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Date:

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Arcadis Project No.:

B0064479.2019

Subject:

PFAS Investigation Phase 1 Summary- Plant 6 RACER Trust Site, Lansing,
Michigan

The following provides a summary of the per- and polyfluoroalkyl substances (PFAS) investigation completed at RACER Trust, Plant 6 located in the City of Lansing, Michigan (Site).

As described in the RACER Plants 2 and 6 – Monitoring Well PFAS Summary (Arcadis 2018a), initial monitoring well sampling was completed in areas of the former Plant 6 wastewater treatment plant (AOI 6-83), former paint shop area (AOI 6-81), former paint mixing room (AOI 6-60) and Plant 6 rinse water cistern (AOI 6-11) areas. Perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) were detected along the property boundary near the former paint shop area, as well as in central Plant 6, near the former rinse water cistern. The highest PFAS concentrations at Plant 6 were observed at monitoring well P6-SB-07 located near a former rinse water cistern that was associated with a phosphoric acid dip process that may have used vapor suppressants containing PFAS. This memorandum describes the first phase of the additional investigation activities completed as part of the 2018 Plant 6 PFAS Investigation workplan (Arcadis 2018b).

The primary objectives of the Phase 1 PFAS investigation were as follows:

- Further characterize the areas where PFAS were detected in monitoring wells on-site, and identify areas where PFAS may have migrated off-site along the Plant 6 eastern property boundary.

- Characterize the former rinse water cistern source area near well P6-SB-07, both vertically and laterally to determine flow direction (via concentration distribution), source strength and identify additional characterization needs, as appropriate.
- Evaluate off-site PFAS impacts within the North Verlinden Street and Osborn Road rights-of-way (ROWs) to identify areas requiring further off-site delineation, if necessary.
- Evaluate potential PFAS impacts to Lansing City storm sewers along North Verlinden and Osborn Street ROWs. The North Verlinden storm sewers outfall to the Grand River south of the Site. The Osborn Street sewers are combined and flow to the City of Lansing wastewater treatment plant.

1. INVESTIGATION ACTIVITIES

The work completed consisted of thirty-one (31) temporary monitoring wells installed in a total of twenty-five (25) soil borings at Plant 6 and the adjacent ROWs. Soil boring locations and relevant AOIs are shown on **Figures 1** and **2**. Additionally, water samples were collected from storm sewers and combined sewers adjacent to the Site (**Figure 3**). The investigation was conducted from November 19 to November 21, 2018 and November 26 to November 30, 2018 consistent with the revised workplan provided to MDEQ and the City of Lansing on October 10, 2018 and approved by MDEQ on October 15, 2018.

Overburden geology at Plant 6 consists of up to 35 feet of low permeability clay with discontinuous sand and silt seams located over a dense clay followed by dry interbedded silt/sand/clay to bedrock. Groundwater at the Site is encountered within the saturated silt/sand seams located within the upper 35 feet of unconsolidated material. Bedrock, consisting of interbedded sandstone and shale (Saginaw Formation), is encountered at depths between 50 and 60 feet below grade and is dry initially with the bedrock water table at a depth of approximately 70 to 80 feet below grade.

Vertical aquifer profile (VAP) groundwater samples were collected at each soil boring from the more permeable zones identified within the overburden. At each boring location one to two suitable zones were identified for sampling and groundwater samples were collected using low-flow sampling techniques. In addition, the five soil borings completed in the P6-SB-07 area included soil samples collected from near surface, above the first saturated unit, and at a midpoint between the surface and first saturated unit.

Six samples were collected from the storm sewers adjacent to the Site. Samples were collected by accessing the manhole covers within City ROWs and collecting the sample using a peristaltic pump and PFAS free disposable tubing.

Soil, groundwater, and storm sewer samples were sent to SGS Accutest Laboratory located in Orlando, Florida and analyzed for the 24 PFAS outlined in the Michigan Department of Environmental Quality (MDEQ) PFAS Minimum Laboratory Analyte List (MDEQ, 2018) using modified USEPA Method 537 with isotope dilution (DoD QSM 5.1). Storm sewer samples were also analyzed for 1,4-dioxane at Merit Laboratories in Lansing using USEPA Method 8260 SIM. To avoid cross contamination, all sampling was conducted in accordance with the Arcadis PFAS Sampling Technical Guidance Instruction. QA/QC samples for each matrix (groundwater, storm water, and soil) were collected at a frequency of at least one field duplicate (DUP) for every 10 samples, one matrix spike/matrix spike duplicate (MS/MSD) collected in triplicate per 20 samples. Additionally, one equipment blank from the tubing used for sampling, and one equipment blank per water level meter were collected.

2. RESULTS AND DISCUSSION

The analytical results for groundwater samples were compared to the MDEQ Part 201 Groundwater Surface Water Interface (GSI) criterion for PFOS (12 nanograms per liter [ng/L]) and PFOA (12,000 ng/L); and Drinking Water (DW) Criteria (70 ng/L for combined concentrations of PFOS and PFOA). The analytical results for storm sewer samples were compared to the GSI criterion for PFOS and PFOA. The analytical results for soil samples were compared to the MDEQ Part 201 Groundwater Surface Water Interface Protection (GSIP) criterion for PFOS (0.24 micrograms per kilogram [$\mu\text{g}/\text{kg}$]) and PFOA (10,000 $\mu\text{g}/\text{kg}$). Groundwater sample locations and analytical results for combined PFOS and PFOA are shown on **Figure 1** with a comparison to DW criteria, and groundwater analytical results for PFOS compared to GSI criteria are shown on **Figure 2**. PFOS analytical results from storm sewer samples compared to the GSI criterion are shown on **Figure 3**. Soil analytical results compared to GSIP for PFOS and PFOA are shown on **Figures 4** and **Figure 5**, respectively. The analytical data summary for soil, groundwater and storm sewer samples is provided in **Tables 1, 2** and **3**, respectively. Laboratory analytical reports are included as **Attachment 1**.

- Geology observed in soil borings completed at Plant 6 and the adjacent public ROWs is generally consistent with observations from previous on-site investigations. The geology generally consists of up to 8 feet of fill material (primarily on-site) underlain by interbedded clay with lenses of silt and sand. Perched water was generally encountered within the more permeable sand lenses; however, the permeable zones appear discontinuous. The interbedded clays, silts, and sand lenses are underlain by a dense glacial till, generally encountered at depths of 20 to 35 feet bgs. Boring logs are included in **Attachment 2**.
- PFOS and PFOA exceed DW Criteria at several locations (**Figure 1**) along the eastern property boundary of Plant 6, as well as the area of the former rinse water cistern near monitoring well P6-SB-07. Concentrations of PFOS in perched groundwater also exceed GSI at the majority of locations containing DW exceedances (**Figure 2**).
- Groundwater collected from all eight off-site soil borings were either non-detect or below criteria for PFOS and PFOA. Additional work is proposed as part of the second phase of the investigation to complete delineation near the property boundaries based on the Phase 1 results.
- PFOS was detected in all six storm sewer samples above the GSI Criteria at concentrations ranging from 17.4 ng/l to 73 ng/l (**Figure 3**). PFOA was also detected in all storm sewer samples at concentrations below GSI. 1,4-Dioxane was not detected in the storm sewer samples. Sampling of additional storm sewer structures is proposed to evaluate where PFOS and PFOA are entering the storm sewers and determine additional steps necessary to eliminate the groundwater discharge.
- Of the fifteen (15) soil samples collected from five borings located in and around P6-SB-07, only three contained estimated (J-flag) detections of PFOA (**Figure 4**), which were all below the GSIP Criteria. PFOS was not detected in any of the soil samples (**Figure 5**). The lack of significant PFOS and PFOA detections in soil suggest that vadose zone soils in the area of the former rinse water cistern and P6-SB-07 do not represent an ongoing source of PFAS.

Additional PFAS compounds were also detected at the Site and are included on **Tables 1** through **3**.

3. PROPOSED ADDITIONAL ACTIVITIES

A second phase of work, as stated in the 2018 Plant 6 PFAS Investigation Workplan (Arcadis 2018b), is proposed to complete delineation of PFOS and PFOA exceedances observed near the boundaries of Plant 6. In addition, as noted above, further on-site storm sewer samples will be collected to better determine where impacts from the Site may be entering storm sewers. Proposed additional groundwater sampling locations are included on **Figure 6**. Additional storm sewer sampling locations are shown on **Figure 7**.

Soil borings proposed for off-site locations will be limited to the City of Lansing ROWs. The scope of work will be consistent with the approach detailed in the Phase 1 workplan (Arcadis 2018b) with groundwater samples collected from permeable zones encountered at each location. Additional on-site storm sewer samples were collected on January 26th. RACER will work with the City of Lansing to secure access to the additional off-site storm sewer sampling locations, as well as the ROW access for the proposed off-site soil borings.

References:

Arcadis. 2018a. Monitoring Well PFAS Summary. RACER Trust, Lansing, Michigan, Plants 2 and 6. September 14.

Arcadis. 2018b. PFAS Investigation Work plan (Rev. 2). RACER Trust, Lansing, Michigan, Plant 6. October 10.

Enclosures:

Table 1 – Plant 6 Soil Analytical Results

Table 2 – Plant 6 VAP Groundwater Results

Table 3 – Plant 6 Storm Sewer Analytical Results

Figure 1 – Plant 6 Groundwater Sampling Locations and PFOS + PFOA Analytical Results

Figure 2 – Plant 6 Groundwater Sampling Locations and PFOS Analytical Results

Figure 3 – Plant 6 Storm Sampling Locations and PFOS Analytical Results

Figure 4 – Plant 6 Soil Sampling Locations and PFOA Analytical Results

Figure 5 – Plant 6 Soil Sampling Locations and PFOS Analytical Results

Figure 6 – Plant 6 Proposed Soil Borings

Figure 7 – Plant 6 Proposed Storm Sampling Locations

Attachment 1 – Laboratory Analytical Reports

Attachment 2 – Soil Boring Logs

TABLES



Table 1
2018 Plant 6 PFAS Investigation Soil Analytical Summary
RACER Trust Plant 6
Lansing, Michigan

Location ID: Sample Depth (ft bgs): Date Collected: Sample Name:	MDEQ Non-Residential GSIP Criteria	Units	SB-P6-QH240 5 - 6 11/26/2018 SB-P6-QH240-5-6_20181126	SB-P6-QH240 11 - 12 11/26/2018 SB-P6-QH240-11-12_20181126	SB-P6-QH240 16 - 17 11/26/2018 SB-P6-QH240-16-17_20181126	SB-P6-QT226 2 - 3 11/21/2018 SB-P6-QT226-2-3_20181121	SB-P6-QT226 9 - 10 11/21/2018 SB-P6-QT226-9-10_20181121	SB-P6-QT226 13 - 14 11/21/2018 SB-P6-QT226-13-14_20181121	SB-P6-QT239 7 - 8 11/26/2018 SB-P6-QT239-7-8_20181126
Poly- and Perfluorinated Compounds									
4:2 FTS	--	ug/kg	<1.1	<1.1	<1.1 [<1.1]	<1.2	<1.2	<1.1	<1.1
6:2FTS	--	ug/kg	<1.1	<1.1	<1.1 [<1.1]	<1.2	<1.2	<1.1	<1.1
8:2FTS	--	ug/kg	<1.1	<1.1	<1.1 [<1.1]	<1.2	<1.2	<1.1	<1.1
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	--	ug/kg	<2.8	<2.7	<2.8 [<2.8]	<2.9	<3.1	<2.8	<2.8
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	--	ug/kg	<2.8	<2.7	<2.8 [<2.8]	<2.9	<3.1	<2.8	<2.8
Perfluorobutanesulfonic acid (PFBS)	--	ug/kg	<1.1	<1.1	<1.1 [<1.1]	<1.2	<1.2	<1.1	<1.1
Perfluorobutanoic acid (PFBA)	--	ug/kg	<1.1	<1.1	<1.1 [<1.1]	<1.2	<1.2	<1.1	<1.1
Perfluorodecanesulfonic acid (PFDS)	--	ug/kg	<1.1	<1.1	<1.1 [<1.1]	<1.2	<1.2	<1.1	<1.1
Perfluorodecanoic acid (PFDA)	--	ug/kg	<1.1	<1.1	<1.1 [<1.1]	<1.2	<1.2	<1.1	<1.1
Perfluorododecanoic acid (PFDoA)	--	ug/kg	<1.1	<1.1	<1.1 [<1.1]	<1.2	<1.2	<1.1	<1.1
Perfluoroheptanesulfonic Acid (PFHpS)	--	ug/kg	<1.1	<1.1	<1.1 [<1.1]	<1.2	<1.2	<1.1	<1.1
Perfluoroheptanoic acid (PFHpA)	--	ug/kg	<1.1	<1.1	<1.1 [<1.1]	<1.2	<1.2	<1.1	<1.1
Perfluorohexanesulfonic acid (PFHxS)	--	ug/kg	<1.1	<1.1	<1.1 [<1.1]	<1.2	<1.2	<1.1	<1.1
Perfluorohexanoic acid (PFHxA)	--	ug/kg	<1.1	<1.1	<1.1 [<1.1]	<1.2	<1.2	<1.1	<1.1
Perfluorononanesulfonic acid (PFNS)	--	ug/kg	<1.1	<1.1	<1.1 [<1.1]	<1.2	<1.2	<1.1	<1.1
Perfluorononanoic acid (PFNA)	--	ug/kg	<1.1	<1.1	<1.1 [<1.1]	<1.2	<1.2	<1.1	<1.1
Perfluorooctane Sulfonamide (FOSA)	--	ug/kg	<1.1	<1.1	<1.1 [<1.1]	<1.2	<1.2	<1.1	<1.1
Perfluorooctane sulfonic acid (PFOS)	0.24	ug/kg	<1.1	<1.1	<1.1 [<1.1]	<1.2	<1.2	<1.1	<1.1
Perfluorooctanoic acid (PFOA)	10000	ug/kg	<1.1	<1.1	<1.1 [<1.1]	<1.2	<1.2	<1.1	<1.1
Perfluoropentanesulfonic acid (PFPeS)	--	ug/kg	<1.1	<1.1	<1.1 [<1.1]	<1.2	<1.2	<1.1	<1.1
Perfluoropentanoic acid (PFPeA)	--	ug/kg	<1.1	<1.1	<1.1 [<1.1]	<1.2	<1.2	<1.1	<1.1
Perfluorotetradecanoic acid (PFTeA)	--	ug/kg	<1.1	<1.1	<1.1 [<1.1]	<1.2	<1.2	<1.1	<1.1
Perfluorotridecanoic Acid (PFTriA)	--	ug/kg	<1.1	<1.1	<1.1 [<1.1]	<1.2	<1.2	<1.1	<1.1
Perfluoroundecanoic acid (PFUnA)	--	ug/kg	<1.1	<1.1	<1.1 [<1.1]	<1.2	<1.2	<1.1	<1.1

See notes on last page.

