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MEMORANDUM

Sent via email

TO: Michael Berkoff, USEPA

REF. NO.: 056393-08

FROM: Greg Carli/Jodie Dembowske/adh/16

DATE: November 7, 2012

C.C.: 12th Street Landfill Technical Team:
Richard Gay, Weyerhaeuser; Kristi Zakrzewski, MDEQ;
John Bradley, MDEQ; Jeff Keiser, CH2MHill;
Scott Hutsell, CH2MHill

US EPA RECORDS CENTER REGION 5
468819

RE: **July 2012 Semiannual Groundwater Sampling Results**
12th Street Landfill-Operable Unit No. 4-Allied Paper/Portage Creek/Kalamazoo River Superfund Site, Otsego Township, Michigan

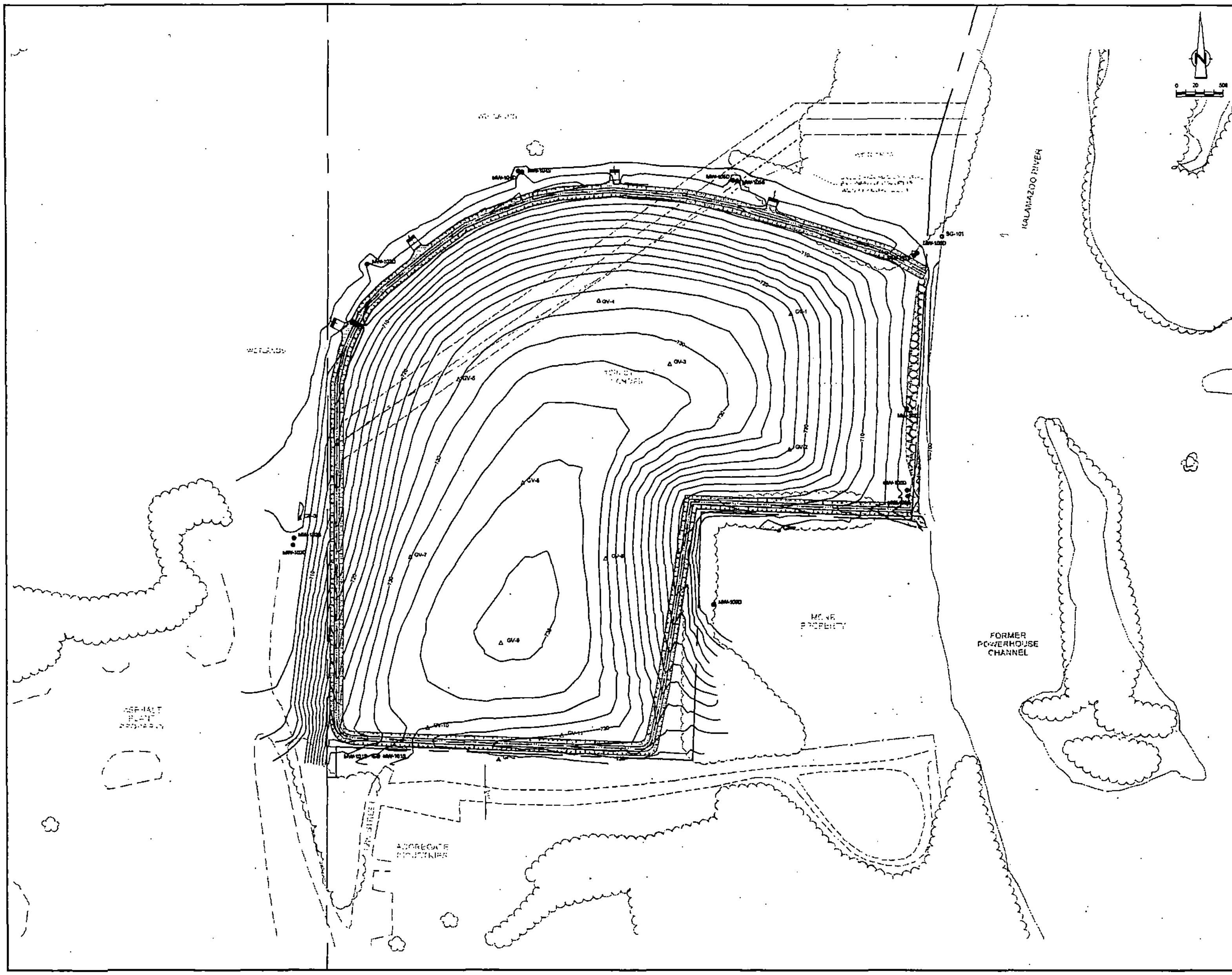
This memorandum has been prepared by Conestoga-Rovers & Associates (CRA) to summarize the results of the July 2012 semiannual groundwater sampling event performed at the 12th Street Landfill, Operable Unit No. 4 – Allied Paper/Portage Creek/Kalamazoo River Superfund Site, located in Otsego Township, Michigan between July 23 and July 25, 2012.

The July 2012 sampling event was the second semiannual sampling event performed as part of the Operation, Maintenance, and Monitoring (OM&M) activities at the Site. The most recent sampling event prior to this was the April 2012 quarterly event.

A total of 15 groundwater monitoring wells (MW-101S, MW-101D, MW-102S, MW-102D, MW-103D, MW-104S, MW-104D, MW-105S, MW-105D, MW-106S, MW-106D, MW-107S, MW-108S, MW-108D, and MW-109D) were installed in February 2011, at varying depths, around the perimeter of the landfill to complete the OM&M monitoring well network. The locations of the monitoring wells are shown on Figure 1. Prior to the July 2012 sampling event, CRA collected static water levels for 2 weeks from each well and the river staff gauge, as required by the OM&M Plan (May 2011). Monitoring well construction details and groundwater elevations from the water level collection event are presented in Table 1. Figure 2 presents the shallow groundwater elevation contours, and Figure 3 presents the deep groundwater elevation contours, both from the pre-sampling water level event on July 23, 2012.

During the July 2012 groundwater sampling event, samples were collected from each monitoring well in the monitoring well network. Field measurements of pH, oxidation-reduction potential (ORP), dissolved oxygen (DO), conductivity (mS/cm), temperature (Deg C), and turbidity (NTU) were collected. Samples were collected using low flow sampling and submitted for laboratory analysis of polychlorinated biphenyls (PCBs), polychlorinated dibenzodioxins/polychlorinated dibenzofurans (PCDD/PCDF), target analyte list (TAL) for inorganics, cyanide, target compound list (TCL) semi-volatile organic compounds (SVOCs) and TCL volatile compounds (VOCs). The July 2012 analytical results were compared to Michigan Act 451, Part 201 Cleanup Criteria and Part 213 Risk-based Screening Levels: Residential and Non-Residential

REGISTERED COMPANY FOR ISO 9001 ENGINEERING DESIGN



LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING EDGE OF WATER
- EXISTING TREES AND/OR BRUSH
- 718 FINAL ELEVATION CONTOURS
- ROAD/DRAINAGE SWALE
- GV-1 GAS VENT LOCATION
- MW-105S MONITORING WELL LOCATION
- GP-1 GAS PROBE LOCATION
- SG-101 STAFF GAUGE LOCATION

