10	<10	51	20	--	--	--	--	--	--	--
	11/6/1997	2.0	<100	6.50	2,800	11.00	<10	<10	183	40	650	741	--	141	<0.005	<0.020	1,178
	5/4/1998	3.0	<5	6.58	2,400	14.50	10	10	18	40	--	--	--	--	--	--	--
	11/5/1998	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--	--	--
	12/23/1998	--	--	--	--	--	--	--	--	--	--	--	--	NS	NS	NS	NS
	4/26/1999	4.0	<100	7.69	1,860	12.20	<10	<10	19	20	--	--	--	--	--	--	--
	11/5/1999	2.5	<100	6.75	2,340	15.40	<10	<10	20	30	610	1280	47,100	128	<0.005	<0.020	1,222
	4/26/2000	5.5	<100	7.56	2,780	9.50	<10	<10	12	30	--	--	--	--	--	--	--
	12/8/2000	5.0	<10	7.56	2,400	7.83	<10	<10	46	<10	50	--	69,500	142	<0.005	<0.020	1,246
	5/16/2001	4.8	<100	7.41	1,070	12.55	<10	<10	7	10	--	--	--	--	--	--	--
	10/17/2001	4.0	<100	7.54	2,130	10.77	<10	<10	8	20	940	--	66,000	122	<0.005	NA	1,150
	5/16/2002	1.9	<100	7.19	2,470	11.60	<10	<10	7	10	--	--	--	--	--	--	--
	11/7/2002	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	6/4/2003	2.2	57	6.78	2,690	10.70	<5	<5	15	13	--	--	--	--	--	--	--
	11/13/2003	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	6/30/2004	3.8	NS	6.91	2,379	12.70	<5	8	19	28	--	--	--	--	--	--	--
	12/9/2004	3.0	<30	5.88	2,480	11.40	<5	<5	11	19	570	248	55,900	149	<0.005	<0.010	1,350
	6/8/2005	4.0	<30	7.09	2,116	10.31	6	6	12	17	480	701	58,300	128	<0.005	<0.010	1,160
	12/7/2005	5.0	<30	8.58	2,830	11.86	11	5	12	40	320	410	58,500	--	--	--	--
	6/29/2006	1.9	<30	6.82	2,820	12.40	6	6	13	19	390	330	63,600	125	<0.005	<0.010	1,150
	11/30/2006	2.7	36.7	7.15	2,830	12.47	<5	6	<5	14	--	--	--	--	--	--	--
	6/5/2007	2.1	<30	6.70	2,770	11.04	12	6	24	21	320	1,900	67,300	112	<0.005	<0.010	1,120
	11/16/2007	2.0	27.4	6.67	3,000	9.36	2	6	24	18	--	--	--	--	--	--	--
	7/2/2008	1.8	36.4	6.44	3,060	19.70	<5	4	13	19	780	812	64,200	133	<0.005	<0.010	1,280
	11/20/2008	2.2	15.9	6.35	3,290	8.07	<5	<1	13	<5	--	--	--	--	--	--	--
Dup.	11/20/2008	2.0	127	6.35	3,280	8.07	<5	<1	13	<5	--	--	--	--	--	--	--
	6/25/2009	1.6	<30	6.67	2,700	19.75	<5	<1	<5	<5	59	173	65,300	107	<0.005	<0.010	1,120
	11/16/2009	3	84.1	6.71	3,030	12.73	<5	<4	16	8	--	--	--	--	--	--	--
	6/15/2010	3	27.5	6.69	3,030	12.98	<5	<4	7	6	460	475	70,700	117	<0.005	<0.020	1,230
	11/11/2010	3	37.5	6.37	2,910	12.90	19	4	7	15	--	--	--	--	--	--	--
	6/22/2011	1.9	<30	6.70	2,600	13.99	17	6	21	12	780	661	63,300	99	<0.005	<0.010	972
Replicate	6/22/2011	--	--	--	--	--	<5	--	--	--	--	--	--	--	--	--	--
	11/16/2011	2	50	7.18	3,060	12.86	<5	<4	7	<5	--	--	--	--	--	--	--
	6/26/2012	2	21	6.53	2,770	13.95	<5	<4	8	<5	60	433	73,700	101	<0.005	<0.02	1,110
	12/5/2012	2.3	19	6.80	3,210	12.04	<5	8	17	23	--	--	--	--	--	--	--
	6/5/2013	2.1	15	7.07	2,660	12.50	<5	<4	6	25	40	173	66,400	106	<0.005	<0.02	1,150
	11/6/2013	2.2	NS	6.36	2,730	12.96	10	8	47	8	--	--	--	--	--	--	--
	6/25/2014	1.9	25	6.82	2,650	11.49	<5	<5	18	8	<20	159	27,100	108	<0.005	<0.02	1,070
	11/19/2014	**2.1**	**29**	**6.77**	**2,670**	**8.12**	**<5**	**6**	**14**	**12**	--	--	--	--	--	--	--

See notes on page 16.

Table 2
RACER Trust - Coldwater Road Landfill Facility
Post-Closure Monitoring - Historical Analytical Results
Physical Parameters, TOC, TOX, Metals, Chloride, Cyanide, Phenols, and Sulfate

Well ID	Sample Date	Indicator Parameters					Dissolved Metals (µg/L)							Inorganics (mg/L)			
		TOC (mg/L)	TOX (µg/L)	pH	SpC	T	Cr	Cu	Ni	Zn	Fe	Mn	Na	Chloride	Cyanide	Phenols	Sulfate
		MDEQ Residential Drinking Water Criteria					100 (A)	1,000 (A)	100 (A)	2,400							
	6/21/1995	2.7	<10	7.54	1,048	13.30	<20	<20	<30	150	--	--	--	--	--	--	--
	8/31/1995	3.0	<10	7.91	989	13.20	<20	<20	<40	<20	--	--	--	--	--	--	--
	2/9/1996	2.3	<10	7.42	1,021	9.30	<20	<20	<40	<20	--	--	--	--	--	--	--
	6/19/1996	1.4	<100	7.04	944	13.20	<20	<20	<20	<20	--	--	--	--	--	--	--
B-18A	8/21/1996	2.4	<5	7.49	1,041	12.80	<20	<20	<20	60	--	--	--	--	--	--	--
	11/13/1996	19.0	<5	7.22	1,331	6.40	<20	<20	<20	70	--	--	--	--	--	--	--
	5/6/1997	2.0	<100	6.50	900	10.00	<10	<10	13	10	--	--	--	--	--	--	--
	11/6/1997	4.0	<100	6.40	1,100	10.00	<10	<10	62	10	380	62	--	12	<0.005	<0.020	130
	5/4/1998	2.0	<5	6.72	862	11.80	<10	<10	<5	20	--	--	--	--	--	--	--
	11/5/1998	1.0	<10	6.00	1,090	11.80	<10	<10	<5	10	240	128	46,000	--	--	--	--
	12/23/1998	--	--	--	--	--	--	--	--	--	--	--	--	10	<0.005	<0.020	133
	4/26/1999	2.1	<100	8.10	921	14.00	<10	<10	<5	20	--	--	--	--	--	--	--
	11/5/1999	4.3	<100	7.10	832	14.00	<10	<10	<5	60	180	155	39,200	8	<0.005	<0.020	130
	4/26/2000	2.4	<100	7.50	980	10.40	<10	<10	<5	30	--	--	--	--	--	--	--
	12/8/2000	2.6	<10	6.96	990	9.94	<10	<10	15	<10	<10	--	34,500	7	<0.005	<0.020	126
Dup.	12/8/2000	2.6	<10	--	--	--	<10	<10	13	<10	40	--	35,100	7	<0.005	<0.020	112
	5/16/2001	2.4	<100	7.91	1,160	12.88	<10	<10	<5	10	--	--	--	--	--	--	--
	10/17/2001	2.2	<100	7.09	1,020	12.22	<10	<10	<5	<10	350	--	35,400	7	<0.005	<0.020	132
	5/16/2002	1.5	<100	7.19	2,080	12.20	<10	<10	<5	10	--	--	--	--	--	--	--
	11/7/2002	1.9	<30	7.16	820	10.06	<5	<5	<5	<5	190	26	40,800	10	<0.005	<0.020	134
	6/4/2003	1.6	<30	6.92	790	13.10	<5	<5	<5	5	--	--	--	--	--	--	--
	11/13/2003	1	<30	7.68	1,180	7.10	<5	<5	<5	<5	160	<5	--	10	<0.005	<0.010	129
Dup.	11/13/2003	--	--	--	--	--	--	--	--	--	--	--	--	11	<0.005	<0.010	130
	6/29/2004	1.2	<30	7.19	863	12.00	<5	<5	7	10	--	--	--	--	--	--	--
	12/9/2004	3	<30	6.19	960	10.50	<5	<5	9	12	900	363	37,900	14	<0.005	<0.010	127
	6/8/2005	2	<30	7.38	819	10.87	<5	<5	6	16	170	80	40,000	11	<0.005	<0.010	120
	12/8/2005	2.6	<30	9.73	1,120	10.14	11	<4	<5	10	390	170	47,000	--	--	--	--
	6/27/2006	1.2	<30	7.09	1,110	13.20	5	4	<5	46	170	50	48,200	13	<0.005	<0.010	125
	11/30/2006	1.4	119	7.18	1,100	11.47	5	<4	<5	9	--	--	--	--	--	--	--
	6/4/2007	1	19.9	7.01	1,070	13.19	9	3	3	14	110	22	51,800	15	<0.005	<0.010	114
	11/14/2007	<1	19	6.91	1,090	13.65	1	2	6	11	--	--	--	--	--	--	--
	6/25/2008	12	34.1	7.10	1,060	20.41	<5	2	<5	11	310	<5	54,800	15	<0.005	<0.010	110
	11/18/2008	<1	<30	6.58	1,088	2.86	<5	<1	<5	<5	--	--	--	--	--	--	--
	6/24/2009	<1	<30	7.25	1,060	26.23	<5	1	<5	15	<20	<5	53,100	16	<0.005	<0.010	111
	11/18/2009	2	<30	6.89	1,070	11.73	<5	<4	<5	45	--	--	--	--	--	--	--
	6/17/2010	1	<30	7.19	1,080	17.48	<5	<4	<5	8	<20	<5	45,500	15	<0.005	<0.020	109
	11/10/2010	2	28	6.91	1,065	9.51	12	<4	<5	<5	--	--	--	--	--	--	--
	6/21/2011	1.2	<30	7.16	1,031	18.77	10	<4	5	12	240	<5	46,100	17	<0.005	<0.010	103
Replicate	6/21/2011	--	--	--	--	--	<5	--	--	--	--	--	--	--	--	--	--
	11/15/2011	1	28	7.01	1,063	11.98	<5	<4	<5	<5	--	--	--	--	--	--	--
	6/27/2012	1.2	<40	6.99	1,057	14.39	<5	<4	<5	<5	30	26	50,000	18	<0.005	<0.02	103
Dup.	6/27/2012	1.2	<40	6.99	1,054	14.39	<5	<4	<5	5	40	27	46,500	18	<0.005	<0.02	101
	12/6/2012	1.5	<40	7.03	1,071	9.29	<5	<4	5	9	--	--	--	--	--	--	--
	6/5/2013	1.5	4.7	7.17	1,040	14.61	<5	<4	<5	31	20	12	43,900	19	<0.005	<0.02	110
	11/5/2013	1.4	<10	7.15	1,063	12.14	<5	<4	<5	11	--	--	--	--	--	--	--
	6/24/2014	1.5	<30	7.03	1,048	12.83	<5	<5	6	7	<20	20	20,500	18	<0.005	<0.02	107
	11/19/2014	**1.4**	**16**	**7.10**	**1,073**	**6.27**	**<5**	**<4**	**5**	**7**	**--**	**--**	**--**	**--**	**--**	**--**	**--**
Dup.	**11/19/2014**	**1.5**	**<60**	**7.10**	**1,072**	**6.27**	**<5**	**<4**	**5**	**7**	**--**	**--**	**--**	**--**	**--**	**--**	**--**

See notes on page 16.

Table 2
RACER Trust - Coldwater Road Landfill Facility
Post-Closure Monitoring - Historical Analytical Results
Physical Parameters, TOC, TOX, Metals, Chloride, Cyanide, Phenols, and Sulfate

Well ID	Sample Date	Indicator Parameters					Dissolved Metals (µg/L)							Inorganics (mg/L)			
		TOC (mg/L)	TOX (µg/L)	pH	SpC	T	Cr	Cu	Ni	Zn	Fe	Mn	Na	Chloride	Cyanide	Phenols	Sulfate
		MDEQ Residential Drinking Water Criteria					100 (A)	1,000 (A)	100 (A)	2,400							
	6/21/1995	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--	--	--
	8/31/1995	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--	--	--
	2/9/1996	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--	--	--
	6/19/1996	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--	--	--
B-19A	8/21/1996	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--	--	--
	11/13/1996	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--	--	--
	5/6/1997	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--	--	--
	11/6/1997	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	WD	WD	WD	WD
	5/4/1998	3.0	<5	6.84	1,480	10.10	<10	<10	<5	30	--	--	--	--	--	--	--
	11/5/1998	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--	--	--
	12/23/1998	--	--	--	--	--	--	--	--	--	--	--	--	NS	NS	NS	NS
	4/26/1999	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--	--	--
	11/5/1999	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	4/26/2000	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--	--	--
	12/8/2000	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	5/16/2001	4.0	<100	7.14	1,050	11.83	<10	<10	<5	<10	--	--	--	--	--	--	--
	10/17/2001	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	5/16/2002	6.0	<100	7.19	1,740	10.60	<10	<10	<5	10	--	--	--	--	--	--	--
	11/7/2002	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	6/4/2003	5.8	<30	6.92	1,350	12.90	<5	<5	<5	<5	--	--	--	--	--	--	--
	11/13/2003	3.4	<30	7.59	1,620	10.20	<5	<5	<5	<5	20	<5	--	148	<0.005	<0.010	229
	6/29/2004	3.9	<30	7.17	1,316	14.70	<5	<5	<5	8	--	--	--	--	--	--	--
	12/9/2004	5.0	33	6.24	1,340	9.90	<5	<5	<5	9	240	11	111,000	116	<0.005	<0.010	233
Dup.	12/9/2004	5.0	<30	--	--	--	<5	<5	<5	7	170	<5	114,000	116	<0.005	<0.010	233
B-19AR	6/7/2005	3.0	<30	7.09	829	12.20	<5	<5	7	<5	1,320	228	15,700	52	<0.005	<0.010	130
Dup.	12/8/2005	5.5	<30	--	1,390	--	10	<4	<5	20	160	<20	81,400	--	--	--	--
	12/8/2005	5.3	<30	7.13	1,390	12.27	10	<4	<5	<10	150	<20	74,800	--	--	--	--
Re-sample	2/14/2006	--	--	7.95	840	5.89	<5	--	--	--	--	--	--	--	--	--	--
	6/29/2006	2.7	<30	7.58	860	12.00	<5	<4	12	21	240	210	22,400	51	<0.005	<0.010	153
	11/30/2006	6.2	33.7	7.18	1,300	11.43	5	<4	<5	<5	--	--	--	--	--	--	--
	6/7/2007	2	<30	6.97	899	11.35	6	4	4	9	70	21	19,700	58	<0.005	<0.010	136
	11/13/2007	1.5	<30	7.27	1,070	12.10	3	7	26	11	--	--	--	--	--	--	--
	6/25/2008	2.4	38.8	7.13	1,060	17.42	<5	3	<5	16	380	9	18,500	58	<0.005	<0.010	148
	11/18/2008	1.3	<30	7.00	1,052	7.96	<5	1	<5	14	--	--	--	--	--	--	--
	6/24/2009	1.0	<30	7.74	911	17.30	<5	2	<5	<5	36	<5	21,200	60	<0.005	<0.010	147
	11/19/2009	2	<30	7.41	994	10.36	<5	<4	<5	7	--	--	--	--	--	--	--
	6/15/2010	2	<30	7.57	992	16.10	<5	<4	<5	<5	<20	<5	19,800	59	<0.005	<0.020	154
	11/10/2010	2	<30	6.91	1,128	8.69	12	<4	<5	<5	--	--	--	--	--	--	--
	6/22/2011	1.5	<30	7.35	902	17.15	5	<4	5	<5	240	<5	22,400	64	<0.005	<0.010	140
Replicate	6/22/2011	--	--	--	--	--	<5	--	--	--	--	--	--	--	--	--	--
	11/16/2011	2	26	7.06	1,091	8.43	<5	<4	<5	5	--	--	--	--	--	--	--
	6/27/2012	1.5	<40	7.78	1,005	13.25	<5	<4	<5	<5	<20	<5	23,200	62	<0.005	<0.02	145
	12/6/2012	1.8	<40	7.36	1,129	10.24	<5	<4	5	6	--	--	--	--	--	--	--
	6/5/2013	1.5	39	8.16	777	12.99	<5	<4	<5	25	40	<5	27,700	72	<0.005	<0.02	136
	11/6/2013	1.6	3.6	7.33	1,104	11.61	<5	<4	10	<5	--	--	--	--	--	--	--
	6/23/2014	2.0	23	8.40	817	17.28	<5	<5	5	<5	<20	<5	11,900	74	<0.005	<0.02	136
	11/20/2014	**2.1**	**190**	**7.37**	**1,038**	**6.16**	**<5**	**6**	**6**	**10**	--	--	--	--	--	--	--

See notes on page 16.

Table 2
RACER Trust - Coldwater Road Landfill Facility
Post-Closure Monitoring - Historical Analytical Results
Physical Parameters, TOC, TOX, Metals, Chloride, Cyanide, Phenols, and Sulfate

Well ID	Sample Date	Indicator Parameters					Dissolved Metals (µg/L)							Inorganics (mg/L)			
		TOC (mg/L)	TOX (µg/L)	pH	SpC	T	Cr	Cu	Ni	Zn	Fe	Mn	Na	Chloride	Cyanide	Phenols	Sulfate
		MDEQ Residential Drinking Water Criteria					100 (A)	1,000 (A)	100 (A)	2,400							
	6/21/1995	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/31/1995	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/9/1996	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/19/1996	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-24	8/21/1996	5.6	<5	7.80	1,502	12.70	<20	<20	<20	90	--	--	--	--	--	--	--
	11/13/1996	20.0	<5	7.09	2,030	7.80	<20	<20	<20	50	--	--	--	--	--	--	--
	5/6/1997	5.0	<100	6.40	1,700	10.00	<10	<10	31	10	--	--	--	--	--	--	--
	11/6/1997	--	--	--	--	--	--	--	--	--	--	--	--	NS	NS	NS	NS
	5/4/1998	4.0	<5	6.52	1,410	11.60	<10	<10	8	20	--	--	--	--	--	--	--
	11/5/1998	4.0	23	5.50	1,595	10.40	<10	<10	9	20	60	120	27,700	--	--	--	--
	12/23/1998	--	--	--	--	--	--	--	--	--	--	--	--	163	<0.005	<0.020	205
	4/26/1999	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--	--	--
	11/5/1999	NS	NS	7.20	1,152	13.80	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	4/26/2000	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--	--	--
	12/8/2000	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	5/15/2001	NS	NS	6.40	1,450	12.88	NS	NS	NS	NS	NS	NS	NS	--	--	--	--
	10/17/2001	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	5/16/2002	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--	--	--
	11/7/2002	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	6/3/2003	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--	--	--
	11/13/2003	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	6/30/2004	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--	--	--
	12/9/2004	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
B-24R	6/7/2005	8.0	<30	7.27	857	10.58	8	<5	<5	<5	10,600	448	27,100	49	<0.005	<0.010	206
B-24R	12/8/2005	6.6	<30	5.16	1,120	11.89	11	<4	<5	10	3,180	210	28,700	--	--	--	--
	6/28/2006	4.7	<30	7.31	1,080	11.90	6	<4	<5	<5	3,760	210	27,700	48	<0.005	<0.010	182
	11/30/2006	4.8	30	7.31	1,100	11.67	6	<4	<5	<5	--	--	--	--	--	--	--
	6/4/2007	4.5	110	7.19	1,080	11.02	9	2	2	19	2,400	194	27,900	47	<0.005	<0.010	184
	11/13/2007	4.1	30.1	7.13	1,130	13.98	3	1	5	7	--	--	--	--	--	--	--
	6/26/2008	4.3	<30	6.99	1,130	18.99	<5	1	<5	8	3,490	175	39,600	46	<0.005	<0.010	189
	11/18/2008	3.8	<30	6.76	1,125	5.25	<5	<1	<5	<5	--	--	--	--	--	--	--
	6/24/2009	5.2	<30	6.62	1,120	17.44	<5	<1	<5	<5	4,000	155	38,400	48	<0.005	<0.010	201
	11/18/2009	5	86.4	7.08	1,140	12.94	<5	<4	<5	<5	--	--	--	--	--	--	--
	6/16/2010	4	22.7	7.02	1,150	16.27	<5	<4	<5	<5	1,880	222	39,500	46	<0.005	<0.020	196
	11/9/2010	5	26.8	6.90	1,136	13.46	11	<4	<5	<5	--	--	--	--	--	--	--
	6/21/2011	3.7	<30	7.11	1,136	17.54	10	<4	6	<5	1,130	255	51,700	45	<0.005	<0.010	206
Dup.	6/21/2011	3.7	<30	7.11	1,137	17.54	8	<4	6	<5	1,070	255	52,000	45	<0.005	<0.010	206
Replicate	6/21/2011	--	--	--	--	--	<5	--	--	--	--	--	--	--	--	--	--
Dup. Replicate	6/21/2011	--	--	--	--	--	<5	--	--	--	--	--	--	--	--	--	--
	11/16/2011	4	24	7.69	1,141	11.09	<5	<4	<5	<5	--	--	--	--	--	--	--
	6/26/2012	3.5	16	6.80	1,219	13.71	<5	<4	<5	<5	1,200	242	72,000	45	<0.005	<0.02	219
B-24R	12/6/2012	4.2	48	6.98	1,204	10.17	<5	<4	<5	6	--	--	--	--	--	--	--
B-24R	6/3/2013	4	4.8	7.19	1,127	11.40	<5	<4	<5	<5	110	130	38,600	45	<0.005	<0.02	227
	11/5/2013	4	5.5	7.16	1,203	12.61	<5	<4	<5	<5	--	--	--	--	--	--	--
Dup.	11/5/2013	4	<10	7.16	1,203	12.61	<5	<4	<5	<5	--	--	--	--	--	--	--
	6/24/2014	3.7	16	7.10	1,202	13.91	<5	8	8	9	60	238	24,300	45	<0.005	<0.02	243
Dup.	6/24/2014	3.7	16	7.10	1,201	13.91	<5	<5	7	<5	8	231	25,000	46	<0.005	<0.02	240
	11/19/2014	**3.9**	**21**	**6.98**	**1,290**	**5.44**	**<5**	**<4**	**11**	**<5**	--	--	--	--	--	--	--

See notes on page 16.

Table 2
RACER Trust - Coldwater Road Landfill Facility
Post-Closure Monitoring - Historical Analytical Results
Physical Parameters, TOC, TOX, Metals, Chloride, Cyanide, Phenols, and Sulfate

Well ID	Sample Date	Indicator Parameters					Dissolved Metals (µg/L)							Inorganics (mg/L)			
		TOC (mg/L)	TOX (µg/L)	pH	SpC	T	Cr	Cu	Ni	Zn	Fe	Mn	Na	Chloride	Cyanide	Phenols	Sulfate
		MDEQ Residential Drinking Water Criteria					100 (A)	1,000 (A)	100 (A)	2,400							
B-28	11/21/2005	--	--	6.21	994	12.34	--	--	--	<5	--	--	--	--	--	--	--
Dup.	11/21/2005	--	--	6.21	--	12.34	--	--	--	7	--	--	--	--	--	--	--
	6/27/2006	3	<30	7.12	828	13.20	5	<4	<5	18	2,380	210	17,000	--	--	--	--
	12/1/2006	2.4	<30	7.48	812	12.30	<5	<4	<5	5	--	--	--	--	--	--	--
Dup.	12/1/2006	3.3	<30	7.48	810	12.30	<5	<4	<5	<5	--	--	--	--	--	--	--
	6/5/2007	2.1	<30	6.84	845	10.56	9	2	3	6	1,690	160	25,100	12	<0.005	<0.010	87
	11/15/2007	2.5	15	6.81	816	9.12	3	2	5	11	--	--	--	--	--	--	--
	6/27/2008	1.8	<30	6.87	840	17.63	<5	1	<5	5	370	84	16,300	10	<0.005	<0.010	88
	11/19/2008	1.1	<30	6.75	804	6.98	<5	<1	<5	<5	--	--	--	--	--	--	--
	6/24/2009	1.1	<30	6.96	822	19.46	<5	<1	<5	<5	204	132	14,600	10	<0.005	<0.010	84
	11/18/2009	2	<30	6.94	814	11.59	<5	<4	<5	20	--	--	--	--	--	--	--
	6/16/2010	2	<30	7.02	841	17.57	<5	<4	<5	<5	790	173	19,100	12	<0.005	<0.020	78
	11/10/2010	3	<30	7.05	813	13.29	18	<4	<5	<5	--	--	--	--	--	--	--
	6/21/2011	1.5	<30	7.23	837	14.08	9	<4	5	<5	1,380	130	23,400	12	<0.005	<0.010	80
Replicate	6/21/2011	--	--	--	--	--	<5	--	--	--	--	--	--	--	--	--	--
	11/15/2011	2	160	7.17	823	12.46	<5	<4	<5	<5	--	--	--	--	--	--	--
	6/26/2012	2	<40	6.45	849	13.01	<5	<4	<5	<5	1,960	84	29,800	12	<0.005	<0.02	80
Dup.	12/6/2012	1.6	<40	7.25	823	11.37	<5	<4	<5	<5	--	--	--	--	--	--	--
	12/6/2012	1.7	<40	7.25	823	11.37	<5	<4	<5	<5	--	--	--	--	--	--	--
	6/3/2013	1.5	10	6.88	834	13.10	<5	<4	5	<5	1,310	111	26,000	12	<0.005	<0.02	87
	11/5/2013	1.6	<10	7.26	842	12.91	<5	<4	<5	<5	--	--	--	--	--	--	--
	6/24/2014	1.5	<30	7.03	852	12.19	<5	9	<5	<5	1,490	53	15,400	12	<0.005	<0.02	89
Replicate	7/28/2014	--	--	--	--	--	--	<5	--	--	--	--	--	--	--	--	--
	11/19/2014	**1.6**	**<60**	**7.05**	**844**	**7.48**	**<5**	**<4**	**<5**	**<5**	**--**	**--**	**--**	**--**	**--**	**--**	**--**

Notes

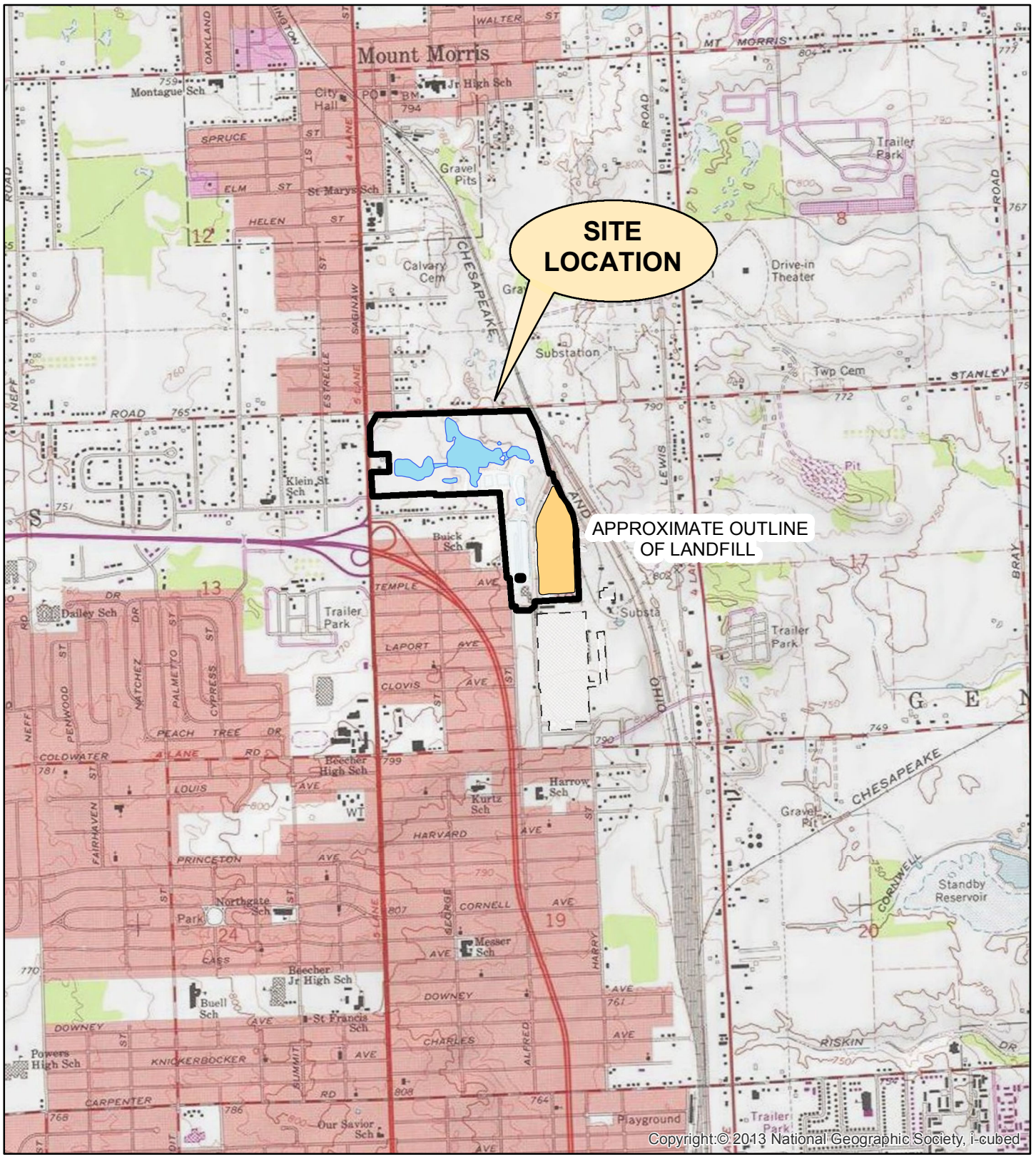
1) < = Not detected.
2) NS = Not sampled, insufficient liquid encountered.
3) NR = No Result, insufficient sample volume.
4) T = Temperature in degrees Celsius.
5) -- = Not analyzed.
6) Dup = Duplicate sample.