Table 1
2018 Plant 6 PFAS Investigation Soil Analytical Summary
RACER Trust Plant 6
Lansing, Michigan

Location ID: Sample Depth (ft bgs): Date Collected: Sample Name:	MDEQ Non-Residential GSIP Criteria	Units	SB-P6-QT239 11 - 12 11/26/2018 SB-P6-QT239-11-12_20181126	SB-P6-QT239 15 - 16 11/26/2018 SB-P6-QT239-15-16_20181126	SB-P6-QT255 4 - 5 11/21/2018 SB-P6-QT255-4-5_20181121	SB-P6-QT255 8 - 9 11/21/2018 SB-P6-QT255-8-9_20181121	SB-P6-QT255 35 - 36 11/21/2018 SB-P6-QT255-35-36_20181121	SB-P6-RH241 1 - 2 11/21/2018 SB-P6-RH241-1-2_20181121	SB-P6-RH241 4 - 5 11/21/2018 SB-P6-RH241-4-5_20181121
Poly- and Perfluorinated Compounds									
4:2 FTS	--	ug/kg	<1.1	<1.1	<1.2	<1.2 [<1.1]	<1.1	<1.1	<1.1
6:2FTS	--	ug/kg	<1.1	<1.1	<1.2	<1.2 [<1.1]	<1.1	<1.1	<1.1
8:2FTS	--	ug/kg	<1.1	<1.1	<1.2	<1.2 [<1.1]	<1.1	<1.1	<1.1
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	--	ug/kg	<2.8	<2.7	<3.0	<2.9 [<2.8]	<2.9	<2.9	<2.8
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	--	ug/kg	<2.8	<2.7	<3.0	<2.9 [<2.8]	<2.9	<2.9	<2.8
Perfluorobutanesulfonic acid (PFBS)	--	ug/kg	<1.1	<1.1	<1.2	<1.2 [<1.1]	<1.1	<1.1	<1.1
Perfluorobutanoic acid (PFBA)	--	ug/kg	<1.1	<1.1	<1.2	<1.2 [<1.1]	<1.1	<1.1	<1.1
Perfluorodecanesulfonic acid (PFDS)	--	ug/kg	<1.1	<1.1	<1.2	<1.2 [<1.1]	<1.1	<1.1	<1.1
Perfluorodecanoic acid (PFDA)	--	ug/kg	<1.1	<1.1	<1.2	<1.2 [<1.1]	<1.1	<1.1	<1.1
Perfluorododecanoic acid (PFDoA)	--	ug/kg	<1.1	<1.1	<1.2	<1.2 [<1.1]	<1.1	<1.1	<1.1
Perfluoroheptanesulfonic Acid (PFHpS)	--	ug/kg	<1.1	<1.1	<1.2	<1.2 [<1.1]	<1.1	<1.1	<1.1
Perfluoroheptanoic acid (PFHpA)	--	ug/kg	<1.1	<1.1	<1.2	1.21 [0.754 J]	<1.1	<1.1	<1.1
Perfluorohexanesulfonic acid (PFHxS)	--	ug/kg	<1.1	<1.1	<1.2	<1.2 [<1.1]	<1.1	<1.1	<1.1
Perfluorohexanoic acid (PFHxA)	--	ug/kg	<1.1	<1.1	<1.2	0.967 J [0.772 J]	<1.1	0.235 J	<1.1
Perfluorononanesulfonic acid (PFNS)	--	ug/kg	<1.1	<1.1	<1.2	<1.2 [<1.1]	<1.1	<1.1	<1.1
Perfluorononanoic acid (PFNA)	--	ug/kg	<1.1	<1.1	<1.2	<1.2 [<1.1]	<1.1	<1.1	<1.1
Perfluorooctane Sulfonamide (FOSA)	--	ug/kg	<1.1	<1.1	<1.2	<1.2 [<1.1]	<1.1	<1.1	<1.1
Perfluorooctane sulfonic acid (PFOS)	0.24	ug/kg	<1.1	<1.1	<1.2	<1.2 [<1.1]	<1.1	<1.1	<1.1
Perfluorooctanoic acid (PFOA)	10000	ug/kg	1.02 J	<1.1	<1.2	0.601 J [0.305 J]	<1.1	0.342 J	<1.1
Perfluoropentanesulfonic acid (PFPeS)	--	ug/kg	<1.1	<1.1	<1.2	<1.2 [<1.1]	<1.1	<1.1	<1.1
Perfluoropentanoic acid (PFPeA)	--	ug/kg	<1.1	<1.1	<1.2	2.21 [1.76]	<1.1	0.235 J	<1.1
Perfluorotetradecanoic acid (PFTeA)	--	ug/kg	<1.1	<1.1	<1.2	<1.2 [<1.1]	<1.1	<1.1	<1.1
Perfluorotridecanoic Acid (PFTriA)	--	ug/kg	<1.1	<1.1	<1.2	<1.2 [<1.1]	<1.1	<1.1	<1.1
Perfluoroundecanoic acid (PFUnA)	--	ug/kg	<1.1	<1.1	<1.2	<1.2 [<1.1]	<1.1	<1.1	<1.1

See notes on last page.

Table 1
 2018 Plant 6 PFAS Investigation Soil Analytical Summary
 RACER Trust Plant 6
 Lansing, Michigan

Location ID: Sample Depth (ft bgs): Date Collected: Sample Name:	MDEQ Non-Residential GSIP Criteria	Units	SB-P6-RH241 9 - 10 11/21/2018 SB-P6-RH241-9-10_20181121
Poly- and Perfluorinated Compounds			
4:2 FTS	--	ug/kg	<1.1
6:2FTS	--	ug/kg	<1.1
8:2FTS	--	ug/kg	<1.1
N-ethyl perfluorooctane sulfonamidoacetic acid (NETFOSAA)	--	ug/kg	<2.8
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	--	ug/kg	<2.8
Perfluorobutanesulfonic acid (PFBS)	--	ug/kg	<1.1
Perfluorobutanoic acid (PFBA)	--	ug/kg	<1.1
Perfluorodecanesulfonic acid (PFDS)	--	ug/kg	<1.1
Perfluorodecanoic acid (PFDA)	--	ug/kg	<1.1
Perfluorododecanoic acid (PFDoA)	--	ug/kg	<1.1
Perfluoroheptanesulfonic Acid (PFHpS)	--	ug/kg	<1.1
Perfluoroheptanoic acid (PFHpA)	--	ug/kg	<1.1
Perfluorohexanesulfonic acid (PFHxS)	--	ug/kg	<1.1
Perfluorohexanoic acid (PFHxA)	--	ug/kg	<1.1
Perfluorononanesulfonic acid (PFNS)	--	ug/kg	<1.1
Perfluorononanoic acid (PFNA)	--	ug/kg	<1.1
Perfluorooctane Sulfonamide (FOSA)	--	ug/kg	<1.1
Perfluorooctane sulfonic acid (PFOS)	0.24	ug/kg	<1.1
Perfluorooctanoic acid (PFOA)	10000	ug/kg	<1.1
Perfluoropentanesulfonic acid (PFPeS)	--	ug/kg	<1.1
Perfluoropentanoic acid (PFPeA)	--	ug/kg	<1.1
Perfluorotetradecanoic acid (PFTeA)	--	ug/kg	<1.1
Perfluorotridecanoic Acid (PFTriA)	--	ug/kg	<1.1
Perfluoroundecanoic acid (PFUnA)	--	ug/kg	<1.1

See notes on last page.

Notes:

Bold result denotes detection is above the laboratory reporting limit but below MDEQ Part 201 Generic Cleanup Criteria.
Gray shading denotes exceedances of one or more Proposed 2017 MDEQ Part 201 Generic Cleanup Criteria.
Data shown in brackets [] represent duplicate sample analytical results.
- - = Not listed in the MDEQ Criteria Tables.
All analysis completed using modified USEPA Method 537

Acronyms and Abbreviations:

ft bgs - feet below ground surface
Non-Residential GSIP - MDEQ Part 201 Non-residential Groundwater Surface Water Interface Protection Criteria
SB - soil boring
MDEQ - Michigan Department of Environmental Quality
USEPA - United States Environmental Protection Agency
µg/kg - micrograms/kilogram

Analytical Laboratory:

SGS Accutest - Orlando, FL

Qualifiers:

J = Compound positively detected above laboratory method detection limit below the quantitative reporting limit. The value reported is an estimated concentration.

Table 2
2018 Plant 6 PFAS Vertical Aquifer Profile Analytical Summary
RACER Trust Plant 6
Lansing, Michigan

Location ID: Date Collected: Sample Name:	MI GW (DEQ2017) RES DW	MI SW (DEQ2016) Rule 57 HNV	Units	SB-P6-MF293 11/28/2018 SB-P6-MF293_3- 8_20181128	SB-P6-MF293 11/28/2018 SB-P6-MF293_20- 25_20181128	SB-P6-MF301 11/28/2018 SB-P6-MF301_3- 8_20181128	SB-P6-MF301 11/28/2018 SB-P6-MF301_20- 25_20181128	SB-P6-MF311 11/28/2018 SB-P6-MF311_8- 13_20181128	SB-P6-MF311 11/28/2018 SB-P6-MF311_20- 25_20181128	SB-P6-MF321 11/28/2018 SB-P6-MF321_15- 20_20181128	SB-P6-MK335 11/29/2018 SB-P6-MK335_9- 14_20181129
Poly- and Perfluorinated Compounds											
4:2 FTS	--	--	ng/L	<8	<8	<8	<8	<8.3	<8 [<8]	<8	<8
6:2FTS	--	--	ng/L	<8	<8	<8	<8	<8.3	<8 [<8]	<8	<8
8:2FTS	--	--	ng/L	<8	<8	<8	<8	<8.3	<8 [<8]	<8	<8
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	--	--	ng/L	<20	<20	<20	<20	<21	<20 [<20]	<20	<20
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	--	--	ng/L	<20	<20	<20	<20	<21	<20 [<20]	<20	<20
Perfluorobutanesulfonic acid (PFBS)	--	--	ng/L	2.23 J	2.03 J	1.78 J	<4	1.23 J	<4 [<4]	1.38 J	<4
Perfluorobutanoic acid (PFBA)	--	--	ng/L	19.9	20	18.3	11.7	23.3	25.1 [24.7]	6.17 J	<8
Perfluorodecanesulfonic acid (PFDS)	--	--	ng/L	<4	<4	<4	<4	<4.2	<4 [<4]	<4	<4
Perfluorodecanoic acid (PFDA)	--	--	ng/L	<4	<4	<4	<4	<4.2	<4 [<4]	<4	<4
Perfluorododecanoic acid (PFDoA)	--	--	ng/L	<4	<4	<4	<4	<4.2	<4 [<4]	<4	<4
Perfluoroheptanesulfonic Acid (PFHpS)	--	--	ng/L	<4	<4	<4	<4	<4.2	<4 [<4]	<4	<4
Perfluoroheptanoic acid (PFHpA)	--	--	ng/L	15.7	16.5	14.1	1.83 J	20.0	13.3 [13]	4.27	<4
Perfluorohexanesulfonic acid (PFHxS)	--	--	ng/L	<4	<4	1.03 J	<4	1.21 J	<4 [<4]	1.54 J	<4
Perfluorohexanoic acid (PFHxA)	--	--	ng/L	38.1	41	21.7	7.15	47.6	37.2 [36.5]	5.57	<4
Perfluorononanesulfonic acid (PFNS)	--	--	ng/L	<4	<4	<4	<4	<4.2	<4 [<4]	<4	<4
Perfluorononanoic acid (PFNA)	--	--	ng/L	2.64 J	1.4 J	1.33 J	<4	<4.2	<4 [<4]	<4	<4
Perfluorooctane Sulfonamide (FOSA)	--	--	ng/L	<4	<4	<4	<4	<4.2	<4 [<4]	<4	<4
Perfluorooctane sulfonic acid (PFOS)	--	12	ng/L	4.62	<4	4.08	<4	3.01 J	<4 [<4]	2.97 J	<4
Perfluorooctanoic acid (PFOA)	--	12,000	ng/L	50.4	41.5	23.8	1.61 J	11.4	7.25 [6.24]	14.2	1.13 J
Perfluoropentanesulfonic acid (PFPeS)	--	--	ng/L	<4	<4	<4	<4	<4.2	<4 [<4]	<4	<4
Perfluoropentanoic acid (PFPeA)	--	--	ng/L	31.5	34.1	20.3	11.7	53.3	49.1 [48]	5.36	1.55 J
Perfluorotetradecanoic acid (PFTeA)	--	--	ng/L	<4	<4	<4	<4	<4.2	<4 [<4]	<4	<4
Perfluorotridecanoic Acid (PFTriA)	--	--	ng/L	<4	<4	<4	<4	<4.2	<4 [<4]	<4	<4
Perfluoroundecanoic acid (PFUnA)	--	--	ng/L	<4	<4	<4	<4	<4.2	<4 [<4]	<4	<4
Total PFAS (PFOS + PFOA)	70	--	ng/L	55.02	41.5	27.88	1.61 J	14.41 J	7.25 [6.24]	17.17 J	1.13 J

See notes on last page.

