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Peter Quackenbush
Hazardous Waste Section
Michigan Department of Environmental Quality
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PO Box 30242
Lansing, Michigan, 48909

Subject:
Lower 1,4-Dioxane Toe Investigation Work Plan
RACER Trust, Plant 2, Lansing, Michigan

Date:
Rev. November 19, 2015

Contact:
Patrick Curry

Phone:
810-225-1926

Email:
Patrick.Curry@arcadis.com

Our ref:
B0064479.2015

Dear Mr. Quackenbush:

This work plan has been prepared by Arcadis on behalf of the Revitalizing Auto Communities Environmental Response (RACER) Trust for Plant 2 located in Lansing, Michigan (Site). This work plan describes the field activities proposed to evaluate potential sources for the elevated 1,4-dioxane concentrations noted at well TW-14-02, located in the weathered bedrock near the southern toe of the lower 1,4-dioxane plume. Concentrations at this well are an order of magnitude higher than at other monitoring wells installed along the core of the plume.

This work will be completed in support of the corrective measures evaluation. The objectives of this study are as follows:

1. Further characterize the variability of 1,4-dioxane concentrations within the core of the lower 1,4-dioxane plume near TW-14-02.

2. Evaluate if an off-site source or the on-site perched plume is contributing to the lower plume.

3. Delineate the extent of 1,4-dioxane west of MW-13-42.

4. Verify continuity of the plume from north to south across Plant 2 between PW-14-02 and PW-14-01.

To accomplish these objectives, soil borings will be completed near well TW-14-02 at the toe of the lower 1,4-dioxane plume, near the Plant 2 LNAPL source area and west of well MW-13-42 and west of the Site along West Genesee Street. A monitoring well will be installed along the western property boundary to delineate the plume and act as a replacement for MW-13-42. A monitoring well will also be installed within the weathered bedrock adjacent to bedrock well MW-12-05. At each location, soil will be sampled at high resolution to evaluate vertical migration of 1,4-dioxane, if any. In addition, groundwater samples will be collected from the weathered bedrock zone to provide further resolution on the lower 1,4-dioxane plume.

LOWER 1,4-DIOXANE TOE INVESTIGATION SCOPE OF WORK

The lower 1,4-dioxane toe investigation scope of work was developed given the above objectives and the intended use of the data. The proposed soil boring and monitoring well location are depicted on Figure 1. The scope of work will include:

- Thirteen (13) soil borings will be completed through overburden into the weathered bedrock at several locations including at the toe of the plume, near the Plant 2 LNAPL, west of MW-13-42, and downgradient of Adams Plating. The following will be completed at each location:
    - Whole core soil sampling (WCSS) at nominal three foot intervals through the perched and vadose zone to bedrock.
    - In weathered bedrock, collect two vertical aquifer profile (VAP) samples; one near the weathered rock/overburden interface, and one from five (5) feet deeper into the weathered bedrock zone.
- One (1) weathered bedrock monitoring well adjacent to bedrock well MW-12-05 to establish continuity of the lower 1,4-dioxane plume from north to south. Due to the proximity of the bedrock well MW-12-05 VAP sampling will not be completed at this location, however, WCSS will be completed.
- One (1) additional weathered bedrock will be installed west of MW-13-42 to provide delineation and a replacement monitoring point to the west of the lower 1,4-dioxane plume. Both VAP and WCSS will be completed at this location.
- Soil and groundwater samples to be analyzed with an on-site mobile laboratory (Triad Environmental Services, Inc. [Triad]).

The proposed initial soil boring locations are included on Figure 1. For reference, Attachment 1 includes a figure illustrating soil and groundwater analytical data from relevant soil borings and monitoring wells.

Field Procedures and Activities

This section describes the activities proposed for the Site, which include utility clearance, field and analytical procedures, adaptive strategy, data management plan and waste handling.