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

12th STREET LANDFILL
OTSEGO TOWNSHIP, MICHIGAN

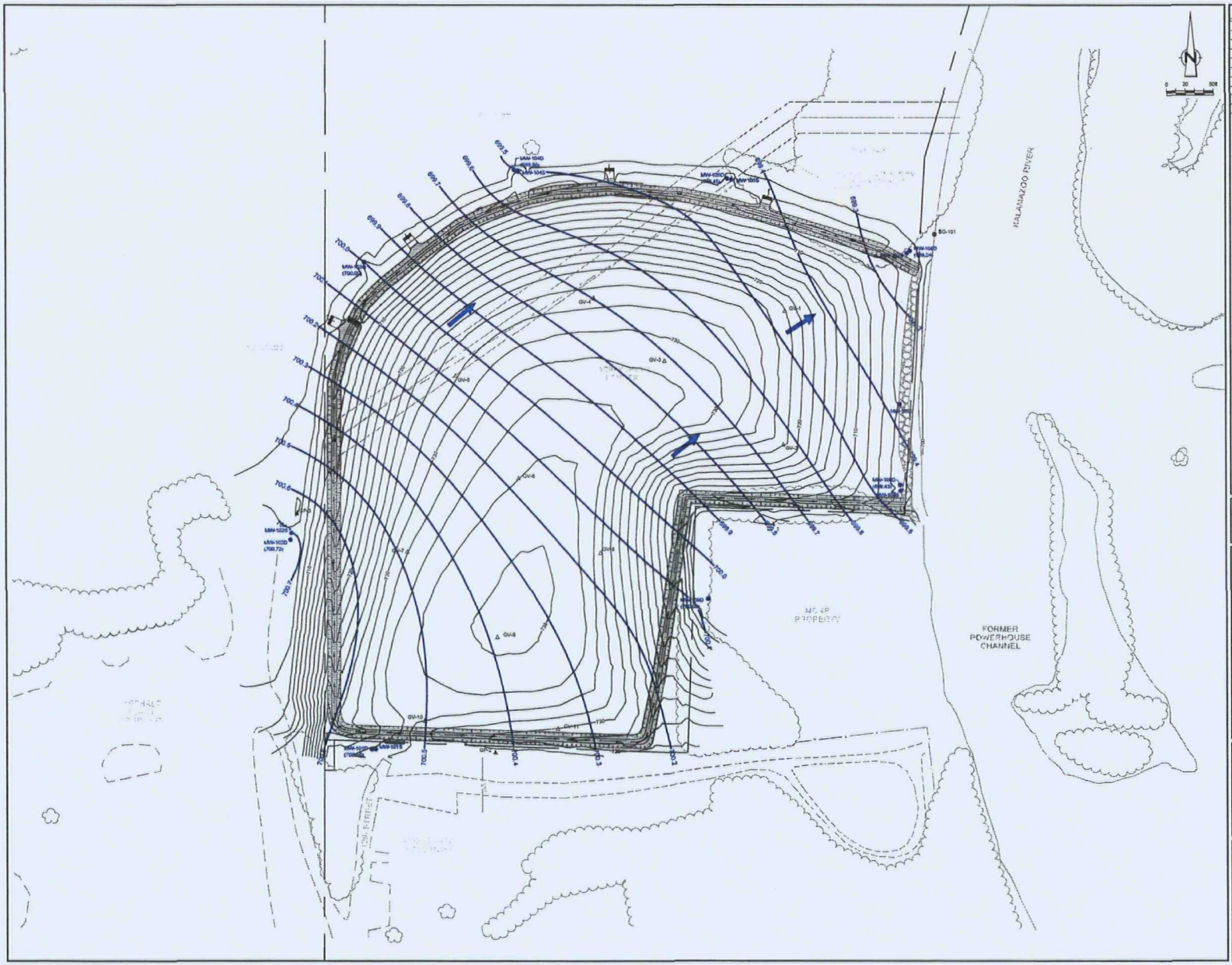
MONITORING WELL LOCATIONS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE ADAPTED FROM PREVIOUS RI/7 DESIGN

Project Manager:	Reviewed By:	Date	
J. DEMBOWSKE	G. CARLI	OCTOBER 2012	
Scale: AS SHOWN	Project Nº: 056393-08	Report Nº: MEMO016	Drawing Nº: figure 1

056393-08(MEMO016)GN-SC002 NOV 6/2012



N/2	Revision	Date	Initial

LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING EDGE OF WATER
- EXISTING TREES AND/OR BRUSH
- 718 FINAL ELEVATION CONTOURS
- ROAD/DRAINAGE SWALE
- GV-1 GAS VENT LOCATION
- MW-106S MONITORING WELL LOCATION
- GP-1 GAS PROBE LOCATION
- SG-101 STAFF GAUGE LOCATION
- 700.40 GROUNDWATER ELEVATION CONTOUR
- (700.33) GROUNDWATER ELEVATION
- GROUNDWATER FLOW DIRECTION

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

12th STREET LANDFILL
OTSEGO TOWNSHIP, MICHIGAN

GROUNDWATER ELEVATION CONTOURS
DEEP - JULY 23, 2012

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE ADAPTED FROM PREVIOUS RMT DESIGN

Project Manager:	Reviewed By:	Date:	
J. DEMBOWSKE	G. CARLI	OCTOBER 2012	
Scale:	Project N/R:	Report N/R:	Drawing N/R:
AS SHOWN	056393-08	MEMO016	figure 3

056393-08(MEMO016)GN-SC004 NOV 9/2012

TABLE 1

GROUNDWATER LEVEL ELEVATION DATA
JULY 2012 WATER LEVEL DATA
12th STREET LANDFILL
OTSEGO TOWNSHIP, MICHIGAN

Locations	*Ground Surface Elevation (feet AMSL)*	*Reference Elevation (feet AMSL)*	*Monitoring Well Depth (feet bgs)*	*Screened Interval (feet AMSL)*	*July 2012 Water Level Data Water Level Elevation (feet AMSL)*						
					Date						
					7/9/2012	7/11/2012	7/13/2012	7/16/2012	7/18/2012	7/20/2012	7/23/2012
MW-101S	734.35	737.46	39	702.35 to 695.35	700.49	700.36	700.47	700.42	700.48	700.69	700.55
MW-101D	734.33	737.14	75	664.33 to 659.33	700.48	700.32	700.44	700.34	700.26	700.68	700.55
MW-102S	704.18	707.36	10	701.18 to 694.18	700.56	700.39	700.51	700.56	700.56	700.74	700.68
MW-102D	704.43	707.43	45	664.43 to 659.43	700.57	700.43	700.54	700.57	700.58	700.87	700.72
MW-103D	704.37	707.36	35	674.37 to 669.37	699.80	699.62	699.80	699.84	699.96	700.22	700.00
MW-104S	703.86	706.55	25.5	684.86 to 677.86	699.25	699.03	699.27	699.34	699.45	699.70	699.45
MW-104D	703.48	706.42	45	663.48 to 658.48	699.30	699.06	699.30	699.34	699.47	699.70	699.50
MW-105S	704.89	707.86	12	699.89 to 692.89	699.04	698.79	699.11	699.15	699.26	699.44	699.24
MW-105D	704.78	707.89	47	662.78 to 657.78	699.32	699.03	699.33	699.40	699.41	699.56	699.45
MW-106S	703.88	706.96	9	701.88 to 694.88	698.91	698.64	699.00	699.03	699.08	699.24	699.11
MW-106D	703.66	706.36	45	664.66 to 659.66	699.16	698.84	699.16	699.21	699.22	699.34	699.24
MW-107S	703.76	706.73	13	695.76 to 690.76	699.23	698.90	699.24	699.29	699.29	699.43	699.33
MW-108S	703.32	706.21	9	701.32 to 694.32	699.39	698.38	698.72	698.77	698.77	699.56	699.50
MW-108D	703.39	706.16	45	663.39 to 658.39	699.30	699.02	699.36	699.39	699.38	699.49	699.43
MW-109D	707.41	710.46	23	689.41 to 684.41	700.06	703.28	703.63	703.67	703.66	700.19	700.08
SG-101	700.9	703.05	-	-	698.75	698.35	698.77	698.83	698.81	698.95	698.85

Notes:
[ ] Indicates that water level in monitoring well is lower than the river elevation.
feet AMSL - feet above mean sea level.
feet bgs - feet below ground surface.