Table 2
2018 Plant 6 PFAS Vertical Aquifer Profile Analytical Summary
RACER Trust Plant 6
Lansing, Michigan

Location ID: Date Collected: Sample Name:	MI GW (DEQ2017) RES DW	MI SW (DEQ2016) Rule 57 HN	Units	SB-P6-MK335 11/29/2018 SB-P6-MK335_28- 33_20181129	SB-P6-MQ289 11/20/2018 SB-P6-MQ289-15- 20_20181120	SB-P6-MQ289 11/30/2018 SB-P6-MQ289_27- 32_20181130	SB-P6-MQ312 11/21/2018 SB-P6-MQ312-5- 10_20181121	SB-P6-NF322 11/21/2018 SB-P6-NF322-19- 24_20181121	SB-P6-NF322 11/21/2018 SB-P6-NF322-19.5- 24.5_20181121	SB-P6-NS335 11/29/2018 SB-P6-NS335_11- 16_20181129
Poly- and Perfluorinated Compounds										
4:2 FTS	--	--	ng/L	<8	<8 [<8]	<17	<8	<8	<8	<8 [<8]
6:2 FTS	--	--	ng/L	<8	<8 [<8]	<17	<8	<8	<8	<8 [<8]
8:2 FTS	--	--	ng/L	<8	<8 [<8]	<17	<8	<8	<8	<8 [<8]
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	--	--	ng/L	<20	<20 [<20]	<42	<20	<20	<20	<20 [<20]
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	--	--	ng/L	<20	<20 [<20]	<42	<20	<20	<20	<20 [<20]
Perfluorobutanesulfonic acid (PFBS)	--	--	ng/L	<4	4.46 [4.48]	<8.3	4.04	1.9 J	<4	2.11 J [2.39 J]
Perfluorobutanoic acid (PFBA)	--	--	ng/L	<8	42.1 [58.7]	15.4 J	42.7	18.5	36.1	<8 [<8]
Perfluorodecanesulfonic acid (PFDS)	--	--	ng/L	<4	<4 [<4]	<8.3	6.76	<4	<4	<4 [<4]
Perfluorodecanoic acid (PFDA)	--	--	ng/L	<4	<4 [<4]	<8.3	35.3	<4	<4	<4 [<4]
Perfluorododecanoic acid (PFDoA)	--	--	ng/L	<4	<4 [<4]	<8.3	<4	<4	<4	<4 [<4]
Perfluoroheptanesulfonic Acid (PFHpS)	--	--	ng/L	<4	<4 [<4]	<8.3	1.25 J	<4	<4	<4 [<4]
Perfluoroheptanoic acid (PFHpA)	--	--	ng/L	<4	48.3 [68.2]	12.6	110	2.94 J	<4	<4 [<4]
Perfluorohexanesulfonic acid (PFHxS)	--	--	ng/L	<4	2.11 J [2.88 J]	<8.3	2.58 J	<4	<4	1.18 J [1.47 J]
Perfluorohexanoic acid (PFHxA)	--	--	ng/L	<4	122 [178]	30.2	76.1	11	17.6	<4 [<4]
Perfluorononanesulfonic acid (PFNS)	--	--	ng/L	<4	<4 [<4]	<8.3	<4	<4	<4	<4 [<4]
Perfluorononanoic acid (PFNA)	--	--	ng/L	<4	3.19 J [1.82 J]	<8.3	28.2	<4	<4	<4 [<4]
Perfluorooctane Sulfonamide (FOSA)	--	--	ng/L	<4	<4 [<4]	<8.3	4.56	<4	<4	<4 [<4]
Perfluorooctane sulfonic acid (PFOS)	--	12	ng/L	<4	7.32 [10.7]	8.02 J	71.9	<4	<4	<4 [<4]
Perfluorooctanoic acid (PFOA)	--	12,000	ng/L	1.09 J	94.6 [118]	28.8	226	5.8	<4	<4 [<4]
Perfluoropentanesulfonic acid (PFPeS)	--	--	ng/L	<4	<4 [<4]	<8.3	<4	<4	<4	<4 [<4]
Perfluoropentanoic acid (PFPeA)	--	--	ng/L	<4	33 [78.4]	19.5	86.7	19	47.3	<4 [<4]
Perfluorotetradecanoic acid (PFTeA)	--	--	ng/L	<4	<4 [<4]	<8.3	<4	<4	<4	<4 [<4]
Perfluorotridecanoic Acid (PFTriA)	--	--	ng/L	<4	<4 [<4]	<8.3	<4	<4	<4	<4 [<4]
Perfluoroundecanoic acid (PFUnA)	--	--	ng/L	<4	<4 [<4]	<8.3	<4	<4	<4	<4 [<4]
Total PFAS (PFOS + PFOA)	70	--	ng/L	1.09 J	101.92 [128.7]	36.82 J	297.9	5.8	<4	<4 [<4]

See notes on last page.

Table 2
2018 Plant 6 PFAS Vertical Aquifer Profile Analytical Summary
RACER Trust Plant 6
Lansing, Michigan

Location ID: Date Collected: Sample Name:	MI GW (DEQ2017) RES DW	MI SW (DEQ2016) Rule 57 HNV	Units	SB-P6-OH322 11/28/2018 SB-P6-OH322_10- 15_20181128	SB-P6-OH322 11/28/2018 SB-P6-OH322_15- 20_20181128	SB-P6-OS335 11/28/2018 SB-P6-OS335_18.5- 23.5_20181128	SB-P6-OX322 11/26/2018 SB-P6-OX322-18- 23_20181126	SB-P6-QA336 11/29/2018 SB-P6-QA336_13- 18_20181129	SB-P6-QA336 11/29/2018 SB-P6-QA336_30- 35_20181129	SB-P6-QH240 11/30/2018 SB-P6-QH240_15- 20_20181130
Poly- and Perfluorinated Compounds										
4:2 FTS	--	--	ng/L	<8	<8	<8	<40	<8	<20	<15
6:2FTS	--	--	ng/L	<8	<8	<8	<40	<8	<20	<15
8:2FTS	--	--	ng/L	<8	<8	<8	<40	<8	<20	<15
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	--	--	ng/L	<20	<20	<20	<100	<20	<50	<38
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	--	--	ng/L	<20	<20	<20	<100	<20	<50	<38
Perfluorobutanesulfonic acid (PFBS)	--	--	ng/L	4.88	4.09	1.54 J	<20	2.81 J	<10	<7.7
Perfluorobutanoic acid (PFBA)	--	--	ng/L	27.6	21.1	7.05 J	27 J	5.46 J	8.35 J	19.3
Perfluorodecanesulfonic acid (PFDS)	--	--	ng/L	<4	<4	<4	<20	<4	<10	<7.7
Perfluorodecanoic acid (PFDA)	--	--	ng/L	3.32 J	5.36	<4	<20	<4	2.92 J	7.85
Perfluorododecanoic acid (PFDoA)	--	--	ng/L	<4	<4	<4	<20	<4	<10	<7.7
Perfluoroheptanesulfonic Acid (PFHpS)	--	--	ng/L	<4	<4	<4	<20	<4	<10	<7.7
Perfluoroheptanoic acid (PFHpA)	--	--	ng/L	46	29.3	2.83 J	34.6	3.43 J	4.76 J	24.7
Perfluorohexanesulfonic acid (PFHxS)	--	--	ng/L	5.54	4.1	1.12 J	<20	4.77	2.86 J	<7.7
Perfluorohexanoic acid (PFHxA)	--	--	ng/L	46.7	34.2	5.79	44.7	5.91	6.78 J	21.1
Perfluorononanesulfonic acid (PFNS)	--	--	ng/L	<4	<4	<4	<20	<4	<10	<7.7
Perfluorononanoic acid (PFNA)	--	--	ng/L	7.2	5.49	<4	<20	<4	<10	9.94
Perfluorooctane Sulfonamide (FOSA)	--	--	ng/L	<4	<4	<4	<20	<4	<10	8.24
Perfluorooctane sulfonic acid (PFOS)	--	12	ng/L	19.5	16.1	8.41	<20	2.65 J	3.93 J	105
Perfluorooctanoic acid (PFOA)	--	12,000	ng/L	68.8	39.6	7.31	65.6	9.81	11.1	77.6
Perfluoropentanesulfonic acid (PFPeS)	--	--	ng/L	<4	<4	<4	<20	<4	<10	<7.7
Perfluoropentanoic acid (PFPeA)	--	--	ng/L	50	34.6	6.51	40.5	6.71	10.1	20.9
Perfluorotetradecanoic acid (PFTeA)	--	--	ng/L	<4	<4	<4	<20	<4	<10	<7.7
Perfluorotridecanoic Acid (PFTriA)	--	--	ng/L	<4	<4	<4	<20	<4	<10	<7.7
Perfluoroundecanoic acid (PFUnA)	--	--	ng/L	<4	<4	<4	<20	<4	<10	<7.7
Total PFAS (PFOS + PFOA)	70	--	ng/L	88.3	55.7	15.72	65.6	12.46 J	15.03 J	182.6

See notes on last page.

Table 2
 2018 Plant 6 PFAS Vertical Aquifer Profile Analytical Summary
 RACER Trust Plant 6
 Lansing, Michigan

Location ID: Date Collected: Sample Name:	MI GW (DEQ2017) RES DW	MI SW (DEQ2016) Rule 57 HNV	Units	SB-P6-QM322 11/26/2018 SB-P6-QM322-15- 20_20181126	SB-P6-QT226 11/30/2018 SB-P6-QT226_13- 18_20181130	SB-P6-QT239 11/30/2018 SB-P6-QT239_15- 20_20181130	SB-P6-RH241 11/30/2018 SB-P6-RH241_13- 18_20181130	SB-P6-RQ322 11/26/2018 SB-P6-RQ322-13- 18_20181126	SB-P6-RQ322 11/27/2018 SB-P6-RQ322-27- 32_20181127
Poly- and Perfluorinated Compounds									
4:2 FTS	--	--	ng/L	<40	<17	<17	<17	<8	<8
6:2FTS	--	--	ng/L	<40	<17	<17	<17	<8	<8
8:2FTS	--	--	ng/L	<40	<17	<17	<17	<8	<8
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	--	--	ng/L	<100	<42	<42	<42	<20	<20
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	--	--	ng/L	<100	<42	<42	<42	<20	<20
Perfluorobutanesulfonic acid (PFBS)	--	--	ng/L	<20	<8.3	2.6 J	<8.3	1.89 J	4.64
Perfluorobutanoic acid (PFBA)	--	--	ng/L	99.7	20.2	100	48.6	42.2	19.5
Perfluorodecanesulfonic acid (PFDS)	--	--	ng/L	<20	<8.3	<8.3	<8.3	<4	<4
Perfluorodecanoic acid (PFDA)	--	--	ng/L	12.9 J	<8.3	44.1	2.7 J	<4	<4
Perfluorododecanoic acid (PFDoA)	--	--	ng/L	<20	<8.3	<8.3	<8.3	<4	<4
Perfluoroheptanesulfonic Acid (PFHpS)	--	--	ng/L	<20	<8.3	<8.3	<8.3	<4	<4
Perfluoroheptanoic acid (PFHpA)	--	--	ng/L	131	9.12	332	79.3	92.4	59.5
Perfluorohexanesulfonic acid (PFHxS)	--	--	ng/L	<20	<8.3	<8.3	4.49 J	1.96 J	2.81 J
Perfluorohexanoic acid (PFHxA)	--	--	ng/L	157	21.8	350	107	96.9	48.1
Perfluorononanesulfonic acid (PFNS)	--	--	ng/L	<20	<8.3	<8.3	<8.3	<4	<4
Perfluorononanoic acid (PFNA)	--	--	ng/L	23.9	<8.3	99.6	18.1	8.87	2.12 J
Perfluorooctane Sulfonamide (FOSA)	--	--	ng/L	<20	<8.3	<8.3	<8.3	<4	<4
Perfluorooctane sulfonic acid (PFOS)	--	12	ng/L	23.9	<8.3	39.1	16.9	8.96	2.66 J
Perfluorooctanoic acid (PFOA)	--	12,000	ng/L	189	12.2	449	253	157	60.9
Perfluoropentanesulfonic acid (PFPeS)	--	--	ng/L	<20	<8.3	<8.3	<8.3	<4	1.38 J
Perfluoropentanoic acid (PFPeA)	--	--	ng/L	162	30.6	368	108	89.4	38.3
Perfluorotetradecanoic acid (PFTeA)	--	--	ng/L	<20	<8.3	<8.3	<8.3	<4	<4
Perfluorotridecanoic Acid (PFTriA)	--	--	ng/L	<20	<8.3	<8.3	<8.3	<4	<4
Perfluoroundecanoic acid (PFUnA)	--	--	ng/L	<20	<8.3	2.94 J	<8.3	<4	<4
Total PFAS (PFOS + PFOA)	70	--	ng/L	212.9	12.2	488.1	269.9	165.96	63.56 J

See notes on last page.

Notes:

Bold result denotes detection is above the laboratory reporting limit but below MDEQ Part 201 Generic Cleanup Criteria.
Gray shading denotes exceedances of one or more Proposed 2017 MDEQ Part 201 Generic Cleanup Criteria.
Data shown in brackets [] represent duplicate sample analytical results.
- - = Not listed in the MDEQ Criteria Tables.
All analysis completed using modified USEPA Method 537

Acronyms and Abbreviations:

DW - 2017 MDEQ Part 201 Drinking Water Criteria
HNV (Non-DW) - 2016 MDEQ Rule 57 Human Non-Cancer Value for Surface Water from a Non-Drinking Water Source
ng/L - nanograms per liter
NA - not analyzed
GW - groundwater
Sb - soil boring
SW - surface water
MDEQ - Michigan Department of Environmental Quality
USEPA - United States Environmental Protection Agency
VAP - vertical aquifer profiling

Analytical Laboratory:

SGS Accutest - Orlando, FL

Qualifiers:

J = Compound positively detected above laboratory method detection limit below the quantitative reporting limit. The value reported is an estimated concentration.

Table 3
2018 Plant 6 Storm Sewer Analytical Summary
RACER Trust Plant 6
Lansing, Michigan

Location ID:	MDEQ Part		OSBORN-MH-1	P6-MH2-SW	VERLINDEN-MH-1	VERLINDEN-MH-2	VERLINDEN-MH-3	VERLINDEN-MH-4
Date Collected:	201 GSI		11/29/2018	12/7/2018	11/29/2018	11/29/2018	11/29/2018	11/29/2018
Sample Name:		Units	OSBORN-MH-1_112918	P6-MH2-SW_120718	VERLINDEN-MH-1_112918	VERLINDEN-MH-2_112918	VERLINDEN-MH-3_112918	VERLINDEN-MH-4_112918
Poly- and Perfluorinated Compounds (by USEPA Method 537 modified)								
4:2 FTS	--	ng/L	<8	<8 [<8]	<8	<8	<8	<8 [<8]
6:2FTS	--	ng/L	<8	<8 [<8]	<8	<8	<8	<8 [<8]
8:2FTS	--	ng/L	<8	<8 [<8]	<8	<8	<8	<8 [<8]
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	--	ng/L	<20	<20 [<20]	<20	<20	<20	<20 [<20]
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	--	ng/L	<20	<20 [<20]	<20	<20	<20	<20 [<20]
Perfluorobutanesulfonic acid (PFBS)	--	ng/L	2.78 J	1.86 J [2 J]	4.7	3.58 J	5.48	6.17 [5.14]
Perfluorobutanoic acid (PFBA)	--	ng/L	21.9	16.7 [16.2]	26.3	20.3	16.8	17.8 [19.9]
Perfluorodecanesulfonic acid (PFDS)	--	ng/L	<4	<4 [<4]	<4	<4	<4	<4 [<4]
Perfluorodecanoic acid (PFDA)	--	ng/L	7.75	2.17 J [2.05 J]	6.18	3.78 J	2.55 J	3.1 J [2.72 J]
Perfluorododecanoic acid (PFDoA)	--	ng/L	<4	<4 [<4]	<4	<4	<4	<4 [<4]
Perfluoroheptanesulfonic Acid (PFHpS)	--	ng/L	<4	<4 [<4]	<4	<4	<4	<4 [<4]
Perfluoroheptanoic acid (PFHpA)	--	ng/L	27.0	20.7 [19.3]	32.7	28.4	22.3	21.1 [25.5]
Perfluorohexanesulfonic acid (PFHxS)	--	ng/L	1.86 J	1.26 J [1.03 J]	1.82 J	2.39 J	2.44 J	3.03 J [3.21 J]
Perfluorohexanoic acid (PFHxA)	--	ng/L	26.4	23.2 [21.6]	31.9	29.9	24.4	25.2 [27.9]
Perfluorononanesulfonic acid (PFNS)	--	ng/L	<4	<4 [<4]	<4	<4	<4	<4 [<4]
Perfluorononanoic acid (PFNA)	--	ng/L	8.11	3.03 J [3.04 J]	6.23	6.21	4.47	4.46 [5.06]
Perfluorooctane Sulfonamide (FOSA)	--	ng/L	3.39 J	14.1 [13.3]	2.7 J	2.25 J	1.54 J	1.55 J [1.73 J]
Perfluorooctane sulfonic acid (PFOS)	12	ng/L	47	73 [62]	18.8	22.7	17.4	18.2 [20.6]
Perfluorooctanoic acid (PFOA)	12,000	ng/L	53.2	39.4 [37.4]	48.7	48.5	38.4	40.3 [44.9]
Perfluoropentanesulfonic acid (PFPeS)	--	ng/L	<4	<4 [<4]	<4	<4	<4	<4 [<4]
Perfluoropentanoic acid (PFPeA)	--	ng/L	28.2	25.3 [24.3]	29.3	29.2	26.7	26.8 [28.4]
Perfluorotetradecanoic acid (PFTeA)	--	ng/L	<4	<4 [<4]	<4	<4	<4	<4 [<4]
Perfluorotridecanoic Acid (PFTriA)	--	ng/L	<4	<4 [<4]	<4	<4	<4	<4 [<4]
Perfluoroundecanoic acid (PFUnA)	--	ng/L	<4	<4 [<4]	<4	<4	<4	<4 [<4]
Combined PFOS + PFOA	--	ng/L	100.2	112.4 [99.4]	67.5	71.2	55.8	58.5 [65.5]
1,4-Dioxane (by USEPA Method 8260 SIM)								
1,4-Dioxane	2,800	µg/L	<1	<1	<1	<1	<1	<1 [<1]

See notes on last page.

