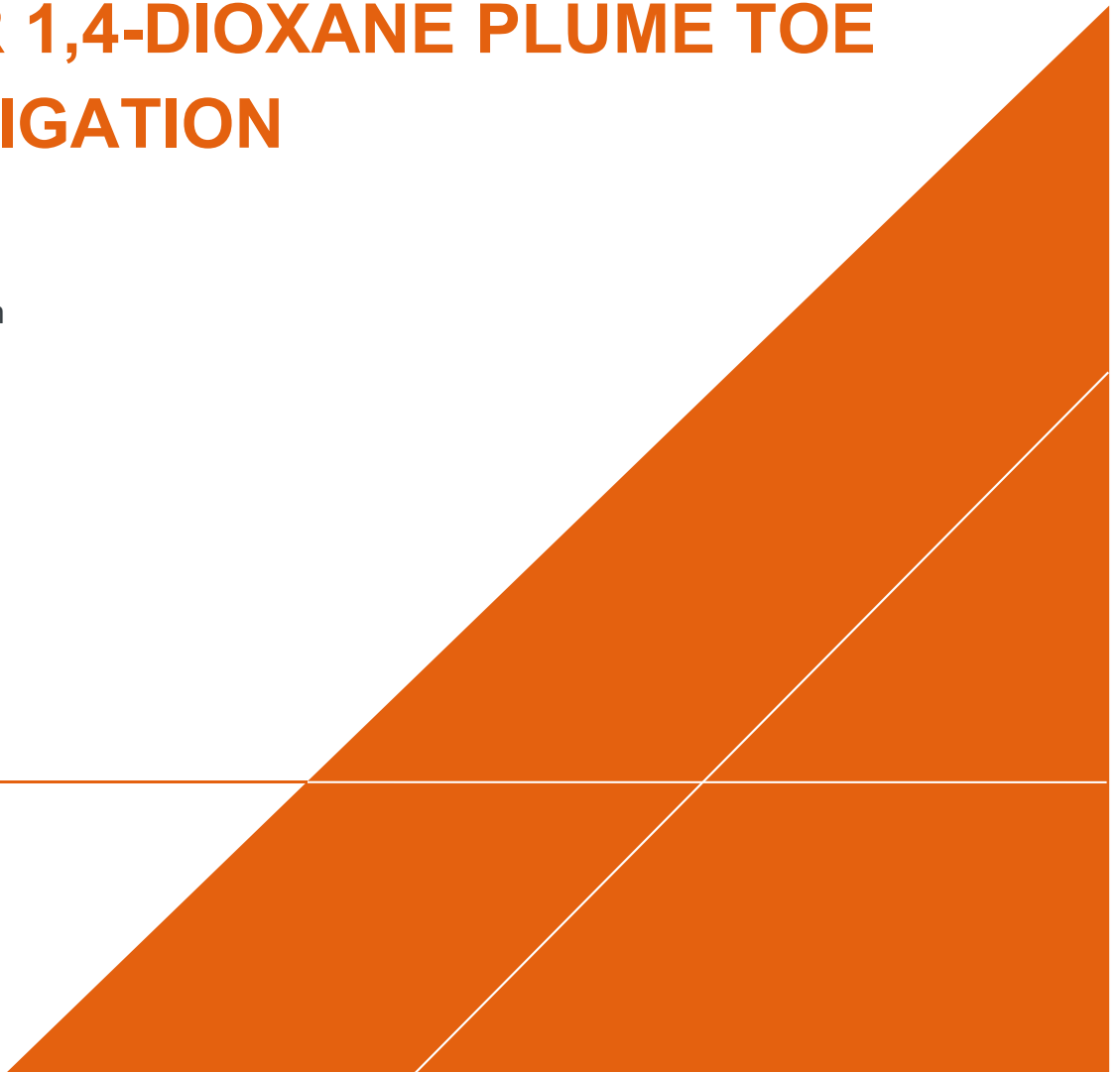


Revitalizing Auto Communities Environmental Response (RACER) Trust

LOWER 1,4-DIOXANE PLUME TOE INVESTIGATION

Plant 2
Lansing, Michigan

March 11, 2016



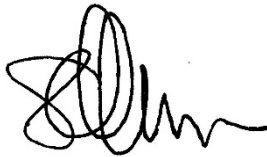
LOWER 1,4-DIOXANE PLUME TOE INVESTIGATION

Plant 2

Lansing, Michigan



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- A Boring Logs
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- C Analytical Comparison Tables and Graphs
- D Merit Laboratories Analytical Reports

1 INTRODUCTION

Arcadis has prepared this Lower 1,4-Dioxane Toe Investigation summary report on behalf of the Revitalizing Auto Communities Environmental Response (RACER) Trust in cooperation with the Michigan Department of Environmental Quality (MDEQ) for Plant 2 located in Lansing, Michigan. This report describes activities conducted to further evaluate potential sources for the elevated 1,4-dioxane concentration noted at well TW-14-02, located in the weathered bedrock zone near the southern toe of the lower 1,4-dioxane plume. Concentrations at this well are an order of magnitude higher than those at other monitoring wells installed along the core of the plume.

Work completed was consistent with the scope described in the Lower 1,4-Dioxane Toe Investigation Work Plan (Work Plan; Arcadis 2015a) provided to the MDEQ on November 19, 2015. The location of the investigation area and an overview of the groundwater impacts associated with 1,4-dioxane are presented as Figure 1. The soil borings completed as part of this investigation are provided on Figure 2. The specific objectives of this investigation were 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 the on-site perched light non-aqueous phase liquid (LNAPL) area on Plant 2, or potentially an off-site source, is contributing to the lower 1,4-dioxane plume.
3. Delineate the extent of 1,4-dioxane in weathered bedrock west of MW-13-42 near the Plant 2 property boundary.
4. Verify continuity of the plume from north to south at Plant 2 between the test well areas associated with PW-14-02 and PW-14-01.

2 FIELD ACTIVITIES

Investigation activities were completed from November 30 to December 10, 2015. Soil borings and monitoring wells were completed using sonic drilling techniques. The soil boring and monitoring well locations are shown on Figure 2. The boring logs are included as Appendix A.

At each location, soil was sampled at high resolution to evaluate the potential for vertical migration of 1,4-dioxane. In addition, groundwater samples were collected from the weathered bedrock zone to provide further resolution on the lower 1,4-dioxane plume extent and variability. The completed scope of work includes the following:

- Fifteen soil borings were advanced through overburden into the weathered bedrock: four at the toe of the plume, seven near the Plant 2 LNAPL area, one adjacent to bedrock well MW-12-05, and three to the west of MW-13-42 and downgradient of Adams Plating. At each location the following was completed:
 - Whole core soil sampling (WCSS) at nominal 3- to 4-foot intervals through the perched and vadose zone to bedrock.

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- In weathered bedrock, two vertical aquifer profile (VAP) groundwater samples were collected: one near the overburden/weathered rock interface, and one from 5 feet deeper into the weathered bedrock zone.
- Soil and groundwater samples collected at each boring were analyzed on site for 1,4-dioxane by Triad Environmental Solutions (Triad ES) using the direct ion trap mass spectrometry (DSITMS) analytical method (U.S. Environmental Protection Agency [USEPA] Method 8265).
- One of the soil borings was completed as a weathered bedrock monitoring well (MW-15-72) adjacent to bedrock well MW-12-05 to establish continuity of the lower 1,4-dioxane plume from north to south. This boring/well was double cased. The outer casing was first cemented into the glacial till at a depth of approximately 30 feet below ground surface (ft bgs). After sufficient time for the cement to cure, the boring was continued to bedrock. Due to the proximity of bedrock well MW-12-05, only one VAP sample was collected at this location. Monitoring well MW-15-72 was then constructed within the borehole.
- One of the soil borings was completed as weathered bedrock monitoring well MW-15-73 west of MW-13-42 to delineate the western extent of the lower 1,4-dioxane plume, and to act as a replacement monitoring well for MW-13-42. Well MW-13-42 was installed slightly shallow and decreasing water levels, as well as increasing concentrations of 1,4-dioxane (from <5 to 20 micrograms per liter [µg/L]), have been observed in the well over time.

2.1 Mobile Lab

The Triad ES 1,4-dioxane analysis method is based on solid-phase micro extraction followed by analysis using the DSITMS with USEPA Method 8265 (Triad ES 2014). Tables 1 and 2 summarize DSITMS analytical data collected during this event. Appendix B includes DSITMS quality assurance/quality control sample results. Select split samples were also submitted to an off-site laboratory – Merit Analytical Laboratory (Merit) in Lansing, Michigan – for gas chromatography-mass spectrometry (USEPA Method 8260) comparison to the DSITMS data. Appendix C includes a comparison of the DSITMS results to the Merit results.

Hydrocarbon impacts were identified qualitatively by the DSITMS near the perched LNAPL area. The presence of the hydrocarbons in these samples interfered with the DSITMS analysis of 1,4-dioxane. Based on these observations, select samples with suspected hydrocarbon impacts were submitted to Merit for compound identification and quantitative analysis. The compounds detected in these samples are summarized in Table 3. Appendix D includes the Merit analytical reports for the split samples and the hydrocarbon identification samples.

3 RESULTS

This section summarizes the results of the lower 1,4-dioxane toe investigation. Plant 2 geology and hydrogeology are discussed first, followed by a summary of the distribution of 1,4-dioxane in soil and groundwater.

3.1 Geology and Hydrogeology

The following provides a brief description of the hydrogeologic setting of the lower 1,4-dioxane plume. Additional details, including numerous cross-sections and output from the three-dimensional model, are available as part of the RCRA Facilities Investigation (RFI) Phase 2 Reports (Arcadis 2013, 2014a) and the Lower 1,4-Dioxane Source Evaluation Report (Arcadis 2014b). Figures 3, 4, and 5 include conceptual cross-sections illustrating the geology in the investigation area.

3.1.1 Stratigraphy

The complex sedimentary environment present at Plant 2 includes a thick sequence of glaciofluvial and glacial till sediments consisting predominantly of clays and silts, with discontinuous layers of sand, silty sand, and occasional gravel. Consistent with the findings of the RFI, the geology of the area investigated as part of the lower 1,4-dioxane toe investigation can be divided into six general hydrostratigraphic units (from shallow to deep):

- **Shallow Fill (~0-5 feet ft bgs):** Fill that was placed as part of construction – generally poorly sorted clay/silt/sand/gravel.
- **Interbedded Zone (~5-30 ft bgs):** Consists of predominantly clay with interbedded silt and fine sand seams. The silts and sands are typically saturated below 6 feet.
- **Glacial Till (~30-45 ft bgs):** Can vary in thickness, but typically dense and dry, and separates the perched zone from the deep overburden vadose zone.
- **Deep Overburden (dry) (~45-65 ft bgs):** At Plant 2, the deep overburden consists of dry interbedded sand, silt, and glacial tills between the glacial till and deeper saturated weathered bedrock.
- **Weathered Bedrock (~65-80 ft bgs):** In the northern portion of Plant 2, the zone consists of the higher permeability weathered sandstone of the Grand River Formation and transitions in the north-central portion of Plant 2 to the interbedded shale and fine sandstone of the Saginaw Formation. The weathered zone is gradational, varies in thickness, and transitions vertically to more consolidated bedrock.
- **Bedrock:** In the northern portion of Plant 2 the bedrock consists of the Grand River Formation consisting of fine to medium grained sandstone. The Grand River Formation occupies erosional valleys within the Saginaw Formation, which consists of interbedded shale and fine grained sandstone. The contact between the two formations occurs in the north-western portion of Plant 2 with the Grand River Formation located to the northwest, and the Saginaw Formation present to the southeast. All borings completed during this evaluation encountered Saginaw Formation with the exception of borings SB-P2-ML33 and SB-P2-MM43, located on West Genesee Street. The bedrock description at these locations is consistent with Grand River Formation.

At Plant 2 the 1,4-dioxane impacts are encountered in two distinct water-bearing zones:

1. **Perched Zone (~5-30 ft bgs)** – Consists of predominantly clay with interbedded silt and fine sand zones. The more permeable zones are typically saturated below 5 feet and generally limited in extent and connectivity. The interbedded stratigraphy within the perched zone creates variable vertical and horizontal groundwater gradients that make groundwater flow direction difficult to determine. Based

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on the extent of the perched groundwater impacts, flow away from the Plant 2 LNAPL area appears radial initially, but easterly overall.

2. **Weathered Bedrock (~65-80 ft bgs):** In the lower zone the groundwater is encountered at approximately 65 to 70 feet below grade. The bedrock surface is deeper at Plant 3 with an area of saturated deep overburden, consisting primarily of interbedded silt and fine sand, near the lower 1,4-dioxane source area (Arcadis 2014b). The lower 1,4-dioxane plume migrates from the Plant 3 source area to the south-southeast. Bedrock becomes shallower to the south, and at Plant 2, the lower 1,4-dioxane plume migrates within the weathered bedrock zone. The bedrock is capped with a low permeability glacial till that creates semi-confined conditions within the weathered bedrock over much of Plant 2.

The cross-sections provided as Figures 3, 4, and 5 include the specific soil descriptions at each boring and a generalized two-category (color) interpolation of the hydrostratigraphy. The two-category hydrostratigraphy is based on permeability; “more permeable” generally includes gravel, sand, and sandy silt, and “less permeable” includes the silt, clay, and clay mixes (glacial till). Also indicated on the cross-sections are the general water-bearing zones as described above.

3.1.2 Correlation of Fixed and Mobile Laboratory Results

A subset of the soil and groundwater samples analyzed on site for 1,4-dioxane by DSITMS was also analyzed off site at Merit Laboratories using USEPA Method 8260 SIM. Appendix C includes a comparison of the DSITMS results to the off-site laboratory analysis.

The analytical comparison indicates that DSITMS is a reliable indicator of 1,4-dioxane in soil and groundwater. The DSITMS groundwater results exhibit acceptable agreement with the off-site analysis but in general, are biased low by approximately 30 to 50%. In addition, the detection limit for 1,4-dioxane using DSITMS was elevated to about 20 µg/L in groundwater during this investigation. Groundwater results included on Figures 3, 4, and 5 include the Method 8260 SIM results when available.

The DSITMS soil results also exhibit acceptable agreement with the Method 8260 SIM results, but have a greater bias low than the groundwater results. The comparisons included in Appendix C show that the soil results are biased low by an average factor of three to four. The source of the bias in the soil results is unclear, though it appears to be associated with the solid-phase micro extraction method used for the DSITMS 1,4-dioxane soil analyses. The detection limit for 1,4-dioxane in soil using DSITMS ranged from 20 to 48 micrograms per kilogram (µg/kg) during this investigation.

Overall, the comparisons indicate the DSITMS 1,4-dioxane data are of sufficient quality to support the objectives of this evaluation. To be consistent with Table 1, the soil data posted on the cross-sections (Figures 3, 4, and 5) include the DSITMS results for soil. Note, however, that these results would likely be higher by a factor of three to four if analyzed by a fixed laboratory employing standard Method 8260 SIM.

3.2 1,4-Dioxane in Soil and Groundwater

The following sections summarize the key observations from review of the 1,4-dioxane sampling results. Soil and groundwater analytical data are included on Figures 3 through 6 and summarized in Tables 1 and 2.

3.2.1 Lower-1,4-Dioxane Plume near TW-14-02

A total of four borings were completed to the east and west of TW-14-02. There were six soil samples with detected 1,4-dioxane concentrations shallower than the weathered bedrock. These samples were from the two borings east of TW-14-02 and contained 1,4-dioxane concentrations ranging from 26 to 55 µg/kg. Results from these three borings are included cross-section A-A' included as Figure 3. These results indicate that limited downward migration of 1,4-dioxane occurs in the area immediately around well TW-14-02.

The groundwater results from the VAP sampling show that the occurrence of 1,4-dioxane is highly variable in the core of the lower plume, with concentrations ranging from 16 µg/L to as high as 1,230 µg/L, in addition to the 2,500 µg/L detected at TW-14-02. The bedrock at the eastern-most boring (SB-A5.3-PA107) was composed primarily of shale and groundwater samples could not be collected due to the low permeability. In addition, consistent with the conclusions of the *Lower 1,4-Dioxane Tracer Study and In-situ Chemical Oxidation (ISCO) Injection Pilot Test* (Arcadis 2016), 1,4-dioxane may be stored in the less permeable zones of bedrock along the lower plume.

Although the soil sampling completed in this area does not suggest a direct connection to the overlying perched groundwater impacts, contribution of 1,4-dioxane from the perched zone may occur further upgradient as outlined below. The occurrence of elevated concentrations of 1,4-dioxane at TW-14-02 could also be associated with mass released at the Plant 3 source area early in the development of the lower plume that has since migrated to the present location.

3.2.2 Perched 1,4-Dioxane and the Plant 2 LNAPL Area

Eight boring locations were completed in the vicinity of the Plant 2 LNAPL: six along the south side of the Plant 2 LNAPL, one on the north side of the LNAPL, and one adjacent to MW-12-05. Cross-section B-B' (Figure 4) includes the soil and groundwater results for this area. Shallow soil samples from the south side of the LNAPL contained 1,4-dioxane at concentrations up to 2,827 µg/kg by DSITMS. A split sample from this interval analyzed by Merit indicated a 1,4-dioxane concentration of 6,538 µg/kg. In addition, 1,4-dioxane extends through the confining till layer and into the vadose zone at several of the boring locations south of the perched LNAPL.

The highest concentrations of 1,4-dioxane in groundwater within the lower plume are in line with the core of the plume as it migrates south from Plant 3. However, VAP samples collected south of the Plant 2 LNAPL indicate concentrations up to 105 µg/L (SB-A5.2-OG124) east of the axis of the lower 1,4-dioxane plume core that may be attributed in part to leakage from the perched zone.

Select samples from two locations within the perched plume with suspected hydrocarbon impacts were submitted to Merit for compound identification and quantitative analysis. The soil samples from the

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perched zone contained chloroethanes, chloromethanes, and chloroethenes. These results are consistent with previous samples collected from near the LNAPL area.

3.2.3 Contribution from Former Adams Plating

Three borings were completed downgradient of the former Adams Plating Company (APC) facility at the western property boundary (MW-15-73) and continuing west along West Genesee Street (SB-P2-ML33, SB-P2-MM43). Results from these three borings are illustrated on cross-section C-C' (Figure 5). Soil samples from the surface to weathered bedrock did not contain 1,4-dioxane at concentrations higher than the DSITMS detection limit. Due to the elevated detection limits with DSITMS, the groundwater samples collected along this transect were all run at Merit using Method 8260 SIM. The results show low concentrations at the Plant 2 property boundary at MW-15-73, increasing concentrations at boring SB-P2-MM43 along W. Genesee St, and decreasing concentrations at SB-P2-ML33 further to the west.

The groundwater samples from these locations suggest that the former APC facility may contribute low concentrations of 1,4-dioxane to the weathered bedrock that migrates in a southerly direction parallel to the flow direction at the RACER property.

The VAP data collected as part of the lower 1,4-dioxane toe investigation is summarized on Figure 6. Figure 6 includes an apparent extent of the APC perched plume based on the October 2014 sampling data, as well as a hypothetical weathered bedrock plume based on VAP results along West Genesee Street.

3.2.4 Installation of Additional Monitoring Wells

Two additional monitoring wells were installed during the investigation. Well MW-15-72 was installed adjacent to bedrock well MW-12-05 to verify the continuity of the plume in the weathered bedrock from north to south across Plant 2. Well MW-15-73 was installed along the western property boundary, east of well MW-13-42, to act as a replacement well for MW-13-42 and delineate the western edge of the lower 1,4-dioxane plume. Both wells are shown on Figures 2 and 3.

Initial sampling of well MW-15-72 identified a concentration of 1,4-dioxane generally consistent with other wells along the core of the lower 1,4-dioxane plume and verifies the continuity of the plume from north to south across Plant 2. Sampling of well MW-15-73 identified 1,4-dioxane at concentrations less than 8.5 µg/L and provides a new monitoring point along the western property boundary.

4 CONCLUSIONS

The lower 1,4-dioxane toe investigation consisted of 15 soil borings completed from November 30 to December 10, 2015. Soil was sampled at high resolution to evaluate the potential for vertical migration of 1,4-dioxane, and groundwater samples were collected from the weathered bedrock zone to provide further resolution on the lower 1,4-dioxane plume extent and variability. Based on the results of the investigation, Arcadis offers the following conclusions:

- The weathered bedrock in the Plant 2 study area is a heavily interbedded shale and sandstone. This heterogeneity, coupled with varying degrees of weathering, creates a complex zone of migration for the lower 1,4-dioxane plume. The distribution of 1,4-dioxane across the toe of the plume, as well as

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elsewhere along the plume when characterized (e.g., Arcadis 2014a, 2014b, 2016), indicates a variable relatively high concentration core surrounded by a lower concentration diffuse halo.

- The source of the elevated 1,4-dioxane at well TW-14-02 is unclear. Soil sampling of the perched zone and deep overburden at this location does not suggest a direct connection to overlying perched groundwater impacts located to the north, although it is possible that contribution of 1,4-dioxane from the perched zone occurs further upgradient. Elevated 1,4-dioxane at TW-14-02 could also be associated with mass released early in the development of the plume that migrated to the present location from Plant 3.
- Continuous soil samples collected through the overburden near the Plant 2 LNAPL show that 1,4-dioxane impacts extend through the perched zone, confining glacial till layer, and into the dry deep overburden at several locations. Although the highest concentrations of 1,4-dioxane in groundwater still appear to be in line with the core of the plume as it migrates south from the Plant 3 source area, VAP samples indicate east of axis concentrations up to 105 µg/L that may be attributed, in part, to leakage from the perched zone.
- VAP sampling completed downgradient of the former Adams Plating Company (APC) suggest that the facility may contribute 1,4-dioxane to the weathered bedrock zone and potentially impact the west side of the Plant 2 property.
- Initial sampling of well MW-15-72, installed adjacent to bedrock well MW-12-05 along the core of the plume, indicates a concentration of 1,4-dioxane generally consistent with other wells along the core and verifies the continuity of the plume from north to south across Plant 2.
- Initial sampling of well MW-15-73, replacement well for MW-13-42 along the western Plant 2 property boundary, identified 1,4-dioxane at concentrations less than 8.5 µg/L. This well bounds the lower 1,4-dioxane plume to the west.

5 NEXT STEPS

The extent to which the perched zone at Plant 2 contributes 1,4-dioxane to the weathered bedrock is a key factor to understand prior to remedy selection. The contribution of 1,4-dioxane from the perched zone to the lower zone could affect remedy considerations for both the Plant 2 LNAPL and the lower 1,4-dioxane plume. The results of the investigation outlined above, coupled with the weathered bedrock hydraulic testing completed in 2014 (Arcadis 2015b) and the tracer study and chemical oxidation pilot testing completed in fall 2015 (Arcadis 2016), all suggest that remediation of the lower 1,4-dioxane plume will be challenging.

Additional data will be required to both better understand the implications for leakage from the perched zone and provide a more robust monitoring network, particularly to the southeast and southwest of the Plant 2 LNAPL area. Additional work considered includes collecting data to better understand the following:

- Magnitude and potential influence of 1,4-dioxane migration from the Plant 2 LNAPL area to weathered bedrock, including identifying the main areas of vertical flux, if possible.

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- Verification of the extent of the lower 1,4-dioxane plume. Although VAP work in 2013 delineated the extent of the lower 1,4-dioxane plume, additional work is needed to evaluate potential expansion of the plume and evaluate potential migration of impacts southeast of the Plant 2 LNAPL area.
- Extent of weathered bedrock impacts associated with the former APC facility. Although downgradient impacts associated with APC are below current criteria, additional data may be required to verify weathered bedrock impacts associated with this facility.

Arcadis will provide a work plan to the MDEQ that outlines the scope and objectives for potential additional work in second quarter 2016.

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TABLES



Table 1
DSITMS USEPA Method 8265 Soil Analytical Results
Lower 1,4-Dioxane Toe Investigation
Plants 2,3, and 6 Industrial Land
Lansing, Michigan

Sample Name	Depth (feet)	Date Sampled	1,4-Dioxane (µg/kg)
MW-15-72_2.0	2	12/01/15	<44.9
MW-15-72_5.0	5	12/01/15	<44.9
MW-15-72_8.0	8	12/01/15	<44.9
MW-15-72_9.5	9.5	12/01/15	<44.9
MW-15-72_10.5	10.5	12/01/15	<44.9
MW-15-72_12.5	12.5	12/01/15	<44.9
MW-15-72_16	16	12/01/15	NA
MW-15-72_18	18	12/01/15	NA
MW-15-72_21	21	12/01/15	<44.4
MW-15-72_23	23	12/01/15	<44.4
MW-15-72_24.5	24.5	12/01/15	<44.4
MW-15-72_26	26	12/01/15	<44.4
MW-15-72_29	29	12/01/15	<44.4
MW-15-72_30	30	12/03/15	<47.6
MW-15-72_33	33	12/03/15	<47.6
MW-15-72_36	36	12/03/15	<47.6
MW-15-72_39	39	12/03/15	<47.6
MW-15-72_42	42	12/03/15	<47.6
MW-15-72_44	44	12/03/15	<47.6
MW-15-72_46.5	46.5	12/03/15	<47.6
MW-15-72_49.5	49.5	12/03/15	<47.6
MW-15-72_52.5	52.5	12/03/15	<47.6
MW-15-72_55.5	55.5	12/03/15	<47.8
MW-15-72_58.5	58.5	12/03/15	<47.6
MW-15-72_61.5	61.5	12/03/15	<47.6
MW-15-72_64	64	12/03/15	49.6
MW-15-72_67.5	67.5	12/03/15	<47.6
MW-15-73_2	2	12/02/15	<44.4
MW-15-73_5	5	12/02/15	<44.4
MW-15-73_8	8	12/02/15	NA
MW-15-73_10.5	10.5	12/02/15	NA
MW-15-73_11.5	11.5	12/02/15	<44.4
MW-15-73_14.5	14.5	12/02/15	<44.4
MW-15-73_16.5	16.5	12/02/15	<44.4
MW-15-73_17.5	17.5	12/02/15	<44.4
MW-15-73_18.5	18.5	12/02/15	<44.4
MW-15-73_21.5	21.5	12/02/15	<44.4
MW-15-73_24.5	24.5	12/02/15	<44.4
MW-15-73_27.5	27.5	12/02/15	<44.4
MW-15-73_29	29	12/02/15	<44.4
MW-15-73_29.5	29.5	12/02/15	<44.4
MW-15-73_31	31	12/02/15	<44.4
MW-15-73_31.5	31.5	12/02/15	<44.4
MW-15-73_34.5	34.5	12/02/15	<47.6
MW-15-73_34.5 (replicate)	34.5	12/02/15	<42.9
MW-15-73_36.5	36.5	12/02/15	<47.6
MW-15-73_39.5	39.5	12/02/15	<47.8
MW-15-73_42.5	42.5	12/02/15	<47.6

Table 1
DSITMS USEPA Method 8265 Soil Analytical Results
Lower 1,4-Dioxane Toe Investigation
Plants 2,3, and 6 Industrial Land
Lansing, Michigan

Sample Name	Depth (feet)	Date Sampled	1,4-Dioxane (µg/kg)
MW-15-73_45.5	45.5	12/02/15	<47.8
MW-15-73_47.5	47.5	12/02/15	<47.6
MW-15-73_48.5	48.5	12/02/15	<47.8
MW-15-73_51.5	51.5	12/02/15	<47.8
MW-15-73_52.5	52.5	12/02/15	<47.6
MW-15-73_55.5	55.5	12/02/15	<47.6
MW-15-73_58.5	58.5	12/02/15	<47.6
MW-15-73_61.5	61.5	12/02/15	<47.6
MW-15-73_64.5	64.5	12/02/15	<47.6
MW-15-73_67.5	67.5	12/02/15	<47.6
MW-15-73_70.5	70.5	12/02/15	<47.6
MW-15-73_73.5	73.5	12/02/15	<47.6
MW-15-73_76.5	76.5	12/02/15	<47.6
SB-A5.2-NK132_2	2	12/09/15	<44.5
SB-A5.2-NK132_6	6	12/09/15	<44.5
SB-A5.2-NK132_10	10	12/09/15	<44.5
SB-A5.2-NK132_14	14	12/09/15	<44.5
SB-A5.2-NK132_18	18	12/09/15	<44.5
SB-A5.2-NK132_22	22	12/09/15	<44.5
SB-A5.2-NK132_26	26	12/09/15	<44.5
SB-A5.2-NK132_30	30	12/10/15	<44.5
SB-A5.2-NK132_34	34	12/10/15	<44.5
SB-A5.2-NK132_38	38	12/10/15	<44.5
SB-A5.2-NK132_42	42	12/10/15	<44.5
SB-A5.2-NK132_46	46	12/10/15	<44.5
SB-A5.2-NK132_50	50	12/10/15	<44.5
SB-A5.2-NK132_54	54	12/10/15	<44.5
SB-A5.2-NK132_58	58	12/10/15	<44.5
SB-A5.2-NK132_62	62	12/10/15	<44.5
SB-A5.2-NK132_65	65	12/10/15	<44.5
SB-A5.2-NK132_69	69	12/10/15	<44.5
SB-A5.2-OC91_2	2	12/04/15	491 E
SB-A5.2-OC91_2 (replicate)	2	12/04/15	213.1
SB-A5.2-OC91_5	5	12/04/15	177.4
SB-A5.2-OC91_5 (replicate)	5	12/04/15	119.8
SB-A5.2-OC91_8	8	12/04/15	299 E
SB-A5.2-OC91_8 (replicate)	8	12/04/15	273.9
SB-A5.2-OC91_9.5	9.5	12/04/15	261 E
SB-A5.2-OC91_9.5 (replicate)	9.5	12/04/15	73.4
SB-A5.2-OC91_10	10	12/04/15	302 E
SB-A5.2-OC91_10 (replicate)	10	12/04/15	110.0
SB-A5.2-OC91_13.5	13.5	12/04/15	46.5 J
SB-A5.2-OC91_15.5	15.5	12/04/15	<47.8
SB-A5.2-OC91_16.5	16.5	12/04/15	<47.8
SB-A5.2-OC91_19.5	19.5	12/04/15	<47.8
SB-A5.2-OC91_22.5	22.5	12/04/15	<47.8
SB-A5.2-OC91_25.5	25.5	12/04/15	114.9
SB-A5.2-OC91_28.5	28.5	12/04/15	<47.8