Exceeds MDEQ Residential Drinking Water Criteria

7) A = Criterion is the state of Michigan drinking water standard established pursuant to Section 5 of 1976 PA 399, MCL 325.1005.
8) E = Criterion is the aesthetic drinking water value, as required by Section 20120a(5) of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA)

FIGURES

FIGURE 1



Document Path: I:\Racer-Trust.15388\51440.Coldwater-Rd-La\Docs\Reports\GW Monitoring\Annual 11-14\Figures\001 - Site_Location (2014-11).mxd

PLOT DATE: 12/22/2014 KBS

RACER TRUST
COLDWATER ROAD LANDFILL FACILITY
FLINT, MICHIGAN

SITE LOCATION MAP

N

0 0.8
Miles

FEBRUARY 2014
15388/51440/001

O'BRIEN & GERE ENGINEERS, INC.

FIGURE 2

N

LEGEND

- LEACHATE COLLECTION SUMP
- ACCESS PORT FOR LEAK DETECTION VAULT
- MONITORING WELL
- ABANDONED WELL

RACER TRUST
COLDWATER ROAD
LANDFILL FACILITY
FLINT, MICHIGAN

SITE LAYOUT

0 150 300 450 600
Feet

O'BRIEN & GERE ENGINEERS, INC.

DECEMBER 2014
15388/51440/002

PLOT DATE: 12/22/2014 KBS

FIGURE 3

N

LEGEND

- MONITORING WELL
- (803.71) GROUNDWATER ELEVATION
- ABANDONED WELL

RACER TRUST
COLDWATER ROAD
LANDFILL FACILITY
FLINT, MICHIGAN

SHALLOW GROUNDWATER ELEVATION MAP NOVEMBER 18, 2014

0 75 150 300 450 600
Feet

NOVEMBER 2014
15388/51440-003

O'BRIEN & GERE ENGINEERS, INC.

WETLANDS
RAILROAD
DIRT ROAD / TRAIL
B-19AR (771.56)
B-19A
REMAINING MATERIALS AREA
B-24R (804.78)
B-18A (788.54)
~ LANDFILL ~
CONTROL BUILDING
B-7 (795.02)
B-9 (805.99)
B-28 (811.19)
FORMER WWTP BUILDING & BASINS
ABANDONED RAILROAD
I-475
B-30
B-14
B-29
FENCE
MORRIS HILLS
CONCRETE / GRAVEL ROAD
MAP USES DATA FROM THE MICHIGAN CENTER FOR GEOGRAPHIC INFORMATION
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Document Path: I:\Racer-Trust.15388\51440.Coldwater-Rd-Lal\Docs\Reports\GW Monitoring\Annual 11-14\Figures\003- Figure 3- GW_Elevations_Perched (2014-11).mxd

PLOT DATE: 12/22/2014 KBS

FIGURE 4

N

LEGEND

- ⊕ MONITORING WELL
- (748.45) GROUNDWATER ELEVATION
- 740 GROUNDWATER POTENTIOMETRIC SURFACE ELEVATION

RACER TRUST
COLDWATER ROAD
LANDFILL FACILITY
FLINT, MICHIGAN

DRIFT AQUIFER GROUNDWATER POTENTIOMETRIC SURFACE MAP NOVEMBER 18, 2014

0 70 140 280 420 560
Feet

DECEMBER 2014
15388/51440-004

O'BRIEN & GERE ENGINEERS, INC.

WETLANDS
B-2D (749.92)
RAILROAD
749
DIRT ROAD / TRAIL
REMAINING MATERIALS AREA
748
747
746
B-20D (745.25)
745
744
~ LANDFILL ~
743
742
741
B-21D (740.68)
740
739
738
CONTROL BUILDING
FORMER WWTP BUILDING & BASINS
B-23DR (730.82)
737
B-22D (737.57)
ABANDONED RAILROAD
NOTE THAT THE WATER ELEVATION FOR MONITORING WELL B-23DR WAS NOT USED IN DEVELOPING THE GROUNDWATER POTENTIOMETRIC SURFACE
B-27D (736.74)
FENCE
I-475
MORRIS HILLS
CONCRETE / GRAVEL ROAD
MAP USES DATA FROM THE MICHIGAN CENTER FOR GEOGRAPHIC INFORMATION
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Document Path: I:\Racer-Trust.15388\51440.Coldwater-Rd-Lab\Docs\Reports\GW Monitoring\Annual 11-14\Figures\004 - Figure 4 GW_Contours_Deep (2014-06).mxd

PLOT DATE: 12/22/2014-KBS

APPENDIX A

Sampling Procedures

TABLE OF CONTENTS

1 INTRODUCTION

This procedure is for the collection of groundwater samples for laboratory analysis.

The objective of most groundwater quality monitoring programs is to obtain samples that are representative of existing groundwater conditions, or samples that retain the physical and chemical properties of the groundwater within an aquifer.

One of the most important aspects of groundwater sampling is acquiring samples that are free of suspended silt, sediment, or other fine grained particulates. Fine grain materials may often have a variety of chemical components sorbed to the particle or have the ability to sorb chemicals from the aqueous phase to the particle, which will bias the subsequent analytical results.

Constituents known to have an affinity for fine-grained particulates are: polychlorinated biphenyls (PCBs), semi-volatile organic compounds (SVOCs), and inorganics. Monitoring programs where these constituents are suspected or known to be prevalent must employ sampling methods that minimize particulate presence.

The "Low Stress/Low Flow" purging and sampling method will be utilized to purge the well to allow representative water from the formation to replace the standing water within the sampling zone of the well. Experience has shown that the low stress/low flow technique typically achieves representative groundwater samples with minimal particulate interference.

Lastly, in extreme cases "ultra-low flow" techniques have been employed at select sites where low stress/low flow methods were used, yet particulate-sensitive constituents continue to bias the analytical results, or excessive drawdown is produced using standard low stress/low flow methods due to the presence of low permeability materials within a well's screened zone. Ultra-low flow techniques are conducted at purging rates below 100 ml per minute, and should only be utilized after low stress/low flow methods have been attempted.

2 PROCEDURAL GUIDELINES

The following describes techniques for groundwater sampling: Low Stress/Low Flow Methods.

Low stress/low flow methods will be employed when it is critical to collect groundwater samples truly representative of the groundwater present, and to minimize the impact of sediment/colloid presence.

2.1 PREPARATORY REQUIREMENTS

Prior to groundwater sampling, an inspection will be performed on each well. The inspection will include:

- Inspecting the concrete pad for cracks
- Inspecting the protective steel cover
- Inspecting the integrity of the PVC well casing (to the extent possible)
- Inspecting the well caps
- Inspecting the well identification markings to confirm they are legible (if illegible, re-mark)
- Inspecting the locks to assess whether they are in good working condition.

Results of the well inspection will be documented on the Groundwater Sampling Log for each well. If the inspection indicates repairs are required, these will be performed prior to the next sampling event. Corrective actions implemented to repair well(s) will also be documented on the Groundwater Sampling Log and/or the field notebook for the facility.

Groundwater purging and sampling data will be recorded on the Groundwater Sampling Log.

2.2 WELL PURGING AND STABILIZATION MONITORING (LOW STRESS/LOW FLOW METHOD)

The procedure for sampling the monitoring wells is as follows:

1) Sampling equipment will first be decontaminated prior to each use by the following protocol:
   - Scrub equipment thoroughly in a low-sudsing detergent solution (*e.g.*, Alconox). Pump low-sudsing detergent solution through submersible pump for approximately 5 minutes, if utilized
   - Rinse equipment thoroughly with distilled water, and pump distilled water through submersible pump, if utilized
   - Wrap equipment in plastic for handling and/or storage until next use
   - Decontamination of disposable tubing, if used, will not be necessary
2) Calibrate field instrument and document calibration activity. Calibration shall be performed in accordance with manufacturer's recommendations, and noted on the Groundwater Sampling Log
3) An electric water level probe will be used to measure the depth from the top of the casing to the top of water to the nearest 0.01-ft. The measurement will be recorded in a dedicated field notebook and Groundwater Sampling Log
4) Measure the depth from the top of casing to the bottom of the well for the initial sampling event
5) Slowly lower the pump and/or tubing into the well positioning the pump intake at the mid-point of the well screen taking care to minimize disturbing the well
6) During the purging of the well, monitor and record the field indicator parameters (pH, temperature, conductivity, oxidation-reduction (redox) reaction potential (ORP), dissolved oxygen (DO), and turbidity) approximately every 5 minutes. Stabilization is considered achieved when the final groundwater flow rate is achieved, and three consecutive readings for each parameter are within the following limits:

pH	±0.1 pH units for three consecutive readings;
temperature	±3 percent for three consecutive readings;
conductivity	±3 percent for three consecutive readings;
ORP	±10 millivolts (mV) for three consecutive readings;
DO	±10 percent for three consecutive readings; and
Turbidity	±10 percent for three consecutive readings or a final value of less than 5 nephelometric turbidity units (NTU).

7) Verify that drawdowns of 0.3 ft or less are maintained and make adjustments as necessary. Record drawdown measurements and note adjustments in pumping rates as necessary on the Groundwater Sampling Log. If drawdowns of 0.3 ft or less cannot be maintained utilize ultra-low flow purge techniques. However, if ultra-low flow purging still results in the well purging "dry," allowed the well to recharge and the sample will be collected as soon as sufficient water is present to obtain the necessary sample volume

8) Obtain a sample for chemical analyses immediately upon stabilization of field parameter measurements. Field filter the sample for dissolved metals using a 0.45-micron filter prior to preserving with acid. Samples are to be collected in the order of volatility as follows: TOC/TOX (or VOCs) and dissolved metals.

If after 2 hours of purging the indicator parameters have not stabilized, as recommended in the USEPA guidance, the purging will be discontinued and the sample will be collected with an explanation of attempts to achieve stabilization.

Either a decontaminated submersible pump or peristaltic pump (for shallow wells only) may be utilized to purge each well. If a submersible pump is utilized in the purging process, then it will be decontaminated prior to and after sampling each well. Sampling equipment must be protected from the ground surface by a clean plastic sheet laid around the work area. Water from purging will not be containerized.

2.3 SAMPLE PRESERVATION

Sample bottles will be labeled with sample identification, collection date and time, filtration/preservative status. Sample bottles will be filled and capped securely and immediately preserved (if required) and stored at 4 degrees Celsius in a cooler.

The cooler and samples will be prepared for shipment or transport by the following procedure:

1) Prepare cooler(s) for shipment.
   - Tape drain(s) of cooler shut
   - Place mailing label with laboratory address on top of cooler(s).
2) Arrange sample containers in a manner to prevent potential sample container breakage.
3) Confirm the bottle labels are completed correctly. Place clear tape over bottle labels to prevent moisture accumulation from causing the label to peel off.
4) Seal sample containers within plastic zip-lock bags to prevent packing material from contacting samples.
5) Place packing material at the bottom of the cooler to act as a cushion for the sample containers.
6) Fill remaining spaces with packing material.
7) Confirm containers are firmly packed in cooler.
8) If ice is required to preserve the samples, cubes should be repackaged in double zip-lock bags, and placed on top of the packing material.

9) Sign COC form (or obtain signature) and indicate the time and date it was relinquished to Federal Express or other carrier, as appropriate.

10) Separate copies of COC forms. Seal proper copies within a large zip-lock bag and tape to inside lid of cooler. Retain copies of forms in-house.

11) Close lid and latch.

12) Tape cooler shut on both ends, making several complete revolutions with strapping tape.

13) Relinquish to Federal Express or other courier service. Retain airbill receipt for project records (Note: Samples will be shipped for "NEXT DAY" delivery).

If samples are delivered directly to the laboratory, or the laboratories in-house courier, by the sampling team, the packaging/shipping requirements may be omitted. COC procedures; however, must be strictly maintained.

2.4 SAMPLE MANAGEMENT AND CHAIN-OF-CUSTODY

COC procedures document the history of sample containers and samples from the time of preparation of sample containers through sample collection, shipment, and analysis. A sample is considered in custody if:

- The sample is in the sampler's physical possession
- The sample is secured by the sampler to prevent tampering
- The sample is secured by the sampler employee in an area that is restricted to authorized personnel.

To maintain a record of sample collection, transfer between personnel, shipment, and receipt by the laboratory, a COC record will be completed for each sample at each sampling location. Each time the samples are transferred, signatures of the person relinquishing and receiving the samples, as well as the date and time, will be documented.

Parallel field notebook/Groundwater Sampling Log and COC records will be maintained. Recorded information will include:

- Sampling Location
- Time and Date
- Sampling Method
- Method of Preservation.

Additionally, the field notebook will also include information on weather conditions, depth to water, total depth of the well, field parameter and instrument calibration records and other useful or pertinent information. The notebook will be kept at the facility or with their designated contractor.

2.5 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) MEASURES

Field QA/QC procedures will consist of collecting one equipment blank (if reusable equipment is used) and one duplicate sample (one additional sample from one of the wells) for each sampling event. The duplicate sample will be assigned a separate sample identification and submitted to the laboratory "blind".

The procedure for collecting an equipment blank will be to pass distilled water through the decontaminated sampling device into a laboratory-supplied sample bottles. An equipment blank sample will not be required if disposable sampling equipment is used.

3 REFERENCES

USEPA Low-Flow (Minimal Drawdown) Groundwater Sampling Procedures (EPA/540/S -95/504).

USEPA (Region 1) Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells (EQASOP-GW 001), January 19, 2010.

USEPA RCRA Groundwater Monitoring: Draft Technical Guidance (EPA/530-R-93-001).

MDEQ RRD Operational Memorandum No. 2: Sampling and Analysis.

APPENDIX B

Groundwater Sampling Logs

O'Brien & Gere Engineers, Inc. — **Ground Water Sampling Log**

Date	11/18/14	Weather	Mostly Cloudy 20's
Site Name	Coldwater Road Landfill	Well #	B-7
Location	Flint, MI	Evacuation Method	peristaltic pump
Project No.	51440	Sampling Method	Low-flow
Personnel	KBS		

Well Information:

Depth of Well *	31.59 ft.	Water Volume /ft. for:
Depth to Water *	20.18 ft.	X 2" Diameter Well = 0.163 X LWC
Length of Water Column	ft.	4" Diameter Well = 0.653 X LWC
Volume of Water in Well	gal.(s)	6" Diameter Well = 1.469 X LWC

Volume removed before sampling: 1 gal.(s)
Did well go dry? NO

* Measurements taken from: [X] Well Casing [ ] Protective Casing [ ] (Other, Specify)

Instrument Calibration:

	Calibrated within Range
pH	Yes
ORP	Yes
Conductivity	Yes
DO	Yes

Water parameters:

Time	Pumping Rate (ml/min.)	Drawdown (ft) 0.3 feet or less	Temperature (Celsius) ±3 percent	Conductivity (mS/cm) ±0.005 (mS/cm)	Dissolved Oxygen (mg/L) ±10 percent	pH ±0.1 pH units	ORP (mV) ±10 millivolts	Turbidity (NTUs) ±10 percent
1445 initial	100 initial	20.79 initial	5.70 initial	879 initial	initial	7.58 initial	187.8 initial	243 initial
1450	<100	21.71	5.61	881	11.82	7.47	187.0	197
1455		22.40	6.17	885	9.76	7.39	186.5	118
1500		22.63	5.60	880	9.96	7.38	186.0	118
1505		23.17	4.83	879	10.40	7.35	186.4	116
1510		23.59	5.50	867	9.08	7.33	186.2	118
1515		24.00	5.18	872	9.97	7.33	186.0	124
1520		24.44	4.92	875	9.99	7.32	185.8	124
1525		24.90	4.82	877	9.75	7.31	185.7	121

Water Sample:
Time Collected: 1530

Physical Appearance at Start		Physical Appearance at Sampling	
Color	light Brown	Color	light Brown
Odor	None	Odor	None
Turbidity (> 100 NTU)	243	Turbidity (> 100 NTU)	121
Sheen/Free Product	None	Sheen/Free Product	None

Samples collected:

Analyses	# Bottles	Bottle Size/Type	Preservative	Field Filtered
Dissolved Metals - Cu, Cr, Ni, Zn	1	125 ml Plastic	HNO_3	yes
TOC	2	40 ml VOAs	H_2SO_4	
TOX	1	1 L Amber	H_2SO_4	
SpC	1	250 ml Plasitc	None	

Notes:

O'Brien & Gere Engineers, Inc. — **Ground Water Sampling Log**

Date	11/19/14	Weather	cloudy 20's
Site Name	Coldwater Road Landfill	Well #	B-28
Location	Flint, MI	Evacuation Method	peristaltic pump
Project No.	51440	Sampling Method	Low-flow
Personnel	KBS		

Well Information:

Depth of Well *	31.5	ft.
Depth to Water *	6.88	ft.
Length of Water Column		ft.
Volume of Water in Well		gal.(s)

Water Volume /ft. for:
- X 2" Diameter Well = 0.163 X LWC
- 4" Diameter Well = 0.653 X LWC
- 6" Diameter Well = 1.469 X LWC

Volume removed before sampling: 1 gal.(s)
Did well go dry? NO

* Measurements taken from: [X] Well Casing [ ] Protective Casing [ ] (Other, Specify)

Instrument Calibration:

	Calibrated within Range
pH	Yes
ORP	Yes
Conductivity	Yes
DO	Yes

Water parameters:

Time	Pumping Rate (ml/min.)	Drawdown (ft) 0.3 feet or less	Temperature (Celsius) ±3 percent	Conductivity (mS/cm) ±0.005 (mS/cm)	Dissolved Oxygen (mg/L) ±10 percent	pH ±0.1 pH units	ORP (mV) ±10 millivolts	Turbidity (NTUs) ±10 percent
905	initial 100	initial 7.31	initial 7.54	initial 797	initial	initial 6.45	initial 220.4	initial
910		7.41	7.51	805	6.80	6.65	161.1	15
915		8.28	7.39	802	4.79	6.80	138.5	5
920		8.65	7.44	797	3.08	6.90	30.2	8
925		8.85	7.54	794	2.67	6.94	-1.0	5
930		9.10	7.39	792	2.32	6.99	-59.2	5
935		9.29	7.31	791	2.03	7.02	-68.3	3
940		9.35	7.45	789	1.93	7.03	-77.4	3
945		9.43	7.48	790	1.81	7.05	-78.0	2
950		9.54	7.48	791	1.74	7.05	-81.1	2

Water Sample:
Time Collected: 950

Physical Appearance at Start		Physical Appearance at Sampling	
Color	clear	Color	clear
Odor	NONE	Odor	NONE
Turbidity (> 100 NTU)	15	Turbidity (> 100 NTU)	2
Sheen/Free Product	None	Sheen/Free Product	NONE

Samples collected:

Analyses	# Bottles	Bottle Size/Type	Preservative	Field Filtered
Dissolved Metals - Cu, Cr, Ni, Zn	1	125 ml Plastic	HNO_3	yes
TOC	2	40 ml VOAs	H_2SO_4	
TOX	1	1 L Amber	H_2SO_4	
SpC	1	250 ml Plasitc	None	

Notes:

O'Brien & Gere Engineers, Inc. — **Ground Water Sampling Log**

Date	11/19/14	Weather	cloudy / snow 20's
Site Name	Coldwater Road Landfill	Well #	B-24r
Location	Flint, MI	Evacuation Method	peristaltic pump
Project No.	51440	Sampling Method	Low-flow
Personnel	KBS		

Well Information:

			Water Volume /ft. for:
Depth of Well *	29.5 ft.	X	2" Diameter Well = 0.163 X LWC
Depth to Water *	13.57 ft.		4" Diameter Well = 0.653 X LWC
Length of Water Column	ft.		6" Diameter Well = 1.469 X LWC
Volume of Water in Well	gal.(s)		

Volume removed before sampling: 7 gal.(s)

Did well go dry? NO

* Measurements taken from: [X] Well Casing [ ] Protective Casing [ ] (Other, Specify)

Instrument Calibration: Calibrated within Range

pH	Y-S
ORP	Y-S
Conductivity	Y-S
DO	Y-S

Water parameters:

Time	Pumping Rate (ml/min.)	Drawdown (ft) (0.3 feet or less)	Temperature (Celsius) (±3 percent)	Conductivity (mS/cm) (±0.005 (mS/cm))	Dissolved Oxygen (mg/L) (±10 percent)	pH (±0.1 pH units)	ORP (mV) (±10 millivolts)	Turbidity (NTUs) (±10 percent)
1030 initial	100	13.10	3.65	1131		7.35	-5.4	764
1035	<100	13.67	4.91	1171	7.00	7.11	-3.9	7000
1040		14.20	5.27	1182	5.34	7.06	1.9	696
1045		14.43	5.19	1182	4.74	7.03	6.5	
1050		14.60	5.19	1184	4.55	7.01	9.7	477
1055		14.73	5.37	1182	4.40	7.00	12.7	355
1100		14.83	5.46	1180	4.27	7.00	15.7	190
1105		14.94	5.43	1179	4.71	6.99	18.9	88
1110		15.04	5.51	1178	5.04	6.99	21.8	50
1115		15.11	5.52	1180	5.32	6.99	23.8	41
1120		15.18	5.64	1185	5.52	7.00	26.1	28

OVER =>

Water Sample:

Time Collected: 1140

Physical Appearance at Start		Physical Appearance at Sampling	
Color	light Brown	Color	Clear
Odor	NONE	Odor	NONE
Turbidity (> 100 NTU)	764	Turbidity (> 100 NTU)	5
Sheen/Free Product	NONE	Sheen/Free Product	NONE

Samples collected:

Analyses	# Bottles	Bottle Size/Type	Preservative	Field Filtered
Dissolved Metals - Cu, Cr, Ni, Zn	1	125 ml Plastic	HNO_3	yes
TOC	2	40 ml VOAs	H_2SO_4	
TOX	1	1 L Amber	H_2SO_4	
SpC	1	250 ml Plasitc	None	

Notes:

B-24c

Time	Pump	DD	Temp	Con	DO	pH	ORP	Turb
1125	< 160	15.24	5.55	1188	5.62	7.00	28.8	16
1130	↓	15.33	5.43	1191	5.64	7.00	30.2	10
1135		15.39	5.49	1193	5.52	6.99	32.0	6
1140		15.48	5.44	1202	5.54	6.98	34.2	5

O'Brien & Gere Engineers, Inc. — **Ground Water Sampling Log**

Date	11/19/14	Weather	cloudy / light snow 20's
Site Name	Coldwater Road Landfill	Well #	B-9
Location	Flint, MI	Evacuation Method	peristaltic pump
Project No.	51440	Sampling Method	Low-flow
Personnel	KBS		

Well Information:

Depth of Well *	25.35 ft.	Water Volume /ft. for:	
Depth to Water *	3.52 ft.	X	2" Diameter Well = 0.163 X LWC
Length of Water Column	ft.		4" Diameter Well = 0.653 X LWC
Volume of Water in Well	gal.(s)		6" Diameter Well = 1.469 X LWC

Volume removed before sampling: 1 gal.(s)

Did well go dry? NO

* Measurements taken from: [X] Well Casing [ ] Protective Casing [ ] (Other, Specify)

Instrument Calibration:

	Calibrated within Range
pH	yes
ORP	yes
Conductivity	yes
DO	yes

Water parameters:

Time	Pumping Rate (ml/min.)	Drawdown (ft) 0.3 feet or less	Temperature (Celsius) ±3 percent	Conductivity (mS/cm) ±0.005 (mS/cm)	Dissolved Oxygen (mg/L) ±10 percent	pH ±0.1 pH units	ORP (mV) ±10 millivolts	Turbidity (NTUs) ±10 percent
1235	initial 100	initial 4.55	initial 9.05	initial 2470	initial	initial 7.02	initial 54.3	initial 33
1240	100	4.83	8.36	2526	5.45	6.83	39.6	31
1245		5.39	8.05	2532	3.51	6.75	38.4	29
1250		5.72	8.04	2536	3.34	6.73	39.1	27
1255		6.21	8.03	2542	3.82	6.72	40.9	22
1300		6.69	8.03	2536	4.27	6.74	39.0	17
1305		7.10	8.05	2541	4.32	6.76	34.9	15
1310		7.55	8.10	2539	4.26	6.77	32.6	16
1315								

Water Sample:

Time Collected: 1310

Physical Appearance at Start		Physical Appearance at Sampling	
Color	clear	Color	clear
Odor	NONE	Odor	NONE
Turbidity (> 100 NTU)	33	Turbidity (> 100 NTU)	16
Sheen/Free Product	NONE	Sheen/Free Product	NONE

Samples collected:

Analyses	# Bottles	Bottle Size/Type	Preservative	Field Filtered
Dissolved Metals - Cu, Cr, Ni, Zn	1	125 ml Plastic	HNO_3	yes
TOC	2	40 ml VOAs	H_2SO_4	
TOX	1	1 L Amber	H_2SO_4	
SpC	1	250 ml Plasitc	None	

Notes:

O'Brien & Gere Engineers, Inc. — **Ground Water Sampling Log**

Date	11/19/14		
Site Name	Coldwater Road Landfill	Weather	cloudy / light snow 20's
Location	Flint, MI	Well #	B-18A
Project No.	51440	Evacuation Method	peristaltic pump
Personnel	KBS	Sampling Method	Low-flow

Well Information:

Depth of Well *	43.4 ft.	Water Volume /ft. for:	
Depth to Water *	23.71 ft.	X	2" Diameter Well = 0.163 X LWC
Length of Water Column	ft.		4" Diameter Well = 0.653 X LWC
Volume of Water in Well	gal.(s)		6" Diameter Well = 1.469 X LWC

Volume removed before sampling: 1 gal.(s)
Did well go dry? NO

* Measurements taken from: [X] Well Casing [ ] Protective Casing [ ] (Other, Specify)

