January 21, 2015

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

RE: Corrective Action Closure- Former Wastewater Treatment Plant
Coldwater Road Landfill, Flint, Michigan
MID 005 356 860

FILE: 15388 /51440/rep

Dear Mr. Conforti:

On behalf of Revitalizing Auto Communities Environmental Response (RACER) Trust, O'Brien & Gere is pleased to present this letter which serves as the Corrective Action closure request for the former wastewater treatment plant (WWTP) located at the Coldwater Road Landfill site (Figure 1).

## SITE HISTORY

### SITE DESCRIPTION

The RACER Trust Coldwater Road Landfill facility (Site) is located adjacent to and north of the RACER Trust former Peregrine U.S., Inc. property (RACER Trust former Peregrine property) as shown on the Site Plan, Figure 1. The RACER Trust Coldwater Road Landfill facility consists of the stabilized wastewater treatment sludge monofill landfill, restored wetlands, and leachate accumulation facility. The former WWTP previously was located on the Coldwater Road Landfill property and was decommissioned and demolished in 1999. The Coldwater Road landfill property is bordered on the south by the RACER Trust former Peregrine property, which formerly contained several manufacturing buildings and support facilities. The buildings on the RACER Trust former Peregrine property were decommissioned and demolished between 1999 and 2001. A figure depicting the division between the RACER Coldwater Road Landfill facility and the RACER Trust former Peregrine property is included as Figure 2.

### SITE OWNERSHIP

On December 10, 1996, an asset Purchase Agreement for the manufacturing portion of the Coldwater Road site, which is now referred to as the "RACER Trust former Peregrine property, MIR 000 020 743", was signed by General Motors (GM) and Peregrine. GM retained ownership of the northern portion, which is now referred to as the "RACER Trust Coldwater Road Landfill facility MID 005 356 860", and sold the manufacturing facility (former Peregrine property). In August 1999, Remediation and Liability Management Company, Inc. (REALM - a wholly owned subsidiary of GM) took back ownership of the manufacturing facility from Peregrine. In April 2000 a Michigan Department of Environmental Quality (MDEQ) Notification of Regulated Waste Activity form (EQP5150) and United States Environmental Protection Agency (USEPA) Hazardous Waste Permit Application Part A (USEPA form 8700-23) were submitted to document change of ownership of the landfill and the former WWTP property from GM to REALM. REALM, a wholly-owned subsidiary of GM, managed the Resource Conservation and Recovery Act (RCRA) closure program for the REALM Coldwater Road Landfill facility under the 1992 Corrective Action Consent Order (CACO) until REALM filed for bankruptcy in October 2009 at which time Motors Liquidation Company (MLC), which was the former GM after its June 2009 bankruptcy filing,

assumed management of the property. The RACER Trust was created on March 31, 2011 by the U.S. Bankruptcy Court to clean up and position for redevelopment properties and facilities owned by MLC. The Coldwater Road Landfill facility (including the former WWTP) and the former Peregrine property were two of the properties assigned to RACER Trust. RACER Trust currently manages the RCRA closure program for the Coldwater Road Landfill facility under the 1992 CACO.

## RCRA CLOSURE

Several of the RCRA units and Solid Waste Management Units (SWMUs) were closed in accordance with the 1989 Closure Plan during construction of the on-site hazardous waste landfill between 1990 and 1994. Roy F. Weston, Inc. (Weston) provided quality assurance oversight and closure verification during this construction phase. As documented in the Draft Closure Certification Documentation Package (Weston, November 1994), there were several units not closed at the completion of landfill construction. Closure of these remaining units was completed between 1994 and 2003 with oversight provided by O'Brien & Gere. Closure documentation for all units covered under the CACO for the RACER Trust Coldwater Road Landfill facility is provided in the following seven final closure reports along with the MDEQ approved closure certification date:

- Final Closure Certification Documentation Package -Decontamination Pits and Sump, Chromium Reduction Basins at the WWTP, September 1998, Roy F. Weston, Inc. (Weston). MDEQ closure certification provided in a letter dated March 24, 2005.
- Subsurface Investigation of Decontamination Pits/Sump and Chromium Reduction Basins Report, June 1999, O'Brien & Gere Engineers, Inc. (O'Brien & Gere). MDEQ closure certification provided in a letter dated October 15, 1999.
- Final Closure Certification, former Drum Storage Area and Waste Pile Pad, June 1999, Weston. MDEQ closure certification provided in a letter dated March 24, 2005.
- Part I - Final Closure Certification Documentation, November 2000, O'Brien & Gere and subsequent data submittals. MDEQ closure certification in a letter dated March 24, 2005.
- Part II - Final Closure Certification Documentation, November 2000, Weston and subsequent data submittals. MDEQ closure certification provided in a letter dated March 24, 2005.
- Addendum to the June 1999 Closure Certification Report for the Former Drum Storage Area at the Former Peregrine, U.S., Inc. Property at the Coldwater Road Facility, January 2005, O'Brien and Gere. MDEQ closure certification provided in a letter dated March 24, 2005.

The former WWTP was not listed in the 1992 CACO for the Site. The following closure certification reports document the closure activities associated with former WWTP:

- Addendum to the June 1999 Closure Certification Report for the Former Wastewater Treatment Plant at the Coldwater Road Facility, September 2008, O'Brien and Gere.
- Addendum to the June 1999 Closure Certification Report for the Former Wastewater Treatment Plant at the Coldwater Road Facility, April 2013, O'Brien and Gere.

The regulatory background for the WWTP is discussed in the following Section.

## FORMER WASTEWATER TREATMENT PLANT BACKGROUND

The former WWTP at the Coldwater Road Landfill facility was located at the southwestern corner of the property as shown on Figure 1 (Site Plan). The WWTP was constructed in the early 1950s to treat plating waste streams as generated by the manufacturing facility located on the former Peregrine property. Plating operations ran from 1953 to 1987. Process wastewater from the former manufacturing plant discharged to the former WWTP through force mains. Chemical/physical treatment of the process wastewater was performed at the

former WWTP on a batch basis. The chromium, nickel, and acid/alkali wastes were combined and treated for heavy metal removal, whereas the copper-cyanide waste was treated separately.

Use of the WWTP was terminated in December 1996 when the manufacturing plant was sold to Peregrine, Inc. The WWTP building and associated basins were subsequently decontaminated and demolished by REALM between December 1998 and May 1999.

REALM also voluntarily implemented an investigation at the former WWTP to evaluate potential releases from the surrounding basins between September 1998 and May 1999. The former WWTP basin investigation was performed in accordance with procedures outlined in O'Brien & Gere's January 1999 Quality Assurance Project Plan (QAPP) for the Coldwater Road facility and Three Basement Basin Sampling and Analysis Plan (SAP). It should be noted that during this investigation three soil borings were proposed to be monitoring wells. However, wet subsurface soil conditions were not observed during soil boring installation; therefore, no wells were installed.

The basin investigation included collection of subsurface soil samples underneath and around the former WWTP and surrounding basins, concrete samples from the basins and former WWTP basement floor, rinsate samples, and groundwater samples from two existing monitoring wells located southwest of the former WWTP. Results of the basin investigation were reported to MDEQ in the Former WWTP Basin Investigation Report dated November 2000. The results supported closure approval and no further action for the former WWTP basins and surrounding area. However, in a letter from the MDEQ Waste and Hazardous Material Division (WHMD) dated March 24, 2005, MDEQ did not extend the "no further action" determination to the former WWTP. MDEQ indicated that the requirements specified in the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA) Parts 111 and 201, specifically, the dissolved lead in groundwater was not delineated.

A Work Plan was prepared and submitted to MDEQ in April 2006, which addressed the issues raised in their March 24, 2005 letter. The Work Plan proposed investigating the concentrations of dissolved lead in groundwater at the former WWTP. MDEQ reviewed the Work Plan and after minor modifications were included, the Work Plan was approved in a letter dated January 26, 2007. Results of the December 2006 Work Plan investigation were reported to MDEQ in the 2008 Addendum Report dated September 2008. The results supported closure approval and no further action for the former WWTP basins and surrounding area. However, in a letter from MDEQ WHMD dated March 24, 2009, MDEQ comments to the 2008 Addendum Report indicated that several issues remained unresolved; specifically, that the dissolved iron and manganese in groundwater were not delineated horizontally, and that one of the report's conclusions, that shallow groundwater at the Site was not in an aquifer, could not be supported unless that designation is formally approved through submittal of a Groundwater Not In An Aquifer (GWNIAA) Determination. Additionally, in a teleconference call on May 4, 2009, the MDEQ expressed concern that volatile organic compounds (VOCs) in soil were not delineated vertically.

A response to MDEQ comments on the 2008 Addendum Report was submitted to MDEQ on July 13, 2009. The response addressed the GWNIAA issue and two of the three delineation concerns (iron and VOCs) that were raised by MDEQ. The July 13, 2009 response also proposed an additional investigation to address the third delineation concern (dissolved manganese in groundwater). MDEQ approved the response to their comments and approved the additional investigation in a letter dated September 26, 2011.

O'Brien & Gere completed investigation of the former WWTP in a phased approach following MDEQ approval of the July 13, 2009 Work Plan. The installation of monitoring wells was performed on October 10, 2011 (monitoring well locations depicted on Figure 2) and two subsequent groundwater sampling events were performed on November 4, 2011 and April 5, 2012.

Groundwater analytical results from two quarters (November 2011 & April 2012) of groundwater sampling, along with previous groundwater analytical results, document that the manganese impact at the former WWTP had been assessed to the revised site-specific background value for dissolved manganese (0.708 mg/l), which was presented in the Addendum to the June 1999 Closure Certification Report for the Former Wastewater Treatment Plant dated April 2013. MDEQ did not respond to this Closure Certification Report because they wanted to review the results from a pending groundwater investigation in the vicinity of OBG MW-10 at the former Peregrine facility proposed by Conestoga-Rovers & Associates (CRA), the RACER Trust consultant for the former Peregrine facility.

## MANGANESE DELINEATION IN GROUNDWATER

CRA and RACER Trust met with MDEQ on June 11, 2013 and agreed to complete an additional investigation in the vicinity of OBG MW-10 to delineate the extent of manganese impact to groundwater at the former Peregrine facility. The investigation was completed in accordance with the MDEQ-Approved CRA Supplemental RFI Groundwater Investigation Work Plan dated September 16, 2013. The investigation was documented in a Memorandum from CRA dated January 28, 2014 (included in Exhibit A) submitted to the MDEQ.

The investigation included the installation of nine soil borings surrounding monitoring wells OBG MW-9 and OBG MW-10 as shown on Figure 3. The borings were advanced until groundwater was encountered or to a maximum depth of 20 ft below grade (fbg). Groundwater was not encountered at four of the nine boring locations (BH-116, BH-118, BH-119 and BH-120) and five locations (BH-112, BH-113, BH -114, BH-115, BH-117 and BH-121) produced a sufficient volume of water for sample collection. Boreholes in which groundwater was observed were sampled using low-flow sampling methods with samples collected when turbidity readings of 10 NTUs or less were observed. Groundwater samples from the five boreholes were sampled for dissolved and total manganese. Results of the investigation indicated dissolved manganese results from three boreholes east of wells OBG MW-9 and OBG MW-10 (BH-113, BH-114, and BH-115) were above the OBG calculated site-specific background. During the installation of the off-site boreholes (BH-118, BH-119, BH-120 and BH-121) groundwater was observed at one location (BH-121). A dissolved manganese sample was collected and analyzed from this borehole location (BH-121), with results indicating a concentration of dissolved manganese below the Site-specific background value. The groundwater analytical results for this groundwater investigation and previous samples collected from OBG MW-9 and OBG MW-10 are summarized on Table 1 and Figure 3. The results of this investigation were presented to the MDEQ in a draft Memorandum dated December 13, 2013. The draft Memorandum concluded the extent of manganese impacted groundwater at well OBG MW-10 has been delineated through groundwater sample collection and through documenting a lack of saturated zone west of OBG MW-10 deeming offsite migration to the west unlikely. In an email dated January 21, 2014 from the MDEQ (Richard Conforti) to RACER Trust (David Favero), the MDEQ agreed with the conclusions of the draft Memorandum and no further action is required to evaluate the off-site migration/delineation of manganese impacted groundwater in the vicinity of OBG MW-10. The final Memorandum was issued to the MDEQ on January 28, 2014.

## CONCLUSIONS

As reported in the January 28, 2014 Memorandum, and in the Addendum to the June 1999 Closure Certification Report for the Former Wastewater Treatment Plant (WWTP) dated April 2013, an evaluation of pertinent migration pathways at the former WWTP concludes that compliance with Generic Non-Residential cleanup criteria is achieved for the former WWTP with the condition that the current Declaration of Restrictive Covenant will be supplemented to restrict groundwater use at the entire Coldwater Road Landfill Site. Therefore, based on the results of investigation activities and the migration pathway evaluation, closure of the former WWTP pursuant to NREPA Part 111 is achieved and no further action is requested for the former WWTP.

Post-closure activities associated with the landfill are continuing in accordance with the current MDEQ-approved Post-Closure Care Plan dated October 2014. Following MDEQ approval of closure for the former WWTP, RACER anticipates implementing a supplemental Declaration of Restrictive Covenant and establishing a post-closure operating license for the entire Coldwater Road Landfill facility. Once the post closure operating license is established, RACER will request termination of the Corrective Action Consent Order.

If you have any questions, please feel free to contact either David Favero with RACER Trust at (734) 879-9525 or Tony Finch at (248) 477-5701.

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

Scott L. Cormier, PE
Vice President

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

Anthony J. Finch, CPG
Senior Project Geologist

**ENCLOSURES:**
Table 1 – Groundwater Analytical Results

Figure 1 – Site Plan
Figure 2 – Monitoring Well Locations
Figure 3- Groundwater Delineation Locations

Attachment A – CRA Memorandum dated January 28, 2014

cc: David Favero – RACER Trust
Clifford Yantz- O'Brien & Gere

# *TABLES*

# Table 1
# RACER Trust
# Coldwater Road Landfill Facility - Former WWTP
# Groundwater Analytical Results
# Manganese - Method 200.8

| | Total Manganese | Dissolved Manganese |
|---|---|---|
| OBG MW-4 | 0.118 | --- |
| OBG MW-5 | 0.532 | 0.520 |
| OBG MW-7 | 0.212 | --- |
| OBG MW-8 | 0.371 | --- |
| OBG MW-9 | 0.591 | 0.562 |
| OBG MW-10 | **2.62** | **2.57** |
| BH-111 | Dry to 20 ft. | |
| BH-112 | **14** | **1.2** |
| BH-113 | --- | **1.6** |
| BH-114 | --- | **2.7** |
| BH-115 | --- | **0.9** |
| BH-116 | Dry to 20 ft. | |
| BH-117 | 0.088/0.09 | 0.1/0.088 |
| BH-118 | Dry to 20 ft. | |
| BH-119 | Dry to 20 ft. | |
| BH-120 | Dry to 15 ft. | |
| BH-121 | --- | 0.24 |
| BK-3-00 | Dry to 30 ft. | |

| | Total Manganese | Dissolved Manganese |
|---|---|---|
| FMR WWTP - Site Specific Background | 0.708 [6] | 0.708 |
| Part 201[7] | 0.05 | 0.05 |

Notes:

1) Results and criteria are shown in mg/l (ppM).

2) Samples analyzed by Merit Laboratories, Inc. of East Lansing, Michigan.