Table 1
DSITMS USEPA Method 8265 Soil Analytical Results
Lower 1,4-Dioxane Toe Investigation
Plants 2,3, and 6 Industrial Land
Lansing, Michigan

Sample Name	Depth (feet)	Date Sampled	1,4-Dioxane (µg/kg)
SB-A5.2-OC91_31.5	31.5	12/04/15	78.4
SB-A5.2-OC91_31.5 (replicate)	31.5	12/04/15	<42.9
SB-A5.2-OC91_34.5	34.5	12/04/15	<47.8
SB-A5.2-OC91_37	37	12/04/15	<47.8
SB-A5.2-OC91_40	40	12/04/15	44.7 J
SB-A5.2-OC91_43	43	12/04/15	<47.8
SB-A5.2-OC91_46	46	12/04/15	<47.8
SB-A5.2-OC91_48	48	12/04/15	<47.8
SB-A5.2-OC91_51	51	12/04/15	25.1 J
SB-A5.2-OC91_54	54	12/04/15	46.0 J
SB-A5.2-OC91_57	57	12/04/15	40.7 J
SB-A5.2-OC91_60	60	12/04/15	51.4
SB-A5.2-OC91_62	62	12/04/15	<47.8
SB-A5.2-OC94_1.5	1.5	12/07/15	<22.1
SB-A5.2-OC94_4.5	4.5	12/07/15	39.7
SB-A5.2-OC94_7.5	7.5	12/07/15	33.3
SB-A5.2-OC94_10.5	10.5	12/07/15	<22.1
SB-A5.2-OC94_13	13	12/07/15	<22.1
SB-A5.2-OC94_13.5	13.5	12/07/15	21.1 J
SB-A5.2-OC94_16	16	12/07/15	<22.1
SB-A5.2-OC94_16.5	16.5	12/07/15	<22.1
SB-A5.2-OC94_19.5	19.5	12/07/15	9.5 J
SB-A5.2-OC94_22.5	22.5	12/07/15	47.8
SB-A5.2-OC94_25.5	25.5	12/07/15	42.4
SB-A5.2-OC94_28.5	28.5	12/07/15	56.6
SB-A5.2-OC94_31.5	31.5	12/07/15	51.1
SB-A5.2-OC94_34	34	12/07/15	31.2
SB-A5.2-OC94_37	37	12/07/15	<22.1
SB-A5.2-OC94_38	38	12/07/15	56.9
SB-A5.2-OC94_41	41	12/07/15	31.9
SB-A5.2-OC94_44	44	12/07/15	<22.1
SB-A5.2-OC94_47	47	12/07/15	<22.1
SB-A5.2-OC94_50	50	12/07/15	<22.1
SB-A5.2-OC94_50 (replicate)	50	12/07/15	<42.9
SB-A5.2-OC94_53	53	12/07/15	<22.1
SB-A5.2-OC94_58	58	12/07/15	<22.1
SB-A5.2-OC94_59	59	12/07/15	<22.1
SB-A5.2-OC94_61	61	12/07/15	<22.1
SB-A5.2-OC94_64	64	12/07/15	<22.1
SB-A5.2-OE113_2.5	2.5	12/08/15	<42.9
SB-A5.2-OE113_5.5	5.5	12/08/15	<42.9
SB-A5.2-OE113_8.5	8.5	12/08/15	2.4
SB-A5.2-OE113_11.5	11.5	12/08/15	4.0
SB-A5.2-OE113_14.5	14.5	12/08/15	27.6
SB-A5.2-OE113_17.5	17.5	12/08/15	<42.9
SB-A5.2-OE113_20.5	20.5	12/08/15	60.2
SB-A5.2-OE113_22.5	22.5	12/08/15	40.1
SB-A5.2-OE113_25.5	25.5	12/08/15	18.5

Table 1
DSITMS USEPA Method 8265 Soil Analytical Results
Lower 1,4-Dioxane Toe Investigation
Plants 2,3, and 6 Industrial Land
Lansing, Michigan

Sample Name	Depth (feet)	Date Sampled	1,4-Dioxane (µg/kg)
SB-A5.2-OE113_28.5	28.5	12/08/15	41.4
SB-A5.2-OE113_31.5	31.5	12/08/15	177.8
SB-A5.2-OE113_34.5	34.5	12/08/15	178.7
SB-A5.2-OE113_37	37	12/08/15	7.3
SB-A5.2-OE113_38	38	12/08/15	65.7
SB-A5.2-OE113_41	41	12/08/15	104.6
SB-A5.2-OE113_44	44	12/08/15	116.6
SB-A5.2-OE113_47	47	12/08/15	56.6
SB-A5.2-OE113_50	50	12/08/15	<44.5
SB-A5.2-OE113_53	53	12/08/15	<44.5
SB-A5.2-OE113_56	56	12/08/15	<44.5
SB-A5.2-OE113_58	58	12/08/15	<44.5
SB-A5.2-OE113_61	61	12/08/15	<44.5
SB-A5.2-OE113_64	64	12/08/15	<44.5
SB-A5.2-OE113_67	67	12/08/15	<44.5
SB-A5.2-OF107_1	1	12/07/15	<20.0
SB-A5.2-OF107_4	4	12/07/15	<20.0
SB-A5.2-OF107_7	7	12/07/15	<20.0
SB-A5.2-OF107_10	10	12/07/15	<20.0
SB-A5.2-OF107_14	14	12/07/15	NA
SB-A5.2-OF107_17.5	17.5	12/07/15	<20.0
SB-A5.2-OF107_21	21	12/07/15	28.4 J
SB-A5.2-OF107_24	24	12/07/15	<40.9
SB-A5.2-OF107_27	27	12/07/15	<40.9
SB-A5.2-OF107_29	29	12/07/15	<40.9
SB-A5.2-OF107_32	32	12/07/15	<40.9
SB-A5.2-OF107_35	35	12/07/15	<40.9
SB-A5.2-OF107_38	38	12/07/15	<40.9
SB-A5.2-OF107_41	41	12/07/15	<40.9
SB-A5.2-OF107_44	44	12/07/15	<40.9
SB-A5.2-OF107_47	47	12/07/15	<40.9
SB-A5.2-OF107_50	50	12/07/15	<40.9
SB-A5.2-OF107_54	54	12/07/15	<40.9
SB-A5.2-OF107_57	57	12/07/15	<40.9
SB-A5.2-OF107_60	60	12/07/15	<40.9
SB-A5.2-OF107_62	62	12/07/15	<40.9
SB-A5.2-OF107_65	65	12/07/15	<44.5
SB-A5.2-OF107_68	68	12/07/15	<44.5
SB-A5.2-OF107_71	71	12/07/15	<44.5
SB-A5.2-OG118_1.5	1.5	12/09/15	<42.9
SB-A5.2-OG118_3.5	3.5	12/09/15	<42.9
SB-A5.2-OG118_7.5	7.5	12/09/15	14.6
SB-A5.2-OG118_11.5	11.5	12/09/15	151.2
SB-A5.2-OG118_15.5	15.5	12/09/15	64.5
SB-A5.2-OG118_19.5	19.5	12/09/15	38.1
SB-A5.2-OG118_23.5	23.5	12/09/15	36.3
SB-A5.2-OG118_27.5	27.5	12/09/15	53.8
SB-A5.2-OG118_31.5	31.5	12/09/15	331.3

Table 1
DSITMS USEPA Method 8265 Soil Analytical Results
Lower 1,4-Dioxane Toe Investigation
Plants 2,3, and 6 Industrial Land
Lansing, Michigan

Sample Name	Depth (feet)	Date Sampled	1,4-Dioxane (µg/kg)
SB-A5.2-OG118_35.5	35.5	12/09/15	515.4
SB-A5.2-OG118_39.5	39.5	12/09/15	69.6
SB-A5.2-OG118_43.5	43.5	12/09/15	66.8
SB-A5.2-OG118_47.5	47.5	12/09/15	<42.9
SB-A5.2-OG118_51.5	51.5	12/09/15	91.3
SB-A5.2-OG118_55.5	55.5	12/09/15	127.4
SB-A5.2-OG118_59.5	59.5	12/09/15	<42.9
SB-A5.2-OG118_63.5	63.5	12/09/15	<42.9
SB-A5.2-OG124_15	15	12/07/15	581 E
SB-A5.2-OG124_18	18	12/07/15	2827 E
SB-A5.2-OG124_18 (replicate)	18	12/07/15	1543
SB-A5.2-OG124_21	21	12/07/15	541 E
SB-A5.2-OG124_24	24	12/07/15	552 E
SB-A5.2-OG124_24 (replicate)	24	12/07/15	383.6
SB-A5.2-OG124_27	27	12/07/15	123.7
SB-A5.2-OG124_30	30	12/07/15	125.3
SB-A5.2-OG124_30 (replicate)	30	12/07/15	198.3
SB-A5.2-OG124_31.25	31.25	12/07/15	20.0 J
SB-A5.2-OG124_34	34	12/07/15	16.2 J
SB-A5.2-OG124_37	37	12/07/15	17.8
SB-A5.2-OG124_37 (replicate)	37	12/07/15	85.7
SB-A5.2-OG124_40	40	12/07/15	<22.1
SB-A5.2-OG124_43	43	12/07/15	<22.1
SB-A5.2-OG124_46	46	12/07/15	<22.1
SB-A5.2-OG124_49	49	12/07/15	<22.1
SB-A5.2-OG124_52	52	12/07/15	<22.1
SB-A5.2-OG124_55	55	12/07/15	<22.1
SB-A5.2-OG124_58	58	12/07/15	<22.1
SB-A5.2-OG124_61.5	61.5	12/07/15	<22.1
SB-A5.2-OG124_64	64	12/07/15	<22.1
SB-A5.2-OG124_67	67	12/07/15	<22.1
SB-A5.2-OG124_70	70	12/07/15	<20.0
SB-A5.3-PA104_1	1	12/02/15	<47.6
SB-A5.3-PA104_4	4	12/02/15	<47.6
SB-A5.3-PA104_6	6	12/03/15	<47.6
SB-A5.3-PA104_7.5	7.5	12/03/15	<47.6
SB-A5.3-PA104_10	10	12/03/15	<47.6
SB-A5.3-PA104_13	13	12/03/15	<47.6
SB-A5.3-PA104_16	16	12/03/15	<47.6
SB-A5.3-PA104_19	19	12/03/15	<47.6
SB-A5.3-PA104_22	22	12/03/15	<47.6
SB-A5.3-PA104_25	25	12/03/15	<47.6
SB-A5.3-PA104_27.5	27.5	12/03/15	32.5 J
SB-A5.3-PA104_28.5	28.5	12/03/15	<47.6
SB-A5.3-PA104_30	30	12/03/15	<47.6
SB-A5.3-PA104_32	32	12/03/15	<47.6
SB-A5.3-PA104_33	33	12/03/15	<47.6
SB-A5.3-PA104_36	36	12/03/15	<47.6

Table 1
DSITMS USEPA Method 8265 Soil Analytical Results
Lower 1,4-Dioxane Toe Investigation
Plants 2,3, and 6 Industrial Land
Lansing, Michigan

Sample Name	Depth (feet)	Date Sampled	1,4-Dioxane (µg/kg)
SB-A5.3-PA104_39	39	12/03/15	<47.6
SB-A5.3-PA104_42	42	12/03/15	<47.6
SB-A5.3-PA104_45	45	12/03/15	<47.6
SB-A5.3-PA104_48	48	12/03/15	49.6
SB-A5.3-PA104_48 (replicate)	48	12/03/15	29.6
SB-A5.3-PA104_51	51	12/03/15	<47.6
SB-A5.3-PA104_54	54	12/03/15	<47.6
SB-A5.3-PA104_57	57	12/03/15	<47.8
SB-A5.3-PA104_60	60	12/03/15	26.3 J
SB-A5.3-PA104_62	62	12/03/15	51.9
SB-A5.3-PA107_1.5	1.5	12/03/15	<47.8
SB-A5.3-PA107_3	3	12/03/15	<47.8
SB-A5.3-PA107_6	6	12/03/15	<47.8
SB-A5.3-PA107_9	9	12/03/15	<47.8
SB-A5.3-PA107_12	12	12/03/15	<47.8
SB-A5.3-PA107_15	15	12/03/15	<47.8
SB-A5.3-PA107_16.5	16.5	12/03/15	<47.8
SB-A5.3-PA107_19	19	12/03/15	<47.8
SB-A5.3-PA107_19 (replicate)	19	12/03/15	<42.9
SB-A5.3-PA107_22	22	12/03/15	<47.8
SB-A5.3-PA107_25	25	12/03/15	<47.8
SB-A5.3-PA107_27.5	27.5	12/03/15	<47.8
SB-A5.3-PA107_29	29	12/03/15	<47.8
SB-A5.3-PA107_32	32	12/03/15	<47.8
SB-A5.3-PA107_35	35	12/03/15	<47.8
SB-A5.3-PA107_38	38	12/03/15	38.0 J
SB-A5.3-PA107_41	41	12/03/15	<47.8
SB-A5.3-PA107_44	44	12/03/15	<47.8
SB-A5.3-PA107_47	47	12/03/15	<47.8
SB-A5.3-PA107_50	50	12/03/15	<47.8
SB-A5.3-PA107_53	53	12/03/15	<47.8
SB-A5.3-PA107_56	56	12/03/15	29.2 J
SB-A5.3-PA107_59	59	12/03/15	54.7
SB-A5.3-PA107_71	71	12/07/15	17.1 J
SB-A5.3-PA107_74	74	12/07/15	<22.1
SB-A5.3-PA94_1	1	11/30/15	<44.9
SB-A5.3-PA94_4	4	11/30/15	<44.9
SB-A5.3-PA94_7	7	11/30/15	<44.9
SB-A5.3-PA94_10	10	11/30/15	<44.9
SB-A5.3-PA94_12	12	11/30/15	<44.9
SB-A5.3-PA94_15	15	11/30/15	<44.9
SB-A5.3-PA94_15 (replicate)	15	11/30/15	<42.9
SB-A5.3-PA94_17	17	11/30/15	<44.9
SB-A5.3-PA94_20	20	11/30/15	<44.9
SB-A5.3-PA94_23	23	11/30/15	<44.9
SB-A5.3-PA94_26	26	11/30/15	<44.9
SB-A5.3-PA94_29	29	11/30/15	<44.9
SB-A5.3-PA94_32	32	11/30/15	<44.9

Table 1
DSITMS USEPA Method 8265 Soil Analytical Results
Lower 1,4-Dioxane Toe Investigation
Plants 2,3, and 6 Industrial Land
Lansing, Michigan

Sample Name	Depth (feet)	Date Sampled	1,4-Dioxane (µg/kg)
SB-A5.3-PA94_35	35	11/30/15	<44.9
SB-A5.3-PA94_38	38	11/30/15	<44.9
SB-A5.3-PA94_41	41	11/30/15	<44.9
SB-A5.3-PA94_44	44	11/30/15	<44.9
SB-A5.3-PA94_47	47	11/30/15	<44.9
SB-A5.3-PA94_50	50	11/30/15	<44.9
SB-A5.3-PA94_53	53	11/30/15	<44.9
SB-A5.3-PA94_56	56	11/30/15	<44.9
SB-A5.3-PA94_59	59	12/01/15	<44.4
SB-A5.3-PA98_1	1	12/01/15	<44.4
SB-A5.3-PA98_4	4	12/01/15	<44.4
SB-A5.3-PA98_7	7	12/01/15	<44.4
SB-A5.3-PA98_8	8	12/01/15	<44.4
SB-A5.3-PA98_11	11	12/01/15	<44.4
SB-A5.3-PA98_14	14	12/01/15	<44.4
SB-A5.3-PA98_17	17	12/01/15	<44.4
SB-A5.3-PA98_20	20	12/01/15	<44.4
SB-A5.3-PA98_21	21	12/01/15	<44.4
SB-A5.3-PA98_24	24	12/01/15	<44.4
SB-A5.3-PA98_27	27	12/01/15	<44.4
SB-A5.3-PA98_28	28	12/01/15	<44.4
SB-A5.3-PA98_31	31	12/01/15	<44.4
SB-A5.3-PA98_33	33	12/01/15	<44.4
SB-A5.3-PA98_36	36	12/01/15	<44.4
SB-A5.3-PA98_39	39	12/01/15	<44.4
SB-A5.3-PA98_41	41	12/02/15	<44.4
SB-A5.3-PA98_44	44	12/02/15	<44.4
SB-A5.3-PA98_47	47	12/02/15	<44.4
SB-A5.3-PA98_48	48	12/02/15	<44.4
SB-A5.3-PA98_51	51	12/02/15	<44.4
SB-A5.3-PA98_54	54	12/02/15	<44.4
SB-A5.3-PA98_57	57	12/02/15	<44.4
SB-A5.3-PA98_60	60	12/02/15	<44.4
SB-P2-MM43_1	1	12/09/15	<44.5
SB-P2-MM43_5	5	12/09/15	<44.5
SB-P2-MM43_9	9	12/09/15	<44.5
SB-P2-MM43_13	13	12/09/15	<44.5
SB-P2-MM43_17	17	12/09/15	<44.5
SB-P2-MM43_21	21	12/09/15	<44.5
SB-P2-MM43_25	25	12/09/15	<44.5
SB-P2-MM43_29	29	12/09/15	<44.5
SB-P2-MM43_33	33	12/09/15	<44.5
SB-P2-MM43_36.25	36.25	12/10/15	<44.5
SB-P2-MM43_37.25	37.25	12/10/15	<44.5
SB-P2-MM43_38	38	12/10/15	<44.5
SB-P2-MM43_39	39	12/10/15	<44.5
SB-P2-MM43_41	41	12/10/15	<44.5
SB-P2-MM43_45	45	12/10/15	<44.5

Table 1
DSITMS USEPA Method 8265 Soil Analytical Results
Lower 1,4-Dioxane Toe Investigation
Plants 2,3, and 6 Industrial Land
Lansing, Michigan

Sample Name	Depth (feet)	Date Sampled	1,4-Dioxane (µg/kg)
SB-P2-MM43_48.5	48.5	12/10/15	<44.5
SB-P2-MM43_53	53	12/10/15	<44.5
SB-P2-MM43_57	57	12/10/15	<44.5
SB-P2-MM43_61	61	12/10/15	<44.5
SB-P2-MM43_65	65	12/10/15	<44.5
SB-P2-ML33_0.5	0.5	12/08/15	<44.5
SB-P2-ML33_2	2	12/08/15	<44.5
SB-P2-ML33_5	5	12/08/15	<44.5
SB-P2-ML33_8	8	12/08/15	<44.5
SB-P2-ML33_12	12	12/08/15	<42.9
SB-P2-ML33_12.8	12.8	12/08/15	<42.9
SB-P2-ML33_13.1	13.1	12/08/15	<42.9
SB-P2-ML33_17	17	12/08/15	<42.9
SB-P2-ML33_21	21	12/08/15	<42.9
SB-P2-ML33_25	25	12/08/15	<44.5
SB-P2-ML33_29	29	12/08/15	<44.5
SB-P2-ML33_31	31	12/08/15	<44.5
SB-P2-ML33_35	35	12/08/15	<44.5
SB-P2-ML33_39	39	12/08/15	<44.5
SB-P2-ML33_43	43	12/08/15	<44.5
SB-P2-ML33_47	47	12/09/15	<44.5
SB-P2-ML33_49	49	12/09/15	<40.9
SB-P2-ML33_53	53	12/09/15	<40.9
SB-P2-ML33_57.5	57.5	12/09/15	<40.9
SB-P2-ML33_62	62	12/09/15	<40.9
SB-P2-ML33_66	66	12/09/15	<40.9

Notes:

Soil results reported on wet weight basis

< = less than

µg/kg = micrograms per kilogram

J = Estimated. Value detected at concentration below method detection limit.

E = Estimated. Value exceeded the calibration range.

DSITMS = direct sampling ion trap mass spectrometer

NA = Not analyzed due to suspected presence of hydrocarbons

Replicate = Re-analysis of original sample prior to submitting sample for fixed laboratory comparative analysis

USEPA = United States Environmental Protection Agency

Table 2
DSITMS USEPA Method 8265 Groundwater Analytical Results
Lower 1,4-Dioxane Toe Investigation
Plants 2,3, and 6 Industrial Land
Lansing, Michigan

Sample Name	Depth (feet)	Date Sampled	1,4-Dioxane (µg/L)
MW-15-72_63-68	63-68	12/03/15	156 E
MW-15-73_73-78	73-78	12/02/15	<20.0
MW-15-73_78-83	78-83	12/02/15	<20.0
SB-A5.2-NK132_67-72	67-72	12/10/15	54.6
SB-A5.2-NK132_72-77	72-77	12/10/15	65.8
SB-A5.2-OC91_62-67	62-67	12/04/15	360 E
SB-A5.2-OC91_67-72	67-72	12/04/15	50.9
SB-A5.2-OC94_62-67	62-67	12/07/15	97.2
SB-A5.2-OC94_67-72	67-72	12/07/15	11.7 J
SB-A5.2-OE113_62-67	62-67	12/09/15	38.9
SB-A5.2-OE113_67-72	67-72	12/09/15	82.5
SB-A5.2-OF107_62-67	62-67	12/07/15	<20.0
SB-A5.2-OF107_67-72	67-72	12/07/15	<20.0
SB-A5.2-OG118_62-67	62-67	12/09/15	16.4 J
SB-A5.2-OG118_67-72	67-72	12/09/15	18.8 J
SB-A5.2-OG124_70-75	70-75	12/07/15	105
SB-A5.2-OG124_75-80	75-80	12/08/15	<20.0
SB-A5.3-PA104_65-70	65-70	12/03/15	634 E
SB-A5.3-PA104_70-75	70-75	12/03/15	888 E
SB-A5.3-PA94_60-65	60-65	12/02/15	10.2 J
SB-A5.3-PA94_70-75	70-75	12/02/15	170 E
SB-A5.3-PA98_65-70	65-70	12/02/15	526 E
SB-A5.3-PA98_70-75	70-75	12/02/15	439 E
SB-P2-MM43_65-70	65-70	12/10/15	<20.0
SB-P2-MM43_70-75	70-75	12/10/15	21.1
SB-P2-ML33_65-70	65-70	12/09/15	<20.0
SB-P2-ML33_70-75	70-75	12/09/15	<20.0

Notes:

< = less than

µg/L = micrograms per liter

J = Estimated. Value detected at concentration below method detection limit.

E = Estimated. Value exceeded the calibration range.

DSITMS = direct sampling ion trap mass spectrometer

USEPA = United States Environmental Protection Agency

Table 3

GC/MS USEPA Method 8260-SIM Analytical Results for Suspected Hydrocarbon Impacted Samples

Lower 1,4-Dioxane Toe Investigation

Plants 2,3,6 Industrial Land

Lansing, Michigan

Sample Name	Depth (feet)	Date Sampled	1,4-Dioxane (µg/kg)	TPH GRO (µg/kg)	Chloroethane (µg/kg)	1,1-Dichloroethane (µg/kg)	1,1-Dichloroethene (µg/kg)	Chloroform (µg/kg)	1,2-Dichloroethane (µg/kg)	Vinyl Chloride (µg/kg)	1,1,1-Trichloroethane (µg/kg)
SB-A5.2-OF107_10	10	12/07/15	<6.3	<416.6	10.4	81.3	14.6	4.2	<2.0	4.2	81.3
SB-A5.2-OF107_54	54	12/07/15	<6.3	<420.1	<2.1	<2.1	<2.1	<2.1	<2.1	<2.1	<2.1
SB-A5.2-OF107_57	57	12/07/15	<6.8	<454.5	<2.2	<2.2	<2.2	2.3	<2.2	<2.2	<2.2
SB-A5.2-OG124_9.5	9.5	12/07/15	130	<480.7	1036	14.4	2.4	4.8	12.0	<2.4	<2.4

Notes:

Soil results reported on wet weight basis

Only VOCs that were detected are included

< = less than

µg/kg = micrograms per kilogram

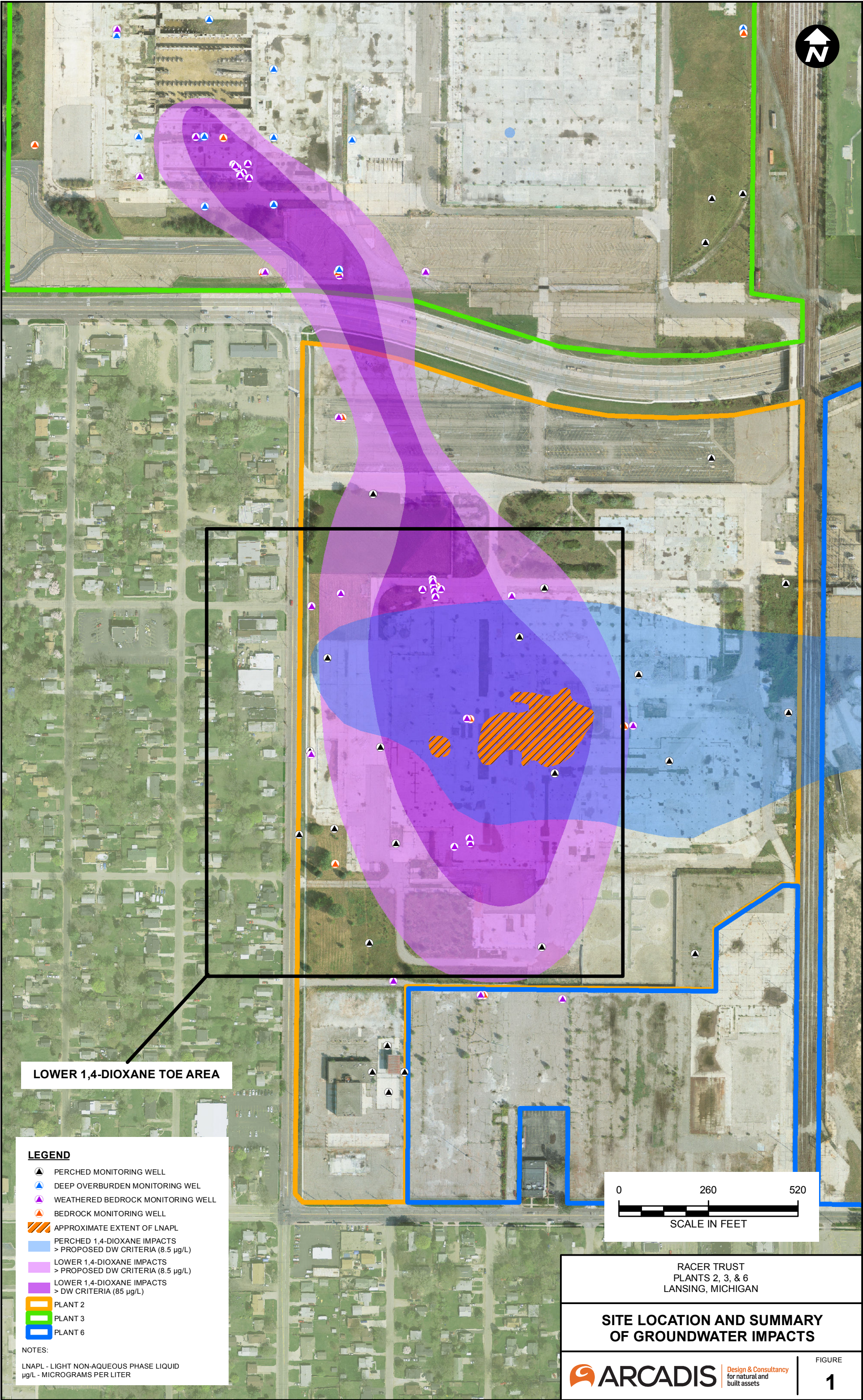
GC/MS = Gas chromatography/mass spectrometry

TPH GRO = Total petroleum hydrocarbons gasoline range organics

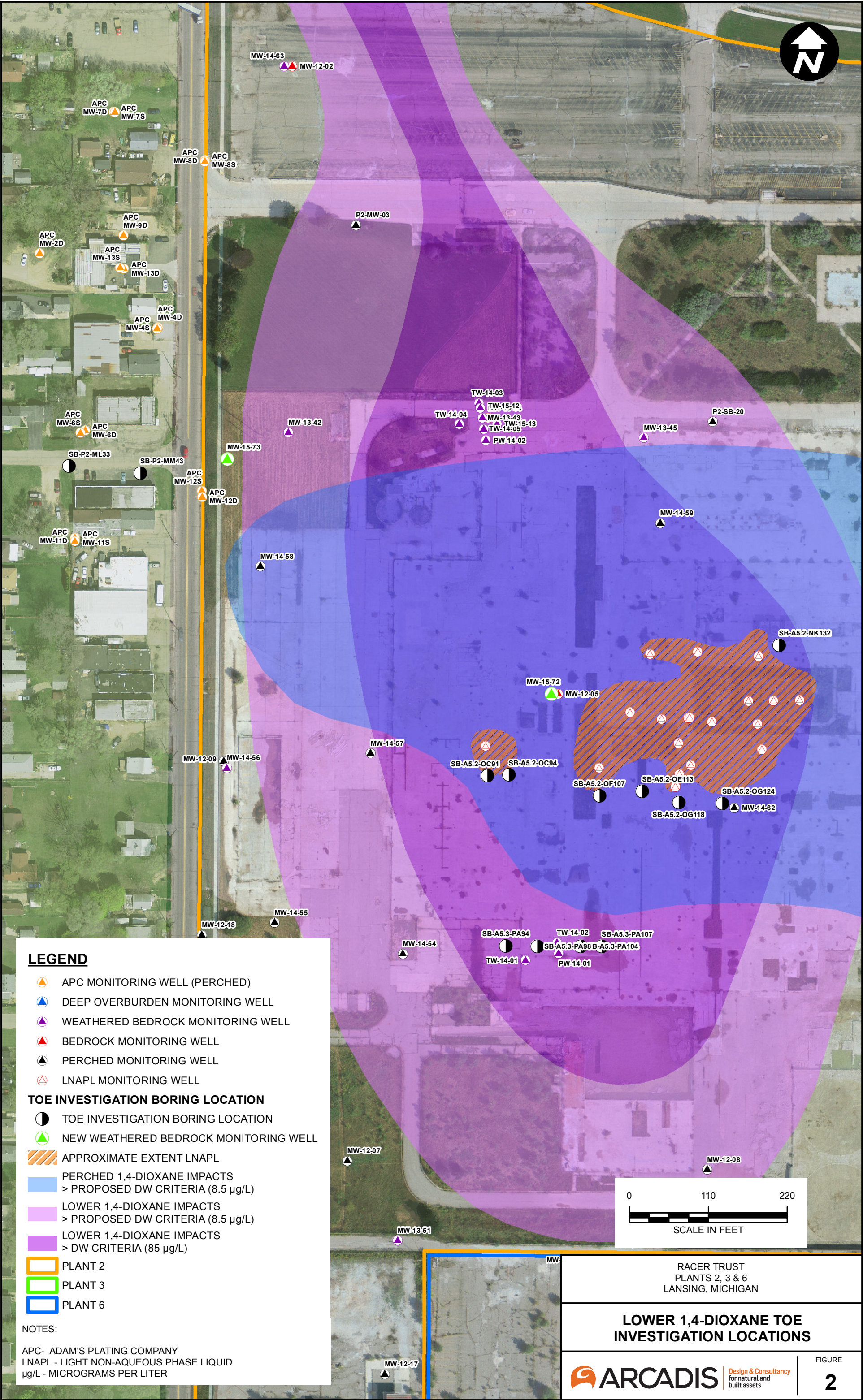
FIGURES



CITY: Novi DIV: ENV DB: TRY PIC: D. KAIDING PM: R. CHRISTENSEN TM: K. TEMPLIN TR: J. SALING PROJECT NUMBER: B0064479.2015/B0064480.2015 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl G:\GIS\Project Files\MotorsLiquidationCompany\Lansing\Docs\14D Toe Investigation\Figure 1 - Toe Investigation.mxd PLOTTED: 3/10/2016 11:51:39 AM BY: dolexa



