

Mr. Peter Quackenbush
Senior Environmental Engineer
Hazardous Waste Section
Office of Waste Management & Radiological Protection
Michigan Department of Environmental Quality
525 West Allegan Street
Constitution Hall, Atrium North
Lansing, MI 48909

Arcadis of Michigan, LLC
10559 Citation Drive
Suite 100
Brighton
Michigan 48116
Tel 810 229 8594
Fax 810 229 8837
www.arcadis.com

Subject:

Third Quarter 2015 Groundwater Monitoring Summary
RACER Lansing - Plants 2, 3 and 6
Lansing, Michigan

ENVIRONMENT

Contact:

Patrick Curry

Dear Mr. Quackenbush,

Date:

November 10, 2015

The purpose of this correspondence is to summarize the Third quarter 2015 groundwater monitoring activities completed at RACER Lansing – Plants 2, 3 and 6 (Site). Arcadis of Michigan, LLC (Arcadis) completed the third quarter 2015 gauging and groundwater monitoring activities as part of the on-going Resource Conservation and Recovery Act (RCRA) Corrective Action, between September 8 and September 11, 2015. The activities completed during the third quarter event included:

Phone:

810 225 1926

Email:

Patrick.Curry@arcadis.com

- Gauging LNAPL Wells;
- Quarterly groundwater sampling activities;
- LNAPL recovery

Our ref:

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All monitoring activities were completed in accordance with the approved Revised Interim Groundwater Monitoring Work Plan (IGMP), dated November 14, 2014, and incorporated the changes to the IGMP Matrix approved by the MDEQ on August 18, 2015.

Monitoring well locations for Plants 2 and 3 are included on **Figure 1** and **Figure 2**, respectively. Please note, in accordance with the revised IGMP Matrix, no monitoring wells were sampled at Plant 6 during the third quarter 2015 sampling event.

SITE ACTIVITIES

Site wide groundwater elevation measurements were collected from a total of 35 wells on September 8, 2015. Prior to starting the gauging activities, wells were screened for the presence of vapor phase VOCs using a photoionization detector (PID). Light non-aqueous phase liquid (LNAPL) gauging was completed at a total of 24 wells. The groundwater elevations and LNAPL thicknesses are summarized on **Table 1** and **Table 2**, respectively.

LNAPL Removal

As outlined in the Summary of LNAPL Transmissivity Results memorandum provided to the MDEQ on March 30, 2015, LNAPL transmissivity estimates for the deeper LNAPL wells installed in the deeper, confined LNAPL zone at Plant 2 are two to three orders of magnitude below the criterion established by MDEQ to define LNAPL that can be recovered in a cost effective and efficient manner. However, given that PCBs are present in the deeper LNAPL zone at elevated concentrations, and the LNAPL accumulates at significant thickness at several wells, LNAPL is manually recovered from these wells on a quarterly basis.

During the third quarter event, four of the seven of the deeper LNAPL monitoring wells (LMW-12-03D, LMW-14-12D, LMW-14-15D and LMW-14-16D) indicated LNAPL thickness greater than 6 feet. A summary of the LNAPL recovered from these wells is provided as **Table 3**. Approximately 7.9 gallons of total liquid was recovered from the wells, which included both groundwater and LNAPL. Total LNAPL recovered is estimated to be 7.4 gallons during the third quarter 2015 event.

Groundwater Sampling

Between September 8 and September 11, 2015 a total of 11 monitoring wells were sampled and analyzed for one or more of the following:

- Target compound list (TCL) volatile organic compounds (VOCs) using USEPA Method SW8260B.
- 1,4-Dioxane using Method SW8260B-SIM.
- Select metals (arsenic, nickel, lead, vanadium, chromium, and copper) utilizing Method SW6020A. Samples were submitted for dissolved and total metals analysis if turbidity could not be stabilized below 10 nephelometric turbidity units (NTUs).

- Metals (antimony, arsenic, barium, boron, cadmium, chromium, cobalt, copper, lead, manganese, mercury (Method 7471B), nickel, selenium, silver, vanadium, and zinc) using Method SW6020A. Samples were submitted for both dissolved and total metals analysis if turbidity could not be stabilized below 10 NTUs.
- Semi-volatile organic compounds (SVOCs) using Method SW8270D.

Groundwater samples were collected utilizing low-flow groundwater sampling methods with a submersible pump. Samples were submitted under chain of custody protocol to Merit Laboratories (Merit) located in Lansing, Michigan. Groundwater analytical results are summarized on **Table 4**. Groundwater low-flow sampling logs are included as **Attachment 1**.

RESULTS

Monitoring wells sampled during quarterly events represent wells where concentrations are noted as increasing, or additional data is needed to assess plume stability. Exceedances of the Part 201 Residential Drinking Water (DW) Criteria are summarized on **Table 4** and illustrated on **Figures 1** and **2**. Results of the third quarter sampling event are summarized below.

- VOCs and SVOCs exceeding DW Criteria include bis(2-Ethylhexyl)phthalate (DEHP) and 1,4-dioxane. This is consistent with previous groundwater investigation and monitoring results. Previous correspondence with Merit has indicated that the persistent low-level phthalates detected in groundwater at the Site are associated with laboratory cross-contamination.
- Metals that exceed DW Criteria include manganese and nickel. This is consistent with previous groundwater investigation and monitoring results. Manganese has been shown to be elevated regionally in groundwater relative to aesthetic DW Criteria and is not shown on **Figures 1 & 2**.

There were several detections of COCs observed in the perched zone or weathered bedrock near the property boundary. The following outlines these detections and proposes one or more explanations for the occurrence:

- MW-13-42, a weathered bedrock monitoring well located west of the lower 1,4-dioxane plume, had a 1,4-dioxane concentration of 20 µg/L during the third quarter monitoring event. Although the concentration is below the current DW Criteria, this well has indicated a slow but consistent increasing trend for 1,4-dioxane. The well will continue to be monitored on a quarterly basis and additional investigation will be completed during the fourth quarter 2015 to further evaluate 1,4-dioxane in the weathered bedrock zone in this area.

- MW-14-56, a weathered bedrock well located near the western Plant 2 property boundary, had a 1,4-dioxane concentration of 8 µg/L (below the proposed DW Criteria of 8.5 µg/L) during the third quarter sampling event. 1,4-Dioxane was detected at similar concentrations (6 to 7 µg/L) during the past three quarterly sampling events and the plume at this location appears to be stable. However, this well will continue to be monitored on a quarterly basis through the first quarter 2016 to verify concentrations are not changing. The sampling frequency at this well will be re-evaluated as part of the next annual report.
- Nickel was detected at a concentration of 0.251 mg/L (DW criteria: 0.10 mg/L) at MW-13-32 located near the Plant 3 eastern property boundary. Previous sampling events have shown an increasing trend for nickel in this area, including at MW-13-31 located further to the west. For example, during the second quarter 2015, the concentration of nickel at these locations were 2.16 and 1.77 mg/L respectively. During the third quarter, the concentration of nickel at both wells MW-13-32 and MW-13-31 decreased to 0.251 and 0.017 mg/L, respectively. Groundwater elevation in this area has indicated a component of the groundwater flow is westerly, onto the Site. These wells will continue to be monitored quarterly to determine the overall trend of nickel at these locations.
- Samples from well TW-14-02, located at the toe of the lower 1,4-dioxane plume on Plant 2 has had elevated concentrations of 1,4-dioxane since first being sampled during the second quarter 2015. During the third quarter sampling event, the concentration of 1,4-dioxane at this location was 3,300 µg/L. There are several possible explanations for this occurrence including leakage from the perched zone, an off-site source, or simply a heretofore undetected pocket of elevated 1,4-dioxane related to the previously identified source area on Plant 3. Additional work has been proposed to further evaluate this occurrence and is expected to be completed during the fourth quarter 2015. In the meantime, well TW-14-02 will be added to the IGMP and monitored quarterly.

Groundwater monitoring will continue in accordance with the revised IGMP Matrix, approved by the MDEQ on August 18, 2015. As noted above, additional investigation will be completed on Plant 2 to evaluate the elevated concentration of 1,4-dioxane at well TW-14-02 and the Plant 2 western property boundary. The proposed scope of work for this *Lower 1,4-Dioxane Toe Investigation* was provided under separate cover to the MDEQ on November 5, 2015.

The fourth quarter semi-annual groundwater sampling event is scheduled to begin November 30th and the fourth quarter report will be submitted to the MDEQ first quarter 2016. A comprehensive annual groundwater monitoring report and updated plume stability assessment will be prepared following the first quarter 2016 sampling event and submitted during the second quarter 2016, as outlined in the approved IGMP. Validated laboratory analytical reports, from each of the four quarterly sampling events, will be provided at that time.

Mr. Peter Quackenbush
November 10, 2015

If you should have any questions regarding the enclosed data please do not hesitate to contact me at 810.225.1926 or via email at patrick.curry@arcadis.com.

Sincerely,

Arcadis of Michigan, LLC

Patrick J. Curry, CPG
Senior Geologist

Copies:

Dave Favero, RACER
Grant Trigger, RACER
Randy Seida, Westside Water
Alec Malvetis, City of Lansing
Angie Goodman, LBWL
Cheryl Loudon, LBWL
David Love, Ingham County Drain Commission
Steve Haywood, Lansing Township
Lansing Public Library

Enclosures:

Tables

- 1 Summary of Groundwater Elevations – September 2015
- 2 Summary of LNAPL Thicknesses – September 2015
- 3 Summary of LNAPL Recovery – September 2015
- 4 Summary of Third Quarter 2015 Groundwater Analytical Data – September 2015

Figures

- 1 Third Quarter 2015 Drinking Water Exceedances Plant 2
- 2 Third Quarter 2015 Drinking Water Exceedances Plant 3

Attachments

- 1 Third Quarter 2015 Groundwater Sampling Logs

Tables



TABLE 1
SUMMARY OF GROUNDWATER ELEVATION MEASUREMENTS
 September 2015
 Third Quarter 2015 Groundwater Report
 RACER Trust Plants 2 and 3 - Lansing, Michigan