TABLE 2

SUMMARY OF JULY 2012 GROUNDWATER ANALYTICAL RESULTS
12th STREET LANDFILL
OTSEGO TOWNSHIP, MICHIGAN

Sample Location:		Michigan Act 451, Part 201 Cleanup Criteria and Part 213 Risk-based Screening Levels: Residential and Non-Residential Generic Cleanup Criteria [1]			*MW-101S*	*MW-101D*	*MW-102S*	*MW-102D*
Sample Identification:					*WG-56393-072512-JV-094*	*WG-56393-072512-JV-095*	*WG-56393-072312-JV-075*	*WG-56393-072312-JV-076*
Sample Date:					*7/25/2012*	*7/25/2012*	*7/23/2012*	*7/23/2012*
Sample Type:		Residential Drinking Water [a]	Non-Residential Drinking Water [b]	Groundwater Surface Water Interface [c]				
	Units							
Semi-Volatile Organic Compounds								
Acenaphthene	µg/L	1300	3800	38	0.20 U	0.20 U	0.20 U	0.20 U
Acenaphthylene	µg/L	52	150	ID	0.20 U	0.20 U	0.20 U	0.20 U
Anthracene	µg/L	43	43	ID	0.20 U	0.20 U	0.20 U	0.20 U
Benzo(a)anthracene	µg/L	2.1	8.5	ID	0.20 U	0.20 U	0.20 U	0.20 U
Benzo(a)pyrene	µg/L	5	5	ID	0.20 U	0.20 U	0.20 U	0.20 U
Benzo(b)fluoranthene	µg/L	1.5	1.5	ID	0.20 U	0.20 U	0.20 U	0.20 U
Benzo(g,h,i)perylene	µg/L	1	1	-	0.20 U	0.20 U	0.20 U	0.20 U
Benzo(k)fluoranthene	µg/L	1	1	-	0.20 U	0.20 U	0.20 U	0.20 U
Butyl benzylphthalate (BBP)	µg/L	1200	2700	67	0.20 U	0.20 U	0.20 U	0.20 U
Carbazole	µg/L	85	350	10	0.20 U	0.20 U	0.20 U	0.20 U
4-Chloro-3-methylphenol	µg/L	150	420	7.4	0.49 U	0.49 U	0.50 U	0.49 U
bis(2-Chloroethyl)ether	µg/L	2	8.3	1	0.20 U	0.20 U	0.20 U	0.20 U
2-Chlorophenol	µg/L	45	130	18	0.49 U	0.49 U	0.50 U	0.49 U
Chrysene	µg/L	1.6	1.6	ID	0.20 U	0.20 U	0.20 U	0.20 U
Dibenz(a,h)anthracene	µg/L	2	2	ID	0.20 U	0.20 U	0.20 U	0.20 U
Dibenzofuran	µg/L	ID	ID	4	0.20 U	0.20 U	0.20 U	0.20 U
3,3'-Dichlorobenzidine	µg/L	1.1	4.3	0.3	2.0 U	2.0 U	2.0 U	2.0 U
2,4-Dichlorophenol	µg/L	73	210	11	0.49 U	0.49 U	0.50 U	0.49 U
Diethyl phthalate	µg/L	5500	16000	110	0.20 U	0.20 U	0.20 U	0.20 U
Dimethyl phthalate	µg/L	73000	210000	-	0.20 U	0.20 U	0.20 U	0.20 U
2,4-Dimethylphenol	µg/L	370	1000	380	3.9 U	3.9 U	4.0 U	3.9 U
Di-n-butylphthalate (DBP)	µg/L	880	2500	9.7	0.20 U	0.20 U	0.20 U	0.20 U
4,6-Dinitro-2-methylphenol	µg/L	20	20	-	2.0 U	2.0 U	2.0 U	2.0 U
2,4-Dinitrotoluene	µg/L	7.7	32	-	0.20 U	0.20 U	0.20 U	0.20 U
Di-n-octyl phthalate (DnOP)	µg/L	130	380	ID	0.20 U	0.20 U	0.20 U	0.20 U
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	6	6	25	0.97 U	0.97 U	0.17 J	0.97 U
Fluoranthene	µg/L	210	210	1.6	0.20 U	0.20 U	0.20 U	0.20 U
Fluorene	µg/L	880	2000	12	0.20 U	0.20 U	0.20 U	0.20 U
Hexachlorobenzene	µg/L	1	1	0.2	0.20 U	0.20 U	0.20 U	0.20 U
Hexachlorobutadiene	µg/L	15	42	0.053	0.20 U	0.20 U	0.20 U	0.20 U
Hexachlorocyclopentadiene	µg/L	50	50	ID	0.97 U	0.97 U	1.0 U	0.97 U
Hexachloroethane	µg/L	7.3	21	6.7	0.20 U	0.20 U	0.20 U	0.20 U
Indeno(1,2,3-cd)pyrene	µg/L	2	2	ID	0.20 U	0.20 U	0.20 U	0.20 U
Isophorone	µg/L	770	3100	1300	0.20 U	0.20 U	0.20 U	0.20 U
2-Methylnaphthalene	µg/L	260	750	19	0.20 U	0.20 U	0.20 U	0.20 U
2-Methylphenol	µg/L	370	1000	30	0.49 U	0.49 U	0.50 U	0.49 U
4-Methylphenol	µg/L	370	1000	30	0.49 U	0.49 U	0.50 U	0.49 U
Naphthalene	µg/L	520	1500	11	0.20 U	0.20 U	0.20 U	0.20 U
Nitrobenzene	µg/L	3.4	9.6	180	0.20 U	0.20 U	0.20 U	0.20 U
2-Nitrophenol	µg/L	20	58	ID	0.49 U	0.49 U	0.50 U	0.49 U
N-Nitrosodi-n-propylamine	µg/L	5	5	-	0.20 U	0.20 U	0.20 U	0.20 U
N-Nitrosodiphenylamine	µg/L	270	1100	-	0.20 U	0.20 U	0.20 U	0.20 U
Pentachlorophenol	µg/L	1	1	G,X	0.97 U	0.97 U	1.0 U	0.97 U
Phenanthrene	µg/L	52	150	2	0.20 U	0.20 U	0.20 U	0.20 U
Phenol	µg/L	4400	13000	450	0.49 U	0.49 U	0.50 U	0.49 U
Pyrene	µg/L	140	140	ID	0.20 U	0.20 U	0.20 U	0.20 U
2,4,5-Trichlorophenol	µg/L	730	2100	-	0.49 U	0.49 U	0.50 U	0.49 U
2,4,6-Trichlorophenol	µg/L	120	470	5	0.49 U	0.49 U	0.50 U	0.49 U

TABLE 2

SUMMARY OF JULY 2012 GROUNDWATER ANALYTICAL RESULTS
12th STREET LANDFILL
OTSEGO TOWNSHIP, MICHIGAN

Sample Location:		Michigan Act 451, Part 201 Cleanup Criteria and Part 213 Risk-based Screening Levels: Residential and Non-Residential Generic Cleanup Criteria [1]			*MW-101S*	*MW-101D*	*MW-102S*	*MW-102D*
Sample Identification:					*WG-56393-072512-JV-094*	*WG-56393-072512-JV-095*	*WG-56393-072312-JV-075*	*WG-56393-072312-JV-076*
Sample Date:					*7/25/2012*	*7/25/2012*	*7/23/2012*	*7/23/2012*
Sample Type:		Residential Drinking Water [a]	Non-Residential Drinking Water [b]	Groundwater Surface Water Interface [c]				
	Units							
Metals								
Aluminum	µg/L	50	50	-	7.6 U	6.4 U	4.3	3.6
Antimony	µg/L	6	6	130	0.050 U	0.050 U	0.050 U	0.050 U
Arsenic	µg/L	10	10	10	0.3 J	0.2 J	0.2 J	0.2 J
Barium	µg/L	2000	2000	1400	89.0	76.0	91.9	67.1
Beryllium	µg/L	4	4	41	0.020 U	0.020 U	0.020 U	0.020 U
Cadmium	µg/L	5	5	5.1	0.020 U	0.020 U	0.014 J	0.010 J
Chromium (total)	µg/L	100	100	11	0.20 U	0.29 U	0.09 J	0.19 J
Chromium VI (hexavalent)	µg/L	100	100	11	2.0 U	2.0 U	2.0 UJ	2.0 UJ
Cobalt	µg/L	40	100	100	0.105	0.106	0.252	0.071
Copper	µg/L	1000	1000	23	0.45	0.47	0.53	0.30
Iron	µg/L	300	300	-	43.0	18.5 J	26.2	8.0 J
Lead	µg/L	4	4	34	0.046 U	0.047 U	0.046	0.065
Magnesium	µg/L	400000	1100000	-	24900	23700	24000	22800
Manganese	µg/L	50	50	5200	2.790	0.784 U	133[d,e]	0.291
Mercury	µg/L	2	2	0.0013	0.00062 J	0.00102	0.001 U	0.001 U
Nickel	µg/L	100	100	130	0.81 U	0.97 U	1.03	0.60
Selenium	µg/L	50	50	5	1.0 U	1.0 U	1.0 U	1.0 U
Silver	µg/L	34	98	0.2	0.020 U	0.020 U	0.020 U	0.020 U
Sodium	µg/L	120000	350000	-	24600	23700	21700	19400
Thallium	µg/L	2	2	3.7	0.020 U	0.021 U	0.048	0.020 U
Vanadium	µg/L	4.5	62	12	0.20 U	0.20 U	0.05 J	0.10 J
Zinc	µg/L	2400	5000	310	0.7 U	1.4 U	0.8	1.0
General Chemistry								
Cyanide (amenable)	µg/L	200	200	-	10 U	10 U	10 U	10 U
Cyanide (total)	µg/L	200	200	5.2	10 U	10 U	10 U	10 U
Field Parameters								
Conductivity	mS/cm	-	-	-	0.901	0.669	0.676	0.599
Dissolved oxygen (DO)[3]	mg/L	-	-	-	5.18	4.25	0.68	1.93
Oxidation reduction potential (ORP)	millivolts	-	-	-	77	104	33	90
pH	s.u.	6.5 - 8.5	6.5 - 8.5	-	6.6	7.43	7.03	7.18
Temperature	Deg C	-	-	-	16.8	15.28	24.09	20.18
Turbidity	NTU	-	-	-	3.03	0.92	2.26	1.8

Notes:
[1] Cleanup criteria identified by MDEQ RRD Op Memo No. 1, updated 9/28/12, pursuant to 1994 PA 451 as amended.
[2] Also known as Methyl isobutyl ketone (MIBK).

U - Not present at or above the associated value.
J - Laboratory qualifiers - estimated concentration.