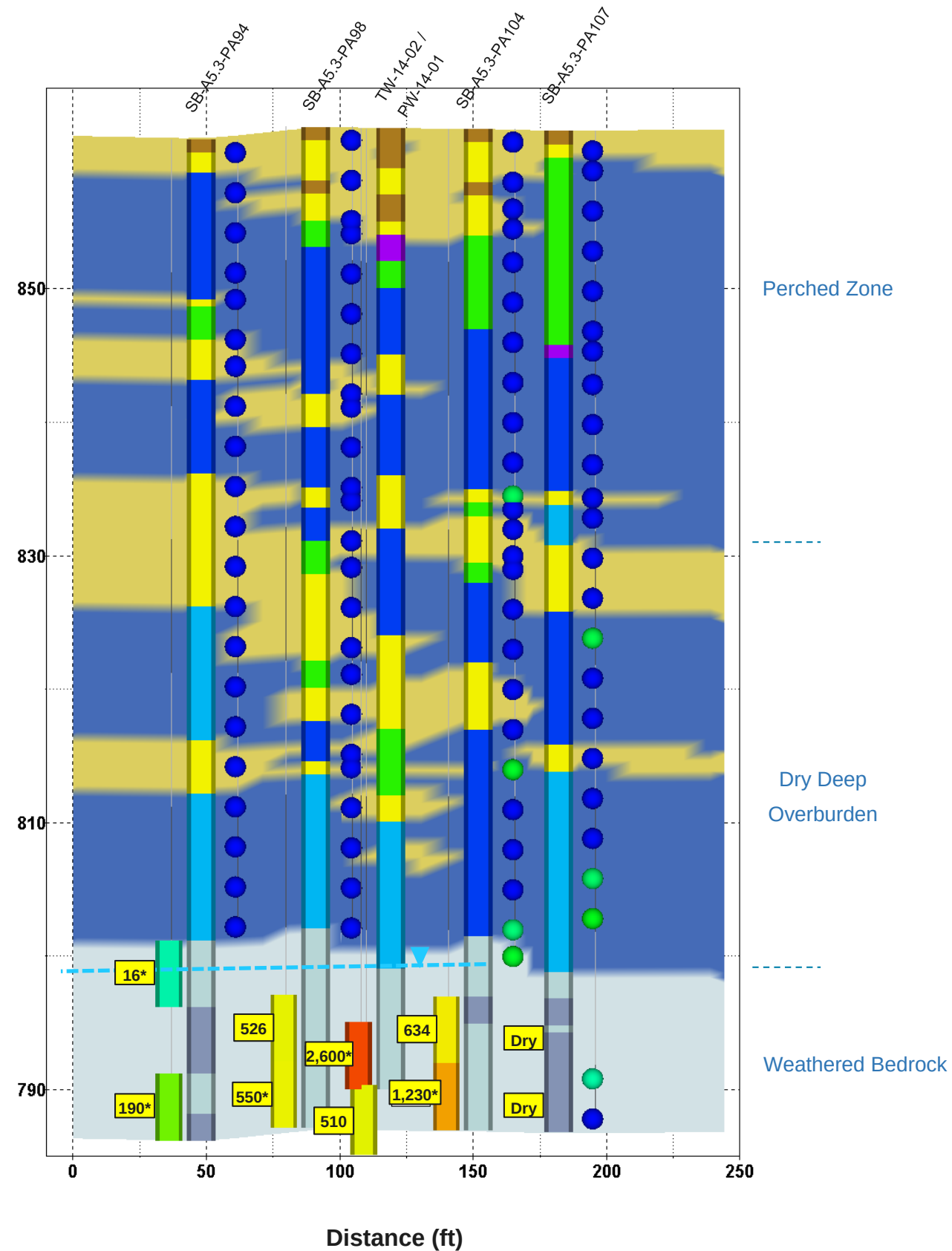
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G:\GIS\Project Files\MotorsLiquidationCompany\Lansing\Docs\14D Toe Investigation\Figure 2 - Locations.mxd PLOTTED: 3/10/2016 11:53:12 AM BY: dalex



A
WEST

A'
EAST

Elevation (ft msl)

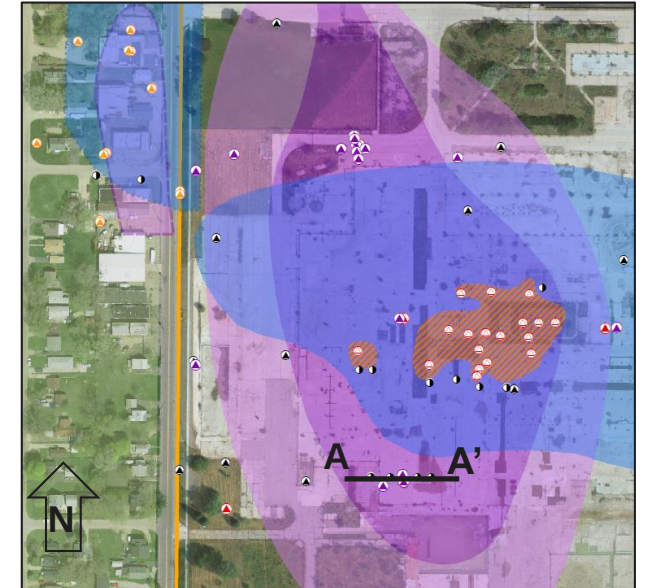


- NOTE:
1. Soil and groundwater concentrations provided in parts per billion
 - µg/L – micrograms per liter
 - µg/kg – micrograms per kilogram
 2. Monitoring well results represent most recent sampling event (December 2015)
 3. * - VAP sample analyzed via GC-MS Method 8260, otherwise DSITMS Method 8265
 4. Soil samples are provided by DSITMS Method 8265. Results could potentially be three to four times higher if analyzed using standard Method 8260-SIM.

VAP – Vertical aquifer profiling
 DSITMS – Direct ion trap mass spectrometry
 GC-MS – Gas chromatography-mass spectrometry
 ft msl – feet above mean sea level

Figure 3
Cross-Section A – A'

RACER Trust
 Lansing, Michigan



LEGEND

STRATIGRAPHY

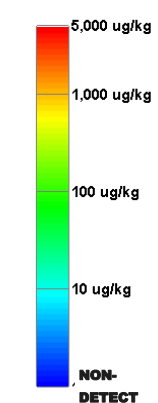
TOPSOIL/ASPHALT/CONCRETE
FILL
GRAVELLY SAND
SAND
SILTY SAND
SILTY/SANDY/GRAVELLY CLAY
CLAY
PEAT
BEDROCK (PRIMARILY SANDSTONE)
BEDROCK (PRIMARILY SHALE)
NO RECOVERY

HYDROSTRATIGRAPHY

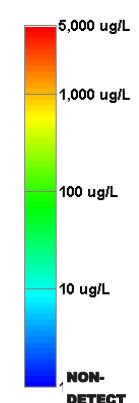
More Permeable
Less Permeable
Bedrock

1,4-DIOXANE CONCENTRATION

SOIL



GROUNDWATER



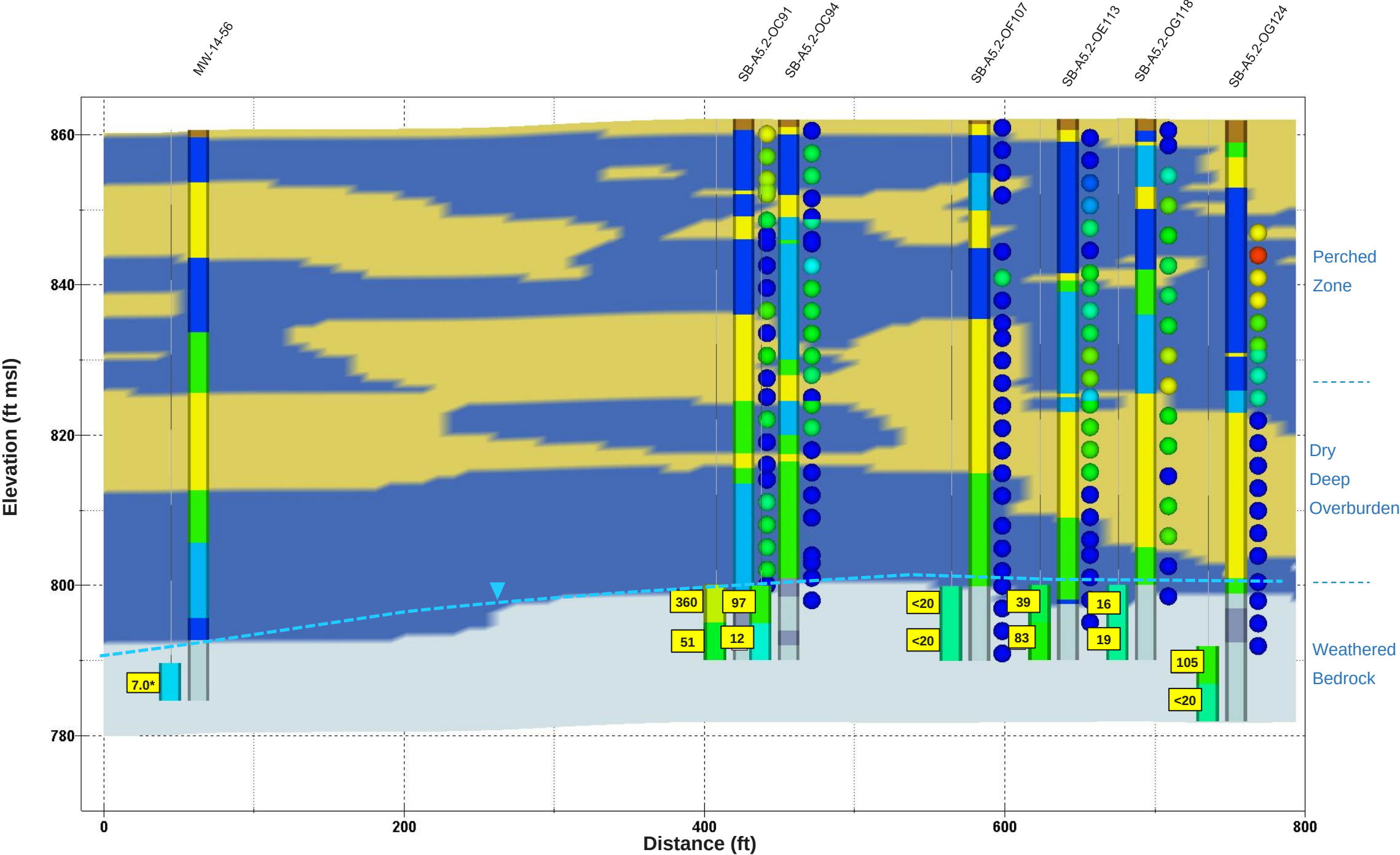
- Approximate Bedrock Water Table
- Soil Sample Result
- Groundwater Sample Result

B

WEST

B'

EAST



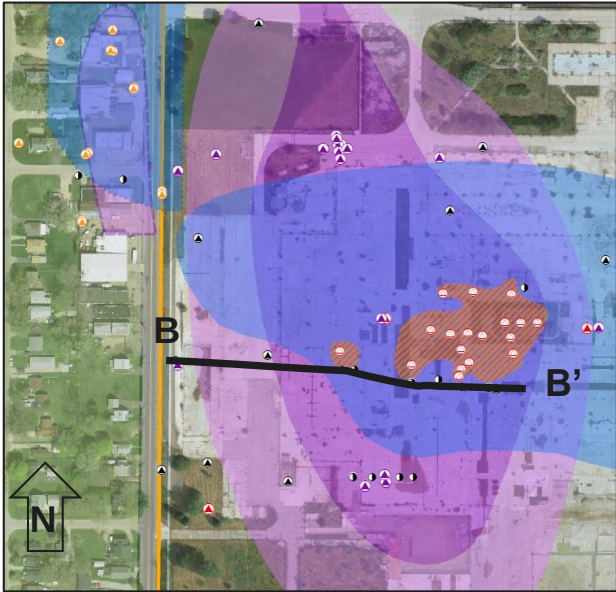
NOTE:

1. Soil and groundwater concentrations provided in parts per billion
 - $\mu\text{g/L}$ – micrograms per liter
 - $\mu\text{g/kg}$ – micrograms per kilogram
2. Monitoring well results represent most recent sampling event (December 2015)
3. * - VAP sample analyzed via GC-MS Method 8260, otherwise DSITMS Method 8265
4. Soil samples are provided by DSITMS Method 8265. Results could potentially be three to four times higher if analyzed using standard Method 8260-SIM.

VAP – Vertical aquifer profiling
DSITMS – Direct ion trap mass spectrometry
GC-MS – Gas chromatography-mass spectrometry
ft msl – feet above mean sea level

Figure 4
Cross-Section B – B'

RACER Trust
Lansing, Michigan



LEGEND

STRATIGRAPHY

- TOPSOIL/ASPHALT/CONCRETE
- FILL
- GRAVELLY SAND
- SAND
- SILTY SAND
- SILTY/SANDY/GRAVELLY CLAY
- CLAY
- PEAT
- BEDROCK (PRIMARILY SANDSTONE)
- BEDROCK (PRIMARILY SHALE)
- NO RECOVERY

HYDROSTRATIGRAPHY

- More Permeable
- Less Permeable
- Bedrock

1,4-DIOXANE CONCENTRATION

SOIL

GROUNDWATER

5,000 ug/kg

1,000 ug/kg

100 ug/kg

10 ug/kg

NON-DETECT

5,000 ug/L

1,000 ug/L

100 ug/L

10 ug/L

NON-DETECT

Approximate Bedrock Water Table

Soil Sample Result

Groundwater Sample Result

ARCADIS

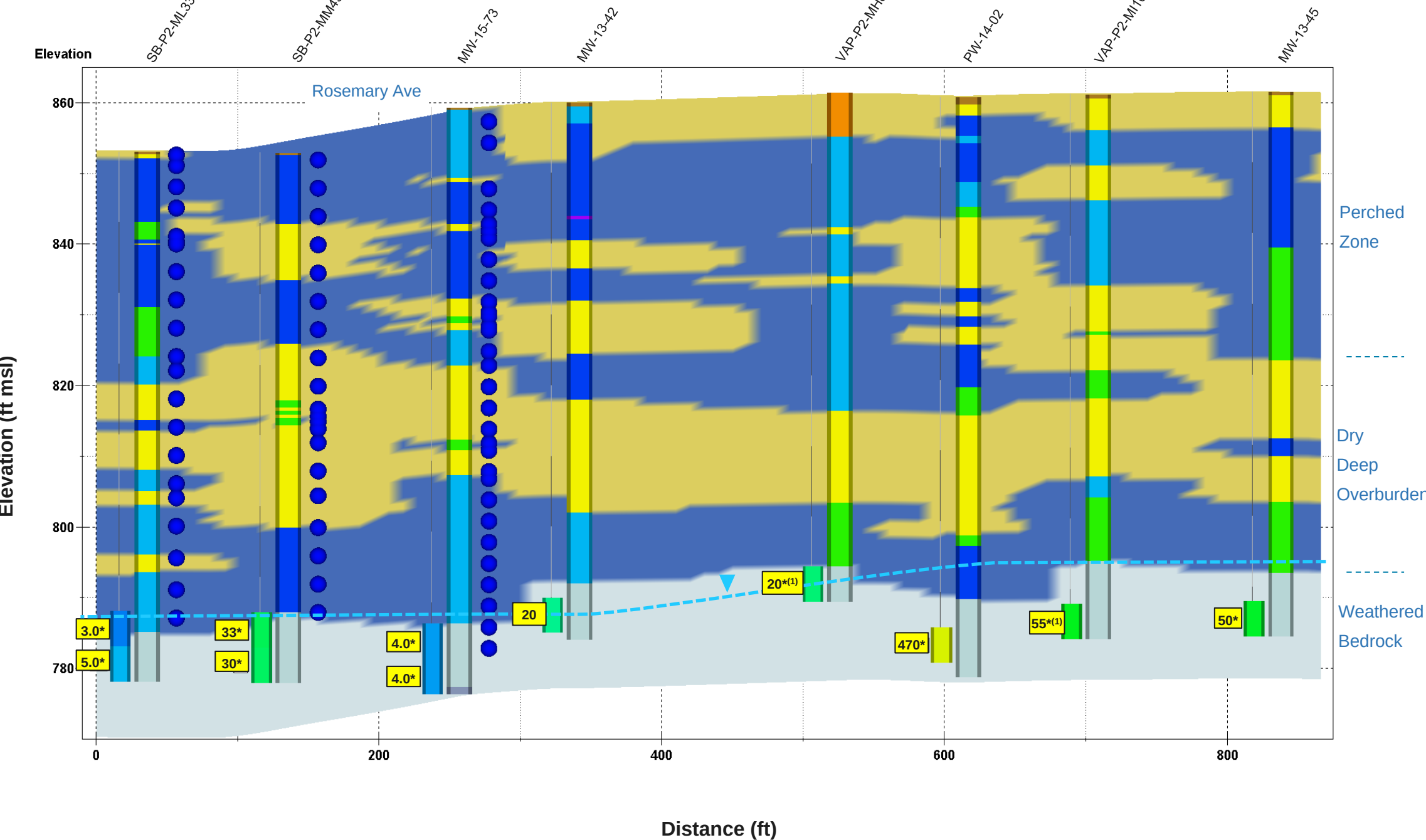
Design & Consultancy for natural and built assets

C

WEST

C'

EAST

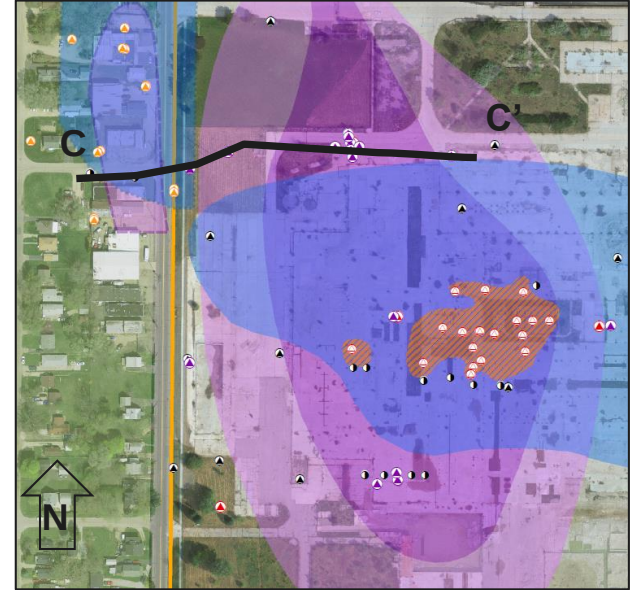


- NOTE:
1. Soil and groundwater concentrations provided in parts per billion
 - µg/L – micrograms per liter
 - µg/kg – micrograms per kilogram
 2. Monitoring well results represent most recent sampling event (December 2015)
 3. * - VAP sample analyzed via GC-MS Method 8260, otherwise DSITMS Method 8265
 4. Soil samples are provided by DSITMS Method 8265. Results could potentially be three to four times higher if analyzed using standard Method 8260-SIM.
 5. (1) - VAP Samples collected in August 2013

VAP – Vertical aquifer profiling
DSITMS – Direct ion trap mass spectrometry
GC-MS – Gas chromatography-mass spectrometry
ft msl – feet above mean sea level

Figure 5
Cross-Section C – C'

RACER Trust
Lansing, Michigan



LEGEND

STRATIGRAPHY

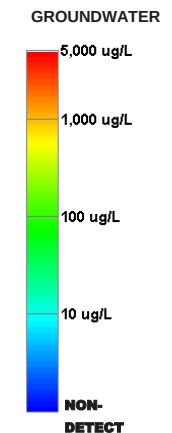
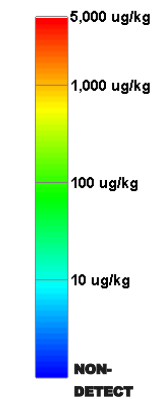
- TOPSOIL/ASPHALT/CONCRETE
- FILL
- GRAVELLY SAND
- SAND
- SILTY SAND
- SILTY/SANDY/GRAVELLY CLAY
- CLAY
- PEAT
- BEDROCK (PRIMARILY SANDSTONE)
- BEDROCK (PRIMARILY SHALE)
- NO RECOVERY

HYDROSTRATIGRAPHY

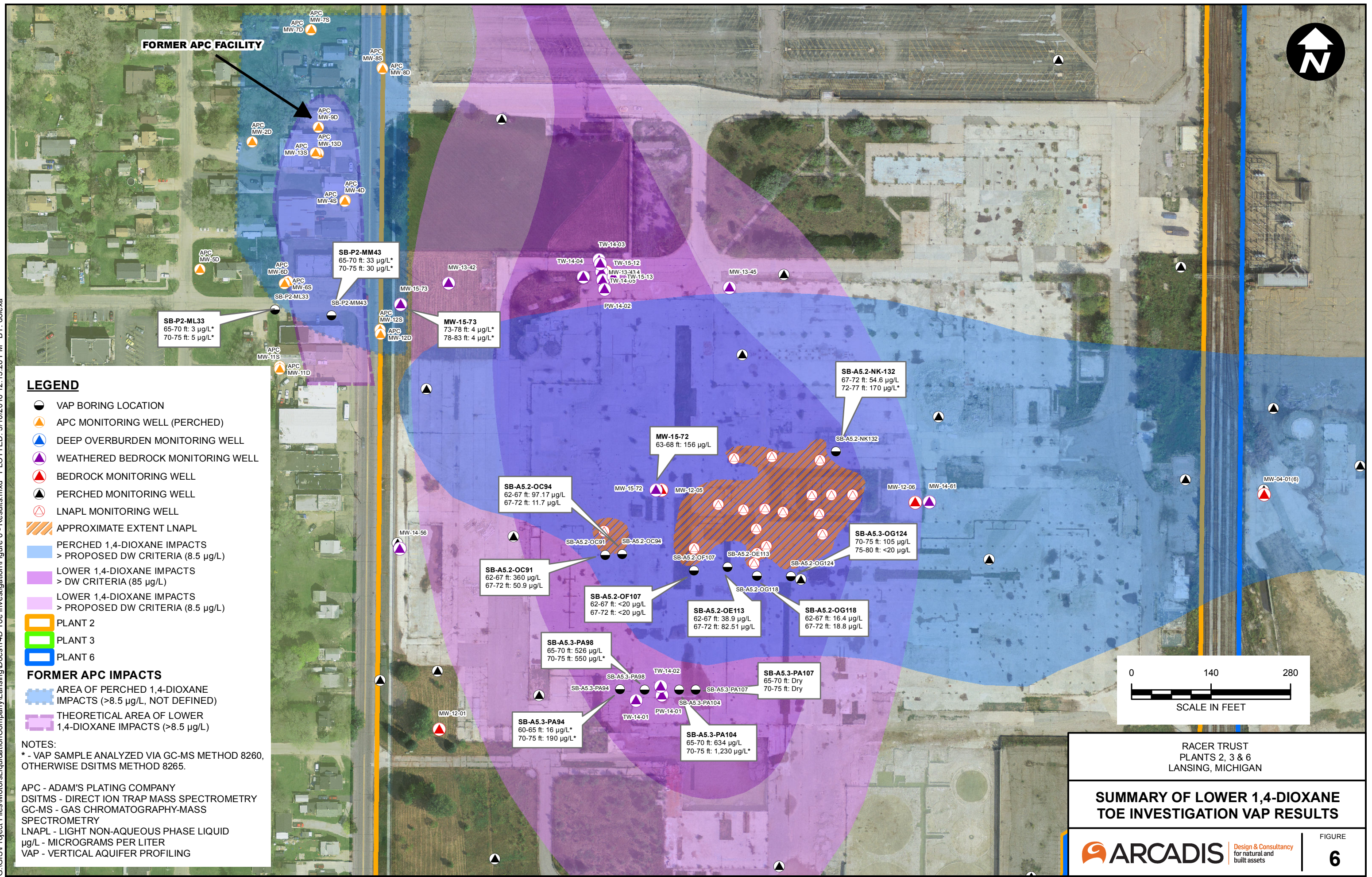
- More Permeable
- Less Permeable
- Bedrock

1,4-DIOXANE CONCENTRATION

SOIL GROUNDWATER



- Approximate Bedrock Water Table
- Soil Sample Result
- Groundwater Sample Result



APPENDIX A

Boring Logs



Date Start: 12/1/15
Date Finish: 12/3/15
Drilling Company: Cascade
Driller's Name: Mike Bond
Drilling Method: Continuous
Sampling Method: 5', 4" core barrel, 10' pushes
Rig Type: Sonic
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA

Northing: NA
Easting: NA
Casing Elevation: NA

Borehole Depth (ft. bgs.): 68'
Surface Elevation: NA

Descriptions By: Angela DeGrandis

Well/Boring ID: MW-15-72
Client: RACER

Location: RACER Lansing Plant 2

Weather Conditions: Light Rain, 41 F

DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
0					NA			(0.0 - 1.0') CONCRETE		
1.2		1	0.0-7.0	6.91		X		(1.0 - 7.0') CLAY, high plasticity, slow dilatancy; little fine to medium sand, subrounded to subangular; trace granules to pebbles, subrounded to subangular; dry to moist; stiff to very stiff; brown (10YR 5/3)		
0.5										
0.2										
0.3						X				
0.2										
0.2										
2.3						X		(7.0 - 10.5') SAND, fine to medium, subrounded to subangular; little small to medium pebbles, subround; trace large pebbles, subround; trace silt; poorly sorted; moist; brown (10YR 5/3)		
6.7										
1.0						X				
1.0						X		(10.5 - 15.5') SILT and CLAY, high plasticity, slow dilatancy; moist; soft to medium stiff; brown (10YR 5/3)		
0.6		2	7.0-17.0	9.41		X				
1.8										
0.7										
1.7										
21.2						X		(15.5 - 17.0') SAND, fine to medium, subrounded to subangular; trace granules to small pebbles, subrounded to subangular; little silt; poorly sorted; dry to moist; grayish brown (2.5Y 5/2)		
12.6										
8.6						X		(17.0 - 22.0') CLAY and SILT, high plasticity, slow dilatancy; little fine to medium sand, subrounded to subangular; trace granules subrounded; moist; soft to medium stiff; gray (2.5Y 5/1)		
1.0										
0.7		3	17.0-22.0	5						

8" Surface Casing to 30'bgs

Remarks: bgs = below ground surface
 Drilling Resumed on 12/3/15 after outer casing had a proper amount of time to set.



Date Start: 12/1/15
Date Finish: 12/3/15
Drilling Company: Cascade
Driller's Name: Mike Bond
Drilling Method: Continuous
Sampling Method: 5', 4" core barrel, 10' pushes
Rig Type: Sonic
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA

Northing: NA
Easting: NA
Casing Elevation: NA

Borehole Depth (ft. bgs.): 68'
Surface Elevation: NA

Descriptions By: Angela DeGrandis

Well/Boring ID: MW-15-72
Client: RACER

Location: RACER Lansing Plant 2

Weather Conditions: Light Rain, 41 F

DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
25	-25	4	22.0-25.0	3	0.5	×				
					0.5	×				
					0.1	×		(22.0 - 24.0') SAND, very fine to fine; well sorted; dry to moist; gray (2.5Y 5/1)		
					0.1	×				
					0.0	×		(24.0 - 26.0') SILT, non-plastic, rapid dilatancy; some fine sand; wet to moist; medium stiff; gray (2.5Y 5/1)		
					0.0	×				
		5	25.0-30.0	5	0.0	×		(26.0 - 30.0') CLAY and SILT, high plasticity, slow dilatancy; little fine to medium sand, trace granules, subrounded to subangular; dry to moist; medium stiff to stiff; dark gray (2.5Y 4/1) Note: Resume Drilling on 12/3/15		
					0.2	×				
					0.0	×				
					0.0	×				
30	-30				0.3	×				
					0.0	×		(30.0 - 33.0') SILT, non-plastic, no dilatancy; and SAND, fine; little granules, subround to subangular; poorly sorted; dry to moist; stiff; gray (2.5Y 5/1)		Bentonite Grout to Surface
					0.0	×				
					0.0	×				
		6	30.0-37.0	7	0.7	×		(33.0 - 37.0') SAND, fine, subround to subangular; trace granules, subangular; trace silt; poorly sorted; dry to moist; gray (2.5Y 5/1)		2" PVC Schedule 40 Casing
					1.0	×				
35	-35				1.4	×				
					0.2	×				
					0.0	×		(37.0 - 44.0') SAND, fine to medium, subrounded to subangular; trace granules, subangular; trace silt; poorly sorted; dry to moist; gray (2.5Y 5/1)		
					0.0	×				
		7	37.0-42.0	3.75	0.0	×				

Remarks: bgs = below ground surface
 Drilling Resumed on 12/3/15 after outer casing had a proper amount of time to set.