3) Yellow highlight denotes delineation results. Sample dates and locations are shown on Figure 3.

4) Bold type indicates concentration above WWTP Site-Specifc Background and Part 201 Residential Health-Based Drinking Water criteria.

5) Site-specific background calculated in accordance with MDEQ Sampling Strategies and Statistical Training Materials for Part 201 Cleanup Criteria dated 2002 and USEPA ProUCL Technical Guide (USEPA 2010).

6) Adequate data to calculate a WWTP site-specific background for total manganese is not available, therefore, as a conservative measure total manganese concentrations will be compared to site-specific background concentrations for dissolved manganese.

7) The MDEQ Part 201 criteria is the residential/non-residential health-based drinking water criteria (dated 9/28/2012).

8) '---' denotes the sample was not collected or not analyzed.

9) Samples were not collected at the six dry boreholes.

10) Data for the CRA boreholes and temporary well are from the CRA memo to Mr. Richard Conforti, dated 1/28/2014, concerning the "*Summary of Investigation of Potential Groundwater Migration In The Vicinity of OBG MW-10 Former Peregrine (US) Inc. (Peregrine) Coldwater Road Facility* ".

# *FIGURES*

# FIGURE 1

STANLEY ROAD

SAGINAW ROAD

~ WETLANDS ~

~ COLDWATER ROAD LANDFILL FACILITY ~

KLEIN ST.

DUNKIRK RD.

GEORGE ST.

CHRYSLER ST.

HARTMAN ST.

TEMPLE ST.

TEMPLE ST.

MORRIS HILLS PKWY.

MORRIS HILLS PKWY.

475

HORTON ST.

CSX RAILROAD

~ LANDFILL ~

FORMER WASTEWATER TREATMENT AREA

~ FORMER PEREGRINE PROPERTY ~

MAP USES DATA FROM THE MICHIGAN CENTER FOR GEOGRAPHIC INFORMATION

N

LEGEND

COLDWATER ROAD LANDFILL FACILITY

FORMER PEREGRINE PROPERTY

RACER TRUST
COLDWATER ROAD
FORMER WWTP
FLINT, MICHIGAN

## SITE PLAN

0 100 200 400 600 800

Feet

NOVEMBER 2014
15388/51440-001

O'BRIEN & GERE ENGINEERS, INC.

# FIGURE 2

~ COLDWATER ROAD LANDFILL FACILITY ~

~ LANDFILL ~

~ RESIDENTIAL ~

FORMER WWTP

OBG MW-1
OBG MW-2
OBG MW-3
OBG MW-4
OBG MW-5
OBG MW-6
OBG MW-7
OBG MW-8
OBG MW-9
OBG MW-10

~ FORMER PEREGRINE ~
PROPERTY

Note: FORMER WWTP indicates former wastewatre treatment plant

N

LEGEND

- FORMER WWTP BUILDING
- FORMER WWTP BASIN
- MONITORING WELL LOCATION

RACER TRUST
COLDWATER ROAD
FORMER WWTP
FLINT, MICHIGAN

## MONITORING WELL LOCATIONS

0 25 50 75 100
Feet

NOVEMBER 2014
15388/51440-002

O'BRIEN & GERE ENGINEERS, INC.

# FIGURE 3

N

~ RESIDENTIAL ~

FORMER WWTP

~ LANDFILL ~

~ COLDWATER ROAD LANDFILL FACILITY ~

~ FORMER PEREGRINE ~ PROPERTY

**OBG MW-8**

| PARAMETER | CONC. | DATE |
|---|---|---|
| TOTAL MANGANESE | 0.371 mg/l | 12/11/2007 |

**OBG MW-5**

| PARAMETER | CONC. | DATE |
|---|---|---|
| TOTAL MANGANESE | 0.532 mg/l | 3/18/2008 |
| DISSOLVED MANGANESE | 0.520 mg/l | 3/18/2008 |

**OBG MW-7**

| PARAMETER | CONC. | DATE |
|---|---|---|
| TOTAL MANGANESE | 0.212 mg/l | 3/18/2008 |

**OBG MW-2**

| PARAMETER | CONC. | DATE |
|---|---|---|
| TOTAL MANGANESE | 0.307 mg/l | 12/11/2007 |

**OBG MW-1**

| PARAMETER | CONC. | DATE |
|---|---|---|
| TOTAL MANGANESE | 0.405 mg/l | 3/18/2008 |

**OBG MW-4**

| PARAMETER | CONC. | DATE |
|---|---|---|
| TOTAL MANGANESE | 0.118 mg/l | 12/11/2007 |

**OBG MW-9**

| PARAMETER | CONC. | DATE |
|---|---|---|
| TOTAL MANGANESE | 0.565 mg/l | 11/4/2011 |
| | 0.591 mg/l | 3/5/2012 |
| DISSOLVED MANGANESE | 0.570 mg/l | 11/4/2011 |
| | 0.562 mg/l | 3/5/2012 |

**OBG MW-3**

| PARAMETER | CONC. | DATE |
|---|---|---|
| TOTAL MANGANESE | 5.08 mg/l | 12/11/2007 |

**BH-113**

| PARAMETER | CONC. | DATE |
|---|---|---|
| DISSOLVED MANGANESE | 1.6 mg/l | 10/21/2013 |

**BH-112**

| PARAMETER | CONC. | DATE |
|---|---|---|
| TOTAL MANGANESE | 14 mg/l | 3/28/2012 |
| DISSOLVED MANGANESE | 1.2 mg/l | 3/28/2012 |

**BH-118**

BOREHOLE - DRY TO 20 FT.

**BH-111**

BOREHOLE - DRY TO 20 FT.

**BK-3-00**

TEMPORARY WELL- DRY TO 30 FT.

**BH-119**

BOREHOLE - DRY TO 20 FT.

**BH-114**

| PARAMETER | CONC. | DATE |
|---|---|---|
| DISSOLVED MANGANESE | 2.7 mg/l | 10/21/2013 |

**OBG MW-10**

| PARAMETER | CONC. | DATE |
|---|---|---|
| TOTAL MANGANESE | 3.56 mg/l | 11/4/2011 |
| | 2.62 mg/l | 3/5/2012 |
| DISSOLVED MANGANESE | 3.69 mg/l | 11/4/2011 |
| | 2.57 mg/l | 3/5/2012 |

**BH-115**

| PARAMETER | CONC. | DATE |
|---|---|---|
| DISSOLVED MANGANESE | 0.9 mg/l | 10/21/2013 |

**BH-120**

BOREHOLE - DRY TO 15 FT.

**BH-116**

BOREHOLE - DRY TO 20 FT.

**BH-121**

| PARAMETER | CONC. | DATE |
|---|---|---|
| DISSOLVED MANGANESE | 0.24 mg/l | 10/22/2013 |

**BH-117**

| PARAMETER | CONC. | DATE |
|---|---|---|
| TOTAL MANGANESE | 0.088 mg/l | 10/22/2013 |
| DISSOLVED MANGANESE | 0.1 mg/l | 10/22/2013 |

## LEGEND

- FORMER WWTP BUILDING
- FORMER WWTP BASIN
- MONITORING WELL (OBG)
- TEMPORARY WELL (CRA)
- BOREHOLE (CRA)
- HIGHLIGHT COLOR DENOTES WELL OR BOREHOLE THAT DELINEATES MANGANESE BELOW THE WWTP SITE SPECIFIC BACKGROUND VALUE

**CRITERIA**

| PARAMETER | WWTP SITE SPECIFIC BACKGROUND | MDEQ PART 201 CRITERIA |
|---|---|---|
| TOTAL MANGANESE | 0.708 mg/l | 0.05 mg/l |
| DISSOLVED MANGANESE | 0.708 mg/l | 0.05 mg/l |

THE PART 201 CRITERIA NOTED ABOVE IS FOR BOTH RESIDENTIAL AND NON-RESIDENTIAL DRINKING WATER.

NOTES:

1) Manganese concentrations shown at the OBG monitoring wells are the highest detected values at the specified locations.
2) Dissolved manganese was not analyzed at monitoring wells MW-1, MW-2, MW-3, MW-4, MW-6, MW-7 and MW-8.
3) Data for the CRA boreholes and temporary well are from the CRA memo to Mr. Richard Conforti, dated 1/28/2014, concerning the "*Summary of Investigation of Potential Groundwater Migration In The Vicinity of OBG MW-10 Former Peregrine (US) Inc. (Peregrine) Coldwater Road Facility*".
4) 'FORMER WWTP' indicates the former wastewater treatment plant.

RACER TRUST
COLDWATER ROAD
FORMER WWTP
FLINT, MICHIGAN

# GROUNDWATER DELINEATION LOCATIONS

0 25 50 75 100
Feet

NOVEMBER 2014
15388/51440-003

O'BRIEN & GERE ENGINEERS, INC.

I:\Racer-Trust.15388\51440.Coldwater-Rd-La\Docs\Reports\WWTP Closure cert ltr\Figures\003 - GW Delineation Map.mxd

PLOTDATE: 01/05/15 11:10:53 AM onellim

# *Attachments*

# *Attachment A*

# *CRA Memorandum dated January 28, 2014*

CONESTOGA-ROVERS & ASSOCIATES

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

# MEMORANDUM

| | | | |
|---|---|---|---|
| TO: | Mr. Richard Conforti | REF. NO.: | 012636-T09 |
| FROM: | Michael Tomka/Richard Chatfield/kf/86 | DATE: | January 28, 2014 |
| CC: | Dave Favero/Grant Trigger (RACER), Tony Finch (OBG)<br>Jack Schinderle/John McCabe/Joe rogers/William Yocum (MDEQ) | | |
| **RE:** | **Supplemental RCRA Facility Investigation**<br>**Summary of Investigation of Potential Groundwater Migration In The Vicinity of OBG MW-10**<br>**Former Peregrine (US) Inc. (Peregrine) Coldwater Road Facility**<br>**Genesee Township, Michigan** | | |

Conestoga-Rovers & Associates (CRA) has prepared the following memorandum on behalf of Revitalizing Auto Communities Environmental Response Trust (RACER) and in accordance with Section 1.2 of the Supplement RFI Groundwater Investigation Work Plan and Groundwater Monitoring Plan submitted to the Michigan Department of Environmental Quality (MDEQ) on September 16, 2013 for the Former Peregrine (US) Inc. (Peregrine) Coldwater Road Facility in Genesee Township, Michigan (Site).

In accordance with Section 1.2 of the September 16, 2013 plan, a borehole investigation was completed in the vicinity of OBG MW-10 to evaluate potential off-Site migration of groundwater impacted by manganese concentrations exceeding residential and non-residential drinking water criteria. The borehole investigation was completed the week of October 21, 2013. In total, nine boreholes (BH-113 to BH-121) were advanced (5 on-Site and 4 off-Site) around OBG MW-9 and OBG MW-10. The borehole locations are presented in Figure 1 and the borehole completion details are summarized in Table 1. The borehole stratigraphic logs are presented in Attachment A. Borings were advanced until groundwater was encountered or to a maximum depth of 20 feet below ground surface (bgs).

Water was not encountered at four of the nine boreholes (BH-116, BH-118, BH-119, and BH-120). Of the nine boreholes advanced; five produced sufficient water to collect groundwater samples. Low flow sampling turbidity requirements of 10 NTU or less were achieved at one location (BH-117). Borehole water samples were collected (if water was present) from each borehole. Samples from the five boreholes where water was encountered were analyzed for total (if low flow sampling turbidity requirements could be achieved) and dissolved manganese (field filtered). The results of the groundwater samples are presented in Table 1; the laboratory analytical report is presented in Attachment B. Dissolved manganese results from three boreholes (BH-113 [1.6 miligrams per litre [mg/L]]; BH-114 [2.7 mg/L]; and, BH-115 [0.9 mg/L]) were found to exceed both Site-specific background (0.547 mg/L) and residential/non-residential drinking water aesthetic criteria (0.05 mg/L). Only one sample (BH-114) exceeded the non-residential health based drinking water standard of 2.5 mg/L. The groundwater sampling logs are presented in Attachment C.

Of the four off-Site boreholes, water was present at one location (BH-121). The dissolved manganese concentration at BH-121 was 0.24 mg/L; below the Site-specific background of 0.547 mg/L. The three additional off-Site locations encountered the top of clay between 1.5 to 5 feet bgs with the clay extending until the boreholes terminated (between 15-20ft bgs). Therefore, off-site migration of groundwater in this area is unlikely due to the limited saturated zone. Furthermore, no exceedances of screening criteria were observed in off-site groundwater in this area.

In addition, the on-Site extent of manganese impacted groundwater has been delineated; neither of the two southern most on-Site boreholes (BH-116 and BH-117) exceeded Site-specific background for total (0.963 mg/L) or dissolved manganese. Insufficient water was present at BH-116 to collect a sample. The groundwater sample from BH-117 had a reported total manganese concentration of 0.088 mg/L and a dissolved manganese concentration of 0.10 mg/L.

To the east, the storm sewer utility corridor running north-south acts as a barrier to possible groundwater migration. Figure 2 presents north-south and east-west cross-sections in the OBG MW-10 area. As presented in the cross-sections, all water bearing seams are located at a minimum elevation of 797 ft AMSL; however, the bedding material in the utility corridor extends to a minimum elevation of 785.5 ft AMSL. Therefore, in the event of groundwater migration to the east, the utility corridor would acts as a barrier which would intersect and collect groundwater and prevent migration past the corridor. Groundwater would then be able to infiltrate into the storm sewer or travel along the utility corridor bedding.

The depth of saturated material encountered at MW-19-13 (screened in the storm sewer bedding) is approximately 21.4 feet bgs in this area. The depth of saturated material encountered in the vicinity of OBG MW-10 was a maximum of 14 feet bgs. In accordance with the Supplement RFI Groundwater Investigation Work Plan and Groundwater Monitoring Plan (CRA, 2013), groundwater monitoring will be performed quarterly at MW-19-13 to monitor groundwater quality in the utility corridor bedding. However, the groundwater sample collected from the BH-112 reported a dissolved manganese concentration of 1.2 mg/L which exceeded Site-specific background (0.547 mg/L) but did not exceed non-residential drinking water health based criteria. In addition, total manganese exceeded both Site-specific background (0.963 mg/L) and non-residential drinking water health based aesthetic criteria (2.5 mg/L) at a concentration of 14 mg/L.

In summary, no groundwater with manganese concentrations above background levels was encountered off-Site to the west nor to the south of OBG MW-10 (on-site and off-site), and a utility corridor acts as a barrier to groundwater migration to the east of OBG MW-10; therefore, the extent of groundwater containing concentrations of manganese above background levels in the vicinity of OBG MW-10 has been delineated. Furthermore, additional investigation of manganese impacts to the north of OBG MW-10 has been completed by RACER on the adjacent property; a figure showing the off-Site detections of manganese is presented in Attachment D.

Therefore, CRA does not recommend any modifications (e.g., no monitoring is proposed for OBG MW-9 or OBG MW-10 and no additional new wells are proposed) to the groundwater monitoring program presented in the Supplement RFI Groundwater Investigation Work Plan and Groundwater Monitoring Plan (CRA, 2013). Furthermore, no further action is required to evaluate the potential for off-Site migration of manganese impacted groundwater in the vicinity of OBG MW-10. At this time, CRA recommends proceeding with the comprehensive annual groundwater monitoring event consisting of 13 perched water bearing unit locations and four drift aquifer wells as identified in Section 4.0 of the September 16, 2013 Supplement RFI Groundwater Investigation Work Plan and Groundwater Monitoring Plan. The work will be schedule upon MDEQ approval of this assessment.