TABLE 2

SUMMARY OF JULY 2012 GROUNDWATER ANALYTICAL RESULTS
12th STREET LANDFILL
OTSEGO TOWNSHIP, MICHIGAN

Sample Location:		*MW-103D*	*MW-104S*	*MW-104D*	*MW-105S*	*MW-105D*	*MW-106S*
Sample Identification:		*WG-56393-072312-JV-077*	*WG-56393-072312-JV-078*	*WG-56393-072312-JV-079*	*WG-56393-072412-JV-084*	*WG-56393-072412-JV-085*	*WG-56393-072412-JV-086*
Sample Date:		*7/23/2012*	*7/23/2012*	*7/23/2012*	*7/24/2012*	*7/24/2012*	*7/24/2012*
Sample Type:							
	Units						
Semi-Volatile Organic Compounds							
Acenaphthene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Acenaphthylene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Anthracene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Benzo(a)anthracene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Benzo(a)pyrene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Benzo(b)fluoranthene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Benzo(g,h,i)perylene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Benzo(k)fluoranthene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Butyl benzylphthalate (BBP)	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Carbazole	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
4-Chloro-3-methylphenol	µg/L	0.49 U	0.50 U	0.49 U	0.49 U	0.50 U	0.49 U
bis(2-Chloroethyl)ether	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
2-Chlorophenol	µg/L	0.49 U	0.50 U	0.49 U	0.49 U	0.50 U	0.49 U
Chrysene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Dibenz(a,h)anthracene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Dibenzofuran	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
3,3'-Dichlorobenzidine	µg/L	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
2,4-Dichlorophenol	µg/L	0.49 U	0.50 U	0.49 U	0.49 U	0.50 U	0.49 U
Diethyl phthalate	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Dimethyl phthalate	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.047 J	0.20 U
2,4-Dimethylphenol	µg/L	3.9 U	4.0 U	3.9 U	3.9 U	4.0 U	3.9 U
Di-n-butylphthalate (DBP)	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
4,6-Dinitro-2-methylphenol	µg/L	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
2,4-Dinitrotoluene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Di-n-octyl phthalate (DnOP)	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	0.97 U	0.99 U	0.97 U	0.97 U	0.22 J	0.97 U
Fluoranthene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Fluorene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Hexachlorobenzene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Hexachlorobutadiene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Hexachlorocyclopentadiene	µg/L	0.97 U	0.99 U	0.97 U	0.97 U	0.99 U	0.97 U
Hexachloroethane	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Indeno(1,2,3-cd)pyrene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Isophorone	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
2-Methylnaphthalene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
2-Methylphenol	µg/L	0.49 U	0.50 U	0.49 U	0.49 U	0.50 U	0.49 U
4-Methylphenol	µg/L	0.49 U	0.50 U	0.49 U	0.49 U	0.50 U	0.49 U
Naphthalene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Nitrobenzene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
2-Nitrophenol	µg/L	0.49 U	0.50 U	0.49 U	0.49 U	0.50 U	0.49 U
N-Nitrosodi-n-propylamine	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
N-Nitrosodiphenylamine	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Pentachlorophenol	µg/L	0.97 U	0.99 U	0.97 U	0.97 U	0.99 U	0.97 U
Phenanthrene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Phenol	µg/L	0.49 U	0.50 U	0.49 U	0.49 U	0.50 U	0.49 U
Pyrene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
2,4,5-Trichlorophenol	µg/L	0.49 U	0.50 U	0.49 U	0.49 U	0.50 U	0.49 U
2,4,6-Trichlorophenol	µg/L	0.49 U	0.50 U	0.49 U	0.49 U	0.50 U	0.49 U

TABLE 2

SUMMARY OF JULY 2012 GROUNDWATER ANALYTICAL RESULTS
12th STREET LANDFILL
OTSEGO TOWNSHIP, MICHIGAN

Sample Location:		*MW-103D*	*MW-104S*	*MW-104D*	*MW-105S*	*MW-105D*	*MW-106S*
Sample Identification:		*WG-56393-072312-JV-077*	*WG-56393-072312-JV-078*	*WG-56393-072312-JV-079*	*WG-56393-072412-JV-084*	*WG-56393-072412-JV-085*	*WG-56393-072412-JV-086*
Sample Date:		*7/23/2012*	*7/23/2012*	*7/23/2012*	*7/24/2012*	*7/24/2012*	*7/24/2012*
Sample Type:							
	Units						
Metals							
Aluminum	µg/L	5.3	4.3	3.2	1.6 J	2.4	6.8
Antimony	µg/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
Arsenic	µg/L	0.2 J	0.3 J	0.2 J	0.3 J	0.1 J	17.5[a,b]
Barium	µg/L	59.8	70.7	67.3	111	71.5	347
Beryllium	µg/L	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
Cadmium	µg/L	0.020 U	0.010 J	0.020 U	0.010 J	0.020 U	0.020 U
Chromium (total)	µg/L	0.19 J	0.14 J	0.33	0.12 J	0.17 J	0.19 J
Chromium VI (hexavalent)	µg/L	2.0 UJ	2.0 UJ	2.0 UJ	2.0 U	2.0 U	2.0 U
Cobalt	µg/L	0.092	0.094	0.086	0.332	0.086	0.528
Copper	µg/L	0.33	0.28	0.29	0.40	0.30	0.24
Iron	µg/L	17.5 J	12.0 J	5.4 J	80.5	4.0 J	13500[a,b]
Lead	µg/L	0.023	0.027	0.017 J	0.015 J	0.033	0.031
Magnesium	µg/L	21400	22800	22600	27100	24500	27600
Manganese	µg/L	0.882	0.666	0.196	79.1[a,b]	0.183	406[a,b]
Mercury	µg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Nickel	µg/L	0.67	0.69	0.77	1.01	0.60	1.01
Selenium	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Silver	µg/L	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
Sodium	µg/L	19300	20200	20200	23700	22000	22400
Thallium	µg/L	0.022 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
Vanadium	µg/L	0.13 J	0.13 J	0.11 J	0.04 J	0.06 J	0.13 J
Zinc	µg/L	0.4 J	0.7	0.5	0.4 J	2.2	0.8
General Chemistry							
Cyanide (amenable)	µg/L	10 U	10 U	10 U	10 U	10 U	10 U
Cyanide (total)	µg/L	10 U	10 U	10 U	10 U	10 U	10 U
Field Parameters							
Conductivity	mS/cm	0.98	0.617	0.619	0.738	0.631	1.31
Dissolved oxygen (DO)[3]	mg/L	2.48	1.42	3.09	0.96	3.21	2.60
Oxidation reduction potential (ORP)	millivolts	36	103	116	51	109	-143
pH	s.u.	6.9	7.28	7.42	7.04	7.23	6.5
Temperature	Deg C	19.9	17.29	20.4	18.98	16.92	16.8
Turbidity	NTU	2..97	1.42	1.78	0.87	0.62	3.85

Notes:
[1] Cleanup criteria identified by MDEQ RRD Op Memo No. 1, updated 9/28/12, pursuant to 1994 PA 451 as amended.
[2] Also known as Methyl isobutyl ketone (MIBK).

U - Not present at or above the associated value.
J - Laboratory qualifiers - estimated concentration.

TABLE 2

SUMMARY OF JULY 2012 GROUNDWATER ANALYTICAL RESULTS
12th STREET LANDFILL
OTSEGO TOWNSHIP, MICHIGAN

Sample Location:		*MW-106D*	*MW-107S*	*MW-108S*	*MW-108D*	*MW-109D*	*MW-109D*
Sample Identification:		*WG-56393-072412-JV-087*	*WG-56393-072412-JV-088*	*WG-56393-072412-JV-089*	*WG-56393-072412-JV-090*	*WG-56393-072312-JV-080*	*WG-56393-072312-JV-081*
Sample Date:		*7/24/2012*	*7/24/2012*	*7/24/2012*	*7/24/2012*	*7/23/2012*	*7/23/2012*
Sample Type:							*Duplicate*
	Units						
Semi-Volatile Organic Compounds							
Acenaphthene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Acenaphthylene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Anthracene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Benzo(a)anthracene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Benzo(a)pyrene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Benzo(b)fluoranthene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Benzo(g,h,i)perylene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Benzo(k)fluoranthene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Butyl benzylphthalate (BBP)	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Carbazole	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
4-Chloro-3-methylphenol	µg/L	0.49 U	0.49 U	0.50 U	0.49 U	0.49 U	0.49 U
bis(2-Chloroethyl)ether	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
2-Chlorophenol	µg/L	0.49 U	0.49 U	0.50 U	0.49 U	0.49 U	0.49 U
Chrysene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Dibenz(a,h)anthracene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Dibenzofuran	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
3,3'-Dichlorobenzidine	µg/L	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
2,4-Dichlorophenol	µg/L	0.49 U	0.49 U	0.50 U	0.49 U	0.49 U	0.49 U
Diethyl phthalate	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Dimethyl phthalate	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
2,4-Dimethylphenol	µg/L	3.9 U	3.9 U	4.0 U	3.9 U	3.9 U	3.9 U
Di-n-butylphthalate (DBP)	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
4,6-Dinitro-2-methylphenol	µg/L	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
2,4-Dinitrotoluene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Di-n-octyl phthalate (DnOP)	µg/L	0.026 J	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	0.97 U	0.97 U	1.0 U	0.97 U	0.97 U	0.97 U
Fluoranthene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Fluorene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Hexachlorobenzene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Hexachlorobutadiene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Hexachlorocyclopentadiene	µg/L	0.97 U	0.97 U	1.0 U	0.97 U	0.97 U	0.97 U
Hexachloroethane	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Indeno(1,2,3-cd)pyrene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Isophorone	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
2-Methylnaphthalene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
2-Methylphenol	µg/L	0.49 U	0.49 U	0.50 U	0.49 U	0.49 U	0.49 U
4-Methylphenol	µg/L	0.49 U	0.49 U	0.50 U	0.49 U	0.49 U	0.49 U
Naphthalene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Nitrobenzene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
2-Nitrophenol	µg/L	0.49 U	0.49 U	0.50 U	0.49 U	0.49 U	0.49 U
N-Nitrosodi-n-propylamine	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
N-Nitrosodiphenylamine	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Pentachlorophenol	µg/L	0.97 U	0.97 U	1.0 U	0.97 U	0.97 U	0.97 U
Phenanthrene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Phenol	µg/L	0.49 U	0.49 U	0.50 U	0.49 U	0.49 U	0.49 U
Pyrene	µg/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
2,4,5-Trichlorophenol	µg/L	0.49 U	0.49 U	0.50 U	0.49 U	0.49 U	0.49 U
2,4,6-Trichlorophenol	µg/L	0.49 U	0.49 U	0.50 U	0.49 U	0.49 U	0.49 U