Well ID:	Date Collected:	Screened Interval Top (ft bgs):	Screened Interval Bottom (ft bgs):	Reference Elevation (ft toc):	Ground Surface Elevation (ft msl):	Total Well Depth (ft toc):	Depth to Water (ft toc):	Groundwater Elevation (ft msl):
Plant 2								
LMW-12-01	9/8/2015	7	12	864.91	862.14	14.81	9.36	855.55
LMW-12-02	9/8/2015	5	10	865.25	862.17	12.94	6.24	859.01
LMW-12-03D	9/8/2015	17.3	22.3	864.99	862.08	--	16.63	848.36
LMW-12-03S	9/8/2015	4	9	864.93	862.06	11.76	7.13	857.80
LMW-12-04	9/8/2015	16	21	864.94	862.12	23.68	10	854.94
LMW-12-05	9/8/2015	7	12	865.03	862.17	101.88	77.64	787.39
LMW-12-06	9/8/2015	4	9	865.02	862.15	12.02	6.64	858.38
LMW-12-07	9/8/2015	4	9	864.13	861.50	12	5.54	858.59
LMW-12-08	9/8/2015	8	13	864.40	861.56	--	10.65	853.75
LMW-14-12D	9/8/2015	18	23	864.59	862.11	--	24.6	839.99
LMW-14-13D	9/8/2015	17.5	22.5	865.03	862.06	24.48	10.2	854.83
LMW-14-14D	9/8/2015	18	23	864.89	861.90	25.3	11.73	853.16
LMW-14-15D	9/8/2015	18	23	865.11	861.66	--	22.63	842.48
LMW-15-16D	9/8/2015	19.5	24.5	865.20	862.24	--	19.72	845.48
LMW-15-17D	9/8/2015	20	25	865.21	862.24	27.3	10.36	854.85
MW-12-05	9/8/2015	75	99	865.19	862.23	101.89	77.73	787.46
MW-13-42	9/8/2015	70	75	861.61	860.03	76.94	76.37	785.24
MW-13-43	9/8/2015	72	77	863.82	860.97	79.78	71.29	792.53
MW-13-44	9/8/2015	96	115	864.24	861.03	119.35	83.46	780.78
MW-13-45	9/8/2015	72	77	863.80	861.54	78.34	70.33	793.47
MW-14-56	9/8/2015	71	76	863.27	860.56	79	75.96	787.31
P2-SB-37	9/8/2015	5	10	865.90	861.90	--	7.93	857.97
PMW-01	9/8/2015	2.59	7.59	860.85	861.33	--	4.7	856.15
PMW-02	9/8/2015	2.59	7.59	861.12	861.50	--	1.33	859.79
PMW-03	9/8/2015	1.2	6.2	861.59	862.12	6.09	1.1	860.49
TW-14-02	9/8/2015	67	72	865.01	862.13	74.82	66.7	798.31
Plant 3								
LMW-12-09	9/8/2015	3	8	863.22	860.40	10.76	4.4	858.82
LMW-12-10	9/8/2015	14	19	866.82	863.60	--	19.39	847.43
LMW-12-11	9/8/2015	15	20	866.53	863.53	22.83	12.77	853.76
MW-13-22	9/8/2015	89	94	864.37	861.50	96.25	73.19	791.18
MW-13-31	9/8/2015	5	10	861.27	858.36	12.8	11.72	849.55
MW-13-32	9/8/2015	5	10	860.11	857.32	12.65	8.46	851.65
MW-15-71	9/8/2015	110	115	864.56	861.58	118.33	70.96	793.60
UNK-13	9/8/2015	11	16	859.11	859.91	14.98	4.09	855.02
UNK-14	9/8/2015	10.4	15.4	859.32	859.70	14.73	3.35	855.97

Note:

- not calculated
- ft bgs - feet below ground surface
- ft toc - feet below top of casing
- ft msl - feet above mean sea level
- N/A - not analyzed
- NS - not surveyed

TABLE 2
SUMMARY OF LNAPL THICKNESS
SEPTEMBER 2015
Third Quarter 2015 Groundwater Report
RACER Trust Plants 2 and 3 - Lansing, Michigan

Well ID:	Date Collected:	Reference Elevation (TOC):	Ground Surface Elevation:	Total Well Depth (ft. below TOC):	Depth to Water (ft. below TOC):	Depth to LNAPL (ft. below TOC):	Calc. Thickness NAPL (ft):	Groundwater Elevation (ft. amsl):
LMW-12-01	9/8/2015	864.91	862.14	14.81	9.36	NP	NP	855.55
LMW-12-02	9/8/2015	865.25	862.17	12.94	6.24	NP	NP	859.01
LMW-12-03D	9/8/2015	864.99	862.08	NM	16.63	9.77	6.86	854.53*
LMW-12-03S	9/8/2015	864.93	862.06	11.76	7.13	NP	NP	857.80
LMW-12-04	9/8/2015	864.94	862.12	23.68	10	NP	NP	854.94
LMW-12-05	9/8/2015	865.03	862.17	101.88	77.64	NP	NP	787.39
LMW-12-06	9/8/2015	865.02	862.15	12.02	6.64	NP	NP	858.38
LMW-12-07	9/8/2015	864.13	861.50	12	5.54	NP	NP	858.59
LMW-12-08	9/8/2015	864.40	861.56	NM	10.65	7.88	2.77	856.24*
LMW-14-12D	9/8/2015	864.59	862.11	NM	24.6	8.21	16.39	854.73*
LMW-14-13D	9/8/2015	865.03	862.06	24.48	10.2	NP	NP	854.83
LMW-14-14D	9/8/2015	864.89	861.90	25.3	11.73	NP	NP	853.16
LMW-14-15D	9/8/2015	865.11	861.66	NM	22.63	9.65	12.98	854.16*
LMW-15-16D	9/8/2015	865.20	862.24	NM	19.72	12.12	7.60	852.32*
LMW-15-17D	9/8/2015	865.21	862.24	27.3	10.36	NP	NP	854.85
P2-SB-37	9/8/2015	865.90	861.90	NM	7.93	6.24	1.69	859.49*
PMW-01	9/8/2015	860.85	861.33	NM	4.7	0.76	3.94	859.69*
PMW-02	9/8/2015	861.12	861.50	NM	1.33	0.81	0.52	860.26*
PMW-03	9/8/2015	861.59	862.12	6.09	1.1	NP	NP	860.49
LMW-12-09	9/8/2015	863.22	860.40	10.76	4.4	NP	NP	858.82
LMW-12-10	9/8/2015	866.82	863.60	0	19.39	9.29	11.26	857.56*
LMW-12-11	9/8/2015	866.53	863.53	22.83	12.77	NP	NP	853.76
UNK-13	9/8/2015	859.11	859.91	14.98	4.09	0	0	855.02
UNK-14	9/8/2015	859.32	859.7	14.73	3.35	3.12	0.1500001	856.10*

Note:

*Groundwater elevations have been corrected for the presence of LNAPL using a measured LNAPL density of 0.8995 g/mL

ft. - feet

ft. amsl - feet above mean sea level

ID - Identification

NM - Not Measured

NP - No Product

TOC - Top of Casing

**TABLE 3
SUMMARY OF LNAPL RECOVERY
SEPTEMBER 2015**

**Third Quarter 2015 Groundwater Monitoring Report
RACER Trust Plant 2 - Lansing, Michigan**

<i>Well ID:</i>	<i>Recovery Date:</i>	<i>Reference Elevation (TOC):</i>	<i>Ground Surface Elevation:</i>	<i>Total Well Depth (ft. below TOC):</i>	<i>Depth to Water (ft. below TOC):</i>	<i>Depth to LNAPL (ft. below TOC):</i>	<i>Starting LNAPL Thickness (ft):</i>	<i>Groundwater Elevation (ft msl):</i>	<i>Estimated LNAPL Volume Recovered (gallons):</i>	<i>Liquid Recovered (gallons)****</i>
LMW-12-03D	9/11/2015**	864.99	862.08	NM	16.63	9.77	6.86	854.53*	0.90	0.90
LMW-14-12D	9/11/2015**	864.59	862.11	NM	24.6	8.21	16.39	854.73*	5.00	5.25
LMW-14-13D	9/11/2015**	865.03	862.06	24.48	10.2	NP	NP	854.83	NP	NP
LMW-14-14D	9/11/2015**	864.89	861.90	25.3	11.73	NP	NP	853.16	NP	NP
LMW-14-15D	9/11/2015**	865.11	861.66	NM	22.63	9.65	12.98	854.16*	0.00	0.00
LMW-15-16D	9/11/2015**	865.20	862.24	NM	19.72	12.12	7.6	852.32*	1.50	1.75
LMW-15-17D	9/11/2015**	865.21	862.24	27.3	10.36	NP	NP	854.85	NP	NP
Total:									7.40	7.90

Note:

*Groundwater elevations have been corrected for the presence of LNAPL using a measured LNAPL density of 0.8995 g/mL

** Depth to water and depth to LNAPL measurements were collected on 9/8/2015 as part of the 2nd quarter sitewide gauging.

*** Volume calculations based on an internal well volume of 0.1686 gallons per foot in a 2 inch diameter well. All wells in this table are 2 inches in diameter.

**** Recovery performed via 1.5 inch diameter weighted PVC bailers. Volume includes groundwater and LNAPL recovered.

ft. - feet

ID - Identification

msl - mean sea level

NM - Not Measured

NP - No Product

TOC - Top of Casing

TABLE 4
SUMMARY OF 3rd QUARTER 2015 GROUNDWATER ANALYTICAL DATA
September 2015
Third Quarter 2015 Groundwater Report
RACER Trust Plants 2 and 3 - Lansing, Michigan