Instrument Calibration: Calibrated within Range

pH	Yes
ORP	Yes
Conductivity	Yes
DO	Yes

Water parameters:

Time	Pumping Rate (ml/min.)	Drawdown (ft) 0.3 feet or less	Temperature (Celsius) ±3 percent	Conductivity (mS/cm) ±0.005 (mS/cm)	Dissolved Oxygen (mg/L) ±10 percent	pH ±0.1 pH units	ORP (mV) ±10 millivolts	Turbidity (NTUs) ±10 percent
1410 initial	100 initial	24.31 initial	5.85 initial	1028 initial	13.04 initial	7.43 initial	93.4 initial	
1415	100	24.45	5.77	1026	6.85	7.36	41.6	10
1420		24.96	5.79	1020	3.32	7.24	35.7	8
1425		25.32	5.98	1015	2.77	7.19	34.3	5
1430		25.66	5.97	1013	2.48	7.16	34.4	5
1435		26.00	5.95	1010	2.33	7.13	34.3	3
1440	↓	26.44	6.27	1008	2.23	7.10	32.9	3

Water Sample:
Time Collected: 1440

Physical Appearance at Start		Physical Appearance at Sampling	
Color	clear	Color	clear
Odor	NONE	Odor	NONE
Turbidity (> 100 NTU)	10	Turbidity (> 100 NTU)	3
Sheen/Free Product	NONE	Sheen/Free Product	NONE

Samples collected:

Analyses	# Bottles	Bottle Size/Type	Preservative	Field Filtered
Dissolved Metals - Cu, Cr, Ni, Zn	1	125 ml Plastic	HNO_3	yes
TOC	2	40 ml VOAs	H_2SO_4	
TOX	1	1 L Amber	H_2SO_4	
SpC	1	250 ml Plasitc	None	

Notes:
DUP-2 collected

O'Brien & Gere Engineers, Inc. — **Ground Water Sampling Log**

Date	11/19/14	Weather	light snow 20's
Site Name	Coldwater Road Landfill	Well #	B-19Ar
Location	Flint, MI	Evacuation Method	bladder pump
Project No.	51440	Sampling Method	Low-flow
Personnel	KBS		

Well Information:

Depth of Well *	46.5 ft.	
Depth to Water *	41.59 ft.	3.5
Length of Water Column	ft.	
Volume of Water in Well	gal.(s)	

Water Volume /ft. for:
- X — 2" Diameter Well = 0.163 X LWC
- 4" Diameter Well = 0.653 X LWC
- 6" Diameter Well = 1.469 X LWC

Volume removed before sampling: 1 1/2 gal.(s)

Did well go dry? yes

* Measurements taken from: [X] Well Casing [ ] Protective Casing [ ] (Other, Specify)

Instrument Calibration:

	Calibrated within Range
pH	yes
ORP	yes
Conductivity	yes
DO	yes

Water parameters:

Time	Pumping Rate (ml/min.)	Drawdown (ft) (0.3 feet or less)	Temperature (Celsius) (±3 percent)	Conductivity (mS/cm) (±0.005 (mS/cm))	Dissolved Oxygen (mg/L) (±10 percent)	pH (±0.1 pH units)	ORP (mV) (±10 millivolts)	Turbidity (NTUs) (±10 percent)
1550	initial 100	initial 41.76	initial 7.18	initial 932	initial	initial 7.71	initial 480.1	initial 14.7
1555	100	42.35	8.32	918	8.47	7.57	47.8	435
1600		42.43	8.02	917	6.77	7.53	38.9	483
1605		42.79	7.35	929	6.14	7.48	41.9	390
1610		42.95	7.33	933	5.97	7.44	37.4	262
1615		43.12	7.24	945	5.84	7.41	36.7	176
1620		43.20	7.31	948	5.77	7.40	36.4	152
1625			7.10	962	5.24	7.37	37.0	151
1630			6.16	974	5.17	7.37	36.7	146

Water Sample: Time Collected 1600 11/20/14

Physical Appearance at Start		Physical Appearance at Sampling	
Color	light Brown	Color	light Brown
Odor	NONE	Odor	NONE
Turbidity (> 100 NTU)	107	Turbidity (> 100 NTU)	1100
Sheen/Free Product	NONE	Sheen/Free Product	NONE

Samples collected:

Analyses	# Bottles	Bottle Size/Type	Preservative	Field Filtered
Dissolved Metals - Cu, Cr, Ni, Zn	1	125 ml Plastic	HNO_3	yes
TOC	2	40 ml VOAs	H_2SO_4	
TOX	1	1 L Amber	H_2SO_4	
SpC	1	250 ml Plasitc	None	

Notes: turb during sampling 1100 NTU

APPENDIX C

Analytical Results

Analytical Laboratory Report

Report ID: S63688.01(01)
Generated on 12/05/2014

Report to

Attention: Clifford Yantz
O'Brien & Gere Engineers, Inc.
37000 Grand River Ave.
Suite 260
Farmington, MI 48335

Phone: 248-477-5701 FAX: 248-477-5962
Email: Clifford.Yantz@obg.com

Addtional Contacts: Kevin Schneider

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
Kevin George (kgeorge@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S63688.01-S63688.07
Project: RACER Coldwater Rd Landfill Annual Event
Collected Date: 11/18/2014 - 11/20/2014
Submitted Date/Time: 11/20/2014 14:45
Sampled by: Kevin Schneider
P.O. #: 11311200

Maya Murshak
Technical Director

General Report Notes

Results relate only to items tested as received by laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis were applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods

Method Summary

Method	Version
E120.1	EPA Method 120.1 Revision 1982
E200.8	EPA Method 200.8 Revision 5.4
SM5310C	Standard Method 5310C 20th Edition
SW3015A	SW 846 Method 3015A Revision 1 February 2007
SW9020B	SW 846 Method 9020B Revision 2 September 1994

Sample Summary (7 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S63688.01	B-7	Groundwater	11/18/2014 15:30
S63688.02	B-28	Groundwater	11/19/2014 09:50
S63688.03	B-24r	Groundwater	11/19/2014 11:40
S63688.04	B-9	Groundwater	11/19/2014 13:10
S63688.05	B-18A	Groundwater	11/19/2014 14:40
S63688.06	DUP-2	Groundwater	11/19/2014 00:01
S63688.07	B-19Ar	Groundwater	11/20/2014 10:00

Analytical Laboratory Report

Lab Sample ID: S63688.01
Sample Tag: B-7
Collected Date/Time: 11/18/2014 15:30
Matrix: Groundwater
COC Reference: 84891

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	500ml Plastic	None	Yes	5.0	IR
2	40ml Glass	H2SO4	Yes	5.0	IR
1	125ml Plastic	HNO3	Yes	5.0	IR
1	1L Amber	H2SO4	Yes	5.0	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Analyst	CAS #	Flags
Extraction / Prep.								
Metal Digestion	Completed			SW3015A	11/24/14 11:50	CCM		
Inorganics								
Conductivity	896	umhos/cm		E120.1	11/25/14 13:26	JKB		
TOC	6.5	mg/L	1	SM5310C	11/25/14 18:46	JKB		
Metals								
Chromium, Dissolved	Not detected	mg/L	0.005	E200.8	11/24/14 16:54	CCM	7440-47-3	
Copper, Dissolved	0.006	mg/L	0.004	E200.8	11/24/14 16:54	CCM	7440-50-8	
Nickel, Dissolved	0.006	mg/L	0.005	E200.8	11/24/14 16:54	CCM	7440-02-0	
Zinc, Dissolved	0.006	mg/L	0.005	E200.8	11/24/14 16:54	CCM	7440-66-6	
Organics								
TOX	28	ug/L	60	SW9020B	12/02/14 08:05	Tes		OJ

O-Analysis performed by outside laboratory. See attached report. J-Estimated value less than reporting limit, but greater than MDL

Analytical Laboratory Report

Lab Sample ID: S63688.02
Sample Tag: B-28
Collected Date/Time: 11/19/2014 09:50
Matrix: Groundwater
COC Reference: 84891

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	500ml Plastic	None	Yes	5.0	IR
2	40ml Glass	H2SO4	Yes	5.0	IR
1	125ml Plastic	HNO3	Yes	5.0	IR
1	1L Amber	H2SO4	Yes	5.0	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Analyst	CAS #	Flags
Extraction / Prep.								
Metal Digestion	Completed			SW3015A	11/24/14 11:50	CCM		
Inorganics								
Conductivity	844	umhos/cm		E120.1	11/25/14 13:28	JKB		
TOC	1.6	mg/L	1	SM5310C	11/25/14 19:06	JKB		
Metals								
Chromium, Dissolved	Not detected	mg/L	0.005	E200.8	11/24/14 16:56	CCM	7440-47-3	
Copper, Dissolved	Not detected	mg/L	0.004	E200.8	11/24/14 16:56	CCM	7440-50-8	
Nickel, Dissolved	Not detected	mg/L	0.005	E200.8	11/24/14 16:56	CCM	7440-02-0	
Zinc, Dissolved	Not detected	mg/L	0.005	E200.8	11/24/14 16:56	CCM	7440-66-6	
Organics								
TOX	Not detected	ug/L	60	SW9020B	12/02/14 08:05	Tes		O

O-Analysis performed by outside laboratory. See attached report.

Analytical Laboratory Report

Lab Sample ID: S63688.03
Sample Tag: B-24r
Collected Date/Time: 11/19/2014 11:40
Matrix: Groundwater
COC Reference: 84891

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	500ml Plastic	None	Yes	5.0	IR
2	40ml Glass	H2SO4	Yes	5.0	IR
1	125ml Plastic	HNO3	Yes	5.0	IR
1	1L Amber	H2SO4	Yes	5.0	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Analyst	CAS #	Flags
Extraction / Prep.								
Metal Digestion	Completed			SW3015A	11/24/14 11:50	CCM		
Inorganics								
Conductivity	1,290	umhos/cm		E120.1	11/25/14 13:30	JKB		
TOC	3.9	mg/L	1	SM5310C	11/25/14 19:25	JKB		
Metals								
Chromium, Dissolved	Not detected	mg/L	0.005	E200.8	11/24/14 16:58	CCM	7440-47-3	
Copper, Dissolved	Not detected	mg/L	0.004	E200.8	11/24/14 16:58	CCM	7440-50-8	
Nickel, Dissolved	0.011	mg/L	0.005	E200.8	11/24/14 16:58	CCM	7440-02-0	
Zinc, Dissolved	Not detected	mg/L	0.005	E200.8	11/24/14 16:58	CCM	7440-66-6	
Organics								
TOX	21	ug/L	60	SW9020B	12/02/14 08:05	Tes		OJ

O-Analysis performed by outside laboratory. See attached report. J-Estimated value less than reporting limit, but greater than MDL

Analytical Laboratory Report

Lab Sample ID: S63688.04
Sample Tag: B-9
Collected Date/Time: 11/19/2014 13:10
Matrix: Groundwater
COC Reference: 84891

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	500ml Plastic	None	Yes	5.0	IR
2	40ml Glass	H2SO4	Yes	5.0	IR
1	125ml Plastic	HNO3	Yes	5.0	IR
1	1L Amber	H2SO4	Yes	5.0	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Analyst	CAS #	Flags
Extraction / Prep.								
Metal Digestion	Completed			SW3015A	11/24/14 11:50	CCM		
Inorganics								
Conductivity	2,670	umhos/cm		E120.1	11/25/14 13:32	JKB		
TOC	2.1	mg/L	1	SM5310C	11/25/14 20:07	JKB		
Metals								
Chromium, Dissolved	Not detected	mg/L	0.005	E200.8	11/24/14 17:14	CCM	7440-47-3	
Copper, Dissolved	0.006	mg/L	0.004	E200.8	11/24/14 17:14	CCM	7440-50-8	
Nickel, Dissolved	0.014	mg/L	0.005	E200.8	11/24/14 17:14	CCM	7440-02-0	
Zinc, Dissolved	0.012	mg/L	0.005	E200.8	11/24/14 17:14	CCM	7440-66-6	
Organics								
TOX	29	ug/L	60	SW9020B	12/02/14 08:05	Tes		OJ

O-Analysis performed by outside laboratory. See attached report. J-Estimated value less than reporting limit, but greater than MDL

Analytical Laboratory Report

Lab Sample ID: S63688.05
Sample Tag: B-18A
Collected Date/Time: 11/19/2014 14:40
Matrix: Groundwater
COC Reference: 84891

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	500ml Plastic	None	Yes	5.0	IR
2	40ml Glass	H2SO4	Yes	5.0	IR
1	125ml Plastic	HNO3	Yes	5.0	IR
1	1L Amber	H2SO4	Yes	5.0	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Analyst	CAS #	Flags
Extraction / Prep.								
Metal Digestion	Completed			SW3015A	11/24/14 11:50	CCM		
Inorganics								
Conductivity	1,073	umhos/cm		E120.1	11/25/14 13:34	JKB		
TOC	1.4	mg/L	1	SM5310C	11/25/14 20:27	JKB		
Metals								
Chromium, Dissolved	Not detected	mg/L	0.005	E200.8	11/24/14 17:16	CCM	7440-47-3	
Copper, Dissolved	Not detected	mg/L	0.004	E200.8	11/24/14 17:16	CCM	7440-50-8	
Nickel, Dissolved	0.005	mg/L	0.005	E200.8	11/24/14 17:16	CCM	7440-02-0	
Zinc, Dissolved	0.007	mg/L	0.005	E200.8	11/24/14 17:16	CCM	7440-66-6	
Organics								
TOX	16	ug/L	60	SW9020B	12/02/14 08:05	Tes		OJ

O-Analysis performed by outside laboratory. See attached report. J-Estimated value less than reporting limit, but greater than MDL

Analytical Laboratory Report

Lab Sample ID: S63688.06
Sample Tag: DUP-2
Collected Date/Time: 11/19/2014 00:01
Matrix: Groundwater
COC Reference: 84891

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	500ml Plastic	None	Yes	5.0	IR
2	40ml Glass	H2SO4	Yes	5.0	IR
1	125ml Plastic	HNO3	Yes	5.0	IR
1	1L Amber	H2SO4	Yes	5.0	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Analyst	CAS #	Flags
Extraction / Prep.								
Metal Digestion	Completed			SW3015A	11/24/14 11:50	CCM		
Inorganics								
Conductivity	1,072	umhos/cm		E120.1	11/25/14 13:36	JKB		
TOC	1.5	mg/L	1	SM5310C	11/25/14 20:47	JKB		
Metals								
Chromium, Dissolved	Not detected	mg/L	0.005	E200.8	11/24/14 17:18	CCM	7440-47-3	
Copper, Dissolved	Not detected	mg/L	0.004	E200.8	11/24/14 17:18	CCM	7440-50-8	
Nickel, Dissolved	0.005	mg/L	0.005	E200.8	11/24/14 17:18	CCM	7440-02-0	
Zinc, Dissolved	0.007	mg/L	0.005	E200.8	11/24/14 17:18	CCM	7440-66-6	
Organics								
TOX	Not detected	ug/L	60	SW9020B	12/02/14 08:05	Tes		O

O-Analysis performed by outside laboratory. See attached report.

Analytical Laboratory Report

Lab Sample ID: S63688.07
Sample Tag: B-19Ar
Collected Date/Time: 11/20/2014 10:00
Matrix: Groundwater
COC Reference: 84891

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	500ml Plastic	None	Yes	5.0	IR
2	40ml Glass	H2SO4	Yes	5.0	IR
1	125ml Plastic	HNO3	Yes	5.0	IR
1	1L Amber	H2SO4	Yes	5.0	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Analyst	CAS #	Flags
Extraction / Prep.								
Metal Digestion	Completed			SW3015A	11/24/14 11:50	CCM		
Inorganics								
Conductivity	1,038	umhos/cm		E120.1	11/25/14 13:38	JKB		
TOC	2.1	mg/L	1	SM5310C	11/25/14 21:06	JKB		
Metals								
Chromium, Dissolved	Not detected	mg/L	0.005	E200.8	11/24/14 17:20	CCM	7440-47-3	
Copper, Dissolved	0.006	mg/L	0.004	E200.8	11/24/14 17:20	CCM	7440-50-8	
Nickel, Dissolved	0.006	mg/L	0.005	E200.8	11/24/14 17:20	CCM	7440-02-0	
Zinc, Dissolved	0.010	mg/L	0.005	E200.8	11/24/14 17:20	CCM	7440-66-6	
Organics								
TOX	190	ug/L	300	SW9020B	12/03/14 09:21	Tes		OJ

O-Analysis performed by outside laboratory. See attached report. J-Estimated value less than reporting limit, but greater than MDL

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

84891

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Cliff Yantz / Kevin Schneider
COMPANY: O'Brien & Gere
ADDRESS: 37000 Grand River ste 260
CITY: Farmington Hills STATE: MI ZIP CODE: 48335
PHONE NO.: 248-477-5701 FAX NO.: 248-477-5982 P.O. NO.:
E-MAIL ADDRESS: clifford.yantz@OBG.com QUOTE NO.:

INVOICE TO

CONTACT NAME: ☒ SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS:

PROJECT NO./NAME: RACER Coldwater Rd Landfill Annual Event
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Kevin Schneider

TURNAROUND TIME REQUIRED ☐ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☒ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☒ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☐ Other

Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	Dissolved Metals	TOC	Specific conductivity	TOX	Special Instructions
63688.01	11/18/14	1530	B-7	GW	5	1		1	3				X	X	X	X	Metals Are:
.02	11/19/14	950	B-28										X	X	X	X	Cu, Cr, Ni, Zn
.03		1140	B-24r										X	X	X	X	
.04		1310	B-9										X	X	X	X	
.05		1440	B-18A										X	X	X	X	
.06	↓	—	DUP-2										X	X	X	X	
.07	11/20/14	1000	B-19Ar	↓	↓	↓		↓	↓				X	X	X	X	

RELINQUISHED BY: SIGNATURE/ORGANIZATION: OBG ☒ Sampler DATE 11/20/14 TIME 1320
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE 11-20-14 TIME 1320

RELINQUISHED BY: SIGNATURE/ORGANIZATION: DATE TIME
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION: Kevin George DATE 11/20/14 TIME 1445
RECEIVED BY: SIGNATURE/ORGANIZATION: DATE 11/20/14 TIME 1445

SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS

NOTES: TEMP. ON ARRIVAL 5.0

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Tel: (330)497-9396

TestAmerica Job ID: 240-44742-1
Client Project/Site: 63688

For:
Merit Laboratories
2680 E Lansing Drive
East Lansing, Michigan 48823

Attn: Ms. Barb Richardson

Denise D Heckler

Authorized for release by:
12/5/2014 4:10:51 PM

Denise Heckler, Project Manager II
(330)966-9477
denise.heckler@testamericainc.com

Table of Contents

Definitions/Glossary

Client: Merit Laboratories
Project/Site: 63688

TestAmerica Job ID: 240-44742-1

Qualifiers

General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.
F1	MS and/or MSD Recovery exceeds the control limits
F2	MS/MSD RPD exceeds control limits

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Job ID: 240-44742-1

Laboratory: TestAmerica Canton

Narrative

Job Narrative
240-44742-1

Comments
No additional comments.

Receipt
The samples were received on 11/22/2014 10:15 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.0º C.

General Chemistry
Method(s) 9020B: The matrix spike / matrix spike duplicate (MS/MSD) precision for TOX in batch 255754 was outside control limits. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample / laboratory control sample duplicate (LCS/LCSD) precision was within acceptance limits.

Method(s) 9020B: Breakthrough exceeded 10% for the following sample in batch 255795 for TOX:63688.07 (240-44742-7). The sample was originally run at a 2X with 50% breakthrough and reanalyzed at a 10X, therefore the data have been reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Method Summary

Client: Merit Laboratories
Project/Site: 63688

TestAmerica Job ID: 240-44742-1

Method	Method Description	Protocol	Laboratory
9020B	Organic Halides, Total (TOX)	SW846	TAL DEN

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL DEN = TestAmerica Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100

Sample Summary

Client: Merit Laboratories
Project/Site: 63688

TestAmerica Job ID: 240-44742-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-44742-1	63688.01	Water	11/18/14 15:30	11/22/14 10:15
240-44742-2	63688.02	Water	11/19/14 09:50	11/22/14 10:15
240-44742-3	63688.03	Water	11/19/14 11:40	11/22/14 10:15
240-44742-4	63688.04	Water	11/19/14 13:10	11/22/14 10:15
240-44742-5	63688.05	Water	11/19/14 14:40	11/22/14 10:15
240-44742-6	63688.06	Water	11/19/14 00:00	11/22/14 10:15
240-44742-7	63688.07	Water	11/20/14 10:00	11/22/14 10:15

Detection Summary

Client: Merit Laboratories
Project/Site: 63688

TestAmerica Job ID: 240-44742-1

Client Sample ID: 63688.01 — Lab Sample ID: 240-44742-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Halogens, Total Organic	28	J	60	15	ug/L	1		9020B	Total/NA

Client Sample ID: 63688.02 — Lab Sample ID: 240-44742-2

No Detections.

Client Sample ID: 63688.03 — Lab Sample ID: 240-44742-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Halogens, Total Organic	21	J	60	15	ug/L	1		9020B	Total/NA

Client Sample ID: 63688.04 — Lab Sample ID: 240-44742-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Halogens, Total Organic	29	J	60	15	ug/L	1		9020B	Total/NA

Client Sample ID: 63688.05 — Lab Sample ID: 240-44742-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Halogens, Total Organic	16	J	60	15	ug/L	1		9020B	Total/NA

Client Sample ID: 63688.06 — Lab Sample ID: 240-44742-6

No Detections.

Client Sample ID: 63688.07 — Lab Sample ID: 240-44742-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Halogens, Total Organic	190	J	300	77	ug/L	5		9020B	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Merit Laboratories
Project/Site: 63688

TestAmerica Job ID: 240-44742-1

Client Sample ID: 63688.01
Date Collected: 11/18/14 15:30
Date Received: 11/22/14 10:15

Lab Sample ID: 240-44742-1
Matrix: Water

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Halogens, Total Organic	28	J	60	15	ug/L			12/02/14 08:05	1

Client: Merit Laboratories
Project/Site: 63688

TestAmerica Job ID: 240-44742-1

Client Sample ID: 63688.02
Date Collected: 11/19/14 09:50
Date Received: 11/22/14 10:15

Lab Sample ID: 240-44742-2
Matrix: Water

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Halogens, Total Organic	60	U	60	15	ug/L			12/02/14 08:05	1

Client: Merit Laboratories
Project/Site: 63688

TestAmerica Job ID: 240-44742-1

Client Sample ID: 63688.03
Date Collected: 11/19/14 11:40
Date Received: 11/22/14 10:15

Lab Sample ID: 240-44742-3
Matrix: Water

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Halogens, Total Organic	21	J	60	15	ug/L			12/02/14 08:05	1

Client: Merit Laboratories
Project/Site: 63688

TestAmerica Job ID: 240-44742-1

Client Sample ID: 63688.04
Date Collected: 11/19/14 13:10
Date Received: 11/22/14 10:15

Lab Sample ID: 240-44742-4
Matrix: Water

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Halogens, Total Organic	29	J	60	15	ug/L			12/02/14 08:05	1

Client: Merit Laboratories
Project/Site: 63688

TestAmerica Job ID: 240-44742-1

Client Sample ID: 63688.05
Date Collected: 11/19/14 14:40
Date Received: 11/22/14 10:15

Lab Sample ID: 240-44742-5
Matrix: Water

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Halogens, Total Organic	16	J	60	15	ug/L			12/02/14 08:05	1

Client: Merit Laboratories
Project/Site: 63688

TestAmerica Job ID: 240-44742-1

Client Sample ID: 63688.06
Date Collected: 11/19/14 00:00
Date Received: 11/22/14 10:15

Lab Sample ID: 240-44742-6
Matrix: Water

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Halogens, Total Organic	60	U	60	15	ug/L			12/02/14 08:05	1

Client: Merit Laboratories
Project/Site: 63688

TestAmerica Job ID: 240-44742-1

Client Sample ID: 63688.07
Date Collected: 11/20/14 10:00
Date Received: 11/22/14 10:15

Lab Sample ID: 240-44742-7
Matrix: Water

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Halogens, Total Organic	190	J	300	77	ug/L			12/03/14 09:21	5

Method: 9020B - Organic Halides, Total (TOX)

Lab Sample ID: MB 280-255754/2
Matrix: Water
Analysis Batch: 255754

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Halogens, Total Organic	30	U	30	7.7	ug/L			12/02/14 08:05	1

Lab Sample ID: LCS 280-255754/4
Matrix: Water
Analysis Batch: 255754

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Halogens, Total Organic	100	93.0		ug/L		93	78 - 114

Lab Sample ID: LCSD 280-255754/5
Matrix: Water
Analysis Batch: 255754

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Halogens, Total Organic	100	96.2		ug/L		96	78 - 114	3	23

Lab Sample ID: 240-44742-4 MS
Matrix: Water
Analysis Batch: 255754

Client Sample ID: 63688.04
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Halogens, Total Organic	29	J	100	75.5	F1	ug/L		46	78 - 114

Lab Sample ID: 240-44742-4 MSD
Matrix: Water
Analysis Batch: 255754

Client Sample ID: 63688.04
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Halogens, Total Organic	29	J	100	124	F2	ug/L		95	78 - 114	49	23

Lab Sample ID: MB 280-255795/2
Matrix: Water
Analysis Batch: 255795

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Halogens, Total Organic	30	U	30	7.7	ug/L			12/03/14 09:21	1

Lab Sample ID: LCS 280-255795/4
Matrix: Water
Analysis Batch: 255795

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Halogens, Total Organic	100	93.5		ug/L		94	78 - 114

Lab Sample ID: LCSD 280-255795/5
Matrix: Water
Analysis Batch: 255795

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Halogens, Total Organic	100	94.9		ug/L		95	78 - 114	1	23

QC Association Summary

Client: Merit Laboratories
Project/Site: 63688

TestAmerica Job ID: 240-44742-1

General Chemistry

Analysis Batch: 255754

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-44742-1	63688.01	Total/NA	Water	9020B	
240-44742-2	63688.02	Total/NA	Water	9020B	
240-44742-3	63688.03	Total/NA	Water	9020B	
240-44742-4	63688.04	Total/NA	Water	9020B	
240-44742-4 MS	63688.04	Total/NA	Water	9020B	
240-44742-4 MSD	63688.04	Total/NA	Water	9020B	
240-44742-5	63688.05	Total/NA	Water	9020B	
240-44742-6	63688.06	Total/NA	Water	9020B	
LCS 280-255754/4	Lab Control Sample	Total/NA	Water	9020B	
LCSD 280-255754/5	Lab Control Sample Dup	Total/NA	Water	9020B	
MB 280-255754/2	Method Blank	Total/NA	Water	9020B	

Analysis Batch: 255795

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-44742-7	63688.07	Total/NA	Water	9020B	
LCS 280-255795/4	Lab Control Sample	Total/NA	Water	9020B	
LCSD 280-255795/5	Lab Control Sample Dup	Total/NA	Water	9020B	
MB 280-255795/2	Method Blank	Total/NA	Water	9020B	

Lab Chronicle

Client: Merit Laboratories
Project/Site: 63688

TestAmerica Job ID: 240-44742-1

Client Sample ID: 63688.01 — Lab Sample ID: 240-44742-1

Date Collected: 11/18/14 15:30 — **Matrix: Water**
Date Received: 11/22/14 10:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9020B		1	255754	12/02/14 08:05	ELJ	TAL DEN

Client Sample ID: 63688.02 — Lab Sample ID: 240-44742-2

Date Collected: 11/19/14 09:50 — **Matrix: Water**
Date Received: 11/22/14 10:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9020B		1	255754	12/02/14 08:05	ELJ	TAL DEN

Client Sample ID: 63688.03 — Lab Sample ID: 240-44742-3

Date Collected: 11/19/14 11:40 — **Matrix: Water**
Date Received: 11/22/14 10:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9020B		1	255754	12/02/14 08:05	ELJ	TAL DEN

Client Sample ID: 63688.04 — Lab Sample ID: 240-44742-4

Date Collected: 11/19/14 13:10 — **Matrix: Water**
Date Received: 11/22/14 10:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9020B		1	255754	12/02/14 08:05	ELJ	TAL DEN

Client Sample ID: 63688.05 — Lab Sample ID: 240-44742-5

Date Collected: 11/19/14 14:40 — **Matrix: Water**
Date Received: 11/22/14 10:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9020B		1	255754	12/02/14 08:05	ELJ	TAL DEN

Client Sample ID: 63688.06 — Lab Sample ID: 240-44742-6

Date Collected: 11/19/14 00:00 — **Matrix: Water**
Date Received: 11/22/14 10:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9020B		1	255754	12/02/14 08:05	ELJ	TAL DEN

Lab Chronicle

Client: Merit Laboratories
Project/Site: 63688

TestAmerica Job ID: 240-44742-1

Client Sample ID: 63688.07
Date Collected: 11/20/14 10:00
Date Received: 11/22/14 10:15

Lab Sample ID: 240-44742-7
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9020B		5	255795	12/03/14 09:21	ELJ	TAL DEN

Laboratory References:

TAL DEN = TestAmerica Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100

Certification Summary

Client: Merit Laboratories
Project/Site: 63688

TestAmerica Job ID: 240-44742-1

Laboratory: TestAmerica Canton

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
California	NELAP	9	01144CA	06-30-14 *
California	State Program	9	2927	04-30-15
Connecticut	State Program	1	PH-0590	12-31-14
Florida	NELAP	4	E87225	06-30-15
Georgia	State Program	4	N/A	06-30-15
Illinois	NELAP	5	200004	07-31-15
Kansas	NELAP	7	E-10336	01-31-15
Kentucky (UST)	State Program	4	58	06-30-15
L-A-B	DoD ELAP		L2315	07-18-16
Minnesota	NELAP	5	039-999-348	12-31-14
Nevada	State Program	9	OH-000482008A	07-31-15
New Jersey	NELAP	2	OH001	06-30-15
New York	NELAP	2	10975	03-31-15
Ohio VAP	State Program	5	CL0024	10-31-15
Pennsylvania	NELAP	3	68-00340	08-31-15
Texas	NELAP	6		08-31-15
USDA	Federal		P330-13-00319	11-26-16
Virginia	NELAP	3	460175	09-14-15
Washington	State Program	10	C971	01-12-15
West Virginia DEP	State Program	3	210	12-31-14
Wisconsin	State Program	5	999518190	08-31-15

Laboratory: TestAmerica Denver

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	DoD ELAP		2907.01	10-31-15
A2LA	ISO/IEC 17025		2907.01	10-31-15
Alabama	State Program	4	40730	09-30-12 *
Alaska (UST)	State Program	10	UST-30	04-05-15
Arizona	State Program	9	AZ0713	12-19-14 *
Arkansas DEQ	State Program	6	88-0687	06-01-15
California	State Program	9	2513	08-31-16
Connecticut	State Program	1	PH-0686	09-30-16
Florida	NELAP	4	E87667	06-30-15
Georgia	State Program	4	N/A	01-09-15
Illinois	NELAP	5	200017	04-30-15
Iowa	State Program	7	370	12-01-14 *
Kansas	NELAP	7	E-10166	04-30-15
Louisiana	NELAP	6	02096	06-30-15
Maine	State Program	1	CO0002	03-03-15
Minnesota	NELAP	5	8-999-405	12-31-14
Nevada	State Program	9	CO0026	07-31-15
New Hampshire	NELAP	1	205310	04-28-15
New Jersey	NELAP	2	CO004	06-30-15
New Mexico	State Program	6	CO00026	01-09-15
New York	NELAP	2	11964	03-31-15
North Carolina (WW/SW)	State Program	4	358	12-31-14
North Dakota	State Program	8	R-034	01-09-15 *
Oklahoma	State Program	6	8614	08-31-15

* Certification renewal pending - certification considered valid.