TABLE 2

SUMMARY OF JULY 2012 GROUNDWATER ANALYTICAL RESULTS
12th STREET LANDFILL
OTSEGO TOWNSHIP, MICHIGAN

Sample Location:		*MW-106D*	*MW-107S*	*MW-108S*	*MW-108D*	*MW-109D*	*MW-109D*
Sample Identification:		*WG-56393-072412-JV-087*	*WG-56393-072412-JV-088*	*WG-56393-072412-JV-089*	*WG-56393-072412-JV-090*	*WG-56393-072312-JV-080*	*WG-56393-072312-JV-081*
Sample Date:		*7/24/2012*	*7/24/2012*	*7/24/2012*	*7/24/2012*	*7/23/2012*	*7/23/2012*
Sample Type:							*Duplicate*
	Units						
Metals							
Aluminum	µg/L	2.0 J	1.8 J	7.6	3.3	1.4 J	1.7 J
Antimony	µg/L	0.085	0.050 U	0.050 U	0.027 J	0.050 U	0.050 U
Arsenic	µg/L	0.1 J	2.6	0.5	1.9	0.5 U	0.5 U
Barium	µg/L	77.8	105	89.6	285	90.2	89.1
Beryllium	µg/L	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
Cadmium	µg/L	0.006 J	0.030 J	0.020 U	0.007 J	0.007 J	0.006 J
Chromium (total)	µg/L	0.51	0.20 U	0.20	0.16 J	0.14 J	0.15 J
Chromium VI (hexavalent)	µg/L	2.0 U	2.0 U	2.0 U	2.0 U	2.0 UJ	2.0 UJ
Cobalt	µg/L	0.083	0.405	0.186	0.538	0.084	0.097
Copper	µg/L	0.43	0.53	0.51	0.30	0.43	0.46
Iron	µg/L	6.8 J	3540[ab]	98.5	510[ab]	20.0 U	20.0 U
Lead	µg/L	0.027	0.018 J	0.048	0.027	0.032	0.016 J
Magnesium	µg/L	23700	29000	27100	24700	28300	27700
Manganese	µg/L	0.138	723[ab]	29.8	219[ab]	0.061	0.082
Mercury	µg/L	0.001 U	0.001 U	0.00114 U	0.001 U	0.001 U	0.001 U
Nickel	µg/L	0.67	3.04	0.80	1.30	0.80	0.82
Selenium	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Silver	µg/L	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
Sodium	µg/L	23100	23700	23400	39900	23000	22200
Thallium	µg/L	0.020 U	0.098	0.020 U	0.062	0.020 U	0.020 U
Vanadium	µg/L	0.09 J	0.20 U	0.10 J	0.04 J	0.04 J	0.06 J
Zinc	µg/L	0.8	1.9	0.9	1.7	0.7	1.2
General Chemistry							
Cyanide (amenable)	µg/L	10 U	10 U	10 U	10 U	10 U	10 U
Cyanide (total)	µg/L	10 U	10 U	10 U	10 U	10 U	10 U
Field Parameters							
Conductivity	mS/cm	1.03	1.36	0.703	0.707	0.98	0.98
Dissolved oxygen (DO)[3]	mg/L	4.40	3.09	2.34	0.92	4.29	4.29
Oxidation reduction potential (ORP)	millivolts	-67	-108	66	-76	33	33
pH	s.u.	7	6.6	7.32	7.32	6.8	6.8
Temperature	Deg C	15	16.7	13.99	14.87	13.7	13.7
Turbidity	NTU	1.93	4.62	1.65	2.65	1.35	1.35

Notes:
[1] Cleanup criteria identified by MDEQ RRD Op Memo No. 1, updated 9/28/12, pursuant to 1994 PA 451 as amended.
[2] Also known as Methyl isobutyl ketone (MIBK).

U - Not present at or above the associated value.
J - Laboratory qualifiers - estimated concentration.

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MEMORANDUM

TO:	Greg Carli	REF. NO.:	56393
FROM:	Susan Scrocchi/ma/8/Det	DATE:	November 5, 2012
RE:	Data Quality Assessment and Full Validation Groundwater Monitoring – July 2012 12th Street Landfill, Otsego Township, Michigan		

The following details a quality assessment and validation of the analytical data resulting from the July 2012, collection of 15 water samples, and eight (8) quality control samples from the 12th Street Landfill Site in Otsego Township, Michigan. The sample summary detailing sample identification, sample location, quality control samples, and analytical parameters is presented in Table 1. Sample analysis was completed at Columbia Analytical Services in Kelso, Washington (CAS) and CAS in Houston, Texas in accordance with the methodologies presented in Table 2.

The quality control criteria used to assess the data were established by the methods and the quality assurance project plan (QAPP). Application of quality assurance criteria was consistent with following guidance documents:

i. "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review", EPA-540/R-99/008, October 1999

ii. "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review", EPA-540/R-94/013, February 1994

iii. "USEPA Analytical Operations/Data Quality Center (AOC) National Functional Guidelines for Chlorinated Dioxin/Furan Data Review", EPA 540-R-02-003, August 2002

These guidelines are collectively referred to as "NFGs" in this Memorandum.

Sample Quantitation

The laboratory reported detected concentrations of organic and inorganic compounds below the laboratory's report limit (RL) but above the laboratory's method detection limit (MDL). The laboratory flagged these sample concentrations with a "J". These concentrations should be qualified as estimated (J) values unless qualified otherwise in this memorandum.

Continuing Calibration – Organic Analyses

To ensure that each instrument was capable of producing acceptable quantitative data over the analysis period, continuing calibration standards must be analyzed every 12 hours for GC/MS analyses. The following criteria are employed to evaluate the continuing calibration data:

i. GC/MS (VOCs/SVOCs) – must meet a minimum mean RRF of 0.05

ii. GC/MS (VOCs/SVOCs) – the percent difference between the mean initial calibration RRF and the continuing calibration RRF must not exceed 25 percent

iii. GC/MS (VOCs/SVOCs determined by quadratic curve) – the percent drift between the true value and the continuing calibration value must not exceed 25 percent

iv. GC/MS (PCDD/PCDF) – the percent difference between the mean initial calibration RRF and the continuing calibration RRF must not exceed 20 percent for the unlabeled native analyte (30% for the labeled)

v. GC (all compounds using average for multi-response compounds) – the percent difference between mean initial calibration factor and the continuing calibration factor must not exceed 15 percent

vi. GC (compounds determined by linear regression) – the percent drift between the true value and the continuing calibration value must not exceed 15 percent

Calibration standards were analyzed at the required frequency and the results met the above criteria for instrument sensitivity and linearity of response and sensitivity with the exception of the qualified samples presented in Table 5.

Inductively Coupled Plasma/Mass Spectrometer (ICP/MS) –
Mass Calibration and Resolution Checks – Metal Analyses

To ensure adequate mass resolution, identification, and to some degree, sensitivity; the performance of each ICP/MS instrument used for metals analyses was checked prior to calibration before initiating an analysis sequence through the analysis of a tuning solution. The results of the tuning solution analysis were reviewed against the following criteria:

i. Analyze tuning solution a minimum of four times with a percent RSD of less than or equal to five for the analytes contained in the tuning solution

ii. The mass resolution must be within 0.1 amu of the true value over the analytical range

Instrument performance check data were reviewed. The tuning solution was analyzed at the required frequency throughout the analyses. The results of all instrument performance checks were within the acceptance criteria, indicating acceptable instrument performance.

Initial Calibration – Inorganic Analyses

Initial calibration of the instruments ensures that they are capable of producing satisfactory quantitative data at the beginning of a series of analyses. For inductively coupled plasma (ICP) analysis, a calibration blank and at least one standard must be analyzed at each wavelength to establish the analytical curve. For instrumental wet chemistry analysis, a calibration blank and a minimum of four standards must be

Surrogate Compounds – Organic Analyses

Individual sample performance for organic analyses was monitored by assessing the results of surrogate compound percent recoveries. Surrogate percent recoveries are reviewed against the laboratory developed control limits provided in the analytical report.