Location ID: Sample Depth(-): Date Collected: Sample Name:	Units	MI GW (DEQ2013) RES DW	MI GW (DEQ2013) GSI	MW-12-05 09/11/15 MW-12-05_091115	MW-13-22 09/09/15 MW-13-22_090915	MW-13-31 09/09/15 MW-13-31_090915	MW-13-32 09/09/15 MW-13-32_090915	MW-13-42 09/11/15 MW-13-42_091115	MW-13-43 09/10/15 MW-13-43_091015	MW-13-44 09/11/15 MW-13-44_091115	MW-13-45 09/10/15 MW-13-45_091015	MW-14-56 09/11/15 MW-14-56_091115	MW-15-71 09/09/15 MW-15-71_090915	TW-14-02 09/10/15 TW-14-02_091015
Field														
Conductance, specific	mS/cm	--	--	3.526	1.871	0.936	0.996	NA	2.726	1.430	1.328	4.911	1.231	3.629
Dissolved oxygen (DO)	mg/L	--	--	0.82	0.37	0.58	2.65	NA	0.35	0.46	1.49	0.60	0.75	0.57
Oxidation reduction potential (ORP), field	millivolts	--	--	-84.80	-36.40	74.3	78.7	NA	-45.60	-117.30	79.3	-56.10	-92.50	-92.70
pH	s.u.	--	--	6.92	6.63	6.88	7.00	NA	7.11	7.11	7.37	6.71	7.26	7.09
Temperature, field	Deg C	--	--	15.65	16.02	19.25	19.13	NA	17.92	15.06	18.62	15.32	17.96	20.13
Turbidity (field)	NTU	--	--	0.65	1.80	5.75	NA	NA	9.38	7.14	7.41	NA	21.0	25.4
Volatile Organics														
1,2-Dibromo-3-chloropropane (DBCP)	ug/L	0.2	--	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
1,2-Dibromoethane (Ethylene dibromide)	ug/L	0.05	5.7	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
1,2-Dichlorobenzene	ug/L	600	13	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
1,4-Dichlorobenzene	ug/L	75	17	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
1,4-Dioxane	ug/L	8.5	2,800	10 ^a	240 Y ^a	NA	NA	20 ^a	360 Y ^a	<3	56 ^a	8	<3	3,200 Y [3,300 Y] ^{ab}
1,1,1-Trichloroethane	ug/L	200	89	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
2-Hexanone	ug/L	1,000	--	<10	<10	NA	NA	<10	<10	<10	<10	<10	<10	<10 [<10]
1,1,2,2-Tetrachloroethane	ug/L	8.5	78	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
Acetone	ug/L	730	1,700	<10	<10	NA	NA	<10	11	<10	<10	<10	<10	<10 [<10]
1,1,2-Trichloroethane	ug/L	5	330	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
Bromodichloromethane	ug/L	80	--	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
1,1-Dichloroethane	ug/L	880	740	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
Bromoform	ug/L	80	--	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
1,1-Dichloroethene	ug/L	7	130	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
Bromomethane (Methyl bromide)	ug/L	10	35	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
1,2-Dichloroethane	ug/L	5	360	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
Carbon disulfide	ug/L	800	--	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
Carbon tetrachloride	ug/L	5	45	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
cis-1,2-Dichloroethene	ug/L	70	620	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
Chlorobenzene	ug/L	100	25	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
trans-1,2-Dichloroethene	ug/L	100	1,500	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
Chloroform (Trichloromethane)	ug/L	80	350	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
Trichloroethene	ug/L	5	200	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
Chloromethane (Methyl chloride)	ug/L	260	--	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
Tetrachloroethene	ug/L	5	60	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
cis-1,3-Dichloropropene	ug/L	--	--	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
Vinyl chloride	ug/L	2	13	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
Chloroethane	ug/L	430	1,100	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
Dichlorodifluoromethane (CFC-12)	ug/L	1,700	--	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
Benzene	ug/L	5	200	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
Methyl acetate	ug/L	--	--	<10	<10	NA	NA	<10	<10	<10	<10	<10	<10	<10 [<10]
Ethylbenzene	ug/L	74	18	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
Methylene chloride	ug/L	5	1,500	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
Styrene	ug/L	100	80	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
Toluene	ug/L	790	270	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
trans-1,3-Dichloropropene	ug/L	--	--	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
Methyl tert butyl ether (MTBE)	ug/L	40	7,100	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
Trichlorofluoromethane (CFC-11)	ug/L	2,600	--	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
Trifluorotrchloroethane (Freon 113)	ug/L	170,000	32	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	13,000	2,200	<10	<10	NA	NA	<10	<10	<10	<10	<10	<10	<10 [<10]
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	1,800	--	<10	<10	NA	NA	<10	<10	<10	<10	<10	<10	<10 [<10]
1,2,4-Trichlorobenzene	ug/L	70	99	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
1,2-Dichloropropane	ug/L	5	230	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
1,3-Dichlorobenzene	ug/L	6.6	28	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
Cyclohexane	ug/L	--	--	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
Methyl cyclohexane	ug/L	--	--	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
Dibromochloromethane	ug/L	80	--	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
Isopropyl benzene	ug/L	800	28	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
o-Xylene	ug/L	--	--	<1	<1	NA	NA	<1	<1	<1	<1	<1	<1	<1 [<1]
m&p-Xylene	ug/L	--	--	<2	<2	NA	NA	<2	<2	<2	<2	<2	<2	<2 [<2]

TABLE 4
SUMMARY OF 3rd QUARTER 2015 GROUNDWATER ANALYTICAL DATA
September 2015
Third Quarter 2015 Groundwater Report
RACER Trust Plants 2 and 3 - Lansing, Michigan

Location ID: Sample Depth(-): Date Collected: Sample Name:	Units	MI GW (DEQ2013) RES DW	MI GW (DEQ2013) GSI	MW-12-05 09/11/15 MW-12-05_091115	MW-13-22 09/09/15 MW-13-22_090915	MW-13-31 09/09/15 MW-13-31_090915	MW-13-32 09/09/15 MW-13-32_090915	MW-13-42 09/11/15 MW-13-42_091115	MW-13-43 09/10/15 MW-13-43_091015	MW-13-44 09/11/15 MW-13-44_091115	MW-13-45 09/10/15 MW-13-45_091015	MW-14-56 09/11/15 MW-14-56_091115	MW-15-71 09/09/15 MW-15-71_090915	TW-14-02 09/10/15 TW-14-02_091015
Semivolatile Organics														
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	ug/L	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
2,4,6-Trichlorophenol	ug/L	120	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
2,4-Dichlorophenol	ug/L	73	11	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
2,4,5-Trichlorophenol	ug/L	730	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
2,4-Dimethylphenol	ug/L	370	380	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
2,4-Dinitrophenol	ug/L	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
2,4-Dinitrotoluene	ug/L	7.7	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
2,6-Dinitrotoluene	ug/L	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
2-Chloronaphthalene	ug/L	1,800	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
2-Chlorophenol	ug/L	45	18	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
2-Methylnaphthalene	ug/L	260	19	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
2-Methylphenol	ug/L	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
2-Nitroaniline	ug/L	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
2-Nitrophenol	ug/L	20	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
3&4-Methylphenol	ug/L	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
3,3'-Dichlorobenzidine	ug/L	1.1	0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Naphthalene	ug/L	520	11	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
3-Nitroaniline	ug/L	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
4,6-Dinitro-2-methylphenol	ug/L	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
4-Bromophenyl phenyl ether	ug/L	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
4-Chloro-3-methylphenol	ug/L	150	7.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
4-Chloroaniline	ug/L	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
4-Chlorophenyl phenyl ether	ug/L	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
4-Nitroaniline	ug/L	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
4-Nitrophenol	ug/L	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Anthracene	ug/L	43	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Acenaphthene	ug/L	1,300	38	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Acenaphthylene	ug/L	52	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Acetophenone	ug/L	1,500	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Atrazine	ug/L	3	7.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Benzaldehyde	ug/L	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Benzo(a)anthracene	ug/L	2.1	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Benzo(a)pyrene	ug/L	5	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Benzo(b)fluoranthene	ug/L	1.5	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Benzo(g,h,i)perylene	ug/L	1	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Benzo(k)fluoranthene	ug/L	1	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Biphenyl (1,1-Biphenyl)	ug/L	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
bis(2-Chloroethoxy)methane	ug/L	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
bis(2-Chloroethyl)ether	ug/L	2	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
bis(2-Ethylhexyl)phthalate (DEHP)	ug/L	6	25	NA	NA	NA	NA	NA	NA	NA	NA	NA	7 B ^a	3 B
Butyl benzylphthalate (BBP)	ug/L	1,200	67	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Caprolactam	ug/L	5,800	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Carbazole	ug/L	85	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Chrysene	ug/L	1.6	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Dibenz(a,h)anthracene	ug/L	2	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<2	<2
Dibenzofuran	ug/L	--	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Diethyl phthalate	ug/L	5,500	110	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Dimethyl phthalate	ug/L	73,000	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<2	<2
Di-n-butylphthalate (DBP)	ug/L	880	9.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Di-n-octyl phthalate (DnOP)	ug/L	130	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Fluoranthene	ug/L	210	1.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Fluorene	ug/L	880	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Hexachlorobenzene	ug/L	1	0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Hexachlorobutadiene	ug/L	15	0.053	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Hexachlorocyclopentadiene	ug/L	50	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Hexachloroethane	ug/L	7.3	6.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Indeno(1,2,3-cd)pyrene	ug/L	2	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Isophorone	ug/L	770	1,300	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Nitrobenzene	ug/L	3.4	180	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
N-Nitrosodi-n-propylamine	ug/L	5	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
N-Nitrosodiphenylamine	ug/L	270	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Pentachlorophenol	ug/L	1	2.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Phenanthrene	ug/L	52	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Phenol	ug/L	4,400	450	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1
Pyrene	ug/L	140	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<1

TABLE 4
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Location ID: Sample Depth(-): Date Collected: Sample Name:	Units	MI GW (DEQ2013) RES DW	MI GW (DEQ2013) GSI	MW-12-05 09/11/15 MW-12-05_091115	MW-13-22 09/09/15 MW-13-22_090915	MW-13-31 09/09/15 MW-13-31_090915	MW-13-32 09/09/15 MW-13-32_090915	MW-13-42 09/11/15 MW-13-42_091115	MW-13-43 09/10/15 MW-13-43_091015	MW-13-44 09/11/15 MW-13-44_091115	MW-13-45 09/10/15 MW-13-45_091015	MW-14-56 09/11/15 MW-14-56_091115	MW-15-71 09/09/15 MW-15-71_090915	TW-14-02 09/10/15 TW-14-02_091015	
Inorganics															
Antimony	mg/L	0.006	0.13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.005	<0.005
Arsenic	mg/L	0.01	0.01	NA	NA	<0.002 [<0.002]	<0.002	NA	NA	NA	NA	NA	NA	0.008	0.005
Barium	mg/L	2	1.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.225	1.06
Boron	mg/L	0.5	7.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.10	0.05
Cadmium	mg/L	0.005	0.0045	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0005	<0.0005
Chromium	mg/L	--	0.16	NA	NA	0.005 [<0.005]	0.014	NA	NA	NA	NA	NA	NA	<0.005	0.012
Cobalt	mg/L	0.04	0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.005	<0.005
Copper	mg/L	1	0.02	NA	NA	0.007 [0.007]	0.009	NA	NA	NA	NA	NA	NA	<0.005	<0.005
Lead	mg/L	0.004	0.044	NA	NA	<0.003 [<0.003]	<0.003	NA	NA	NA	NA	NA	NA	<0.003	<0.003
Manganese	mg/L	0.05	4.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.106 ^a	0.061 ^a
Mercury	mg/L	0.002	0.000013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0002	<0.0002
Nickel	mg/L	0.1	0.12	NA	NA	0.017 [0.017]	0.251 ^{ab}	NA	NA	NA	NA	NA	NA	0.023	0.018
Selenium	mg/L	0.05	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.005	0.022
Silver	mg/L	0.034	0.0002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0007 ^b	<0.0005
Vanadium	mg/L	0.0045	0.027	NA	NA	<0.005 [<0.005]	<0.005	NA	NA	NA	NA	NA	NA	<0.005	<0.005
Zinc	mg/L	2.4	0.26	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.005	<0.005
Inorganics-Filtered															
Antimony (dissolved)	mg/L	0.006	0.13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.005	<0.005
Arsenic (dissolved)	mg/L	0.01	0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.007	0.003
Barium (dissolved)	mg/L	2	1.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.224	1.06
Boron (Dissolved)	mg/L	0.5	7.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.10	0.05
Cadmium (dissolved)	mg/L	0.005	0.0045	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0005	<0.0005
Chromium (dissolved)	mg/L	--	0.16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.005	0.011
Cobalt (dissolved)	mg/L	0.04	0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.005	<0.005
Copper (dissolved)	mg/L	1	0.02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.005	<0.005
Lead (dissolved)	mg/L	0.004	0.044	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.003	<0.003
Manganese (dissolved)	mg/L	0.05	4.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.096 ^a	0.061 ^a
Mercury (dissolved)	mg/L	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0002	<0.0002
Nickel (dissolved)	mg/L	0.1	0.12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.024	0.018
Selenium (dissolved)	mg/L	0.05	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.005	0.022
Silver (dissolved)	mg/L	0.034	0.0002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0005	<0.0005
Vanadium (dissolved)	mg/L	0.0045	0.027	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.005	<0.005
Zinc (dissolved)	mg/L	2.4	0.26	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.005	<0.005