Should you have any questions or comments please feel free to contact us (519-884-0510).

## LEGEND

- FACILITY BOUNDARY
- STORM SEWER LINE
- SANITARY SEWER LINE
- M.H. MANHOLE
- BOREHOLE LOCATION
- MONITORING WELL LOCATION
- ABANDONED/TEMPORARY MONITORING WELL LOCATION
- A A' CROSS-SECTION LOCATION

| OBG MW-9 | 11/29/2010 |
|---|---|
| Metals | |
| Aluminum | 0.157 J (B) |
| Iron | 1.41 (B) |
| Lead | 0.0063 (B) |
| Manganese | 0.426 (B) |

- SAMPLE LOCATION
- SAMPLE DATE
- RESULT (mg/L)
- PARAMETER
- EXCEEDS CRITERIA

0 50 100ft

| Chemical Name | BG_shallow | A | B | C |
|---|---|---|---|---|
| Manganese | 0.963 | 0.05 | 0.05 | - |
| Manganese (dissolved) | 0.547 | 0.05 | 0.05 | - |

Criteria:
DB_shallow - Shallow Background Criteria
A - Non Resdential Drinking Water Criteria (2011) (NRDWC[A])
B - Resdential Drinking Water Criteria (2011) (RDWC[B])
C - Groundwater Surface Water Interface Criteria (2011) (GSI[C])

MANUFACTURING BUILDING (BUILDING #44)

MW-5 (DRY TO 25FT)
MW-6
MW-7 (DRY TO 25FT)
MW-20-13
MW-19-13
BH-112
BH-111 (DRY TO 20FT)
BH-114
BH-115
BH-113
BH-116 (DRY TO 20FT)
BH-117
BH-110 (DRY TO 15FT)
BH-109 (DRY TO 20FT)
OBG MW-9
OBG MW-10
BK-3-00 (DRY TO 30FT)
BH-121
BH-118 (DRY TO 20FT)
BH-119 (DRY TO 20FT)
BH-120 (DRY TO 15FT)
M.H.
48"
36"

| BH-112 | 3/28/2012 |
|---|---|
| Metals | |
| Manganese | 14 (AB) |
| Manganese (dissolved) | 1.2 (AB) |

| BH-114 | 10/21/2013 |
|---|---|
| Metals | |
| Manganese (dissolved) | 2.7 (AB) |

| BH-115 | 10/21/2013 |
|---|---|
| Metals | |
| Manganese (dissolved) | 0.9 (AB) |

| BH-113 | 10/21/2013 |
|---|---|
| Metals | |
| Manganese (dissolved) | 1.6 (AB) |

| BH-117 | 10/22/2013 |
|---|---|
| Metals | |
| Manganese | 0.088/0.09 |
| Manganese (dissolved) | 0.1/0.088 |

| BH-121 | 10/22/2013 |
|---|---|
| Metals | |
| Manganese (dissolved) | 0.24 |

| OBG MW-9 | 11/4/2011 | 3/5/2012 |
|---|---|---|
| Metals | | |
| Manganese | 0.565 | 0.591 |
| Manganese (dissolved) | 0.57 (AB) | 0.562 (AB) |

| OBG MW-10 | 11/4/2011 | 3/5/2012 |
|---|---|---|
| Metals | | |
| Manganese | 3.56 (AB) | 2.62 (AB) |
| Manganese (dissolved) | 3.69 (AB) | 2.57 (AB) |

NOTES:
THIS DRAWING IS FOR REFERENCE ONLY AND IS NEITHER COMPLETE NOR TO EXACTING SCALE.
AERIAL PHOTO FROM NAIP, 2009.

figure 1

ADDITIONAL INVESTIGATION RESULTS- VICINITY OF OBG MW-10
FORMER PEREGRINE (US), INC. COLDWATER ROAD FACILITY
*Genesee Township, Michigan*

12636-T09(MEMO086)GN-WA001 DEC 2/2013

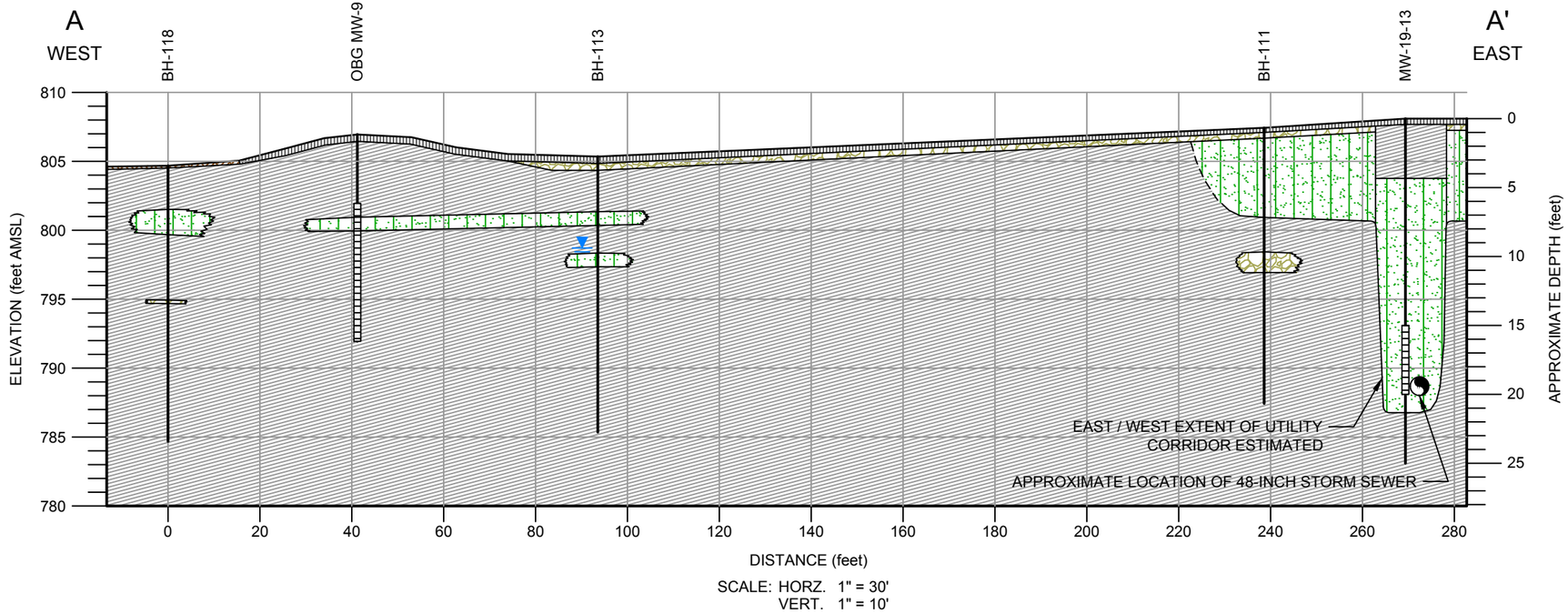


figure 2

CROSS-SECTIONS A-A' AND B-B'
FORMER PEREGRINE (US), INC. COLDWATER ROAD FACILITY
*Genesee Township, Michigan*

12636-T09(MEMO086)GN-WA003 DEC 2/2013

**TABLE 1**

**BOREHOLE COMPLETION DETAILS**
**FORMER PEREGRINE (US) INC. COLDWATER ROAD FACILITY**
**GENESEE TOWNSHIP, MICHIGAN**

| *Boring Location* | *Installation Date* | *Ground Surface Elevation* [1] *(ft AMSL)* | *Depth of Boring (ft bgs)* | *Depth to Clay (ft bgs)* | *Screen Interval (ft bgs)* | *Tubidity (NTU)* | *Dissolved Manganese Concentration (mg/L)* Background [3]: 0.547mg/l | *Total Manganese Concentration (mg/L)* Background [3]: 0.963mg/l |
|---|---|---|---|---|---|---|---|---|
| BH-112 | 3/28/2012 | 808.09 | 25 | 21 | 15 to 20 | -- | **1.2** | **14** |
| BH-113 | 10/21/2013 | 805.34 | 20 | 8 | 7.52 to 12.52 | 86.8 | **1.6** | -- |
| BH-114 | 10/21/2013 | 806.11 | 15 | 10 | 4 to 12 | 126 | **2.7** | -- |
| BH-115 | 10/21/2013 | 807.44 | 15 | 9 | 7.39 to 12.39 | 15.8 | **0.9** | -- |
| BH-116 | 10/21/2013 | 808.03 | 20 | 0.5 | (2) | -- | -- | -- |
| BH-117 | 10/22/2013 | 807.87 | 15 | 12 | 10 to 15 | 4.25 | 0.1 | 0.088 |
| BH-118 | 10/22/2013 | 804.68 | 20 | 5 | (2) | -- | -- | -- |
| BH-119 | 10/22/2013 | 805.15 | 20 | 1.5 | (2) | -- | -- | -- |
| BH-120 | 10/22/2013 | 805.56 | 15 | 1.7 | (2) | -- | -- | -- |
| BH-121 | 10/22/2013 | 805.78 | 20 | No Clay | 15 to 20 | 59.5 | 0.24 | -- |
| MW-19-13 | 10/21/2013 | 808.09 | 25 | 21.4 | 15 t0 20 | [4] | [4] | [4] |

Notes:

Metals - Total and Dissolved Metals
Cyanide - Amenable cyanide

[1] Surveyed December 9, 2011

[2] No water present, screen not required

[3] MDEQ approved Site-specific background criteria; residential/non-residential criteria are below the background criteria

[4] New well location to be sampled as part of quaterly monitoring program

# Attachment A

# STRATIGRAPHY LOG (OVERBURDEN)

PAGE ___ OF ___

PROJECT NAME ___
PROJECT NUMBER 12636
CLIENT ___
LOCATION ___

DRILLING CONTRACTOR ___
DRILLER ___
SURFACE ELEVATION ___
WEATHER (A.M.) ___
(P.M.) ___

HOLE DESIGNATION BH113
DATE/TIME STARTED ___
DATE/TIME COMPLETED ___
DRILLING METHOD ___
CRA SUPERVISOR SSH

| STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM | AT | TO | SAMPLE DESCRIPTION<br>ORDER OF DESCRIPTORS:<br>SOIL TYPE SYMBOL(S) – PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS<br>NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT). | SAMPLE DETAILS: SAMPLE # | SAMPLING METHOD | PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES) 6" | 6" | 6" | 6" | N | R | SAMPLE INTERVAL | PID / FID (ppm) | CHEMICAL ANALYSIS | GRAIN SIZE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 5" | asphalt | | | | | | | | | | | | | | |
| 5" | | 1 | sand + gravel, fill, med grained moist, brown | | | | | | | | | | | | | | |
| 1 | | 2 | grey / brown clay, silty clay, little med grained sand, trace gravel, soft | | | | | | | | | | | | | | |
| 2 | | 4 | silty clay, little sand, brown, trace gravel, med soft | | | | | | | | | | | | | | |
| 4 | | 5 | silty sand, moist to wet brown, fine to med grained, trace gravel | | | | | | | | | | | | | | |
| 5 | | | silty clay, med to soft, little sand brown wet to moist | | | | | | | | | | | | | | |
| | | 8 | sand seams med grained wet brown | | | | | | | | | | | | | | |
| 8 | | 14 | brown clay, stiff trace sand, trace gravel | | | | | | | | | | | | | | |
| 14 | | 20 | clay little silt + sand, trace gravel, stiff, damp | | | | | | | | | | | | | | |

DEPTH OF BOREHOLE CAVING ___ DEPTH OF FIRST GROUNDWATER ENCOUNTER ___ TOPSOIL THICKNESS ___

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION ___ AFTER ___ HOURS ___

COMPLETION DETAILS: ___

NOTES AND COMMENTS

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES:

# STRATIGRAPHY LOG (OVERBURDEN)

PAGE ___ OF ___

PROJECT NAME _____
PROJECT NUMBER 12636
CLIENT _____
LOCATION _____

DRILLING CONTRACTOR _____
DRILLER _____
SURFACE ELEVATION _____
WEATHER (A.M.) _____
(P.M.) _____

HOLE DESIGNATION BH114
DATE/TIME STARTED 10/21/13
DATE/TIME COMPLETED _____
DRILLING METHOD _____
CRA SUPERVISOR _____

| STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM | AT | TO | SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) – PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS. NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT). | SAMPLE DETAILS: SAMPLE # | SAMPLING METHOD | PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES) 6" | 6" | 6" | 6" | N | R | SAMPLE INTERVAL | PID / FID (ppm) | CHEMICAL ANALYSIS | GRAIN SIZE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 5" | asphalt | | | | | | | | | | | | | | | |
| 5" | | 2'/2 | silty sand, moist to wet, trace gravel, brown, fine to med | | | | | | | | | | | | | | | |
| 2'/2 | | 3'/2 | soft clay, silty, sandy, brown, wet | | | | | | | | | | | | | | | |
| 3'/2 | | 7 | sand, fine, little silt, brown, moist/wet | | | | | | | | | | | | | | | |
| 7 | | 8 | silty clay, brown, wet, little sand | | | | | | | | | | | | | | | |
| 8 | | 10 | sand fine to med, little silt, moist to wet | | | | | | | | | | | | | | | |
| 10 | | 11 | brown/dark brown mottled clay, trace sand, little gravel, moist | | | | | | | | | | | | | | | |
| 11 | | 15 | silty clay, soft to med, grey moist | | | | | | | | | | | | | | | |

DEPTH OF BOREHOLE CAVING _____ DEPTH OF FIRST GROUNDWATER ENCOUNTER _____ TOPSOIL THICKNESS _____

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION _____, AFTER ___ HOURS ___

COMPLETION DETAILS: _____

NOTES AND COMMENTS

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: hydro punch screen 4' - set at 12'

# STRATIGRAPHY LOG (OVERBURDEN)

PAGE ___ OF ___

BH115

PROJECT NAME _____
PROJECT NUMBER _____
CLIENT _____
LOCATION _____

DRILLING CONTRACTOR _____
DRILLER _____
SURFACE ELEVATION _____
WEATHER (A.M.) _____
(P.M.) _____

HOLE DESIGNATION _____
DATE/TIME STARTED _____
DATE/TIME COMPLETED _____
DRILLING METHOD _____
CRA SUPERVISOR _____

| STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM | AT | TO | SAMPLE DESCRIPTION<br>ORDER OF DESCRIPTORS:<br>SOIL TYPE SYMBOL(S) – PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS<br>NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT). | SAMPLE DETAILS: SAMPLE # | SAMPLING METHOD | PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES) 6" | 6" | 6" | 6" | N | R | SAMPLE INTERVAL | PID / FID (ppm) | CHEMICAL ANALYSIS | GRAIN SIZE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 5" | asphalt | | | | | | | | | | | | | | |
| 5" | | 1 1/2 | silty clay, little sand, trace gravel, black streaks, dry | | | | | | | | | | | | | | |
| 1 1/2 | | 3 | brown sand, silty, moist to dry, fine to med grained | | | | | | | | | | | | | | |
| 3 | | 4 | silty clay, brown mod stiff, little sand, trace gravel, orange streaks | | | | | | | | | | | | | | |
| 4 | | 7 1/2 | sand, brown, trace silt + gravel, fine to med, dry, wet | | | | | | | | | | | | | | |
| | 6 1/2 | | | | | | | | | | | | | | | | |
| 7 1/2 | | 9 | clay / sand seams ≈ 6" thick, silty clay, little sand, med-sand, trace silt, fine gravel, wet | | | | | | | | | | | | | | |
| 9 | | 12 1/2 | brown/grey clay, silty, stiff, trace sand + gravel | | | | | | | | | | | | | | |
| 12 1/2 | | 15 | grey clay, stiff, moist trace silt + gravel | | | | | | | | | | | | | | |