Utility Clearance

Prior to advancing any borings, utility clearance will be completed for all proposed locations. Reliable lines of evidence that may be utilized in accordance with the site specific utility clearance plan include: Miss Dig call, client provided maps of utilities, visual site inspection, and/or hand clearing to a depth of 5 feet below grade.

Sonic Drilling

Soil borings will be advanced using rotary-sonic drilling methods. The addition of water will be avoided during drilling. Continuous soil cores will be obtained from the ground surface to the bedrock (up to 80 feet bgs) at each boring location. Arcadis will log and describe the overburden and bedrock in accordance with the Arcadis Soil Description Standard Operating Procedures included with the MDEQ approved Field Sampling Plan (FSP, Arcadis 2011). All borings will be screened at two foot intervals with a photo ionization detector (PID) suited for screening of volatile organic compounds (VOCs). Boring logs will be generated based on the field descriptions. In addition, VAP groundwater samples will be collected from two intervals within the weathered bedrock during boring advancement using temporary well materials.

The permanent monitoring wells will also be installed using rotary-sonic drilling methods. Soils will be logged as described above, prior to selecting the screened intervals and constructing the well within the borehole. The proposed well adjacent to MW-12-05 will be installed with dual-cased construction. An outer casing will be advanced through the perched zone and seated into the underlying glacial till (approximately 30-40 feet below grade). This outer 6 inch steel casing will be cemented in place and allowed to cure for a minimum of 24 hours. Once the outer casing is in place, the borehole will be advanced through the casing to the target depth within the weathered bedrock anticipated to be 70-75 feet below grade.

Wells will be installed within the upper 5 feet of the weathered bedrock zone and constructed with stainless steel wire-wrapped 0.010-slot screens and two inch PVC riser. An appropriate sand pack will be placed around the screen interval to a depth of 1 foot above the well screen followed by 1-2 feet of choker sand and then bentonite grout to

grade. Following installation, monitoring wells will be developed using a combination of purging and surging until free of fine grained material.

Soil Sampling

Each soil sample will be collected using a clean, disposable, gas-tight syringe in a manner consistent with United States Environmental Protection Agency (USEPA) Method 5035 sampling protocols. The subsamples will be extruded into individual laboratory prepared pre-weighed 40-milliliter (mL) vials containing distilled water. Each soil sample will be analyzed for 1,4-dioxane on-site by Triad. Splits of approximately 5% of the soil sample extracts will be submitted to Merit Laboratories for analysis of 1,4-dioxane (8260SIM) for comparison to the on-site laboratory results.

VAP Sampling

Groundwater samples will be collected into unpreserved 40-mL vials and analyzed for 1,4-dioxane on-site by Triad. Splits of approximately 5% of the groundwater samples will be submitted to Merit Laboratories for analysis of 1,4-dioxane (8260SIM) for comparison to the on-site laboratory results.

DSITMS Mobile Laboratory

Soil and groundwater samples will be provided to an on-site mobile laboratory, provided by Triad to perform rapid, on-site analyses of 1,4-dioxane. The 1,4-dioxane analysis method is based on solid phase micro extraction (SPME) followed by mass spectrometric analysis using the direct sampling ion trap mass spectrometer (DSITMS) (Triad, 2014). This method has been demonstrated to provide quantitative analysis of 1,4-dioxane to detection limits of 1-2 micrograms per liter (µg/L) for groundwater, and 5-8 micrograms per kilogram (µg/Kg) for soil samples. The sample production rate and detection limits will allow real-time field decision making within the proposed drilling program.

Data Management Plan

The following outlines the procedures that will be used to manage the data collected in the field.