TABLE 4
SUMMARY OF 3rd QUARTER 2015 GROUNDWATER ANALYTICAL DATA
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Qualifier Type	Lab Qualifiers	Definition
Inorganic	B	Indicates an estimated value between the instrument detection limit and the Reporting Limit (RL).
Inorganic	U	The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
Inorganic	Y	
Organic	B	Analyte was also detected in the associated method blank.
Organic	U	The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
Organic	Y	

Table Notes:

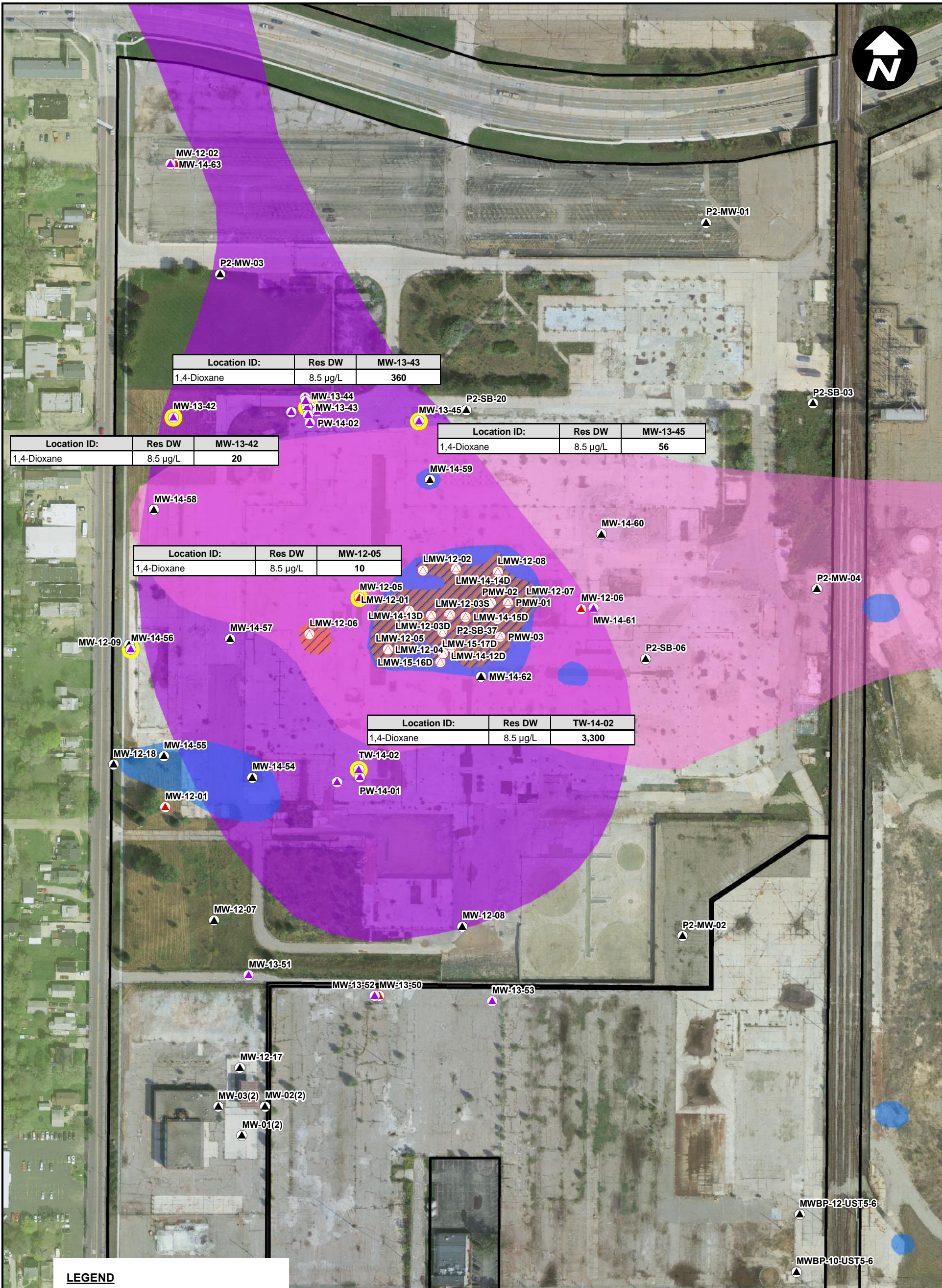
- Shading indicates result exceeding one or more MDEQ Part 201 Generic Cleanup Criteria and Screening Levels, Dated December 30, 2013.
- Bold fonts represent data where detections were noted above the MDL but below MDEQ Part 201 Generic Cleanup Criteria.
- Data shown in [] represent duplicate sample analytical results.
- = Not listed in the MDEQ Criteria Tables.
- mS/cm - milli Siemens per centimeter
- mg/L - milligrams per liter
- s.u. - standard unit
- Deg. C. - degrees celcius
- NTU - Nephelometric Turbidity Unit
- ug/L - micrograms per liter
- a - Sample exceeds Residential Drinking Water Criteria. 1,4-Dioxane includes the proposed drinking water criteria of 8.5 ug/L.
- b - Sample exceeds Groundwater Surface Water Interface Criteria
- NA - Not Analyzed during the 2nd Quarter 2015 Sampling Event

Lab and Validation Data Qualifiers:

- B = Compounds also found in associated method blank.
- X = Elevated reporting limit due to matrix interference.
- Y = Elevated reporting limit due to high target concentration.
- O = Analysis performed by outside laboratory.

Figures





Location ID:	Res DW	MW-13-43
1,4-Dioxane	8.5 µg/L	360

Location ID:	Res DW	MW-13-45
1,4-Dioxane	8.5 µg/L	56

Location ID:	Res DW	MW-13-42
1,4-Dioxane	8.5 µg/L	20

Location ID:	Res DW	MW-12-05
1,4-Dioxane	8.5 µg/L	10

Location ID:	Res DW	TW-14-02
1,4-Dioxane	8.5 µg/L	3,300

LEGEND

EXISTING MONITORING WELLS

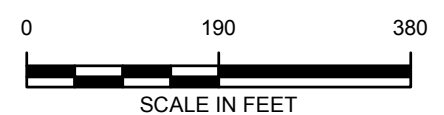
- DEEP OVERBURDEN MONITORING WELL
- WEATHERED BEDROCK MONITORING WELL
- BEDROCK MONITORING WELL
- NAPL MONITORING WELL
- PERCHED MONITORING WELL
- 3Q15 SAMPLED MONITORING WELL
- APPROXIMATE EXTENT LNAPL
- APPROX. EXTENT VOCs IN PERCHED ZONE
- PERCHED 1,4-DIOXANE IMPACTS > PROPOSED DW CRITERIA (8.5 µg/L)
- LOWER 1,4-DIOXANE IMPACTS > PROPOSED DW CRITERIA (8.5 µg/L)
- PROPERTY BOUNDARY

NOTES:

NOT ALL WELLS SHOWN ON THIS FIGURE WERE SAMPLED DURING THIS MONITORING EVENT.

DW: DRINKING WATER
 VOCs: VOLATILE ORGANIC COMPOUNDS
 LNAPL: LIGHT NON-AQUEOUS PHASE LIQUID

FOR 1,4-DIOXANE 8.5 µg/L IS THE PROPOSED DRINKING WATER CRITERIA (DWC) BEING CONSIDERED BASED ON DISCUSSIONS WITH THE MDEQ. THEREFORE, 8.5 µg/L IS THE EFFECTIVE DWC STANDARD AT THE SITE. THE CURRENT PROMULGATED DWC STANDARD FOR 1,4-DIOXANE IS 85 µg/L.