DEPTH OF BOREHOLE CAVING _____ DEPTH OF FIRST GROUNDWATER ENCOUNTER _____ TOPSOIL THICKNESS _____

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION _____, AFTER ____ HOURS ____

COMPLETION DETAILS: _____

NOTES AND COMMENTS

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES:

set MW (temp) at 10' bgs

# STRATIGRAPHY LOG (OVERBURDEN)

PAGE ___ OF ___

PROJECT NAME _____
PROJECT NUMBER _____
CLIENT _____
LOCATION _____

DRILLING CONTRACTOR _____
DRILLER _____
SURFACE ELEVATION _____
WEATHER (A.M.) _____
(P.M.) _____

HOLE DESIGNATION BH116
DATE/TIME STARTED _____
DATE/TIME COMPLETED _____
DRILLING METHOD _____
CRA SUPERVISOR _____

| STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM | AT | TO | SAMPLE DESCRIPTION (ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) – PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS. NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).) | SAMPLE DETAILS: SAMPLE # | SAMPLING METHOD | PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES) 6" | 6" | 6" | 6" | N | R | SAMPLE INTERVAL | PID / FID (ppm) | CHEMICAL ANALYSIS | GRAIN SIZE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 5" | asphalt | | | | | | | | | | | | | | | |
| 5" | | | brown/grey clay, little silt trace gravel, dry, stiff, trace sand | | | | | | | | | | | | | | | |
| | 3 | | little sand, more grey, less silt than fine gravel | | | | | | | | | | | | | | | |
| | | 7½ | | | | | | | | | | | | | | | | |
| 7½ | | | grey clay, trace sand/gravel, little silt, stiff, moist | | | | | | | | | | | | | | | |
| | 9 | 12 | softer, more silt | | | | | | | | | | | | | | | |
| 12 | | 13 | grey sand + gravel seam, moist to wet fine to med trace silt | | | | | | | | | | | | | | | |
| 13 | | 20 | grey clay, silt, soft, trace sand/gravel, moist | | | | | | | | | | | | | | | |

DEPTH OF BOREHOLE CAVING _____ DEPTH OF FIRST GROUNDWATER ENCOUNTER _____ TOPSOIL THICKNESS _____

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION _____ AFTER ____ HOURS ____

COMPLETION DETAILS: _____

NOTES AND COMMENTS

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES:

12-13 - does not appear to be enough water bearing zone to sample

# STRATIGRAPHY LOG (OVERBURDEN)

PAGE__ OF __

PROJECT NAME Coldwater Rd. RACER
PROJECT NUMBER 12636-T12-01413
CLIENT RACER
LOCATION Flint, MI

DRILLING CONTRACTOR CRA Services
DRILLER Ray Garza
SURFACE ELEVATION
WEATHER

HOLE DESIGNATION BH-117
DATE 10-22-13 0830
DRILLING METHOD Geo-Probe
CRA SUPERVISOR Eric Mickelson

| STRATIGRAPHIC INTERVALS DEPTHS in ft/m BGS FROM | AT | TO | SAMPLE DESCRIPTION Order of Description: Soil Type Symbols(s) - Primary Components(s), (Nature Of Deposit), Secondary Components, Relative Density/Consistency, Grain Size/Plasticity, Gradation/Structure, Color, Moisture Content, Supplementary Descriptors | SAMPLE DETAILS Sample # | SAMPLING METHOD | PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES AND RECOVERIES) 6" | 6" | 6" | 6" | N | R | SAMPLE INTERVAL | PID / FID (ppm) | SAMPLE I.D. | ANALYTICAL SAMPLE DEPTH | SAMPLE TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.5 | Asphalt | | | | | | | | | 0-2.5 | 0.1 | | | |
| 0.5 | | 2.5 | CL-Silty Clay - trace fine grained sand, firm, low plasticity, brown moist | 1 | DP | | | | | | 90 | 2.5-5.0 | 0.2 | | | |
| | | | | | | | | | | | | 5.0-7.5 | 0.2 | | | |
| 2.5 | | 3.6 | SM-Silty Sand - compact, fine grained, tan, moist | 2 | DP | | | | | | 85 | 7.5-10 | 0.1 | | | |
| 3.6 | | 10.6 | SP-Sand - few silt, compact, fine grained, tan to brownish-orange, moist | | | | | | | | | 10-12.5 | 0.1 | | | |
| | | | | 3 | DP | | | | | | 100 | 12.5-15 | 0.2 | | | |
| | 6.5 | | wet | | | | | | | | | 15-17.5 | | | | |
| 10.6 | | 12.0 | ML-Silt - trace fine grained sand, compact, fine grained, moist | | | | | | | | | 17.5-20 | | | | |
| | | | | | | | | | | | | 20-22.5 | | | | |
| 12.0 | | 15.0 | CL-Clay - few silt, stiff, low plasticity, gray, moist | | | | | | | | | 22.5-25 | | | | |
| | 14.9 | | fine sand seam (14.9 - 15.0') | | | | | | | | | 25-27.5 | | | | |
| | | | | | | | | | | | | 27.5-30 | | | | |
| | | | | | | | | | | | | 30-32.5 | | | | |
| | | | | | | | | | | | | 32.5-35 | | | | |
| | | | | | | | | | | | | 35-37.5 | | | | |
| | | | | | | | | | | | | 37.5-40 | | | | |
| | | | | | | | | | | | | 40-42.5 | | | | |
| | | | | | | | | | | | | 42.5-45 | | | | |
| | | | | | | | | | | | | 45-47.5 | | | | |
| | | | | | | | | | | | | 47.5-50 | | | | |

NOTES AND COMMENTS

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL

NOTES:

# STRATIGRAPHY LOG (OVERBURDEN)



PROJECT NAME Coldwater Rd.
PROJECT NUMBER 12636-T12-01Y13
CLIENT RACER
LOCATION Flint, MI

DRILLING CONTRACTOR CRA Services
DRILLER Rey Garza
SURFACE ELEVATION
WEATHER

HOLE DESIGNATION BH-118
DATE 10-22-13
DRILLING METHOD GeoProbe
CRA SUPERVISOR Eric Mickelson

lines up with 113

| STRATIGRAPHIC INTERVALS DEPTHS in ft/m BGS FROM | AT | TO | SAMPLE DESCRIPTION Order of Description: Soil Type Symbols(s) - Primary Components(s), (Nature Of Deposit), Secondary Components, Relative Density/Consistency, Grain Size/Plasticity, Gradation/Structure, Color, Moisture Content, Supplementary Descriptors | SAMPLE DETAILS: Sample # | Sampling Method | Penetration Record Split Spoon Blows (Record N-Values and Recoveries) 6" | 6" | 6" | 6" | N | R | Sample Interval | PID / FID (ppm) | SAMPLE I.D. | ANALYTICAL SAMPLE DEPTH | SAMPLE TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.2 | Vegetation | ~~3~~ | | | | | | | | 0-2.5 | ~~0.3~~ | | | |
| 0.2 | | 1.7 | ML-Silt - trace fine sand, compact, fine grained, greenish-brown, moist | 1 | DP | | | | | | 90 | 2.5-5.0 | ~~0.4~~ | | | |
| ~~1.7~~ | | | ~~[illegible]~~ | | | | | | | | | 5.0-7.5 | 0.1 | | | |
| 1.7 | | 3.2 | CL-Silty Clay - trace fine grained sand, firm, low plasticity, brown, moist, occasional fine gravel | 2 | DP | | | | | | 90 | 7.5-10 | 0.1 | | | |
| ~~3.2~~ | | | | | | | | | | | | 10-12.5 | ~~0.2~~ | | | |
| 3.2 | | 5.0 | SP-Sand - few silt, trace fine gravel, compact, fine grained, brown, moist | 3 | DP | | | | | | 100 | 12.5-15 | ~~0.3~~ | | | |
| | | | | | | | | | | | | 15-17.5 | 0.1 | | | |
| 5.0 | | 20.0 | CL-Clay - few silt, trace fine sand, firm, low plasticity, light gray to light brown, moist | 4 | DP | | | | | | 100 | 17.5-20 | 0.0 | | | |
| | | | | | | | | | | | | 20-22.5 | | | | |
| | 8.9 | | soft, very moist, tree roots abundant (8.9'-9.7') | | | | | | | | | 22.5-25 | | | | |
| | 9.9 | | wet, fine sand (9.9'-10.0') | | | | | | | | | 25-27.5 | | | | |
| | 10.0 | | stiff, light brown (~~[illegible]~~ (10.0'-18.1') moist | | | | | | | | | 27.5-30 | | | | |
| | 18.1 | | gray, stiff, moist (18.1'-20.0') | | | | | | | | | 30-32.5 | | | | |
| | | | | | | | | | | | | 32.5-35 | | | | |
| | | | | | | | | | | | | 35-37.5 | | | | |
| | | | | | | | | | | | | 37.5-40 | | | | |
| | | | | | | | | | | | | 40-42.5 | | | | |
| | | | | | | | | | | | | 42.5-45 | | | | |
| | | | | | | | | | | | | 45-47.5 | | | | |
| | | | | | | | | | | | | 47.5-50 | | | | |
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**NOTES AND COMMENTS**

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL

NOTES:

# STRATIGRAPHY LOG (OVERBURDEN)



PROJECT NAME Coldwater Rd.
PROJECT NUMBER 12636-T12-01413
CLIENT RACER
LOCATION Flint, MI

DRILLING CONTRACTOR CRA Services
DRILLER Rey Garza
SURFACE ELEVATION
WEATHER

HOLE DESIGNATION BH-119
DATE 10-22-13
DRILLING METHOD Geo Probe
CRA SUPERVISOR Eric Mickelson

| STRATIGRAPHIC INTERVALS DEPTHS in ft/m BGS FROM | AT | TO | SAMPLE DESCRIPTION: Order of Description: Soil Type Symbols(s) - Primary Components(s), (Nature Of Deposit), Secondary Components, Relative Density/Consistency, Grain Size/Plasticity, Gradation/Structure, Color, Moisture Content, Supplementary Descriptors | SAMPLE DETAILS: Sample # | SAMPLING METHOD | PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES AND RECOVERIES) 6" | 6" | 6" | 6" | N | R | SAMPLE INTERVAL | PID / FID (ppm) | SAMPLE I.D. | ANALYTICAL SAMPLE DEPTH | SAMPLE TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.2 | Vegetation | | | | | | | | | 0-2.5 | 0.1 | | | |
| 0.2 | | 1.5 | ML-Silt - trace fine sand, compact, fine grained, brown, moist | 1 | DP | | | | | | 100 | 2.5-5.0 | 0.2 | | | |
| | | | | | | | | | | | | 5.0-7.5 | 0.3 | | | |
| 1.5 | | 20.0 | CL-Silty Clay - trace fine sand, firm, low plasticity, brown to light gray, moist, occasional tree roots | 2 | DP | | | | | | 100 | 7.5-10 | 0.3 | | | |
| | | | | | | | | | | | | 10-12.5 | 0.1 | | | |
| | 6.1 | | fine sand lense (0.01' thick), gray, wet | 3 | DP | | | | | | 100 | 12.5-15 | 0.0 | | | |
| | 14.0 | | gray, stiff (14.0-20.0') | | | | | | | | | 15-17.5 | 0.1 | | | |
| | | | | 4 | DP | | | | | | 100 | 17.5-20 | 0.2 | | | |
| | | | | | | | | | | | | 20-22.5 | | | | |
| | | | | | | | | | | | | 22.5-25 | | | | |
| | | | | | | | | | | | | 25-27.5 | | | | |
| | | | | | | | | | | | | 27.5-30 | | | | |
| | | | | | | | | | | | | 30-32.5 | | | | |
| | | | | | | | | | | | | 32.5-35 | | | | |
| | | | | | | | | | | | | 35-37.5 | | | | |
| | | | | | | | | | | | | 37.5-40 | | | | |
| | | | | | | | | | | | | 40-42.5 | | | | |
| | | | | | | | | | | | | 42.5-45 | | | | |
| | | | | | | | | | | | | 45-47.5 | | | | |
| | | | | | | | | | | | | 47.5-50 | | | | |

**NOTES AND COMMENTS**

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL

NOTES:

# STRATIGRAPHY LOG (OVERBURDEN)



PROJECT NAME Coldwater Rd.
PROJECT NUMBER 12636-T12-01413
CLIENT RACER
LOCATION Flint, MI

DRILLING CONTRACTOR CRA Services
DRILLER Rey Garza
SURFACE ELEVATION
WEATHER

HOLE DESIGNATION BH-120
DATE 10-22-13
DRILLING METHOD GeoProbe
CRA SUPERVISOR Eric Mickelson

| STRATIGRAPHIC INTERVALS DEPTHS in ft/m BGS FROM | AT | TO | SAMPLE DESCRIPTION Order of Description: Soil Type Symbols(s) - Primary Components(s), (Nature Of Deposit), Secondary Components, Relative Density/Consistency, Grain Size/Plasticity, Gradation/Structure, Color, Moisture Content, Supplementary Descriptors | SAMPLE DETAILS Sample # | SAMPLING METHOD | PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES AND RECOVERIES) 6" | 6" | 6" | 6" | N | R | SAMPLE INTERVAL | PID / FID (ppm) | SAMPLE I.D. | ANALYTICAL SAMPLE DEPTH | SAMPLE TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.2 | Vegetation | | | | | | | | | 0-2.5 | 0.2 | | | |
| 0.2 | | 1.7 | SP - Sand - trace silt, compact, fine grained, brown, moist | 1 | DP | | | | | | 100 | 2.5-5.0 | 0.1 | | | |
| 1.7 | | 15.0 | CL - Silty Clay - trace fine sand, firm, low plasticity, brown, moist | | | | | | | | | 5.0-7.5 | 0.0 | | | |
| | | | | 2 | DP | | | | | | 100 | 7.5-10 | 0.2 | | | |
| | 5.5 | | higher content of silt, very moist (5.5'-6.2') | | | | | | | | | 10-12.5 | 0.1 | | | |
| | 6.8 | | stiff, occasional fine gravel (6.8'-15.0') | 3 | DP | | | | | | 100 | 12.5-15 | 0.0 | | | |
| | 10.0 | | gray, moderate plasticity (10.0'-15.0') | | | | | | | | | 15-17.5 | | | | |
| | | | | | | | | | | | | 17.5-20 | | | | |
| | | | | | | | | | | | | 20-22.5 | | | | |
| | | | | | | | | | | | | 22.5-25 | | | | |
| | | | | | | | | | | | | 25-27.5 | | | | |
| | | | | | | | | | | | | 27.5-30 | | | | |
| | | | | | | | | | | | | 30-32.5 | | | | |
| | | | | | | | | | | | | 32.5-35 | | | | |
| | | | | | | | | | | | | 35-37.5 | | | | |
| | | | | | | | | | | | | 37.5-40 | | | | |
| | | | | | | | | | | | | 40-42.5 | | | | |
| | | | | | | | | | | | | 42.5-45 | | | | |
| | | | | | | | | | | | | 45-47.5 | | | | |
| | | | | | | | | | | | | 47.5-50 | | | | |
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NOTES AND COMMENTS