The surrogate recovery acceptance criteria were met for all samples that could be evaluated.

Matrix Spike/Matrix Spike Duplicate Analyses

To assess the long term accuracy and precision of the analytical methods on various matrices, matrix spike/matrix spike duplicate (MS/MSD) percent recoveries and the relative percent difference (RPD) of the concentrations were determined. The organic MS/MSD percent recovery and RPD control limits are established by the laboratory. The inorganic control limits are defined by the methods or the laboratory and the NFG. The samples selected for MS/MSD analysis are identified in Table 1.

The MS/MSD percent recoveries and associated RPD acceptance criteria were met for most analyses. The samples that should be qualified due to violation of MS percent recovery criteria are outlined in Table 7.

Laboratory Control Sample/Laboratory Control Duplicate Analyses

The laboratory control sample (LCS) and/or laboratory control duplicate (LCD) analyses serve as a monitor of the overall performance in all steps of the sample analysis and are analyzed with each sample batch. The LCS/LCD percent recoveries were evaluated against method and laboratory established control limits.

The LCS/LCD percent recoveries were within the laboratory control limits or did not warrant qualification, indicating that an acceptable level of overall performance was achieved.

Laboratory precision was verified by the relative percent difference (RPD) of the LCS/LCD when a matrix spike/matrix spike duplicate was not analyzed.

The RPDs were within the laboratory control limits, indicating that an acceptable level of overall laboratory precision was achieved.

Inductively Coupled Plasma (ICP) Interference Check Sample Analysis – Inorganic Analyses

To verify that proper inter-element and background correction factors had been established by the laboratory for metals analyses, the ICP interference check samples (ICS) are analyzed. The ICSs are evaluated against recovery control limits of 80 to 120 percent.

The ICS analysis results were evaluated for all samples and were within the control limits.

Internal Standard Summaries – Organic Analyses

To correct for variability in the GC/MS response and sensitivity, internal standard (IS) compounds are added to all samples. All results are calculated as a ratio of the compound and associated IS response. Overall instrument stability and performance for VOC and SVOC analyses was monitored using IS peak

Duplicate Sample Analyses – Inorganic Analyses

The laboratory precision of matrix-specific metals methods was monitored by the analyses of duplicate samples.

The duplicate relative percent difference (RPD), were within the acceptance criteria.

Post Digestion Spike Analyses – Inorganic Analyses

At least one spiked (pre-digestion) sample is prepared and analyzed for each analytical batch of metals. When the pre-digestion spike recovery falls outside of the control limits and the sample result is greater than four times the spike added, a post digestion spike is performed for those analytes that do not meet the specified criteria.

The post digestion spike results were evaluated and were within the control limits.

Contract Required Detection Limit (CRDL) Analyses – Inorganic Analyses

The instrument calibration near the Contract Required Detection Limit (CRDL) must be verified for each analyte reported. An ICP standard solution at the CRDL (CRI) is evaluated against the control limits provided.

The CRI analysis results were evaluated for all samples and were within the control limits with the exceptions outlined in Table 9.

Target Compound Identification

To minimize erroneous compound identification during organic analyses, qualitative criteria including compound retention time and mass spectra (if applicable) were evaluated according to identification criteria established by the methods. The samples identified in Table 1 were reviewed. The organic compounds reported adhered to the specified identification criteria.

The reported quantitation results and detection limits were checked to ensure results reported were accurate. The samples identified in Table 1 were reviewed. No discrepancies were found between the raw data and the sample results reported by the laboratory.

Field Quality Assurance/Quality Control

The field quality assurance/quality control consisted of one (1) field blank (rinsate) sample, six (6) trip blank samples and one (1) field duplicate sample.

Field Blank Samples

To assess the efficiency of field decontamination procedures and cleanliness of sample containers, the rinsate sample identified in Table 1 was collected and analyzed.

The samples that should be qualified due to rinsate blank contamination are summarized in Table 10. No additional targeted analytes were reported as detected in the rinsate samples.

TABLE 1

SAMPLE COLLECTION AND ANALYSIS SUMMARY
GROUNDWATER MONITORING - JULY 2012
12TH STREET LANDFILL
OTSEGO TOWNSHIP, MICHIGAN

						Analysis/Parameter							
Sample Identification	*Location*	*Matrix*	*QC Samples*	*Collection Date (mm/dd/yyyy)*	*Collection Time (hr:min)*	*TCL VOC*	*TCL SVOC*	*TCL PCB*	*PCDD/PCDF*	*TAL Metals*	*LL Mercury*	*Hex Chromium*	*Cyanide (total, amenable)*
CAS Work Order No. K1207120													
WG-56393-072312-JV-075	MW-102S	water	MS/MSD-P	7/23/2012	14:00	X	X	X	X	X	X	X	X
WG-56393-072312-JV-076	MW-102D	water	MS/MSD-P	7/23/2012	14:08	X	X	X	X	X	X	X	X
WG-56393-072312-JV-077	MW-103D	water		7/23/2012	14:05	X	X	X	X	X	X	X	X
WG-56393-072312-JV-078	MW-104S	water		7/23/2012	16:22	X	X	X	X	X	X	X	X
WG-56393-072312-JV-079	MW-104D	water		7/23/2012	16:15	X	X	X	X	X	X	X	X
WG-56393-072312-JV-080	MW-109D	water		7/23/2012	16:35	X	X	X	X	X	X	X	X
WG-56393-072312-JV-081	MW-109D	water	DUP (-080)	7/23/2012	16:50	X	X	X	X	X	X	X	X
TB-56393-072312-JV-082	-	water	Trip Blank	7/23/2012	23:59	X							
TB-56393-072312-JV-083	-	water	Trip Blank	7/23/2012	23:59						X		
CAS Work Order No. K1207180													
WG-56393-072412-JV-084	MW-105S	water		7/24/2012	14:01	X	X	X	X	X	X	X	X
WG-56393-072412-JV-085	MW-105D	water		7/24/2012	14:00	X	X	X	X	X	X	X	X
WG-56393-072412-JV-086	MW-106S	water		7/24/2012	13:55	X	X	X	X	X	X	X	X
WG-56393-072412-JV-087	MW-106D	water		7/24/2012	14:20	X	X	X	X	X	X	X	X
WG-56393-072412-JV-088	MW-107S	water		7/24/2012	16:20	X	X	X	X	X	X	X	X
WG-56393-072412-JV-089	MW-108S	water		7/24/2012	15:45	X	X	X	X	X	X	X	X
WG-56393-072412-JV-090	MW-108D	water		7/24/2012	15:48	X	X	X	X	X	X	X	X
TB-56393-072412-JV-091	-	water	Trip Blank	7/24/2012	23:59	X							
TB-56393-072412-JV-092	-	water	Trip Blank	7/24/2012	23:59						X		

TABLE 2

SUMMARY OF ANALYTICAL METHODS, HOLDING TIME PERIODS, AND PRESERVATIVES
GROUNDWATER MONITORING - JULY 2012
12TH STREET LANDFILL
OTSEGO TOWNSHIP, MICHIGAN

Parameter	*Method* [1]	*Matrix*	*Holding Time*	*Preservation*
TCL VOC	SW-846 8260	Water	- 14 days from sample collection to completion of analysis.	pH < 2 and Iced, 4 ± 2° C
TCL SVOC	SW-846 8270	Water	- 7 days from sample collection to extraction - 40 days from extraction to completion of analysis	Iced, 4 ± 2° C
PCB	SW-846 8082	Water	- 7 days from sample collection to extraction - 40 days from extraction to completion of analysis	Iced, 4 ± 2° C
PCDD/PCDF	SW-846 8290	Water	- 30 days from sample collection to extraction - 45 days from extraction to completion of analysis	Iced, 4 ± 2° C
TAL Metals		Water	- 180 days from sample collection to completion of analysis	pH < 2 and Iced, 4 ± 2° C
Aluminum	EPA-WW 200.8			
Antimony	EPA-WW 200.8			
Arsenic	EPA-WW 200.8			
Barium	EPA-WW 200.8			
Beryllium	EPA-WW 200.8			
Cadmium	EPA-WW 200.8			
Chromium	EPA-WW 200.8			
Cobalt	EPA-WW 200.8			
Copper	EPA-WW 200.8			
Iron	EPA-WW 200.7			
Lead	EPA-WW 200.8			
Magnesium	EPA-WW 200.7			
Manganese	EPA-WW 200.8			
Nickel	EPA-WW 200.8			
Selenium	EPA-WW 200.8			
Silver	EPA-WW 200.8			
Sodium	EPA-WW 200.7			
Thallium	EPA-WW 200.8			
Vanadium	EPA-WW 200.8			
Zinc	EPA-WW 200.8			
LL-Mercury	EPA 1631	Water	- 28 days from sample collection to completion of analysis	pH < 2 and Iced, 4 ± 2° C

TABLE 3

SUMMARY OF QUALIFIED SAMPLE RESULTS DUE TO VIOLATION OF HOLDING TIME PERIOD
GROUNDWATER MONITORING - JULY 2012
12TH STREET LANDFILL
OTSEGO TOWNSHIP, MICHIGAN