Date Start: 12/1/15
Date Finish: 12/3/15
Drilling Company: Cascade
Driller's Name: Mike Bond
Drilling Method: Continuous
Sampling Method: 5', 4" core barrel, 10' pushes
Rig Type: Sonic
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA

Northing: NA
Easting: NA
Casing Elevation: NA
Borehole Depth (ft. bgs.): 68'
Surface Elevation: NA
Descriptions By: Angela DeGrandis

Well/Boring ID: MW-15-72
Client: RACER
Location: RACER Lansing Plant 2
Weather Conditions: Light Rain, 41 F

DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
40					0.0					
					0.8	×				
					0.8					
					0.0	×				
45	-45	8	42.0-47.0	5	0.3			(44.0 - 47.0') SILT, non-plastic, no to slow dilatancy; and SAND, very fine to fine; trace to little granules to small pebbles, subrounded to subangular; poorly sorted; dry to moist; dark gray (2.5Y 4/1)		
					0.0					
					0.0	×				
					0.0					
					0.0	×				
50	-50	9	47.0-52.0	5	0.0			(47.0 - 52.0') SAND, fine to medium, subrounded to subangular; little granules to small pebbles, subrounded to subangular; trace medium pebbles, subrounded; some silt; poorly sorted; dry; dark gray (2.5Y 4/1)		
					0.0					
					0.0	×				
					0.0					
					0.0	×				
55	-55	10	52.0-57.0	5	0.0			(52.0 - 57.5') SILT, non-plastic, slow dilatancy; some very fine to fine sand; trace granules, subrounded to subangular; moist; dark gray (2.5Y 4/1) Note: wet from 55.0'-56.0' bgs		
					0.0					
					0.0	×				
					0.0					
					0.0	×				
					0.0					
					0.0	×		(57.5 - 62.0') SILT and CLAY, non-plastic to medium plasticity, no dilatancy; little to some fine to medium sand, subrounded to subangular; little granules to small pebbles, subrounded to subangular; dry; very stiff to stiff; dark gray (2.5Y 4/1), (TILL) Note: Sandstone and Shale fragments, starting at 58.0' bgs		
					0.0					
60	-60	11	57.0-62.0	5	0.0					

Remarks: bgs = below ground surface
 Drilling Resumed on 12/3/15 after outer casing had a proper amount of time to set.



Northings: NA
Easting: NA
Casing Elevation: NA

Borehole Depth (ft. bgs.): 68'
Surface Elevation: NA

Descriptions By: Angela DeGrandis

Northings: NA
Easting: NA
Casing Elevation: NA

Borehole Depth (ft. bgs.): 68'
Surface Elevation: NA

Descriptions By: Angela DeGrandis

[illegible]

Remarks: bgs = below ground surface
Drilling Resumed on 12/3/15 after outer casing had a proper amount of time to set.



Date Start: 12/2/15
Date Finish: 12/2/15
Drilling Company: Cascade
Driller's Name: Mike Bond
Drilling Method: Continuous
Sampling Method: 5', 4" core barrel, 10' pushes
Rig Type: Sonic
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA

Northing: NA
Easting: NA
Casing Elevation: NA
Borehole Depth (ft. bgs.): 83'
Surface Elevation: NA
Descriptions By: Angela DeGrandis

Well/Boring ID: MW-15-73
Client: RACER
Location: RACER Lansing Plant 2
Weather Conditions: Clear, 31 F

DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
0	0							(0.0 - 0.3') TOPSOIL, grass		
0.9								(0.3 - 10.5') CLAY, medium plasticity, no dilatancy; and SAND, fine to medium, subrounded to subangular; little granules to medium pebbles, subrounded to subangular; poorly sorted; dry; stiff; dark grayish brown (10YR 4/2)		
0.3						X				
0.1										
0.5		1	0.0-7.0	5.41						
0.1						X				
0.0										
0.0										
1.6						X				
3.2										
3.2										
5.5						X		(10.0 - 10.5') SAND, fine to medium, subrounded to subangular; some silt, trace clay; poorly sorted; dry; very dark brown (10YR 2/2)		
1.9		2	7.0-17.0	9.16				(10.5 - 16.5') CLAY, high plasticity, slow dilatancy; moist; soft; olive gray (5Y 5/2)		
2.5										
1.0										
0.8						X				
0.7										
0.6						X		(16.5 - 17.5') SAND, medium, subrounded to subangular; little coarse sand to granules, subrounded to subangular; trace clay; poorly sorted; moist; gray (2.5Y 5/1) -Note: wet at 17.0' to 18.0' bgs		
0.7						X				
0.8						X		(17.5 - 27.0') CLAY, some silt, high plasticity, no dilatancy; little to trace fine to medium sand, subrounded; trace granules, subangular; dry to moist; stiff to very stiff; gray (2.5Y 5/1)		
0.3										

Remarks: bgs = below ground surface



Date Start: 12/2/15 Date Finish: 12/2/15 Drilling Company: Cascade Driller's Name: Mike Bond Drilling Method: Continuous Sampling Method: 5', 4" core barrel, 10' pushes Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 83' Surface Elevation: NA Descriptions By: Angela DeGrandis	Well/Boring ID: MW-15-73 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Clear, 31 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
25	-25	3	17.0-27.0	10	0.2	X				
					0.2	X				
					0.3					
					0.2					
					0.0	X				
					0.1					
					0.1					
					0.4	X		(27.0 - 29.5') SAND, medium to coarse, subrounded to subangular; little fine sand; little granules to medium pebbles, subrounded to subangular; poorly sorted; wet; dark gray (2.5Y 4/1)		
					0.4	X				
					0.5			(29.5 - 30.5') SILT; and SAND, fine to medium, subrounded to subangular; poorly sorted; stiff to very stiff; dry; gray (2.5Y 5/1)		
					0.2	X		(30.5 - 31.5') SAND, fine to medium, subrounded to subangular; little granules to medium pebbles, subround to subangular; trace silt; poorly sorted; moist to wet; gray (2.5Y 5/1)		
					0.1	X				
		4	27.0-37.0	10	0.1	X		(31.5 - 36.5') SILT and CLAY, low to medium plasticity, no dilatancy; little fine to medium sand, subrounded to subangular; trace granules, subangular; dry; very stiff to stiff; dark gray (2.5Y 4/1)		
					0.4					
					0.1	X				
					0.1					
					0.1	X				
					0.1					
					0.1	X		(36.5 - 41.0') SAND, medium to coarse, subrounded to subangular; trace to little granules, subrounded to subangular; poorly sorted; moist; very dark gray (2.5Y 3/1)		
					4.0					
					4.7					
					4.0	X				

	Remarks: bgs = below ground surface
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Date Start: 12/2/15 Date Finish: 12/2/15 Drilling Company: Cascade Driller's Name: Mike Bond Drilling Method: Continuous Sampling Method: 5', 4" core barrel, 10' pushes Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 83' Surface Elevation: NA Descriptions By: Angela DeGrandis	Well/Boring ID: MW-15-73 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Clear, 31 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
45	-45	5	37.0-47.0	5.16	5.6	×		(41.0 - 45.0') SAND, fine; little silt; poorly sorted; dry; grayish brown (2.5Y 5/2)		
					4.4	×				
					4.4	×				
					6.0					
					4.2					
					4.6	×		(45.0 - 47.0') SAND, very fine to fine; little to trace silt; poorly sorted; dry; gray (2.5Y 6/1) -Note: possible pulverized sandstone		
					3.1					
					1.2	×		(47.0 - 48.5') SILT, non-plastic, no dilatancy; and SAND, fine; little granules, subround to subangular; poorly sorted; dry; grayish brown (2.5Y 5/2)		
					9.7	×				
					2.2			(48.5 - 52.0') SAND, fine; little granules to small pebbles, subrounded to subangular; trace silt; poorly sorted; dry; grayish brown (2.5Y 5/2)		
50	-50				1.2					
					5.0	×				
		6	47.0-57.0	10	0.0	×		(52.0 - 73.0') CLAY and SILT, medium to high plasticity, no dilatancy; little fine to medium sand, subround to subangular; trace granules, subround to subangular; dry to moist; stiff to very stiff; dark gray ((2.5Y 4/1) -Note: sandstone chunks throughout, starting at 57.0' bgs		
					0.0					
55	-55				0.1	×				
					0.0					
					0.0					
					0.0					
					0.0					
					0.0					
					0.0					

	Remarks: bgs = below ground surface
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Well/Boring ID: MW-15-73

Client: RACER

Location: RACER Lansing Plant 2

Weather Conditions: Clear, 31 F

 Infrastructure · Water · Environment · Buildings	Remarks: bgs = below ground surface
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Date Start: 12/2/15 Date Finish: 12/2/15 Drilling Company: Cascade Driller's Name: Mike Bond Drilling Method: Continuous Sampling Method: 5', 4" core barrel, 10' pushes Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 83' Surface Elevation: NA Descriptions By: Angela DeGrandis	Well/Boring ID: MW-15-73 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Clear, 31 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
80 - 80		9	77.0- 83.0	6	0.0			(82.0 - 83.0') Weathered SHALE, some sandstone fragments; dry to moist; black (2.5Y 2.5/1) -Note: VAP sample collected from 78.0' to 83.0' bgs, at 1633		
85 - 85								End of Boring at 83.0' bgs		
90 - 90										
95 - 95										
100 - 100										

	Remarks: bgs = below ground surface
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
0	0	1	0.0-7.0	7	NA			(0.0 - 1.0') CONCRETE		
0.0	×					(1.0 - 6.0') SAND, fine to medium, subrounded to subangular; little granules to medium pebbles, subrounded to subangular; little clay; poorly sorted; moist; dark yellowish brown (10YR 4/4) -Note: color change to very dark gray (10YR 3/1) at 4.0' bgs				
0.0										
0.0										
0.0	×									
0.0			10	7.0-17.0	0.0		(6.0 - 16.0') SAND, medium subrounded to subangular; trace granules to medium pebbles, subrounded to subangular; trace silt; poorly sorted; moist; dark gray (2.5Y 4/1)			
0.1										
0.0	×									
0.0										
0.0					0.0	×		(16.0 - 17.0') CLAY, some silt, high plasticity, no to slow dilatancy; trace granules, subrounded; moist; medium stiff to stiff; dark gray (2.5Y 4/1)		
0.0										
0.0	×									
0.0										
0.0					0.0			(17.0 - 46.0') CLAY and SILT, medium to high plasticity, no dilatancy; little granules to small pebbles, subrounded to subangular; moist; stiff; dark gray (2.5Y 4/1)		
0.0	×									
0.0										

Project: B0064479.2015.00102 Template: ARCADIS_Analytical Boring-Well 2013.lfx Page: 1 of 4
Data File: SB-A5.2-NK132 Date: 2/19/2016 Created/Edited by: Wesley Kuhn/

Northings: NA
Easting: NA
Casing Elevation: NA

Borehole Depth (ft. bgs.): 77'
Surface Elevation: NA

Descriptions By: Angela DeGrandis

Northings: NA
Easting: NA
Casing Elevation: NA

Borehole Depth (ft. bgs.): 77'
Surface Elevation: NA

Descriptions By: Angela DeGrandis

DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
25	-25	3	17.0-27.0	10	0.0	X				
					0.0					
					0.0					
					0.0					
					0.0					
					0.0	X				
					0.0					
30	-30	4	27.0-37.0	10	0.0	X				
					0.0					
					0.3					
					0.0					
					0.0					
					0.1					
					0.0	X				
35	-35				0.1					
					0.0					
					0.0					
					0.0	X				
					0.0					
					0.9					

Remarks: bgs = below ground surface
No odor or staining observed.



Date Start: 12/9/15 Date Finish: 12/10/15 Drilling Company: Cascade Driller's Name: Mike Bond Drilling Method: Continuous Sampling Method: 5', 4" core barrel, 10' pushes Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 77' Surface Elevation: NA Descriptions By: Angela DeGrandis	Well/Boring ID: SB-A5.2-NK132 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Partly Cloudy 49 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
45	-45	5	37.0-47.0	10	0.3	×				
					0.1	×				
					0.0					
					0.8					
					0.1					
					0.1	×				
					0.7			(46.0 - 57.5') SAND, fine; little medium sand to granules, subround to subangular; trace silt; poorly sorted; dry to moist; light brownish gray (2.5Y 6/2) to grayish brown (2.5Y 5/2)		
					1.3					
					3.9					
50	-50				1.6	×				
					2.3					
		6	47.0-57.0	7.58	1.9					
					2.3					
					2.2	×				
					3.2					
55	-55				2.7					
					3.5					
					3.3	×		(57.5 - 64.0') SAND, fine; little granules to small pebbles, subrounded to subangular; and SILT, non-plastic, no dilatancy; poorly sorted; dry; gray (2.5Y 5/1)		
					2.3					
60	-60				2.7					

	Remarks: bgs = below ground surface No odor or staining observed.
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Date Start: 12/9/15 Date Finish: 12/10/15 Drilling Company: Cascade Driller's Name: Mike Bond Drilling Method: Continuous Sampling Method: 5', 4" core barrel, 10' pushes Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 77' Surface Elevation: NA Descriptions By: Angela DeGrandis	Well/Boring ID: SB-A5.2-NK132 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Partly Cloudy 49 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
68					1.6					
		7	57.0-67.0	10		X				
					1.4					
					8.7					
					4.0					
65	-65				0.5	X		(64.0 - 65.5') CLAY and SILT, low plasticity, slow dilatancy; little granules to small pebbles, subrounded to subangular; moist; medium stiff; dark gray (2.5Y 4/1)		
					0.0			(65.5 - 66.5') SILT, little to some clay, non-plastic, no dilatancy; little fine to medium sand to medium pebbles, subrounded to subangular; dry; dark gray (2.5Y 4/1)		
					0.0			(66.5 - 77.0') SHALE and SANDSTONE, heavily weathered; interbedded; dry; dark gray (2.5Y 4/1) -Note: wet from 67.0 to 68.5' bgs. -Note: collect VAP sample from 67'-72' at 1002. Collect VAP sample from 72'-77' at 1134.		
70	-70	8	67.0-72.0	5		X				
					0.0					
					0.0					
					0.3					
					0.4					
75	-75	9	72.0-77.0	5						
					5.0					
					0.3					
					0.0					
					0.0					
					0.0					
					0.0			End of Boring at 77.0' bgs.		

	Remarks: bgs = below ground surface No odor or staining observed.
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Date Start: 12/4/15 Date Finish: 12/4/15 Drilling Company: Cascade Driller's Name: Mike Bond Drilling Method: Continuous Sampling Method: 5', 4" core barrel, 10' pushes Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 72' Surface Elevation: NA Descriptions By: Angela DeGrandis	Well/Boring ID: SB-A5.2-OC91 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Overcast, 38 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
					NA			(0.0 - 1.5') CONCRETE		
		1	0.0-7.0	7	0.0	X		(1.5 - 9.5') CLAY, high plasticity, no dilatancy; little fine to medium sand, subrounded to subangular; trace granules to medium pebbles, subrounded to subangular; dry to moist; stiff to very stiff; brown (10YR 5/3)		
-5	-5				0.0	X				
					0.0	X				
					0.0	X				
					0.0	X				
					0.0	X				
-10	-10				1.6	X		(9.5 - 10.0') SAND, fine to medium, subrounded to subangular; little small to medium pebbles, subrounded; trace clay; poorly sorted; moist; brown (10YR 5/3)		
					0.0	X		(10.0 - 13.0') CLAY, some silt, high plasticity, slow dilatancy; trace granules to small pebbles, subrounded to subangular; moist; soft; grayish brown (10YR 5/2)		
		2	7.0-17.0	10	0.0	X				
					1.0	X				
					0.0	X		(13.0 - 16.0') SAND, fine to medium, subrounded to subangular; little granules to medium pebbles, subrounded to subangular; trace silt; poorly sorted; moist; grayish brown (10YR 5/2)		
-15	-15				0.0	X				
					0.0	X				
					0.0	X		(16.0 - 26.0') CLAY, some silt, high to medium plasticity, no to slow dilatancy; little granules to small pebbles, subrounded to subangular; moist, medium stiff; dark gray (2.5Y 4/1)		
					0.0	X				
					0.0	X				
					0.0	X				
-20	-20				0.0	X				

	Remarks: bgs = below ground surface
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Northings: NA
Easting: NA
Casing Elevation: NA

Borehole Depth (ft. bgs.): 72'
Surface Elevation: NA

Descriptions By: Angela DeGrandis

Northings: NA
Easting: NA
Casing Elevation: NA

Borehole Depth (ft. bgs.): 72'
Surface Elevation: NA

Descriptions By: Angela DeGrandis

DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
20 - 22	-20	3	17.0-27.0	10	0.0					
	0.0									
	0.0				X					
	0.0									
	0.0									
	0.0									
25 - 25	-25				0.0	X		(26.0 - 37.5') SAND, fine to medium, subrounded to subangular; trace silt; well sorted; dry; gray (2.5Y 6/1)		
					0.0					
		4	27.0-37.0	5.08	1.3					
					0.3	X				
					1.4					
30 - 30	-30				2.4					
					0.1	X				
					0.0					
					0.0					
					0.1	X				
35 - 35	-35				0.0					
					0.9	X				
					0.0			(37.5 - 44.5') SILT, non-plastic, no dilatancy; and SAND, very fine to fine; little granules to medium pebbles, subrounded to subangular; poorly sorted; dry to moist; dark gray (7.5Y 4/1)		
					0.0					
					0.0					

Remarks: bgs = below ground surface

Date Start: 12/4/15 Date Finish: 12/4/15 Drilling Company: Cascade Driller's Name: Mike Bond Drilling Method: Continuous Sampling Method: 5', 4" core barrel, 10' pushes Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 72' Surface Elevation: NA Descriptions By: Angela DeGrandis	Well/Boring ID: SB-A5.2-OC91 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Overcast, 38 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
40		5	37.0-47.0	10	0.0	×				
45	-45				0.0	×		(44.5 - 46.5') SAND, fine to medium, subrounded to subangular; trace silt; well sorted; dry; gray (2.5Y 5/1)		
					0.0	×		(46.5 - 48.5') SILT, non-plastic, no dilatancy; and SAND, very fine to fine; little granules to small pebbles, subrounded to subangular; poorly sorted; dry; dark gray (2.5Y 4/1) to Gray (2.5Y 5/1)		
50	-50	6	47.0-57.0	9.16	0.0	×		(48.5 - 62.5') SILT and CLAY, low to medium plasticity, no dilatancy; some fine sand; little granules to small pebbles, subrounded to subangular; dry; very stiff to stiff; dark gray (2.5Y 4/1) -Note: TILL -Note: begin to see fragments of shale starting at 58.0' bgs		
55	-55				0.0	×				
60	-60	7	57.0-62.0	5	0.0	×				

	Remarks: bgs = below ground surface
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Date Start: 12/4/15 Date Finish: 12/4/15 Drilling Company: Cascade Driller's Name: Mike Bond Drilling Method: Continuous Sampling Method: 5', 4" core barrel, 10' pushes Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 72' Surface Elevation: NA Descriptions By: Angela DeGrandis	Well/Boring ID: SB-A5.2-OC91 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Overcast, 38 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
68 - 68					0.0					
					0.0					
					0.0					
					0.0					
65 - 65		8	62.0-67.0	5	0.0			(62.5 - 68.5') Weathered SHALE and SANDSTONE; dark gray (2.5Y 4/1) to gray (2.5Y 5/1) -Note: pulverized and dry -Note: VAP sample collected from 62' - 67' at 1400 -Note: wet @ 67.0'		
					0.0					
					0.0					
					0.0					
					0.0					
70 - 70		9	67.0-72.0	4.58	0.0			(68.5 - 72.0') SANDSTONE, fine; natural fractures; gray (2.5Y 6/1), shale seams -Note: sandstone pulverized from rig from 69.5 - 70.5' bgs -Note: collect VAP sample from 67.0' - 72' at 1528		
					0.0					
					0.0					
					0.0					
					0.0					
75 - 75								End of Boring at 72.0' bgs		
80 - 80										

	Remarks: bgs = below ground surface
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Date Start: 12/7/15 Date Finish: 12/7/15 Drilling Company: Cascade Driller's Name: Mike Bond Drilling Method: Continuous Sampling Method: 5', 4" core barrel, 10' pushes Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 72' Surface Elevation: NA Descriptions By: Angela DeGrandis	Well/Boring ID: SB-A5.2-OC94 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Overcast, 27 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
					NA			(0.0 - 1.0') CONCRETE		
					0.3	X		(1.0 - 2.0') SAND, fine to medium, subround to subangular; little granules to small pebbles, subrounded to subangular; trace clay; poorly sorted; moist; brown (10YR 5/3)		
					0.9			(2.0 - 10.0') CLAY, high plasticity, no dilatancy; little fine to medium sand, subrounded to subangular; trace granules to medium pebbles, subround to subangular; dry to moist; stiff to very stiff; brown (10YR 5/3)		
5	-5	1	0.0-7.0	7	0.0	X				
					0.0	X				
					0.0					
					0.0					
					0.3	X				
					0.0					
					1.1					
10	-10				0.0	X		(10.0 - 13.0') SAND, fine to medium subrounded to subangular; trace granules, subround; little silt; poorly sorted; moist; dark yellowish brown (10YR 3/4)		
		2	7.0-17.0	10	3.5					
					0.7	X				
					0.0	X		(13.0 - 16.0') CLAY and SILT, medium plasticity, slow to medium dilatancy; little fine to medium sand, subround to subangular; subround; moist; gray (10YR 5/1) -Note: Yellowish Brown (10YR 5/8) from 12.5 to 13.0'bgs		
15	-15				0.0	X				
					0.0	X		(16.0 - 16.5') SAND, fine; and SILT, trace clay, non-plastic, slow dilatancy; poorly sorted; moist; gray (10YR 5/1)		
					0.0	X		(16.5 - 32.0') CLAY and SILT, medium to low plasticity, no to slow dilatancy; little granules to small pebbles, subround to subangular; moist; stiff; dark gray (2.5Y 4/1)		
					1.4					
					0.0					
					0.0	X				
20	-20				0.0					

	Remarks: bgs = below ground surface
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction															
-20	-20	3	17.0- 27.0	10	0.0																				
-21	-21				0.0																				
-22	-22				0.0	X																			
-23	-23				0.0																				
-24	-24				0.0																				
-25	-25				0.0	X																			
-26	-26	4	27.0- 37.0	9.33	0.0																				
-27	-27				0.9	X																			
-28	-28				0.1																				
-29	-29				0.0																				
-30	-30				0.0																				
-31	-31				0.0	X																			
-32	-32				0.0																				
-33	-33				0.0																				
-34	-34				0.0	X																			
-35	-35				0.0																				
-36	-36				0.0																				
-37	-37				0.0																				
-38	-38				0.0																				
-39	-39				0.0	X																			
-40	-40				0.0																				
-41	-41				0.0																				
-42	-42				0.0	X																			
-43	-43				0.0																				
-44	-44				0.0																				
-45	-45				0.0	X																			
-46	-46				0.0																				
-47	-47				0.1																				
-48	-48				0.0	X																			
-49	-49				0.0																				
-50	-50				0.1																				
-51	-51				0.0	X																			
-52	-52				0.0																				
-53	-53				0.1																				
-54	-54				0.0	X																			
-55	-55				0.0																				
-56	-56				0.1																				
-57	-57				0.0	X																			
-58	-58				0.0																				
-59	-59				0.1																				
-60	-60				0.0	X																			
-61	-61				0.0																				
-62	-62				0.1																				
-63	-63				0.0	X																			
-64	-64				0.0																				
-65	-65				0.1																				
-66	-66				0.0	X																			
-67	-67				0.0																				
-68	-68				0.1																				
-69	-69				0.0	X																			
-70	-70				0.0																				
-71	-71				0.1																				
-72	-72				0.0	X																			
-73	-73				0.0																				
-74	-74				0.1																				
-75	-75				0.0	X																			
-76	-76				0.0																				
-77	-77				0.1																				
-78	-78				0.0	X																			
-79	-79				0.0																				
-80	-80				0.1																				
-81	-81				0.0	X																			
-82	-82				0.0																				
-83	-83				0.1																				
-84	-84				0.0	X																			
-85	-85				0.0																				
-86	-86				0.1																				
-87	-87				0.0	X																			
-88	-88				0.0																				
-89	-89				0.1																				
-90	-90				0.0	X																			
-91	-91				0.0																				
-92	-92				0.1																				
-93	-93				0.0	X																			
-94	-94				0.0																				
-95	-95				0.1																				
-96	-96				0.0	X																			
-97	-97				0.0																				
-98	-98				0.1																				
-99	-99				0.0	X																			
-100	-100				0.0																				
-101	-101				0.1																				

	Remarks: bgs = below ground surface
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Date Start: 12/7/15 Date Finish: 12/7/15 Drilling Company: Cascade Driller's Name: Mike Bond Drilling Method: Continuous Sampling Method: 5', 4" core barrel, 10' pushes Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 72' Surface Elevation: NA Descriptions By: Angela DeGrandis	Well/Boring ID: SB-A5.2-OC94 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Overcast, 27 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
40		5	37.0-47.0	10	0.0	X				
					0.0					
					0.0			(42.0 - 44.5') SAND, very fine to fine; little granules to small pebbles, subround to subangular; and SILT, non-plastic; poorly sorted; dry; dark gray (2.5Y 4/1)		
					0.0	X				
45	-45				0.0			(44.5 - 45.5') SAND, fine to medium, subround to subangular; trace silt; well sorted; dry; gray (2.5Y 4/1)		
					0.0			(45.5 - 47.0') SAND, very fine to fine; little granules to small pebbles, subround to subangular; and SILT; poorly sorted; dry; dark gray (2.5Y 4/1)		
					0.0	X				
		6	47.0-57.0	10	0.0			(47.0 - 61.0') SILT, little clay, non-plastic; little fine sand; trace granules to small cobble, subangular; stiff; moist; dark gray (10YR 4/1)		
					0.0					
					0.0	X				
50	-50				0.0					
					0.0	X				
					0.0					
					0.0	X				
55	-55				0.0					
					0.0	X				
					0.0					
					0.0	X				
60	-60				0.0					

	Remarks: bgs = below ground surface
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Date Start: 12/8/15 Date Finish: 12/9/15 Drilling Company: Cascade Driller's Name: Mike Bond Drilling Method: Continuous Sampling Method: 5', 4" core barrel, 10' pushes Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 72' Surface Elevation: NA Descriptions By: Angela DeGrandis	Well/Boring ID: SB-A5.2-OE113 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Overcast, 45 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
					NA			(0.0 - 1.5') CONCRETE		
					0.0	×		(1.5 - 3.0') SAND, fine to medium, subrounded to subangular; little granules to small pebbles, subrounded to subangular; trace medium to large pebbles, subrounded; trace clay; poorly sorted; moist; very dark gray (10YR 3/1)		
		1	0.0-7.0	7	0.0	×		(3.0 - 20.5') CLAY, some silt, high plasticity, no to slow dilatancy; trace granules, subround; moist; medium stiff; very dark gray (2.5Y 3/1) -Note: green staining from 7-10' bgs -Note: color change to Gray (2.5Y 5/1) at 6.0' bgs		
-5	-5				0.0	×				
					0.0	×				
					0.0	×				
-10	-10				0.0	×				
		2	7.0-17.0	10	0.0	×				
					0.0	×				
					0.0	×				
					0.0	×				
-15	-15				0.0	×				
					0.0	×				
					0.0	×				
					0.0	×				
-20	-20				0.0	×				

	Remarks: bgs = below ground surface
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Date Start: 12/8/15 Date Finish: 12/9/15 Drilling Company: Cascade Driller's Name: Mike Bond Drilling Method: Continuous Sampling Method: 5', 4" core barrel, 10' pushes Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 72' Surface Elevation: NA Descriptions By: Angela DeGrandis	Well/Boring ID: SB-A5.2-OE113 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Overcast, 45 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
20.5		3	17.0-27.0	10	0.0	X		(20.5 - 21.5') SAND, fine to medium, subrounded to subangular; trace granules, subrounded to subangular; little silt; poorly sorted; moist; dark gray (2.5Y 4/1)		
21.5					0.0	X		(21.5 - 23.0') SILT, little clay, non-plastic, medium dilatancy; some fine sand; moist; gray (2.5Y 5/1)		
23.0					0.0	X		(23.0 - 36.5') CLAY and SILT, medium to high plasticity, slow dilatancy; little to some fine to medium sand, subrounded to subangular; moist; medium stiff; gray (2.5Y 5/1)		
25	-25	4	27.0-37.0	10	0.0	X				
					0.0	X				
					0.0	X				
30	-30				0.0	X				
					0.0	X				
					0.0	X				
35	-35				0.0	X		(36.5 - 37.0') SAND, fine to medium, subrounded to subangular; trace granules; trace clay; poorly sorted; dry to moist; gray (2.5Y 5/1)		
					0.0	X		(37.0 - 39.0') CLAY, low to medium plasticity, slow dilatancy; and SAND, fine; trace granules to small pebbles, subrounded to subangular; poorly sorted; moist; gray (2.5Y 5/1)		
					0.0	X		(39.0 - 53.0') SAND, fine to medium, subrounded to subangular; trace granules to small pebbles, subrounded; well sorted; dry to moist; gray (2.5Y 5/1)		

	Remarks: bgs = below ground surface
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Date Start: 12/8/15 Date Finish: 12/9/15 Drilling Company: Cascade Driller's Name: Mike Bond Drilling Method: Continuous Sampling Method: 5', 4" core barrel, 10' pushes Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 72' Surface Elevation: NA Descriptions By: Angela DeGrandis	Well/Boring ID: SB-A5.2-OE113 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Overcast, 45 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
40		5	37.0-47.0	8.3	0.0	×				
41					0.7					
42					0.0					
43					0.4	×				
44					0.7					
45	-45	6	47.0-57.0	7.5	0.2					
46					1.1	×				
47					0.0					
48					0.0					
49					1.0	×				
50	-50	7	57.0-62.0	5	0.8			(53.0 - 58.0') SAND, fine to medium, subrounded to subangular; little granules to medium pebbles, subrounded to subangular; trace large pebbles, subrounded; and SILT; poorly sorted; dry; gray (2.5Y 5/1)		
51					1.1					
52					0.4	×				
53					1.6					
54					0.4					
55	-55				0.6	×		(58.0 - 64.0') SILT, little to some clay, low plasticity, no dilatancy; little fine sand; little granules to medium pebbles, subrounded to subangular; dry; stiff; dark gray (2.5Y 4/1)		
56					1.7					
57					0.8	×				
58					0.8					
59					2.5					