Table 3
2018 Plant 6 Groundwater Monitoring Well and Manhole Analytical Summary
RACER Trust Plant 6
Lansing, Michigan

Notes:

Bold result denotes detection is above the laboratory reporting limit but below MDEQ Part 201 Generic Cleanup Criteria.

Gray shading denotes exceedances of one or more Proposed 2017 MDEQ Part 201 Generic Cleanup Criteria.

Data shown in brackets [] represent duplicate sample analytical results.

-- = Not listed in the MDEQ Criteria Tables.

All analysis completed using modified USEPA Method 537

Acronyms and Abbreviations:

GSI - Groundwater Surface Water Interface Criteria (based on 2016 MDEQ Rule 57 Human Non-Cancer Value for Surface Water from a Non-Drinking Water Source)

MH - manhole

ng/L - nanograms per liter

µg/L - micrograms per liter

NA - not analyzed

SB - soil boring

MDEQ - Michigan Department of Environmental Quality

USEPA - United States Environmental Protection Agency

Analytical Laboratory:

SGS Accutest - Orlando, FL

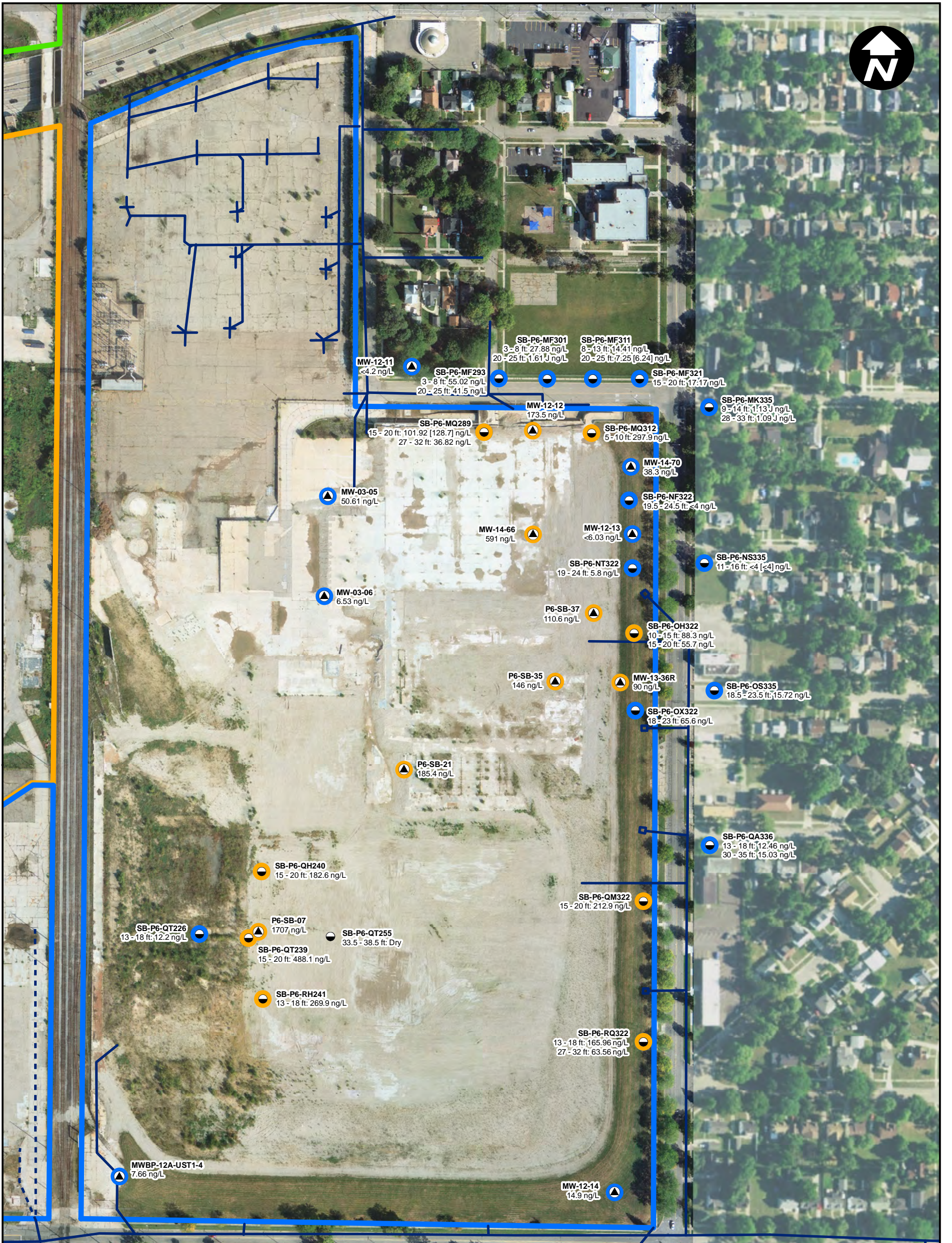
Qualifiers:

J = Compound positively detected above laboratory method detection limit below the quantitative reporting limit. The value reported is an estimated concentration.

FIGURES



CITY: Novi DIV: ENV DB: TRY PIC: PM: TR: PROJECT NUMBER: COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl G:\GIS\Project Files\MotorsLiqudationCompany\Lansing\Docs\PFAS\P6_PFAS in GW.mxd PLOTTED: 1/24/2019 11:15:30 AM BY: dolixa



LEGEND

- ▲ MONITORING WELL
- VAP BORING
- PFOS + PFOA < 70 ng/L
- PFOS + PFOA > 70 ng/L
- STORM SEWER LOCATION
- - - ASSUMED/ESTIMATED STORM SEWER LOCATION

APPROXIMATE PLANT BOUNDARIES

- PLANT 2
- PLANT 3
- PLANT 6

NOTES:

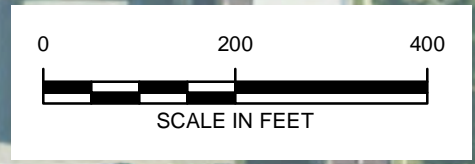
THE ANALYTICAL RESULTS REPRESENT THE COMBINED PFOS AND PFOA CONCENTRATION IN THE SAMPLE AND ARE PRESENTED IN UNITS OF ng/L.

ANALYTICAL RESULTS IN BRACKETS REPRESENT DUPLICATE SAMPLE RESULTS.

THE PFOS AND PFOA COMBINED MDEQ PART 201 DRINKING WATER CRITERIA IS 70 ng/L.

J - COMPOUND DETECTED ABOVE LABORATORY METHOD DETECTION LIMIT AND BELOW THE QUANTITATIVE REPORTING LIMIT ng/L - NANOGRAMS PER LITER

ALL ANALYSES COMPLETED USING MODIFIED USEPA METHOD 537.

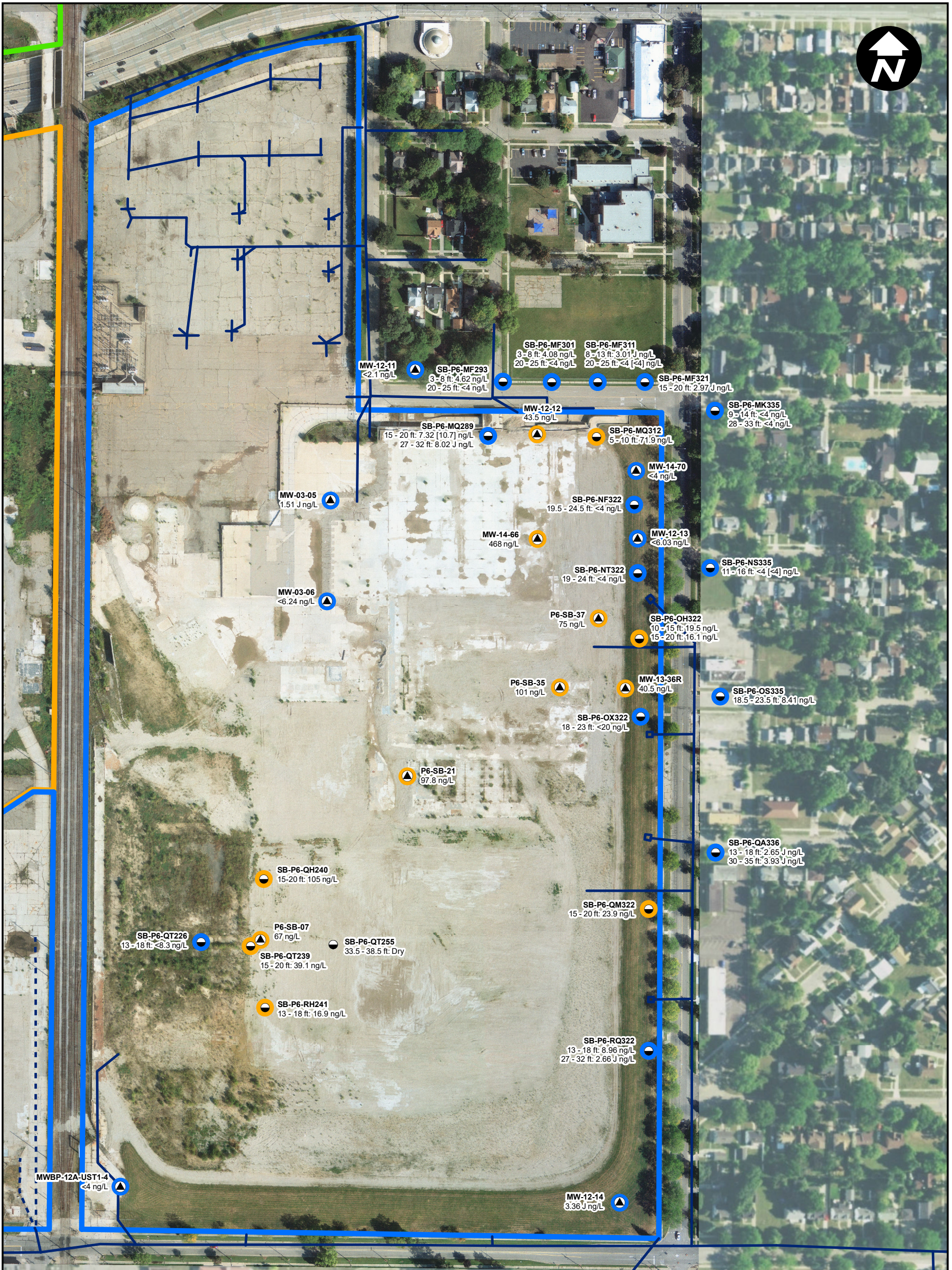


RACER TRUST
PLANT 6
LANSING, MICHIGAN

**PLANT 6 GW SAMPLING LOCATIONS
AND PFOS + PFOA ANALYTICAL RESULTS**

ARCADIS Design & Consultancy
for natural and
built assets

FIGURE
1



LEGEND

- MONITORING WELL
- VAP BORING
- PFOS < 12 ng/L
- PFOS > 12 ng/L
- STORM SEWER LOCATION
- ASSUMED/ESTIMATED STORM SEWER LOCATION

APPROXIMATE PLANT BOUNDARIES

- PLANT 2
- PLANT 3
- PLANT 6

NOTES:

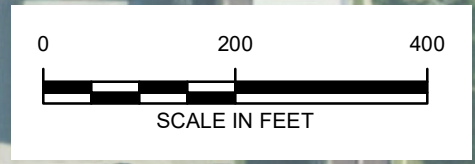
THE ANALYTICAL RESULTS REPRESENT THE PFOS CONCENTRATION IN THE SAMPLE AND ARE PRESENTED IN UNITS OF ng/L.

ANALYTICAL RESULTS IN BRACKETS REPRESENT DUPLICATE SAMPLE RESULTS.

THE PFOS MDEQ PART 201 GROUNDWATER SURFACE WATER INTERFACE (GSI) CRITERION IS 12 ng/L.

J - COMPOUND DETECTED ABOVE LABORATORY METHOD DETECTION LIMIT AND BELOW THE QUANTITATIVE REPORTING LIMIT ng/L - NANOGRAMS PER LITER

ALL ANALYSES COMPLETED USING MODIFIED USEPA METHOD 537.