Parameter	*Analyte*	*Holding Time (hour)*	*Holding Time Criteria (hours)*	*Sample ID*	*Qualified Sample Results*	*Units*
TAL Metals	Hexavalent Chromium	46	24	WG-56393-072312-JV-075	2.0 UJ	µg/L
		46	24	WG-56393-072312-JV-076	2.0 UJ	µg/L
		46	24	WG-56393-072312-JV-077	2.0 UJ	µg/L
		46	24	WG-56393-072312-JV-078	2.0 UJ	µg/L
		46	24	WG-56393-072312-JV-079	2.0 UJ	µg/L
		46	24	WG-56393-072312-JV-080	2.0 UJ	µg/L
		46	24	WG-56393-072312-JV-081	2.0 UJ	µg/L

Notes:

UJ - Non-detect with an Estimated Report Limit

TAL - Target Analyte List

TABLE 4

SUMMARY OF QUALIFIED SAMPLE DATA DUE TO VIOLATION OF INITIAL CALIBRATION ACCEPTANCE CRITERIA
GROUNDWATER MONITORING - JULY 2012
12TH STREET LANDFILL
OTSEGO TOWNSHIP, MICHIGAN

Parameter	*Analyte*	*Calibration Date*	*RRF*	*Associated Sample ID*	*Qualified Result*	*Units*
TCL VOC	2-Butanone	7/27/12	0.017	WG-56393-072312-JV-075	R	µg/L
				WG-56393-072312-JV-076	R	µg/L
				WG-56393-072312-JV-077	R	µg/L
				WG-56393-072312-JV-078	R	µg/L
				WG-56393-072312-JV-079	R	µg/L
				WG-56393-072312-JV-080	R	µg/L
				WG-56393-072312-JV-081	R	µg/L
				WG-56393-072512-JV-094	R	µg/L

Notes:

J - Estimated Concentration
R - Rejected

RRF - Relative Response Factor
TCL - Target Compound List
VOC - Volatile Organic Compounds

TABLE 6

SUMMARY OF QUALIFIED SAMPLE DATA DUE TO METHOD BLANK CONTAMINATION
GROUNDWATER MONITORING - JULY 2012
12TH STREET LANDFILL
OTSEGO TOWNSHIP, MICHIGAN

Parameter	*Analyte*	*Analysis Date*	*Blank Result*	*Sample ID*	*Original Sample Result*		*Qualified Sample Result*	*Units*
TAL Metals	Silver	8/8/12	0.005J	WG-56393-072512-JV-095	0.014	J	0.020 U	µg/L
				WG-56393-072312-JV-075	0.008	J	0.020 U	µg/L
				WG-56393-072312-JV-078	0.010	J	0.020 U	µg/L
				WG-56393-072312-JV-079	0.007	J	0.020 U	µg/L
TAL Metals	Antimony	8/8/12	0.005J	WG-56393-072512-JV-094	0.015	J	0.050 U	µg/L
				WG-56393-072512-JV-095	0.024	J	0.050 U	µg/L
				WG-56393-072412-JV-084	0.023	J	0.050 U	µg/L
				WG-56393-072412-JV-085	0.015	J	0.050 U	µg/L
				WG-56393-072412-JV-089	0.018	J	0.050 U	µg/L
				WG-56393-072312-JV-076	0.025	J	0.050 U	µg/L
				WG-56393-072312-JV-077	0.017	J	0.050 U	µg/L
				WG-56393-072312-JV-078	0.012	J	0.050 U	µg/L
				WG-56393-072312-JV-079	0.017	J	0.050 U	µg/L
				WG-56393-072312-JV-080	0.016	J	0.050 U	µg/L
				WG-56393-072312-JV-081	0.012	J	0.050 U	µg/L
TAL Metals	Antimony	8/8/12	0.009J	WG-56393-072412-JV-086	0.040	J	0.050 U	µg/L
				WG-56393-072412-JV-088	0.026	J	0.050 U	µg/L
				WG-56393-072312-JV-075	0.044	J	0.050 U	µg/L
TAL Metals	Selenium	8/8/12	0.4J	WG-56393-072512-JV-094	0.5	J	1.0 U	µg/L
				WG-56393-072412-JV-089	0.8	J	1.0 U	µg/L
				WG-56393-072312-JV-075	0.4	J	1.0 U	µg/L
				WG-56393-072312-JV-076	0.3	J	1.0 U	µg/L
				WG-56393-072312-JV-078	0.3	J	1.0 U	µg/L
				WG-56393-072312-JV-079	0.4	J	1.0 U	µg/L

TABLE 6

SUMMARY OF QUALIFIED SAMPLE DATA DUE TO METHOD BLANK CONTAMINATION
GROUNDWATER MONITORING - JULY 2012
12TH STREET LANDFILL
OTSEGO TOWNSHIP, MICHIGAN

Parameter	*Analyte*	*Analysis Date*	*Blank Result*	*Sample ID*	*Original Sample Result*	*Qualified Sample Result*	*Units*
TCL SVOC (Continued)	Diethyl phthalate	7/26/12	0.018	WG-56393-072312-JV-079	0.037 J	0.20 U	µg/L
				WG-56393-072312-JV-080	0.029 J	0.20 U	µg/L
				WG-56393-072312-JV-081	0.026 J	0.20 U	µg/L
TCL SVOC	Diethyl phthalate	7/30/12	0.039	WG-56393-072512-JV-094	0.029 J	0.20 U	µg/L
				WG-56393-072512-JV-095	0.048 J	0.20 U	µg/L
TCL SVOC	Di-n-butylphthalate (DBP)	7/30/12	0.044	WG-56393-072512-JV-094	0.079 J	0.20 U	µg/L
				WG-56393-072512-JV-095	0.097 J	0.20 U	µg/L
TCL VOC	Methylene chloride	8/2/12	0.18	WG-56393-072412-JV-087	0.10 J	2.0 U	µg/L
TCL VOC	Methylene chloride	8/2/12	0.21	WG-56393-072312-JV-075	0.11 J	2.0 U	µg/L
				WG-56393-072312-JV-080	0.14 J	2.0 U	µg/L
TCL VOC	Methylene chloride	8/2/12	0.23	WG-56393-072412-JV-088	0.14 J	2.0 U	µg/L
				WG-56393-072412-JV-089	0.14 J	2.0 U	µg/L

Notes:

U -Qualified as Not Detected at the report limit

SVOC - Semivolatile Organic Compounds
TAL - Target Analyte List
TCL - Target Compound List
VOC - Volatile Organic Compounds

TABLE 8

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING INTERNAL STANDARD (IS) RECOVERIES
GROUNDWATER MONITORING - JULY 2012
12TH STREET LANDFILL
OTSEGO TOWNSHIP, MICHIGAN

Parameter	*Sample ID*	*IS*	*IS Area Count*	*Control Limits*	*Analytes*	*Qualified Sample Results*	*Units*
PCDD/PCDF	WG-56393-072412-JV-089	37C-2,3,7,8-TCDD	142	40-135	1,2,3,7,8-PeCDD	3.80 J	µg/L
PCDD/PCDF	WG-56393-072412-JV-090	37C-2,3,7,8-TCDD	143	40-135	1,2,3,7,8-PeCDD	3.73 J	µg/L
PCDD/PCDF	WG-56393-072312-JV-078	37C-2,3,7,8-TCDD	141	40-135	1,2,3,7,8-PeCDD	4.17 J	µg/L
PCDD/PCDF	WG-56393-072312-JV-081	37C-2,3,7,8-TCDD	140	40-135	1,2,3,7,8-PeCDD	3.96 J	µg/L

Notes:

J - Estimated Value

TABLE 10

SUMMARY OF QUALIFIED SAMPLE DATA DUE TO RINSE BLANK CONTAMINATION
GROUNDWATER MONITORING - JULY 2012
12TH STREET LANDFILL
OTSEGO TOWNSHIP, MICHIGAN