	Remarks: bgs = below ground surface
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Northings: NA
Easting: NA
Casing Elevation: NA

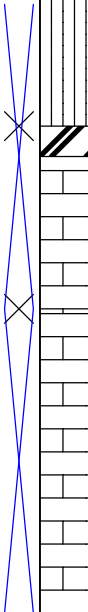
Borehole Depth (ft. bgs.): 72'
Surface Elevation: NA

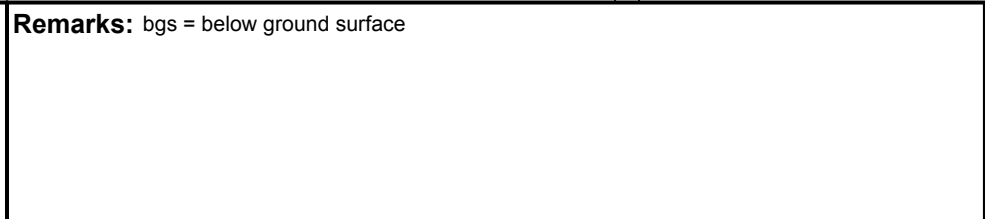
Descriptions By: Angela DeGrandis

Northings: NA
Easting: NA
Casing Elevation: NA

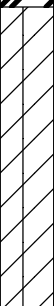
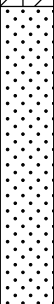
Borehole Depth (ft. bgs.): 72'
Surface Elevation: NA

Descriptions By: Angela DeGrandis

DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
63 - 68					0.0 0.1	✕				
65 - 65		8	62.0-67.0	5	3.5 16.9 2.6 2.1 1.3	✕		(64.0 - 64.5') CLAY, some silt, medium to high plasticity, rapid dilatancy; little fine to medium sand, subround to subangular; trace granules to small pebbles, subangular; soft; wet; very dark gray (2.5Y 3/1) (64.5 - 67.0') Weathered SANDSTONE, fine to very fine; gray (2.5Y 6/1) -Note: VAP sample from 62'- 67" collected at 0822 on 12/9/15		
70 - 70		9	67.0-72.0	5	0.0 1.5 0.0 0.0 0.0	✕		(67.0 - 72.0') SANDSTONE and SHALE, heavily weathered and interbedded; dry; gray (2.5Y 6/1) -Note: VAP sample from 67"-72' collected at 0916		
75 - 75								End of Boring at 72.0' bgs		



Date Start: 12/7/15 Date Finish: 12/8/15 Drilling Company: Cascade Driller's Name: Mike Bond Drilling Method: Continuous Sampling Method: 5', 4" core barrel, 10' pushes Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 72' Surface Elevation: NA Descriptions By: Alex Villhauer	Well/Boring ID: SB-A5.2-OF107 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Overcast, 30 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
					0.0	×		(0.0 - 0.5') Concrete		
					0.0			(0.5 - 2.0') SAND, fine; some granules to small pebbles, subangular to subrounded; trace clay; moist; dark brown (10YR 3/3)		
		1	0.0-7.0	7	0.0	×		(2.0 - 7.0') CLAY, little silt, medium plasticity; trace fine sand; trace granules to medium pebbles, subangular; moist; soft; brown (10YR 4/3) -Note: green staining		
-5	-5				0.0					
					0.0	×		(7.0 - 12.0') SILT and CLAY, low plasticity; trace granules to small pebbles, subangular; trace fine sand; moist; stiff; brown (10YR 5/3) -Note: infilled fractures throughout vertical and horizontal		
-10	-10				0.0	×				
		2	7.0-17.0	10	0.0			(12.0 - 17.0') SAND, fine to medium; well sorted; wet; brown (10YR 5/3) -Note: silt section at 14.5 and 16.0' -Note: sweet odor		
-15	-15				0.4	×				
					3.0					
					1.4	×				
					0.4					
					0.0			(17.0 - 26.5') CLAY, some silt, medium plasticity; trace fine sand; trace granules to medium pebbles, subangular; moist; medium stiff; gray (10YR 5/1)		
-20	-20				0.0	×				
					0.0					
					0.0					

	Remarks: bgs = below ground surface
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Well/Boring ID: SB-A5.2-OF107

Client: RACER

Location: RACER Lansing Plant 2

Weather Conditions: Overcast, 30 F

 ARCADIS Infrastructure · Water · Environment · Buildings	Remarks: bgs = below ground surface
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Date Start: 12/7/15 Date Finish: 12/8/15 Drilling Company: Cascade Driller's Name: Mike Bond Drilling Method: Continuous Sampling Method: 5', 4" core barrel, 10' pushes Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 72' Surface Elevation: NA Descriptions By: Alex Villhauer	Well/Boring ID: SB-A5.2-OF107 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Overcast, 30 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
40		5	37.0-47.0	6	0.0	X				
					0.0					
					0.0	X				
45	-45				0.0					
					0.0					
					0.0	X				
					0.0			(47.0 - 50.0') SILT, non-plastic; little fine sand; trace granules small pebbles, subangular; dry; brown (10YR 5/3)		
					0.0					
50	-50	6	47.0-54.0	7	0.0	X				
					0.0					
					0.0			(50.0 - 62.0') SILT, little clay, low plasticity; little fine sand; little granule to small cobbles, subangular; moist; stiff; dark gray (10YR 4/1)		
					0.0					
					0.0	X				
55	-55				0.0					
					0.0					
		7	54.0-60.0	6	0.0	X				
					0.0					
					0.0					
					0.0					
60	-60				0.0					

	Remarks: bgs = below ground surface
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Date Start: 12/9/15 Date Finish: 12/9/15 Drilling Company: Cascade Driller's Name: Mike Bond Drilling Method: Continuous Sampling Method: 5', 4" core barrel, 10' pushes Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 72' Surface Elevation: NA Descriptions By: Angela DeGrandis	Well/Boring ID: SB-A5.2-OG118 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Partly Cloudy 45 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
					NA			(0.0 - 1.5') CONCRETE		
					0.0	X		(1.5 - 3.0') CLAY, some silt, medium plasticity, slow dilatancy; little fine to medium sand, subrounded to subangular; trace granules, subangular; moist; very stiff; very dark grayish brown (2.5Y 4/2)		
					0.0	X		(3.0 - 3.5') SAND, fine to medium, subrounded to subangular; little granules, subangular; trace silt; poorly sorted; moist; very dark gray (2.5Y 3/1)		
		1	0.0-7.0	7	0.0	X		(3.5 - 9.0') CLAY and SILT, medium plasticity, no to slow dilatancy; trace granules, subround; moist; medium stiff; very dark gray (2.5Y 3/1) -Note: color change to Gray (2.5Y 5/1) at 7.0' bgs		
-5	-5				0.0					
					0.0	X				
					0.0					
					0.0	X				
					0.0					
-10	-10				0.0	X		(9.0 - 12.0') SAND, fine to medium, subround to subangular; trace granules, subround; some silt; poorly sorted; moist; gray (2.5Y 5/1)		
					0.0	X				
		2	7.0-17.0	10	0.0	X		(12.0 - 20.0') CLAY, some silt, high plasticity, no to slow dilatancy; little fine to medium sand, subrounded to subangular; trace granules to small pebbles, subrounded to subangular; moist; stiff to medium stiff, gray (2.5Y 5/1)		
					0.0					
					0.0	X				
-15	-15				0.0					
					0.0	X				
					0.0					
					0.0	X				
					0.0					
					0.0	X				
-20	-20				0.0					

	Remarks: bgs = below ground surface
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Date Start: 12/9/15 Date Finish: 12/9/15 Drilling Company: Cascade Driller's Name: Mike Bond Drilling Method: Continuous Sampling Method: 5', 4" core barrel, 10' pushes Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 72' Surface Elevation: NA Descriptions By: Angela DeGrandis	Well/Boring ID: SB-A5.2-OG118 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Partly Cloudy 45 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
20	-20	3	17.0-27.0	8.3	0.0			(20.0 - 26.0') SAND, fine to medium, subrounded to subangular; trace granules to medium pebbles, subround to subangular; and SILT, some to little clay; poorly sorted; moist to wet; gray (2.5Y 5/1)		
21	-21				0.0					
22	-22				0.0					
23	-23				0.0	X				
24	-24				0.0					
25	-25	4	27.0-37.0	10	0.0			(26.0 - 36.5') CLAY and SILT, medium to high plasticity, slow dilatancy; little to some fine to medium sand, subround to subangular; moist; stiff to very stiff; gray (2.5Y 5/1)		
26	-26				0.0	X				
27	-27				0.0					
28	-28				0.0					
29	-29				0.0					
30	-30				0.0	X				
31	-31				0.0					
32	-32				0.0					
33	-33				0.0					
34	-34				0.0	X				
35	-35				0.0			(36.5 - 57.0') SAND, fine to medium, subround to subangular; trace granules to large pebbles, subrounded to subangular; trace silt; poorly sorted; dry to moist; grayish brown (2.5Y 5/2) -Note: very dry at 49' to 51' bgs		
36	-36				4.4					
37	-37				3.2					
38	-38				6.0	X				

	Remarks: bgs = below ground surface
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Date Start: 12/9/15 Date Finish: 12/9/15 Drilling Company: Cascade Driller's Name: Mike Bond Drilling Method: Continuous Sampling Method: 5', 4" core barrel, 10' pushes Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 72' Surface Elevation: NA Descriptions By: Angela DeGrandis	Well/Boring ID: SB-A5.2-OG118 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Partly Cloudy 45 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
45	-45	5	37.0-47.0	7.5	4.1					
					4.3					
					2.3					
					2.1	X				
					5.2					
					9.0					
					5.2					
					8.0	X				
					5.1					
50	-50				3.9					
					3.2					
					3.3	X				
		6	47.0-57.0	5	1.8					
					0.7					
55	-55				0.6					
					1.2	X				
					1.5					
					0.0			(57.0 - 62.0') SILT, little to some clay, low plasticity, no dilatancy; little fine sand; some granules to medium pebbles, subround to subangular; dry; dark gray (2.5Y 4/1)		
					0.0					
					0.0	X				

	Remarks: bgs = below ground surface
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Northings: NA
Easting: NA
Casing Elevation: NA

Borehole Depth (ft. bgs.): 72'
Surface Elevation: NA

Descriptions By: Angela DeGrandis

Northings: NA
Easting: NA
Casing Elevation: NA

Borehole Depth (ft. bgs.): 72'
Surface Elevation: NA

Descriptions By: Angela DeGrandis

DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
63 - 68		7	57.0-64.0	7	0.0					
					0.0					
					0.0			(62.0 - 66.0') SANDSTONE and SHALE, heavily weathered; interbedded; dry; dark gray (2.5Y 4/1)		
					0.0					
65 - 65		8	64.0-67.0	3	0.0					
					0.7			(66.0 - 68.5') Weathered SANDSTONE, fine to very fine; moist; gray (2.5Y 6/1) -Note: VAP sample from 62'-67' collected at 1338		
					0.0					
					2.6					
					2.2					
70 - 70		9	67.0-72.0	5	2.0			(68.5 - 72.0') SANDSTONE and SHALE, heavily weathered and interbedded; dry; dark gray (2.5Y 4/1) -Note: VAP sample from 67'-72' collected at 1435 -Note: moist to wet from 67'-69.5' bgs		
					2.0					
					1.9					
75 - 75								End of Boring at 72.0' bgs		

Remarks: bgs = below ground surface

Date Start: 12/7/15 Date Finish: 12/8/15 Drilling Company: Cascade Driller's Name: Dave Gordon Drilling Method: Continuous Sampling Method: 5', 5" core barrel Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 80' Surface Elevation: NA Descriptions By: Austin Westhuis	Well/Boring ID: SB-A5.2-OG124 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Cloudy, 35 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
					0.0			(0.0 - 3.0') CONCRETE		
		1	0.0-5.0	5	0.0	×		(3.0 - 5.0') SAND, very fine to medium, subround; little to some granules to large pebbles, subround; and SILT, trace to little clay, non-plastic, no dilatancy; poorly sorted; dry to moist; dark yellowish brown (10YR 3/4) -Note: fill material		
5	-5				0.0			(5.0 - 9.0') SAND, very fine to medium, subround; little granules to large pebbles, subangular; some silt, trace clay; poorly sorted; moist; very dark gray (10YR 3/1) to very dark grayish brown (10YR 3/2) -Note: slight odor from 7'-9', fill material, trace metal debris		
		2	5.0-10.0	5	0.3	×				
					1.2					
					5.3					
10	-10				0.0	×		(9.0 - 31.0') CLAY, some silt, medium to high plasticity, no dilatancy; trace to little fine sand, subround; trace granules to large pebbles, subround; moist; medium stiff to stiff; gray (10YR 5/1)		
		3	10.0-15.0	5	0.0					
					0.0					
					0.0					
15	-15				0.0	×				
		4	15.0-20.0	5	0.0					
					0.0	×				
					0.0					
					0.0					
20	-20				0.0					

	Remarks: bgs = below ground surface Slight odor observed from 7'-9', No staining noted.
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Date Start: 12/7/15 Date Finish: 12/8/15 Drilling Company: Cascade Driller's Name: Dave Gordon Drilling Method: Continuous Sampling Method: 5', 5" core barrel Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 80' Surface Elevation: NA Descriptions By: Austin Westhuis	Well/Boring ID: SB-A5.2-OG124 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Cloudy, 35 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
20	-20	5	20.0-25.0	5	0.0	X				
25	-25	6	25.0-30.0	5	0.0	X				
30	-30	7	30.0-35.0	5	0.0	X		(31.0 - 31.5') SAND, very fine to fine, subround; little silt; well sorted; wet; light gray (10YR 7/2) to grayish brown (10YR 5/2)		
35	-35	8	35.0-40.0	5	0.0	X		(31.5 - 36.0') CLAY, little to some silt, medium to high plasticity, no dilatancy; trace fine sand, subround; trace granules to small pebbles, subround; moist; medium stiff to soft; grayish brown (10YR 5/2)		
40	-40				0.0	X		(36.0 - 39.0') CLAY and SILT, medium to low plasticity, no dilatancy; some fine sand, subround; trace granules to large pebbles, subround; dry to moist; grayish brown (10YR 5/2)		
45	-45				0.0	X		(39.0 - 61.0') SAND, fine, subround; little silt; well sorted; dry to moist; light brownish gray (10YR 6/2)		

	Remarks: bgs = below ground surface Slight odor observed from 7'-9', No staining noted.
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Date Start: 12/7/15 Date Finish: 12/8/15 Drilling Company: Cascade Driller's Name: Dave Gordon Drilling Method: Continuous Sampling Method: 5', 5" core barrel Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 80' Surface Elevation: NA Descriptions By: Austin Westhuis	Well/Boring ID: SB-A5.2-OG124 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Cloudy, 35 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
40		9	40.0-45.0	5	0.0	X				
					0.0					
					0.0					
					0.0	X				
45	-45	10	45.0-50.0	4	0.0					
					0.0					
					0.0	X				
					0.0					
50	-50	11	50.0-55.0	4	0.0					
					0.0					
					0.0	X				
					0.0					
55	-55	12	55.0-60.0	4	0.0					
					0.0	X				
					0.0					
					0.0					
60	-60				0.0					

	Remarks: bgs = below ground surface Slight odor observed from 7'-9', No staining noted.
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Date Start: 12/7/15 Date Finish: 12/8/15 Drilling Company: Cascade Driller's Name: Dave Gordon Drilling Method: Continuous Sampling Method: 5', 5" core barrel Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 80' Surface Elevation: NA Descriptions By: Austin Westhuis	Well/Boring ID: SB-A5.2-OG124 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Cloudy, 35 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
60 - 65		13	60.0-65.0	5	0.0 0.0 0.0 0.0	X		(61.0 - 63.0') SAND, very fine to fine, subround; and SILT; poorly sorted; dry to moist; dark grayish brown (10YR 4/2) -Note: little sandstone fragments		
					0.0 0.0	X		(63.0 - 65.0') SANDSTONE, weathered, fine; light gray (10YR 7/2); little to some shale; dark gray (10YR 4/1) -Note: dry to moist		
		14	65.0-70.0	5	0.0 0.0 0.0 0.0	X		(65.0 - 69.5') SHALE, weathered; dark gray (10YR 4/1); trace sandstone		
70 - 75		15	70.0-75.0	5	0.0 0.0 0.0 0.0			(69.5 - 80.0') SANDSTONE, large fragments, fine; white (10YR 8/1); wet Note: VAP sample collected from 70-75' bgs.		
		16	75.0-80.0	5	0.0 0.0 0.0 0.0			Note: VAP sample collected from 75-80' bgs.		

	Remarks: bgs = below ground surface Slight odor observed from 7'-9', No staining noted.
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Date Start: 12/7/15 Date Finish: 12/8/15 Drilling Company: Cascade Driller's Name: Dave Gordon Drilling Method: Continuous Sampling Method: 5', 5" core barrel Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 80' Surface Elevation: NA Descriptions By: Austin Westhuis	Well/Boring ID: SB-A5.2-OG124 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Cloudy, 35 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
80								End of Boring at 80' bgs		
85	-85									
90	-90									
95	-95									
100	-100									

	Remarks: bgs = below ground surface Slight odor observed from 7'-9', No staining noted.
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Date Start: 11/30/15
Date Finish: 12/1/15
Drilling Company: Cascade
Driller's Name: Dave Gordon
Drilling Method: Continuous
Sampling Method: 5', 5" core barrel
Rig Type: Sonic
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA

Northing: NA
Easting: NA
Casing Elevation: NA

Borehole Depth (ft. bgs.): 75'
Surface Elevation: NA

Descriptions By: Austin Westhuis

Well/Boring ID: SB-A5.3-PA94
Client: RACER

Location: RACER Lansing Plant 2

Weather Conditions: Partly Cloudy, 35 F

DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
0	0				0.0	×	(0.0 - 1.0') CONCRETE			
		1	0.0-5.0	5	0.0	×	(1.0 - 2.5') SAND, fine to medium, trace coarse sand, subround; trace granules to medium pebbles subround; well sorted; dry; yellowish brown (10YR 5/4)			
					0.0	×	(2.5 - 12.0') CLAY, some silt, high plasticity, no dilatancy; little to trace fine sand, subround; trace granules to medium pebbles, subround; dry; medium stiff to stiff; brown (10YR 4/3)			
5	-5	2	5.0-10.0	5	0.0	×				
					0.0	×				
					0.0	×				
10	-10	3	10.0-15.0	5	0.0	×	(12.0 - 12.5') SAND, fine, subround; trace granules subround; little to some silt; well sorted; dry to moist; grayish brown (10YR 5/2)			
					0.0	×	(12.5 - 15.0') SILT, some clay, low plasticity to non-plastic, slow dilatancy; little to some fine sand; trace granules to medium pebbles, subround; moist; medium stiff; gray (10YR 5/1)			
					0.0	×				
15	-15	4	15.0-20.0	5	0.0	×	(15.0 - 18.0') SAND, fine, subround; trace granules, subround; trace silt; well sorted; dry to moist; light gray (10YR 7/2)			
					0.0	×				
					0.0	×	(18.0 - 25.0') CLAY, little silt, medium to high plasticity, no dilatancy; trace very fine to fine sand, subround; trace granules to small pebbles, subround; moist; stiff to soft; gray (10YR 5/1)			
20	-20				0.0	×				

Remarks: bgs = below ground surface



Date Start: 11/30/15 Date Finish: 12/1/15 Drilling Company: Cascade Driller's Name: Dave Gordon Drilling Method: Continuous Sampling Method: 5', 5" core barrel Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 75' Surface Elevation: NA Descriptions By: Austin Westhuis	Well/Boring ID: SB-A5.3-PA94 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Partly Cloudy, 35 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
0 - 5		5	20.0-25.0	5	0.0 0.0 0.0 0.0 0.0	X 				
25 - 25		6	25.0-30.0	5	0.0 0.0 0.0 0.0 0.0	X 		(25.0 - 35.0') SAND, fine, subround; trace granules, subround; trace silt; well sorted; dry to moist; light gray (10YR 7/2)		
30 - 30		7	30.0-35.0	5	0.0 0.0 0.0 0.0 0.0	X 				
35 - 35		8	35.0-40.0	5	0.0 0.0 0.0 0.0 0.0	X 		(35.0 - 45.0') CLAY and SILT, low plasticity to non-plastic; some fine sand, subround; trace to little granules to large pebbles, subround; dry to moist; stiff to very stiff; gray (10YR 5/1)		

	Remarks: bgs = below ground surface
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Date Start: 11/30/15 Date Finish: 12/1/15 Drilling Company: Cascade Driller's Name: Dave Gordon Drilling Method: Continuous Sampling Method: 5', 5" core barrel Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 75' Surface Elevation: NA Descriptions By: Austin Westhuis	Well/Boring ID: SB-A5.3-PA94 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Partly Cloudy, 35 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
40		9	40.0-45.0	5	0.0	X				
					0.0					
					0.0					
					0.0	X				
					0.0					
45	-45	10	45.0-50.0	5	0.0	X		(45.0 - 49.0') SAND, very fine to fine, subround; some silt; well sorted; dry to moist; light gray (10YR 7/2)		
					0.0					
					0.0					
					0.0	X				
					0.0					
					0.0					
50	-50	11	50.0-55.0	5	0.0	X		(49.0 - 60.0') CLAY and SILT, low plasticity to non-plastic, no dilatancy; some fine sand, subround; little granules to large pebbles, subround; dry to moist; stiff to very stiff; dark gray (10YR 4/1) -Note: trace fine sandstone fragments		
					0.0					
					0.0					
					0.0	X				
					0.0					
					0.0					
55	-55	12	55.0-60.0	4	0.0	X				
					0.0					
					0.0					
					0.0	X				
					0.0					
60	-60				0.0					

	Remarks: bgs = below ground surface
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Date Start: 11/30/15 Date Finish: 12/1/15 Drilling Company: Cascade Driller's Name: Dave Gordon Drilling Method: Continuous Sampling Method: 5', 5" core barrel Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 75' Surface Elevation: NA Descriptions By: Austin Westhuis	Well/Boring ID: SB-A5.3-PA94 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Partly Cloudy, 35 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
60 - 65		13	60.0-65.0	5	0.0 0.0 0.0 0.0 0.0			(60.0 - 65.0') Weathered SANDSTONE, very fine to fine; light gray (10YR 7/2) Note: VAP sample collected from 60-65' bgs. at 1025		
65 - 65		14	65.0-70.0	5	0.0 0.0 0.0 0.0 0.0			(65.0 - 70.0') SHALE, dark gray (10YR 4/1), little to some fine sandstone; light gray (10YR 7/2)		
70 - 70		15	70.0-75.0	5	0.0 0.0 0.0 0.0 0.0			(70.0 - 73.0') Weathered SANDSTONE, very fine to fine; light gray (10YR 7/2) Note: VAP sample collected from 70-75' bgs. at 1425 (73.0 - 75.0') SHALE and SANDSTONE, dark gray (10YR 4/1) to light gray (10YR 7/2)		
75 - 75								End of Boring at 75' bgs		

	Remarks: bgs = below ground surface
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Date Start: 12/1/15
Date Finish: 12/2/15
Drilling Company: Cascade
Driller's Name: Dave Gordon
Drilling Method: Continuous
Sampling Method: 5', 5" core barrel
Rig Type: Sonic
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA

Northing: NA
Easting: NA
Casing Elevation: NA

Borehole Depth (ft. bgs.): 75'
Surface Elevation: NA

Descriptions By: Austin Westhuis

Well/Boring ID: SB-A5.3-PA98
Client: RACER

Location: RACER Lansing Plant 2

Weather Conditions: Cloudy, light rain, 35 F

DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
0	0				0.0	×		(0.0 - 1.0') CONCRETE		
		1	0.0-5.0	5	0.0	×		(1.0 - 4.0') SAND, fine, subround; trace granules, subround; trace silt; well sorted; dry; very pale brown (10YR 7/4)		
					0.0	×		(4.0 - 5.0') CONCRETE		
5	-5				0.0	×		(5.0 - 7.0') SAND, fine, subround; trace granules to small pebbles, subround; trace silt; well sorted; moist; very pale brown (10YR 7/4)		
		2	5.0-10.0	5	0.0	×		(7.0 - 9.0') SILT, some clay, low plasticity, no dilatancy; little fine sand, subround; moist; soft; dark brown (10YR 3/3) - Note: organic rich		
					0.0	×		(9.0 - 20.0') CLAY, some silt, high plasticity, no dilatancy; little granules to medium pebbles, subround; trace fine sand, subround; dry to moist; medium stiff; gray (10YR 5/1)		
10	-10				0.0	×				
		3	10.0-15.0	5	0.0	×				
					0.0	×				
15	-15				0.0	×				
		4	15.0-20.0	5	0.0	×				
					0.0	×				
					0.0	×				
20	-20				0.0	×				

Remarks: bgs=below ground surface
 No observed odors or stains



Date Start: 12/1/15 Date Finish: 12/2/15 Drilling Company: Cascade Driller's Name: Dave Gordon Drilling Method: Continuous Sampling Method: 5', 5" core barrel Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 75' Surface Elevation: NA Descriptions By: Austin Westhuis	Well/Boring ID: SB-A5.3-PA98 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Cloudy, light rain, 35 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
20.0	-25.0	5	20.0-25.0	5	0.0	X	(20.0 - 22.5') SAND, very fine to medium, subround; trace granules to large pebbles, subround; some silt; poorly sorted; wet; gray (10YR 5/1)			
22.5	-25.0				0.0	X	(22.5 - 27.0') CLAY, some silt, medium to high plasticity, no dilatancy; trace granules to medium pebbles, subround; little fine sand, subrounded; moist; medium stiff to stiff; gray (10YR 5/1)			
25.0	-25.0				0.0	X				
27.0	-25.0	6	25.0-30.0	5	0.0	X	(27.0 - 28.5') SAND, very fine to fine, subround; some silt; well sorted; wet; light gray (10YR 7/1)			
28.5	-25.0				0.0	X	(28.5 - 31.0') CLAY, some silt, high plasticity, no dilatancy; trace granules to large pebbles, subround; little fine sand, subrounded; moist; medium stiff; gray (10YR 5/1)			
30.0	-25.0				0.0	X				
31.0	-25.0	7	30.0-35.0	5	0.0	X	(31.0 - 33.5') SILT, trace clay, non-plastic, slow dilatancy; some fine sand, subround; well sorted; moist to wet; medium stiff; gray (10YR 5/1)			
33.5	-25.0				0.0	X	(33.5 - 40.0') SAND, very fine to fine, subround; little to some silt; well sorted; dry to moist; light gray (10YR 7/2)			
35.0	-25.0	8	35.0-40.0	5	0.0	X				
37.5	-25.0				0.0	X				
40.0	-25.0				0.0	X				

	Remarks: bgs=below ground surface No observed odors or stains
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Date Start: 12/1/15 Date Finish: 12/2/15 Drilling Company: Cascade Driller's Name: Dave Gordon Drilling Method: Continuous Sampling Method: 5', 5" core barrel Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 75' Surface Elevation: NA Descriptions By: Austin Westhuis	Well/Boring ID: SB-A5.3-PA98 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Cloudy, light rain, 35 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
40.0					0.0	X		(40.0 - 42.0') SILT, trace clay; some very fine to fine sand, subround; well sorted; medium stiff; moist; gray (10YR 5/1)		
42.0		9	40.0-45.0	5	0.0	X		(42.0 - 44.5') SAND, fine to very fine, subround; little silt; well sorted; dry; light gray (10YR 7/2)		
44.5	-45				0.0	X		(44.5 - 47.5') CLAY, some silt, medium to high plasticity, no dilatancy; trace fine sand; trace granules to small pebbles, subround; medium stiff; moist; gray (10YR 5/1)		
47.5		10	45.0-50.0	5	0.0	X		(47.5 - 48.5') SAND, very fine; some silt; well sorted; moist; light gray (10YR 7/2)		
48.5					0.0	X		(48.5 - 60.0') SANDSTONE, weathered, very fine to fine; light gray (10YR 7/2); trace shale fine laminations		
50.0	-50				0.0	X				
55.0	-55	11	50.0-55.0	5	0.0	X				
55.0					0.0	X				
55.0		12	55.0-60.0	5	0.0	X				
60.0	-60				0.0	X				

	Remarks: bgs=below ground surface No observed odors or stains
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Date Start: 12/1/15 Date Finish: 12/2/15 Drilling Company: Cascade Driller's Name: Dave Gordon Drilling Method: Continuous Sampling Method: 5', 5" core barrel Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 75' Surface Elevation: NA Descriptions By: Austin Westhuis	Well/Boring ID: SB-A5.3-PA98 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Cloudy, light rain, 35 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
60 - 65		13	60.0-65.0	5	0.0 0.0 0.0 0.0 0.0			(60.0 - 65.0') SANDSTONE, weathered, very fine to fine; light gray (10YR 7/2), trace shale fine lamination		
65 - 65		14	65.0-70.0	5	0.0 0.0 0.0 0.0 0.0			(65.0 - 68.0') SANDSTONE, weathered Note: VAP sample collected from 65-70' bgs. at 1330. (68.0 - 75.0') SANDSTONE, weathered; and SHALE		
70 - 70		15	70.0-75.0	5	0.0 0.0 0.0 0.0 0.0			Note: VAP sample collected from 70-75' bgs. at 1425		
75 - 75								End of Boring at 75' bgs		

	Remarks: bgs=below ground surface No observed odors or stains
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Date Start: 12/2/15 Date Finish: 12/3/15 Drilling Company: Cascade Driller's Name: Dave Gordon Drilling Method: Continuous Sampling Method: 5', 5" core barrel Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 75' Surface Elevation: NA Descriptions By: Austin Westhuis	Well/Boring ID: SB-A5.3-PA104 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Cloudy, 35 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
0	0				0.0	×		(0.0 - 1.0') CONCRETE		
		1	0.0-5.0	5	0.0	×		(1.0 - 4.0') SAND, fine, subround; trace granules to medium pebbles, subround; trace to little silt; well sorted; dry to moist; yellowish brown (10YR 5/6)		
					0.0	×		(4.0 - 5.0') CONCRETE		
5	-5				0.0	×		(5.0 - 7.0') SAND, fine, subround; trace granules to small pebbles, subround; trace silt; well sorted; moist; light yellowish brown (10YR 7/4)		
		2	5.0-10.0	5	0.4	×		(7.0 - 8.0') SAND, fine, subround; little granules to small pebbles, subround; little to some silt; poorly sorted; moist; dark brown (10YR 3/3) -Note: slight odor, trace metal debris		
					0.6	×		(8.0 - 15.0') SILT, some clay, low plasticity, no dilatancy; little fine sand, subround; moist; soft; dark brown (10YR 3/3) -Note: organic rich		
10	-10				0.0	×				
		3	10.0-15.0	5	0.0	×				
					0.0	×				
					0.0	×				
15	-15				0.0	×		(15.0 - 27.0') CLAY, some silt, high plasticity, no dilatancy; trace granules to small pebbles, subround; trace fine sand, subround; moist; medium stiff; gray (10YR 5/1)		
		4	15.0-20.0	5	0.0	×				
					0.0	×				
					0.0	×				
20	-20				0.0	×				