Certification Summary

Client: Merit Laboratories
Project/Site: 63688

TestAmerica Job ID: 240-44742-1

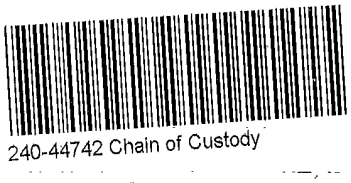
Laboratory: TestAmerica Denver (Continued)

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Oregon	NELAP	10	4025	01-09-15
Pennsylvania	NELAP	3	68-00664	07-30-15
South Carolina	State Program	4	72002001	06-30-15
Texas	NELAP	6	T104704183-13-8	09-30-15
USDA	Federal		P330-13-00202	07-02-16
Utah	NELAP	8	CO00026	07-31-15
Virginia	NELAP	3	460232	06-14-15
Washington	State Program	10	C583	08-03-15
West Virginia DEP	State Program	3	354	11-30-15
Wisconsin	State Program	5	999615430	08-31-15
Wyoming (UST)	A2LA	8	2907.01	10-31-15

TestAmerica Laboratories, Inc.

CHAIN OF CUSTODY AND RECEIVING DOCUMENTS



Merit Laboratories, Inc.

2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

1.0

C.O.C. PAGE # 1 OF 1

87541

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Kevin George
COMPANY: Merit Labs
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: FAX NO.: P.O. NO.:
E-MAIL ADDRESS: kgeorge@meritlabs.com QUOTE NO.:

INVOICE TO

CONTACT NAME: Julie Teague ☒ SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS:

PROJECT NO./NAME: 863688
SAMPLER(S) - PLEASE PRINT/SIGN NAME:

TURNAROUND TIME REQUIRED ☐ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☒ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☒ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☐ Other

Special Instructions

MERIT LAB NO. FOR LAB USE ONLY	2014 DATE	TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	TOX
	11/18	1530	63688.01	GW	1				1				X
	11/19	0950	63688.02										
		1140	63688.03										
		1310	63688.04										
		1440	63688.05										
		—	63688.06										
	11/20	1000	63688.07										

Michigan
190

*Sub'd to TestAmerica

RELINQUISHED BY: SIGNATURE/ORGANIZATION	Kevin George	☐ Sampler	DATE 11/21/14	TIME 1050
RECEIVED BY: SIGNATURE/ORGANIZATION	Merit		DATE 11-21-14	TIME 1050
RELINQUISHED BY: SIGNATURE/ORGANIZATION	Merit		DATE 11-21-14	TIME 1155
RECEIVED BY: SIGNATURE/ORGANIZATION	Teri Hauli		DATE 11/21/14	TIME 1155

RELINQUISHED BY: SIGNATURE/ORGANIZATION	Teri Hauli		DATE 11/21/14	TIME 1234
RECEIVED BY: SIGNATURE/ORGANIZATION	Dakota Turner		DATE 11-22-14	TIME 10:15

SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS	NOTES: TEMP. ON ARRIVAL
SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS	

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

TestAmerica Canton Sample Receipt Form/Narrative Login # : 44742
Canton Facility

Client Merit Labs Site Name
Cooler Received on 11-22-14 Opened on 11-24-14
Cooler unpacked by: Dakota Luerra
FedEx: 1st Grd Exp UPS FAS Stetson Client Drop Off TestAmerica Courier Other

Receipt After-hours: Drop-off Date/Time Storage Location

TestAmerica Cooler # Foam Box Client Cooler Box Other
Packing material used: Bubble Wrap Foam Plastic Bag None Other
COOLANT: Wet Ice Blue Ice Dry Ice Water None

1. Cooler temperature upon receipt
   IR GUN# A (CF +4.0 °C) Observed Cooler Temp. °C Corrected Cooler Temp. °C
   IR GUN# 4 (CF +1.2 °C) Observed Cooler Temp. °C Corrected Cooler Temp. °C
   IR GUN# 5 (CF +0.4 °C) Observed Cooler Temp. 1.6 °C Corrected Cooler Temp. 2.0 °C
   IR GUN# 8 (CF +0.7 °C) Observed Cooler Temp. °C Corrected Cooler Temp. °C
   ☐ See Multiple Cooler Form
2. Were custody seals on the outside of the cooler(s)? If Yes Quantity 1 Yes No
   -Were custody seals on the outside of the cooler(s) signed & dated? Yes No NA
   -Were custody seals on the bottle(s)? Yes No
3. Shippers' packing slip attached to the cooler(s)? Yes No
4. Did custody papers accompany the sample(s)? Yes No
5. Were the custody papers relinquished & signed in the appropriate place? Yes No
6. Did all bottles arrive in good condition (Unbroken)? Yes No
7. Could all bottle labels be reconciled with the COC? Yes No
8. Were correct bottle(s) used for the test(s) indicated? Yes No
9. Sufficient quantity received to perform indicated analyses? Yes No
10. Were sample(s) at the correct pH upon receipt? Yes No NA pH Strip Lot# HC425511
11. Were VOAs on the COC? Yes No
12. Were air bubbles >6 mm in any VOA vials? Yes No NA
13. Was a trip blank present in the cooler(s)? Yes No

Contacted PM Date by via Verbal Voice Mail Other
Concerning

14. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES

Samples processed by: Jessie Boner

15. SAMPLE CONDITION

Sample(s) were received after the recommended holding time had expired.
Sample(s) were received in a broken container.
Sample(s) were received with bubble >6 mm in diameter. (Notify PM)

16. SAMPLE PRESERVATION

Sample(s) were further preserved in the laboratory.
Time preserved: Preservative(s) added/Lot number(s):

Login Container Summary Report

Temperature readings: _____

Client Sample ID	Lab ID	Container Type	Container pH	Preservative Added (mls)	Lot #
63688.01	240-44742-A-1	Amber Glass 1 liter - Sulfuric Acid	<2	_____	_____
63688.02	240-44742-A-2	Amber Glass 1 liter - Sulfuric Acid	<2	_____	_____
63688.03	240-44742-A-3	Amber Glass 1 liter - Sulfuric Acid	<2	_____	_____
63688.04	240-44742-A-4	Amber Glass 1 liter - Sulfuric Acid	<2	_____	_____
63688.05	240-44742-A-5	Amber Glass 1 liter - Sulfuric Acid	<2	_____	_____
63688.06	240-44742-A-6	Amber Glass 1 liter - Sulfuric Acid	<2	_____	_____
63688.07	240-44742-A-7	Amber Glass 1 liter - Sulfuric Acid	<2	_____	_____

Login Sample Receipt Checklist

Client: Merit Laboratories

Job Number: 240-44742-1

Login Number: 44742
List Number: 2
Creator: Conquest, Tyler W

List Source: TestAmerica Denver
List Creation: 11/25/14 02:33 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

APPENDIX D

Groundwater Sampling Program QA/QC Summary

APPENDIX D
QUALITY ASSURANCE/QUALITY CONTROL SUMMARY

Data verification was independently performed by O'Brien & Gere Engineers, Inc. to assess the groundwater monitoring data quality for samples collected during the 2014 annual groundwater sampling event conducted in November 2014. Data verification was utilized to confirm the quality of the field and laboratory (Merit Laboratories, Inc. (Merit) of East Lansing, Michigan) data. The data verification included review of: (1) laboratory documentation, (2) chain-of-custody (COC) documentation, (3) target analyte results, (4) laboratory data qualifiers, if any, (5) laboratory reporting (quantitation) limits, (6) laboratory blank analysis, and (7) quality control samples, including: duplicate samples.

The results of the data verification indicated the following:

- Laboratory documentation was complete.
- Chain-of-custody (COC) documentation was complete.
- Target analyte results were reported in accordance with the project requirements.
- Laboratory blank analysis did not indicate evidence of artifacts from the sampling or analytical process (above reporting limit [RL]).
- Laboratory quantitation (or reporting) limits (RLs) were within the project required limits for undiluted samples.
- No elevated RLs were reported due to matrix interference or sample dilution.
- Breakthrough exceeded 10% for the following TOX samples: B-19Ar. Re-analysis was performed in accordance with United States Environmental Protection Agency (USEPA) Method 9020B with concurring results. Furthermore, the method blank results were non-detects and laboratory control sample (LCS) results were within percent recover limits (between 60 and 140 percent); therefore, the data was reported in accordance with USEPA Method 9020B.
- The relative percent difference (RPD) for the duplicate sample results for B-18A and Dup-2 (B-18A) were within acceptable limits, except for TOX, which was detected at 16 µg/L in the original sample, but was not detected (<60 µg/L) in the duplicate sample.

Furthermore, the instrument utilized for measurement of field parameters calibrated within range (deviation from standard of less than 3 percent) for pH, oxidation reduction potential (ORP), specific conductivity (conductivity) and dissolved oxygen (DO); therefore, operated within manufacturers specifications during sample collection.

The data verification indicates that the overall usability of the groundwater monitoring data is acceptable for the intended use without further qualification or rejection of the data. With the exception of the qualification the results for TOX in B-18A as estimated (J) due to the exceedance of acceptable limits for the RPD in the sample and duplicate sample for B-18A.

APPENDIX E

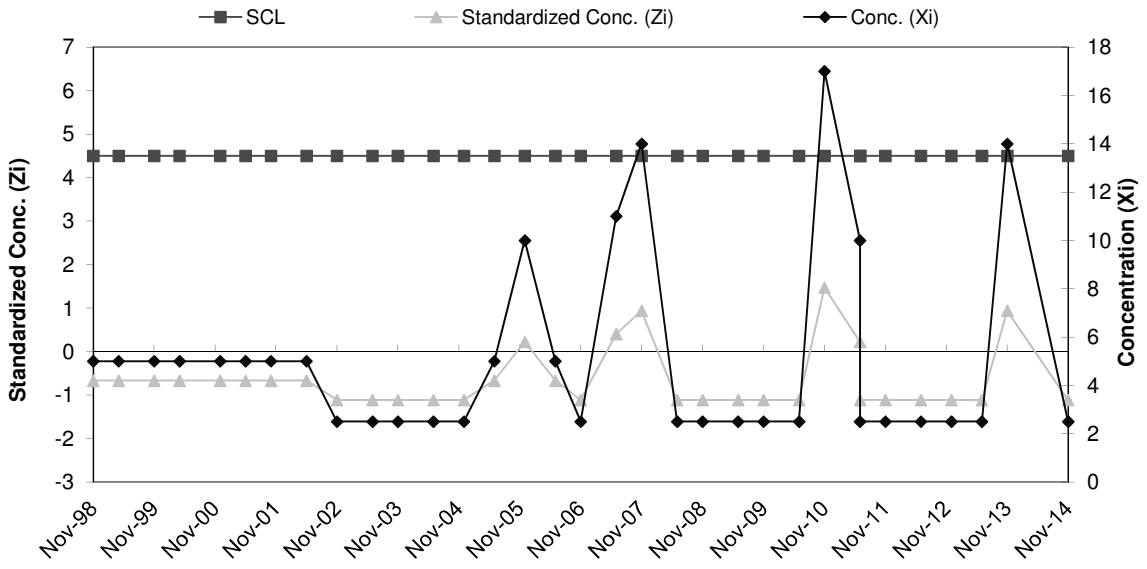
Monitoring Well Control Charts

COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-7 Cr

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Jun-95	10	**8.75**	**5.60**
2	Aug-95	10		
3	Feb-96	10		
4	Jun-96	10		
5	Aug-96	10		
6	Nov-96	10		
7	May-97	5		
8	May-98	5		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)	Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	Nov-98	4.5	5	-0.67	36	Nov-11	4.5	2.5	-1.12
10	Apr-99	4.5	5	-0.67	37	Jun-12	4.5	2.5	-1.12
11	Nov-99	4.5	5	-0.67	38	Dec-12	4.5	2.5	-1.12
12	Apr-00	4.5	5	-0.67	39	Jun-13	4.5	2.5	-1.12
13	Dec-00	4.5	5	-0.67	40	Nov-13	4.5	14	0.94
14	May-01	4.5	5	-0.67	41	Nov-14	4.5	2.5	-1.12
15	Oct-01	4.5	5	-0.67					
16	May-02	4.5	5	-0.67					
17	Nov-02	4.5	2.5	-1.12					
18	Jun-03	4.5	2.5	-1.12					
19	Nov-03	4.5	2.5	-1.12					
20	Jun-04	4.5	2.5	-1.12					
21	Dec-04	4.5	2.5	-1.12					
22	Jun-05	4.5	5	-0.67					
23	Dec-05	4.5	10	0.22					
24	Jun-06	4.5	5	-0.67					
25	Nov-06	4.5	2.5	-1.12					
26	Jun-07	4.5	11	0.40					
27	Nov-07	4.5	14	0.94					
28	Jun-08	4.5	2.5	-1.12					
29	Nov-08	4.5	2.5	-1.12					
30	Jun-09	4.5	2.5	-1.12					
31	Nov-09	4.5	2.5	-1.12					
32	Jun-10	4.5	2.5	-1.12					
33	Nov-10	4.5	17	1.47					
34	Jun-11	4.5	10	0.22					
35	Jun-11	4.5	2.5	-1.12					

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

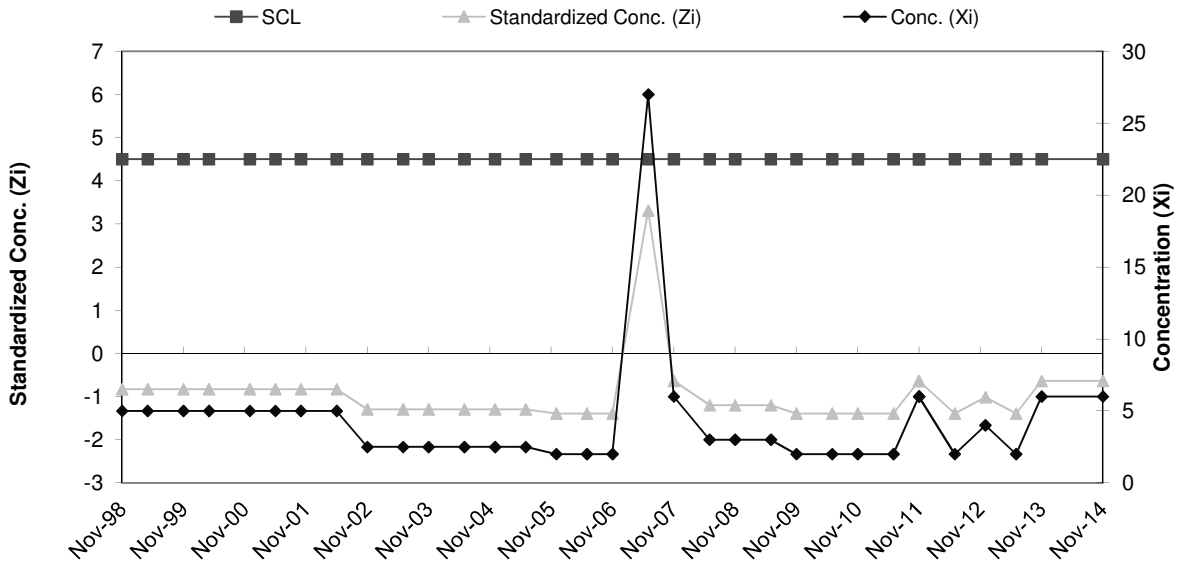


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-7 Cu

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Jun-95	10	**9.40**	**5.32**
2	Aug-95	10		
3	Feb-96	10		
4	Jun-96	10		
5	Aug-96	10		
6	Nov-96	10		
7	May-97	10		
8	May-98	5		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)	Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	Nov-98	4.5	5	-0.83	35	Nov-11	4.5	6	-0.64
10	Apr-99	4.5	5	-0.83	36	Jun-12	4.5	2	-1.39
11	Nov-99	4.5	5	-0.83	37	Dec-12	4.5	4	-1.02
12	Apr-00	4.5	5	-0.83	38	Jun-13	4.5	2	-1.39
13	Dec-00	4.5	5	-0.83	39	Nov-13	4.5	6	-0.64
14	May-01	4.5	5	-0.83	40	Nov-14	4.5	6	-0.64
15	Oct-01	4.5	5	-0.83					
16	May-02	4.5	5	-0.83					
17	Nov-02	4.5	2.5	-1.30					
18	Jun-03	4.5	2.5	-1.30					
19	Nov-03	4.5	2.5	-1.30					
20	Jun-04	4.5	2.5	-1.30					
21	Dec-04	4.5	2.5	-1.30					
22	Jun-05	4.5	2.5	-1.30					
23	Dec-05	4.5	2	-1.39					
24	Jun-06	4.5	2	-1.39					
25	Nov-06	4.5	2	-1.39					
26	Jun-07	4.5	27	3.31					
27	Nov-07	4.5	6	-0.64					
28	Jun-08	4.5	3	-1.20					
29	Nov-08	4.5	3	-1.20					
30	Jun-09	4.5	3	-1.20					
31	Nov-09	4.5	2	-1.39					
32	Jun-10	4.5	2	-1.39					
33	Nov-10	4.5	2	-1.39					
34	Jun-11	4.5	2	-1.39					
35	Nov-11	4.5	6	-0.64					

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

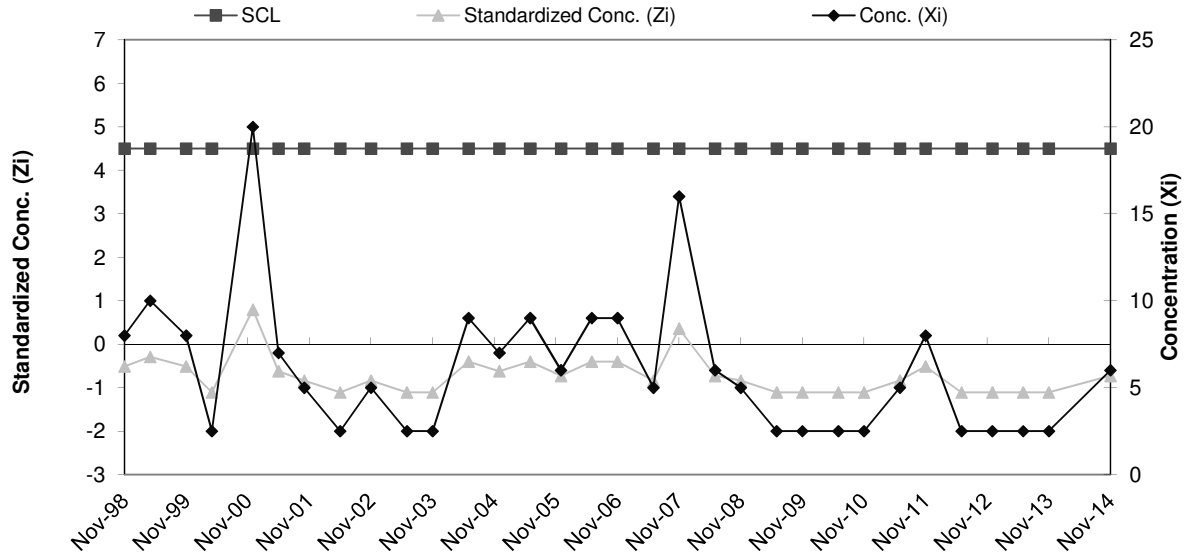


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-7 Ni

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Jun-95	15		
2	Aug-95	20		
3	Feb-96	20		
4	Jun-96	10	**12.70**	**9.19**
5	Aug-96	10		
6	Nov-96	20		
7	May-97	14		
8	May-98	2.5		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)	Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	Nov-98	4.5	8	-0.51	35	Nov-11	4.5	8	-0.51
10	Apr-99	4.5	10	-0.29	36	Jun-12	4.5	2.5	-1.11
11	Nov-99	4.5	8	-0.51	37	Dec-12	4.5	2.5	-1.11
12	Apr-00	4.5	2.5	-1.11	38	Jun-13	4.5	2.5	-1.11
13	Dec-00	4.5	20	0.79	39	Nov-13	4.5	2.5	-1.11
14	May-01	4.5	7	-0.62	40	Nov-14	4.5	6	-0.73
15	Oct-01	4.5	5	-0.84					
16	May-02	4.5	2.5	-1.11					
17	Nov-02	4.5	5	-0.84					
18	Jun-03	4.5	2.5	-1.11					
19	Nov-03	4.5	2.5	-1.11					
20	Jun-04	4.5	9	-0.40					
21	Dec-04	4.5	7	-0.62					
22	Jun-05	4.5	9	-0.40					
23	Dec-05	4.5	6	-0.73					
24	Jun-06	4.5	9	-0.40					
25	Nov-06	4.5	9	-0.40					
26	Jun-07	4.5	5	-0.84					
27	Nov-07	4.5	16	0.36					
28	Jun-08	4.5	6	-0.73					
29	Nov-08	4.5	5	-0.84					
30	Jun-09	4.5	2.5	-1.11					
31	Nov-09	4.5	2.5	-1.11					
32	Jun-10	4.5	2.5	-1.11					
33	Nov-10	4.5	2.5	-1.11					
34	Jun-11	4.5	5	-0.84					

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

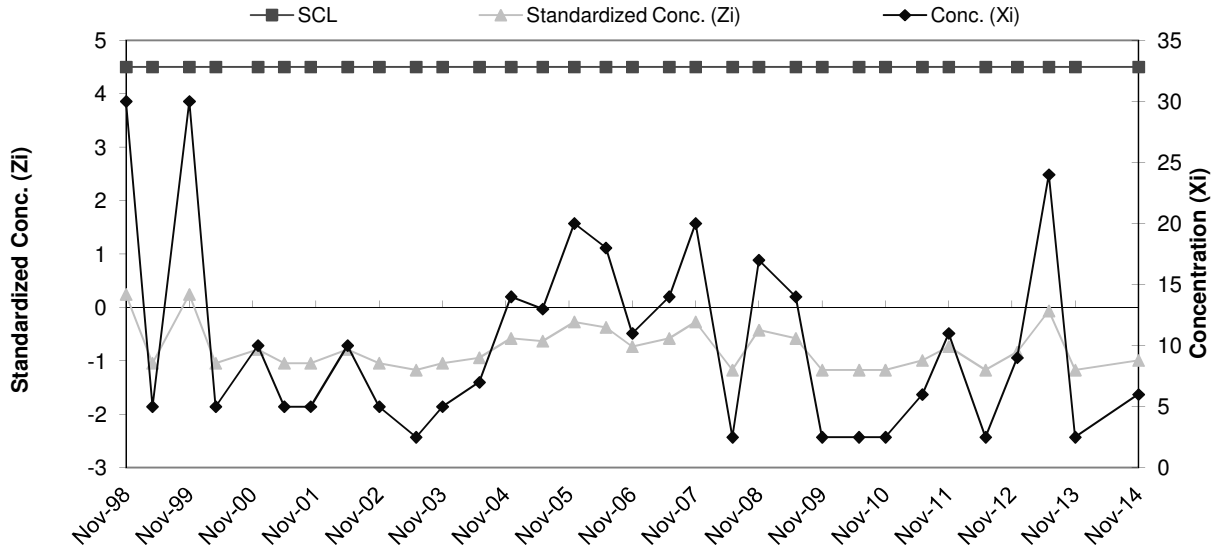


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-7 Zn

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Jun-95	10		
2	Aug-95	10		
3	Feb-96	22		
4	Jun-96	20	**25.25**	**19.40**
5	Aug-96	60		
6	Nov-96	50		
7	May-97	10		
8	May-98	20		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)	Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	Nov-98	4.5	30	0.24	35	Nov-11	4.5	11	-0.73
10	Apr-99	4.5	5	-1.04	36	Jun-12	4.5	2.5	-1.17
11	Nov-99	4.5	30	0.24	37	Dec-12	4.5	9	-0.84
12	Apr-00	4.5	5	-1.04	38	Jun-13	4.5	24	-0.06
13	Dec-00	4.5	10	-0.79	39	Nov-13	4.5	2.5	-1.17
14	May-01	4.5	5	-1.04	40	Nov-14	4.5	6	-0.99
15	Oct-01	4.5	5	-1.04			4.5		
16	May-02	4.5	10	-0.79					
17	Nov-02	4.5	5	-1.04					
18	Jun-03	4.5	2.5	-1.17					
19	Nov-03	4.5	5	-1.04					
20	Jun-04	4.5	7	-0.94					
21	Dec-04	4.5	14	-0.58					
22	Jun-05	4.5	13	-0.63					
23	Dec-05	4.5	20	-0.27					
24	Jun-06	4.5	18	-0.37					
25	Nov-06	4.5	11	-0.73					
26	Jun-07	4.5	14	-0.58					
27	Nov-07	4.5	20	-0.27					
28	Jun-08	4.5	2.5	-1.17					
29	Nov-08	4.5	17	-0.43					
30	Jun-09	4.5	14	-0.58					
31	Nov-09	4.5	2.5	-1.17					
32	Jun-10	4.5	2.5	-1.17					
33	Nov-10	4.5	2.5	-1.17					
34	Jun-11	4.5	6	-0.99					