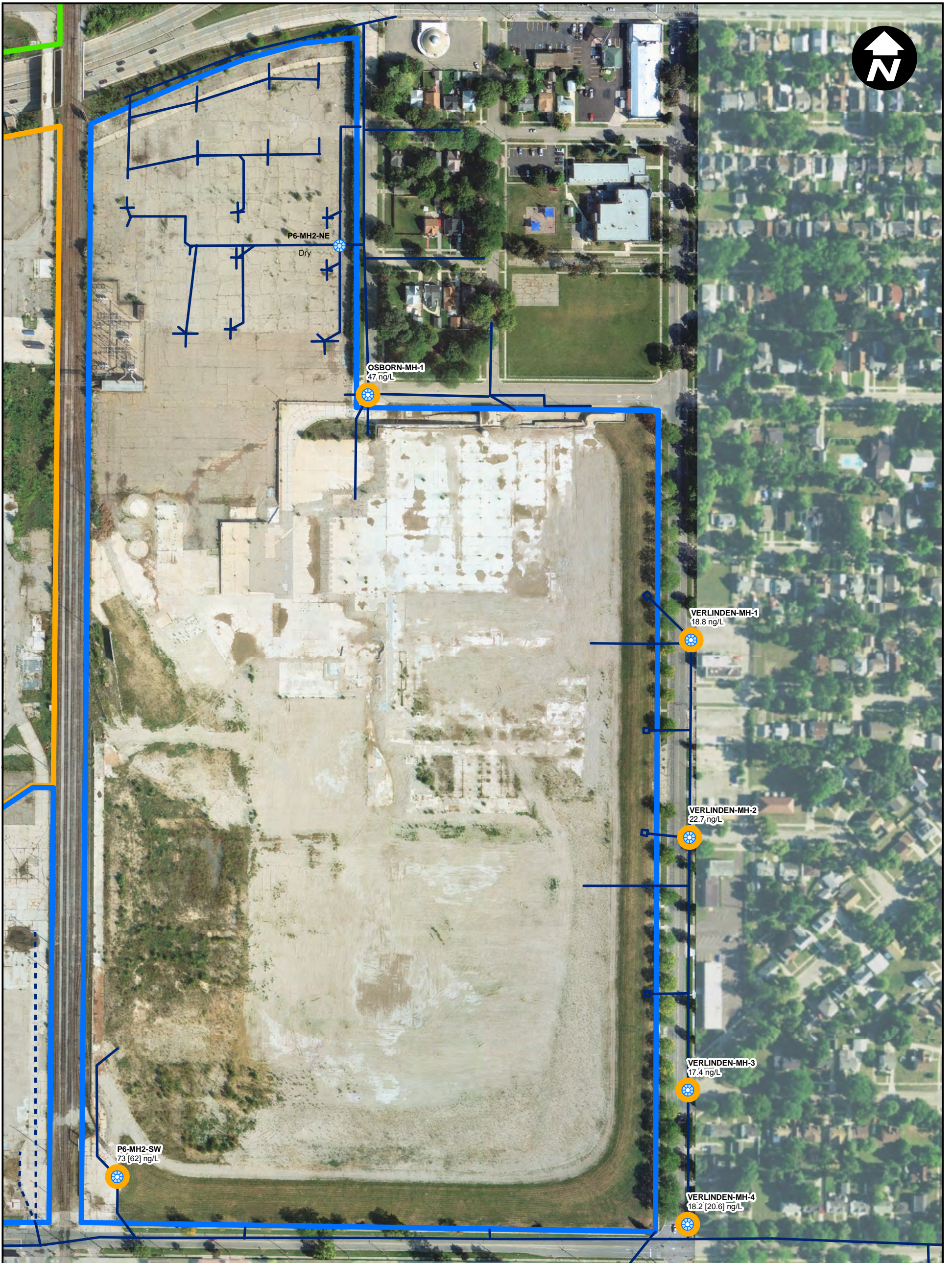


RACER TRUST
 PLANT 6
 LANSING, MICHIGAN

PLANT 6 GW SAMPLING LOCATIONS AND PFOS ANALYTICAL RESULTS

FIGURE 2

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LEGEND

- STORM SEWER MANHOLE
- PFOS < 12 ng/L
- PFOS > 12 ng/L
- STORM SEWER LOCATION
- ASSUMED/ESTIMATED STORM SEWER LOCATION

APPROXIMATE PLANT BOUNDARIES

- PLANT 2
- PLANT 3
- PLANT 6

NOTES:

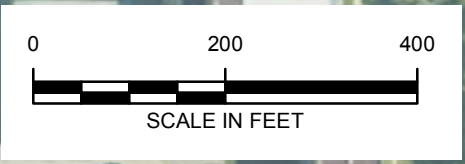
THE ANALYTICAL RESULTS REPRESENT THE PFOS CONCENTRATION IN THE SAMPLE AND ARE PRESENTED IN UNITS OF ng/L.

ANALYTICAL RESULTS IN BRACKETS REPRESENT DUPLICATE SAMPLE RESULTS.

THE PFOS MDEQ PART 201 GROUNDWATER SURFACE WATER INTERFACE (GSI) CRITERION IS 12 ng/L.

J - COMPOUND DETECTED ABOVE LABORATORY METHOD DETECTION LIMIT AND BELOW THE QUANTITATIVE REPORTING LIMIT ng/L - NANOGRAMS PER LITER

ALL ANALYSES COMPLETED USING MODIFIED USEPA METHOD 537.

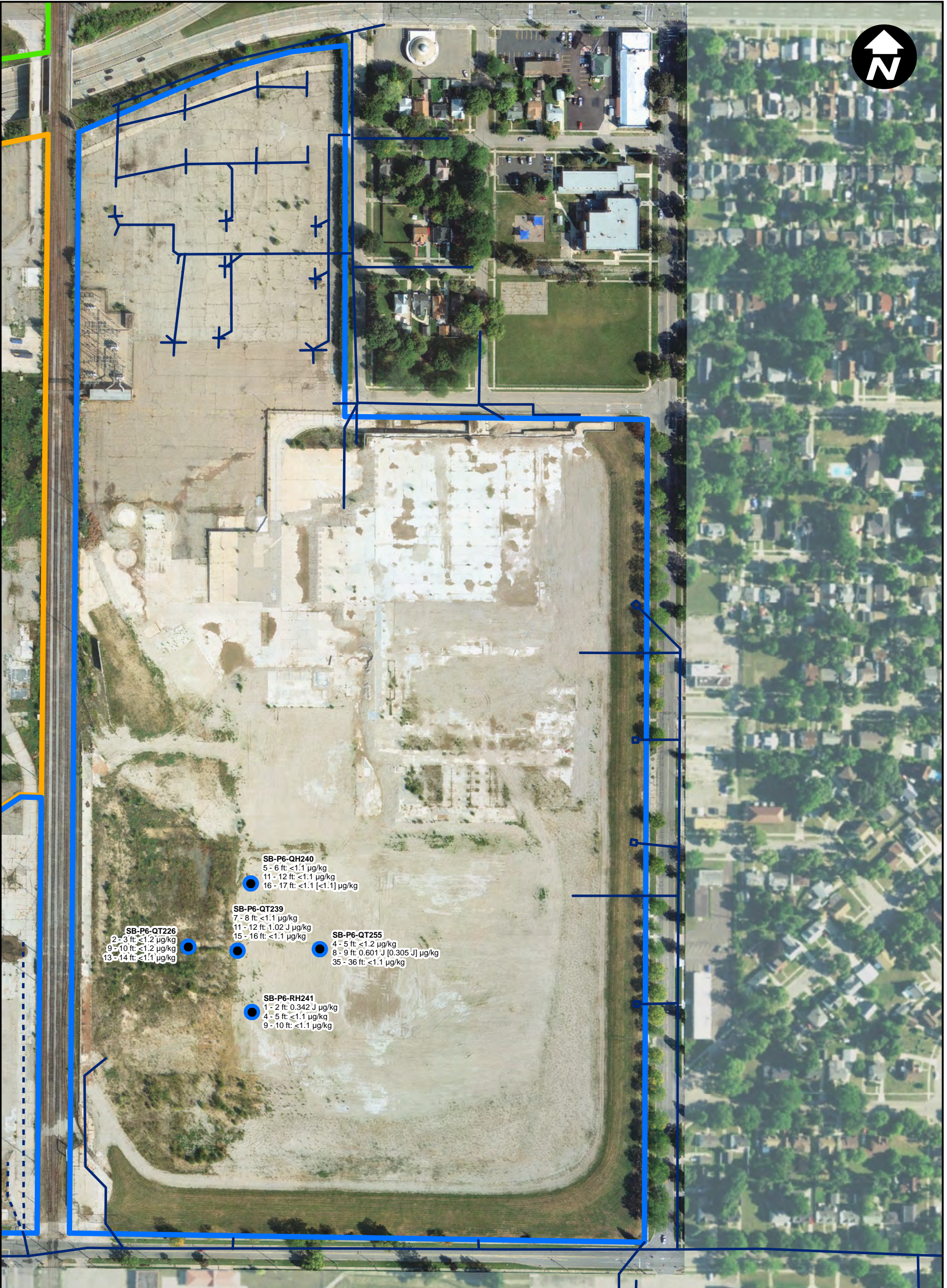


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PLANT 6 STORM SAMPLING LOCATIONS AND PFOS ANALYTICAL RESULTS

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FIGURE **3**



SB-P6-QH240
 5 - 6 ft: <1.1 µg/kg
 11 - 12 ft: <1.1 µg/kg
 16 - 17 ft: <1.1 [<1.1] µg/kg

SB-P6-QT239
 7 - 8 ft: <1.1 µg/kg
 11 - 12 ft: 1.02 J µg/kg
 15 - 16 ft: <1.1 µg/kg

SB-P6-QT226
 2 - 3 ft: <1.2 µg/kg
 9 - 10 ft: <1.2 µg/kg
 13 - 14 ft: <1.1 µg/kg

SB-P6-QT255
 4 - 5 ft: <1.2 µg/kg
 8 - 9 ft: 0.601 J [0.305 J] µg/kg
 35 - 36 ft: <1.1 µg/kg

SB-P6-RH241
 1 - 2 ft: 0.342 J µg/kg
 4 - 5 ft: <1.1 µg/kg
 9 - 10 ft: <1.1 µg/kg

LEGEND

- SOIL BORING
- PFOA < 10,000 µg/kg
- PFOA > 10,000 µg/kg
- STORM SEWER LOCATION
- - - ASSUMED/ESTIMATED STORM SEWER LOCATION
- APPROXIMATE PLANT BOUNDARIES**
- PLANT 2
- PLANT 3
- PLANT 6

NOTES:

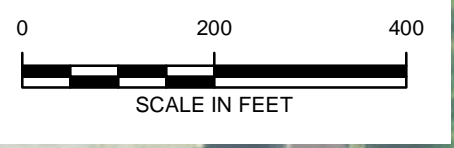
THE ANALYTICAL RESULTS REPRESENT THE PFAS CONCENTRATION IN THE SAMPLE AND ARE PRESENTED IN UNITS OF µg/kg.

ANALYTICAL RESULTS IN BRACKETS REPRESENT DUPLICATE SAMPLE RESULTS.

THE PFOS MDEQ PART 201 GROUNDWATER SURFACE WATER INTERFACE PROTECTION CRITERIA IS 10,000 µg/kg.

J - COMPOUND DETECTED ABOVE LABORATORY METHOD DETECTION LIMIT AND BELOW THE QUANTITATIVE REPORTING LIMIT µg/kg - MICROGRAMS PER KILOGRAM

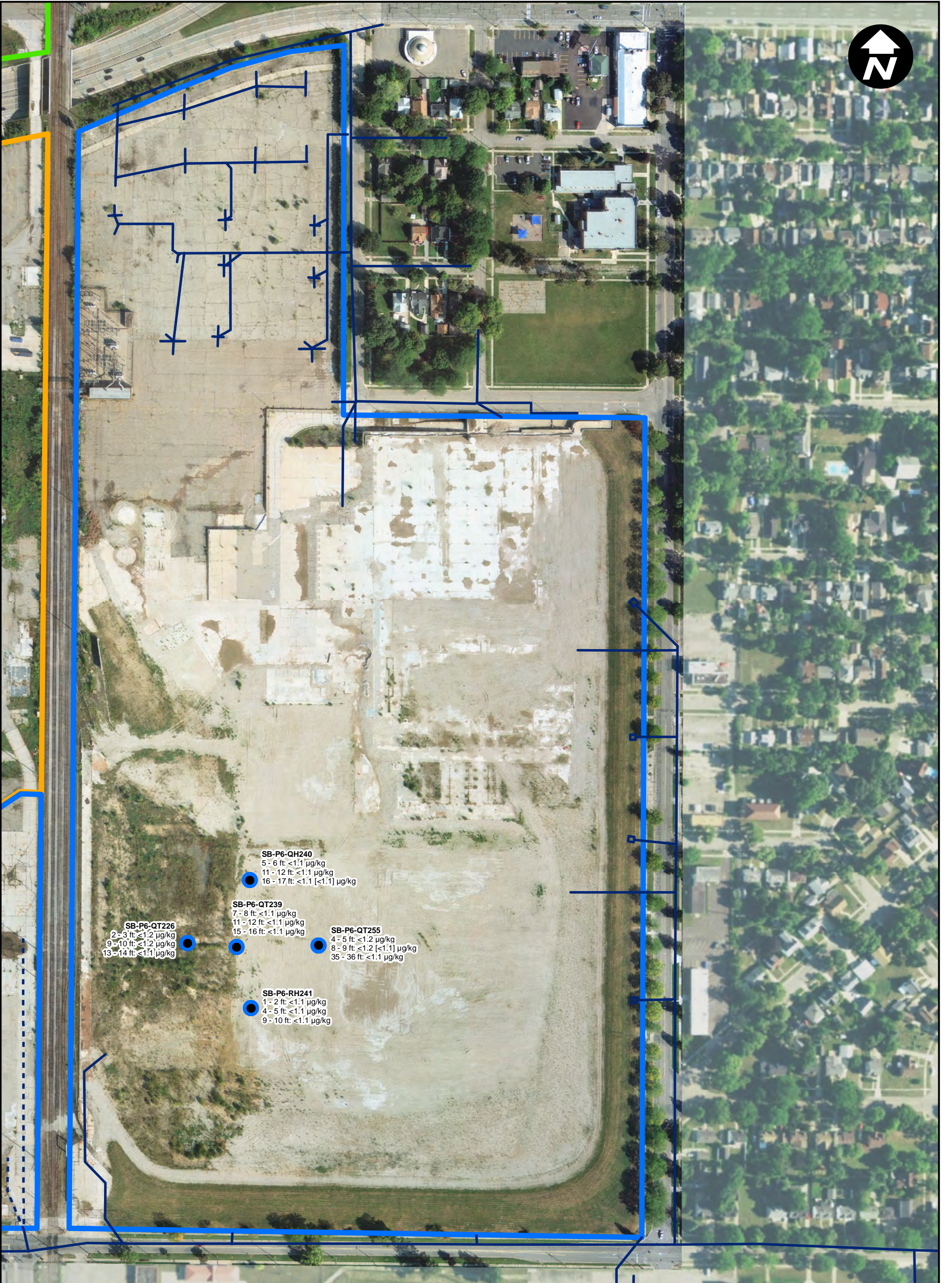
ALL ANALYSES COMPLETED USING MODIFIED USEPA METHOD 537.



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PLANT 6 SOIL SAMPLING LOCATIONS AND PFOA ANALYTICAL RESULTS





LEGEND

- SOIL BORING
 - PFOS < 0.24 µg/kg
 - PFOS > 0.24 µg/kg
 - STORM SEWER LOCATION
 - - - ASSUMED/ESTIMATED STORM SEWER LOCATION
- APPROXIMATE PLANT BOUNDARIES**
- PLANT 2
 - PLANT 3
 - PLANT 6

NOTES:

THE ANALYTICAL RESULTS REPRESENT THE PFOS CONCENTRATION IN THE SAMPLE AND ARE PRESENTED IN UNITS OF µg/kg.