	Remarks: bgs = below ground surface Slight odor at 7' bgs, no staining observed
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Date Start: 12/2/15 Date Finish: 12/3/15 Drilling Company: Cascade Driller's Name: Dave Gordon Drilling Method: Continuous Sampling Method: 5', 5" core barrel Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 75' Surface Elevation: NA Descriptions By: Austin Westhuis	Well/Boring ID: SB-A5.3-PA104 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Cloudy, 35 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
20	-25	5	20.0-25.0	5	0.0	×				
25	-25				0.0	×				
		6	25.0-30.0	5	0.0	×		(27.0 - 28.0') SAND, fine to very coarse, subround; poorly sorted; wet; light gray (10YR 7/2) to grayish brown (10YR 5/2)		
					0.0	×		(28.0 - 29.0') SILT, little clay, low plasticity to non-plastic, no dilatancy; little fine sand, subround; stiff; moist; gray (10YR 5/1)		
30	-30				0.0	×		(29.0 - 31.0') SAND, very fine to fine; little silt; well sorted; wet; grayish brown (10YR 5/2)		
		7	30.0-35.0	5	0.0	×		(31.0 - 32.5') SAND, fine to coarse, subround; little granules, subround; little silt; poorly sorted; wet; grayish brown (10YR 5/2)		
					0.0	×		(32.5 - 34.0') SILT; and SAND, very fine, subround; well sorted; wet; medium stiff to soft; grayish brown (10YR 5/2)		
35	-35				0.0	×		(34.0 - 40.0') CLAY, little silt, high plasticity, no dilatancy; trace fine sand; trace granules to large pebbles, subround; medium stiff; gray (10YR 5/1)		
		8	35.0-40.0	5	0.0	×				
					0.0	×				
40	-40				0.0	×				

	Remarks: bgs = below ground surface Slight odor at 7' bgs, no staining observed
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Date Start: 12/2/15 Date Finish: 12/3/15 Drilling Company: Cascade Driller's Name: Dave Gordon Drilling Method: Continuous Sampling Method: 5', 5" core barrel Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 75' Surface Elevation: NA Descriptions By: Austin Westhuis	Well/Boring ID: SB-A5.3-PA104 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Cloudy, 35 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
40.0 - 45.0		9	40.0-45.0	5	0.0 0.0 0.0 0.0 0.0	X 		(40.0 - 45.0') SAND, very fine to fine, subround; little silt; well sorted; moist; pale brown (10YR 6/3)		
45.0 - 50.0		10	45.0-50.0	5	0.0 0.0 0.0 0.0 0.0	X 		(45.0 - 60.5') CLAY, some silt, high plasticity, no dilatancy; trace to little very fine to fine sand, subround; trace granules to large pebbles, subround; moist; medium stiff to stiff; gray (10YR 5/1) -Note: large sandstone fragments starting at 55.0' bgs		
50.0 - 55.0		11	50.0-55.0	5	0.0 0.0 0.0 0.0 0.0	X 				
55.0 - 60.0		12	55.0-60.0	4	0.0 0.0 0.0 0.0 0.0	X 				

	Remarks: bgs = below ground surface Slight odor at 7' bgs, no staining observed
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Northings: NA
Easting: NA
Casing Elevation: NA

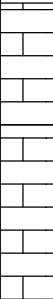
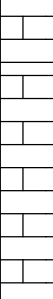
Borehole Depth (ft. bgs.): 75'
Surface Elevation: NA

Descriptions By: Austin Westhuis

Northings: NA
Easting: NA
Casing Elevation: NA

Borehole Depth (ft. bgs.): 75'
Surface Elevation: NA

Descriptions By: Austin Westhuis

DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
60.0 - 65.0		13	60.0-65.0	5	0.0 0.0 0.0 0.0 0.0	X		(60.5 - 65.0') SANDSTONE, weathered; some weathered shale; light gray (10YR 7/2) to dark gray (10YR 7/1)		
65.0 - 70.0		14	65.0-70.0	5	0.0 0.0 0.0 0.0	X		(65.0 - 67.0') SHALE; dark gray (10YR 4/1); trace sandstone Note: VAP sample collected from 65-70' bgs. at 1345. (67.0 - 71.0') SANDSTONE and SHALE; light gray (10YR 7/2) to dark gray (10YR 4/1)		
70.0 - 75.0		15	70.0-75.0	5	0.0 0.0 0.0 0.0	X		(71.0 - 75.0') SANDSTONE, fine, subround; light gray (10YR 7/2) Note: VAP sample collected from 70-75' bgs. at 1455.		
75.0 - 75.0								End of Boring at 75' bgs		

Remarks: bgs = below ground surface
Slight odor at 7' bgs, no staining observed



Date Start: 12/3/15
Date Finish: 12/7/15
Drilling Company: Cascade
Driller's Name: Dave Gordon
Drilling Method: Continuous
Sampling Method: 5', 5" core barrel
Rig Type: Sonic
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA

Northing: NA
Easting: NA
Casing Elevation: NA

Borehole Depth (ft. bgs.): 75'
Surface Elevation: NA

Descriptions By: Austin Westhuis

Well/Boring ID: SB-A5.3-PA107
Client: RACER

Location: RACER Lansing Plant 2

Weather Conditions: Cloudy, 35 F

DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
0	0				0.0			(0.0 - 1.0') CONCRETE		
		1	0.0-5.0	5	0.0	×		(1.0 - 2.0') SAND, fine, subround; little granules to large pebbles, subround; some silt; poorly sorted; moist; yellowish brown (10YR 5/4)		
					0.0	×		(2.0 - 14.0') SAND, very fine to medium, subround; trace to little granules to medium pebbles, subround; and SILT; poorly sorted; moist to wet; very dark brown (10YR 3/2) -Note: trace metal fragments and concrete, fill.		
5	-5				0.0					
		2	5.0-10.0	5	0.0	×				
					0.0	×				
10	-10				0.0					
		3	10.0-15.0	5	0.0	×				
					0.0	×		(14.0 - 16.0') SILT, some clay, low plasticity, no dilatancy; little very fine to fine sand, subround; moist; soft; dark brown (10YR 3/3) -Note: organic rich		
15	-15				0.0	×		(16.0 - 17.0') SILT; and SAND; organic rich; dark yellowish brown (10YR 4/6)		
		4	15.0-20.0	5	0.0	×		(17.0 - 27.0') CLAY, some silt, high plasticity, no dilatancy; trace granules to small pebbles, subround; trace very fine to fine sand, subround; moist; medium stiff to soft; gray (10YR 5/1)		
					0.0	×				
20	-20				0.0					

Remarks: bgs = below ground surface
 No odors or staining observed.



Date Start: 12/3/15 Date Finish: 12/7/15 Drilling Company: Cascade Driller's Name: Dave Gordon Drilling Method: Continuous Sampling Method: 5', 5" core barrel Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 75' Surface Elevation: NA Descriptions By: Austin Westhuis	Well/Boring ID: SB-A5.3-PA107 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Cloudy, 35 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
0					0.0					
		5	20.0-25.0	5	0.0	X				
25	-25				0.0	X				
		6	25.0-30.0	5	0.0	X		(27.0 - 28.0') SAND, very fine to medium, little granules to small pebbles, subround; poorly sorted; wet; light brownish gray (10YR 6/2)		
					0.0	X		(28.0 - 31.0') CLAY and SILT, medium plasticity, no dilatancy; little granules to medium pebbles, subround; little fine sand, subround; moist; stiff; gray (10YR 5/1)		
30	-30				0.0	X				
		7	30.0-35.0	5	0.0	X		(31.0 - 36.0') SAND, very fine to fine, little medium sand, subround; little to some silt; well sorted; wet; pale brown (10YR 6/3)		
35	-35				0.0	X				
		8	35.0-40.0	5	0.0	X		(36.0 - 46.0') CLAY, some silt, high plasticity, no dilatancy; little fine sand, subround; trace granules to large pebbles, subround; moist; medium stiff; grayish brown (10YR 5/2)		
40	-40				0.0					

	Remarks: bgs = below ground surface No odors or staining observed.
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Date Start: 12/3/15 Date Finish: 12/7/15 Drilling Company: Cascade Driller's Name: Dave Gordon Drilling Method: Continuous Sampling Method: 5', 5" core barrel Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 75' Surface Elevation: NA Descriptions By: Austin Westhuis	Well/Boring ID: SB-A5.3-PA107 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Cloudy, 35 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
40		9	40.0-45.0	5	0.0	X				
					0.0					
					0.0					
					0.0	X				
					0.0					
45	-45				0.0					
					0.0					
		10	45.0-50.0	5	0.0	X		(46.0 - 48.0') SAND, fine, subround; little to some silt; well sorted; dry to moist; grayish brown (10YR 5/2)		
					0.0					
					0.0					
					0.0	X		(48.0 - 63.0') CLAY and SILT, low plasticity to non-plastic, no dilatancy; some fine sand; little granules to very large pebbles, subround; dry; stiff to very stiff; dark gray (10YR 4/1) -Note: little sandstone fragments starting at 53.0' bgs		
50	-50				0.0					
					0.0					
					0.0					
		11	50.0-55.0	5	0.0	X				
					0.0					
					0.0					
55	-55				0.0					
					0.0					
					0.0					
		12	55.0-60.0	5	0.0	X				
					0.0					
					0.0					
					0.0	X				
					0.0					
60	-60				0.0					

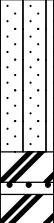
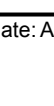
	Remarks: bgs = below ground surface No odors or staining observed.
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Date Start: 12/3/15 Date Finish: 12/7/15 Drilling Company: Cascade Driller's Name: Dave Gordon Drilling Method: Continuous Sampling Method: 5', 5" core barrel Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 75' Surface Elevation: NA Descriptions By: Austin Westhuis	Well/Boring ID: SB-A5.3-PA107 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Cloudy, 35 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
60 - 65		13	60.0-65.0	5	0.0 0.0 0.0 0.0 0.0			(63.0 - 65.0') SANDSTONE, weathered; and SHALE; light gray (10YR 7/2) to dark gray 10YR 4/1)		
65 - 65		14	65.0-70.0	5	0.0 0.0 0.0 0.0 0.0			(65.0 - 67.0') SHALE, weathered; dark gray (10YR 4/1); little sandstone (67.0 - 67.5') SANDSTONE; light gray (10YR 7/2); trace shale (67.5 - 75.0') SHALE, weathered; trace to little sandstone; dry; dark gray (10YR 4/1)		
70 - 70		15	70.0-75.0	5	0.0 0.0 0.0 0.0 0.0	X X		Note: VAP sample attempted to be collected from 65-70' bgs. and 70-75' bgs. Both intervals were DRY.		
75 - 75								End of Boring at 75' bgs		

	Remarks: bgs = below ground surface No odors or staining observed.
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Date Start: 12/8/15 Date Finish: 12/9/15 Drilling Company: Cascade Driller's Name: Dave Gordon Drilling Method: Continuous Sampling Method: 5', 5" core barrel Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 75' Surface Elevation: NA Descriptions By: Austin Westhuis	Well/Boring ID: SB-P2-ML33 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Cloudy, 40 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
					0.0	×		(0.0 - 0.1') Grass, roots, TOPSOIL		
								(0.1 - 0.4') ASPHALT		
		1	0.0-5.0	5	0.0	×		(0.4 - 1.0') SAND, medium; little coarse sand, subround; trace to little granules to medium pebbles, subround; trace to little silt; poorly sorted; dry to moist; dark yellowish brown (10YR 4/4)		
					0.0			(1.0 - 6.0') CLAY, little silt, medium to high plasticity, no dilatancy; trace fine sand, subround; trace granules to small pebbles, subround; moist; medium stiff; dark yellowish brown (10YR 4/6)		
5	-5				0.0	×		(6.0 - 10.0') CLAY, trace to little silt, high plasticity, no dilatancy; trace very fine sand, subround; moist; medium stiff to soft; gray (10YR 6/1)		
		2	5.0-10.0	5	0.0	×				
					0.0			(10.0 - 12.5') SAND, very fine to fine, subround; little medium to coarse sand, subround; little granules to medium pebbles, subround; and SILT, trace to little clay, non-plastic, rapid dilatancy; wet; poorly sorted; very soft; gray (10YR 6/1)		
					0.0	×		(12.5 - 13.0') CLAY, little silt, high plasticity, no dilatancy; trace fine sand, subround; medium stiff; moist; gray (10YR 5/1)		
		3	10.0-15.0	5	0.0	×		(13.0 - 13.2') SAND, fine to coarse, subround; little silt; poorly sorted; wet; grayish brown (10YR 5/2)		
					0.0			(13.2 - 22.0') CLAY, little to some silt, medium plasticity, no dilatancy; little granules to large pebbles, subround; moist; stiff; gray (10YR 5/1)		
15	-15				0.0					
		4	15.0-20.0	5	0.0	×				
					0.0					
20	-20				0.0					

	Remarks: bgs = below ground surface
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Date Start: 12/8/15 Date Finish: 12/9/15 Drilling Company: Cascade Driller's Name: Dave Gordon Drilling Method: Continuous Sampling Method: 5', 5" core barrel Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 75' Surface Elevation: NA Descriptions By: Austin Westhuis	Well/Boring ID: SB-P2-ML33 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Cloudy, 40 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
40	-20				0.0	×				
		5	20.0-25.0	5	0.0			(22.0 - 29.0') SAND, fine, subround; little granules to medium pebbles, subround; and SILT, little clay; poorly sorted; wet; grayish brown (10YR 5/2)		
					0.0					
					0.0					
25	-25				0.0	×				
		6	25.0-30.0	3	0.0					
					0.0					
					0.0	×				
					0.0			(29.0 - 33.0') CLAY and SILT, medium to low plasticity, no dilatancy; little fine sand; trace granules to large pebbles, subround; stiff; moist; gray (10YR 5/1)		
30	-30				0.0	×				
		7	30.0-35.0	5	0.0					
					0.0					
					0.0	×		(33.0 - 38.0') SAND, very fine to fine, subround; trace to little silt; well sorted; dry; light gray (10YR 7/1)		
35	-35				0.0					
		8	35.0-40.0	5	0.0					
					0.0					
					0.0	×		(38.0 - 39.5') CLAY, some silt, medium to high plasticity, no dilatancy; little fine sand, subround; little granules to large pebbles, subround; moist; medium stiff; gray (10YR 5/1)		
					0.0					
40	-40				0.0			(39.5 - 45.0') SAND, very fine to fine; trace granules to small pebbles, subround;		

	Remarks: bgs = below ground surface
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Date Start: 12/8/15 Date Finish: 12/9/15 Drilling Company: Cascade Driller's Name: Dave Gordon Drilling Method: Continuous Sampling Method: 5', 5" core barrel Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 75' Surface Elevation: NA Descriptions By: Austin Westhuis	Well/Boring ID: SB-P2-ML33 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Cloudy, 40 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
40	-40	9	40.0-45.0	5	0.0	×		little to some silt; dry to moist; well sorted; light brownish gray (10YR 6/2)		
45	-45	10	45.0-50.0	5	0.0	×		(45.0 - 48.0') CLAY and SILT, low plasticity, no dilatancy; little fine sand; trace granules, subround; moist; stiff; gray (10YR 5/1)		
50	-50	11	50.0-55.0	5	0.0	×		(48.0 - 50.0') SAND, very fine to fine, subround; little silt; well sorted; dry; light brownish gray (10YR 6/2)		
55	-55	12	55.0-60.0	5	0.0	×		(50.0 - 57.0') CLAY and SILT, low plasticity, no dilatancy; little fine sand, subround; trace granules to large pebbles, subround; moist; stiff; grayish brown(10YR 5/2)		
60	-60				0.0			(57.0 - 59.5') SAND, very fine to fine, subround; little to some silt; well sorted; dry; light brownish gray (10YR 6/2)		
					0.0			(59.5 - 68.0') CLAY and SILT, low plasticity to non-plastic, no dilatancy; some fine		

	Remarks: bgs = below ground surface
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Date Start: 12/8/15 Date Finish: 12/9/15 Drilling Company: Cascade Driller's Name: Dave Gordon Drilling Method: Continuous Sampling Method: 5', 5" core barrel Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 75' Surface Elevation: NA Descriptions By: Austin Westhuis	Well/Boring ID: SB-P2-ML33 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Cloudy, 40 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
60 - 65		13	60.0-65.0	5	0.0 0.0 0.0 0.0 0.0	X		sand; trace granules to medium pebbles, subround; dry; stiff; grayish brown (10YR 5/2) -Note:sandstone fragments starting at 63.0'		
65 - 65		14	65.0-70.0	5	0.0 0.0 0.0 0.0 0.0	X		Note: VAP sample collected from 65-70' bgs. at 1150.		
70 - 70		15	70.0-75.0	5	0.0 0.0 0.0 0.0 0.0	X		(68.0 - 75.0') SANDSTONE, weathered; wet; light gray (10YR 7/2) Note: VAP sample collected from 70-75' bgs. at 1320.		
75 - 75								End of Boring at 75'bgs		

	Remarks: bgs = below ground surface
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Date Start: 12/9/15 Date Finish: 12/10/15 Drilling Company: Cascade Driller's Name: Dave Gordon Drilling Method: Continuous Sampling Method: 5', 5" core barrel Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 75' Surface Elevation: NA Descriptions By: Austin Westhuis	Well/Boring ID: SB-P2-MM43 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Cloudy, 40 F
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DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
					0.0	×		(0.0 - 0.3') ASPHALT		
		1	0.0-5.0	5	0.0			(0.3 - 5.0') CLAY, little silt, high plasticity, no dilatancy; trace fine sand, subround; moist; stiff; dark gray (10YR 4/1)		
					0.0					
					0.0					
					0.0					
5	-5				0.0	×		(5.0 - 10.0') CLAY, some silt, medium plasticity, no dilatancy; trace fine sand, subround; medium stiff; gray (10YR 4/1)		
		2	5.0-10.0	5	0.0					
					0.0					
					0.0	×				
					0.0					
10	-10				0.0			(10.0 - 18.0') SAND, fine to medium, subround; trace granules, subround; little silt; well sorted; wet; light brownish gray (10YR 6/2)		
		3	10.0-15.0	3	0.0	×				
					0.0					
					0.0					
15	-15				0.0	×				
		4	15.0-20.0	5	0.0			(18.0 - 27.0') CLAY, little silt, medium to high plasticity, no dilatancy; trace fine sand, subround; trace granules to large pebbles, subround; moist; medium stiff; gray (10YR 5/1)		
					0.0					
					0.0					
20	-20				0.0					

	Remarks: bgs = below ground surface
--	--

Northings: NA
Easting: NA
Casing Elevation: NA

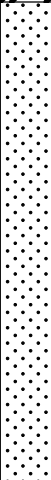
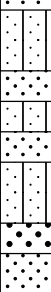
Borehole Depth (ft. bgs.): 75'
Surface Elevation: NA

Descriptions By: Austin Westhuis

Northings: NA
Easting: NA
Casing Elevation: NA

Borehole Depth (ft. bgs.): 75'
Surface Elevation: NA

Descriptions By: Austin Westhuis

DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
20.0	-25.0	5	20.0-25.0	5	0.0	×				
					0.0					
					0.0					
					0.0					
					0.0					
25.0	-25.0				0.0	×		(27.0 - 35.0') SAND, very fine to fine, subround; little to some silt; dry to moist; well sorted; light gray (10YR 7/2)		
		6	25.0-30.0	5	0.0					
					0.0	×				
					0.0					
					0.0					
30.0	-30.0				0.0					
		7	30.0-35.0	5	0.0	×				
					0.0					
					0.0					
					0.0					
35.0	-35.0				0.0	×		(35.0 - 36.0') SILT, trace clay, non-plastic, no dilatancy; and SAND, fine, subround; little granules to large pebbles, subround.		
					0.5	×				
		8	35.0-40.0	5	0.0	×				
					0.0	×				
					0.0	×				
					0.0			(36.0 - 36.5') SAND, very fine to fine, subround; trace to little silt; well sorted; dry to moist; light gray (10YR 7/2)		
					0.0				(36.5 - 37.0') SILT, trace clay, non-plastic, no dilatancy; and SAND, fine, subround; little granules to small pebbles, subround; dry to moist; stiff; grayish brown (10YR 5/2)	
					0.0					(37.0 - 37.5') SAND, very fine, subround; trace silt; well sorted; dry to moist; light gray (10YR 7/2)
					0.0			(37.5 - 38.5') SILT, non-plastic, no dilatancy; and SILT, very fine to fine, subround; trace granules to large pebbles, subround; dry; stiff; gray (10YR 5/1)		

Remarks: bgs = below ground surface

Date Start: 12/9/15 Date Finish: 12/10/15 Drilling Company: Cascade Driller's Name: Dave Gordon Drilling Method: Continuous Sampling Method: 5', 5" core barrel Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 75' Surface Elevation: NA Descriptions By: Austin Westhuis	Well/Boring ID: SB-P2-MM43 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Cloudy, 40 F
--	--	--

DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
40.0	-45.0	9	40.0-45.0	5	0.0	×		(38.5 - 39.0') SAND, fine to medium; little coarse sand, subround; trace granules to small pebbles, subround; little silt; poorly sorted; dry; grayish brown (10YR 5/2)		
45.0	-45.0				0.0			(39.0 - 49.0') SAND, very fine to fine, subround; little silt; dry; well sorted; light gray (10YR 7/2)		
45.0	-45.0				0.0					
45.0	-45.0				0.0					
45.0	-45.0	10	45.0-50.0	5	0.0	×				
45.0	-45.0				0.0					
45.0	-45.0				0.0					
45.0	-45.0				0.0					
50.0	-50.0				0.0			(49.0 - 53.0') SAND, very fine to fine, subround; little to some silt; poorly sorted; dry to moist; light brownish gray (10YR 6/2)		
50.0	-50.0				0.0					
50.0	-50.0				0.0					
50.0	-50.0	11	50.0-55.0	5	0.0	×				
50.0	-50.0				0.0					
50.0	-50.0				0.0					
50.0	-50.0				0.0					
55.0	-55.0				0.0			(53.0 - 65.0') CLAY, some silt, low plasticity, no dilatancy; some fine sand; trace granules to medium pebbles, subround; moist; medium stiff; grayish brown (10YR 5/2)		
55.0	-55.0				0.0					
55.0	-55.0				0.0					
55.0	-55.0	12	55.0-60.0	5	0.0	×				
55.0	-55.0				0.0					
55.0	-55.0				0.0					
55.0	-55.0				0.0					
60.0	-60.0				0.0					

	Remarks: bgs = below ground surface
--	--

Date Start: 12/9/15 Date Finish: 12/10/15 Drilling Company: Cascade Driller's Name: Dave Gordon Drilling Method: Continuous Sampling Method: 5', 5" core barrel Rig Type: Sonic Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 75' Surface Elevation: NA Descriptions By: Austin Westhuis	Well/Boring ID: SB-P2-MM43 Client: RACER Location: RACER Lansing Plant 2 Weather Conditions: Cloudy, 40 F
--	--	--

DEPTH (feet bgs.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
60	-60	13	60.0-65.0	5	0.0	X				
65	-65	14	65.0-70.0	5	0.0	X		(65.0 - 75.0') SANDSTONE, weathered; wet; light gray (10YR 7/2)		
70	-70	15	70.0-75.0	5	0.0	X		Note: VAP sample collected from 65-70' bgs. at 1555.		
75	-75				0.0			Note: VAP sample collected from 70-75' bgs. at 1620.		
					0.0			End of boring at 75' bgs		

	Remarks: bgs = below ground surface
--	--

APPENDIX B

Triad Environmental Solutions QA/QC Summary Tables



Appendix B

DSITMS USEPA Method 8265 QA/QC Analytical Results for 1,4-Dioxane

Lower 1,4-Dioxane Toe Investigation

Plants 2, 3, and 6 Industrial Land

Lansing, Michigan

Date_Sampled	Sample_Name	1,4-Dioxane (ug/L)	QC Criteria	Comments
12/1/2015	Blnk 01	<10	<10	Pass
12/1/2015	20 ppb cal chk 01	19.5	14-26	Pass
12/2/2015	Blnk 01	<10	<10	Pass
12/2/2015	20 ppb cal chk 01	23.7	14-26	Pass
12/2/2015	Blnk 02	<10	<10	Pass
12/2/2015	20 ppb cal chk 02	21.9	14-26	Pass
12/3/2015	Dry Blnk	<10	<10	Pass
12/3/2015	20 ppb cal chk 01	18	14-26	Pass
12/3/2015	Blnk 01	<10	<10	Pass
12/3/2015	20 ppb cal chk 02	18.8	14-26	Pass
12/3/2015	Blnk 02	<10	<10	Pass
12/3/2015	20 ppb cal chk 03	25.6	14-26	Pass
12/4/2015	Dry Blnk	<10	<10	Pass
12/4/2015	20 ppb cal chk 01	22.5	14-26	Pass
12/4/2015	Blnk 01	<10	<10	Pass
12/4/2015	20 ppb cal chk 02	21.2	14-26	Pass
12/4/2015	20 ppb cal chk 03	20.9	14-26	Pass
12/5/2015	Dry Blnk	<10	<10	Pass
12/5/2015	20 ppb cal chk 01	25	14-26	Pass
12/5/2015	Blnk 01	<10	<10	Pass
12/5/2015	20 ppb cal chk 02	25.3	14-26	Pass
12/7/2015	Dry Blnk	<10	<10	Pass
12/7/2015	20 ppb cal chk 01	22.2	14-26	Pass
12/7/2015	Blnk 01	<10	<10	Pass
12/7/2015	20 ppb cal chk 02	23.8	14-26	Pass
12/7/2015	20 ppb cal chk 03	15.4	14-26	Pass
12/8/2015	Dry Blnk	<10	<10	Pass
12/8/2015	20 ppb cal chk 01	22.3	14-26	Pass
12/9/2015	Dry Blnk	<20	<10	Pass
12/9/2015	20 ppb cal chk 01	20.2	14-26	Pass
12/9/2015	20 ppb cal chk 02	25.6	14-26	Pass
12/9/2015	20 ppb cal chk 03	20.2	14-26	Pass

Appendix B**DSITMS USEPA Method 8265 QA/QC Analytical Results for 1,4-Dioxane****Lower 1,4-Dioxane Toe Investigation****Plants 2, 3, and 6 Industrial Land****Lansing, Michigan**

Date_Sampled	Sample_Name	1,4-Dioxane (ug/L)	QC Criteria	Comments
12/10/2015	Dry Blnk 1	<10	<10	Pass
12/10/2015	Dry Blnk 2	<10	<10	Pass
12/10/2015	20 ppb cal chk 01	18.1	14-26	Pass
12/10/2015	Blnk 01	<10	<10	Pass
12/10/2015	20 ppb cal chk 02	18.5	14-26	Pass
12/10/2015	21 ppb cal chk 03	20.7	14-26	Pass
12/10/2015	Blnk 02	<10	<10	Pass
12/10/2015	Blnk 03	<10	<10	Pass
12/11/2015	20 ppb cal chk 01	20.1	14-26	Pass
12/11/2015	Blnk 01	<10	<10	Pass
12/11/2015	20 ppb cal chk 02	17.5	14-26	Pass
12/11/2015	Blnk 02	<10	<10	Pass
12/11/2015	20 ppb cal chk 03	12.5	14-26	Pass
12/11/2015	Blnk 03	<10	<10	Pass
12/11/2015	20 ppb cal chk 04	19.9	14-26	Pass

APPENDIX C

Analytical Comparison Tables and Graphs



Appendix C
Comparison of USEPA Methods 8260-SIM and 8265 1,4-Dioxane
Soil Extract Concentrations
Lower 1,4-Dioxane Toe Investigation
Plants 2, 3, and 6 Industrial Land
Lansing, Michigan

Sample Name	Depth (feet)	DSITMS EPA 8265 1,4-Dioxane (µg/kg)	GC/MS EPA 8260-SIM 1,4-Dioxane (µg/kg)
MW-15-73_34.5 (replicate)	34.5	<42.9	<7.4
SB-A5.2-OC91_2 (replicate)	2	213.1	922.1
SB-A5.2-OC91_5 (replicate)	5	119.8	429.2
SB-A5.2-OC91_8 (replicate)	8	273.9	608.1
SB-A5.2-OC91_9.5 (replicate)	9.5	73.4	363.2
SB-A5.2-OC91_10 (replicate)	10	110.0	538.5
SB-A5.2-OC91_31.5 (replicate)	31.5	<42.9	16.0
SB-A5.2-OC94_50 (replicate)	50	<42.9	34.2
SB-A5.2-OE113_20.5	20.5	60.2	215.5
SB-A5.2-OE113_22.5	22.5	40.1	189.9
SB-A5.2-OE113_41	41	104.6	552.9
SB-A5.2-OG124_18 (replicate)	18	1543.0	6538.5
SB-A5.2-OG124_24 (replicate)	24	383.6	1673.6
SB-A5.2-OG124_30 (replicate)	30	198.3	633.8
SB-A5.2-OG124_37 (replicate)	37	85.7	153.5
SB-A5.3-PA104_48 (replicate)	48	29.6	129.5
SB-A5.3-PA107_19 (replicate)	19	<42.9	27.8
SB-A5.3-PA94_15 (replicate)	15	<42.9	11.2

Notes:

Soil results reported on wet weight basis

µg/kg = micrograms per kilogram

DSITMS = direct sampling ion trap mass spectrometer

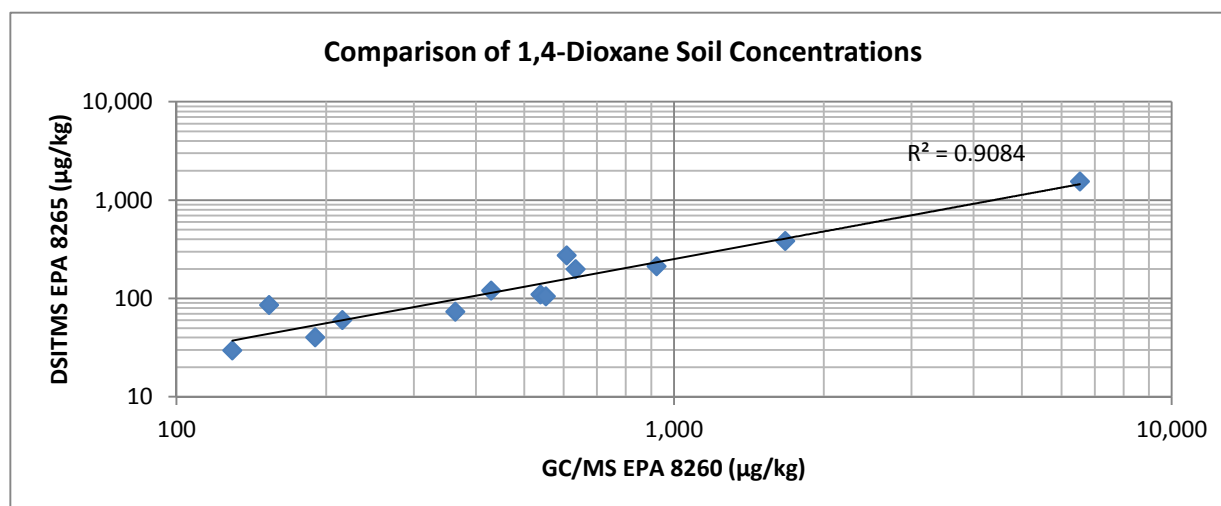
GC/MS = Gas chromatography/mass spectrometry

Replicate = Re-analysis of original sample prior to submitting sample for fixed laboratory comparative analysis

Replicate analysis not performed on samples from SB-A5.2-OE113 because samples were submitted to fixed laboratory on the same day they were collected

USEPA = United States Environmental Protection Agency

Graph only includes samples with detected concentrations



Appendix C
Comparison of USEPA Methods 8260-SIM and 8265 1,4-Dioxane
Groundwater Concentrations
Lower 1,4-Dioxane Toe Investigation
Plants 2, 3, and 6 Industrial Land
Lansing, Michigan

Sample Name	Depth (feet)	DSITMS EPA 8265 1,4-Dioxane (µg/L)	GC/MS EPA 8260-SIM 1,4-Dioxane (µg/L)
MW-15-73_73-78	73-78	<20	4.0
MW-15-73_78-83	78-83	<20	4.0
SB-A5.2-NK132_72-77	72-77	65.8	170
SB-A5.3-PA104_70-75	70-75	888.0	1230
SB-A5.3-PA94_60-65	60-65	10.2	16
SB-A5.3-PA94_70-75	70-75	170	190
SB-A5.3-PA98_70-75	70-75	439.0	550
SB-P2-ML33_65-70	65-70	<20	3.0
SB-P2-ML33_70-75	70-75	<20	5.0
SB-P2-MM43_65-70	65-70	<20	33
SB-P2-MM43_70-75	70-75	21.1	30

Notes:

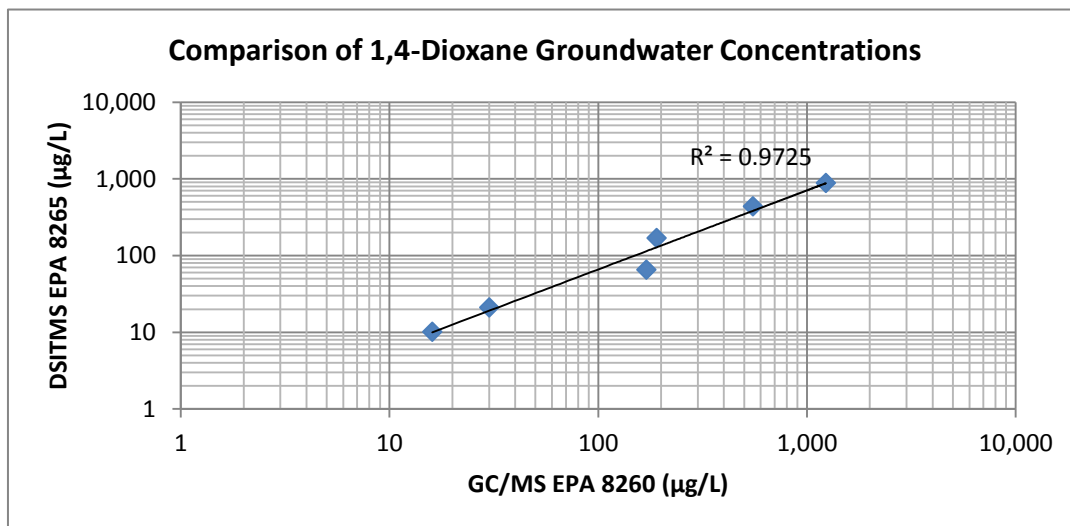
µg/L = micrograms per liter

DSITMS = direct sampling ion trap mass spectrometer

GC/MS = Gas chromatography/mass spectrometry

USEPA = United States Environmental Protection Agency

Graph only includes samples with detected concentrations



APPENDIX D

Merit Laboratories Analytical Reports





Analytical Laboratory Report

Supplemental Report

Report ID: S70204.01(02)
Generated on 12/10/2015
Replaces report S70204.01(01) generated on 12/10/2015

Report to

Attention: Jesse Wright
Arcadis
10559 Citation Drive
Suite 100
Brighton, MI 48116

Phone: 317-236-2860 FAX: 810-229-8837
Email: jesse.wright@arcadis-us.com

Additional Contacts: Patrick Curry

Report produced by

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

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

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

Report Summary

Lab Sample ID(s): S70204.01-S70204.05
Project: RACER Lansing / B0064479.2015.00102
Collected Date: 12/01/2015 - 12/07/2015
Submitted Date/Time: 12/09/2015 17:15
Sampled by: Austin Westhuis
P.O. #: B0064479.2015.00102

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Maya Murshak
Technical Director



Analytical Laboratory Report

Supplemental Report

General Report Notes

Results relate only to items tested as received by laboratory.

Methods may be modified for improved performance.

Results reported on a dry weight basis where applicable.

'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).

40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.

QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.

Full accreditation certificates are available upon request.

Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

Report Narrative

TPH GRO added per client request.



Analytical Laboratory Report

Supplemental Report

Laboratory Certifications

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

Qualifier Descriptions

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

Glossary of Abbreviations

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



Analytical Laboratory Report

Supplemental Report

Method Summary

Method	Version
N/A	Not Applicable
SW8015M	SW 846 Method 8015C Revision 3 February 2007 Modified
SW8260B	SW 846 Method 8260B Revision 2 December 1996
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs
SW8260C	SW 846 Method 8260C Revision 3 August 2006



Analytical Laboratory Report

Supplemental Report

Sample Summary (5 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S70204.01	SB-A5.2-OF107_54	Soil	12/07/15 10:46
S70204.02	SB-A5.2-OG124_9.5	Soil	12/07/15 00:01
S70204.03	SB-A5.2-OF107_10	Soil	12/07/15 15:45
S70204.04	SB-A5.2-OF107_57	Soil	12/07/15 17:00
S70204.05	Trip Blank	Water	12/01/15 00:01



Analytical Laboratory Report

Supplemental Report

Lab Sample ID: S70204.01
Sample Tag: SB-A5.2-OF107_54
Collected Date/Time: 12/07/2015 10:46
Matrix: Soil
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	Water	Yes	12.5	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,2-Dibromo-3-chloropropane	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	96-12-8	
1,2-Dibromoethane	Not detected	ug/L	1	SW8260B	12/10/15 13:10	JGH	106-93-4	
1,4-Dioxane	Not detected	ug/L	3	SW8260B - SIM	12/10/15 12:50	JGH	123-91-1	
TPH GRO (C6-C10)	Not detected	ug/L	200	SW8015M	12/10/15 13:10	JGH		

TCL Volatile Organics 8260

1,1,2-Trichloro-1,2,2-trifluoroethane	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	76-13-1	
Acetone	Not detected	ug/L	10	SW8260C	12/10/15 13:10	JGH	67-64-1	
Carbon disulfide	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	75-15-0	
Methyl Acetate	Not detected	ug/L	10	SW8260C	12/10/15 13:10	JGH	79-20-9	
tert-Methyl butyl ether (MTBE)	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	1634-04-4	
2-Butanone (MEK)	Not detected	ug/L	10	SW8260C	12/10/15 13:10	JGH	78-93-3	
Dichlorodifluoromethane	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	75-71-8	
Chloromethane	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	74-87-3	
Vinyl chloride	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	75-01-4	
Bromomethane	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	74-83-9	
Chloroethane	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	75-00-3	
Trichlorofluoromethane	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	75-69-4	
1,1-Dichloroethene	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	75-35-4	
Methylene chloride	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	75-09-2	
trans-1,2-Dichloroethene	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	156-60-5	
1,1-Dichloroethane	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	75-34-3	
cis-1,2-Dichloroethene	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	156-59-2	
Chloroform	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	67-66-3	
1,1,1-Trichloroethane	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	71-55-6	
Cyclohexane	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	110-82-7	
4-Methyl-2-pentanone (MIBK)	Not detected	ug/L	10	SW8260C	12/10/15 13:10	JGH	108-10-1	
2-Hexanone	Not detected	ug/L	10	SW8260C	12/10/15 13:10	JGH	591-78-6	
Carbon tetrachloride	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	56-23-5	
Benzene	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	71-43-2	
1,2-Dichloroethane	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	107-06-2	
Trichloroethene	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	79-01-6	
1,2-Dichloropropane	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	78-87-5	
Bromodichloromethane	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	75-27-4	
Methyl cyclohexane	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	108-87-2	
cis-1,3-Dichloropropene	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	10061-01-5	
Toluene	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	108-88-3	
trans-1,3-Dichloropropene	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	10061-02-6	
1,1,2-Trichloroethane	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	79-00-5	
Tetrachloroethene	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	127-18-4	
Dibromochloromethane	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	124-48-1	
Chlorobenzene	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	108-90-7	
1,1,2,2-Tetrachloroethane	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	79-34-5	



Analytical Laboratory Report

Supplemental Report

Lab Sample ID: S70204.01 (continued)

Sample Tag: SB-A5.2-OF107_54

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles (continued)								
TCL Volatile Organics 8260 (continued)								
Ethylbenzene	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	100-41-4	
p,m-Xylene	Not detected	ug/L	2	SW8260C	12/10/15 13:10	JGH		
o-Xylene	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	95-47-6	
Styrene	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	100-42-5	
Isopropylbenzene	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	98-82-8	
Bromoform	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	75-25-2	
1,3-Dichlorobenzene	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	541-73-1	
1,4-Dichlorobenzene	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	106-46-7	
1,2-Dichlorobenzene	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	95-50-1	
1,2,4-Trichlorobenzene	Not detected	ug/L	1	SW8260C	12/10/15 13:10	JGH	120-82-1	



Analytical Laboratory Report

Supplemental Report

Lab Sample ID: S70204.02
Sample Tag: SB-A5.2-OG124_9.5
Collected Date/Time: 12/07/2015 00:01
Matrix: Soil
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	Water	Yes	12.5	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,2-Dibromo-3-chloropropane	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	96-12-8	
1,2-Dibromoethane	Not detected	ug/L	1	SW8260B	12/10/15 13:30	JGH	106-93-4	
1,4-Dioxane	54	ug/L	3	SW8260B - SIM	12/10/15 13:08	JGH	123-91-1	
TPH GRO (C6-C10)	Not detected	ug/L	200	SW8015M	12/10/15 13:30	JGH		

TCL Volatile Organics 8260

1,1,2-Trichloro-1,2,2-trifluoroethane	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	76-13-1	
Acetone	Not detected	ug/L	10	SW8260C	12/10/15 13:30	JGH	67-64-1	
Carbon disulfide	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	75-15-0	
Methyl Acetate	Not detected	ug/L	10	SW8260C	12/10/15 13:30	JGH	79-20-9	
tert-Methyl butyl ether (MTBE)	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	1634-04-4	
2-Butanone (MEK)	Not detected	ug/L	10	SW8260C	12/10/15 13:30	JGH	78-93-3	
Dichlorodifluoromethane	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	75-71-8	
Chloromethane	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	74-87-3	
Vinyl chloride	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	75-01-4	
Bromomethane	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	74-83-9	
Chloroethane	431	ug/L	1	SW8260C	12/10/15 13:30	JGH	75-00-3	E
Trichlorofluoromethane	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	75-69-4	
1,1-Dichloroethene	1	ug/L	1	SW8260C	12/10/15 13:30	JGH	75-35-4	
Methylene chloride	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	75-09-2	
trans-1,2-Dichloroethene	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	156-60-5	
1,1-Dichloroethane	6	ug/L	1	SW8260C	12/10/15 13:30	JGH	75-34-3	
cis-1,2-Dichloroethene	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	156-59-2	
Chloroform	2	ug/L	1	SW8260C	12/10/15 13:30	JGH	67-66-3	
1,1,1-Trichloroethane	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	71-55-6	
Cyclohexane	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	110-82-7	
4-Methyl-2-pentanone (MIBK)	Not detected	ug/L	10	SW8260C	12/10/15 13:30	JGH	108-10-1	
2-Hexanone	Not detected	ug/L	10	SW8260C	12/10/15 13:30	JGH	591-78-6	
Carbon tetrachloride	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	56-23-5	
Benzene	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	71-43-2	
1,2-Dichloroethane	5	ug/L	1	SW8260C	12/10/15 13:30	JGH	107-06-2	
Trichloroethene	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	79-01-6	
1,2-Dichloropropane	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	78-87-5	
Bromodichloromethane	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	75-27-4	
Methyl cyclohexane	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	108-87-2	
cis-1,3-Dichloropropene	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	10061-01-5	
Toluene	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	108-88-3	
trans-1,3-Dichloropropene	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	10061-02-6	
1,1,2-Trichloroethane	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	79-00-5	
Tetrachloroethene	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	127-18-4	
Dibromochloromethane	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	124-48-1	
Chlorobenzene	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	108-90-7	

E-Concentration exceeds calibration range



Analytical Laboratory Report

Supplemental Report

Lab Sample ID: S70204.02 (continued)

Sample Tag: SB-A5.2-OG124_9.5

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles (continued)								
TCL Volatile Organics 8260 (continued)								
1,1,2,2-Tetrachloroethane	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	79-34-5	
Ethylbenzene	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	100-41-4	
p,m-Xylene	Not detected	ug/L	2	SW8260C	12/10/15 13:30	JGH		
o-Xylene	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	95-47-6	
Styrene	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	100-42-5	
Isopropylbenzene	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	98-82-8	
Bromoform	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	75-25-2	
1,3-Dichlorobenzene	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	541-73-1	
1,4-Dichlorobenzene	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	106-46-7	
1,2-Dichlorobenzene	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	95-50-1	
1,2,4-Trichlorobenzene	Not detected	ug/L	1	SW8260C	12/10/15 13:30	JGH	120-82-1	



Analytical Laboratory Report

Supplemental Report

Lab Sample ID: S70204.03
Sample Tag: SB-A5.2-OF107_10
Collected Date/Time: 12/07/2015 15:45
Matrix: Soil
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	Water	Yes	12.5	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
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Organics - Volatiles

1,2-Dibromo-3-chloropropane	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	96-12-8	
1,2-Dibromoethane	Not detected	ug/L	1	SW8260B	12/10/15 13:50	JGH	106-93-4	
1,4-Dioxane	Not detected	ug/L	3	SW8260B - SIM	12/10/15 15:14	JGH	123-91-1	
TPH GRO (C6-C10)	Not detected	ug/L	200	SW8015M	12/10/15 13:50	JGH		

TCL Volatile Organics 8260

1,1,2-Trichloro-1,2,2-trifluoroethane	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	76-13-1	
Acetone	Not detected	ug/L	10	SW8260C	12/10/15 13:50	JGH	67-64-1	
Carbon disulfide	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	75-15-0	
Methyl Acetate	Not detected	ug/L	10	SW8260C	12/10/15 13:50	JGH	79-20-9	
tert-Methyl butyl ether (MTBE)	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	1634-04-4	
2-Butanone (MEK)	Not detected	ug/L	10	SW8260C	12/10/15 13:50	JGH	78-93-3	
Dichlorodifluoromethane	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	75-71-8	
Chloromethane	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	74-87-3	
Vinyl chloride	2	ug/L	1	SW8260C	12/10/15 13:50	JGH	75-01-4	
Bromomethane	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	74-83-9	
Chloroethane	5	ug/L	1	SW8260C	12/10/15 13:50	JGH	75-00-3	
Trichlorofluoromethane	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	75-69-4	
1,1-Dichloroethene	7	ug/L	1	SW8260C	12/10/15 13:50	JGH	75-35-4	
Methylene chloride	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	75-09-2	
trans-1,2-Dichloroethene	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	156-60-5	
1,1-Dichloroethane	39	ug/L	1	SW8260C	12/10/15 13:50	JGH	75-34-3	
cis-1,2-Dichloroethene	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	156-59-2	
Chloroform	2	ug/L	1	SW8260C	12/10/15 13:50	JGH	67-66-3	
1,1,1-Trichloroethane	39	ug/L	1	SW8260C	12/10/15 13:50	JGH	71-55-6	
Cyclohexane	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	110-82-7	
4-Methyl-2-pentanone (MIBK)	Not detected	ug/L	10	SW8260C	12/10/15 13:50	JGH	108-10-1	
2-Hexanone	Not detected	ug/L	10	SW8260C	12/10/15 13:50	JGH	591-78-6	
Carbon tetrachloride	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	56-23-5	
Benzene	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	71-43-2	
1,2-Dichloroethane	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	107-06-2	
Trichloroethene	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	79-01-6	
1,2-Dichloropropane	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	78-87-5	
Bromodichloromethane	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	75-27-4	
Methyl cyclohexane	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	108-87-2	
cis-1,3-Dichloropropene	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	10061-01-5	
Toluene	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	108-88-3	
trans-1,3-Dichloropropene	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	10061-02-6	
1,1,2-Trichloroethane	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	79-00-5	
Tetrachloroethene	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	127-18-4	
Dibromochloromethane	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	124-48-1	
Chlorobenzene	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	108-90-7	
1,1,2,2-Tetrachloroethane	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	79-34-5	



Analytical Laboratory Report

Supplemental Report

Lab Sample ID: S70204.03 (continued)

Sample Tag: SB-A5.2-OF107_10

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles (continued)								
TCL Volatile Organics 8260 (continued)								
Ethylbenzene	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	100-41-4	
p,m-Xylene	Not detected	ug/L	2	SW8260C	12/10/15 13:50	JGH		
o-Xylene	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	95-47-6	
Styrene	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	100-42-5	
Isopropylbenzene	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	98-82-8	
Bromoform	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	75-25-2	
1,3-Dichlorobenzene	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	541-73-1	
1,4-Dichlorobenzene	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	106-46-7	
1,2-Dichlorobenzene	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	95-50-1	
1,2,4-Trichlorobenzene	Not detected	ug/L	1	SW8260C	12/10/15 13:50	JGH	120-82-1	



Analytical Laboratory Report

Supplemental Report

Lab Sample ID: S70204.04
Sample Tag: SB-A5.2-OF107_57
Collected Date/Time: 12/07/2015 17:00
Matrix: Soil
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	Water	Yes	12.5	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,2-Dibromo-3-chloropropane	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	96-12-8	
1,2-Dibromoethane	Not detected	ug/L	1	SW8260B	12/10/15 14:11	JGH	106-93-4	
1,4-Dioxane	Not detected	ug/L	3	SW8260B - SIM	12/10/15 13:44	JGH	123-91-1	
TPH GRO (C6-C10)	Not detected	ug/L	200	SW8015M	12/10/15 14:11	JGH		

TCL Volatile Organics 8260

1,1,2-Trichloro-1,2,2-trifluoroethane	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	76-13-1	
Acetone	Not detected	ug/L	10	SW8260C	12/10/15 14:11	JGH	67-64-1	
Carbon disulfide	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	75-15-0	
Methyl Acetate	Not detected	ug/L	10	SW8260C	12/10/15 14:11	JGH	79-20-9	
tert-Methyl butyl ether (MTBE)	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	1634-04-4	
2-Butanone (MEK)	Not detected	ug/L	10	SW8260C	12/10/15 14:11	JGH	78-93-3	
Dichlorodifluoromethane	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	75-71-8	
Chloromethane	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	74-87-3	
Vinyl chloride	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	75-01-4	
Bromomethane	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	74-83-9	
Chloroethane	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	75-00-3	
Trichlorofluoromethane	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	75-69-4	
1,1-Dichloroethene	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	75-35-4	
Methylene chloride	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	75-09-2	
trans-1,2-Dichloroethene	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	156-60-5	
1,1-Dichloroethane	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	75-34-3	
cis-1,2-Dichloroethene	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	156-59-2	
Chloroform	1	ug/L	1	SW8260C	12/10/15 14:11	JGH	67-66-3	
1,1,1-Trichloroethane	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	71-55-6	
Cyclohexane	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	110-82-7	
4-Methyl-2-pentanone (MIBK)	Not detected	ug/L	10	SW8260C	12/10/15 14:11	JGH	108-10-1	
2-Hexanone	Not detected	ug/L	10	SW8260C	12/10/15 14:11	JGH	591-78-6	
Carbon tetrachloride	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	56-23-5	
Benzene	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	71-43-2	
1,2-Dichloroethane	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	107-06-2	
Trichloroethene	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	79-01-6	
1,2-Dichloropropane	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	78-87-5	
Bromodichloromethane	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	75-27-4	
Methyl cyclohexane	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	108-87-2	
cis-1,3-Dichloropropene	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	10061-01-5	
Toluene	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	108-88-3	
trans-1,3-Dichloropropene	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	10061-02-6	
1,1,2-Trichloroethane	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	79-00-5	
Tetrachloroethene	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	127-18-4	
Dibromochloromethane	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	124-48-1	
Chlorobenzene	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	108-90-7	
1,1,2,2-Tetrachloroethane	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	79-34-5	



Analytical Laboratory Report

Supplemental Report

Lab Sample ID: S70204.04 (continued)

Sample Tag: SB-A5.2-OF107_57

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles (continued)								
TCL Volatile Organics 8260 (continued)								
Ethylbenzene	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	100-41-4	
p,m-Xylene	Not detected	ug/L	2	SW8260C	12/10/15 14:11	JGH		
o-Xylene	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	95-47-6	
Styrene	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	100-42-5	
Isopropylbenzene	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	98-82-8	
Bromoform	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	75-25-2	
1,3-Dichlorobenzene	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	541-73-1	
1,4-Dichlorobenzene	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	106-46-7	
1,2-Dichlorobenzene	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	95-50-1	
1,2,4-Trichlorobenzene	Not detected	ug/L	1	SW8260C	12/10/15 14:11	JGH	120-82-1	



Analytical Laboratory Report

Supplemental Report

Lab Sample ID: S70204.05
Sample Tag: Trip Blank
Collected Date/Time: 12/01/2015 00:01
Matrix: Water
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	HCL	Yes	12.5	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
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Extraction / Prep.

pH check for VOCs	Not detected	STD Units		N/A	12/10/15 15:45	JGH		
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Organics - Volatiles

1,2-Dibromo-3-chloropropane	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	96-12-8	
1,2-Dibromoethane	Not detected	ug/L	1	SW8260B	12/10/15 13:03	JGH	106-93-4	
1,4-Dioxane	Not detected	ug/L	3	SW8260B - SIM	12/10/15 12:32	JGH	123-91-1	

TCL Volatile Organics 8260

1,1,2-Trichloro-1,2,2-trifluoroethane	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	76-13-1	
Acetone	Not detected	ug/L	10	SW8260C	12/10/15 13:03	JGH	67-64-1	
Carbon disulfide	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	75-15-0	
Methyl Acetate	Not detected	ug/L	10	SW8260C	12/10/15 13:03	JGH	79-20-9	
tert-Methyl butyl ether (MTBE)	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	1634-04-4	
2-Butanone (MEK)	Not detected	ug/L	10	SW8260C	12/10/15 13:03	JGH	78-93-3	
Dichlorodifluoromethane	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	75-71-8	
Chloromethane	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	74-87-3	
Vinyl chloride	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	75-01-4	
Bromomethane	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	74-83-9	
Chloroethane	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	75-00-3	
Trichlorofluoromethane	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	75-69-4	
1,1-Dichloroethene	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	75-35-4	
Methylene chloride	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	75-09-2	
trans-1,2-Dichloroethene	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	156-60-5	
1,1-Dichloroethane	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	75-34-3	
cis-1,2-Dichloroethene	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	156-59-2	
Chloroform	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	67-66-3	
1,1,1-Trichloroethane	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	71-55-6	
Cyclohexane	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	110-82-7	
4-Methyl-2-pentanone (MIBK)	Not detected	ug/L	10	SW8260C	12/10/15 13:03	JGH	108-10-1	
2-Hexanone	Not detected	ug/L	10	SW8260C	12/10/15 13:03	JGH	591-78-6	
Carbon tetrachloride	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	56-23-5	
Benzene	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	71-43-2	
1,2-Dichloroethane	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	107-06-2	
Trichloroethene	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	79-01-6	
1,2-Dichloropropane	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	78-87-5	
Bromodichloromethane	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	75-27-4	
Methyl cyclohexane	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	108-87-2	
cis-1,3-Dichloropropene	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	10061-01-5	
Toluene	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	108-88-3	
trans-1,3-Dichloropropene	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	10061-02-6	
1,1,2-Trichloroethane	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	79-00-5	
Tetrachloroethene	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	127-18-4	
Dibromochloromethane	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	124-48-1	



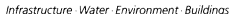
Analytical Laboratory Report

Supplemental Report

Lab Sample ID: S70204.05 (continued)

Sample Tag: Trip Blank

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles (continued)								
TCL Volatile Organics 8260 (continued)								
Chlorobenzene	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	108-90-7	
1,1,2,2-Tetrachloroethane	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	79-34-5	
Ethylbenzene	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	100-41-4	
p,m-Xylene	Not detected	ug/L	2	SW8260C	12/10/15 13:03	JGH		
o-Xylene	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	95-47-6	
Styrene	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	100-42-5	
Isopropylbenzene	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	98-82-8	
Bromoform	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	75-25-2	
1,3-Dichlorobenzene	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	541-73-1	
1,4-Dichlorobenzene	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	106-46-7	
1,2-Dichlorobenzene	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	95-50-1	
1,2,4-Trichlorobenzene	Not detected	ug/L	1	SW8260C	12/10/15 13:03	JGH	120-82-1	



ID#:

CHAIN OF CUSTODY & LABORATORY ANALYSIS REQUEST FORM

Page 1 of 1

Lab Work Order #

[illegible]



Analytical Laboratory Report

Report ID: S70265.01(01)
Generated on 12/21/2015

Report to

Attention: Jesse Wright
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Report Summary

Lab Sample ID(s): S70265.01-S70265.26
Project: RACER Lansing / B0064479.2015.00102
Collected Date: 11/30/2015 - 12/10/2015
Submitted Date/Time: 12/11/2015 15:35
Sampled by: Austin Westhuis
P.O. #: B0064479.2015.00102

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Maya Murshak
Technical Director



Analytical Laboratory Report

General Report Notes

Results relate only to items tested as received by laboratory.

Methods may be modified for improved performance.

Results reported on a dry weight basis where applicable.

'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).

40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.

QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.

Full accreditation certificates are available upon request.

Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

Report Narrative

There is no additional narrative for this analytical report



Analytical Laboratory Report

Laboratory Certifications

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

Qualifier Descriptions

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

Glossary of Abbreviations

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



Analytical Laboratory Report

Method Summary

Method	Version
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs



Analytical Laboratory Report

Sample Summary (26 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S70265.01	SB-A5.2-OG124_18	Soil	12/07/15 10:55
S70265.02	SB-A5.2-OG124_24	Soil	12/07/15 11:24
S70265.03	SB-A5.2-OC91_02	Soil	12/04/15 09:24
S70265.04	SB-A5.2-OC91_10	Soil	12/04/15 09:42
S70265.05	SB-A5.2-OC91_08	Soil	12/04/15 09:40
S70265.06	SB-A5.2-OC91_9.5	Soil	12/04/15 09:41
S70265.07	SB-A5.2-OC91_05	Soil	12/04/15 09:25
S70265.08	SB-A5.2-OG124_30	Soil	12/07/15 11:26
S70265.09	SB-A5.2-OC91_31.5	Soil	12/04/15 10:13
S70265.10	SB-A5.3-PA104_48	Soil	12/03/15 09:44
S70265.11	SB-A5.2-OG124_37	Soil	12/07/15 11:31
S70265.12	SB-A5.2-OC94_50	Soil	12/07/15 10:55
S70265.13	MW-15-73_34.5	Soil	12/02/15 10:19
S70265.14	SB-A5.3-PA107_19	Soil	12/03/15 17:02
S70265.15	SB-A5.3-PA94_15	Soil	11/30/15 14:10
S70265.16	SB-A5.2-OE113_20.5	Soil	12/08/15 14:40
S70265.17	SB-A5.2-OE113_41	Soil	12/08/15 15:09
S70265.18	SB-A5.2-OE113_22.5	Soil	12/08/15 14:41
S70265.19	SB-A5.3-PA104_70-75	Water	12/03/15 14:55
S70265.20	SB-A5.3-PA98_70-75	Water	12/02/15 14:25
S70265.21	SB-A5.3-PA94_70-75	Water	12/02/15 14:25
S70265.22	SB-A5.3-PA94_60-65	Water	12/02/15 10:25
S70265.23	SB-A5.2-NK132_72-77	Water	12/10/15 11:34
S70265.24	SB-P2-MM43_70-75	Water	12/10/15 16:20
S70265.25	MW-15-73_78-83	Water	12/02/15 16:33
S70265.26	Trip Blank	Water	11/30/15 00:01



Analytical Laboratory Report

Lab Sample ID: S70265.01
Sample Tag: SB-A5.2-OG124_18
Collected Date/Time: 12/07/2015 10:55
Matrix: Soil
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	None	Yes	18.3	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,4-Dioxane	3,400	ug/L	200	SW8260B - SIM	12/15/15 17:29	JGH	123-91-1	Y

Y-Elevated reporting limit due to high target concentration



Analytical Laboratory Report

Lab Sample ID: S70265.02
Sample Tag: SB-A5.2-OG124_24
Collected Date/Time: 12/07/2015 11:24
Matrix: Soil
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	None	Yes	18.3	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,4-Dioxane	810	ug/L	60	SW8260B - SIM	12/15/15 16:35	JGH	123-91-1	Y

Y-Elevated reporting limit due to high target concentration



Analytical Laboratory Report

Lab Sample ID: S70265.03
Sample Tag: SB-A5.2-OC91_02
Collected Date/Time: 12/04/2015 09:24
Matrix: Soil
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	None	Yes	18.3	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,4-Dioxane	450	ug/L	30	SW8260B - SIM	12/15/15 15:05	JGH	123-91-1	Y

Y-Elevated reporting limit due to high target concentration



Analytical Laboratory Report

Lab Sample ID: S70265.04
Sample Tag: SB-A5.2-OC91_10
Collected Date/Time: 12/04/2015 09:42
Matrix: Soil
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	None	Yes	18.3	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,4-Dioxane	280	ug/L	30	SW8260B - SIM	12/15/15 15:23	JGH	123-91-1	Y

Y-Elevated reporting limit due to high target concentration



Analytical Laboratory Report

Lab Sample ID: S70265.05
Sample Tag: SB-A5.2-OC91_08
Collected Date/Time: 12/04/2015 09:40
Matrix: Soil
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	None	Yes	18.3	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,4-Dioxane	270	ug/L	30	SW8260B - SIM	12/15/15 15:41	JGH	123-91-1	Y

Y-Elevated reporting limit due to high target concentration



Analytical Laboratory Report

Lab Sample ID: S70265.06
Sample Tag: SB-A5.2-OC91_9.5
Collected Date/Time: 12/04/2015 09:41
Matrix: Soil
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	None	Yes	18.3	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,4-Dioxane	138	ug/L	3	SW8260B - SIM	12/14/15 21:19	LBR	123-91-1	



Analytical Laboratory Report

Lab Sample ID: S70265.07
Sample Tag: SB-A5.2-OC91_05
Collected Date/Time: 12/04/2015 09:25
Matrix: Soil
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	None	Yes	18.3	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,4-Dioxane	182	ug/L	3	SW8260B - SIM	12/14/15 21:37	LBR	123-91-1	



Analytical Laboratory Report

Lab Sample ID: S70265.08
Sample Tag: SB-A5.2-OG124_30
Collected Date/Time: 12/07/2015 11:26
Matrix: Soil
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	None	Yes	18.3	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,4-Dioxane	360	ug/L	30	SW8260B - SIM	12/15/15 15:59	JGH	123-91-1	Y

Y-Elevated reporting limit due to high target concentration



Analytical Laboratory Report

Lab Sample ID: S70265.09
Sample Tag: SB-A5.2-OC91_31.5
Collected Date/Time: 12/04/2015 10:13
Matrix: Soil
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	None	Yes	18.3	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,4-Dioxane	6	ug/L	3	SW8260B - SIM	12/15/15 14:11	JGH	123-91-1	



Analytical Laboratory Report

Lab Sample ID: S70265.10
Sample Tag: SB-A5.3-PA104_48
Collected Date/Time: 12/03/2015 09:44
Matrix: Soil
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	None	Yes	18.3	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,4-Dioxane	57	ug/L	3	SW8260B - SIM	12/14/15 22:31	LBR	123-91-1	



Analytical Laboratory Report

Lab Sample ID: S70265.11
Sample Tag: SB-A5.2-OG124_37
Collected Date/Time: 12/07/2015 11:31
Matrix: Soil
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	None	Yes	18.3	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,4-Dioxane	78	ug/L	3	SW8260B - SIM	12/14/15 22:49	LBR	123-91-1	



Analytical Laboratory Report

Lab Sample ID: S70265.12
Sample Tag: SB-A5.2-OC94_50
Collected Date/Time: 12/07/2015 10:55
Matrix: Soil
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	None	Yes	18.3	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,4-Dioxane	13	ug/L	3	SW8260B - SIM	12/15/15 14:29	JGH	123-91-1	



Analytical Laboratory Report

Lab Sample ID: S70265.13
Sample Tag: MW-15-73_34.5
Collected Date/Time: 12/02/2015 10:19
Matrix: Soil
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	None	Yes	18.3	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,4-Dioxane	Not detected	ug/L	3	SW8260B - SIM	12/15/15 14:47	JGH	123-91-1	



Analytical Laboratory Report

Lab Sample ID: S70265.14
Sample Tag: SB-A5.3-PA107_19
Collected Date/Time: 12/03/2015 17:02
Matrix: Soil
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	None	Yes	18.3	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,4-Dioxane	11	ug/L	3	SW8260B - SIM	12/16/15 20:41	LBR	123-91-1	



Analytical Laboratory Report

Lab Sample ID: S70265.15
Sample Tag: SB-A5.3-PA94_15
Collected Date/Time: 11/30/2015 14:10
Matrix: Soil
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	None	Yes	18.3	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,4-Dioxane	6	ug/L	3	SW8260B - SIM	12/14/15 19:12	LBR	123-91-1	



Analytical Laboratory Report

Lab Sample ID: S70265.16
Sample Tag: SB-A5.2-OE113_20.5
Collected Date/Time: 12/08/2015 14:40
Matrix: Soil
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	None	Yes	18.3	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,4-Dioxane	100	ug/L	30	SW8260B - SIM	12/15/15 18:05	JGH	123-91-1	Y

Y-Elevated reporting limit due to high target concentration



Analytical Laboratory Report

Lab Sample ID: S70265.17
Sample Tag: SB-A5.2-OE113_41
Collected Date/Time: 12/08/2015 15:09
Matrix: Soil
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	None	Yes	18.3	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,4-Dioxane	230	ug/L	30	SW8260B - SIM	12/15/15 18:23	JGH	123-91-1	Y

Y-Elevated reporting limit due to high target concentration



Analytical Laboratory Report

Lab Sample ID: S70265.18
Sample Tag: SB-A5.2-OE113_22.5
Collected Date/Time: 12/08/2015 14:41
Matrix: Soil
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	None	Yes	18.3	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,4-Dioxane	120	ug/L	30	SW8260B - SIM	12/15/15 18:41	JGH	123-91-1	Y

Y-Elevated reporting limit due to high target concentration



Analytical Laboratory Report

Lab Sample ID: S70265.19
Sample Tag: SB-A5.3-PA104_70-75
Collected Date/Time: 12/03/2015 14:55
Matrix: Water
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	40ml Glass	None	Yes	18.3	IR
3	40ml Glass	HCL	Yes	18.3	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,4-Dioxane	1,230	ug/L	60	SW8260B - SIM	12/15/15 16:53	JGH	123-91-1	Y

Y-Elevated reporting limit due to high target concentration



Analytical Laboratory Report

Lab Sample ID: S70265.20
Sample Tag: SB-A5.3-PA98_70-75
Collected Date/Time: 12/02/2015 14:25
Matrix: Water
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	40ml Glass	None	Yes	18.3	IR
3	40ml Glass	HCL	Yes	18.3	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,4-Dioxane	550	ug/L	60	SW8260B - SIM	12/15/15 17:11	JGH	123-91-1	Y

Y-Elevated reporting limit due to high target concentration



Analytical Laboratory Report

Lab Sample ID: S70265.21
Sample Tag: SB-A5.3-PA94_70-75
Collected Date/Time: 12/02/2015 14:25
Matrix: Water
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	40ml Glass	None	Yes	18.3	IR
3	40ml Glass	HCL	Yes	18.3	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,4-Dioxane	190	ug/L	30	SW8260B - SIM	12/15/15 16:17	JGH	123-91-1	Y

Y-Elevated reporting limit due to high target concentration



Analytical Laboratory Report

Lab Sample ID: S70265.22
Sample Tag: SB-A5.3-PA94_60-65
Collected Date/Time: 12/02/2015 10:25
Matrix: Water
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	40ml Glass	None	Yes	18.3	IR
3	40ml Glass	HCL	Yes	18.3	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,4-Dioxane	16	ug/L	3	SW8260B - SIM	12/16/15 20:59	LBR	123-91-1	



Analytical Laboratory Report

Lab Sample ID: S70265.23
Sample Tag: SB-A5.2-NK132_72-77
Collected Date/Time: 12/10/2015 11:34
Matrix: Water
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	40ml Glass	None	Yes	18.3	IR
3	40ml Glass	HCL	Yes	18.3	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,4-Dioxane	170	ug/L	30	SW8260B - SIM	12/15/15 19:17	JGH	123-91-1	Y

Y-Elevated reporting limit due to high target concentration



Analytical Laboratory Report

Lab Sample ID: S70265.24
Sample Tag: SB-P2-MM43_70-75
Collected Date/Time: 12/10/2015 16:20
Matrix: Water
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	40ml Glass	None	Yes	18.3	IR
3	40ml Glass	HCL	Yes	18.3	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,4-Dioxane	30	ug/L	3	SW8260B - SIM	12/16/15 21:17	LBR	123-91-1	



Analytical Laboratory Report

Lab Sample ID: S70265.25
Sample Tag: MW-15-73_78-83
Collected Date/Time: 12/02/2015 16:33
Matrix: Water
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	40ml Glass	None	Yes	18.3	IR
3	40ml Glass	HCL	Yes	18.3	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,4-Dioxane	4	ug/L	3	SW8260B - SIM	12/16/15 21:35	JGH	123-91-1	



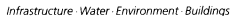
Analytical Laboratory Report

Lab Sample ID: S70265.26
Sample Tag: Trip Blank
Collected Date/Time: 11/30/2015 00:01
Matrix: Water
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	40ml Glass	HCL	Yes	18.3	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles								
1,4-Dioxane	Not detected	ug/L	3	SW8260B - SIM	12/14/15 19:31	LBR	123-91-1	



ID#:

CHAIN OF CUSTODY & LABORATORY ANALYSIS REQUEST FORM

Page 1 of 2

Lab Work Order #

[illegible]

ID#:

CHAIN OF CUSTODY & LABORATORY ANALYSIS REQUEST FORM

Page 2 of 2

Lab Work Order #

Send Results to:	Contact & Company Name: Jesse Wright / Arcadis	Telephone: 317-236-2860	Preservative	E	B								
	Address: 132 E. Washington St., Ste. 600	Fax:	Filtered (✓)										
	City: Indianapolis, IN State: IN Zip: 46204	E-mail Address: Jesse.Wright@arcadis.com	# of Containers	1	3								
	Project Name/Location (City, State): RACER Lansing / Lansing, MI	Project #: 80064479.2015.00102	Container Information	1	1								
Sampler's Printed Name: Austin Westhuis		Sampler's Signature: <i>Austin Westhuis</i>	PARAMETER ANALYSIS & METHOD 14-Dioxane by EPA 8260-Sim 14-Dioxane by EPA 8260-Sim										
Sample ID 70265		Collection Date: 11/30/15 Time: 1410											Type (✓) Comp: ✓ Grab: ✓
15 SB-A5.3-PA94-15		11/30/15 1410	✓	SO	1								
16 SB-A5.2-OE113-20.5		12/3/15 1440	✓	SO	1								
17 SB-A5.2-OE113-41		12/3/15 1509	✓	SO	1								
18 SB-A5.2-OE113-22.5		12/3/15 1441	✓	SO	1								
19 SB-A5.3-PA104-70-75		12/3/15 1455	✓	W		3							
20 SB-A5.3-PA98-70-75		12/2/15 1425	✓	W		3							
21 SB-A5.3-PA94-70-75		12/2/15 1425	✓	W		3							
22 SB-A5.3-PA94-60-65		12/2/15 1025	✓	W		3							
23 SB-A5.2-NK132-72-77		12/10/15 1134	✓	W		3							
24 SB-P2-MM43-70-75		12/10/15 1620	✓	W		3							
25 MW-15-73-78-83		12/2/15 1633	✓	W		3							
26 Trip Blank		—	✓	W		2							
Special Instructions/Comments: ★ Please also email results to Patrick Curry, patrick.curry@arcadis.com ★													
Laboratory Information and Receipt Lab Name: Merit ☒ Cooler packed with ice (✓) Specify Turnaround Requirements: Shipping Tracking #:				Relinquished By Printed Name: Austin Westhuis Signature: <i>Austin Westhuis</i> Firm: Arcadis Date/Time: 12/11/15 1535		Received By Printed Name: Signature: Firm/Courier: Date/Time:		Relinquished By Printed Name: Signature: Firm/Courier: Date/Time:		Laboratory Received By Printed Name: Kevin George Signature: <i>Kevin George</i> Firm: Merit Date/Time: 12/11/15 1535			



Analytical Laboratory Report

Report ID: S70350.01(01)
Generated on 01/04/2016

Report to

Attention: Kristen Padron
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 313-971-6728 FAX: 248-994-2241
Email: Kristen.Padron@arcadis-us.com

Report produced by

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Contacts for report questions:

Kevin George (kgeorge@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S70350.01-S70350.06
Project: RACER Lansing / B0064479.2015.00102
Collected Date: 12/02/2015 - 12/17/2015
Submitted Date/Time: 12/17/2015 12:20
Sampled by: Austin Westhuis
P.O. #: B0064479.2015.00102

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Maya Murshak
Technical Director



Analytical Laboratory Report

General Report Notes

Results relate only to items tested as received by laboratory.

Methods may be modified for improved performance.

Results reported on a dry weight basis where applicable.

'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).

40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.

QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.

Full accreditation certificates are available upon request.

Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

Report Narrative

There is no additional narrative for this analytical report



Analytical Laboratory Report

Laboratory Certifications

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

Qualifier Descriptions

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

Glossary of Abbreviations

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



Analytical Laboratory Report

Method Summary

Method	Version
ASTMD3278 - 96	ASTM Method D3278 - 96(2011)
E200.8	EPA Method 200.8 Revision 5.4
E245.1	EPA Method 245.1 Revision 3.0
E335.4/SM4500-CN	EPA Method 335.4 Revision 1.0 / Standard Method 4500-CN E 20th Edition
E608	EPA Method 608
N/A	Not Applicable
SM4500-S2 D	Standard Method 4450 S2 DC 20th Edition
SW3015A	SW 846 Method 3015A Revision 1 February 2007
SW3510C	SW 846 Method 3510C Revision 3 December 1996
SW8260B	SW 846 Method 8260B Revision 2 December 1996
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs
SW8260C	SW 846 Method 8260C Revision 3 August 2006
SW9045D	SW 846 Method 9045D Revision 4 November 2004



Analytical Laboratory Report

Sample Summary (6 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S70350.01	WC-P2-W-12172015	Water	12/17/15 10:20
S70350.02	SB-P2-MM43_65-70	Water	12/10/15 15:55
S70350.03	SB-P2-ML33_65-70	Water	12/09/15 11:50
S70350.04	SB-P2-ML33_70-75	Water	12/09/15 13:20
S70350.05	MW-15-73_73-78	Water	12/02/15 14:55
S70350.06	Trip Blank	Water	12/17/15 00:01



Analytical Laboratory Report

Lab Sample ID: S70350.01
Sample Tag: WC-P2-W-12172015
Collected Date/Time: 12/17/2015 10:20
Matrix: Water
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Amber	None	Yes	4.0	IR
3	40ml Glass	HCL	Yes	4.0	IR
1	250ml Plastic	None	Yes	4.0	IR
1	125ml Plastic	HNO3	Yes	4.0	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
----------	---------	-------	----	--------	---------------	------	-------	-------

Extraction / Prep.

Extraction, PCB	Completed			SW3510C	12/21/15 11:03	PLB		
Mercury Digestion	Completed			E245.1	12/18/15 12:00	RGS		
Metal Digestion	Completed			SW3015A	12/22/15 09:00	JRH		
pH check for VOCs	<2	STD Units		N/A	12/28/15 15:05	LBR		

Inorganics

Flash Point	Not detected	oF	180	ASTMD3278 - 96	12/28/15 21:15	PL		
pH/ Corrosivity	2.71	STD Units	0.1	SW9045D	01/04/16 13:43	ASB		
Reactive Cyanide	Not detected	mg/L	0.12	E335.4/SM4500-CN	12/23/15 11:20	JDP	57-12-5	
Reactive Sulfide	Not detected	mg/L	0.5	SM4500-S2 D	12/23/15 10:08	JDP	18496-25-8	

Metals

Arsenic	Not detected	mg/L	0.002	E200.8	12/22/15 13:02	JRH	7440-38-2	
Barium	0.195	mg/L	0.005	E200.8	12/22/15 13:02	JRH	7440-39-3	
Cadmium	Not detected	mg/L	0.0005	E200.8	12/22/15 13:02	JRH	7440-43-9	
Chromium	Not detected	mg/L	0.005	E200.8	12/22/15 13:02	JRH	7440-47-3	
Copper	Not detected	mg/L	0.005	E200.8	12/22/15 13:02	JRH	7440-50-8	
Lead	Not detected	mg/L	0.003	E200.8	12/22/15 13:02	JRH	7439-92-1	
Mercury	Not detected	mg/L	0.0002	E245.1	12/18/15 16:18	RGS	7439-97-6	
Selenium	Not detected	mg/L	0.005	E200.8	12/22/15 13:02	JRH	7782-49-2	
Silver	Not detected	mg/L	0.0005	E200.8	12/22/15 13:02	JRH	7440-22-4	
Zinc	0.025	mg/L	0.005	E200.8	12/22/15 13:02	JRH	7440-66-6	

Organics - PCBs/Pesticides

PCB

PCB-1016	Not detected	ug/L	0.1	E608	12/21/15 20:00	JAN	12674-11-2	
PCB-1221	Not detected	ug/L	0.1	E608	12/21/15 20:00	JAN	11104-28-2	
PCB-1232	Not detected	ug/L	0.1	E608	12/21/15 20:00	JAN	11141-16-5	
PCB-1242	Not detected	ug/L	0.1	E608	12/21/15 20:00	JAN	53469-21-9	
PCB-1248	Not detected	ug/L	0.1	E608	12/21/15 20:00	JAN	12672-29-6	
PCB-1254	Not detected	ug/L	0.1	E608	12/21/15 20:00	JAN	11097-69-1	
PCB-1260	Not detected	ug/L	0.1	E608	12/21/15 20:00	JAN	11096-82-5	
PCB, Total	Not detected	ug/L	0.1	E608	12/21/15 20:00	JAN	1336-36-3	

Organics - Volatiles

1,2-Dibromo-3-chloropropane	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	96-12-8	
1,2-Dibromoethane	Not detected	ug/L	1	SW8260B	12/28/15 19:22	JGH	106-93-4	
1,4-Dioxane	7	ug/L	3	SW8260B - SIM	12/18/15 16:30	JGH	123-91-1	



Analytical Laboratory Report

Lab Sample ID: S70350.01 (continued)

Sample Tag: WC-P2-W-12172015

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles (continued)								
TCL Volatile Organics 8260								
1,1,2-Trichloro-1,2,2-trifluoroethane	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	76-13-1	
Acetone	28	ug/L	10	SW8260C	12/28/15 19:22	JGH	67-64-1	
Carbon disulfide	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	75-15-0	
Methyl Acetate	Not detected	ug/L	10	SW8260C	12/28/15 19:22	JGH	79-20-9	
tert-Methyl butyl ether (MTBE)	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	1634-04-4	
2-Butanone (MEK)	51	ug/L	10	SW8260C	12/28/15 19:22	JGH	78-93-3	
Dichlorodifluoromethane	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	75-71-8	
Chloromethane	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	74-87-3	
Vinyl chloride	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	75-01-4	
Bromomethane	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	74-83-9	
Chloroethane	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	75-00-3	
Trichlorofluoromethane	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	75-69-4	
1,1-Dichloroethene	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	75-35-4	
Methylene chloride	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	75-09-2	
trans-1,2-Dichloroethene	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	156-60-5	
1,1-Dichloroethane	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	75-34-3	
cis-1,2-Dichloroethene	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	156-59-2	
Chloroform	6	ug/L	1	SW8260C	12/28/15 19:22	JGH	67-66-3	
1,1,1-Trichloroethane	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	71-55-6	
Cyclohexane	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	110-82-7	
4-Methyl-2-pentanone (MIBK)	Not detected	ug/L	10	SW8260C	12/28/15 19:22	JGH	108-10-1	
2-Hexanone	Not detected	ug/L	10	SW8260C	12/28/15 19:22	JGH	591-78-6	
Carbon tetrachloride	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	56-23-5	
Benzene	2	ug/L	1	SW8260C	12/28/15 19:22	JGH	71-43-2	
1,2-Dichloroethane	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	107-06-2	
Trichloroethene	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	79-01-6	
1,2-Dichloropropane	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	78-87-5	
Bromodichloromethane	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	75-27-4	
Methyl cyclohexane	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	108-87-2	
cis-1,3-Dichloropropene	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	10061-01-5	
Toluene	25	ug/L	1	SW8260C	12/28/15 19:22	JGH	108-88-3	
trans-1,3-Dichloropropene	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	10061-02-6	
1,1,2-Trichloroethane	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	79-00-5	
Tetrachloroethene	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	127-18-4	
Dibromochloromethane	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	124-48-1	
Chlorobenzene	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	108-90-7	
1,1,2,2-Tetrachloroethane	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	79-34-5	
Ethylbenzene	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	100-41-4	
p,m-Xylene	Not detected	ug/L	2	SW8260C	12/28/15 19:22	JGH		
o-Xylene	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	95-47-6	
Styrene	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	100-42-5	
Isopropylbenzene	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	98-82-8	
Bromoform	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	75-25-2	
1,3-Dichlorobenzene	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	541-73-1	
1,4-Dichlorobenzene	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	106-46-7	
1,2-Dichlorobenzene	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	95-50-1	
1,2,4-Trichlorobenzene	Not detected	ug/L	1	SW8260C	12/28/15 19:22	JGH	120-82-1	



Analytical Laboratory Report

Lab Sample ID: S70350.02
Sample Tag: SB-P2-MM43_65-70
Collected Date/Time: 12/10/2015 15:55
Matrix: Water
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	4.0	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Extraction / Prep.								
pH check for VOCs	>2	STD Units		N/A	12/28/15 15:05	LBR		
Organics - Volatiles								
1,4-Dioxane	33	ug/L	3	SW8260B - SIM	12/18/15 16:48	JGH	123-91-1	



Analytical Laboratory Report

Lab Sample ID: S70350.03
Sample Tag: SB-P2-ML33_65-70
Collected Date/Time: 12/09/2015 11:50
Matrix: Water
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	4.0	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Extraction / Prep.								
pH check for VOCs	>2	STD Units		N/A	12/28/15 15:05	LBR		
Organics - Volatiles								
1,4-Dioxane	3	ug/L	3	SW8260B - SIM	12/18/15 17:06	JGH	123-91-1	



Analytical Laboratory Report

Lab Sample ID: S70350.04
Sample Tag: SB-P2-ML33_70-75
Collected Date/Time: 12/09/2015 13:20
Matrix: Water
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	4.0	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Extraction / Prep.								
pH check for VOCs	>2	STD Units		N/A	12/28/15 15:05	LBR		
Organics - Volatiles								
1,4-Dioxane	5	ug/L	3	SW8260B - SIM	12/18/15 17:25	JGH	123-91-1	



Analytical Laboratory Report

Lab Sample ID: S70350.05
Sample Tag: MW-15-73_73-78
Collected Date/Time: 12/02/2015 14:55
Matrix: Water
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	4.0	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
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Extraction / Prep.

pH check for VOCs	>2	STD Units		N/A	12/28/15 15:10	LBR		
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Organics - Volatiles

1,4-Dioxane	4	ug/L	3	SW8260B - SIM	12/18/15 17:43	JGH	123-91-1	F
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F-Analysis run outside of holding time



Analytical Laboratory Report

Lab Sample ID: S70350.06
Sample Tag: Trip Blank
Collected Date/Time: 12/17/2015 00:01
Matrix: Water
COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	HCL	Yes	4.0	IR

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
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Extraction / Prep.

pH check for VOCs	<2	STD Units		N/A	01/04/16 13:32	JGH		
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Organics - Volatiles

1,2-Dibromo-3-chloropropane	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	96-12-8	
1,2-Dibromoethane	Not detected	ug/L	1	SW8260B	12/30/15 14:41	JGH	106-93-4	
1,4-Dioxane	Not detected	ug/L	3	SW8260B - SIM	12/17/15 13:25	JGH	123-91-1	

TCL Volatile Organics 8260

1,1,2-Trichloro-1,2,2-trifluoroethane	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	76-13-1	
Acetone	Not detected	ug/L	10	SW8260C	12/30/15 14:41	JGH	67-64-1	
Carbon disulfide	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	75-15-0	
Methyl Acetate	Not detected	ug/L	10	SW8260C	12/30/15 14:41	JGH	79-20-9	
tert-Methyl butyl ether (MTBE)	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	1634-04-4	
2-Butanone (MEK)	Not detected	ug/L	10	SW8260C	12/30/15 14:41	JGH	78-93-3	
Dichlorodifluoromethane	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	75-71-8	
Chloromethane	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	74-87-3	
Vinyl chloride	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	75-01-4	
Bromomethane	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	74-83-9	
Chloroethane	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	75-00-3	
Trichlorofluoromethane	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	75-69-4	
1,1-Dichloroethene	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	75-35-4	
Methylene chloride	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	75-09-2	
trans-1,2-Dichloroethene	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	156-60-5	
1,1-Dichloroethane	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	75-34-3	
cis-1,2-Dichloroethene	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	156-59-2	
Chloroform	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	67-66-3	
1,1,1-Trichloroethane	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	71-55-6	
Cyclohexane	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	110-82-7	
4-Methyl-2-pentanone (MIBK)	Not detected	ug/L	10	SW8260C	12/30/15 14:41	JGH	108-10-1	
2-Hexanone	Not detected	ug/L	10	SW8260C	12/30/15 14:41	JGH	591-78-6	
Carbon tetrachloride	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	56-23-5	
Benzene	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	71-43-2	
1,2-Dichloroethane	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	107-06-2	
Trichloroethene	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	79-01-6	
1,2-Dichloropropane	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	78-87-5	
Bromodichloromethane	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	75-27-4	
Methyl cyclohexane	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	108-87-2	
cis-1,3-Dichloropropene	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	10061-01-5	
Toluene	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	108-88-3	
trans-1,3-Dichloropropene	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	10061-02-6	
1,1,2-Trichloroethane	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	79-00-5	
Tetrachloroethene	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	127-18-4	
Dibromochloromethane	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	124-48-1	



Analytical Laboratory Report

Lab Sample ID: S70350.06 (continued)

Sample Tag: Trip Blank

Analysis	Results	Units	RL	Method	Run Date/Time	Tech	CAS #	Flags
Organics - Volatiles (continued)								
TCL Volatile Organics 8260 (continued)								
Chlorobenzene	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	108-90-7	
1,1,2,2-Tetrachloroethane	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	79-34-5	
Ethylbenzene	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	100-41-4	
p,m-Xylene	Not detected	ug/L	2	SW8260C	12/30/15 14:41	JGH		
o-Xylene	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	95-47-6	
Styrene	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	100-42-5	
Isopropylbenzene	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	98-82-8	
Bromoform	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	75-25-2	
1,3-Dichlorobenzene	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	541-73-1	
1,4-Dichlorobenzene	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	106-46-7	
1,2-Dichlorobenzene	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	95-50-1	
1,2,4-Trichlorobenzene	Not detected	ug/L	1	SW8260C	12/30/15 14:41	JGH	120-82-1	

ID#: _____

CHAIN OF CUSTODY & LABORATORY ANALYSIS REQUEST FORM

Page 1 of 1

Lab Work Order # _____

Send Results to:	Contact & Company Name:	Telephone:	Preservative	B	B	E	C	E			
	Address:	Fax:	Filtered (✓)								
	City	State	Zip	E-mail Address:	# of Containers	3	3	2	1	1	
	Novi	MI	48377	Kristen.padron@arcadis.com	Container Information	1	1	2	9	3	
Project Name/Location (City, State):		Project #:		PARAMETER ANALYSIS & METHOD							
RACER Lansing/Lansing, MI		80064479.2015.00102									
Sampler's Printed Name:		Sampler's Signature:		VOC + 1,4-Dioxane 8260 sin 1,4-Dioxane 8260 sin PCBs Metals pH, flash point, reactivity							
Austin Westhuis		[Signature]									
Sample ID	Collection	Type (✓)	Matrix								
	Date Time	Comp Grab									
70350											
01 WC-P2-W-12172015	12/17/15 1020	✓	W								
02 SB-P2-MM43-65-70	12/10/15 1555	✓	W								
03 SB-P2-ML33-65-70	12/9/15 1150	✓	W								
04 SB-P2-ML33-70-75	12/9/15 1320	✓	W								
05 MW-15-73-73-78	12/2/15 1455	✓	W								
06 Trip Blank	12/17/15 —	✓	W								

Keys

Preservation Key:
A. H₂SO₄
B. HCL
C. HNO₃
D. NaOH
E. None
F. Other: _____
G. Other: _____
H. Other: _____

Container Information Key:
1. 40 ml Vial
2. 1 L Amber
3. 250 ml Plastic
4. 500 ml Plastic
5. Encore
6. 2 oz. Glass
7. 4 oz. Glass
8. 8 oz. Glass
9. Other: 125ml plastic
10. Other: _____

Matrix Key:
SO - Soil
W - Water
T - Tissue
SE - Sediment
SL - Sludge
A - Air
NL - NAPL/Oil
SW - Sample Wipe
Other: _____

REMARKS

Special Instructions/Comments:
★ Please also email results to jesse.wright@arcadis.com and patrick.curry@arcadis.com

☐ Special QA/QC Instructions(✓):

Laboratory Information and Receipt		Relinquished By	Received By	Relinquished By	Laboratory Received By
Lab Name:	Cooler Custody Seal (✓)	Printed Name:	Printed Name:	Printed Name:	Printed Name:
Merit	☐ Intact ☐ Not Intact	Austin Westhuis			Kevin George
✓ Cooler packed with ice (✓)		[Signature]	Signature:	Signature:	[Signature]
Specify Turnaround Requirements:	Sample Receipt:	Firm:	Firm/Courier:	Firm/Courier:	Firm:
Standard		Arcadis			Merit
Shipping Tracking #:	Condition/Cooler Temp: 4.0	Date/Time:	Date/Time:	Date/Time:	Date/Time:
		12/17/15 1220			12/17/15 1220

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