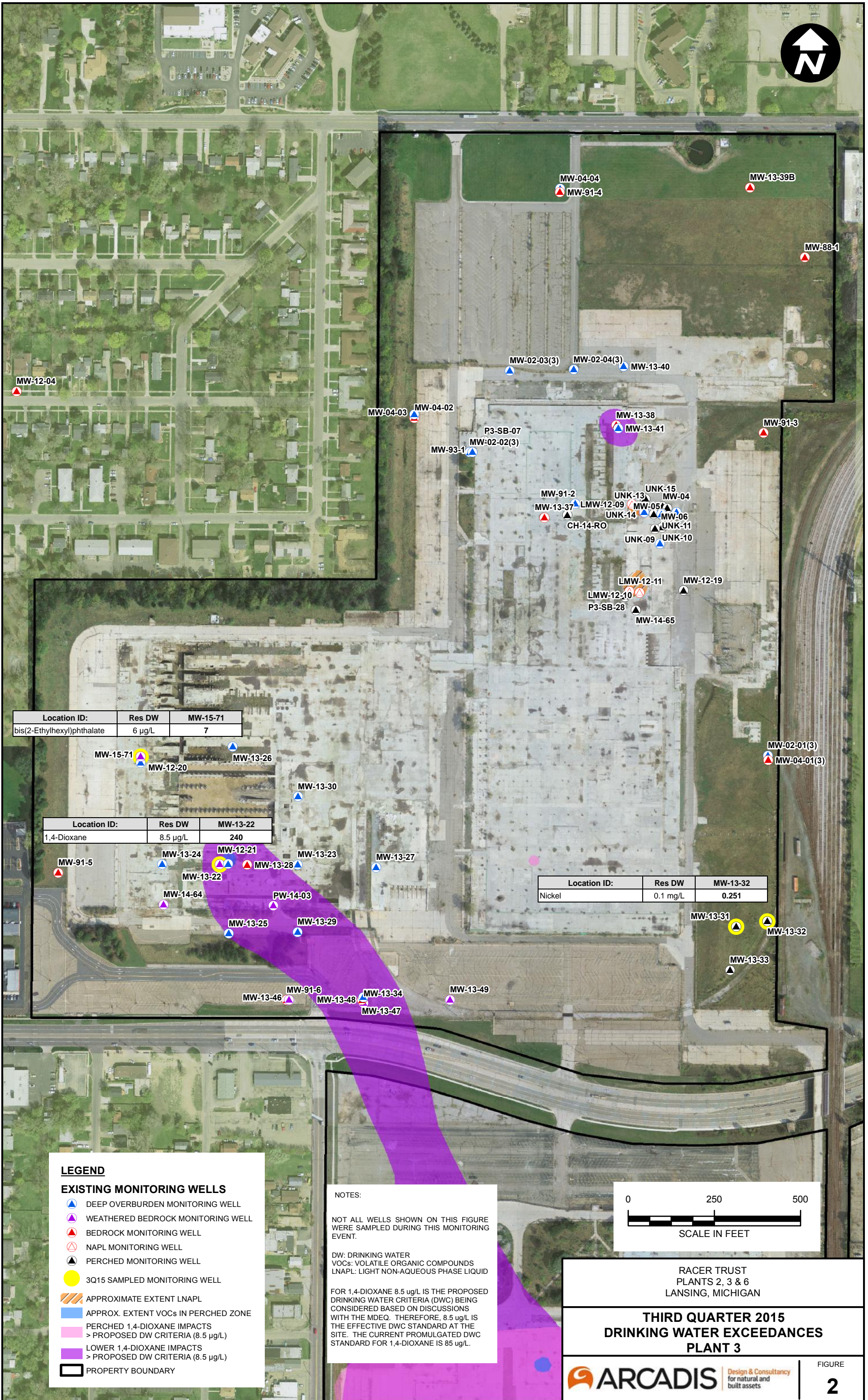
RACER TRUST
 PLANTS 2, 3 & 6
 LANSING, MICHIGAN

**THIRD QUARTER 2015
 DRINKING WATER EXCEEDANCES
 PLANT 2**



FIGURE

1



Location ID:	Res DW	MW-15-71
bis(2-Ethylhexyl)phthalate	6 µg/L	7

Location ID:	Res DW	MW-13-22
1,4-Dioxane	8.5 µg/L	240

Location ID:	Res DW	MW-13-32
Nickel	0.1 mg/L	0.251

LEGEND

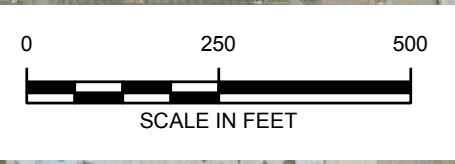
- EXISTING MONITORING WELLS**
- DEEP OVERBURDEN MONITORING WELL
 - WEATHERED BEDROCK MONITORING WELL
 - BEDROCK MONITORING WELL
 - NAPL MONITORING WELL
 - PERCHED MONITORING WELL
 - 3Q15 SAMPLED MONITORING WELL
 - APPROXIMATE EXTENT LNAPL
 - APPROX. EXTENT VOCs IN PERCHED ZONE
 - PERCHED 1,4-DIOXANE IMPACTS > PROPOSED DW CRITERIA (8.5 µg/L)
 - LOWER 1,4-DIOXANE IMPACTS > PROPOSED DW CRITERIA (8.5 µg/L)
 - PROPERTY BOUNDARY

NOTES:

NOT ALL WELLS SHOWN ON THIS FIGURE WERE SAMPLED DURING THIS MONITORING EVENT.

DW: DRINKING WATER
 VOCs: VOLATILE ORGANIC COMPOUNDS
 LNAPL: LIGHT NON-AQUEOUS PHASE LIQUID

FOR 1,4-DIOXANE 8.5 µg/L IS THE PROPOSED DRINKING WATER CRITERIA (DWC) BEING CONSIDERED BASED ON DISCUSSIONS WITH THE MDEQ. THEREFORE, 8.5 µg/L IS THE EFFECTIVE DWC STANDARD AT THE SITE. THE CURRENT PROMULGATED DWC STANDARD FOR 1,4-DIOXANE IS 85 µg/L.



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 LANSING, MICHIGAN

**THIRD QUARTER 2015
 DRINKING WATER EXCEEDANCES
 PLANT 3**

CITY: Novi DIV: ENV DB: TRY PIC: PM: TR: PROJECT NUMBER: COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl G:\GIS\Project Files\MotorsLiquidationCompany\Lansing\Docs\2015 Annual Report\1Q15 Exceedances.mxd PLOTTED: 5/21/2015 2:59:23 PM BY: dolaxa

ATTACHMENT 1

Third Quarter 2015 Groundwater Sampling Logs



Low-Flow Groundwater Sampling Log



Project: <u>Lansing-Plant 2</u>	Site Location: <u>East Lansing, MI</u>	
Project No: <u>B0064479.2015.00603</u>	Well ID: <u>MW-12-05</u>	Sample ID: <u>MW-12-05_091115</u>
Sample Date: <u>9/11/2015</u>	Duplicate: <u>N/A</u>	Other QC: <u>MS/MSD</u>
Sample Time: <u>11:30 AM</u>	Weather: <u>Cloudy 65 F</u>	

Instrument Identification

Purge Method: <u>Bladder Pump</u>	Water Quality Meters: <u>YSI</u>	<u>Turbidity Meter</u>
Measuring Point: <u>TOC</u>	Serial #: <u>1416</u>	<u>4433</u>
Casing Material: <u>Welded Steel</u>	Screen Interval: <u>75.0 to 99.0 ft</u>	
Casing Diameter: <u>4 in</u>	Pump Intake Depth: <u>Initial: 96.00 ft bmp Final: 96.00 ft bmp</u>	
Measured Well Depth: <u>0 ft bmp</u>	Purge Time: <u>10:52 AM</u> to <u>11:28 AM</u>	
Depth to Water: <u>77.64 ft bmp</u>	PID Reading: <u>0.0 ppm</u>	

Field Parameter Measurements During Purging

Time	Cuml Time (min)	Flow Rate (mL/min)	Cuml Vol Purged (gal)	Temp (C)	pH (SU)	Spec Cond (uS/cm)	ORP (mV)	DO (mg/L)	Turb (NTU)	DTW (ft)
10:58 AM	0	100	0.1	16.25	7.00	3464	-85.3	5.40	4.04	78.02
11:03 AM	5	100	0.3	15.80	6.95	3512	-83.5	1.16	0.99	78.22
11:08 AM	10	100	0.4	15.75	6.94	3521	-86.1	0.83	0.73	78.25
11:13 AM	15	100	0.5	15.74	6.93	3523	-86.8	0.97	0.56	78.35
11:18 AM	20	100	0.7	15.68	6.92	3526	-86.5	0.70	0.62	78.41
11:23 AM	25	100	0.8	15.66	6.92	3528	-85.7	0.76	0.55	78.47
11:28 AM	30	100	0.9	15.65	6.92	3526	-84.8	0.82	0.65	78.53

Collected Sample Condition

Color: clear **Odor:** No **Appearance:** clear

Parameter	Container	# of Containers	Preservative	Comments
VOCs; 1,4-Dioxane	40 mL CG	9	HCL	N/A

Comments

General Comments: N/A
Sampling Remarks: N/A

Technician: Adam Richmond

Signature: _____

Abbreviations:

C	degrees Celsius	ft	feet	gal	gallons	mg/L	milligrams per liter	mV	millivolts	NTU	nephelometric turbidity units
CG	clear glass	ft bgs	feet below ground surface	HCL	hydrochloric acid	ml/min	milliliters per minute	N/A	not available	ppm	parts per million
F	degrees Fahrenheit	ft bmp	feet below measuring point							SU	standard units
										TOC	top of casing
										uS/cm	microsiemens per centimeter

Low-Flow Groundwater Sampling Log



Project: Lansing-Plant 2 **Site Location:** East Lansing, MI
Project No: B0064479.2015.00603 **Well ID:** MW-13-42 **Sample ID:** MW-13-42_091115
Sample Date: 9/11/2015 **Duplicate:** N/A **Other QC:** N/A
Sample Time: 8:50 AM **Weather:** Sunny 70 F

Instrument Identification

Purge Method: <u>Bladder Pump</u>	Water Quality Meters: <u>YSI</u> <u>Turbidity Meter</u>
Measuring Point: <u>TOC</u>	Serial #: <u>1416</u> <u>4433</u>
Casing Material: _____	Screen Interval: <u>70.0 to 75.0 ft bgs</u>
Casing Diameter: <u>2 in</u>	Pump Intake Depth: <u>Initial: 76.80 ft bmp</u> <u>Final: 76.80 ft bmp</u>
Measured Well Depth: <u>76.94 ft bmp</u>	Purge Time: <u>9:03 AM</u> to <u>9:03 AM</u>
Depth to Water: <u>76.37 ft bmp</u>	PID Reading: <u>0.0 ppm</u>

Field Parameter Measurements During Purging

Time	Cuml Time (min)	Flow Rate (mL/min)	Cuml Vol Purged (gal)	Temp (C)	pH (SU)	Spec Cond (uS/cm)	ORP (mV)	DO (mg/L)	Turb (NTU)	DTW (ft)
9:03 AM	0	100	0.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Collected Sample Condition

Color: brown **Odor:** No **Appearance:** cloudy

Parameter	Container	# of Containers	Preservative	Comments
VOCs; 1,4-Dioxane	40 mL CG	3	HCL	N/A

Comments

General Comments: N/A
Sampling Remarks: N/A

Technician: Adam Richmond

Signature: _____

Abbreviations:

CG	clear glass	ft bgs	feet below ground surface	HCL	hydrochloric acid	N/A	not available	PVC sch	polyvinyl chloride
F	degrees Fahrenheit	ft bmp	feet below measuring point	mL/min	milliliters per minute	ppm	parts per million	40	Schedule 40
ft	feet	gal	gallons					TOC	top of casing