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

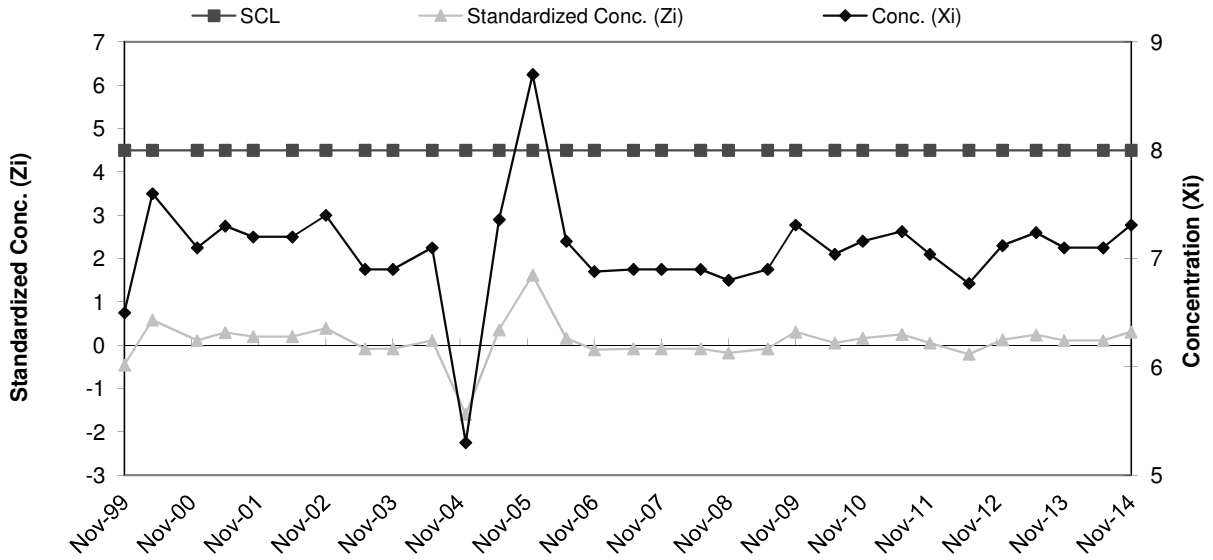


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-7 pH

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Jun-95	7.5	6.99	1.06
2	Jun-96	6.9		
3	Aug-96	7.6		
4	Nov-96	8.0		
5	May-97	7.2		
6	May-98	6.6		
7	Nov-98	4.6		
8	Apr-99	7.5		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)	Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	Nov-99	4.5	6.5	-0.46	33	Nov-11	4.5	7.0	0.05
10	Apr-00	4.5	7.6	0.58	34	Jun-12	4.5	6.8	-0.21
11	Dec-00	4.5	7.1	0.11	35	Dec-12	4.5	7.1	0.13
12	May-01	4.5	7.3	0.30	36	Jun-13	4.5	7.2	0.24
13	Oct-01	4.5	7.2	0.20	37	Nov-13	4.5	7.1	0.11
14	May-02	4.5	7.2	0.20	38	Jun-14	4.5	7.1	0.11
15	Nov-02	4.5	7.4	0.39	39	Nov-14	4.5	7.3	0.30
16	Jun-03	4.5	6.9	-0.08					
17	Nov-03	4.5	6.9	-0.08					
18	Jun-04	4.5	7.1	0.11					
19	Dec-04	4.5	5.3	-1.60					
20	Jun-05	4.5	7.4	0.35					
21	Dec-05	4.5	8.7	1.62					
22	Jun-06	4.5	7.2	0.16					
23	Nov-06	4.5	6.9	-0.10					
24	Jun-07	4.5	6.9	-0.08					
25	Nov-07	4.5	6.9	-0.08					
26	Jun-08	4.5	6.9	-0.08					
27	Nov-08	4.5	6.8	-0.18					
28	Jun-09	4.5	6.9	-0.08					
29	Nov-09	4.5	7.3	0.30					
30	Jun-10	4.5	7.0	0.05					
31	Nov-10	4.5	7.2	0.16					
32	Jun-11	4.5	7.3	0.25					

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

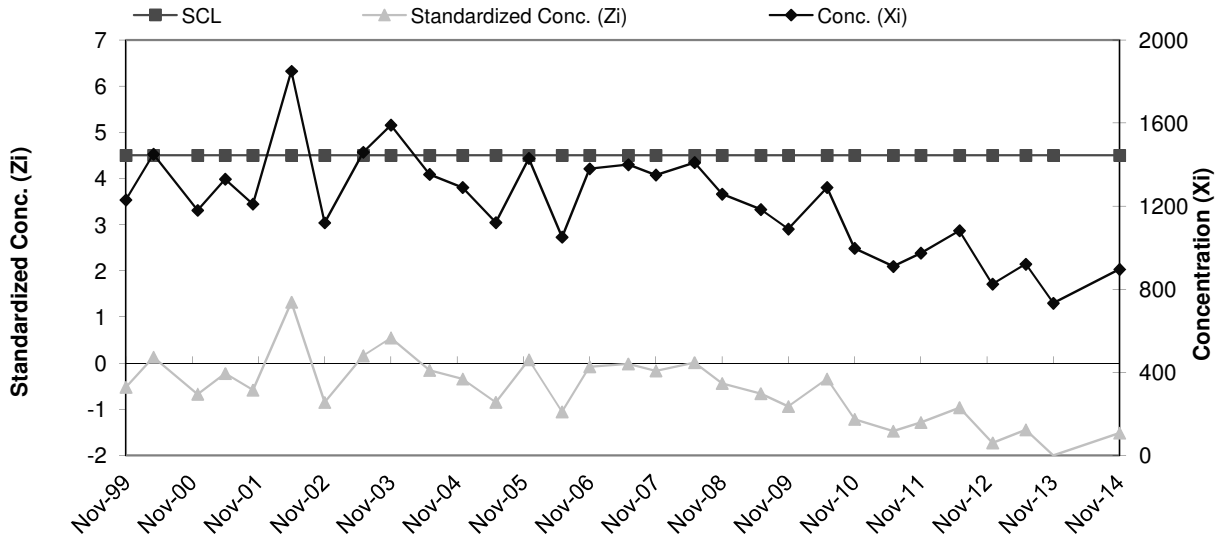


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-7 SpC

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Jun-95	1509.0		
2	Jun-96	1508.0		
3	Aug-96	1567.0		
4	Nov-96	1960.0	**1,405.88**	**336.33**
5	May-97	780.0		
6	May-98	1270.0		
7	Nov-98	1240.0		
8	Apr-99	1413.0		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)	Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	Nov-99	4.5	1230.0	-0.52	33	Nov-11	4.5	974.0	-1.28
10	Apr-00	4.5	1450.0	0.13	34	Jun-12	4.5	1082.0	-0.96
11	Dec-00	4.5	1180.0	-0.67	35	Dec-12	4.5	825.0	-1.73
12	May-01	4.5	1330.0	-0.23	36	Jun-13	4.5	921.0	-1.44
13	Oct-01	4.5	1210.0	-0.58	37	Nov-13	4.5	733.0	-2.00
14	May-02	4.5	1850.0	1.32	38	Nov-14	4.5	896.0	-1.52
15	Nov-02	4.5	1120.0	-0.85			4.5		
16	Jun-03	4.5	1460.0	0.16					
17	Nov-03	4.5	1590.0	0.55					
18	Jun-04	4.5	1353.0	-0.16					
19	Dec-04	4.5	1290.0	-0.34					
20	Jun-05	4.5	1121.0	-0.85					
21	Dec-05	4.5	1430.0	0.07					
22	Jun-06	4.5	1051.0	-1.06					
23	Nov-06	4.5	1380.0	-0.08					
24	Jun-07	4.5	1400.0	-0.02					
25	Nov-07	4.5	1350.0	-0.17					
26	Jun-08	4.5	1410.0	0.01					
27	Nov-08	4.5	1258.0	-0.44					
28	Jun-09	4.5	1184.0	-0.66					
29	Nov-09	4.5	1090.0	-0.94					
30	Jun-10	4.5	1290.0	-0.34					
31	Nov-10	4.5	997.0	-1.22					
32	Jun-11	4.5	910.0	-1.47					

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

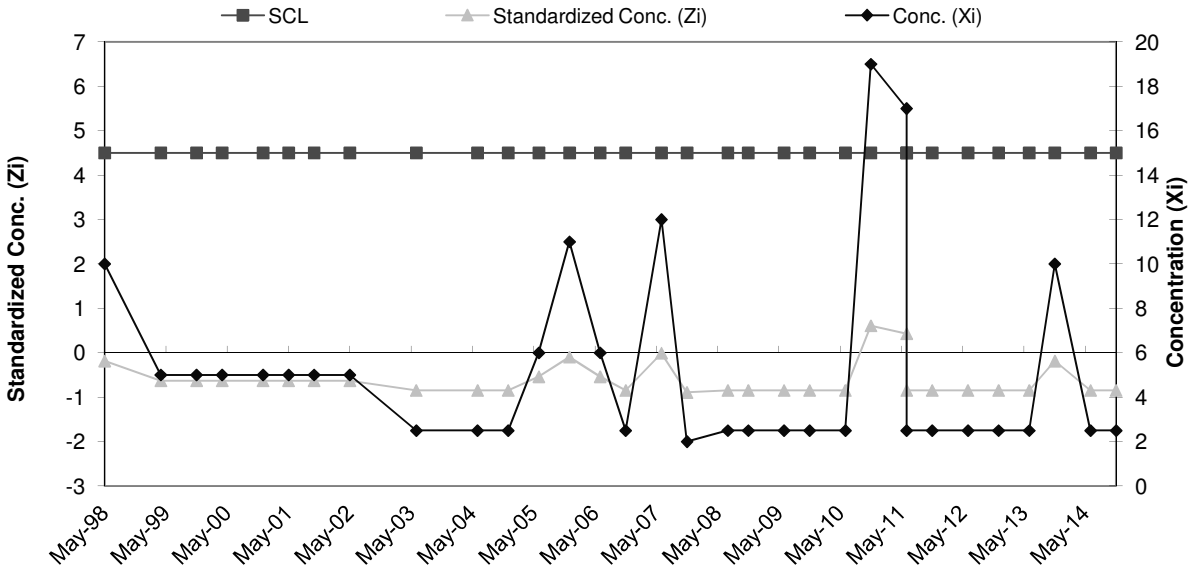


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-9 Cr

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Jun-95	10		
2	Aug-95	37		
3	Feb-96	10		
4	Jun-96	10	**12.12**	**11.34**
5	Aug-96	10		
6	Nov-96	10		
7	May-97	5		
8	Nov-97	5		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)	Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	May-98	4.5	10	-0.19	34	Nov-11	4.5	2.5	-0.85
10	Apr-99	4.5	5	-0.63	35	Jun-12	4.5	2.5	-0.85
11	Nov-99	4.5	5	-0.63	36	Dec-12	4.5	2.5	-0.85
12	Apr-00	4.5	5	-0.63	37	Jun-13	4.5	2.5	-0.85
13	Dec-00	4.5	5	-0.63	38	Nov-13	4.5	10	-0.19
14	May-01	4.5	5	-0.63	39	Jun-14	4.5	2.5	-0.85
15	Oct-01	4.5	5	-0.63	40	Nov-14	4.5	2.5	-0.85
16	May-02	4.5	5	-0.63					
17	Jun-03	4.5	2.5	-0.85					
18	Jun-04	4.5	2.5	-0.85					
19	Dec-04	4.5	2.5	-0.85					
20	Jun-05	4.5	6	-0.54					
21	Dec-05	4.5	11	-0.10					
22	Jun-06	4.5	6	-0.54					
23	Nov-06	4.5	2.5	-0.85					
24	Jun-07	4.5	12	-0.01					
25	Nov-07	4.5	2	-0.89					
26	Jul-08	4.5	2.5	-0.85					
27	Nov-08	4.5	2.5	-0.85					
28	Jun-09	4.5	2.5	-0.85					
29	Nov-09	4.5	2.5	-0.85					
30	Jun-10	4.5	2.5	-0.85					
31	Nov-10	4.5	19	0.61					
32	Jun-11	4.5	17	0.43					
33	Jun-11	4.5	2.5	-0.85					

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

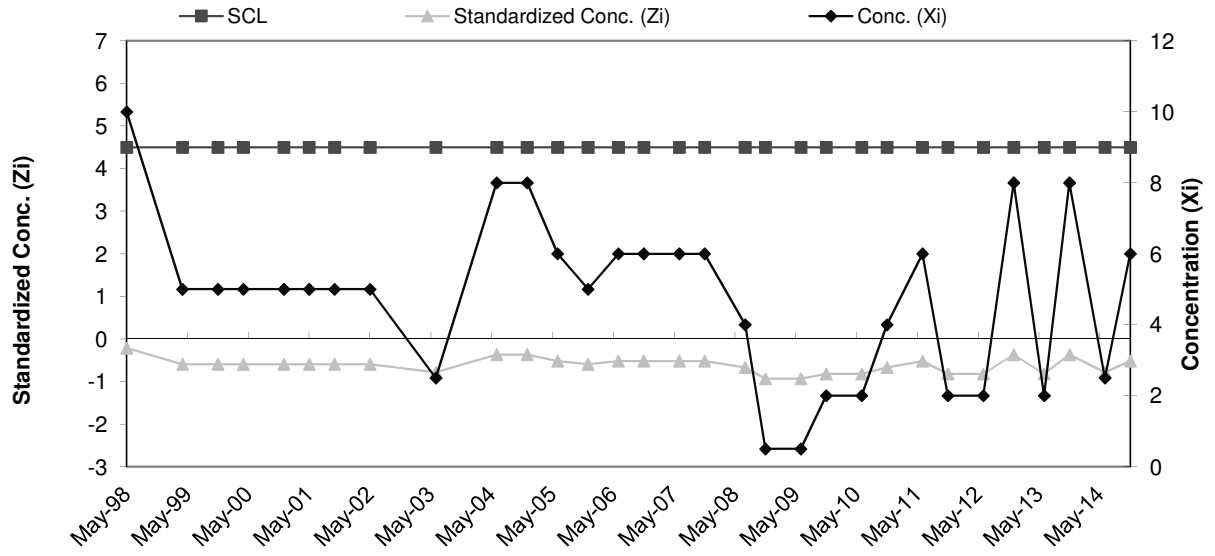


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-9 Cu

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Jun-95	10	**12.87**	**13.26**
2	Aug-95	43		
3	Feb-96	10		
4	Jun-96	10		
5	Aug-96	10		
6	Nov-96	10		
7	May-97	5		
8	Nov-97	5		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)	Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	May-98	4.5	10	-0.22	33	Nov-11	4.5	2	-0.82
10	Apr-99	4.5	5	-0.59	34	Jun-12	4.5	2	-0.82
11	Nov-99	4.5	5	-0.59	35	Dec-12	4.5	8	-0.37
12	Apr-00	4.5	5	-0.59	36	Jun-13	4.5	2	-0.82
13	Dec-00	4.5	5	-0.59	37	Nov-13	4.5	8	-0.37
14	May-01	4.5	5	-0.59	38	Jun-14	4.5	2.5	-0.78
15	Oct-01	4.5	5	-0.59	39	Nov-14	4.5	6	-0.52
16	May-02	4.5	5	-0.59					
17	Jun-03	4.5	2.5	-0.78					
18	Jun-04	4.5	8	-0.37					
19	Dec-04	4.5	8	-0.37					
20	Jun-05	4.5	6	-0.52					
21	Dec-05	4.5	5	-0.59					
22	Jun-06	4.5	6	-0.52					
23	Nov-06	4.5	6	-0.52					
24	Jun-07	4.5	6	-0.52					
25	Nov-07	4.5	6	-0.52					
26	Jul-08	4.5	4	-0.67					
27	Nov-08	4.5	0.5	-0.93					
28	Jun-09	4.5	0.5	-0.93					
29	Nov-09	4.5	2	-0.82					
30	Jun-10	4.5	2	-0.82					
31	Nov-10	4.5	4	-0.67					
32	Jun-11	4.5	6	-0.52					

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

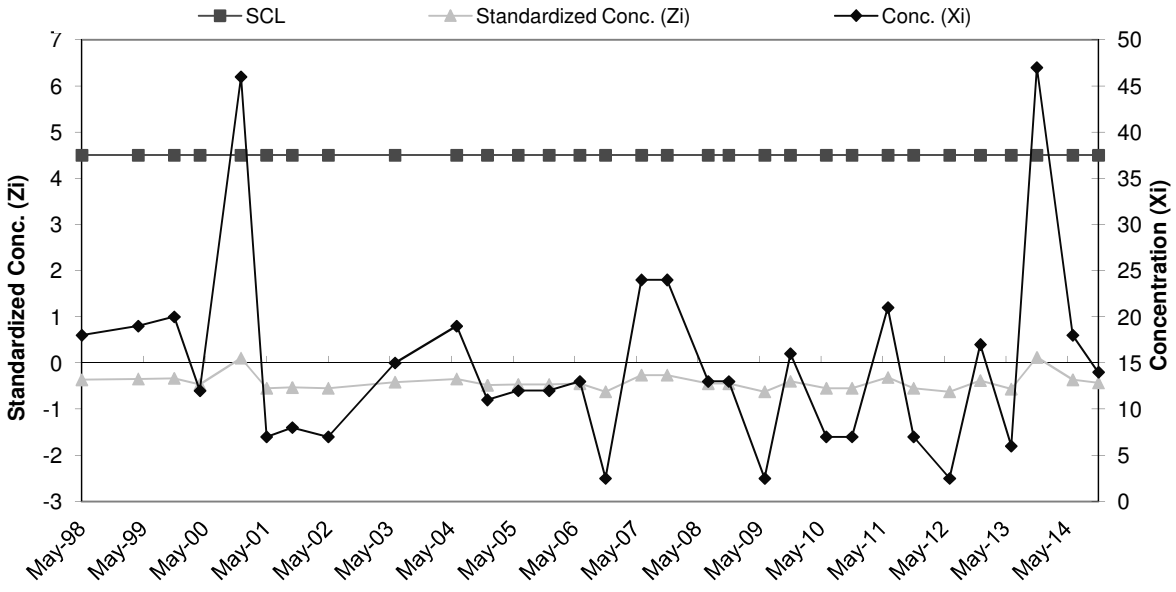


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-9 Ni

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Jun-95	15	**39.83**	**59.86**
2	Aug-95	20		
3	Feb-96	20		
4	Jun-96	10		
5	Aug-96	10		
6	Nov-96	10		
7	May-97	51		
8	Nov-97	183		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)	Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	May-98	4.5	18	-0.36	33	Nov-11	4.5	7	-0.55
10	Apr-99	4.5	19	-0.35	34	Jun-12	4.5	2.5	-0.62
11	Nov-99	4.5	20	-0.33	35	Dec-12	4.5	17	-0.38
12	Apr-00	4.5	12	-0.46	36	Jun-13	4.5	6	-0.57
13	Dec-00	4.5	46	0.10	37	Nov-13	4.5	47	0.12
14	May-01	4.5	7	-0.55	38	Jun-14	4.5	18	-0.36
15	Oct-01	4.5	8	-0.53	39	Nov-14	4.5	14	-0.43
16	May-02	4.5	7	-0.55					
17	Jun-03	4.5	15	-0.41					
18	Jun-04	4.5	19	-0.35					
19	Dec-04	4.5	11	-0.48					
20	Jun-05	4.5	12	-0.46					
21	Dec-05	4.5	12	-0.46					
22	Jun-06	4.5	13	-0.45					
23	Nov-06	4.5	2.5	-0.62					
24	Jun-07	4.5	24	-0.26					
25	Nov-07	4.5	24	-0.26					
26	Jul-08	4.5	13	-0.45					
27	Nov-08	4.5	13	-0.45					
28	Jun-09	4.5	2.5	-0.62					
29	Nov-09	4.5	16	-0.40					
30	Jun-10	4.5	7	-0.55					
31	Nov-10	4.5	7	-0.55					
32	Jun-11	4.5	21	-0.31					

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

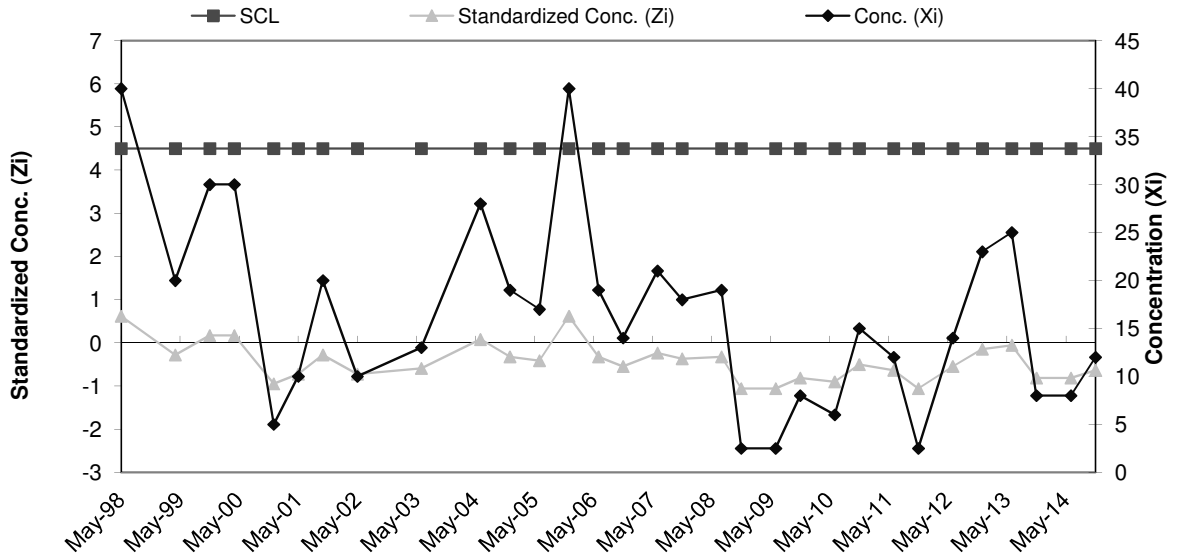


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-9 Zn

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Jun-95	10	**26.23**	**22.36**
2	Aug-95	10		
3	Feb-96	10		
4	Jun-96	10		
5	Aug-96	70		
6	Nov-96	40		
7	May-97	20		
8	Nov-97	40		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)	Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	May-98	4.5	40	0.62	33	Nov-11	4.5	2.5	-1.06
10	Apr-99	4.5	20	-0.28	34	Jun-12	4.5	14	-0.55
11	Nov-99	4.5	30	0.17	35	Dec-12	4.5	23	-0.14
12	Apr-00	4.5	30	0.17	36	Jun-13	4.5	25	-0.06
13	Dec-00	4.5	5	-0.95	37	Nov-13	4.5	8	-0.82
14	May-01	4.5	10	-0.73	38	Jun-14	4.5	8	-0.82
15	Oct-01	4.5	20	-0.28	39	Nov-14	4.5	12	-0.64
16	May-02	4.5	10	-0.73					
17	Jun-03	4.5	13	-0.59					
18	Jun-04	4.5	28	0.08					
19	Dec-04	4.5	19	-0.32					
20	Jun-05	4.5	17	-0.41					
21	Dec-05	4.5	40	0.62					
22	Jun-06	4.5	19	-0.32					
23	Nov-06	4.5	14	-0.55					
24	Jun-07	4.5	21	-0.23					
25	Nov-07	4.5	18	-0.37					
26	Jul-08	4.5	19	-0.32					
27	Nov-08	4.5	2.5	-1.06					
28	Jun-09	4.5	2.5	-1.06					
29	Nov-09	4.5	8	-0.82					
30	Jun-10	4.5	6	-0.90					
31	Nov-10	4.5	15	-0.50					
32	Jun-11	4.5	12	-0.64					

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

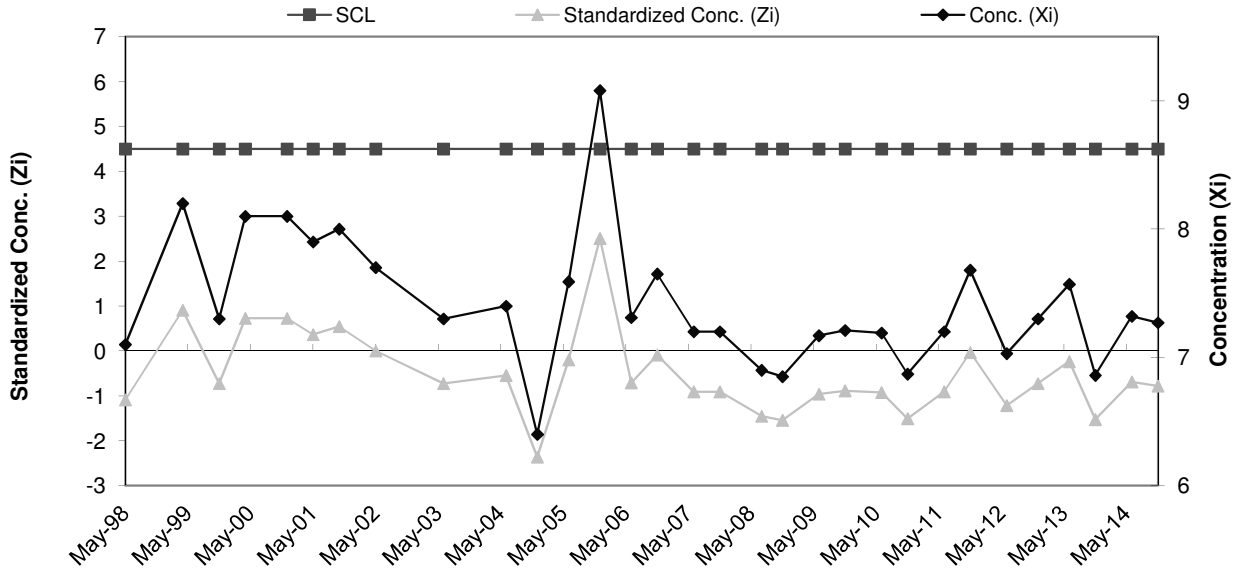


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-9 pH

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Jun-95	7.7	**7.20**	**0.55**
2	Aug-95	7.7		
3	Feb-96	7.3		
4	Jun-96	6.8		
5	Aug-96	8.0		
6	Nov-96	6.8		
7	May-97	6.8		
8	Nov-97	6.5		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)	Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	May-98	4.5	6.6	-1.09	33	Nov-11	4.5	7.2	-0.04
10	Apr-99	4.5	7.7	0.91	34	Jun-12	4.5	6.5	-1.22
11	Nov-99	4.5	6.8	-0.73	35	Dec-12	4.5	6.8	-0.73
12	Apr-00	4.5	7.6	0.73	36	Jun-13	4.5	7.1	-0.24
13	Dec-00	4.5	7.6	0.73	37	Nov-13	4.5	6.4	-1.53
14	May-01	4.5	7.4	0.36	38	Jun-14	4.5	6.8	-0.69
15	Oct-01	4.5	7.5	0.55	39	Nov-14	4.5	6.8	-0.78
16	May-02	4.5	7.2	0.00					
17	Jun-03	4.5	6.8	-0.73					
18	Jun-04	4.5	6.9	-0.55					
19	Dec-04	4.5	5.9	-2.36					
20	Jun-05	4.5	7.1	-0.20					
21	Dec-05	4.5	8.6	2.51					
22	Jun-06	4.5	6.8	-0.71					
23	Nov-06	4.5	7.2	-0.09					
24	Jun-07	4.5	6.7	-0.91					
25	Nov-07	4.5	6.7	-0.91					
26	Jul-08	4.5	6.4	-1.45					
27	Nov-08	4.5	6.4	-1.54					
28	Jun-09	4.5	6.7	-0.96					
29	Nov-09	4.5	6.7	-0.89					
30	Jun-10	4.5	6.7	-0.93					
31	Nov-10	4.5	6.4	-1.51					
32	Jun-11	4.5	6.7	-0.91					