ANALYTICAL RESULTS IN BRACKETS REPRESENT DUPLICATE SAMPLE RESULTS.

THE PFOS MDEQ PART 201 GROUNDWATER SURFACE WATER INTERFACE PROTECTION CRITERIA IS 0.24 µg/kg.

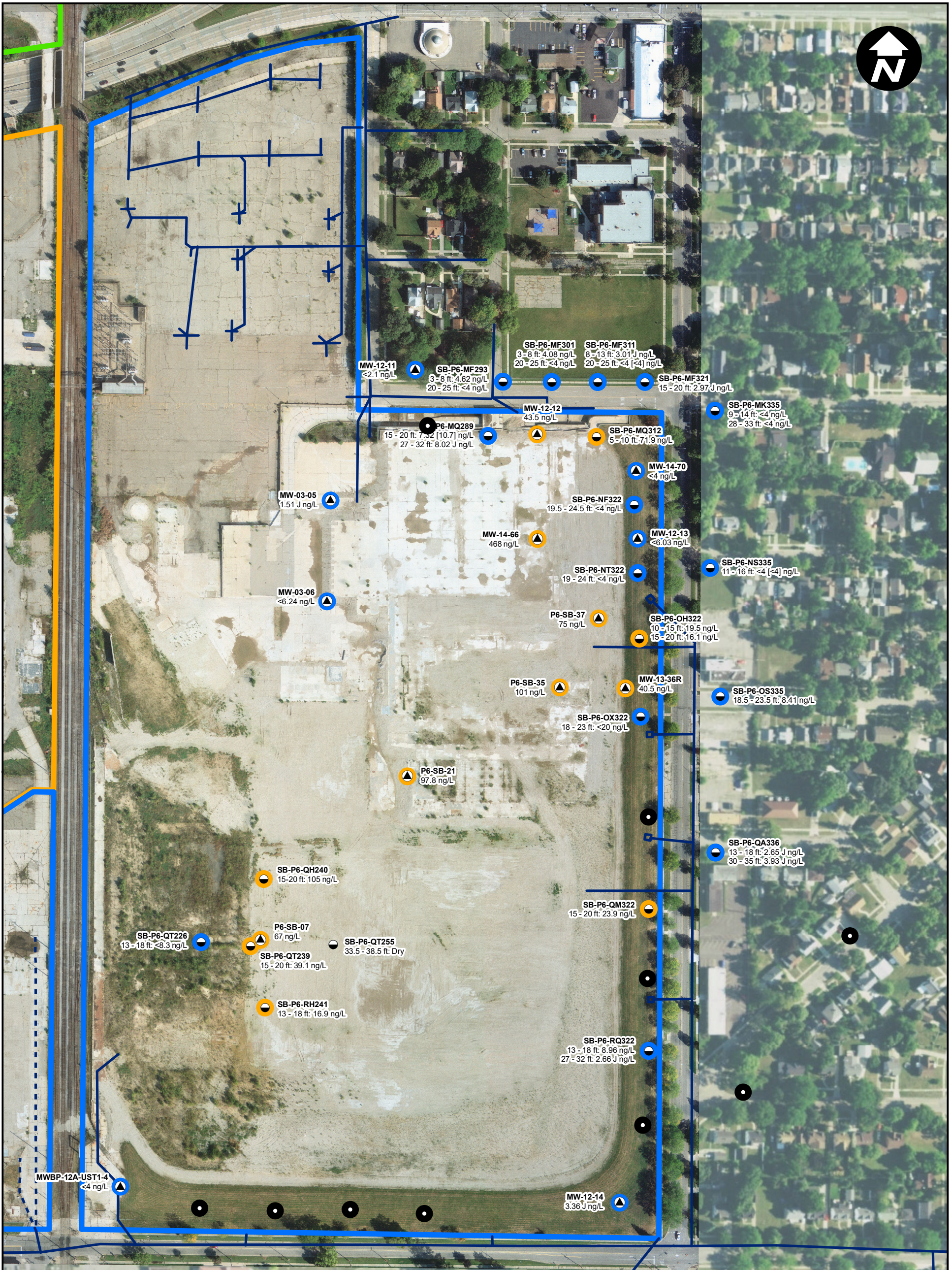
J - COMPOUND DETECTED ABOVE LABORATORY METHOD DETECTION LIMIT AND BELOW THE QUANTITATIVE REPORTING LIMIT µg/kg - MICROGRAMS PER KILOGRAM

ALL ANALYSES COMPLETED USING MODIFIED USEPA METHOD 537.



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PLANT 6 SOIL SAMPLING LOCATIONS AND PFOS ANALYTICAL RESULTS



LEGEND

- MONITORING WELL
- VAP BORING
- PFOS < 12 ng/L
- PFOS > 12 ng/L
- STORM SEWER LOCATION
- ASSUMED/ESTIMATED STORM SEWER LOCATION

APPROXIMATE PLANT BOUNDARIES

- PLANT 2
- PLANT 3
- PLANT 6

NOTES:

- PROPOSED BORING LOCATIONS

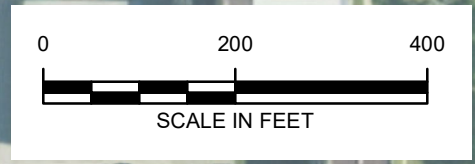
THE ANALYTICAL RESULTS REPRESENT THE PFOS CONCENTRATION IN THE SAMPLE AND ARE PRESENTED IN UNITS OF ng/L.

ANALYTICAL RESULTS IN BRACKETS REPRESENT DUPLICATE SAMPLE RESULTS.

THE PFOS MDEQ PART 201 GROUNDWATER SURFACE WATER INTERFACE (GSI) CRITERION IS 12 ng/L.

J - COMPOUND DETECTED ABOVE LABORATORY METHOD DETECTION LIMIT AND BELOW THE QUANTITATIVE REPORTING LIMIT ng/L - NANOGRAMS PER LITER

ALL ANALYSES COMPLETED USING MODIFIED USEPA METHOD 537.

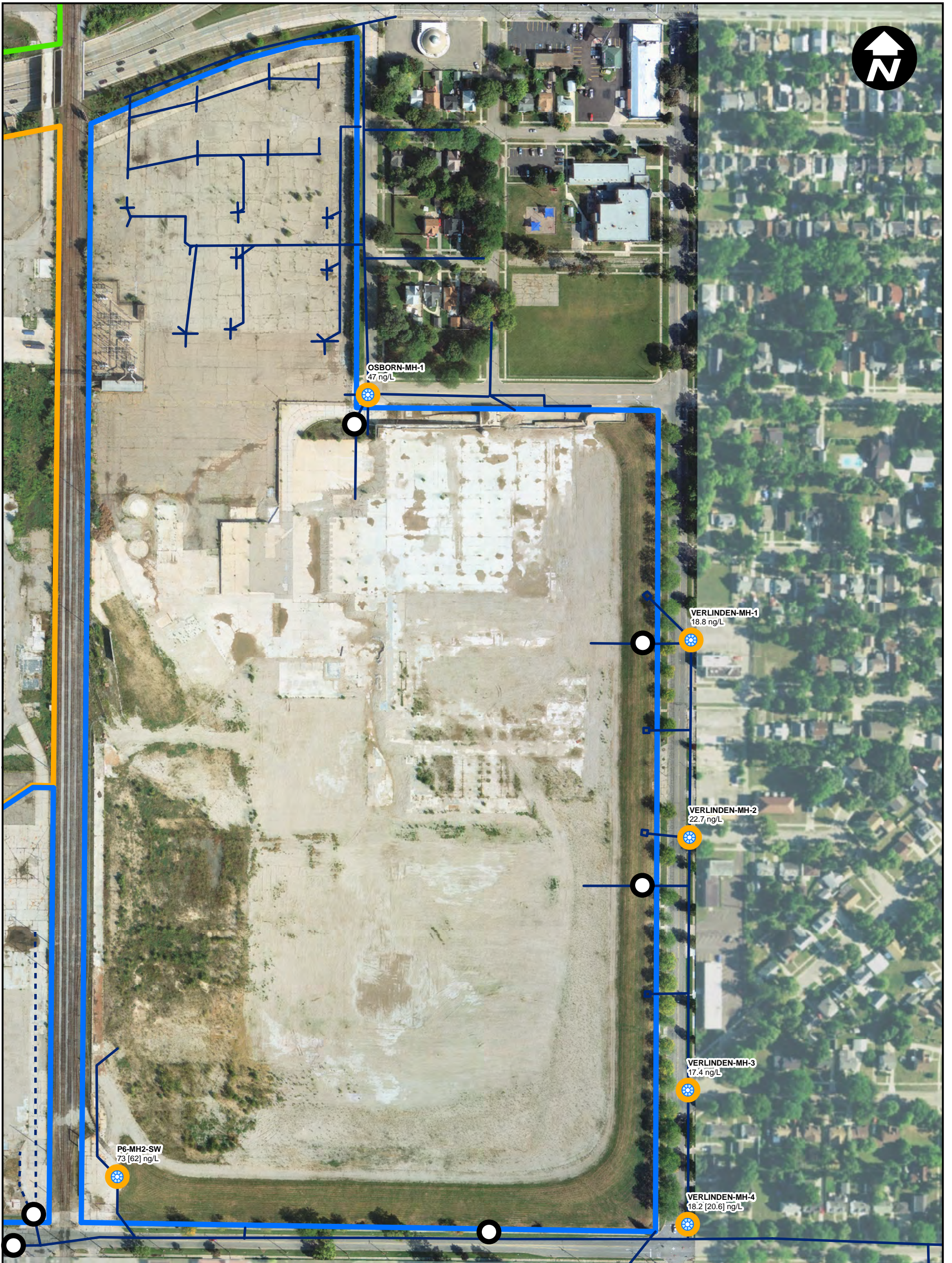


RACER TRUST
PLANT 6
LANSING, MICHIGAN

**PLANT 6 PFAS INVESTIGATION
PROPOSED BORING LOCATIONS**

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for natural and built assets

FIGURE
6



LEGEND

- STORM SEWER MANHOLE
- PFOS < 12 ng/L
- PFOS > 12 ng/L
- STORM SEWER LOCATION
- ASSUMED/ESTIMATED STORM SEWER LOCATION

APPROXIMATE PLANT BOUNDARIES

- PLANT 2
- PLANT 3
- PLANT 6

NOTES:

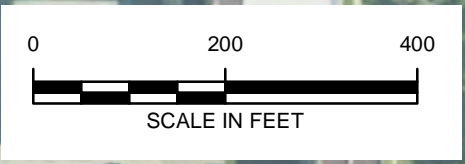
- PROPOSED SAMPLING LOCATIONS

THE ANALYTICAL RESULTS REPRESENT THE PFOS CONCENTRATION IN THE SAMPLE AND ARE PRESENTED IN UNITS OF ng/L.

ANALYTICAL RESULTS IN BRACKETS REPRESENT DUPLICATE SAMPLE RESULTS.

J - COMPOUND DETECTED ABOVE LABORATORY METHOD DETECTION LIMIT AND BELOW THE QUANTITATIVE REPORTING LIMIT ng/L - NANOGRAMS PER LITER

ALL ANALYSES COMPLETED USING MODIFIED USEPA METHOD 537.



RACER TRUST
 PLANT 6
 LANSING, MICHIGAN

PLANT 6 PROPOSED STORM SAMPLING LOCATIONS

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FIGURE 7

ATTACHMENT 1

Laboratory Analytical Reports



The results set forth herein are provided by SGS North America Inc.

e-Hardcopy 2.0
Automated Report

Technical Report for

Arcadis

Racer Lansing PFAS Delineation; Lansing, MI

B0064479.2018

SGS Job Number: FA59665

Sampling Dates: 11/20/18 - 11/27/18

Report to:

Arcadis
300 S Washington Sq Suite 315
Lansing, MI 48933
alex.villhauer@arcadis.com; christine.gregg@arcadis.com
ATTN: Alex Villhauer

Total number of pages in report: 95



Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.

A handwritten signature in black ink that reads "Caitlin Brice".

Caitlin Brice, M.S.
General Manager

Client Service contact: Andrea Colby 407-425-6700

Certifications: FL(E83510), LA(03051), KS(E-10327), IL(200063), NC(573), NJ(FL002), NY(12022), SC(96038001)
DoD ELAP(ANAB L2229), AZ(AZ0806), CA(2937), TX(T104704404), PA(68-03573), VA(460177),
AK, AR, IA, KY, MA, MS, ND, NH, NV, OK, OR, UT, WA, WV

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Test results relate only to samples analyzed.

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Sample Summary

Arcadis

Job No: FA59665

Racer Lansing PFAS Delineation; Lansing, MI
 Project No: B0064479.2018

Sample Number	Collected		Received	Matrix		Client Sample ID
	Date	Time By		Code	Type	
FA59665-1	11/21/18	13:45	AVAW11/28/18	SO	Soil	SB-P6-QT255-4-5
FA59665-2	11/21/18	13:55	AVAW11/28/18	SO	Soil	SB-P6-QT255-8-9
FA59665-3	11/21/18	00:00	AVAW11/28/18	SO	Soil	DUP01-112118
FA59665-4	11/21/18	14:15	AVAW11/28/18	SO	Soil	SB-P6-QT255-35-36
FA59665-5	11/21/18	16:00	AVAW11/28/18	AQ	Ground Water	SB-P6-NF322-19.5-24.5
FA59665-6	11/21/18	16:20	AVAW11/28/18	AQ	Ground Water	SB-P6-NF322-19-24
FA59665-7	11/21/18	09:14	AVAW11/28/18	AQ	Ground Water	SB-P6-MQ312-5-10
FA59665-8	11/20/18	13:45	AVAW11/28/18	AQ	Ground Water	SB-P6-MQ289-15-20
FA59665-9	11/20/18	00:00	AVAW11/28/18	AQ	Ground Water	DUP-01-112018
FA59665-10	11/21/18	10:00	AVAW11/28/18	SO	Soil	SB-P6-QT226-9-10
FA59665-11	11/21/18	10:05	AVAW11/28/18	SO	Soil	SB-P6-QT226-13-14
FA59665-12	11/21/18	09:55	AVAW11/28/18	SO	Soil	SB-P6-QT226-2-3
FA59665-13	11/21/18	12:40	AVAW11/28/18	SO	Soil	SB-P6-RH241-9-10

Soil samples reported on a dry weight basis unless otherwise indicated on result page.