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL

NOTES:

# STRATIGRAPHY LOG (OVERBURDEN)

PAGE__ OF __

PROJECT NAME Coldwater Rd.
PROJECT NUMBER 12636-T12-01413
CLIENT RACER
LOCATION Flint, MI

DRILLING CONTRACTOR CRA Services
DRILLER Rey Garza
SURFACE ELEVATION
WEATHER

HOLE DESIGNATION BH-121
DATE 10-22-13
DRILLING METHOD Geo Probe
CRA SUPERVISOR Eric Mickelson

| STRATIGRAPHIC INTERVALS DEPTHS in ft/m BGS FROM | AT | TO | SAMPLE DESCRIPTION Order of Description: Soil Type Symbols(s) - Primary Components(s), (Nature Of Deposit), Secondary Components, Relative Density/Consistency, Grain Size/Plasticity, Gradation/Structure, Color, Moisture Content, Supplementary Descriptors | SAMPLE DETAILS Sample # | SAMPLING METHOD | PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES AND RECOVERIES) 6" | 6" | 6" | 6" | N | R | SAMPLE INTERVAL | PID / FID (ppm) | SAMPLE I.D. | ANALYTICAL SAMPLE DEPTH | SAMPLE TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.2 | Vegetation | | | | | | | | | 0-2.5 | 0.3 | | | |
| 0.2 | | 1.4 | SP-Sand-trace silt, compact, fine grained, brown, moist | 1 | DP | | | | | | 100 | 2.5-5.0 | 0.7 | | | |
| 1.4 | | 12.9 | CL-Silty Clay-trace fine sand, firm, low plasticity, light brown, moist | | | | | | | | | 5.0-7.5 | 0.0 | | | |
| | | | | 2 | DP | | | | | | 100 | 7.5-10 | 0.0 | | | |
| | 7.0 | | stiff, few silt (7.0'-12.9') | | | | | | | | | 10-12.5 | 0.1 | | | |
| | 8.7 | | gray (8.7'-16.0') | 3 | DP | | | | | | 95 | 12.5-15 | 0.2 | | | |
| 12.9 | | 20.0 | SP-Sand-few silt, compact, fine grained, gray, wet | | | | | | | | | 15-17.5 | 0.1 | | | |
| | 13.2 | | gray, silt seam (13.2'-13.4') | 4 | DP | | | | | | 90 | 17.5-20 | 0.0 | | | |
| | 13.6 | | gray, silt seam (13.6'-14.0') | | | | | | | | | 20-22.5 | | | | |
| | 14.1 | | gray, silt seam (14.1'-14.2') | | | | | | | | | 22.5-25 | | | | |
| | 16.0 | | brown, trace silt, fine to medium grained, wet (16.0'-20.0') | | | | | | | | | 25-27.5 | | | | |
| | | | | | | | | | | | | 27.5-30 | | | | |
| | | | | | | | | | | | | 30-32.5 | | | | |
| | | | | | | | | | | | | 32.5-35 | | | | |
| | | | | | | | | | | | | 35-37.5 | | | | |
| | | | | | | | | | | | | 37.5-40 | | | | |
| | | | | | | | | | | | | 40-42.5 | | | | |
| | | | | | | | | | | | | 42.5-45 | | | | |
| | | | | | | | | | | | | 45-47.5 | | | | |
| | | | | | | | | | | | | 47.5-50 | | | | |
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NOTES AND COMMENTS

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL

NOTES:

# STRATIGRAPHY LOG (OVERBURDEN)



PROJECT NAME Coldwater Rd.
PROJECT NUMBER 12636-T12-01413
CLIENT RACER
LOCATION Flint, MI

DRILLING CONTRACTOR CRA Services
DRILLER Rey Garza
SURFACE ELEVATION
WEATHER

HOLE DESIGNATION MW-19-13
DATE 10-22-13 0915
DRILLING METHOD GeoProbe
CRA SUPERVISOR Eric Mickelson

| STRATIGRAPHIC INTERVALS DEPTHS in ft/m BGS FROM | AT | TO | SAMPLE DESCRIPTION — Order of Description: Soil Type Symbols(s) - Primary Components(s), (Nature Of Deposit), Secondary Components, Relative Density/Consistency, Grain Size/Plasticity, Gradation/Structure, Color, Moisture Content, Supplementary Descriptors | SAMPLE DETAILS: Sample # | SAMPLING METHOD | PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES AND RECOVERIES) 6" | 6" | 6" | 6" | N | R | SAMPLE INTERVAL | PID / FID (ppm) | SAMPLE I.D. | ANALYTICAL SAMPLE DEPTH | SAMPLE TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.5 | Asphalt | 1 | DP | | | | | | 80 | 0-2.5 | 0.1 | | | |
| 0.5 | | 4.4 | CL-Silty Clay - trace fine grained sand, firm, low plasticity, | | | | | | | | | 2.5-5.0 | 0.2 | | | |
| | | | brown, moist, occasional gravel | 2 | DP | | | | | | 70 | 5.0-7.5 | 0.0 | | | |
| 4.4 | | 21.4 | SP-Sand - few silt, compact, fine grained, light brown, moist | | | | | | | | | 7.5-10 | 0.0 | | | |
| | 7.9 | | silt seam (0.02" thick | 3 | DP | | | | | | 65 | 10-12.5 | 0.0 | | | |
| | | → | silt seam (0.02' thick) | | | | | | | | | 12.5-15 | 0.3 | | | |
| | 9.1' | → | clay seam (0.03' thick) | 4 | DP | | | | | | 50 | 15-17.5 | 0.2 | | | |
| | 9.6 | 13.5 | clay seam (0.02' thick) | | | | | | | | | 17.5-20 | 0.1 | | | |
| | 14.9 | | fine to medium grained (14.9' - 19.1'), wet | 5 | DP | | | | | | 40 | 20-22.5 | 0.1 | | | |
| | 19.1 | | silty clay, wet (19.1' - 19.4') | | | | | | | | | 22.5-25 | 0.2 | | | |
| | 19.4 | | with fine gravel (19.4' - 20.0') | | | | | | | | | 25-27.5 | | | | |
| | 21.0 | | gray (21.0' - 21.4') | | | | | | | | | 27.5-30 | | | | |
| 21.4 | | 25.0 | CL-Clay - few silt, stiff, low plasticity, gray, moist | | | | | | | | | 30-32.5 | | | | |
| | | | | | | | | | | | | 32.5-35 | | | | |
| | | | | | | | | | | | | 35-37.5 | | | | |
| | | | | | | | | | | | | 37.5-40 | | | | |
| | | | | | | | | | | | | 40-42.5 | | | | |
| | | | | | | | | | | | | 42.5-45 | | | | |
| | | | | | | | | | | | | 45-47.5 | | | | |
| | | | | | | | | | | | | 47.5-50 | | | | |
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**NOTES AND COMMENTS**

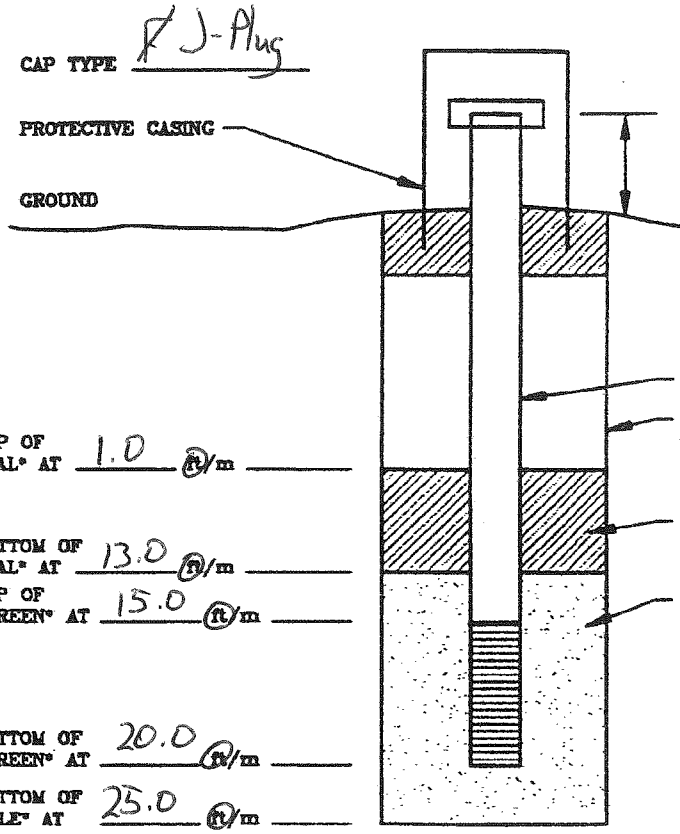
NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL

NOTES:

# OVERBURDEN INSTRUMENTATION LOG

PROJECT NAME Coldwater Rd. - RACER
PROJECT NUMBER 12636-T12-01413
CLIENT RAER Trust
LOCATION Flint, MI

HOLE DESIGNATION MW-19-13
DATE COMPLETED 10-22-13
DRILLING METHOD HSA 4¼"
CRA SUPERVISOR Eric Mickelson




* NOTE:
ALL DIMENSIONS ARE
BELOW GROUND SURFACE (BGS)

SCREEN TYPE: ☐ continuous slot ☐ perforated ☐ louvre ☒ other: PVC

SCREEN MATERIAL: ☐ stainless steel ☐ plastic ☒ other: PVC

SCREEN LENGTH: 5.0 ft/m SCREEN DIAMETER: 2.0 in/cm SCREEN SLOT SIZE: #10 or .010

WELL CASING MATERIAL: PVC WELL CASING DIAMETER: 2.0 in/cm

HOLE DIAMETER: 8.5"

DEVELOPMENT: METHOD: _____ DURATION: _____

# Attachment B

CONESTOGA-ROVERS
& ASSOCIATES

14496 Sheldon Road, Suite #200
Plymouth, Michigan 48170
Telephone: (734) 453-5123 Fax: (734) 453-5201
www.CRAworld.com

# MEMORANDUM

TO: Mike Tomka

REF. NO.: 012636

FROM: Nancy Bergstrom/tl/162/Det

DATE: December 3, 2013

**RE: Analytical Results and Reduced Validation**
**Groundwater Monitoring**
**RACER - Peregrine Site**
**Genesee County, Michigan**
**October 2013**

## 1.0 Introduction

The following document details a reduced validation of analytical results for groundwater samples collected in support of the Groundwater Monitoring at the RACER Peregrine Site during October 2013. Samples were submitted to Test America Laboratories, Inc. , located in North Canton, Ohio. A sample collection and analysis summary is presented in Table 1. The validated analytical results are summarized in Table 2. A summary of the analytical methodology is presented in Table 3.

Standard Conestoga--Rovers & Associates (CRA) report deliverables were submitted by the laboratory. The final results and supporting quality assurance/quality control (QA/QC) data were assessed. Evaluation of the data was based on information obtained from the chain of custody form, finished report forms, method blank data, laboratory control samples (LCS), and field QC samples.

The QA/QC criteria by which these data have been assessed are outlined in the analytical methods referenced in Table 3 and applicable guidance from the documents entitled:

i) "RCRA Facility Investigation (RFI) at Former Peregrin Inc. Coldwater Facility, Genesee Township, Michigan "QAPP", May 15, 2000

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

Item ii) will subsequently be referred to as the "Guidelines" in this Memorandum.

## 2.0 Sample Holding Time and Preservation

The sample holding time criteria and sample preservation requirements for the analyses are summarized in Table 3. Sample chain of custody documents and analytical reports were used to determine sample holding times. All samples were (prepared and) analyzed within the required holding times.

All samples were properly preserved, delivered on ice, and stored by the laboratory at the required temperature (4 +/- 2°C).

## 3.0 Laboratory Method Blank Analyses

Method blanks are prepared from a purified matrix and analyzed with investigative samples to determine the existence and magnitude of sample contamination introduced during the analytical procedures.

For this study, laboratory method blanks were analyzed at a minimum frequency of 1 per 20 investigative samples and/or 1 per analytical batch.

The method blank result was less than five times the investigative sample results, indicating that laboratory contamination was not a factor for this investigation.

## 4.0 Laboratory Control Sample Analyses

LCS are prepared and analyzed as samples to assess the analytical efficiencies of the methods employed, independent of sample matrix effects.

For this study, LCS were analyzed at a minimum frequency of 1 per 20 investigative samples and/or 1 per analytical batch.

The LCS contained all analytes of interest. LCS recoveries were assessed per the "Guidelines". All LCS recoveries were within the control limits, demonstrating acceptable analytical accuracy.

## 5.0 Field QA/QC Samples

The field QA/QC consisted of one field duplicate sample set.

### Field Duplicate Sample Analysis

To assess the analytical and sampling protocol precision, one field duplicate sample was collected and submitted "blind" to the laboratory, as specified in Table 1. The RPDs associated with this duplicate sample must be less than 50 percent for water samples. If the reported concentration in either the investigative sample or its duplicate is less than five times the reporting limit (RL), the evaluation criteria is one times the RL value for water samples.

All field duplicate results were within acceptable agreement, demonstrating acceptable sampling and analytical precision.

## 6.0 Analyte Reporting

The laboratory reported detected results down to the laboratory's method detection limit (MDL) for each analyte. Positive analyte detections less than the RL but greater than the MDL were to be qualified as estimated (J) in Table 2. No positive analyte detections less than the PQL but greater than the MDL were reported.

## 7.0 Conclusion

Based on the assessment detailed in the foregoing, the data summarized in Table 2 are acceptable without qualification.