Parameter	*Analyte*	*Blank ID*	*Blank Result*	*Sample ID*	*Original Sample Result*	*Qualified Sample Result*	*Units*
TAL Metals	Aluminum	EB-56393-072512-JV-093	1.7J	WG-56393-072512-JV-094	7.6	7.6 U	µg/L
				WG-56393-072512-JV-095	6.4	6.4 U	µg/L
TAL Metals	Lead	EB-56393-072512-JV-093	0.031	WG-56393-072512-JV-094	0.046	0.046 U	µg/L
				WG-56393-072512-JV-095	0.047	0.047 U	µg/L
TAL Metals	Manganese	EB-56393-072512-JV-093	0.169	WG-56393-072512-JV-095	0.784	0.784 U	µg/L
TAL Metals	Nickel	EB-56393-072512-JV-093	0.20	WG-56393-072512-JV-094	0.81	0.81 U	µg/L
				WG-56393-072512-JV-095	0.97	0.97 U	µg/L
TAL Metals	Thallium	EB-56393-072512-JV-093	0.063	WG-56393-072512-JV-094	0.012 J	0.020 U	µg/L
				WG-56393-072512-JV-095	0.021	0.021 U	µg/L
TAL Metals	Cadmium	EB-56393-072512-JV-093	0.008J	WG-56393-072512-JV-094	0.013 J	0.020 U	µg/L
				WG-56393-072512-JV-095	0.015 J	0.020 U	µg/L
TAL Metals	Chromium	EB-56393-072512-JV-093	0.14J	WG-56393-072512-JV-094	0.15 J	0.20 U	µg/L
				WG-56393-072512-JV-095	0.29	0.29 U	µg/L
TAL Metals	Vanadium	EB-56393-072512-JV-093	0.03J	WG-56393-072512-JV-094	0.11 J	0.20 U	µg/L
				WG-56393-072512-JV-095	0.13 J	0.20 U	µg/L
TAL Metals	Zinc	EB-56393-072512-JV-093	1.6	WG-56393-072512-JV-094	0.7	0.7 U	µg/L
				WG-56393-072512-JV-095	1.4	1.4 U	µg/L
TAL Metals	Mercury	EB-56393-072512-JV-093	0.11J	WG-56393-072312-JV-075	0.49 J	1.0 U	ng/L
				WG-56393-072312-JV-076	0.26 J	1.0 U	ng/L
				WG-56393-072312-JV-077	0.21 J	1.0 U	ng/L
				WG-56393-072312-JV-078	0.26 J	1.0 U	ng/L
				WG-56393-072312-JV-079	0.24 J	1.0 U	ng/L
				WG-56393-072312-JV-080	0.31 J	1.0 U	ng/L
				WG-56393-072312-JV-081	0.25 J	1.0 U	ng/L

TABLE 10

SUMMARY OF QUALIFIED SAMPLE DATA DUE TO RINSE BLANK CONTAMINATION
GROUNDWATER MONITORING - JULY 2012
12TH STREET LANDFILL
OTSEGO TOWNSHIP, MICHIGAN

Parameter	*Analyte*	*Blank ID*	*Blank Result*	*Sample ID*	*Original Sample Result*	*Qualified Sample Result*	*Units*
TCL SVOC (Continued)	Di-n-butylphthalate	EB-56393-072512-JV-093	0.064 J	WG-56393-072312-JV-077	0.035 J	0.20 U	µg/L
				WG-56393-072312-JV-078	0.066 J	0.20 U	µg/L
				WG-56393-072312-JV-079	0.042 J	0.20 U	µg/L
				WG-56393-072312-JV-080	0.033 J	0.20 U	µg/L
				WG-56393-072312-JV-081	0.045 J	0.20 U	µg/L
TCL SVOC	Naphthalene	EB-56393-072512-JV-093	0.17 J	WG-56393-072412-JV-084	0.065 J	0.20 U	µg/L
				WG-56393-072412-JV-085	0.061 J	0.20 U	µg/L
				WG-56393-072412-JV-086	0.027 J	0.20 U	µg/L
				WG-56393-072412-JV-088	0.038 J	0.20 U	µg/L
				WG-56393-072512-JV-095	0.052 J	0.20 U	µg/L
				WG-56393-072312-JV-075	0.054 J	0.20 U	µg/L
				WG-56393-072312-JV-076	0.044 J	0.20 U	µg/L
				WG-56393-072312-JV-077	0.031 J	0.20 U	µg/L
				WG-56393-072312-JV-078	0.030 J	0.20 U	µg/L
				WG-56393-072312-JV-079	0.034 J	0.20 U	µg/L
PCDD/PCDF	1,2,3,4,6,7,8,9-OCDD	EB-56393-072512-JV-093	64.2	WG-56393-072412-JV-087	63.6	64.2 U	pg/L
				WG-56393-072412-JV-088	57.1	64.2 U	pg/L
				WG-56393-072512-JV-094	63.2	64.2 U	pg/L
PCDD/PCDF	1,2,3,4,6,7,8-HpCDF	EB-56393-072512-JV-093	5.81 J	WG-56393-072412-JV-084	6.51 J	24.0 U	pg/L
				WG-56393-072412-JV-086	7.36 J	24.0 U	pg/L
				WG-56393-072412-JV-087	5.79 J	24.0 U	pg/L
				WG-56393-072412-JV-088	5.76 J	24.0 U	pg/L
				WG-56393-072512-JV-094	6.07 J	24.0 U	pg/L
				WG-56393-072512-JV-095	7.63 J	24.0 U	pg/L
				WG-56393-072312-JV-076	8.36 J	24.0 U	pg/L
				WG-56393-072312-JV-077	5.07 J	24.0 U	pg/L
				WG-56393-072312-JV-080	6.52 J	24.0 U	pg/L
PCDD/PCDF	1,2,3,4,6,7,8-HpCDD	EB-56393-072512-JV-093	54.7	WG-56393-072512-JV-094	49.2	54.7 U	pg/L
				WG-56393-072312-JV-077	42.9	54.7 U	pg/L

TABLE 10

SUMMARY OF QUALIFIED SAMPLE DATA DUE TO RINSE BLANK CONTAMINATION
GROUNDWATER MONITORING - JULY 2012
12TH STREET LANDFILL
OTSEGO TOWNSHIP, MICHIGAN

Parameter	*Analyte*	*Blank ID*	*Blank Result*	*Sample ID*	*Original Sample Result*	*Qualified Sample Result*	*Units*
PCDD/PCDF (Continued)	1,2,3,7,8-PeCDD	EB-56393-072512-JV-093	2.99 J	WG-56393-072512-JV-094	3.29 J	24.0 U	pg/L
				WG-56393-072512-JV-095	3.76 J	24.0 U	pg/L
				WG-56393-072312-JV-076	2.11 JK	24.0 U	pg/L
				WG-56393-072312-JV-077	3.06 J	24.0 U	pg/L
				WG-56393-072312-JV-080	3.84 JK	24.0 U	pg/L
PCDD/PCDF	Total HpCDF	EB-56393-072512-JV-093	5.81 J	WG-56393-072412-JV-084	12.8 J	24.0 U	pg/L
				WG-56393-072412-JV-086	14.1 J	24.0 U	pg/L
				WG-56393-072412-JV-087	11.1 J	24.0 U	pg/L
				WG-56393-072412-JV-088	5.76 J	24.0 U	pg/L
				WG-56393-072512-JV-094	11.3 J	24.0 U	pg/L
				WG-56393-072512-JV-095	14.4 J	24.0 U	pg/L
				WG-56393-072312-JV-077	10.1 J	24.0 U	pg/L
				WG-56393-072312-JV-080	6.52 J	24.0 U	pg/L
PCDD/PCDF	Total HpCDD	EB-56393-072512-JV-093	239	WG-56393-072412-JV-087	222	239 U	pg/L
				WG-56393-072412-JV-088	239	239 U	pg/L
				WG-56393-072512-JV-094	228	239 U	pg/L
				WG-56393-072312-JV-076	201	239 U	pg/L
				WG-56393-072312-JV-077	168	239 U	pg/L
				WG-56393-072312-JV-080	235	239 U	pg/L
PCDD/PCDF	Total HxCDF	EB-56393-072512-JV-093	9.24 J	WG-56393-072412-JV-084	6.03 J	24.0 U	pg/L
				WG-56393-072412-JV-086	5.74 J	24.0 U	pg/L
				WG-56393-072412-JV-087	5.51 J	24.0 U	pg/L
				WG-56393-072412-JV-088	14.4 J	24.0 U	pg/L
				WG-56393-072512-JV-094	12.3 J	24.0 U	pg/L
				WG-56393-072512-JV-095	11.8 J	24.0 U	pg/L
				WG-56393-072312-JV-076	9.44 J	24.0 U	pg/L
				WG-56393-072312-JV-077	5.85 J	24.0 U	pg/L
				WG-56393-072312-JV-080	12.2 J	24.0 U	pg/L

TABLE 11

SUMMARY OF QUALIFIED SAMPLE DATA DUE TO TRIP BLANK CONTAMINATION
GROUNDWATER MONITORING - JULY 2012
12TH STREET LANDFILL
OTSEGO TOWNSHIP, MICHIGAN

Parameter	*Analyte*	*Trip Blank Sample ID*	*Blank Result*	*Associated Sample ID*	*Original Sample Result*	*Qualified Sample Result*	*Units*
TAL Metals	LL-Mercury	TB-56393-072412-JV-092	0.44J	WG-56393-072412-JV-084	0.12 J	1.0 U	ng/L
				WG-56393-072412-JV-085	0.19 J	1.0 U	ng/L
				WG-56393-072412-JV-086	0.7 J	1.0 U	ng/L
				WG-56393-072412-JV-087	0.14 J	1.0 U	ng/L
				WG-56393-072412-JV-088	0.14 J	1.0 U	ng/L
				WG-56393-072412-JV-089	1.14	1.14 U	ng/L
				WG-56393-072412-JV-090	0.85 J	1.0 U	ng/L

Notes:

U -Qualified as Not Detected at the limit indicated

TAL -Target Analyte List