Sample Summary

(continued)

Arcadis

Job No: FA59665

Racer Lansing PFAS Delineation; Lansing, MI
 Project No: B0064479.2018

Sample Number	Collected		Received	Matrix		Client Sample ID
	Date	Time By		Code	Type	
FA59665-14	11/21/18	12:30 AVAW	11/28/18	SO	Soil	SB-P6-RH241-1-2
FA59665-15	11/21/18	12:35 AVAW	11/28/18	SO	Soil	SB-P6-RH241-4-5
FA59665-16	11/26/18	15:00 AVAW	11/28/18	SO	Soil	SB-P6-QH240-5-6
FA59665-16D	11/26/18	15:00 AVAW	11/28/18	SO	Soil Dup/MSD	SB-P6-QH240-5-6
FA59665-16S	11/26/18	15:00 AVAW	11/28/18	SO	Soil Matrix Spike	SB-P6-QH240-5-6
FA59665-17	11/26/18	15:10 AVAW	11/28/18	SO	Soil	SB-P6-QH240-11-12
FA59665-18	11/26/18	15:15 AVAW	11/28/18	SO	Soil	SB-P6-QH240-16-17
FA59665-19	11/26/18	00:00 AVAW	11/28/18	SO	Soil	DUP-02-112618
FA59665-20	11/26/18	16:35 AVAW	11/28/18	SO	Soil	SB-P6-QT239-7-8
FA59665-21	11/26/18	16:40 AVAW	11/28/18	SO	Soil	SB-P6-QT239-11-12
FA59665-22	11/26/18	16:45 AVAW	11/28/18	SO	Soil	SB-P6-QT239-15-16
FA59665-23	11/26/18	15:45 AVAW	11/28/18	AQ	Ground Water	SB-P6-RQ322-13-18
FA59665-24	11/26/18	16:35 AVAW	11/28/18	AQ	Ground Water	SB-P6-QM322-15-20

Soil samples reported on a dry weight basis unless otherwise indicated on result page.



Sample Summary

(continued)

Arcadis

Job No: FA59665

Racer Lansing PFAS Delineation; Lansing, MI
Project No: B0064479.2018

Sample Number	Collected Date	Time By	Received	Matrix Code	Type	Client Sample ID
FA59665-25	11/26/18	17:35	AVAW11/28/18	AQ	Ground Water	SB-P6-OX322-18-23
FA59665-26	11/27/18	13:45	AVAW11/28/18	AQ	Equipment Blank	EB-01-112718
FA59665-27	11/27/18	16:00	AVAW11/28/18	AQ	Ground Water	SB-P6-RQ322-27-32

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

Summary of Hits

Job Number: FA59665
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 11/20/18 thru 11/27/18

Lab Sample ID	Client Sample ID	Result/ Analyte	RL	MDL	Units	Method
---------------	------------------	--------------------	----	-----	-------	--------

FA59665-1 SB-P6-QT255-4-5

No hits reported in this sample.

FA59665-2 SB-P6-QT255-8-9

Perfluoropentanoic acid	2.21	1.2	0.23	ug/kg	EPA 537M BY ID
Perfluorohexanoic acid	0.967 J	1.2	0.23	ug/kg	EPA 537M BY ID
Perfluoroheptanoic acid	1.21	1.2	0.29	ug/kg	EPA 537M BY ID
Perfluorooctanoic acid	0.601 J	1.2	0.29	ug/kg	EPA 537M BY ID

FA59665-3 DUP01-112118

Perfluoropentanoic acid	1.76	1.1	0.23	ug/kg	EPA 537M BY ID
Perfluorohexanoic acid	0.772 J	1.1	0.23	ug/kg	EPA 537M BY ID
Perfluoroheptanoic acid	0.754 J	1.1	0.28	ug/kg	EPA 537M BY ID
Perfluorooctanoic acid	0.305 J	1.1	0.28	ug/kg	EPA 537M BY ID

FA59665-4 SB-P6-QT255-35-36

No hits reported in this sample.

FA59665-5 SB-P6-NF322-19.5-24.5

Perfluorobutanoic acid	0.0361	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid	0.0473	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid	0.0176	0.0040	0.0010	ug/l	EPA 537M BY ID

FA59665-6 SB-P6-NF322-19-24

Perfluorobutanoic acid	0.0185	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid	0.0190	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid	0.0110	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid	0.00294 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid	0.00580	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid	0.00190 J	0.0040	0.0010	ug/l	EPA 537M BY ID

FA59665-7 SB-P6-MQ312-5-10

Perfluorobutanoic acid	0.0427	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid	0.0867	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid	0.0761	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid	0.110	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid	0.226	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid	0.0282	0.0040	0.0010	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA59665
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 11/20/18 thru 11/27/18

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
		0.0353	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00404	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00258 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00125 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.0719	0.0040	0.0015	ug/l	EPA 537M BY ID
		0.00676	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00456	0.0040	0.0010	ug/l	EPA 537M BY ID

FA59665-8 SB-P6-MQ289-15-20

		0.0421	0.0080	0.0020	ug/l	EPA 537M BY ID
		0.0330	0.0040	0.0015	ug/l	EPA 537M BY ID
		0.122	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.0483	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.0946	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00319 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00446	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00211 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00732	0.0040	0.0015	ug/l	EPA 537M BY ID

FA59665-9 DUP-01-112018

		0.0587	0.0080	0.0020	ug/l	EPA 537M BY ID
		0.0784	0.0040	0.0015	ug/l	EPA 537M BY ID
		0.178	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.0682	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.118	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00182 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00448	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00288 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.0107	0.0040	0.0015	ug/l	EPA 537M BY ID

FA59665-10 SB-P6-QT226-9-10

No hits reported in this sample.

FA59665-11 SB-P6-QT226-13-14

No hits reported in this sample.

FA59665-12 SB-P6-QT226-2-3

No hits reported in this sample.

Summary of Hits

Job Number: FA59665
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 11/20/18 thru 11/27/18

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
---------------	------------------	-----------------	----	-----	-------	--------

FA59665-13 SB-P6-RH241-9-10

No hits reported in this sample.

FA59665-14 SB-P6-RH241-1-2

Perfluoropentanoic acid	0.235 J	1.1	0.23	ug/kg	EPA 537M BY ID
Perfluorohexanoic acid	0.235 J	1.1	0.23	ug/kg	EPA 537M BY ID
Perfluorooctanoic acid	0.342 J	1.1	0.29	ug/kg	EPA 537M BY ID

FA59665-15 SB-P6-RH241-4-5

No hits reported in this sample.

FA59665-16 SB-P6-QH240-5-6

No hits reported in this sample.

FA59665-17 SB-P6-QH240-11-12

No hits reported in this sample.

FA59665-18 SB-P6-QH240-16-17

No hits reported in this sample.

FA59665-19 DUP-02-112618

No hits reported in this sample.

FA59665-20 SB-P6-QT239-7-8

No hits reported in this sample.

FA59665-21 SB-P6-QT239-11-12

Perfluorooctanoic acid	1.02 J	1.1	0.28	ug/kg	EPA 537M BY ID
------------------------	--------	-----	------	-------	----------------

FA59665-22 SB-P6-QT239-15-16

No hits reported in this sample.

FA59665-23 SB-P6-RQ322-13-18

Perfluorobutanoic acid	0.0422	0.0080	0.0020	ug/l	EPA 537M BY ID
------------------------	--------	--------	--------	------	----------------

Summary of Hits

Job Number: FA59665
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 11/20/18 thru 11/27/18

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
		0.0894	0.0040	0.0015	ug/l	EPA 537M BY ID
		0.0969	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.0924	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.157	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00887	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00189 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00196 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00896	0.0040	0.0015	ug/l	EPA 537M BY ID

FA59665-24 SB-P6-QM322-15-20

Perfluorobutanoic acid ^a	0.0997	0.040	0.010	ug/l	EPA 537M BY ID
Perfluoropentanoic acid ^a	0.162	0.020	0.0075	ug/l	EPA 537M BY ID
Perfluorohexanoic acid ^a	0.157	0.020	0.0050	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid ^a	0.131	0.020	0.0050	ug/l	EPA 537M BY ID
Perfluorooctanoic acid ^a	0.189	0.020	0.0050	ug/l	EPA 537M BY ID
Perfluorononanoic acid ^a	0.0239	0.020	0.0050	ug/l	EPA 537M BY ID
Perfluorodecanoic acid ^a	0.0129 J	0.020	0.0050	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid ^a	0.0239	0.020	0.0075	ug/l	EPA 537M BY ID

FA59665-25 SB-P6-OX322-18-23

Perfluorobutanoic acid ^a	0.0270 J	0.040	0.010	ug/l	EPA 537M BY ID
Perfluoropentanoic acid ^a	0.0405	0.020	0.0075	ug/l	EPA 537M BY ID
Perfluorohexanoic acid ^a	0.0447	0.020	0.0050	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid ^a	0.0346	0.020	0.0050	ug/l	EPA 537M BY ID
Perfluorooctanoic acid ^a	0.0656	0.020	0.0050	ug/l	EPA 537M BY ID

FA59665-26 EB-01-112718

No hits reported in this sample.

FA59665-27 SB-P6-RQ322-27-32

Perfluorobutanoic acid	0.0195	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid	0.0383	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid	0.0481	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid	0.0595	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid	0.0609	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid	0.00212 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid	0.00464	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid	0.00138 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid	0.00281 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid	0.00266 J	0.0040	0.0015	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA59665
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 11/20/18 thru 11/27/18

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
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(a) Dilution required due to matrix interference.

Sample Results

Report of Analysis

Report of Analysis

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Client Sample ID: SB-P6-QT255-4-5	
Lab Sample ID: FA59665-1	Date Sampled: 11/21/18
Matrix: SO - Soil	Date Received: 11/28/18
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 82.7
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24404.D	1	12/03/18 14:03	NAF	11/30/18 08:00	OP72832	S2Q381
Run #2							

Run #	Initial Weight	Final Volume
Run #1	2.03 g	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND	1.2	0.30	ug/kg	
2706-90-3	Perfluoropentanoic acid	ND	1.2	0.24	ug/kg	
307-24-4	Perfluorohexanoic acid	ND	1.2	0.24	ug/kg	
375-85-9	Perfluoroheptanoic acid	ND	1.2	0.30	ug/kg	
335-67-1	Perfluorooctanoic acid	ND	1.2	0.30	ug/kg	
375-95-1	Perfluorononanoic acid	ND	1.2	0.30	ug/kg	
335-76-2	Perfluorodecanoic acid	ND	1.2	0.30	ug/kg	
2058-94-8	Perfluoroundecanoic acid	ND	1.2	0.30	ug/kg	
307-55-1	Perfluorododecanoic acid	ND	1.2	0.30	ug/kg	
72629-94-8	Perfluorotridecanoic acid	ND	1.2	0.30	ug/kg	
376-06-7	Perfluorotetradecanoic acid	ND	1.2	0.30	ug/kg	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	1.2	0.30	ug/kg	
2706-91-4	Perfluoropentanesulfonic acid	ND	1.2	0.30	ug/kg	
355-46-4	Perfluorohexanesulfonic acid	ND	1.2	0.30	ug/kg	
375-92-8	Perfluoroheptanesulfonic acid	ND	1.2	0.30	ug/kg	
1763-23-1	Perfluorooctanesulfonic acid	ND	1.2	0.30	ug/kg	
68259-12-1	Perfluorononanesulfonic acid	ND	1.2	0.30	ug/kg	
335-77-3	Perfluorodecanesulfonic acid	ND	1.2	0.30	ug/kg	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	1.2	0.30	ug/kg	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	3.0	0.60	ug/kg	
2991-50-6	EtFOSAA	ND	3.0	0.60	ug/kg	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	1.2	0.30	ug/kg	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	1.2	0.30	ug/kg	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-QT255-4-5	
Lab Sample ID: FA59665-1	Date Sampled: 11/21/18
Matrix: SO - Soil	Date Received: 11/28/18
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 82.7
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	1.2	0.30	ug/kg	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	79%		50-150%
	13C5-PFPeA	81%		50-150%
	13C5-PFHxA	89%		50-150%
	13C4-PFHpA	94%		50-150%
	13C8-PFOA	100%		50-150%
	13C9-PFNA	96%		50-150%
	13C6-PFDA	96%		50-150%
	13C7-PFUnDA	93%		50-150%
	13C2-PFDoDA	92%		50-150%
	13C2-PFTeDA	102%		50-150%
	13C3-PFBS	81%		50-150%
	13C3-PFHxS	84%		50-150%
	13C8-PFOS	87%		50-150%
	13C8-FOSA	64%		50-150%
	d3-MeFOSAA	89%		50-150%
	13C2-4:2FTS	80%		50-150%
	13C2-6:2FTS	84%		50-150%
	13C2-8:2FTS	79%		50-150%

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

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Client Sample ID: SB-P6-QT255-8-9	
Lab Sample ID: FA59665-2	Date Sampled: 11/21/18
Matrix: SO - Soil	Date Received: 11/28/18
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 86.5
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24405.D	1	12/03/18 14:20	NAF	11/30/18 08:00	OP72832	S2Q381
Run #2							

Run #	Initial Weight	Final Volume
Run #1	2.01 g	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND	1.2	0.29	ug/kg	
2706-90-3	Perfluoropentanoic acid	2.21	1.2	0.23	ug/kg	
307-24-4	Perfluorohexanoic acid	0.967	1.2	0.23	ug/kg	J
375-85-9	Perfluoroheptanoic acid	1.21	1.2	0.29	ug/kg	
335-67-1	Perfluorooctanoic acid	0.601	1.2	0.29	ug/kg	J
375-95-1	Perfluorononanoic acid	ND	1.2	0.29	ug/kg	
335-76-2	Perfluorodecanoic acid	ND	1.2	0.29	ug/kg	
2058-94-8	Perfluoroundecanoic acid	ND	1.2	0.29	ug/kg	
307-55-1	Perfluorododecanoic acid	ND	1.2	0.29	ug/kg	
72629-94-8	Perfluorotridecanoic acid	ND	1.2	0.29	ug/kg	
376-06-7	Perfluorotetradecanoic acid	ND	1.2	0.29	ug/kg	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	1.2	0.29	ug/kg	
2706-91-4	Perfluoropentanesulfonic acid	ND	1.2	0.29	ug/kg	
355-46-4	Perfluorohexanesulfonic acid	ND	1.2	0.29	ug/kg	
375-92-8	Perfluoroheptanesulfonic acid	ND	1.2	0.29	ug/kg	
1763-23-1	Perfluorooctanesulfonic acid	ND	1.2	0.29	ug/kg	
68259-12-1	Perfluorononanesulfonic acid	ND	1.2	0.29	ug/kg	
335-77-3	Perfluorodecanesulfonic acid	ND	1.2	0.29	ug/kg	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	1.2	0.29	ug/kg	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	2.9	0.58	ug/kg	
2991-50-6	EtFOSAA	ND	2.9	0.58	ug/kg	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	1.2	0.29	ug/kg	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	1.2	0.29	ug/kg	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-QT255-8-9	
Lab Sample ID: FA59665-2	Date Sampled: 11/21/18
Matrix: SO - Soil	Date Received: 11/28/18
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 86.5
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	1.2	0.29	ug/kg	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	79%		50-150%
	13C5-PFPeA	81%		50-150%
	13C5-PFHxA	88%		50-150%
	13C4-PFHpA	92%		50-150%
	13C8-PFOA	99%		50-150%
	13C9-PFNA	97%		50-150%
	13C6-PFDA	94%		50-150%
	13C7-PFUnDA	95%		50-150%
	13C2-PFDoDA	92%		50-150%
	13C2-PFTeDA	98%		50-150%
	13C3-PFBS	79%		50-150%
	13C3-PFHxS	83%		50-150%
	13C8-PFOS	85%		50-150%
	13C8-FOSA	73%		50-150%
	d3-MeFOSAA	89%		50-150%
	13C2-4:2FTS	80%		50-150%
	13C2-6:2FTS	84%		50-150%
	13C2-8:2FTS	79%		50-150%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: DUP01-112118		
Lab Sample ID: FA59665-3		Date Sampled: 11/21/18
Matrix: SO - Soil		Date Received: 11/28/18
Method: EPA 537M BY ID IN HOUSE		Percent Solids: 88.5
Project: Racer Lansing PFAS Delineation; Lansing, MI		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24406.D	1	12/03/18 14:36	NAF	11/30/18 08:00	OP72832	S2Q381
Run #2							