**TABLE 1**

**SAMPLE COLLECTION AND ANALYSIS SUMMARY**
**GROUNDWATER MONITORING**
**RACER - PEREGRINE SITE**
**GENESEE COUNTY, MICHIGAN**
**OCTOBER 2013**

| | | | | | *Analysis/Parameters* | | |
|---|---|---|---|---|---|---|---|
| *Sample Identification* | *Location* | *Matrix* | *Collection Date (mm/dd/yyyy)* | *Collection Time (hr:min)* | *Total Manganese* | *Dissolved Manganese* | *Comments* |
| GW-12636-102113-SSH-1301 | BH-113 | water | 10/21/2013 | 15:05 | | X | |
| GW-12636-102113-SSH-1302 | BH-114 | water | 10/21/2013 | 13:35 | | X | |
| GW-12636-102113-SSH-1303 | BH-115 | water | 10/21/2013 | 13:04 | | X | |
| GW-12636-102213-SSH-1304 | BH-117 | water | 10/22/2013 | 10:25 | X | X | |
| GW-12636-102213-SSH-1305 | BH-117 | water | 10/22/2013 | 10:30 | X | X | Field duplicate of BH-117 |
| GW-12636-102213-SSH-1306 | BH-121 | water | 10/22/2013 | 16:30 | | X | |

**TABLE 2**

**VALIDATED ANALYTICAL RESULTS SUMMARY**
**GROUNDWATER MONITORING**
**RACER - PEREGRINE SITE**
**GENESEE COUNTY, MICHIGAN**
**OCTOBER 2013**

| ***Sample Location:*** | | ***BH-113*** | ***BH-114*** | ***BH-115*** |
|---|---|---|---|---|
| ***Sample ID:*** | | ***GW-12636-102113-SSH-1301*** | ***GW-12636-102113-SSH-1302*** | ***GW-12636-102113-SSH-1303*** |
| ***Sample Date:*** | | ***10/21/2013*** | ***10/21/2013*** | ***10/21/2013*** |
| | ***Units*** | | | |
| Manganese (total) | µg/L | -- | -- | -- |
| Manganese (dissolved) | µg/L | 1600 | 2700 | 900 |

**TABLE 2**

**VALIDATED ANALYTICAL RESULTS SUMMARY**
**GROUNDWATER MONITORING**
**RACER - PEREGRINE SITE**
**GENESEE COUNTY, MICHIGAN**
**OCTOBER 2013**

| ***Sample Location:*** | | ***BH-117*** | ***BH-117*** | ***BH-121*** |
|---|---|---|---|---|
| ***Sample ID:*** | | ***GW-12636-102213-SSH-1304*** | ***GW-12636-102213-SSH-1305*** | ***GW-12636-102213-SSH-1306*** |
| ***Sample Date:*** | | ***10/22/2013*** | ***10/22/2013*** | ***10/22/2013*** |
| | ***Units*** | | | |
| Manganese (total) | µg/L | 88 | 90 | -- |
| Manganese (dissolved) | µg/L | 100 | 88 | 240 |

**TABLE 3**

**ANALYTICAL METHODS AND HOLDING TIME CRITERIA**
**GROUNDWATER MONITORING**
**RACER - PEREGRINE SITE**
**GENESEE COUNTY, MICHIGAN**
**OCTOBER 2013**

| | | | | *Holding Time* | |
|---|---|---|---|---|---|
| *Parameter* | *Method* | *Matrix* | *Preservation* | *Collection to Extraction (Days)* | *Collection or Extraction to Analysis (Days)* |
| Total and Dissolved Manganese | SW-846 6020 | Water | water- pH < 2 and Iced, 4 ± 2° C | - | 180 |

Notes:

SW-846 - "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846, Third Edition, 1986, with subsequent revisions

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

# ANALYTICAL REPORT

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

TestAmerica Job ID: 240-30497-1
Client Project/Site: 12636-T12-006, RACER Peregrine

For:
Conestoga-Rovers & Associates, Inc.
14496 Sheldon Road, Suite 200
Plymouth, Michigan 48170

Attn: Mr. Paul Wiseman

Denise D Heckler

*Authorized for release by:*
*10/28/2013 6:07:45 PM*

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



*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

# Table of Contents

## Job ID: 240-30497-1

**Laboratory: TestAmerica Canton**

**Narrative**

### CASE NARRATIVE

### Client: Conestoga-Rovers & Associates, Inc.

### Project: 12636-T12-006, RACER Peregrine

### Report Number: 240-30497-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica Canton attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header.

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

**RECEIPT**

The samples were received on 10/23/2013; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt was 3.7 C.

**DISSOLVED METALS (ICPMS)**

Samples GW-12636-102113-SSH-1301 (240-30497-1), GW-12636-102113-SSH-1302 (240-30497-2), GW-12636-102113-SSH-1303 (240-30497-3), GW-12636-102113-SSH-1304 (240-30497-4), GW-12636-102113-SSH-1305 (240-30497-5) and GW-12636-102113-SSH-1306 (240-30497-6) were analyzed for dissolved metals (ICPMS) in accordance with EPA SW-846 Method 6020. The samples were prepared on 10/24/2013 and analyzed on 10/25/2013.

No difficulties were encountered during the metals analysis.

All quality control parameters were within the acceptance limits.

**TOTAL RECOVERABLE METALS (ICPMS)**

Samples GW-12636-102113-SSH-1304 (240-30497-4) and GW-12636-102113-SSH-1305 (240-30497-5) were analyzed for total recoverable metals (ICPMS) in accordance with EPA SW-846 Method 6020. The samples were prepared on 10/24/2013 and analyzed on 10/25/2013.

## Job ID: 240-30497-1 (Continued)

### Laboratory: TestAmerica Canton (Continued)

Manganese was detected in method blank MB 240-106923/1-A at a level that was above the method detection limit but below the reporting limit. The value should be considered an estimate, and has been flagged. If the associated sample reported a result above the MDL and/or RL, the result has been flagged.

No other difficulties were encountered during the metals analysis.

All other quality control parameters were within the acceptance limits.

Client: Conestoga-Rovers & Associates, Inc.
Project/Site: 12636-T12-006, RACER Peregrine

TestAmerica Job ID: 240-30497-1

## Qualifiers

### Metals

| Qualifier | Qualifier Description |
|---|---|
| B | Compound was found in the blank and sample. |
| J | Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value. |

## Glossary

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

# Sample Summary

Client: Conestoga-Rovers & Associates, Inc.
Project/Site: 12636-T12-006, RACER Peregrine

TestAmerica Job ID: 240-30497-1

| Lab Sample ID | Client Sample ID | Matrix | Collected | Received |
|---|---|---|---|---|
| 240-30497-1 | GW-12636-102113-SSH-1301 | Water | 10/21/13 15:05 | 10/23/13 09:30 |
| 240-30497-2 | GW-12636-102113-SSH-1302 | Water | 10/21/13 13:35 | 10/23/13 09:30 |
| 240-30497-3 | GW-12636-102113-SSH-1303 | Water | 10/21/13 13:04 | 10/23/13 09:30 |
| 240-30497-4 | GW-12636-102113-SSH-1304 | Water | 10/22/13 10:25 | 10/23/13 09:30 |
| 240-30497-5 | GW-12636-102113-SSH-1305 | Water | 10/22/13 10:30 | 10/23/13 09:30 |
| 240-30497-6 | GW-12636-102113-SSH-1306 | Water | 10/22/13 16:30 | 10/23/13 09:30 |

# Detection Summary

Client: Conestoga-Rovers & Associates, Inc.
Project/Site: 12636-T12-006, RACER Peregrine

TestAmerica Job ID: 240-30497-1

## Client Sample ID: GW-12636-102113-SSH-1301 — Lab Sample ID: 240-30497-1

| Analyte | Result | Qualifier | RL | MDL | Unit | Dil Fac | D | Method | Prep Type |
|---|---|---|---|---|---|---|---|---|---|
| Manganese | 1600 | B | 5.0 | 0.41 | ug/L | 1 | | 6020 | Dissolved |

## Client Sample ID: GW-12636-102113-SSH-1302 — Lab Sample ID: 240-30497-2

| Analyte | Result | Qualifier | RL | MDL | Unit | Dil Fac | D | Method | Prep Type |
|---|---|---|---|---|---|---|---|---|---|
| Manganese | 2700 | B | 5.0 | 0.41 | ug/L | 1 | | 6020 | Dissolved |

## Client Sample ID: GW-12636-102113-SSH-1303 — Lab Sample ID: 240-30497-3

| Analyte | Result | Qualifier | RL | MDL | Unit | Dil Fac | D | Method | Prep Type |
|---|---|---|---|---|---|---|---|---|---|
| Manganese | 900 | B | 5.0 | 0.41 | ug/L | 1 | | 6020 | Dissolved |

## Client Sample ID: GW-12636-102113-SSH-1304 — Lab Sample ID: 240-30497-4

| Analyte | Result | Qualifier | RL | MDL | Unit | Dil Fac | D | Method | Prep Type |
|---|---|---|---|---|---|---|---|---|---|
| Manganese | 88 | B | 5.0 | 0.41 | ug/L | 1 | | 6020 | Total Recoverable |
| Manganese | 100 | B | 5.0 | 0.41 | ug/L | 1 | | 6020 | Dissolved |

## Client Sample ID: GW-12636-102113-SSH-1305 — Lab Sample ID: 240-30497-5

| Analyte | Result | Qualifier | RL | MDL | Unit | Dil Fac | D | Method | Prep Type |
|---|---|---|---|---|---|---|---|---|---|
| Manganese | 90 | B | 5.0 | 0.41 | ug/L | 1 | | 6020 | Total Recoverable |
| Manganese | 88 | B | 5.0 | 0.41 | ug/L | 1 | | 6020 | Dissolved |

## Client Sample ID: GW-12636-102113-SSH-1306 — Lab Sample ID: 240-30497-6

| Analyte | Result | Qualifier | RL | MDL | Unit | Dil Fac | D | Method | Prep Type |
|---|---|---|---|---|---|---|---|---|---|
| Manganese | 240 | B | 5.0 | 0.41 | ug/L | 1 | | 6020 | Dissolved |

This Detection Summary does not include radiochemical test results.

# Method Summary

Client: Conestoga-Rovers & Associates, Inc.
Project/Site: 12636-T12-006, RACER Peregrine

TestAmerica Job ID: 240-30497-1

| Method | Method Description | Protocol | Laboratory |
|---|---|---|---|
| 6020 | Metals (ICP/MS) | SW846 | TAL CAN |

**Protocol References:**

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

**Laboratory References:**

TAL CAN = TestAmerica Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

Client: Conestoga-Rovers & Associates, Inc.
Project/Site: 12636-T12-006, RACER Peregrine

TestAmerica Job ID: 240-30497-1

## Method: 6020 - Metals (ICP/MS) - Total Recoverable

**Client Sample ID: GW-12636-102113-SSH-1304**
**Date Collected: 10/22/13 10:25**
**Date Received: 10/23/13 09:30**

**Lab Sample ID: 240-30497-4**
**Matrix: Water**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Manganese | 88 | B | 5.0 | 0.41 | ug/L | | 10/24/13 09:27 | 10/25/13 16:10 | 1 |

Client: Conestoga-Rovers & Associates, Inc.
Project/Site: 12636-T12-006, RACER Peregrine

TestAmerica Job ID: 240-30497-1

## Method: 6020 - Metals (ICP/MS) - Total Recoverable

**Client Sample ID: GW-12636-102113-SSH-1305**
**Date Collected: 10/22/13 10:30**
**Date Received: 10/23/13 09:30**

**Lab Sample ID: 240-30497-5**
**Matrix: Water**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Manganese | 90 | B | 5.0 | 0.41 | ug/L | | 10/24/13 09:27 | 10/25/13 16:18 | 1 |

Client: Conestoga-Rovers & Associates, Inc.
Project/Site: 12636-T12-006, RACER Peregrine

TestAmerica Job ID: 240-30497-1

## Method: 6020 - Metals (ICP/MS) - Dissolved

**Client Sample ID: GW-12636-102113-SSH-1301**
**Date Collected: 10/21/13 15:05**
**Date Received: 10/23/13 09:30**

**Lab Sample ID: 240-30497-1**
**Matrix: Water**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Manganese | 1600 | B | 5.0 | 0.41 | ug/L | | 10/24/13 09:27 | 10/25/13 15:59 | 1 |

Client: Conestoga-Rovers & Associates, Inc.
Project/Site: 12636-T12-006, RACER Peregrine

TestAmerica Job ID: 240-30497-1

## Method: 6020 - Metals (ICP/MS) - Dissolved

**Client Sample ID: GW-12636-102113-SSH-1302**
**Date Collected: 10/21/13 13:35**
**Date Received: 10/23/13 09:30**

**Lab Sample ID: 240-30497-2**
**Matrix: Water**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Manganese | 2700 | B | 5.0 | 0.41 | ug/L | | 10/24/13 09:27 | 10/25/13 16:02 | 1 |

Client: Conestoga-Rovers & Associates, Inc.
Project/Site: 12636-T12-006, RACER Peregrine

TestAmerica Job ID: 240-30497-1

## Method: 6020 - Metals (ICP/MS) - Dissolved

**Client Sample ID: GW-12636-102113-SSH-1303**
**Date Collected: 10/21/13 13:04**
**Date Received: 10/23/13 09:30**

**Lab Sample ID: 240-30497-3**
**Matrix: Water**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Manganese | 900 | B | 5.0 | 0.41 | ug/L | | 10/24/13 09:27 | 10/25/13 16:06 | 1 |

Client: Conestoga-Rovers & Associates, Inc.
Project/Site: 12636-T12-006, RACER Peregrine

TestAmerica Job ID: 240-30497-1

## Method: 6020 - Metals (ICP/MS) - Dissolved

**Client Sample ID: GW-12636-102113-SSH-1304**
**Date Collected: 10/22/13 10:25**
**Date Received: 10/23/13 09:30**

**Lab Sample ID: 240-30497-4**
**Matrix: Water**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Manganese | 100 | B | 5.0 | 0.41 | ug/L | | 10/24/13 09:27 | 10/25/13 16:14 | 1 |

Client: Conestoga-Rovers & Associates, Inc.
Project/Site: 12636-T12-006, RACER Peregrine

TestAmerica Job ID: 240-30497-1

## Method: 6020 - Metals (ICP/MS) - Dissolved

**Client Sample ID: GW-12636-102113-SSH-1305**
**Date Collected: 10/22/13 10:30**
**Date Received: 10/23/13 09:30**

**Lab Sample ID: 240-30497-5**
**Matrix: Water**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Manganese | 88 | B | 5.0 | 0.41 | ug/L | | 10/24/13 09:27 | 10/25/13 16:22 | 1 |

Client: Conestoga-Rovers & Associates, Inc.
Project/Site: 12636-T12-006, RACER Peregrine

TestAmerica Job ID: 240-30497-1

## Method: 6020 - Metals (ICP/MS) - Dissolved

**Client Sample ID: GW-12636-102113-SSH-1306**
**Date Collected: 10/22/13 16:30**
**Date Received: 10/23/13 09:30**

**Lab Sample ID: 240-30497-6**
**Matrix: Water**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Manganese | 240 | B | 5.0 | 0.41 | ug/L | | 10/24/13 09:27 | 10/25/13 16:26 | 1 |

Client: Conestoga-Rovers & Associates, Inc.
Project/Site: 12636-T12-006, RACER Peregrine

TestAmerica Job ID: 240-30497-1

## Metals

### Prep Batch: 106923

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 240-30497-1 | GW-12636-102113-SSH-1301 | Dissolved | Water | 3005A | |
| 240-30497-2 | GW-12636-102113-SSH-1302 | Dissolved | Water | 3005A | |
| 240-30497-3 | GW-12636-102113-SSH-1303 | Dissolved | Water | 3005A | |
| 240-30497-4 | GW-12636-102113-SSH-1304 | Dissolved | Water | 3005A | |
| 240-30497-4 | GW-12636-102113-SSH-1304 | Total Recoverable | Water | 3005A | |
| 240-30497-5 | GW-12636-102113-SSH-1305 | Dissolved | Water | 3005A | |
| 240-30497-5 | GW-12636-102113-SSH-1305 | Total Recoverable | Water | 3005A | |
| 240-30497-6 | GW-12636-102113-SSH-1306 | Dissolved | Water | 3005A | |
| LCS 240-106923/2-A | Lab Control Sample | Total Recoverable | Water | 3005A | |
| MB 240-106923/1-A | Method Blank | Total Recoverable | Water | 3005A | |

### Analysis Batch: 107335

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 240-30497-1 | GW-12636-102113-SSH-1301 | Dissolved | Water | 6020 | 106923 |
| 240-30497-2 | GW-12636-102113-SSH-1302 | Dissolved | Water | 6020 | 106923 |
| 240-30497-3 | GW-12636-102113-SSH-1303 | Dissolved | Water | 6020 | 106923 |
| 240-30497-4 | GW-12636-102113-SSH-1304 | Dissolved | Water | 6020 | 106923 |
| 240-30497-4 | GW-12636-102113-SSH-1304 | Total Recoverable | Water | 6020 | 106923 |
| 240-30497-5 | GW-12636-102113-SSH-1305 | Dissolved | Water | 6020 | 106923 |
| 240-30497-5 | GW-12636-102113-SSH-1305 | Total Recoverable | Water | 6020 | 106923 |
| 240-30497-6 | GW-12636-102113-SSH-1306 | Dissolved | Water | 6020 | 106923 |
| LCS 240-106923/2-A | Lab Control Sample | Total Recoverable | Water | 6020 | 106923 |
| MB 240-106923/1-A | Method Blank | Total Recoverable | Water | 6020 | 106923 |