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

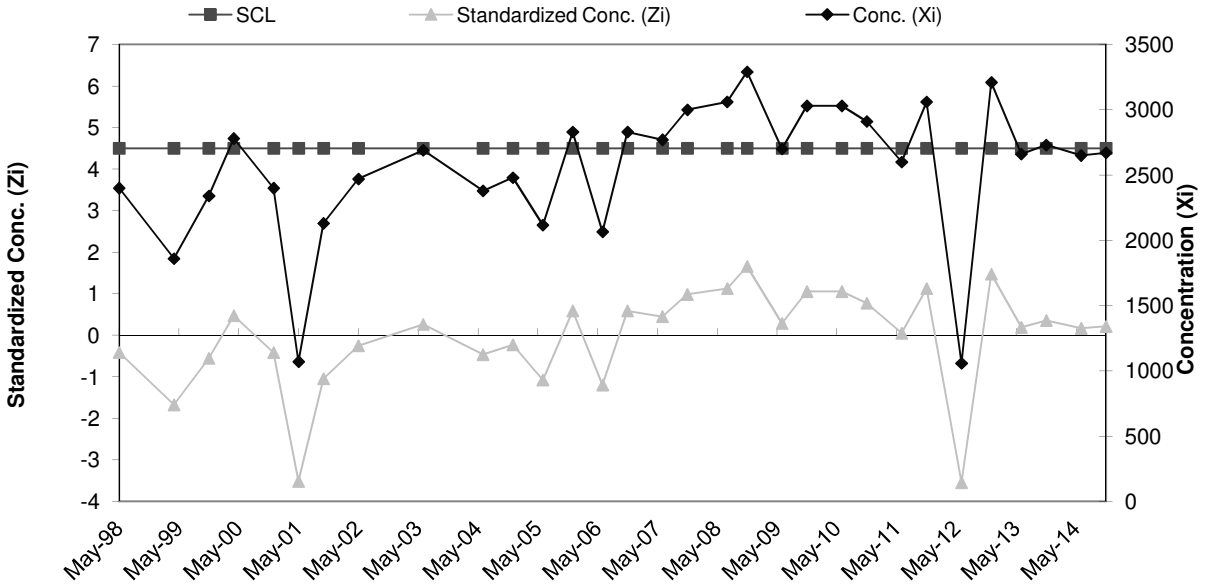


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-9 SpC

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Jun-95	2400	**2,578.63**	**428.85**
2	Aug-95	1829		
3	Feb-96	2860		
4	Jun-96	2550		
5	Aug-96	2310		
6	Nov-96	3280		
7	May-97	2600		
8	Nov-97	2800		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)	Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	May-98	4.5	2400	-0.42	33	Nov-11	4.5	3060	1.12
10	Apr-99	4.5	1860	-1.68	34	Jun-12	4.5	1057	-3.55
11	Nov-99	4.5	2340	-0.56	35	Dec-12	4.5	3210	1.47
12	Apr-00	4.5	2780	0.47	36	Jun-13	4.5	2660	0.19
13	Dec-00	4.5	2400	-0.42	37	Nov-13	4.5	2730	0.35
14	May-01	4.5	1070	-3.52	38	Jun-14	4.5	2650	0.17
15	Oct-01	4.5	2130	-1.05	39	Nov-14	4.5	2670	0.21
16	May-02	4.5	2470	-0.25					
17	Jun-03	4.5	2690	0.26					
18	Jun-04	4.5	2379	-0.47					
19	Dec-04	4.5	2480	-0.23					
20	Jun-05	4.5	2116	-1.08					
21	Dec-05	4.5	2830	0.59					
22	Jun-06	4.5	2065	-1.20					
23	Nov-06	4.5	2830	0.59					
24	Jun-07	4.5	2770	0.45					
25	Nov-07	4.5	3000	0.98					
26	Jul-08	4.5	3060	1.12					
27	Nov-08	4.5	3290	1.66					
28	Jun-09	4.5	2700	0.28					
29	Nov-09	4.5	3030	1.05					
30	Jun-10	4.5	3030	1.05					
31	Nov-10	4.5	2910	0.77					
32	Jun-11	4.5	2600	0.05					

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

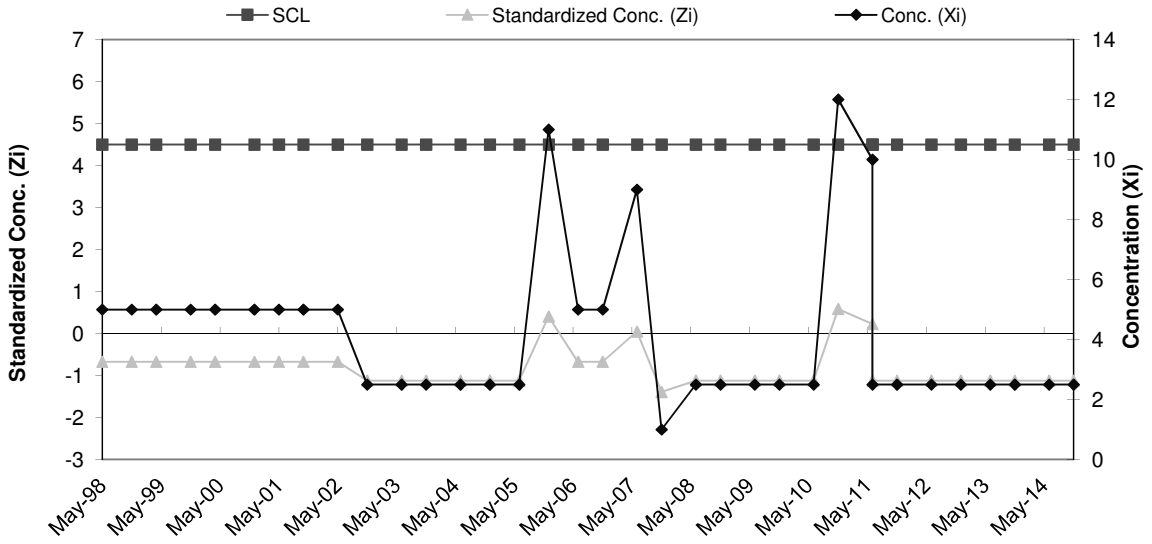


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-18a Cr

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Jun-95	10		
2	Aug-95	10		
3	Feb-96	10		
4	Jun-96	10	**8.74**	**5.57**
5	Aug-96	10		
6	Nov-96	10		
7	May-97	5		
8	Nov-97	5		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)	Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	May-98	4.5	5	-0.67	37	Nov-11	4.5	2.5	-1.12
10	Nov-98	4.5	5	-0.67	38	Jun-12	4.5	2.5	-1.12
11	Apr-99	4.5	5	-0.67	39	Dec-12	4.5	2.5	-1.12
12	Nov-99	4.5	5	-0.67	40	Jun-13	4.5	2.5	-1.12
13	Apr-00	4.5	5	-0.67	41	Nov-13	4.5	2.5	-1.12
14	Dec-00	4.5	5	-0.67	42	Jun-14	4.5	2.5	-1.12
15	May-01	4.5	5	-0.67	43	Nov-14	4.5	2.5	-1.12
16	Oct-01	4.5	5	-0.67					
17	May-02	4.5	5	-0.67					
18	Nov-02	4.5	2.5	-1.12					
19	Jun-03	4.5	2.5	-1.12					
20	Nov-03	4.5	2.5	-1.12					
21	Jun-04	4.5	2.5	-1.12					
22	Dec-04	4.5	2.5	-1.12					
23	Jun-05	4.5	2.5	-1.12					
24	Dec-05	4.5	11	0.41					
25	Jun-06	4.5	5	-0.67					
26	Nov-06	4.5	5	-0.67					
27	Jun-07	4.5	9	0.05					
28	Nov-07	4.5	1	-1.39					
29	Jun-08	4.5	2.5	-1.12					
30	Nov-08	4.5	2.5	-1.12					
31	Jun-09	4.5	2.5	-1.12					
32	Nov-09	4.5	2.5	-1.12					
33	Jun-10	4.5	2.5	-1.12					
34	Nov-10	4.5	12	0.59					
35	Jun-11	4.5	10	0.23					
36	Jun-11	4.5	2.5	-1.12					

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

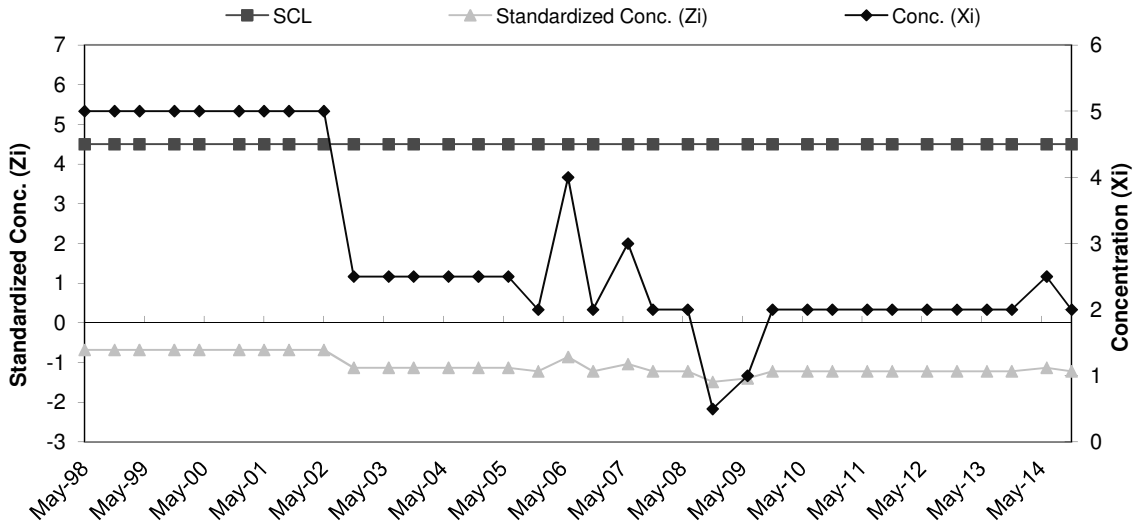


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-18a Cu

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Jun-95	10		
2	Aug-95	10		
3	Feb-96	10		
4	Jun-96	10	**8.78**	**5.56**
5	Aug-96	10		
6	Nov-96	10		
7	May-97	5		
8	Nov-97	5		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)	Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	May-98	4.5	5	-0.68	36	Nov-11	4.5	2	-1.22
10	Nov-98	4.5	5	-0.68	37	Jun-12	4.5	2	-1.22
11	Apr-99	4.5	5	-0.68	38	Dec-12	4.5	2	-1.22
12	Nov-99	4.5	5	-0.68	39	Jun-13	4.5	2	-1.22
13	Apr-00	4.5	5	-0.68	40	Nov-13	4.5	2	-1.22
14	Dec-00	4.5	5	-0.68	41	Jun-14	4.5	2.5	-1.13
15	May-01	4.5	5	-0.68	42	Nov-14	4.5	2	-1.22
16	Oct-01	4.5	5	-0.68					
17	May-02	4.5	5	-0.68					
18	Nov-02	4.5	2.5	-1.13					
19	Jun-03	4.5	2.5	-1.13					
20	Nov-03	4.5	2.5	-1.13					
21	Jun-04	4.5	2.5	-1.13					
22	Dec-04	4.5	2.5	-1.13					
23	Jun-05	4.5	2.5	-1.13					
24	Dec-05	4.5	2	-1.22					
25	Jun-06	4.5	4	-0.86					
26	Nov-06	4.5	2	-1.22					
27	Jun-07	4.5	3	-1.04					
28	Nov-07	4.5	2	-1.22					
29	Jun-08	4.5	2	-1.22					
30	Nov-08	4.5	0.5	-1.49					
31	Jun-09	4.5	1	-1.40					
32	Nov-09	4.5	2	-1.22					
33	Jun-10	4.5	2	-1.22					
34	Nov-10	4.5	2	-1.22					
35	Jun-11	4.5	2	-1.22					

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

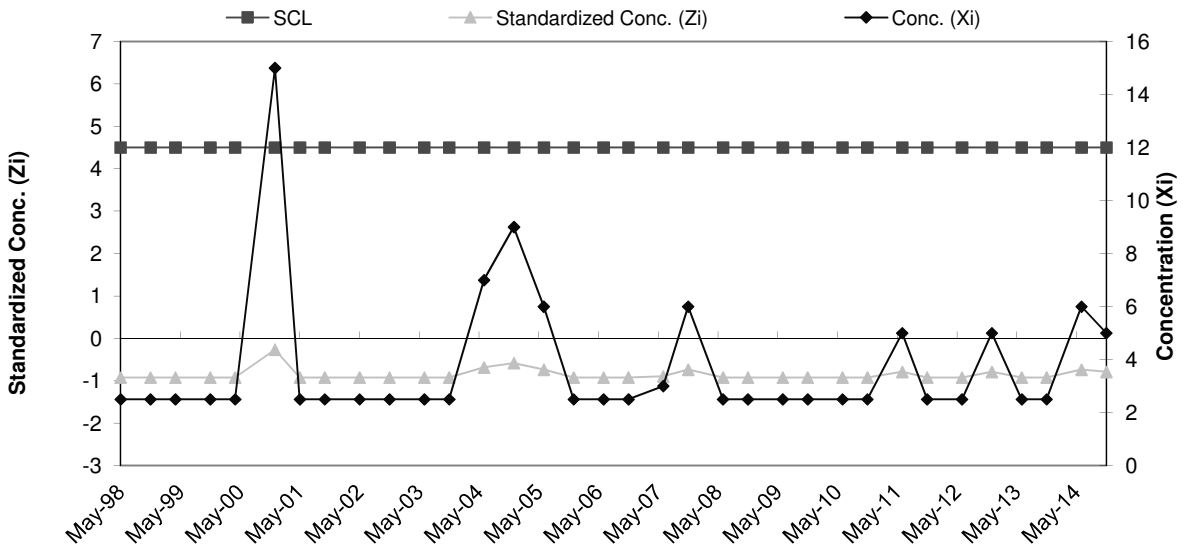


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-18a Ni

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Jun-95	15		
2	Aug-95	20		
3	Feb-96	20		
4	Jun-96	10	**20.01**	**18.96**
5	Aug-96	10		
6	Nov-96	10		
7	May-97	13		
8	Nov-97	62		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)	Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	May-98	4.5	2.5	-0.92	36	Nov-11	4.5	2.5	-0.92
10	Nov-98	4.5	2.5	-0.92	37	Jun-12	4.5	2.5	-0.92
11	Apr-99	4.5	2.5	-0.92	38	Dec-12	4.5	5	-0.79
12	Nov-99	4.5	2.5	-0.92	39	Jun-13	4.5	2.5	-0.92
13	Apr-00	4.5	2.5	-0.92	40	Nov-13	4.5	2.5	-0.92
14	Dec-00	4.5	15	-0.26	41	Jun-14	4.5	6	-0.74
15	May-01	4.5	2.5	-0.92	42	Nov-14	4.5	5	-0.79
16	Oct-01	4.5	2.5	-0.92					
17	May-02	4.5	2.5	-0.92					
18	Nov-02	4.5	2.5	-0.92					
19	Jun-03	4.5	2.5	-0.92					
20	Nov-03	4.5	2.5	-0.92					
21	Jun-04	4.5	7	-0.69					
22	Dec-04	4.5	9	-0.58					
23	Jun-05	4.5	6	-0.74					
24	Dec-05	4.5	2.5	-0.92					
25	Jun-06	4.5	2.5	-0.92					
26	Nov-06	4.5	2.5	-0.92					
27	Jun-07	4.5	3	-0.90					
28	Nov-07	4.5	6	-0.74					
29	Jun-08	4.5	2.5	-0.92					
30	Nov-08	4.5	2.5	-0.92					
31	Jun-09	4.5	2.5	-0.92					
32	Nov-09	4.5	2.5	-0.92					
33	Jun-10	4.5	2.5	-0.92					
34	Nov-10	4.5	2.5	-0.92					
35	Jun-11	4.5	5	-0.79					

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

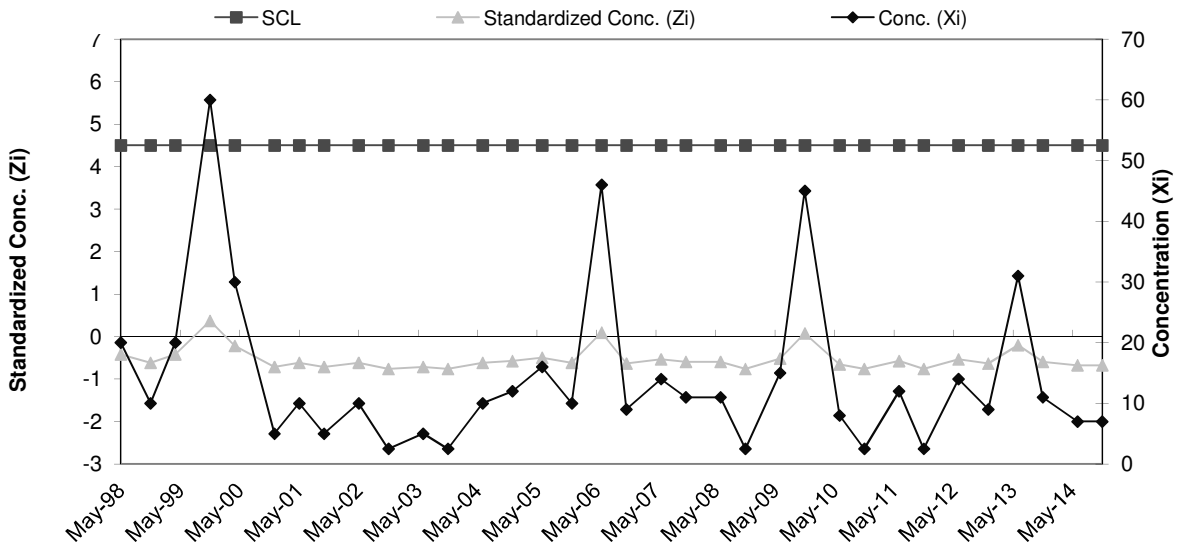


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-18a Zn

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Jun-95	150		
2	Aug-95	10		
3	Feb-96	10		
4	Jun-96	10	**41.25**	**50.67**
5	Aug-96	60		
6	Nov-96	70		
7	May-97	10		
8	Nov-97	10		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)	Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	May-98	4.5	20	-0.42	36	Nov-11	4.5	2.5	-0.76
10	Nov-98	4.5	10	-0.62	37	Jun-12	4.5	14	-0.54
11	Apr-99	4.5	20	-0.42	38	Dec-12	4.5	9	-0.64
12	Nov-99	4.5	60	0.37	39	Jun-13	4.5	31	-0.20
13	Apr-00	4.5	30	-0.22	40	Nov-13	4.5	11	-0.60
14	Dec-00	4.5	5	-0.72	41	Jun-14	4.5	7	-0.68
15	May-01	4.5	10	-0.62	42	Nov-14	4.5	7	-0.68
16	Oct-01	4.5	5	-0.72					
17	May-02	4.5	10	-0.62					
18	Nov-02	4.5	2.5	-0.76					
19	Jun-03	4.5	5	-0.72					
20	Nov-03	4.5	2.5	-0.76					
21	Jun-04	4.5	10	-0.62					
22	Dec-04	4.5	12	-0.58					
23	Jun-05	4.5	16	-0.50					
24	Dec-05	4.5	10	-0.62					
25	Jun-06	4.5	46	0.09					
26	Nov-06	4.5	9	-0.64					
27	Jun-07	4.5	14	-0.54					
28	Nov-07	4.5	11	-0.60					
29	Jun-08	4.5	11	-0.60					
30	Nov-08	4.5	2.5	-0.76					
31	Jun-09	4.5	15	-0.52					
32	Nov-09	4.5	45	0.07					
33	Jun-10	4.5	8	-0.66					
34	Nov-10	4.5	2.5	-0.76					
35	Jun-11	4.5	12	-0.58					

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

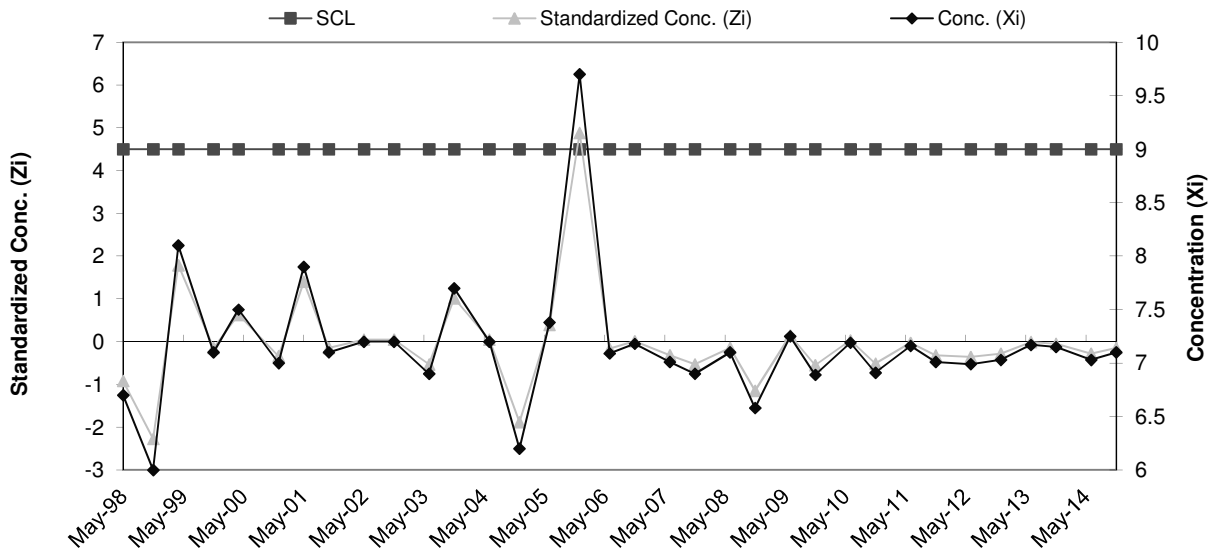


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-18a pH

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Jun-95	7.5	**7.18**	**0.52**
2	Aug-95	7.9		
3	Feb-96	7.4		
4	Jun-96	7.0		
5	Aug-96	7.5		
6	Nov-96	7.2		
7	May-97	6.5		
8	Nov-97	6.4		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)	Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	May-98	4.5	6.7	-0.92	36	Nov-11	4.5	7.0	-0.32
10	Nov-98	4.5	6.0	-2.27	37	Jun-12	4.5	7.0	-0.36
11	Apr-99	4.5	8.1	1.79	38	Dec-12	4.5	7.0	-0.28
12	Nov-99	4.5	7.1	-0.14	39	Jun-13	4.5	7.2	-0.01
13	Apr-00	4.5	7.5	0.63	40	Nov-13	4.5	7.2	-0.05
14	Dec-00	4.5	7.0	-0.34	41	Jun-14	4.5	7.0	-0.28
15	May-01	4.5	7.9	1.40	42	Nov-14	4.5	7.1	-0.14
16	Oct-01	4.5	7.1	-0.14					
17	May-02	4.5	7.2	0.05					
18	Nov-02	4.5	7.2	0.05					
19	Jun-03	4.5	6.9	-0.53					
20	Nov-03	4.5	7.7	1.01					
21	Jun-04	4.5	7.2	0.05					
22	Dec-04	4.5	6.2	-1.88					
23	Jun-05	4.5	7.4	0.40					
24	Dec-05	4.5	9.7	4.88					
25	Jun-06	4.5	7.1	-0.16					
26	Nov-06	4.5	7.2	0.01					
27	Jun-07	4.5	7.0	-0.32					
28	Nov-07	4.5	6.9	-0.53					
29	Jun-08	4.5	7.1	-0.14					
30	Nov-08	4.5	6.6	-1.15					
31	Jun-09	4.5	7.3	0.14					
32	Nov-09	4.5	6.9	-0.55					
33	Jun-10	4.5	7.2	0.03					
34	Nov-10	4.5	6.9	-0.51					
35	Jun-11	4.5	7.2	-0.03					

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

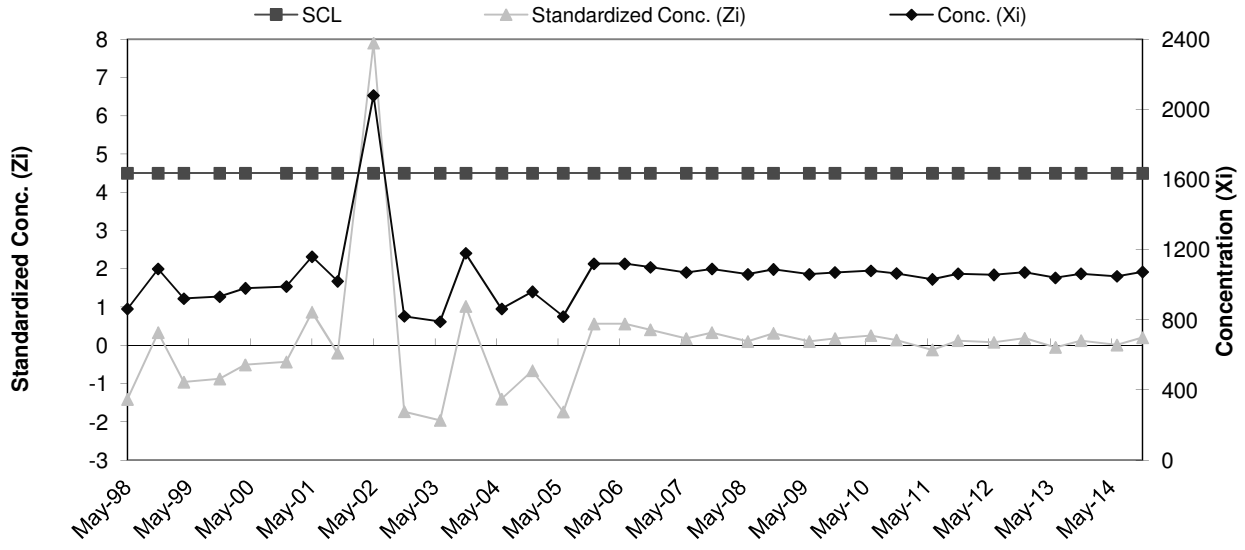


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-18a SpC

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Jun-95	1048		
2	Aug-95	989		
3	Feb-96	1021		
4	Jun-96	944.0	**1,046.75**	**130.80**
5	Aug-96	1041		
6	Nov-96	1331		
7	May-97	900		
8	Nov-97	1100		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)	Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	May-98	4.5	862	-1.41	36	Nov-11	4.5	1063	0.12
10	Nov-98	4.5	1090.0	0.33	37	Jun-12	4.5	1057	0.08
11	Apr-99	4.5	921	-0.96	38	Dec-12	4.5	1071	0.19
12	Nov-99	4.5	932	-0.88	39	Jun-13	4.5	1040	-0.05
13	Apr-00	4.5	980	-0.51	40	Nov-13	4.5	1063	0.12
14	Dec-00	4.5	990.0	-0.43	41	Jun-14	4.5	1048	0.01
15	May-01	4.5	1160	0.87	42	Nov-14	4.5	1073	0.20
16	Oct-01	4.5	1020	-0.20					
17	May-02	4.5	2080	7.90					
18	Nov-02	4.5	820	-1.73					
19	Jun-03	4.5	790	-1.96					
20	Nov-03	4.5	1180	1.02					
21	Jun-04	4.5	863	-1.40					
22	Dec-04	4.5	960	-0.66					
23	Jun-05	4.5	819	-1.74					
24	Dec-05	4.5	1120	0.56					
25	Jun-06	4.5	1120	0.56					
26	Nov-06	4.5	1100	0.41					
27	Jun-07	4.5	1070	0.18					
28	Nov-07	4.5	1090	0.33					
29	Jun-08	4.5	1060	0.10					
30	Nov-08	4.5	1088	0.32					
31	Jun-09	4.5	1060	0.10					
32	Nov-09	4.5	1070	0.18					
33	Jun-10	4.5	1080	0.25					
34	Nov-10	4.5	1065	0.14					
35	Jun-11	4.5	1031	-0.12					