Low-Flow Groundwater Sampling Log



Project: Lansing-Plant 2	Site Location: East Lansing, MI	
Project No: B0064479.2015.00603	Well ID: MW-13-43	Sample ID: MW-13-43_091015
Sample Date: 9/10/2015	Duplicate: N/A	Other QC: N/A
Sample Time: 12:35 PM	Weather: Sunny 75 F	

Instrument Identification

Purge Method: Bladder Pump	Water Quality Meters: YSI	Turbidity Meter
Measuring Point: TOC	Serial #: 1416	4433
Casing Material: Sch 40 PVC	Screen Interval: 72.0 to 77.0 ft bgs	
Casing Diameter: 2 in	Pump Intake Depth: Initial: 77.00 ft bmp	Final: 77.00 ft bmp
Measured Well Depth: 79.78 ft bmp	Purge Time: 11:39 AM	to 12:33 PM
Depth to Water: 71.29 ft bmp	PID Reading: 0.0 ppm	

Field Parameter Measurements During Purging

Time	Cuml Time (min)	Flow Rate (mL/min)	Cuml Vol Purged (gal)	Temp (C)	pH (SU)	Spec Cond (uS/cm)	ORP (mV)	DO (mg/L)	Turb (NTU)	DTW (ft)
11:44 AM	0	100	0.1	20.27	7.62	2230	54.6	7.97	71.60	71.58
11:48 AM	4	100	0.3	19.00	7.54	2240	2.9	4.84	55.20	71.60
11:53 AM	9	100	0.4	18.26	7.38	2361	-21.6	3.25	55.30	71.62
11:58 AM	14	100	0.5	17.96	7.20	2612	-28.4	1.92	42.70	71.64
12:03 PM	19	100	0.7	18.22	7.14	2769	-34.2	1.62	28.30	71.63
12:08 PM	24	100	0.8	18.28	7.13	2775	-36.9	0.66	29.60	71.63
12:13 PM	29	100	0.9	18.20	7.12	2760	-39.8	0.50	24.10	71.63
12:18 PM	34	100	1.0	18.13	7.11	2757	-41.6	0.42	18.60	71.63
12:23 PM	39	100	1.2	18.19	7.10	2735	-41.9	0.40	13.90	71.63
12:28 PM	44	100	1.3	18.00	7.10	2732	-44.4	0.35	11.70	71.63
12:33 PM	49	100	1.4	17.92	7.11	2726	-45.6	0.35	9.38	71.63

Collected Sample Condition

Color: white **Odor:** No **Appearance:** cloudy

Parameter	Container	# of Containers	Preservative	Comments
VOCs; 1,4-Dioxane	40 mL CG	3	HCL	N/A
Deuterium Oxide	60 mL PE	1	None	N/A
Chloride, Alkalinity and Sulfate	250 mL PE	1	None	N/A
MI 10 Metals and Na	125 mL PE	1	HNO3	N/A

Comments

General Comments: N/A
Sampling Remarks: N/A

Technician: Adam Richmond

Signature:

Abbreviations:

C	degrees Celsius	ft bgs	feet below ground surface	HNO3	nitric acid	mV	millivolts	PE	polyethylene	SU	standard units
CG	clear glass	ft bmp	feet below measuring point	mg/L	milligrams per liter	N/A	not available	ppm	parts per million	TOC	top of casing
F	degrees Fahrenheit	gal	gallons	mL/min	milliliters per minute	NTU	nephelometric turbidity units	PVC sch 40	polyvinyl chloride Schedule 40	uS/cm	microsiemens per centimeter
ft	feet	HCL	hydrochloric acid								

Low-Flow Groundwater Sampling Log



Project: <u>Lansing-Plant 2</u>	Site Location: <u>East Lansing, MI</u>	
Project No: <u>B0064479.2015.00603</u>	Well ID: <u>MW-13-44</u>	Sample ID: <u>MW-13-44_091115</u>
Sample Date: <u>9/11/2015</u>	Duplicate: <u>N/A</u>	Other QC: <u>N/A</u>
Sample Time: <u>10:00 AM</u>	Weather: <u>Cloudy 65 F</u>	

Instrument Identification

Purge Method: <u>Bladder Pump</u>	Water Quality Meters: <u>YSI</u>	<u>Turbidity Meter</u>
Measuring Point: <u>TOC</u>	Serial #: <u>2842</u>	<u>4433</u>
Casing Material: <u>Welded Steel</u>	Screen Interval: <u>96.0 to 115.0 ft bgs</u>	
Casing Diameter: <u>4 in</u>	Pump Intake Depth: <u>Initial: 100.00 ft bmp Final: 100.00 ft bmp</u>	
Measured Well Depth: <u>119.35 ft bmp</u>	Purge Time: <u>9:15 AM</u> to <u>9:52 AM</u>	
Depth to Water: <u>83.46 ft bmp</u>	PID Reading: <u>0.0 ppm</u>	

Field Parameter Measurements During Purging

Time	Cuml Time (min)	Flow Rate (mL/min)	Cuml Vol Purged (gal)	Temp (C)	pH (SU)	Spec Cond (uS/cm)	ORP (mV)	DO (mg/L)	Turb (NTU)	DTW (ft)
9:17 AM	0	100	0.1	15.50	7.00	1554	104.1	5.70	8.34	83.78
9:22 AM	5	100	0.3	15.01	6.82	1493	-81.9	1.52	4.43	83.91
9:27 AM	10	100	0.4	14.90	6.86	1467	-94.5	0.76	2.64	84.18
9:32 AM	15	100	0.5	14.98	6.92	1451	-102.5	0.81	3.15	84.35
9:37 AM	20	100	0.7	15.04	6.95	1447	-100.8	0.49	2.40	84.47
9:42 AM	25	100	0.8	15.12	7.01	1444	-109.6	0.44	5.68	84.57
9:47 AM	30	100	0.9	15.11	7.07	1437	-115.6	0.46	3.90	84.69
9:52 AM	35	100	1.0	15.06	7.11	1430	-117.3	0.46	7.14	84.78

Collected Sample Condition

Color: clear **Odor:** No **Appearance:** clear

Parameter	Container	# of Containers	Preservative	Comments
VOCs; 1,4-Dioxane	40 mL CG	3	HCL	N/A

Comments

General Comments: N/A
Sampling Remarks: N/A

Technician: Adam Richmond

Signature:

Abbreviations:

C	degrees Celsius	ft	feet	gal	gallons	mg/L	milligrams per liter	mV	millivolts	NTU	nephelometric turbidity units
CG	clear glass	ft bgs	feet below ground surface	HCL	hydrochloric acid	mL/min	milliliters per minute	N/A	not available	ppm	parts per million
F	degrees Fahrenheit	ft bmp	feet below measuring point							SU	standard units
										TOC	top of casing
										uS/cm	microsiemens per centimeter

Low-Flow Groundwater Sampling Log



Project: Lansing-Plant 2 **Site Location:** East Lansing, MI
Project No: B0064479.2015.00603 **Well ID:** MW-13-45 **Sample ID:** MW-13-45_091015
Sample Date: 9/10/2015 **Duplicate:** N/A **Other QC:** N/A
Sample Time: 2:00 PM **Weather:** Sunny 80 F

Instrument Identification

Purge Method: <u>Bladder Pump</u>	Water Quality Meters: <u>YSI</u>	<u>Turbidity Meter</u>
Measuring Point: <u>TOC</u>	Serial #: <u>1416</u>	<u>4433</u>
Casing Material: <u>Sch. 40 PVC</u>	Screen Interval: <u>72.0 to 77.0 ft bgs</u>	
Casing Diameter: <u>2 in</u>	Pump Intake Depth: <u>Initial: 76.00 ft bmp</u>	<u>Final: 76.00 ft bmp</u>
Measured Well Depth: <u>78.34 ft bmp</u>	Purge Time: <u>1:08 PM</u>	<u>to 1:49 PM</u>
Depth to Water: <u>70.33 ft bmp</u>	PID Reading: <u>0.0 ppm</u>	

Field Parameter Measurements During Purging

Time	Cuml Time (min)	Flow Rate (mL/min)	Cuml Vol Purged (gal)	Temp (C)	pH (SU)	Spec Cond (uS/cm)	ORP (mV)	DO (mg/L)	Turb (NTU)	DTW (ft)
1:14 PM	0	100	0.1	21.47	7.57	1384	-100.6	5.96	46.40	70.59
1:19 PM	5	100	0.3	19.58	7.59	1333	-94.8	1.24	28.10	70.65
1:24 PM	10	100	0.4	18.63	7.48	1321	-87.6	1.20	20.40	70.73
1:29 PM	15	100	0.5	18.49	7.40	1316	-80.9	1.39	15.70	70.80
1:34 PM	20	100	0.7	18.34	7.38	1316	-76.2	1.60	11.00	70.85
1:39 PM	25	100	0.8	18.36	7.35	1318	-76.0	1.50	8.38	70.88
1:44 PM	30	100	0.9	18.97	7.38	1319	-78.8	1.44	7.65	71.02
1:49 PM	35	100	1.0	18.62	7.37	1328	79.3	1.49	7.41	70.99

Collected Sample Condition

Color: white **Odor:** No **Appearance:** clear

Parameter	Container	# of Containers	Preservative	Comments
VOCs; 1,4-Dioxane	40 mL CG	3	HCL	N/A

Comments

General Comments: N/A
Sampling Remarks: N/A

Technician: Adam Richmond

Signature:

Abbreviations:

C	degrees Celsius	ft bgs	feet below ground surface	mg/L	milligrams per liter	N/A	not available	PVC sch	polyvinyl chloride	uS/cm	microsiemens per centimeter
CG	clear glass	ft bmp	feet below measuring point	mL/min	milliliters per minute	NTU	nephelometric turbidity units	40	Schedule 40		
F	degrees Fahrenheit	gal	gallons	mV	millivolts	ppm	parts per million	SU	standard units		
ft	feet	HCL	hydrochloric acid					TOC	top of casing		

Low-Flow Groundwater Sampling Log



Project: Lansing-Plant 2 **Site Location:** East Lansing, MI
Project No: B0064479.2015.00603 **Well ID:** MW-14-56 **Sample ID:** MW-14-56_091115
Sample Date: 9/11/2015 **Duplicate:** N/A **Other QC:** N/A
Sample Time: 1:30 PM **Weather:** Sunny|Cloudy 65 F