## Method: 6020 - Metals (ICP/MS)

**Lab Sample ID: MB 240-106923/1-A**
**Matrix: Water**
**Analysis Batch: 107335**

**Client Sample ID: Method Blank**
**Prep Type: Total Recoverable**
**Prep Batch: 106923**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Manganese | 0.604 | J | 5.0 | 0.41 | ug/L | | 10/24/13 09:27 | 10/25/13 15:27 | 1 |

**Lab Sample ID: LCS 240-106923/2-A**
**Matrix: Water**
**Analysis Batch: 107335**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total Recoverable**
**Prep Batch: 106923**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Manganese | 1000 | 1090 | | ug/L | | 109 | 80 - 120 |

# Lab Chronicle

Client: Conestoga-Rovers & Associates, Inc.
Project/Site: 12636-T12-006, RACER Peregrine

TestAmerica Job ID: 240-30497-1

## Client Sample ID: GW-12636-102113-SSH-1301

**Lab Sample ID: 240-30497-1**

**Date Collected: 10/21/13 15:05**

**Matrix: Water**

**Date Received: 10/23/13 09:30**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Dissolved | Prep | 3005A | | | 106923 | 10/24/13 09:27 | ADS | TAL CAN |
| Dissolved | Analysis | 6020 | | 1 | 107335 | 10/25/13 15:59 | RKT | TAL CAN |

## Client Sample ID: GW-12636-102113-SSH-1302

**Lab Sample ID: 240-30497-2**

**Date Collected: 10/21/13 13:35**

**Matrix: Water**

**Date Received: 10/23/13 09:30**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Dissolved | Prep | 3005A | | | 106923 | 10/24/13 09:27 | ADS | TAL CAN |
| Dissolved | Analysis | 6020 | | 1 | 107335 | 10/25/13 16:02 | RKT | TAL CAN |

## Client Sample ID: GW-12636-102113-SSH-1303

**Lab Sample ID: 240-30497-3**

**Date Collected: 10/21/13 13:04**

**Matrix: Water**

**Date Received: 10/23/13 09:30**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Dissolved | Prep | 3005A | | | 106923 | 10/24/13 09:27 | ADS | TAL CAN |
| Dissolved | Analysis | 6020 | | 1 | 107335 | 10/25/13 16:06 | RKT | TAL CAN |

## Client Sample ID: GW-12636-102113-SSH-1304

**Lab Sample ID: 240-30497-4**

**Date Collected: 10/22/13 10:25**

**Matrix: Water**

**Date Received: 10/23/13 09:30**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable | Prep | 3005A | | | 106923 | 10/24/13 09:27 | ADS | TAL CAN |
| Total Recoverable | Analysis | 6020 | | 1 | 107335 | 10/25/13 16:10 | RKT | TAL CAN |
| Dissolved | Prep | 3005A | | | 106923 | 10/24/13 09:27 | ADS | TAL CAN |
| Dissolved | Analysis | 6020 | | 1 | 107335 | 10/25/13 16:14 | RKT | TAL CAN |

## Client Sample ID: GW-12636-102113-SSH-1305

**Lab Sample ID: 240-30497-5**

**Date Collected: 10/22/13 10:30**

**Matrix: Water**

**Date Received: 10/23/13 09:30**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable | Prep | 3005A | | | 106923 | 10/24/13 09:27 | ADS | TAL CAN |
| Total Recoverable | Analysis | 6020 | | 1 | 107335 | 10/25/13 16:18 | RKT | TAL CAN |
| Dissolved | Prep | 3005A | | | 106923 | 10/24/13 09:27 | ADS | TAL CAN |
| Dissolved | Analysis | 6020 | | 1 | 107335 | 10/25/13 16:22 | RKT | TAL CAN |

# Lab Chronicle

Client: Conestoga-Rovers & Associates, Inc.
Project/Site: 12636-T12-006, RACER Peregrine

TestAmerica Job ID: 240-30497-1

**Client Sample ID: GW-12636-102113-SSH-1306**
**Date Collected: 10/22/13 16:30**
**Date Received: 10/23/13 09:30**

**Lab Sample ID: 240-30497-6**
**Matrix: Water**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Dissolved | Prep | 3005A | | | 106923 | 10/24/13 09:27 | ADS | TAL CAN |
| Dissolved | Analysis | 6020 | | 1 | 107335 | 10/25/13 16:26 | RKT | TAL CAN |

**Laboratory References:**

TAL CAN = TestAmerica Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

# Certification Summary

Client: Conestoga-Rovers & Associates, Inc.
Project/Site: 12636-T12-006, RACER Peregrine

TestAmerica Job ID: 240-30497-1

## Laboratory: TestAmerica Canton

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

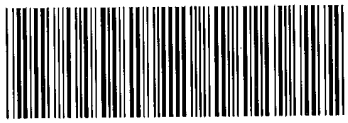
| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| California | NELAP | 9 | 01144CA | 06-30-14 |
| Connecticut | State Program | 1 | PH-0590 | 12-31-13 |
| Florida | NELAP | 4 | E87225 | 06-30-14 |
| Georgia | State Program | 4 | N/A | 06-30-14 |
| Illinois | NELAP | 5 | 200004 | 07-31-14 * |
| Kansas | NELAP | 7 | E-10336 | 01-31-14 |
| Kentucky | State Program | 4 | 58 | 06-30-14 |
| L-A-B | DoD ELAP | | L2315 | 07-18-16 |
| Nevada | State Program | 9 | OH-000482008A | 07-31-14 |
| New Jersey | NELAP | 2 | OH001 | 06-30-14 |
| New York | NELAP | 2 | 10975 | 04-01-14 |
| Ohio VAP | State Program | 5 | CL0024 | 01-19-14 |
| Pennsylvania | NELAP | 3 | 68-00340 | 08-31-14 * |
| Texas | NELAP | 6 | | 08-31-14 * |
| USDA | Federal | | P330-11-00328 | 08-26-14 |
| Virginia | NELAP | 3 | 460175 | 09-14-14 |
| Washington | State Program | 10 | C971 | 01-12-14 |
| Wisconsin | State Program | 5 | 999518190 | 08-31-14 |

* Expired certification is currently pending renewal and is considered valid.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

# CHAIN OF CUSTODY AND RECEIVING DOCUMENTS


240-30497 Chain of Custody

# CHAIN OF CUSTODY RECORD

COC NO.: PL-11809
PAGE 1 OF 2
(See Reverse Side for Instructions)

CONESTOGA-ROVERS & ASSOCIATES
14496 Sheldon Road, Suite #200, Plymouth, Michigan 48170
Phone: (734) 453-5123 Fax: (734) 453-5201

3-7

| | | | |
|---|---|---|---|
| Project No/ Phase/Task Code: 12636 | Laboratory Name: Test America | Lab Location: North Canton, OH | SSOW ID: 12636-T12-006 |
| Project Name: Race Goldwater Rd | Lab Contact: D. Heckler | Lab Quote No: | Cooler No: |
| Project Location: Genesse Twp., MI | | | Carrier: FedEx |
| Chemistry Contact: P. Wiseman | | | Airbill No: 9044 0672 0927 |
| Sampler(s): S. Howemeyer | | | Date Shipped: 10/22/13 |

| Item | Sample Identification (Containers for each sample may be combined on one line) | Date (mm/dd/yy) | Time (hh:mm) | Matrix Code (see back of COC) | Grab (G) or Comp (C) | Container Quantity & Preservation: Unpreserved | Hydrochloric Acid (HCl) | Nitric Acid ($HNO_3$) | Sulfuric Acid ($H_2SO_4$) | Sodium Hydroxide (NaOH) | Methanol/Water (Soil VOC) | EnCores 3x5-g, 1x25-g | Other: | Total Containers/Sample | Analysis Requested: D. Manganese | Analysis Requested: T. Manganese | MS/MSD Request | Comments/ Special Instructions: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | GW-12636-102113-SSA-1301 | 10/21/13 | 1505 | WB | G | | | X | | | | | | 1 | X | | | |
| 2 | GW-12636-102113-SSH-1302 | 10/21/13 | 1335 | WB | G | | | X | | | | | | 1 | X | | | |
| 3 | GW-12636-102113-SSH-1303 | 10/21/13 | 1304 | WB | G | | | X | | | | | | 1 | X | | | |
| 4 | GW-12636-102213-SSH-1304 | 10/22/13 | 1025 | WB | G | | | X | | | | | | 2 | X | X | | |
| 5 | GW-12636-102213-SSH-1305 | 10/22/13 | 1030 | WB | G | | | X | | | | | | 2 | X | X | | |
| 6 | GW-12636-102213-SSH-1306 | 10/22/13 | 1130 | WB | G | | | X | | | | | | 1 | X | | | |
| 7 | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | |

SSH

TAT Required in business days (use separate COCs for different TATs):
☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 1 Week ☒ 2 Week ☐ Other:

Total Number of Containers:

All Samples in Cooler must be on COC

Notes/ Special Requirements:

| Relinquished By | Company | Date | Time | Received By | Company | Date | Time |
|---|---|---|---|---|---|---|---|
| 1. | CRA | 10/22/13 | 1700 | 1. | TA | 10-23-13 | 930 |
| 2. | | | | 2. | | | |
| 3. | | | | 3. | | | |

THE CHAIN OF CUSTODY IS A LEGAL DOCUMENT — ALL FIELDS MUST BE COMPLETED ACCURATELY

Distribution: WHITE — Fully Executed Copy (CRA) YELLOW — Receiving Laboratory Copy PINK — Shipper GOLDENROD — Sampling Crew

CRA Form: COC-10A (20110804)

Page 23 of 25

10/28/2013

**TestAmerica Canton Sample Receipt Form/Narrative** Login # : 300497
**Canton Facility**

Client CRA Site Name _____ Cooler unpacked by:

Cooler Received on 10-23-13 Opened on 10-23-13

FedEx: 1st Grd (Exp) UPS FAS Stetson Client Drop Off TestAmerica Courier Other _____

TestAmerica Cooler # 260-215 Foam Box Client Cooler Box Other _____

Packing material used: (Bubble Wrap) Foam Plastic Bag None Other _____

COOLANT: (Wet Ice) Blue Ice Dry Ice Water None

1. Cooler temperature upon receipt

| | | | |
|---|---|---|---|
| IR GUN# A | (CF +2 °C) Observed Cooler Temp. _____ °C | Corrected Cooler Temp. _____ °C | ☐ See Multiple Cooler Form |
| IR GUN# 4 | (CF +1 °C) Observed Cooler Temp. _____ °C | Corrected Cooler Temp. _____ °C | |
| IR GUN# 5 | (CF +2 °C) Observed Cooler Temp. _____ °C | Corrected Cooler Temp. _____ °C | |
| IR GUN# 8 | (CF -0 °C) 3.7 | Observed Cooler Temp. 3.7 °C | Corrected |

2. Were custody seals on the outside of the cooler(s)? If Yes Quantity _____ Yes (No)
   -Were custody seals on the outside of the cooler(s) signed & dated? Yes No (NA)
   -Were custody seals on the bottle(s)? Yes (No)
3. Shippers' packing slip attached to the cooler(s)? (Yes) No
4. Did custody papers accompany the sample(s)? (Yes) No
5. Were the custody papers relinquished & signed in the appropriate place? (Yes) No
6. Did all bottles arrive in good condition (Unbroken)? (Yes) No
7. Could all bottle labels be reconciled with the COC? (Yes) No
8. Were correct bottle(s) used for the test(s) indicated? (Yes) No
9. Sufficient quantity received to perform indicated analyses? (Yes) No
10. Were sample(s) at the correct pH upon receipt? (Yes) No NA pH Strip Lot# HC385663
11. Were VOAs on the COC? Yes (No)
12. Were air bubbles >6 mm in any VOA vials? Yes No (NA)
13. Was a trip blank present in the cooler(s)? Yes (No)

Contacted PM _____ Date _____ by _____ via Verbal Voice Mail Other
Concerning _____

**14. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES** Samples processed by:

**15. SAMPLE CONDITION**

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

**16. SAMPLE PRESERVATION**

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

# Login Container Summary Report



Temperature readings: _____

| Client Sample ID | Lab ID | Container Type | Container pH | Preservative Added (mls) | Lot # |
|---|---|---|---|---|---|
| GW-12636-102113-SSH-1301 | 240-30497-A-1 | Plastic 500ml - w/ Nitric - Dis. | <2 | _____ | _____ |
| GW-12636-102113-SSH-1302 | 240-30497-A-2 | Plastic 500ml - w/ Nitric - Dis. | <2 | _____ | _____ |
| GW-12636-102113-SSH-1303 | 240-30497-A-3 | Plastic 500ml - w/ Nitric - Dis. | <2 | _____ | _____ |
| GW-12636-102113-SSH-1304 | 240-30497-A-4 | Plastic 500ml - with Nitric Acid | <2 | _____ | _____ |
| GW-12636-102113-SSH-1304 | 240-30497-B-4 | Plastic 500ml - w/ Nitric - Dis. | <2 | _____ | _____ |
| GW-12636-102113-SSH-1305 | 240-30497-A-5 | Plastic 500ml - with Nitric Acid | <2 | _____ | _____ |
| GW-12636-102113-SSH-1305 | 240-30497-B-5 | Plastic 500ml - w/ Nitric - Dis. | <2 | _____ | _____ |
| GW-12636-102113-SSH-1306 | 240-30497-A-6 | Plastic 500ml - w/ Nitric - Dis. | <2 | _____ | _____ |

# Attachment C

# MONITORING WELL RECORD FOR LOW-FLOW PURGING

***Project Data:***

Project Name: _____
Ref. No.: 12636

Date: 10/21/13
Personnel: _____
SSH

***Monitoring Well Data:***

Well No.: BH 113
Vapour PID (ppm): _____
Measurement Point: _____
Constructed Well Depth (m/ft): _____
Measured Well Depth (m/ft): _____
Depth of Sediment (m/ft): _____

Saturated Screen Length (m/ft): _____
Depth to Pump Intake (m/ft)[1]: _____
Well Diameter, D (cm/in): _____
Well Screen Volume, $V_s$ (L)[2]: _____
Initial Depth to Water (m/ft): 6.63


| Time | Pumping Rate (mL/min) | Depth to Water (m/ft) | Drawdown from Initial Water Level[4] (m/ft) | Temperature °C | Conductivity (mS/cm) | Turbidity NTU | DO (mg/L) | pH | ORP (mV) | Volume Purged, Vp (L) | No. of Well Screen Volumes Purged[4] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Precision Required[5]: | ±3 % | ±0.005 or 0.01[5] | ±10 % | ±10 % | ±0.1 Units | ±10 mV | | |
| 1145 | | 6.63 | | | | | | | | | |
| 1340 | 50/1.00 | | | | | | | | | | |
| 1415 | | | | | | 242 | | | | 1.75 gals | |
| 1430 | | | | | | 141 | | | | 2.5 | |
| 1455 | | | | | | 64.6 | | | | 3.5 | |
| 1500 | | | | 17.68 | 4.30 | | 1.83 | 8.01 | -6 | | |
| 1505 | sample | | | | | 86.8 | | | | | |

well set 10' bgs ≈ 1115 time

Notes:

(1) The pump intake will be placed at the well screen mid-point or at a minimum of 0.6 m (2 ft) above any sediment accumulated at the well bottom.
(2) The well screen volume will be based on a 1.52 metres (5-foot) screen length (L). For metric units, $V_s=\pi*(r^2)*L$ in mL, where r (r=D/2) and L are in cm.
For Imperial units, $V_s=\pi*(r^2)*L*(2.54)^3$, where r and L are in inches
(3) The drawdown from the initial water level should not exceed 0.1 m (0.3 ft). The pumping rate should not exceed 600 mL/min.
(4) Purging will continue until stabilization is achieved or until 20 well screen volumes have been purged (unless purge water remains visually turbid and appears to be clearing, or unless stabilization parameters are varying slightly outside of the stabilization criteria and appear to be stabilizing), No. of Well Screen Volumes Purged= Vp/Vs.
(5) For conductivity, the average value of three readings <1 mS/cm ±0.005 mS/cm or where conductivity >1 mS/cm ±0.01 mS/cm.