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

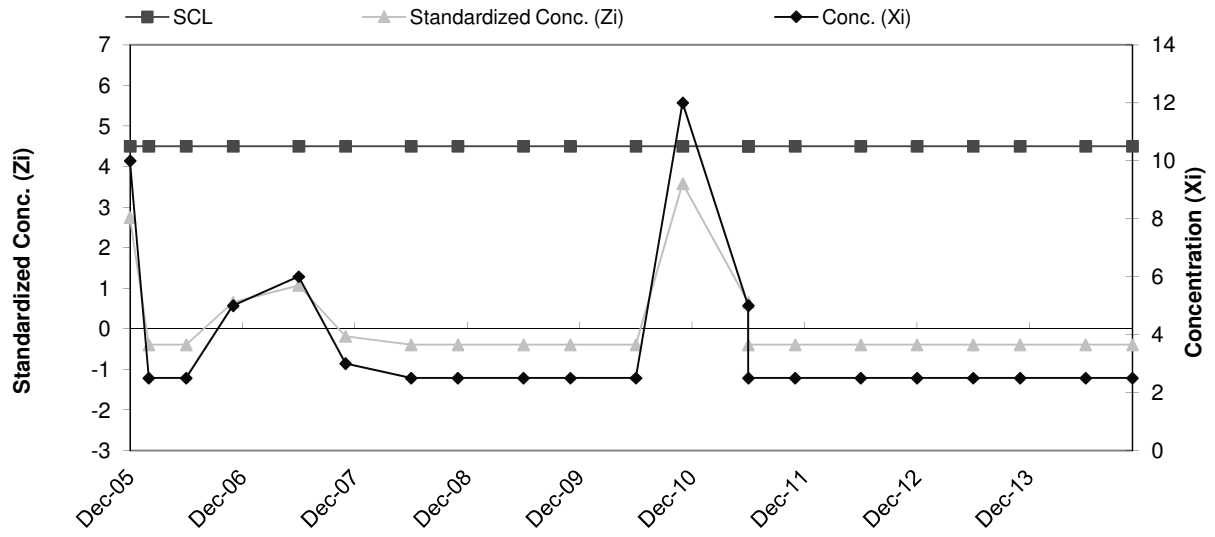


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-19a Cr

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	May-98	5		
2	May-01	5		
3	May-02	5		
4	Jun-03	2.5	**3.44**	**2.39**
5	Nov-03	2.5		
6	Jun-04	2.5		
7	Dec-04	2.5		
8	Jun-05	2.5		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	Dec-05	4.5	10	2.74
10	Feb-06	4.5	2.5	-0.39
11	Jun-06	4.5	2.5	-0.39
12	Nov-06	4.5	5	0.65
13	Jun-07	4.5	6	1.07
14	Nov-07	4.5	3	-0.18
15	Jun-08	4.5	2.5	-0.39
16	Nov-08	4.5	2.5	-0.39
17	Jun-09	4.5	2.5	-0.39
18	Nov-09	4.5	2.5	-0.39
19	Jun-10	4.5	2.5	-0.39
20	Nov-10	4.5	12	3.58
21	Jun-11	4.5	5	0.65
22	Jun-11	4.5	2.5	-0.39
23	Nov-11	4.5	2.5	-0.39
24	Jun-12	4.5	2.5	-0.39
25	Dec-12	4.5	2.5	-0.39
26	Jun-13	4.5	2.5	-0.39
27	Nov-13	4.5	2.5	-0.39
28	Jun-14	4.5	2.5	-0.39
29	Nov-14	4.5	2.5	-0.39

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

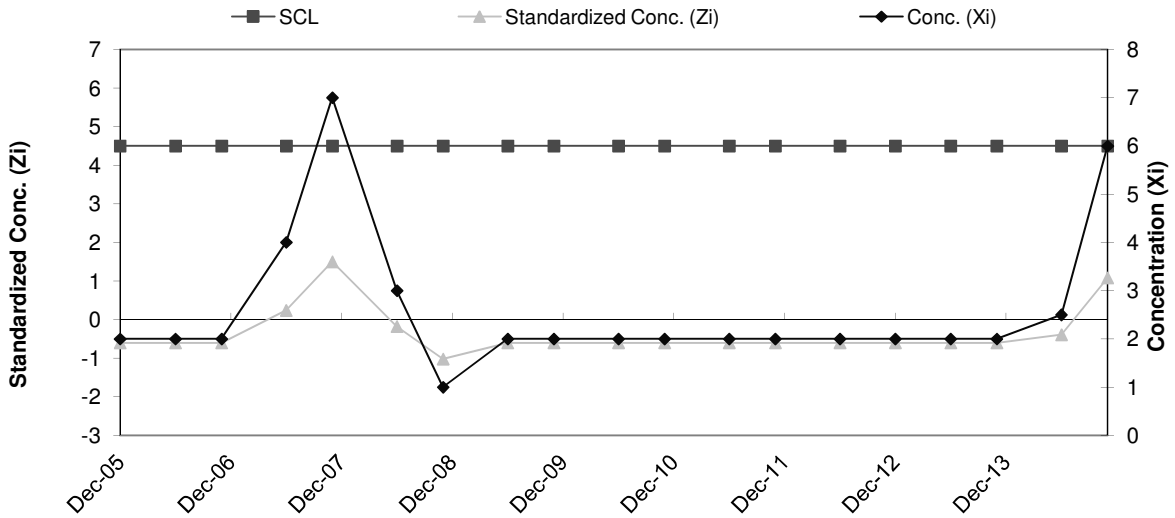


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-19a Cu

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	May-98	5		
2	May-01	5		
3	May-02	5		
4	Jun-03	2.5	**3.43**	**2.38**
5	Nov-03	2.5		
6	Jun-04	2.5		
7	Dec-04	2.5		
8	Jun-05	2.5		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	Dec-05	4.5	2	-0.60
10	Jun-06	4.5	2	-0.60
11	Nov-06	4.5	2	-0.60
12	Jun-07	4.5	4	0.24
13	Nov-07	4.5	7	1.50
14	Jun-08	4.5	3	-0.18
15	Nov-08	4.5	1	-1.02
16	Jun-09	4.5	2	-0.60
17	Nov-09	4.5	2	-0.60
18	Jun-10	4.5	2	-0.60
19	Nov-10	4.5	2	-0.60
20	Jun-11	4.5	2	-0.60
21	Nov-11	4.5	2	-0.60
22	Jun-12	4.5	2	-0.60
23	Dec-12	4.5	2	-0.60
24	Jun-13	4.5	2	-0.60
25	Nov-13	4.5	2	-0.60
26	Jun-14	4.5	2.5	-0.39
27	Nov-14	4.5	6	1.08

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

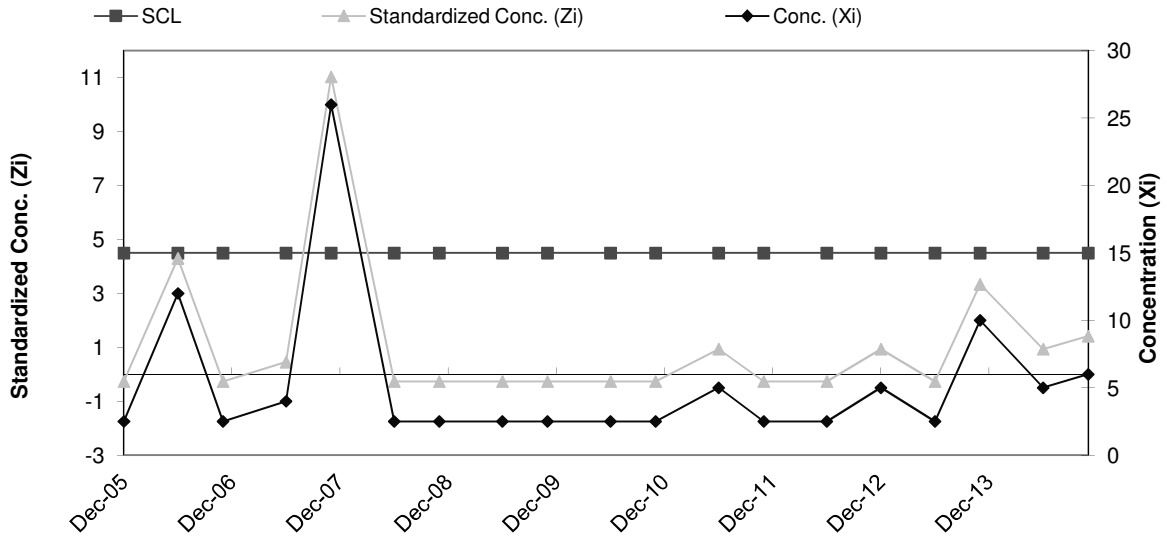


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-19a Ni

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	May-98	2.5	**3.06**	**2.08**
2	May-01	2.5		
3	May-02	2.5		
4	Jun-03	2.5		
5	Nov-03	2.5		
6	Jun-04	2.5		
7	Dec-04	2.5		
8	Jun-05	7		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	Dec-05	4.5	2.5	-0.27
10	Jun-06	4.5	12	4.30
11	Nov-06	4.5	2.5	-0.27
12	Jun-07	4.5	4	0.45
13	Nov-07	4.5	26	11.03
14	Jun-08	4.5	2.5	-0.27
15	Nov-08	4.5	2.5	-0.27
16	Jun-09	4.5	2.5	-0.27
17	Nov-09	4.5	2.5	-0.27
19	Jun-10	4.5	2.5	-0.27
20	Nov-10	4.5	2.5	-0.27
21	Jun-11	4.5	5	0.93
22	Nov-11	4.5	2.5	-0.27
23	Jun-12	4.5	2.5	-0.27
24	Dec-12	4.5	5	0.93
25	Jun-13	4.5	2.5	-0.27
26	Nov-13	4.5	10	3.34
27	Jun-14	4.5	5	0.93
28	Nov-14	4.5	6	1.41

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

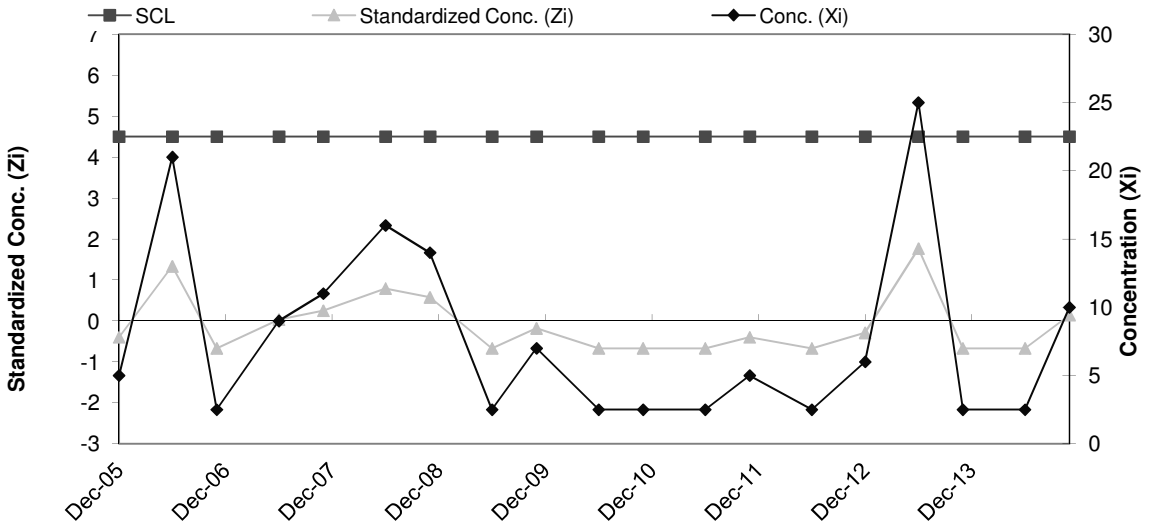


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-19a Zn

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	May-98	30	**8.69**	**9.24**
2	May-01	5		
3	May-02	10		
4	Jun-03	2.5		
5	Nov-03	2.5		
6	Jun-04	8		
7	Dec-04	9		
8	Jun-05	2.5		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	Dec-05	4.5	5	-0.40
10	Jun-06	4.5	21	1.33
11	Nov-06	4.5	2.5	-0.67
12	Jun-07	4.5	9	0.03
13	Nov-07	4.5	11	0.25
14	Jun-08	4.5	16	0.79
15	Nov-08	4.5	14	0.57
16	Jun-09	4.5	2.5	-0.67
17	Nov-09	4.5	7	-0.18
18	Jun-10	4.5	2.5	-0.67
19	Nov-10	4.5	2.5	-0.67
20	Jun-11	4.5	2.5	-0.67
21	Nov-11	4.5	5	-0.40
22	Jun-12	4.5	2.5	-0.67
23	Dec-12	4.5	6	-0.29
24	Jun-13	4.5	25	1.77
25	Nov-13	4.5	2.5	-0.67
26	Jun-14	4.5	2.5	-0.67
27	Nov-14	4.5	10	0.14

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

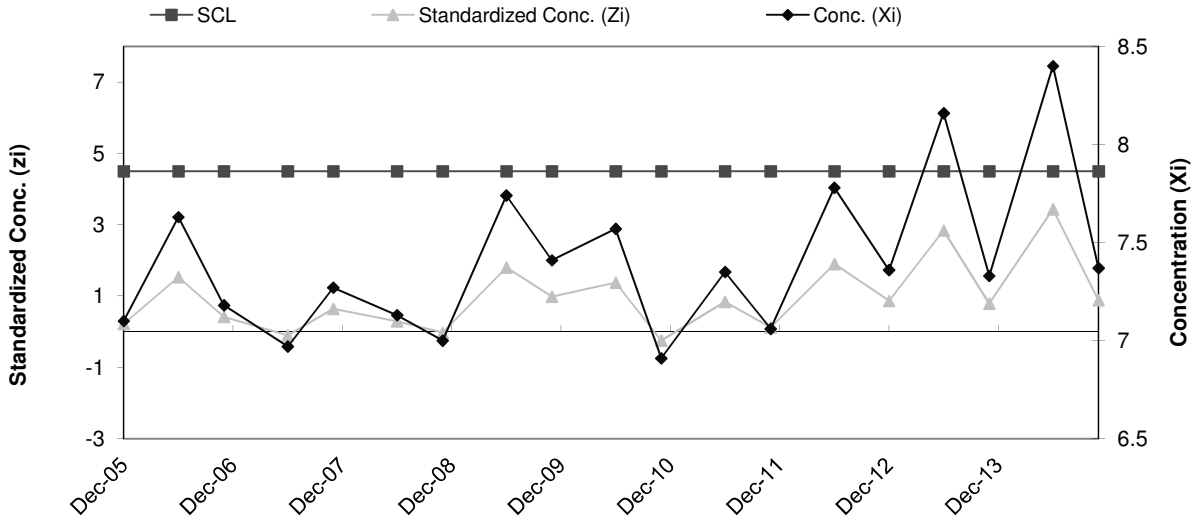


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-19a pH

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	May-98	6.8	**7.01**	**0.40**
2	May-01	7.1		
3	May-02	7.2		
4	Jun-03	6.9		
5	Nov-03	7.6		
6	Jun-04	7.2		
7	Dec-04	6.2		
8	Jun-05	7.1		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	Dec-05	4.5	7.1	0.22
10	Jun-06	4.5	7.6	1.53
11	Nov-06	4.5	7.2	0.42
12	Jun-07	4.5	7.0	-0.10
13	Nov-07	4.5	7.3	0.64
14	Jun-08	4.5	7.1	0.29
15	Nov-08	4.5	7.0	-0.03
16	Jun-09	4.5	7.7	1.80
17	Nov-09	4.5	7.4	0.99
18	Jun-10	4.5	7.6	1.38
19	Nov-10	4.5	6.9	-0.25
20	Jun-11	4.5	7.4	0.84
21	Nov-11	4.5	7.1	0.12
22	Jun-12	4.5	7.8	1.90
23	Dec-12	4.5	7.4	0.86
24	Jun-13	4.5	8.2	2.84
25	Nov-13	4.5	7.3	0.79
26	Jun-14	4.5	8.4	3.43
27	Nov-14	4.5	7.4	0.89

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

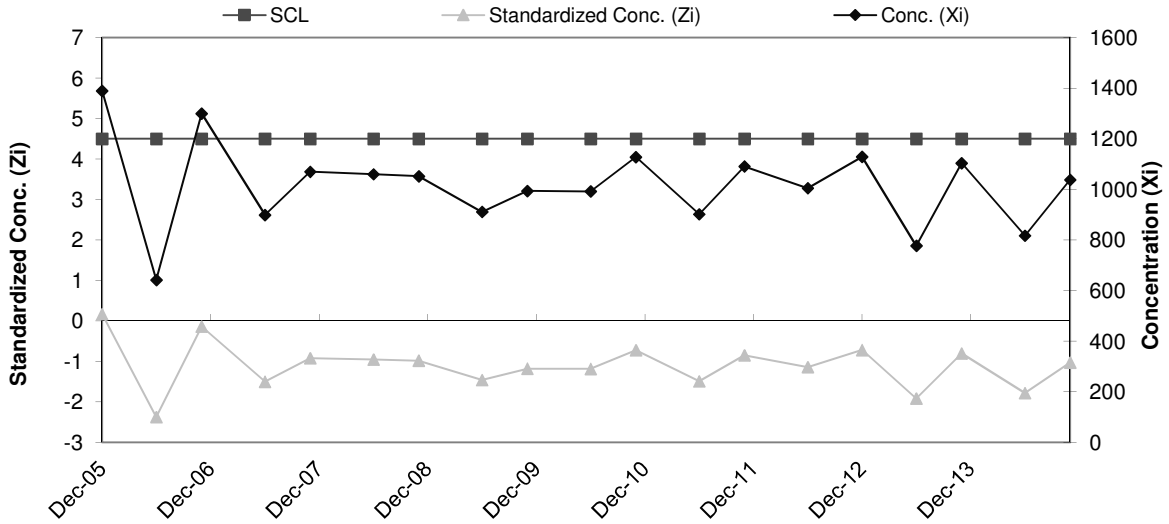


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-19a SpC

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	May-98	1480		
2	May-01	1050		
3	May-02	1740		
4	Jun-03	1350	**1,340.63**	**293.72**
5	Nov-03	1620		
6	Jun-04	1316		
7	Dec-04	1340		
8	Jun-05	829		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	Dec-05	4.5	1390	0.17
10	Jun-06	4.5	642	-2.38
11	Nov-06	4.5	1300	-0.14
12	Jun-07	4.5	899	-1.50
13	Nov-07	4.5	1070	-0.92
14	Jun-08	4.5	1060	-0.96
15	Nov-08	4.5	1052	-0.98
16	Jun-09	4.5	911	-1.46
17	Nov-09	4.5	994	-1.18
18	Jun-10	4.5	992	-1.19
19	Nov-10	4.5	1128	-0.72
20	Jun-11	4.5	902	-1.49
21	Nov-11	4.5	1091	-0.85
22	Jun-12	4.5	1005	-1.14
23	Dec-12	4.5	1129	-0.72
24	Jun-13	4.5	777	-1.92
25	Nov-13	4.5	1104	-0.81
26	Jun-14	4.5	817	-1.78
27	Nov-14	4.5	1038	-1.03

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

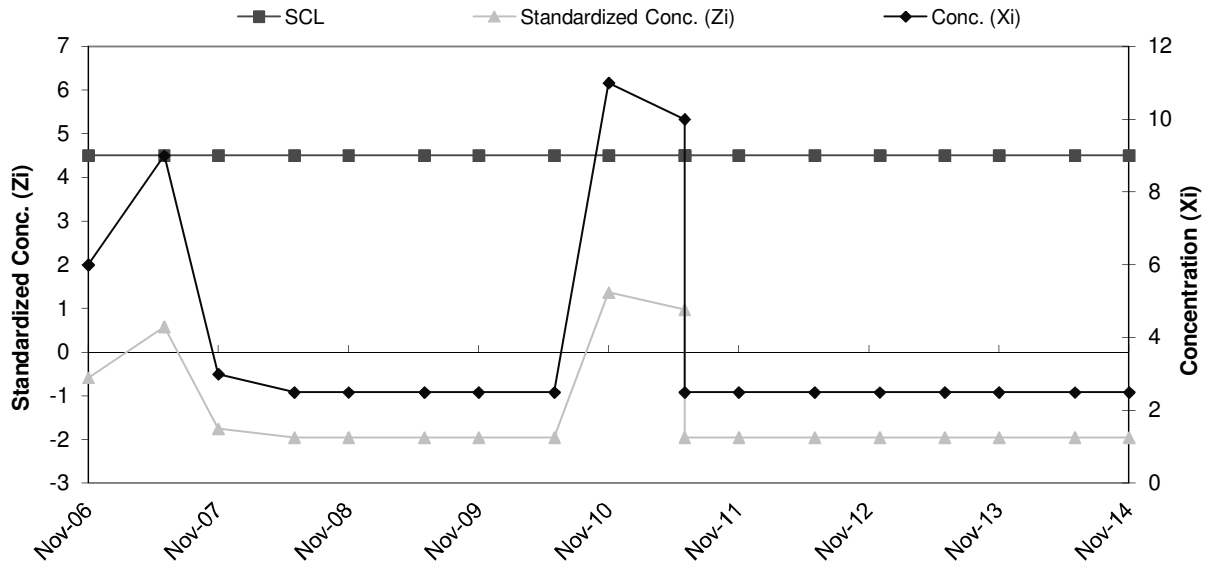


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-24 Cr

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Aug-96	10		
2	Nov-96	10		
3	May-97	5		
4	May-98	5	**7.50**	**2.56**
5	Nov-03	5		
6	Jun-05	8		
7	Dec-05	11		
8	Jun-06	6		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	Nov-06	4.5	6	-0.59
10	Jun-07	4.5	9	0.59
11	Nov-07	4.5	3	-1.76
12	Jun-08	4.5	2.5	-1.95
13	Nov-08	4.5	2.5	-1.95
14	Jun-09	4.5	2.5	-1.95
15	Nov-09	4.5	2.5	-1.95
16	Jun-10	4.5	2.5	-1.95
17	Nov-10	4.5	11	1.37
18	Jun-11	4.5	10	0.98
19	Jun-11	4.5	2.5	-1.95
20	Nov-11	4.5	2.5	-1.95
21	Jun-12	4.5	2.5	-1.95
22	Dec-12	4.5	2.5	-1.95
23	Jun-13	4.5	2.5	-1.95
24	Nov-13	4.5	2.5	-1.95
25	Jun-14	4.5	2.5	-1.95
26	Nov-14	4.5	2.5	-1.95

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

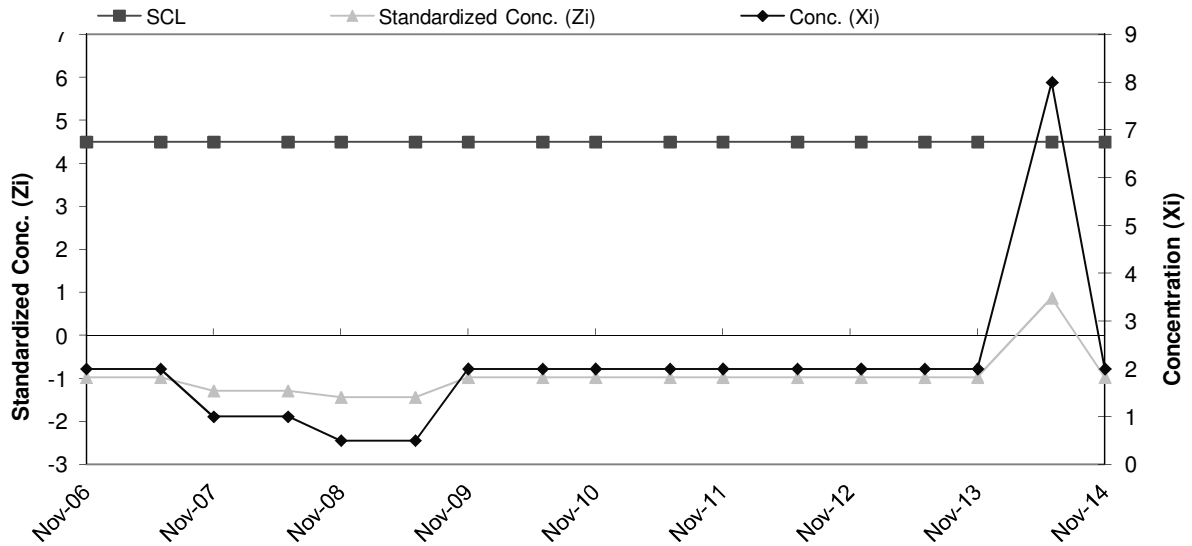


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-24 Cu

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Aug-96	10		
2	Nov-96	10		
3	May-97	5		
4	May-98	5	**5.19**	**3.25**
5	Nov-03	5		
6	Jun-05	2.5		
7	Dec-05	2		
8	Jun-06	2		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	Nov-06	4.5	2	-0.98
10	Jun-07	4.5	2	-0.98
11	Nov-07	4.5	1	-1.29
12	Jun-08	4.5	1	-1.29
13	Nov-08	4.5	0.5	-1.44
14	Jun-09	4.5	0.5	-1.44
15	Nov-09	4.5	2	-0.98
16	Jun-10	4.5	2	-0.98
17	Nov-10	4.5	2	-0.98
18	Jun-11	4.5	2	-0.98
19	Nov-11	4.5	2	-0.98
20	Jun-12	4.5	2	-0.98
21	Dec-12	4.5	2	-0.98
22	Jun-13	4.5	2	-0.98
23	Nov-13	4.5	2	-0.98
24	Jun-14	4.5	8	0.87
25	Nov-14	4.5	2	-0.98

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

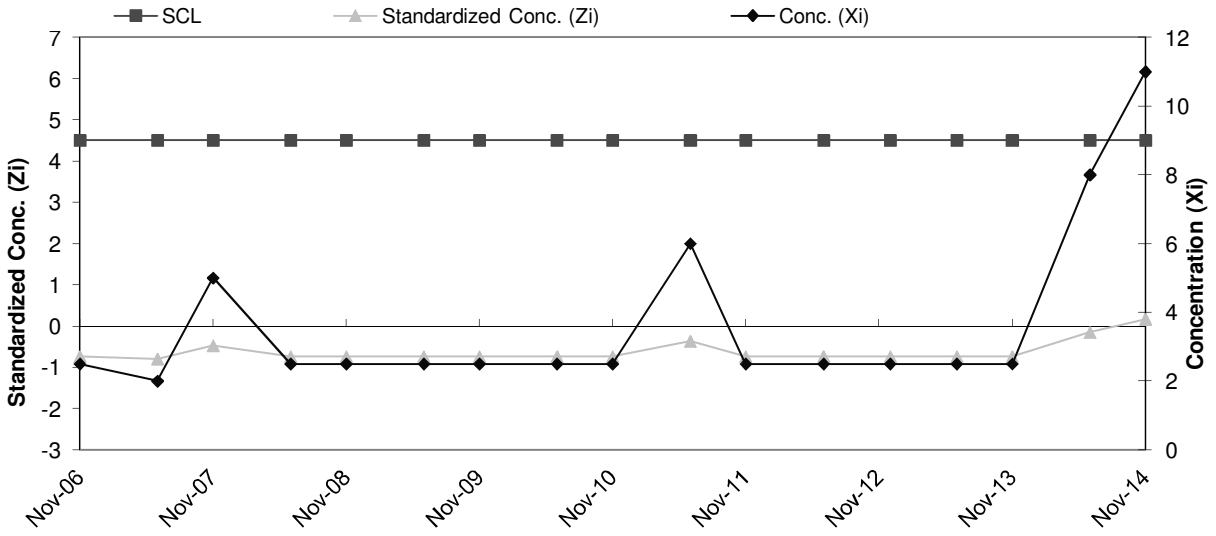


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-24 Ni

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Aug-96	10		
2	Nov-96	10		
3	May-97	31		
4	May-98	8	**9.44**	**9.35**
5	Nov-03	9		
6	Jun-05	2.5		
7	Dec-05	2.5		
8	Jun-06	2.5		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	Nov-06	4.5	2.5	-0.74
10	Jun-07	4.5	2	-0.80
11	Nov-07	4.5	5	-0.47
12	Jun-08	4.5	2.5	-0.74
13	Nov-08	4.5	2.5	-0.74
14	Jun-09	4.5	2.5	-0.74
15	Nov-09	4.5	2.5	-0.74
16	Jun-10	4.5	2.5	-0.74
17	Nov-10	4.5	2.5	-0.74
18	Jun-11	4.5	6	-0.37
19	Nov-11	4.5	2.5	-0.74
20	Jun-12	4.5	2.5	-0.74
21	Dec-12	4.5	2.5	-0.74
22	Jun-13	4.5	2.5	-0.74
23	Nov-13	4.5	2.5	-0.74
24	Jun-14	4.5	8	-0.15
25	Nov-14	4.5	11	0.17