Instrument Identification

Purge Method: <u>Bladder Pump</u>	Water Quality Meters: <u>YSI</u>	<u>Turbidity Meter</u>
Measuring Point: <u>TOC</u>	Serial #: <u>1416</u>	<u>4433</u>
Casing Material: <u>PVC Sch 40</u>	Screen Interval: <u>71.0 to 76.0 ft BTOC</u>	
Casing Diameter: <u>2 in</u>	Pump Intake Depth: <u>Initial: 78.50 ft bmp</u>	<u>Final: 78.50 ft bmp</u>
Measured Well Depth: <u>79.00 ft bmp</u>	Purge Time: <u>12:11 PM</u>	<u>to 12:50 PM</u>
Depth to Water: <u>75.96 ft bmp</u>	PID Reading: <u>0.0 ppm</u>	

Field Parameter Measurements During Purging

Time	Cuml Time (min)	Flow Rate (mL/min)	Cuml Vol Purged (gal)	Temp (C)	pH (SU)	Spec Cond (uS/cm)	ORP (mV)	DO (mg/L)	Turb (NTU)	DTW (ft)
12:16 PM	0	150	0.1	15.51	6.94	4948	-24.2	2.61	525.00	76.62
12:21 PM	4	125	0.3	14.78	6.86	4979	0.8	1.77	189.00	77.09
12:25 PM	8	100	0.4	14.80	6.84	4979	-1.9	2.37	195.00	N/A
12:30 PM	13	100	0.5	14.82	6.83	4980	-14.9	2.52	275.00	N/A
12:35 PM	18	100	0.7	14.87	6.80	4978	-37.7	1.64	403.00	N/A
12:40 PM	23	100	0.8	15.22	6.78	4946	-46.8	1.04	497.00	N/A
12:45 PM	28	100	0.9	15.52	6.76	4973	-51.4	0.90	409.00	N/A
12:50 PM	33	100	1.0	15.32	6.71	4911	-56.1	0.60	N/A	N/A

Collected Sample Condition

Color: brown **Odor:** No **Appearance:** turbid

Parameter	Container	# of Containers	Preservative	Comments
VOCs; 1,4-Dioxane	40 mL CG	3	HCL	N/A

Comments

General Comments: N/A
 Sampling Remarks: Turbidity of recharge sample: 436 NTU.

Technician: Adam Richmond

Signature:

Abbreviations:

C	degrees Celsius	ft bgs	feet below ground surface	mg/L	milligrams per liter	N/A	not available	PVC sch	polyvinyl chloride 40	uS/cm	microsiemens per centimeter
CG	clear glass	ft bmp	feet below measuring point	mL/min	milliliters per minute	NTU	nephelometric turbidity units	SU	standard units		
F	degrees Fahrenheit	gal	gallons	mV	millivolts	ppm	parts per million	TOC	top of casing		
ft	feet	HCL	hydrochloric acid								

Low-Flow Groundwater Sampling Log



Project: Lansing-Plant 2 **Site Location:** East Lansing, MI
Project No: B0064479.2015.00603 **Well ID:** TW-14-02 **Sample ID:** TW-14-02_091015
Sample Date: 9/10/2015 **Duplicate:** DUP_01_091015 **Other QC:** N/A
Sample Time: 4:45 PM **Weather:** Cloudy 80 F

Instrument Identification

Purge Method: <u>Bladder Pump</u>	Water Quality Meters: <u>YSI</u>	<u>Turbidity Meter</u>
Measuring Point: <u>TOC</u>	Serial #: <u>1416</u>	<u>4433</u>
Casing Material: _____	Screen Interval: <u>N/A</u>	
Casing Diameter: _____	Pump Intake Depth: <u>Initial: 70.00 ft bmp Final: 70.00 ft bmp</u>	
Measured Well Depth: <u>74.82 ft bmp</u>	Purge Time: <u>3:44 PM</u> to <u>4:41 PM</u>	
Depth to Water: <u>66.64 ft bmp</u>	PID Reading: <u>0.0 ppm</u>	

Field Parameter Measurements During Purging

Time	Cuml Time (min)	Flow Rate (mL/min)	Cuml Vol Purged (gal)	Temp (C)	pH (SU)	Spec Cond (uS/cm)	ORP (mV)	DO (mg/L)	Turb (NTU)	DTW (ft)
3:46 PM	0	100	0.1	20.50	7.26	3731	-94.8	3.31	207.00	67.16
3:51 PM	4	100	0.3	19.72	7.25	3586	-84.5	1.84	124.00	67.25
3:56 PM	9	100	0.4	19.30	7.20	3468	-78.4	2.11	74.40	67.65
4:01 PM	14	100	0.5	19.48	7.17	3495	-80.4	1.76	46.10	67.96
4:06 PM	19	100	0.7	19.66	7.14	3585	-84.0	1.33	40.20	67.98
4:11 PM	24	100	0.8	19.29	7.12	3619	-85.4	1.01	39.30	68.12
4:16 PM	29	100	0.9	19.21	7.11	3631	-85.5	0.90	33.50	68.36
4:21 PM	34	100	1.0	19.72	7.10	3627	-86.9	0.85	35.30	68.48
4:26 PM	39	100	1.2	19.92	7.10	3638	-87.9	0.72	27.40	68.49
4:31 PM	44	100	1.3	20.08	7.10	3635	-89.6	0.66	24.50	68.65
4:36 PM	49	100	1.4	20.32	7.10	3643	-91.2	0.62	23.70	68.75
4:41 PM	54	100	1.5	20.13	7.09	3629	-92.7	0.57	25.40	68.85

Collected Sample Condition

Color: white **Odor:** No **Appearance:** cloudy

Parameter	Container	# of Containers	Preservative	Comments
VOCs; 1,4-Dioxane	40 mL CG	6	HCL	N/A
SVOCs	1 L AG	2	None	N/A
Metals	125 mL PE	2	HNO3	N/A

Comments

General Comments: N/A
 Sampling Remarks: TURBIDITY WITHIN 10%

Technician: Adam Richmond

Signature: _____

Abbreviations:

AG	amber glass	ft	feet	HNO3	nitric acid	mV	millivolts	PE	polyethylene	TOC	top of casing
C	degrees Celsius	ft bmp	feet below measuring point	mg/L	milligrams per liter	N/A	not available	ppm	parts per million	uS/cm	microsiemens per centimeter
CG	clear glass	gal	gallons	mL/min	milliliters per minute	NTU	nephelometric turbidity units	SU	standard units		
F	degrees Fahrenheit	HCL	hydrochloric acid								

Low-Flow Groundwater Sampling Log



Project: Lansing-Plant 3 **Site Location:** East Lansing, MI
Project No: B0064480.0015.00603 **Well ID:** MW-13-22 **Sample ID:** MW-13-22_090915
Sample Date: 9/9/2015 **Duplicate:** N/A **Other QC:** N/A
Sample Time: 10:10 AM **Weather:** Cloudy 75 F

Instrument Identification

Purge Method: <u>Bladder Pump</u>	Water Quality Meters: <u>YSI</u>	<u>Turbidity Meter</u>
Measuring Point: <u>TOC</u>	Serial #: <u>1416</u>	<u>4433</u>
Casing Material: <u>PVC sch 40</u>	Screen Interval: <u>89.0 to 94.0 ft bgs</u>	
Casing Diameter: <u>2 in</u>	Pump Intake Depth: <u>Initial: 90.0 ft bmp</u>	<u>Final: 90.0 ft bmp</u>
Measured Well Depth: <u>96.22 ft bmp</u>	Purge Time: <u>9:22 AM</u>	<u>to 10:08 AM</u>
Depth to Water: <u>72.92 ft bmp</u>	PID Reading: <u>0.0 ppm</u>	

Field Parameter Measurements During Purging

Time	Cuml Time (min)	Flow Rate (mL/min)	Cuml Vol Purged (gal)	Temp (C)	pH (SU)	Spec Cond (uS/cm)	ORP (mV)	DO (mg/L)	Turb (NTU)	DTW (ft)
9:22 AM	0	100	0.1	16.60	6.63	1829	-32.8	0.40	22.80	73.17
9:33 AM	10	100	0.3	16.34	6.37	1888	-18.3	0.12	10.30	73.15
9:38 AM	16	100	0.4	16.57	6.46	1899	-26.6	0.25	7.75	73.16
9:43 AM	20	100	0.5	16.19	6.50	1901	-22.4	0.86	4.35	73.13
9:48 AM	25	100	0.7	16.13	6.51	1890	-24.4	0.81	4.98	73.13
9:53 AM	30	100	0.8	16.09	6.53	1882	-29.8	0.62	3.41	73.13
9:58 AM	35	100	0.9	16.02	6.56	1880	-32.8	0.50	2.62	73.13
10:03 AM	40	100	1.0	16.06	6.60	1873	-36.5	0.42	2.87	73.13
10:08 AM	45	100	1.1	16.02	6.63	1871	-36.4	0.37	1.80	73.13

Collected Sample Condition

Color: clear **Odor:** No **Appearance:** clear

Parameter	Container	# of Containers	Preservative	Comments
VOCs; 1,4-Dioxane	40 mL CG	3	HCL	N/A

Comments

General Comments: N/A
Sampling Remarks: N/A

Technician: Adam Richmond

Signature:

Abbreviations:

C	degrees Celsius	ft bgs	feet below ground surface	mg/L	milligrams per liter	N/A	not available	PVC sch	polyvinyl chloride	uS/cm	microsiemens per centimeter
CG	clear glass	ft bmp	feet below measuring point	mL/min	milliliters per minute	NTU	nephelometric turbidity units	40	Schedule 40	SU	standard units
F	degrees Fahrenheit	gal	gallons	mV	millivolts	ppm	parts per million	TOC	top of casing		
ft	feet	HCL	hydrochloric acid								

Low-Flow Groundwater Sampling Log



Project: <u>Lansing-Plant 3</u>	Site Location: <u>East Lansing, MI</u>	
Project No: <u>B0064480.0015.00603</u>	Well ID: <u>MW-13-31</u>	Sample ID: <u>MW-13-31_090915</u>
Sample Date: <u>9/9/2015</u>	Duplicate: <u>DUP_02_090915</u>	Other QC: <u>N/A</u>
Sample Time: <u>4:10 PM</u>	Weather: <u>Sunny 75 F</u>	

Instrument Identification

Purge Method: <u>Bladder Pump</u>	Water Quality Meters: <u>YSI</u>	<u>Turbidity Meter</u>
Measuring Point: <u>TOC</u>	Serial #: <u>1416</u>	<u>4433</u>
Casing Material: <u>PVC sch 40</u>	Screen Interval: <u>5.0 to 10.0 ft bgs</u>	
Casing Diameter: <u>2 in</u>	Pump Intake Depth: <u>Initial: 10.0 ft bmp</u>	<u>Final: 10.0 ft bmp</u>
Measured Well Depth: <u>12.80 ft bmp</u>	Purge Time: <u>3:16 PM</u>	<u>to 4:06 PM</u>
Depth to Water: <u>8.68 ft bmp</u>	PID Reading: <u>0.0 ppm</u>	