Sample Designation System

The soil boring and sample naming convention will be consistent with those used during the RFI activities. The boring names will consist of boring type, area and grid location. Sample IDs will be as follows:

"SB"-"RFI AREA"-"GRID ID"_"SAMPLE DEPTH"

For example,

- A soil sample at boring SB-A5.2-NT111 at 35.5 feet below grade would be SB-A5.2-NT111_35.5
- A VAP sample at boring SB-A5.2-NT111 at 60-65 feet below grade would be SB-A5.2-NT111_60-65

Field Documentation

Field personnel will provide documentation covering all aspects of soil and groundwater sampling, recording of field screening results, and sample chain of custody (COC). This documentation will constitute a record that will allow reconstruction of field events to aid in the data review and interpretation process. All documents, records and information relating to the performance of the fieldwork including but not limited to daily field logs, sampling logs, COCs and field equipment calibration logs will be retained in the project file. Reporting

Following completion of the fieldwork, Arcadis will prepare a brief summary report outlining the results of the investigation. It is anticipated this memo can be completed within 4 to 6 weeks after receipt of the analytical results from Merit. The report will include a brief discussion and figures illustrating the results of the investigation, a summary table of the analytical results, and attachments including a comparison of the field results versus fixed lab results, laboratory analytical reports and any other relevant information.

Investigation Derived Waste (IDW) Handling

Liquid IDW will be placed in labeled and sealed 55-gallon steel drums and stored in a secured area. Liquid IDW will include water from decontamination of drilling tooling and purge water from VAP sampling and monitoring well development. Soil cuttings generated during drilling activities will be placed in a roll-off container and picked up from the Site, as necessary, during the course of the investigation. If possible, an existing waste profile will be used for waste profiling, otherwise composite samples will be collected from IDW for permitting purposes.

SCHEDULE

The tentative scheduled start date for the field activities is November 30, 2015, but is dependent upon the availability of the drilling firm and on-site lab. Note that the duration of the field event may vary based on the actual number of borings required to complete the characterization. The estimated range of the duration for this field event is 2 to 3 weeks.

If you have any questions regarding the scope of work described above, please contact Patrick Curry (Arcadis) at 810-225-1926 or Dave Favero (RACER Trust) at 734-879-9525.

Sincerely,

ARCADIS of Michigan, LLC

Patrick Curry, CPG
Senior Geologist

Copies:
Dave Favero, RACER Trust
File

Enclosures:

Figures

1 Lower 1,4-Dioxane Toe Investigation

Attachments

A-1 Summary of 1,4-Dioxane Source Area Impacts

MW-12-02
MW-14-63
APC MW-7D
APC MW-7S
APC MW-8S
APC MW-8D
APC MW-9D
APC MW-2D
APC MW-13S
APC MW-13D
APC MW-4D
APC MW-4S
P2-MW-03
TW-15-12
MW-13-44
TW-14-04
TW-15-13
TW-14-05
PW-14-02
MW-13-42
MW-13-45
P2-SB-20
APC MW-6D
APC MW-6S
APC MW-12S
APC MW-12D
APC MW-11S
APC MW-11D
MW-14-59
MW-14-58
MW-12-05
MW-14-57
MW-12-09
MW-14-56
MW-14-62
MW-14-55
MW-12-18
MW-14-54
TW-14-02
TW-14-01
PW-14-01
MW-12-01
MW-12-07
MW-13-51

0 110 220
SCALE IN FEET

LEGEND

- PERCHED MONITORING WELL
- LNAPL MONITORING WELL
- DEEP OVERBURDEN MONITORING WELL
- WEATHERED BEDROCK MONITORING WELL
- BEDROCK MONITORING WELL
- APPROXIMATE EXTENT LNAPL
- PERCHED 1,4-DIOXANE IMPACTS > PROPOSED DW CRITERIA (8.5 µg/L)
- LOWER 1,4-DIOXANE IMPACTS > PROPOSED DW CRITERIA (8.5 µg/L)
- PLANT 2
- PLANT 3
- PLANT 6