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

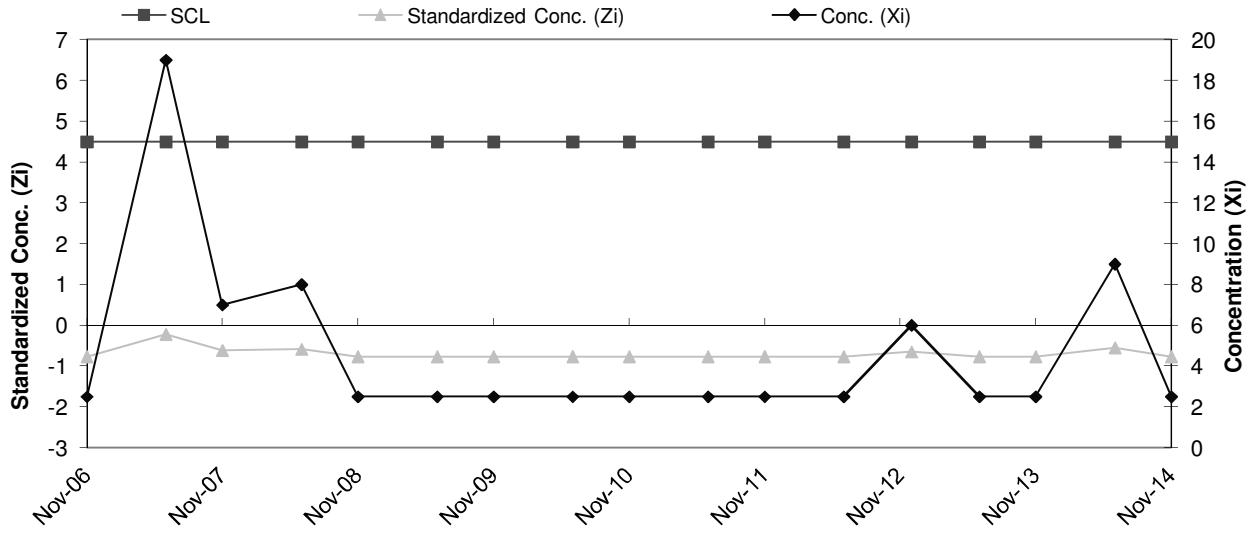


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-24 Zn

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Aug-96	90		
2	Nov-96	50		
3	May-97	10		
4	May-98	20	**25.63**	**30.14**
5	Nov-03	20		
6	Jun-05	2.5		
7	Dec-05	10		
8	Jun-06	2.5		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	Nov-06	4.5	2.5	-0.77
10	Jun-07	4.5	19	-0.22
11	Nov-07	4.5	7	-0.62
12	Jun-08	4.5	8	-0.58
13	Nov-08	4.5	2.5	-0.77
14	Jun-09	4.5	2.5	-0.77
15	Nov-09	4.5	2.5	-0.77
16	Jun-10	4.5	2.5	-0.77
17	Nov-10	4.5	2.5	-0.77
18	Jun-11	4.5	2.5	-0.77
19	Nov-11	4.5	2.5	-0.77
20	Jun-12	4.5	2.5	-0.77
21	Dec-12	4.5	6	-0.65
22	Jun-13	4.5	2.5	-0.77
23	Nov-13	4.5	2.5	-0.77
24	Jun-14	4.5	9	-0.55
25	Nov-14	4.5	2.5	-0.77

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

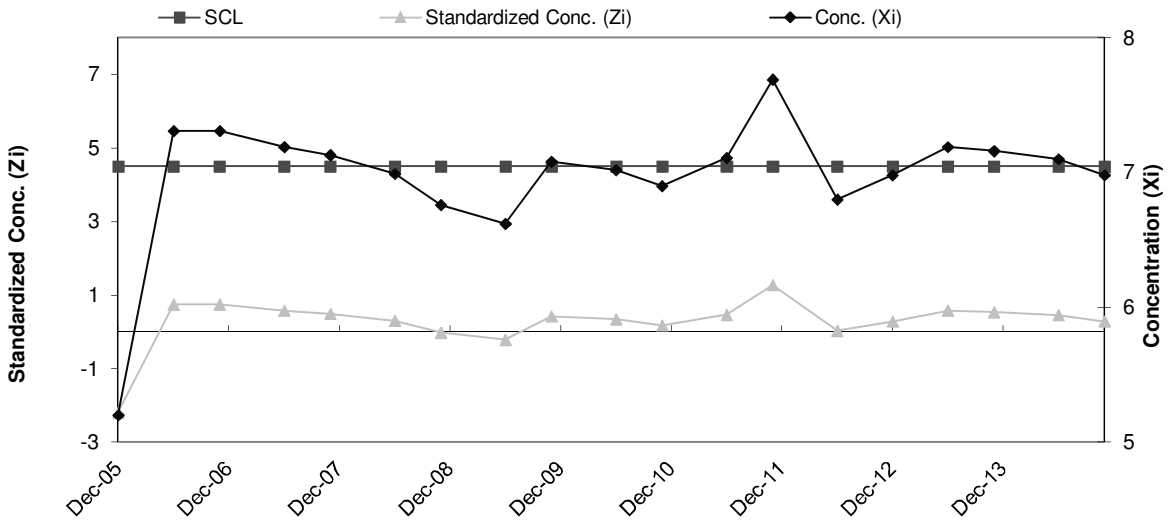


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-24 pH

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Aug-96	7.8	**6.78**	**0.72**
2	Nov-96	7.1		
3	May-97	6.4		
4	May-98	7		
5	Nov-98	6		
6	Nov-99	7		
7	May-01	6.4		
8	Jun-05	7.3		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	Dec-05	4.5	5.2	-2.20
10	Jun-06	4.5	7.3	0.75
11	Nov-06	4.5	7.3	0.75
12	Jun-07	4.5	7.2	0.58
13	Nov-07	4.5	7.1	0.50
14	Jun-08	4.5	7.0	0.30
15	Nov-08	4.5	6.8	-0.02
14	Jun-09	4.5	6.6	-0.22
15	Nov-09	4.5	7.1	0.43
16	Jun-10	4.5	7.0	0.34
17	Nov-10	4.5	6.9	0.17
18	Jun-11	4.5	7.1	0.47
19	Nov-11	4.5	7.7	1.28
20	Jun-12	4.5	6.8	0.03
21	Dec-12	4.5	7.0	0.29
22	Jun-13	4.5	7.2	0.58
23	Nov-13	4.5	7.2	0.54
24	Jun-14	4.5	7.1	0.45
25	Nov-14	4.5	7.0	0.29

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

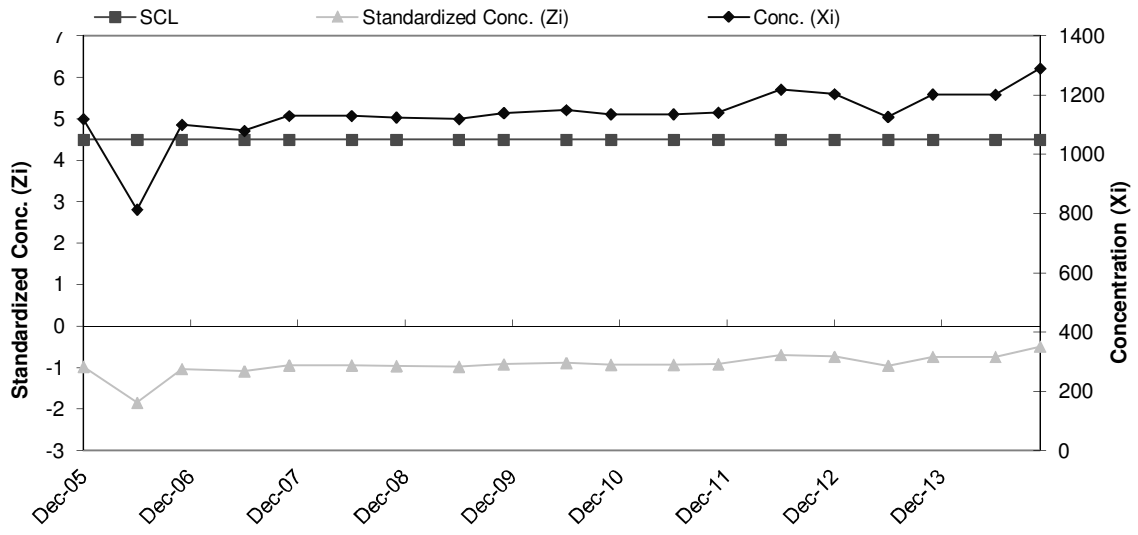


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-24 SpC

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Aug-96	1502		
2	Nov-96	2030		
3	May-97	1700		
4	May-98	1410	**1,462.00**	**351.23**
5	Nov-98	1595		
6	Nov-99	1152		
7	May-01	1450		
8	Jun-05	857		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	Dec-05	4.5	1120	-0.97
10	Jun-06	4.5	814	-1.84
11	Nov-06	4.5	1100	-1.03
12	Jun-07	4.5	1080	-1.09
13	Nov-07	4.5	1130	-0.95
14	Jun-08	4.5	1130	-0.95
15	Nov-08	4.5	1125	-0.96
16	Jun-09	4.5	1120	-0.97
17	Nov-09	4.5	1140	-0.92
18	Jun-10	4.5	1150	-0.89
19	Nov-10	4.5	1136	-0.93
20	Jun-11	4.5	1136	-0.93
21	Nov-11	4.5	1141	-0.91
22	Jun-12	4.5	1219	-0.69
23	Dec-12	4.5	1204	-0.73
24	Jun-13	4.5	1127	-0.95
25	Nov-13	4.5	1203	-0.74
26	Jun-14	4.5	1202	-0.74
27	Nov-14	4.5	1290	-0.49

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

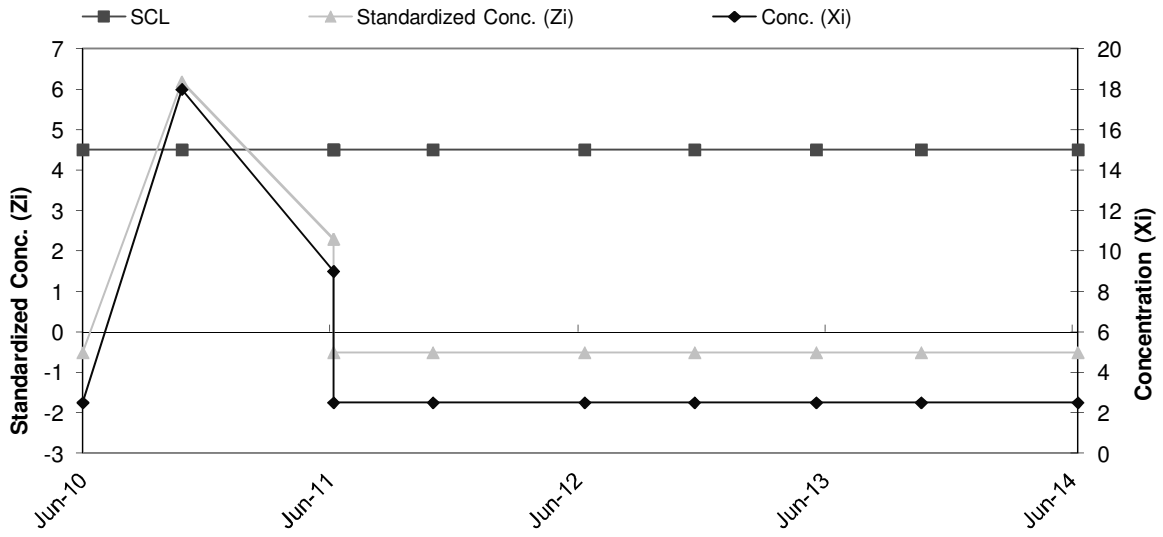


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-28 Cr

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Jun-06	5		
2	Dec-06	2.5		
3	Jun-07	9		
4	Nov-07	3	**3.69**	**2.31**
5	Jun-08	2.5		
6	Nov-08	2.5		
7	Jun-09	2.5		
8	Nov-09	2.5		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	Jun-10	4.5	2.5	-0.51
10	Nov-10	4.5	18	6.19
11	Jun-11	4.5	9	2.30
12	Jun-11	4.5	2.5	-0.51
13	Nov-11	4.5	2.5	-0.51
14	Jun-12	4.5	2.5	-0.51
15	Dec-12	4.5	2.5	-0.51
16	Jun-13	4.5	2.5	-0.51
17	Nov-13	4.5	2.5	-0.51
18	Jun-14	4.5	2.5	-0.51

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

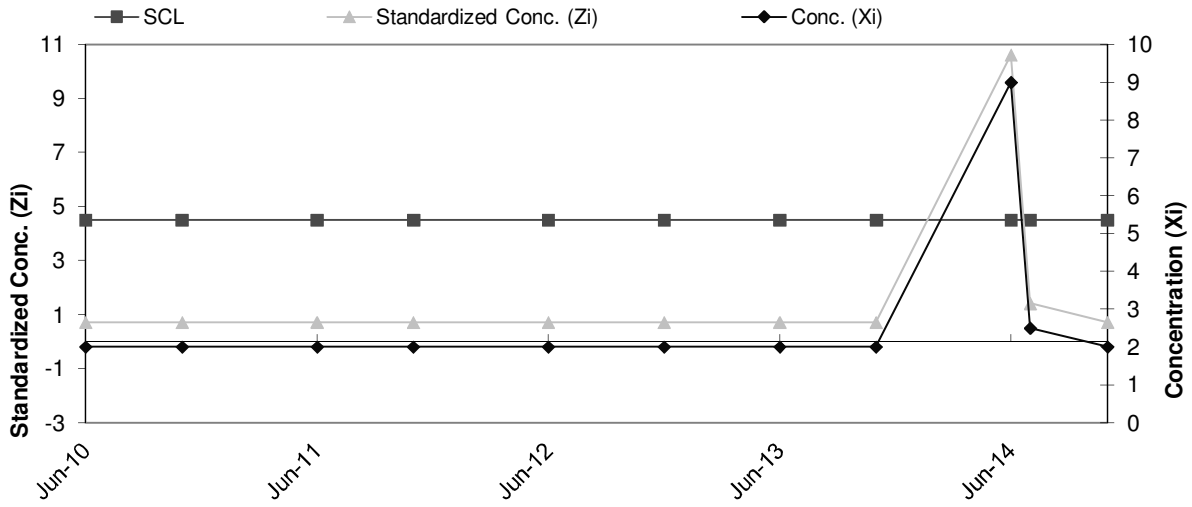


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-28 Cu

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Jun-06	2	**1.50**	**0.71**
2	Dec-06	2		
3	Jun-07	2		
4	Nov-07	2		
5	Jun-08	1		
6	Nov-08	0.5		
7	Jun-09	0.5		
8	Nov-09	2		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	Jun-10	4.5	2	0.71
10	Nov-10	4.5	2	0.71
11	Jun-11	4.5	2	0.71
12	Nov-11	4.5	2	0.71
13	Jun-12	4.5	2	0.71
14	Dec-12	4.5	2	0.71
15	Jun-13	4.5	2	0.71
16	Nov-13	4.5	2	0.71
17	Jun-14	4.5	9	10.61
18	Jul-14	4.5	2.5	1.41
19	Nov-14	4.5	2	0.71

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

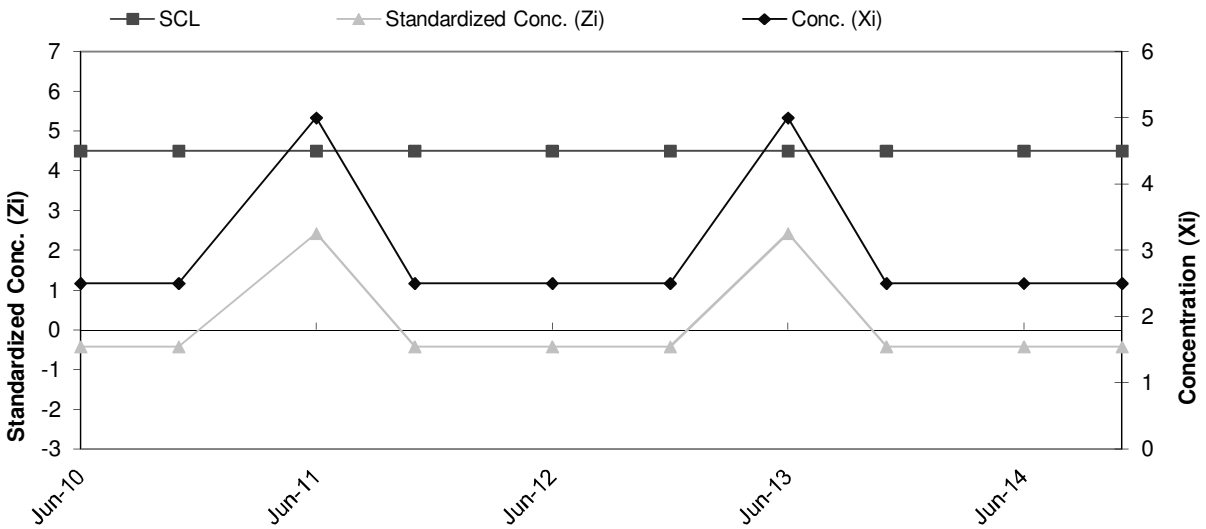


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-28 Ni

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Jun-06	2.5		
2	Dec-06	2.5		
3	Jun-07	3		
4	Nov-07	5	**2.88**	**0.88**
5	Jun-08	2.5		
6	Nov-08	2.5		
7	Jun-09	2.5		
8	Nov-09	2.5		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	Jun-10	4.5	2.5	-0.43
10	Nov-10	4.5	2.5	-0.43
9	Jun-11	4.5	5	2.43
10	Nov-11	4.5	2.5	-0.43
11	Jun-12	4.5	2.5	-0.43
12	Dec-12	4.5	2.5	-0.43
13	Jun-13	4.5	5	2.43
14	Nov-13	4.5	2.5	-0.43
15	Jun-14	4.5	2.5	-0.43
16	Nov-14	4.5	2.5	-0.43

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

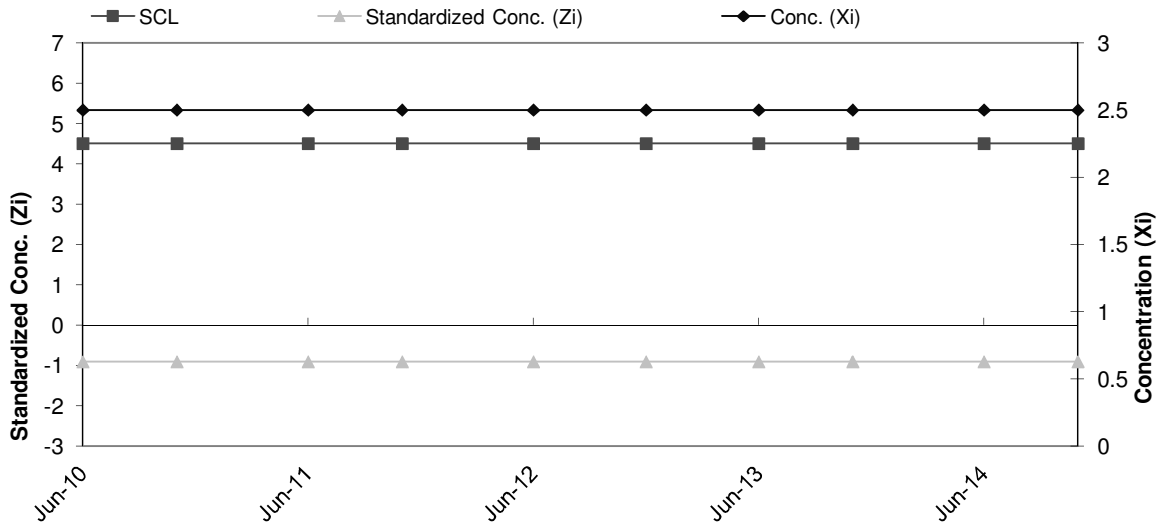


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-28 Zn

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Jun-06	18		
2	Dec-06	5		
3	Jun-07	6		
4	Nov-07	11	**8.75**	**6.88**
5	Jun-08	5		
6	Nov-08	2.5		
7	Jun-09	2.5		
8	Nov-09	20		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	Jun-10	4.5	2.5	-0.91
10	Nov-10	4.5	2.5	-0.91
11	Jun-11	4.5	2.5	-0.91
12	Nov-11	4.5	2.5	-0.91
13	Jun-12	4.5	2.5	-0.91
14	Dec-12	4.5	2.5	-0.91
15	Jun-13	4.5	2.5	-0.91
16	Nov-13	4.5	2.5	-0.91
17	Jun-14	4.5	2.5	-0.91
18	Nov-14	4.5	2.5	-0.91

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

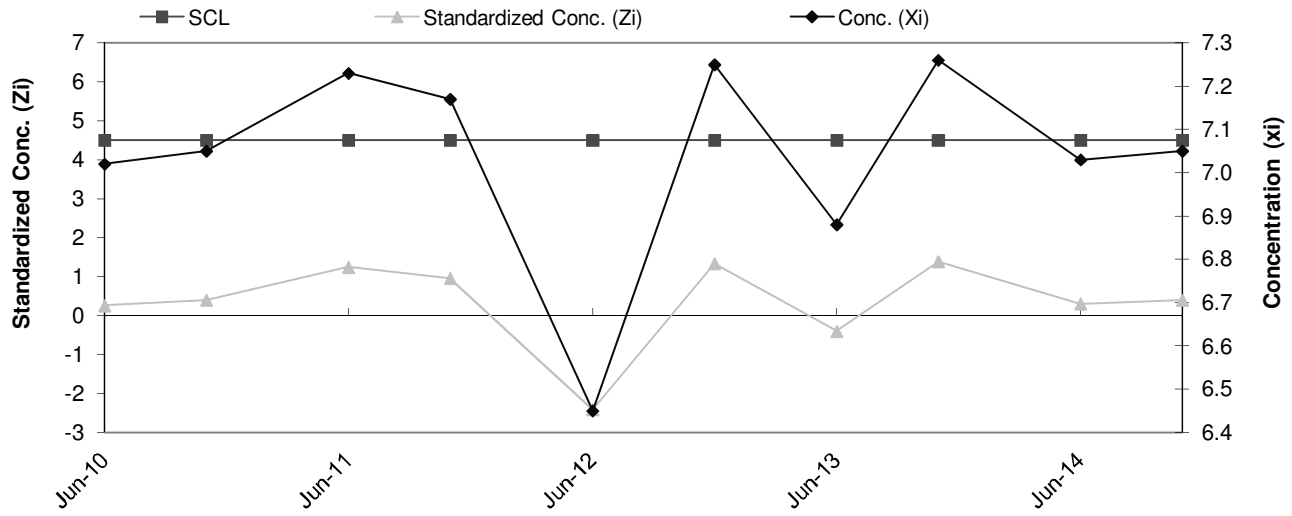


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-28 pH

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Jun-06	7.1		
2	Dec-06	7.4		
3	Jun-07	6.8		
4	Nov-07	6.8	**6.97**	**0.21**
5	Jun-08	6.9		
6	Nov-08	6.8		
7	Jun-09	7.0		
8	Nov-09	6.9		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	Jun-10	4.5	7.0	0.26
10	Nov-10	4.5	7.1	0.40
11	Jun-11	4.5	7.2	1.24
12	Nov-11	4.5	7.2	0.96
13	Jun-12	4.5	6.5	-2.42
14	Dec-12	4.5	7.3	1.34
15	Jun-13	4.5	6.9	-0.40
16	Nov-13	4.5	7.3	1.38
17	Jun-14	4.5	7.0	0.31
18	Nov-14	4.5	7.1	0.40

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean

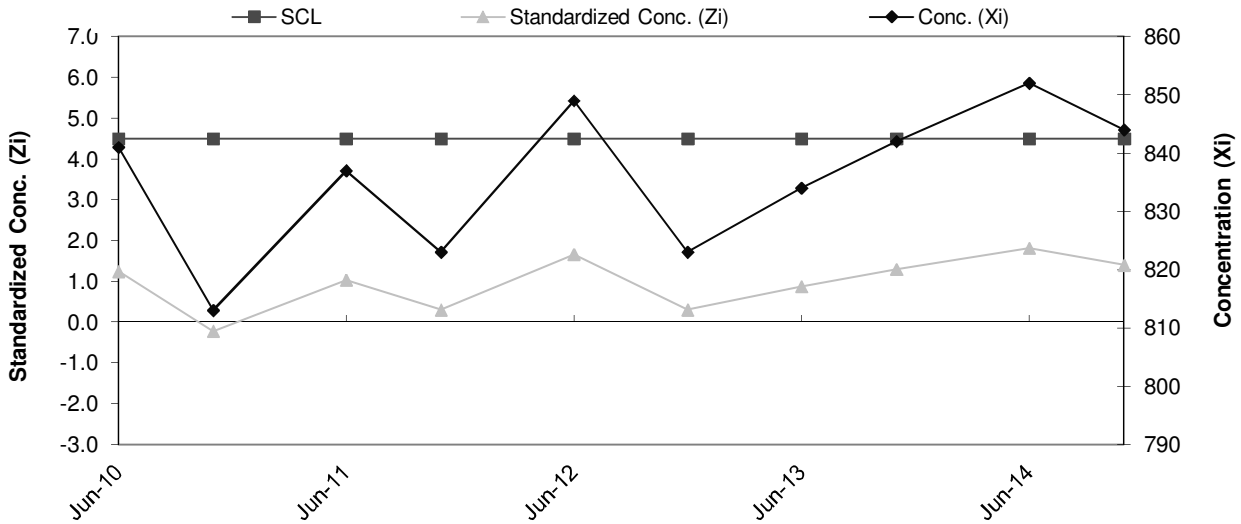


COLDWATER ROAD LANDFILL FACILITY
RCRA GROUND WATER DETECTION MONITORING SYSTEM
SHEWART CONTROL CHART
B-28 SpC

Baseline Data				
Ti	Date	Conc.	Mean	Std. Dev
1	Jun-06	785		
2	Dec-06	812		
3	Jun-07	845		
4	Nov-07	816	**817.25**	**19.14**
5	Jun-08	840		
6	Nov-08	804		
7	Jun-09	822		
8	Nov-09	814		

Ti	Date	SCL	Conc. (Xi)	Standardized Conc. (Zi)
9	Jun-10	4.5	841	1.24
10	Nov-10	4.5	813	-0.22
11	Jun-11	4.5	837	1.03
12	Nov-11	4.5	823	0.30
13	Jun-12	4.5	849	1.66
14	Dec-12	4.5	823	0.30
15	Jun-13	4.5	834	0.87
16	Nov-13	4.5	842	1.29
17	Jun-14	4.5	852	1.82
18	Nov-14	4.5	844	1.40

h = Decision Value for CUSUM, SCL = Shewart Control Limit, k = Standard Error Shift Detection Parameter, Zi = Standardized Mean



More than Engineering Solutions

All materials printed on recycled paper.

O'BRIEN & GERE
www.obg.com