Field Parameter Measurements During Purging

Time	Cuml Time (min)	Flow Rate (mL/min)	Cuml Vol Purged (gal)	Temp (C)	pH (SU)	Spec Cond (uS/cm)	ORP (mV)	DO (mg/L)	Turb (NTU)	DTW (ft)
3:21 PM	0	100	0.1	20.56	7.02	956	-22.4	1.72	72.80	8.65
3:26 PM	5	100	0.3	19.40	7.02	945	5.7	0.75	54.10	8.65
3:31 PM	10	100	0.4	19.47	6.98	940	26.4	0.38	33.20	8.65
3:36 PM	15	100	0.5	19.28	6.94	937	42.5	0.37	18.40	8.65
3:41 PM	20	100	0.7	19.46	6.92	939	53.2	0.42	13.70	8.65
3:46 PM	25	100	0.8	19.51	6.91	938	59.8	0.48	11.80	8.65
3:51 PM	30	100	0.9	19.39	6.89	935	63.7	0.49	10.30	8.65
3:56 PM	35	100	1.0	19.54	6.89	936	68.5	0.50	8.49	8.65
4:01 PM	40	100	1.2	19.56	6.89	937	71.4	0.56	7.01	8.65
4:06 PM	45	100	1.3	19.25	6.88	936	74.3	0.58	5.75	8.65

Collected Sample Condition

Color: clear **Odor:** No **Appearance:** cloudy

Parameter	Container	# of Containers	Preservative	Comments
Select Metals	125 mL PE	2	HNO3	N/A

Comments

General Comments: N/A
Sampling Remarks: N/A

Technician: Adam Richmond

Signature: _____

Abbreviations:

C	degrees Celsius	ft bmp	feet below measuring point	mL/min	milliliters per minute	NTU	nephelometric turbidity units	PVC sch	polyvinyl chloride	uS/cm	microsiemens per centimeter
F	degrees Fahrenheit	gal	gallons	mV	millivolts	PE	polyethylene	40	Schedule 40		
ft	feet	HNO3	nitric acid	N/A	not available	ppm	parts per million	SU	standard units		
ft bgs	feet below ground surface	mg/L	milligrams per liter					TOC	top of casing		

Low-Flow Groundwater Sampling Log



Project: Lansing-Plant 3 **Site Location:** East Lansing, MI
Project No: B0064480.0015.00603 **Well ID:** MW-13-32 **Sample ID:** MW-13-32_090915
Sample Date: 9/9/2015 **Duplicate:** N/A **Other QC:** N/A
Sample Time: 2:50 PM **Weather:** Sunny 75 F

Instrument Identification

Purge Method: <u>Bladder Pump</u>	Water Quality Meters: <u>YSI</u>	<u>Turbidity Meter</u>
Measuring Point: <u>TOC</u>	Serial #: <u>1416</u>	<u>4433</u>
Casing Material: <u>PVC sch 40</u>	Screen Interval: <u>5.0 to 10.0 ft bgs</u>	
Casing Diameter: <u>2 in</u>	Pump Intake Depth: <u>Initial: 9.5 ft bmp</u>	<u>Final: 9.5 ft bmp</u>
Measured Well Depth: <u>12.65 ft bmp</u>	Purge Time: <u>1:42 PM</u>	<u>to 2:43 PM</u>
Depth to Water: <u>7.22 ft bmp</u>	PID Reading: <u>0.0 ppm</u>	

Field Parameter Measurements During Purging

Time	Cuml Time (min)	Flow Rate (mL/min)	Cuml Vol Purged (gal)	Temp (C)	pH (SU)	Spec Cond (uS/cm)	ORP (mV)	DO (mg/L)	Turb (NTU)	DTW (ft)
1:46 PM	0	100	0.1	19.10	7.28	1213	-15.1	1.54	74.30	7.87
1:48 PM	2	100	0.3	18.40	7.19	1500	34.9	1.49	16.70	8.03
1:53 PM	8	100	0.4	18.93	7.07	1124	52.7	1.19	17.10	8.03
1:58 PM	12	100	0.5	19.32	7.03	1154	56.2	0.73	12.40	8.03
2:03 PM	17	100	0.7	19.45	7.01	1126	54.6	0.76	17.70	8.03
2:08 PM	22	100	0.8	19.00	6.98	1169	26.3	0.77	13.10	8.03
2:13 PM	27	100	0.9	19.20	7.02	1085	43.1	1.22	5.67	8.03
2:18 PM	32	100	1.0	19.19	7.03	1048	57.6	1.45	3.23	8.03
2:23 PM	37	100	1.2	19.46	7.03	1028	63.5	1.72	2.41	8.03
2:28 PM	42	100	1.3	19.10	7.03	1016	69.8	1.95	2.33	8.03
2:33 PM	47	100	1.4	19.03	7.02	1008	72.5	2.26	2.77	8.03
2:38 PM	52	100	1.5	19.06	7.01	999	80.5	2.56	3.29	8.03
2:43 PM	57	100	1.7	19.13	7.00	996	78.7	2.65	N/A	8.03

Collected Sample Condition

Color: clear **Odor:** No **Appearance:** cloudy

Parameter	Container	# of Containers	Preservative	Comments
Select Metals	125 mL PE	1	HNO3	N/A

Comments

General Comments: N/A
 Sampling Remarks: Dissolved oxygen sensor may be reading incorrectly.

Technician: Adam Richmond

Signature:

Abbreviations:

C	degrees Celsius	ft bmp	feet below measuring point	mL/min	milliliters per minute	NTU	nephelometric turbidity units	PVC sch 40	polyvinyl chloride Schedule 40	uS/cm	microsiemens per centimeter
F	degrees Fahrenheit	gal	gallons	mV	millivolts	PE	polyethylene	SU	standard units		
ft	feet	HNO3	nitric acid	N/A	not available	ppm	parts per million	TOC	top of casing		
ft bgs	feet below ground surface	mg/L	milligrams per liter								

Low-Flow Groundwater Sampling Log



Project: <u>Lansing-Plant 3</u>	Site Location: <u>East Lansing, MI</u>	
Project No: <u>B0064480.0015.00603</u>	Well ID: <u>MW-15-71</u>	Sample ID: <u>MW-15-71_090915</u>
Sample Date: <u>9/9/2015</u>	Duplicate: <u>N/A</u>	Other QC: <u>N/A</u>
Sample Time: <u>12:40 PM</u>	Weather: <u>Cloudy Humid 75 F</u>	

Instrument Identification

Purge Method: <u>Bladder Pump</u>	Water Quality Meters: <u>YSI</u>	<u>Turbidity Meter</u>
Measuring Point: <u>TOC</u>	Serial #: <u>1416</u>	<u>4433</u>
Casing Material: _____	Screen Interval: <u>N/A</u>	
Casing Diameter: _____	Pump Intake Depth: <u>Initial: 115.0 ft bmp Final: 115.0 ft bmp</u>	
Measured Well Depth: <u>118.29 ft bmp</u>	Purge Time: <u>11:07 AM</u> to <u>12:38 PM</u>	
Depth to Water: <u>70.66 ft bmp</u>	PID Reading: <u>0.0 ppm</u>	

Field Parameter Measurements During Purging

Time	Cuml Time (min)	Flow Rate (mL/min)	Cuml Vol Purged (gal)	Temp (C)	pH (SU)	Spec Cond (uS/cm)	ORP (mV)	DO (mg/L)	Turb (NTU)	DTW (ft)
11:18 AM	0	100	0.1	21.70	8.45	952	-93.2	4.41	230.00	70.90
11:24 AM	5	100	0.3	21.41	7.69	1148	-132.2	1.55	422.00	70.90
11:29 AM	10	100	0.4	20.70	7.51	1183	-124.3	0.98	217.00	70.90
11:34 AM	15	100	0.5	20.45	7.51	1197	-123.6	0.65	171.00	70.90
11:39 AM	20	100	0.7	19.17	7.49	1212	-120.7	0.63	132.00	70.90
11:44 AM	25	100	0.8	18.42	7.43	1218	-114.8	0.57	99.00	70.90
11:49 AM	30	100	0.9	18.15	7.37	1219	-104.8	0.72	83.10	70.90
11:54 AM	35	100	1.0	17.89	7.34	1226	-101.7	0.87	70.90	70.90
11:59 AM	40	100	1.2	17.80	7.31	1226	-99.2	0.60	61.70	70.90
12:04 PM	45	100	1.3	18.09	7.33	1229	-99.5	0.61	39.60	70.90
12:08 PM	49	100	1.4	18.17	7.32	1232	-98.4	0.57	32.40	70.90
12:13 PM	54	100	1.5	18.34	7.31	1229	-96.2	0.63	28.50	70.90
12:18 PM	59	100	1.7	18.25	7.30	1228	-96.3	0.62	29.80	70.90
12:23 PM	64	100	1.8	18.06	7.28	1229	-94.5	0.68	24.70	70.90
12:28 PM	69	100	1.9	17.94	7.28	1229	-93.1	0.70	20.80	70.90
12:33 PM	74	100	2.1	18.06	7.26	1230	-91.6	0.72	22.00	70.90
12:38 PM	79	100	2.2	17.96	7.26	1231	-92.5	0.75	21.00	70.90

Low-Flow Groundwater Sampling Log



Collected Sample Condition

Color: white **Odor:** No **Appearance:** cloudy

Parameter	Container	# of Containers	Preservative	Comments
VOCs; 1,4-Dioxane	40 mL CG	3	HCL	N/A
SVOCs	1 L AG	2	None	N/A
Metals	125 mL PE	2	HNO3	N/A

Comments

General Comments: N/A
 Sampling Remarks: N/A

Technician: Adam Richmond

Signature: _____

Abbreviations:

AG	amber glass	ft	feet	HNO3	nitric acid	mV	millivolts	PE	polyethylene	TOC	top of casing
C	degrees Celsius	ft bmp	feet below measuring point	mg/L	milligrams per liter	N/A	not available	ppm	parts per million	uS/cm	microsiemens per centimeter
CG	clear glass	gal	gallons	mL/min	milliliters per minute	NTU	nephelometric turbidity units	SU	standard units		
F	degrees Fahrenheit	HCL	hydrochloric acid								