ADDITIONAL INVESTIGATION BORINGS

- PROPOSED WEATHERED BEDROCK WELL
- PROPOSED SOIL SAMPLING AND WEATHERED BEDROCK VAP SAMPLING

RACER TRUST
PLANTS 2, 3 & 6
LANSING, MICHIGAN

LOWER 1,4-DIOXANE TOE INVESTIGATION

ARCADIS Design & Consultancy for natural and built assets

FIGURE
1

CITY: Novi DIV: ENV DB: TRY PIC: PM: TM: TR: PROJECT NUMBER: COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
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ATTACHMENT 1

October 2014
APC MW-9D 15-20 ft bgs
1,4-Dioxane in GW - 910 ug/L

September 2015
MW-13-42 70-75 ft bgs
1,4-Dioxane in GW - 20 ug/L

September 2015
MW-13-42 71-76 ft bgs
1,4-Dioxane in GW - 8 ug/L

May 2012
P2-SB-24 5.5-6.5 ft bgs
111-TCA in soil - 11,900 ug/Kg

May 2012
SB-A5.2-NK132 30-32 ft bgs
1,4-Dioxane in GW - 2,500 ug/L

May 2012
SB-A5.2-NY92 1.6-2 ft bgs
111-TCA in soil - 8,530 ug/Kg

May 2012
VAP-A-5.2-OE129 18.5-19.5 ft bgs
1,4-Dioxane in GW - 2,200 ug/L

September 2015
MW-12-05 75-99 ft bgs
1,4-Dioxane in GW - 10 ug/L

May 2012
SB-A5.2-OC107A 8-9 ft bgs
111-TCA in soil - 52,000 ug/Kg

September 2015
TW-14-02 67-72 ft bgs
1,4-Dioxane in GW - 3,300 ug/L

APC MW-7D
APC MW-7S
APC MW-8S
APC MW-8D
APC MW-9D
APC MW-13D
APC MW-2D
APC MW-13S
APC MW-4D
APC MW-4S
APC MW-5D
APC MW-6D
APC MW-6S
APC MW-12S
APC MW-12D
APC MW-11S
APC MW-11D
P2-MW-01
P2-MW-03
P2-SB-20
P2-SB-03
TW-15-12
MW-13-44
TW-14-04
MW-13-43
TW-14-05
TW-15-13
MW-13-42
MW-13-45
PW-14-02
MW-14-58
MW-12-05
MW-14-60
MW-03-04
MW-02-01(6)
P2-MW-04
MW-03-07
MW-04-01(6)
MW-14-57
MW-14-56
MW-12-09
P2-SB-06
MW-14-62
MW-14-55
MW-12-18
MW-14-54
TW-14-02
PW-14-01
TW-14-01
MW-12-01
MW-12-07
MW-12-08
MW-13-51

LEGEND

- APC MONITORING WELL (PERCHED)
- DEEP OVERBURDEN MONITORING WELL
- WEATHERED BEDROCK MONITORING WELL
- BEDROCK MONITORING WELL
- PERCHED MONITORING WELL
- LNAPL MONITORING WELL
- DEEP VAP/HPT BORING
- LIF BORING
- OTHER SOIL BORING
- APPROXIMATE EXTENT LNAPL
- PERCHED 1,4-DIOXANE IMPACTS > PROPOSED DW CRITERIA (8.5 µg/L)
- LOWER 1,4-DIOXANE IMPACTS > PROPOSED DW CRITERIA (8.5 µg/L)
- APPROXIMATE PROPERTY BOUNDARY

0 150 300
SCALE IN FEET

RACER TRUST
PLANTS 2, 3 & 6
LANSING, MICHIGAN

SUMMARY OF 1,4-DIOXANE SOURCE AREA IMPACTS

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A-1

CITY: Novi DIV: ENV DB: TRY PIC: PM: TM: TR: PROJECT NUMBER: COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
G:\GIS\Project Files\MotorsLiquidationCompany\Lansing\Docsworking\Toe Investigation WP Summary 110515.mxd PLOTTED: 11/5/2015 1:39:51 PM BY: pcurry