# MONITORING WELL RECORD FOR LOW-FLOW PURGING

*Project Data:*

Project Name: Coldwater Rd

Ref. No.: 12631

Date: 10/21/13

Personnel:

*Monitoring Well Data:*

Well No.: BH 11B

Vapour PID (ppm):

Measurement Point:

Constructed Well Depth (m/ft):

Measured Well Depth (m/ft):

Depth of Sediment (m/ft):

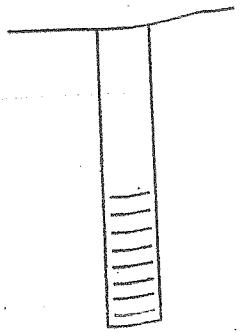
Saturated Screen Length (m/ft):

Depth to Pump Intake (m/ft)[1]:

Well Diameter, D (cm/in):

Well Screen Volume, $V_s$ (L)[2]:

Initial Depth to Water (m/ft):



| Time | Pumping Rate (mL/min) | Depth to Water (m/ft) | Drawdown from Initial Water Level[3] (m/ft) | Temperature °C | Conductivity (mS/cm) | Turbidity NTU | DO (mg/L) | pH | ORP (mV) | Volume Purged, Vp (L) | No. of Well Screen Volum Purged[4] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Precision Required[5]:* | | | | ±3 % | ±0.005 or 0.01[5] | ±10 % | ±10 % | ±0.1 Units | ±10 mV | | |
| 1218 | 50 | — | | | | 428 | | | | | |
| 1236 | | | | | | 428 | | | | | |
| 1335 | sample | | | | | 126 | | | | | |

Notes:

(1) The pump intake will be placed at the well screen mid-point or at a minimum of 0.6 m (2 ft) above any sediment accumulated at the well bottom.

(2) The well screen volume will be based on a 1.52 metres (5-foot) screen length (L). For metric units, $V_s=\pi*(r^2)*L$ in mL, where r (r=D/2) and L are in cm. For Imperial units, $V_s=\pi*(r^2)*L*(2.54)^3$, where r and L are in inches

(3) The drawdown from the initial water level should not exceed 0.1 m (0.3 ft). The pumping rate should not exceed 600 mL/min.

(4) Purging will continue until stabilization is achieved or until 20 well screen volumes have been purged (unless purge water remains visually turbid and appears to be clearing, or unless stabilization parameters are varying slightly outside of the stabilization criteria and appear to be stabilizing), No. of Well Screen Volumes Purged= Vp/Vs.

(5) For conductivity, the average value of three readings <1 mS/cm ±0.005 mS/cm or where conductivity >1 mS/cm ±0.01 mS/cm.

pump 1 Pt went dry

1237 sample 4m start

1332 stop

# MONITORING WELL RECORD FOR LOW-FLOW PURGING

***Project Data:***

Project Name: _____

Ref. No.: 12636

Date: 10/21/13

Personnel: SSH

***Monitoring Well Data:***

Well No.: BH115

Vapour PID (ppm): _____

Measurement Point: _____

Constructed Well Depth (m/ft): _____

Measured Well Depth (m/ft): _____

Depth of Sediment (m/ft): _____

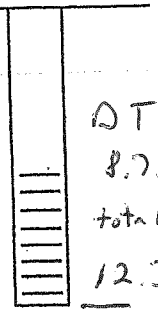
Saturated Screen Length (m/ft): _____

Depth to Pump Intake (m/ft)[1]: _____

Well Diameter, D (cm/in): _____

Well Screen Volume, $V_s$ (L)[2]: _____

Initial Depth to Water (m/ft): 8.25



DTW 8.25

total depth 12.39

| Time | Pumping Rate (mL/min) | Depth to Water (m/ft) | Drawdown from Initial Water Level[3] (m/ft) | Temperature °C | Conductivity (mS/cm) | Turbidity NTU | DO (mg/L) | pH | ORP (mV) | Volume Purged, Vp (L) | No. of Well Screen Volumes Purged[4] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Precision Required[5]: | ±3 % | ±0.005 or 0.01[5] | ±10 % | ±10 % | ±0.1 Units | ±10 mV | | |
| 1510 | | 8.25 | | | | | | | | | |
| 1513 | 50/100 mls | | | | | | | | | | |
| 1530 | | | | | | 79.7 | | | | 1 gal | |
| 1545 | | | | 16.69 | 5.87 | 62.1 | 1.67 | 8.05 | -16 | 1.25 gals | |
| 1550 | sample | | | | | | | | | | |
| 1555 | | | | | | 15.8 | | | | | |

Notes:

(1) The pump intake will be placed at the well screen mid-point or at a minimum of 0.6 m (2 ft) above any sediment accumulated at the well bottom.

(2) The well screen volume will be based on a 1.52 metres (5-foot) screen length (L). For metric units, $V_s=\pi*(r^2)*L$ in mL, where r (r=D/2) and L are in cm.
For Imperial units, $V_s=\pi*(r^2)*L*(2.54)^3$, where r and L are in inches

(3) The drawdown from the initial water level should not exceed 0.1 m (0.3 ft). The pumping rate should not exceed 600 mL/min.

(4) Purging will continue until stabilization is achieved or until 20 well screen volumes have been purged (unless purge water remains visually turbid and appears to be clearing, or unless stabilization parameters are varying slightly outside of the stabilization criteria and appear to be stabilizing), No. of Well Screen Volumes Purged= Vp/Vs.

(5) For conductivity, the average value of three readings <1 mS/cm ±0.005 mS/cm or where conductivity >1 mS/cm ±0.01 mS/cm.

temp well set 10' bgs

sample field filtered

Diss. Manganese

## MONITORING WELL RECORD FOR LOW-FLOW PURGING

***Project Data:***

Project Name: Coldwater Rd. RACER
Ref. No.: 12636-T12-01413
Date: 10-22-13
Personnel: EM

Sample #: 1304 & 1305
Start: 1005

***Monitoring Well Data:***

Well No.: TW-117
Vapour PID (ppm):
Measurement Point:
Constructed Well Depth (m/ft):
Measured Well Depth (m/ft):
Depth of Sediment (m/ft):
Saturated Screen Length (m/ft):
Depth to Pump Intake (m/ft)[1]:
Well Diameter, D (cm/in):
Well Screen Volume, $V_s$ (L)[2]:
Initial Depth to Water (m/ft): 8.05

| Time | Pumping Rate (mL/min) | Depth to Water (m/ft) | Drawdown from Initial Water Level[3] (m/ft) | Temperature °C | Conductivity (mS/cm) | Turbidity NTU | DO (mg/L) | pH | ORP (mV) | Volume Purged, Vp (L) | No. of Well Screen Volumes Purged[3] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Precision Required[5]:* | | | | *±3 %* | *±0.005 or 0.01[6]* | *±10 %* | *±10 %* | *±0.1 Units* | *±10 mV* | | |
| 1015 | | | | | | 19.0 | | | | 1 gal. | |
| 1025 | | | | 15.45 | 3.11 | 4.25 | 1.55 | 7.83 | 32 | 2 gal. | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
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Notes:

Sample Time: 1025

Sample ID: GW-12636-102213-SH-1304
1305 dup

Analysis: Total Manganese, Dissolved Manganese

# MONITORING WELL RECORD FOR LOW-FLOW PURGING

-1306

***Project Data:***

Project Name: Coldwater #1

Ref. No.: 12636

Date: 10/22/13

Personnel: SSH

***Monitoring Well Data:***

Well No.: BH121

Vapour PID (ppm): _____

Measurement Point: _____

Constructed Well Depth (m/ft): _____

Measured Well Depth (m/ft): _____

Depth of Sediment (m/ft): _____

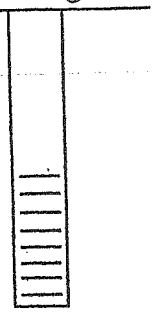
Saturated Screen Length (m/ft): _____

Depth to Pump Intake (m/ft)[1]: _____

Well Diameter, D (cm/in): _____

Well Screen Volume, $V_s$ (L)[2]: _____

Initial Depth to Water (m/ft): 12.57



| Time | Pumping Rate (mL/min) | Depth to Water (m/ft) | Drawdown from Initial Water Level[3] (m/ft) | Temperature °C | Conductivity (mS/cm) | Turbidity NTU | DO (mg/L) | pH | ORP (mV) | Volume Purged, Vp (L) | No. of Well Screen Volumes Purged[4] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Precision Required[5]: | ±3 % | ±0.005 or 0.01[5] | ±10 % | ±10 % | ±0.1 Units | ±10 mV | | |
| 1600 | 50-100 | 12.57 | | | | | | | | 1 pint - went dry | |
| | | | | | | | | | | | |
| 1615 | | | | | | 643 | | | | 1 pint - went dry | |
| | | | | | | | | | | | |
| 1630 | sample | | | | | 271 | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| 1705 | after sampling | | | | | 59.5 | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
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| | | | | | | | | | | | |

DTB 15.01

Notes:

(1) The pump intake will be placed at the well screen mid-point or at a minimum of 0.6 m (2 ft) above any sediment accumulated at the well bottom.

(2) The well screen volume will be based on a 1.52 metres (5-foot) screen length (L). For metric units, $V_s=\pi*(r^2)*L$ in mL, where r (r=D/2) and L are in cm. For Imperial units, $V_s=\pi*(r^2)*L*(2.54)^3$, where r and L are in inches

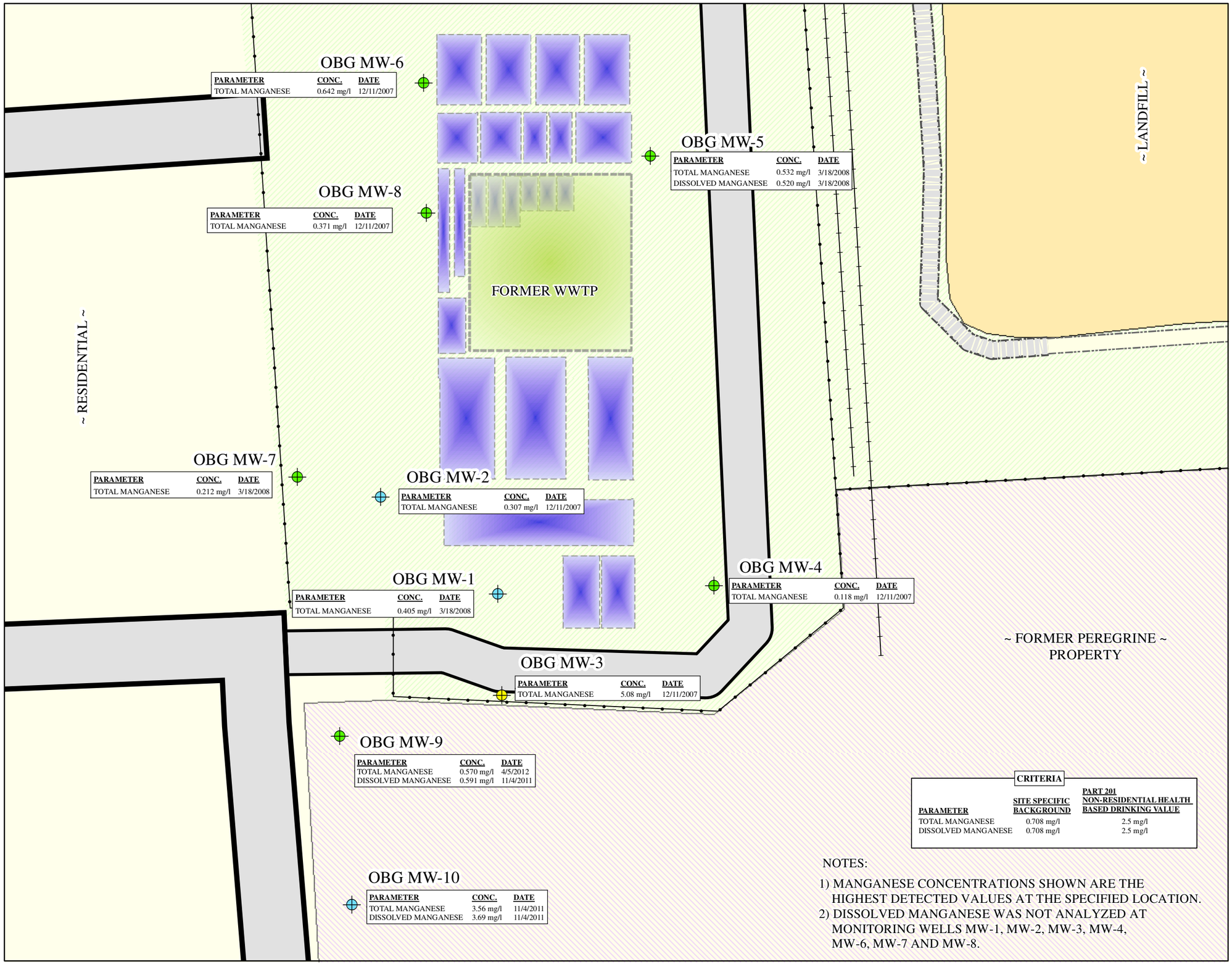
(3) The drawdown from the initial water level should not exceed 0.1 m (0.3 ft). The pumping rate should not exceed 600 mL/min.

(4) Purging will continue until stabilization is achieved or until 20 well screen volumes have been purged (unless purge water remains visually turbid and appears to be clearing, or unless stabilization parameters are varying slightly outside of the stabilization criteria and appear to be stabilizing), No. of Well Screen Volumes Purged= Vp/Vs.

(5) For conductivity, the average value of three readings <1 mS/cm ±0.005 mS/cm or where conductivity >1 mS/cm ±0.01 mS/cm.

# Attachment D

# FIGURE 7




N

## LEGEND

- FORMER WWTP BUILDING
- FORMER WWTP BASIN
- MONITORING WELL THAT DELINEATES MANGANESE BELOW THE SITE SPECIFIC BACKGROUNG VALUE
- ON-SITE MONITORING WELL WITH MANGANESE CONCENTRATION ABOVE CLEANUP CRITERIA
- MONITORING WELL

RACER TRUST
COLDWATER ROAD
FORMER WWTP
FLINT, MICHIGAN

## GROUNDWATER DELINEATION WELLS

0 15 30 60 90 120
Feet

NOVEMBER 2012
15388/48360-008

O'BRIEN & GERE ENGINEERS, INC.