Run #	Initial Weight	Final Volume
Run #1	1.99 g	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND	1.1	0.28	ug/kg	
2706-90-3	Perfluoropentanoic acid	1.76	1.1	0.23	ug/kg	
307-24-4	Perfluorohexanoic acid	0.772	1.1	0.23	ug/kg	J
375-85-9	Perfluoroheptanoic acid	0.754	1.1	0.28	ug/kg	J
335-67-1	Perfluorooctanoic acid	0.305	1.1	0.28	ug/kg	J
375-95-1	Perfluorononanoic acid	ND	1.1	0.28	ug/kg	
335-76-2	Perfluorodecanoic acid	ND	1.1	0.28	ug/kg	
2058-94-8	Perfluoroundecanoic acid	ND	1.1	0.28	ug/kg	
307-55-1	Perfluorododecanoic acid	ND	1.1	0.28	ug/kg	
72629-94-8	Perfluorotridecanoic acid	ND	1.1	0.28	ug/kg	
376-06-7	Perfluorotetradecanoic acid	ND	1.1	0.28	ug/kg	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	1.1	0.28	ug/kg	
2706-91-4	Perfluoropentanesulfonic acid	ND	1.1	0.28	ug/kg	
355-46-4	Perfluorohexanesulfonic acid	ND	1.1	0.28	ug/kg	
375-92-8	Perfluoroheptanesulfonic acid	ND	1.1	0.28	ug/kg	
1763-23-1	Perfluorooctanesulfonic acid	ND	1.1	0.28	ug/kg	
68259-12-1	Perfluorononanesulfonic acid	ND	1.1	0.28	ug/kg	
335-77-3	Perfluorodecanesulfonic acid	ND	1.1	0.28	ug/kg	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	1.1	0.28	ug/kg	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	2.8	0.57	ug/kg	
2991-50-6	EtFOSAA	ND	2.8	0.57	ug/kg	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	1.1	0.28	ug/kg	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	1.1	0.28	ug/kg	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: DUP01-112118	
Lab Sample ID: FA59665-3	Date Sampled: 11/21/18
Matrix: SO - Soil	Date Received: 11/28/18
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 88.5
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	1.1	0.28	ug/kg	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	83%		50-150%
	13C5-PFPeA	85%		50-150%
	13C5-PFHxA	93%		50-150%
	13C4-PFHpA	96%		50-150%
	13C8-PFOA	101%		50-150%
	13C9-PFNA	101%		50-150%
	13C6-PFDA	102%		50-150%
	13C7-PFUnDA	98%		50-150%
	13C2-PFDoDA	97%		50-150%
	13C2-PFTeDA	104%		50-150%
	13C3-PFBS	84%		50-150%
	13C3-PFHxS	87%		50-150%
	13C8-PFOS	87%		50-150%
	13C8-FOSA	88%		50-150%
	d3-MeFOSAA	98%		50-150%
	13C2-4:2FTS	83%		50-150%
	13C2-6:2FTS	88%		50-150%
	13C2-8:2FTS	84%		50-150%

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-QT255-35-36		Date Sampled: 11/21/18
Lab Sample ID: FA59665-4		Date Received: 11/28/18
Matrix: SO - Soil		Percent Solids: 88.6
Method: EPA 537M BY ID IN HOUSE		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24407.D	1	12/03/18 15:05	NAF	11/30/18 08:00	OP72832	S2Q381
Run #2							

Run #	Initial Weight	Final Volume
Run #1	1.97 g	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND	1.1	0.29	ug/kg	
2706-90-3	Perfluoropentanoic acid	ND	1.1	0.23	ug/kg	
307-24-4	Perfluorohexanoic acid	ND	1.1	0.23	ug/kg	
375-85-9	Perfluoroheptanoic acid	ND	1.1	0.29	ug/kg	
335-67-1	Perfluorooctanoic acid	ND	1.1	0.29	ug/kg	
375-95-1	Perfluorononanoic acid	ND	1.1	0.29	ug/kg	
335-76-2	Perfluorodecanoic acid	ND	1.1	0.29	ug/kg	
2058-94-8	Perfluoroundecanoic acid	ND	1.1	0.29	ug/kg	
307-55-1	Perfluorododecanoic acid	ND	1.1	0.29	ug/kg	
72629-94-8	Perfluorotridecanoic acid	ND	1.1	0.29	ug/kg	
376-06-7	Perfluorotetradecanoic acid	ND	1.1	0.29	ug/kg	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	1.1	0.29	ug/kg	
2706-91-4	Perfluoropentanesulfonic acid	ND	1.1	0.29	ug/kg	
355-46-4	Perfluorohexanesulfonic acid	ND	1.1	0.29	ug/kg	
375-92-8	Perfluoroheptanesulfonic acid	ND	1.1	0.29	ug/kg	
1763-23-1	Perfluorooctanesulfonic acid	ND	1.1	0.29	ug/kg	
68259-12-1	Perfluorononanesulfonic acid	ND	1.1	0.29	ug/kg	
335-77-3	Perfluorodecanesulfonic acid	ND	1.1	0.29	ug/kg	
PERFLUOROCTANESULFONAMIDES						
754-91-6	PFOSA	ND	1.1	0.29	ug/kg	
PERFLUOROCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	2.9	0.57	ug/kg	
2991-50-6	EtFOSAA	ND	2.9	0.57	ug/kg	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	1.1	0.29	ug/kg	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	1.1	0.29	ug/kg	

ND = Not detected	MDL = Method Detection Limit	J = Indicates an estimated value
RL = Reporting Limit		B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range		N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-QT255-35-36	
Lab Sample ID: FA59665-4	Date Sampled: 11/21/18
Matrix: SO - Soil	Date Received: 11/28/18
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 88.6
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	1.1	0.29	ug/kg	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	82%		50-150%
	13C5-PFPeA	82%		50-150%
	13C5-PFHxA	90%		50-150%
	13C4-PFHpA	95%		50-150%
	13C8-PFOA	99%		50-150%
	13C9-PFNA	99%		50-150%
	13C6-PFDA	97%		50-150%
	13C7-PFUnDA	95%		50-150%
	13C2-PFDoDA	96%		50-150%
	13C2-PFTeDA	107%		50-150%
	13C3-PFBS	84%		50-150%
	13C3-PFHxS	87%		50-150%
	13C8-PFOS	88%		50-150%
	13C8-FOSA	73%		50-150%
	d3-MeFOSAA	98%		50-150%
	13C2-4:2FTS	83%		50-150%
	13C2-6:2FTS	88%		50-150%
	13C2-8:2FTS	83%		50-150%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-NF322-19.5-24.5	
Lab Sample ID: FA59665-5	Date Sampled: 11/21/18
Matrix: AQ - Ground Water	Date Received: 11/28/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24642.D	1	12/07/18 01:22	NG	12/05/18 10:00	OP72888	S2Q383
Run #2							

Run #	Initial Volume	Final Volume
Run #1	250 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0361	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0473	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0176	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid ^a	ND	0.0040	0.0010	ug/l	
PERFLUOROCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

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Report of Analysis

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Client Sample ID: SB-P6-NF322-19.5-24.5	
Lab Sample ID: FA59665-5	Date Sampled: 11/21/18
Matrix: AQ - Ground Water	Date Received: 11/28/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	76%		30-140%
	13C5-PFPeA	80%		40-140%
	13C5-PFHxA	87%		50-150%
	13C4-PFHpA	91%		50-150%
	13C8-PFOA	105%		50-150%
	13C9-PFNA	106%		50-150%
	13C6-PFDA	94%		50-150%
	13C7-PFUnDA	79%		50-150%
	13C2-PFDoDA	65%		50-150%
	13C2-PFTeDA	46%		40-150%
	13C3-PFBS	84%		50-150%
	13C3-PFHxS	91%		50-150%
	13C8-PFOS	95%		50-150%
	13C8-FOSA	89%		30-140%
	d3-MeFOSAA	108%		50-150%
	13C2-4:2FTS	97%		50-150%
	13C2-6:2FTS	120%		50-150%
	13C2-8:2FTS	102%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-NF322-19-24	
Lab Sample ID: FA59665-6	Date Sampled: 11/21/18
Matrix: AQ - Ground Water	Date Received: 11/28/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24871.D	1	12/11/18 16:57	NAF	12/10/18 08:00	OP72957	S2Q386
Run #2							

Run #	Initial Volume	Final Volume
Run #1	250 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0185	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0190	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0110	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.00294	0.0040	0.0010	ug/l	J
335-67-1	Perfluorooctanoic acid	0.00580	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00190	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
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 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-NF322-19-24	
Lab Sample ID: FA59665-6	Date Sampled: 11/21/18
Matrix: AQ - Ground Water	Date Received: 11/28/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	86%		30-140%
	13C5-PFPeA	81%		40-140%
	13C5-PFHxA	92%		50-150%
	13C4-PFHpA	102%		50-150%
	13C8-PFOA	107%		50-150%
	13C9-PFNA	112%		50-150%
	13C6-PFDA	106%		50-150%
	13C7-PFUnDA	108%		50-150%
	13C2-PFDoDA	96%		50-150%
	13C2-PFTeDA	93%		40-150%
	13C3-PFBS	83%		50-150%
	13C3-PFHxS	91%		50-150%
	13C8-PFOS	94%		50-150%
	13C8-FOSA	86%		30-140%
	d3-MeFOSAA	91%		50-150%
	13C2-4:2FTS	83%		50-150%
	13C2-6:2FTS	108%		50-150%
	13C2-8:2FTS	111%		50-150%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-MQ312-5-10	
Lab Sample ID: FA59665-7	Date Sampled: 11/21/18
Matrix: AQ - Ground Water	Date Received: 11/28/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24872.D	1	12/11/18 17:13	NAF	12/10/18 08:00	OP72957	S2Q386
Run #2							

Run #	Initial Volume	Final Volume
Run #1	250 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0427	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0867	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0761	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.110	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.226	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.0282	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	0.0353	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00404	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00258	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	0.00125	0.0040	0.0010	ug/l	J
1763-23-1	Perfluorooctanesulfonic acid	0.0719	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	0.00676	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	0.00456	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
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 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound



Report of Analysis

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Client Sample ID: SB-P6-MQ312-5-10		Date Sampled: 11/21/18
Lab Sample ID: FA59665-7		Date Received: 11/28/18
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	78%		30-140%
	13C5-PFPeA	75%		40-140%
	13C5-PFHxA	80%		50-150%
	13C4-PFHpA	86%		50-150%
	13C8-PFOA	94%		50-150%
	13C9-PFNA	99%		50-150%
	13C6-PFDA	98%		50-150%
	13C7-PFUnDA	103%		50-150%
	13C2-PFDoDA	88%		50-150%
	13C2-PFTeDA	81%		40-150%
	13C3-PFBS	76%		50-150%
	13C3-PFHxS	80%		50-150%
	13C8-PFOS	76%		50-150%
	13C8-FOSA	37%		30-140%
	d3-MeFOSAA	91%		50-150%
	13C2-4:2FTS	77%		50-150%
	13C2-6:2FTS	97%		50-150%
	13C2-8:2FTS	105%		50-150%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SB-P6-MQ289-15-20	Date Sampled:	11/20/18
Lab Sample ID:	FA59665-8	Date Received:	11/28/18
Matrix:	AQ - Ground Water	Percent Solids:	n/a
Method:	EPA 537M BY ID EPA 537 MOD		
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

Run #1	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24873.D	1	12/11/18 17:29	NAF	12/10/18 08:00	OP72957	S2Q386
Run #2							

Run #1	Initial Volume	Final Volume
Run #1	250 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0421	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0330	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.122	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0483	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0946	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00319	0.0040	0.0010	ug/l	J
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00446	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00211	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.00732	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-MQ289-15-20	
Lab Sample ID: FA59665-8	Date Sampled: 11/20/18
Matrix: AQ - Ground Water	Date Received: 11/28/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	58%		30-140%
	13C5-PFPeA	61%		40-140%
	13C5-PFHxA	65%		50-150%
	13C4-PFHpA	74%		50-150%
	13C8-PFOA	81%		50-150%
	13C9-PFNA	85%		50-150%
	13C6-PFDA	81%		50-150%
	13C7-PFUnDA	85%		50-150%
	13C2-PFDoDA	68%		50-150%
	13C2-PFTeDA	59%		40-150%
	13C3-PFBS	63%		50-150%
	13C3-PFHxS	69%		50-150%
	13C8-PFOS	64%		50-150%
	13C8-FOSA	43%		30-140%
	d3-MeFOSAA	67%		50-150%
	13C2-4:2FTS	64%		50-150%
	13C2-6:2FTS	85%		50-150%
	13C2-8:2FTS	80%		50-150%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: DUP-01-112018	
Lab Sample ID: FA59665-9	Date Sampled: 11/20/18
Matrix: AQ - Ground Water	Date Received: 11/28/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	58%		30-140%
	13C5-PFPeA	65%		40-140%
	13C5-PFHxA	69%		50-150%
	13C4-PFHpA	77%		50-150%
	13C8-PFOA	89%		50-150%
	13C9-PFNA	102%		50-150%
	13C6-PFDA	96%		50-150%
	13C7-PFUnDA	95%		50-150%
	13C2-PFDoDA	78%		50-150%
	13C2-PFTeDA	64%		40-150%
	13C3-PFBS	67%		50-150%
	13C3-PFHxS	76%		50-150%
	13C8-PFOS	77%		50-150%
	13C8-FOSA	37%		30-140%
	d3-MeFOSAA	75%		50-150%
	13C2-4:2FTS	69%		50-150%
	13C2-6:2FTS	90%		50-150%
	13C2-8:2FTS	92%		50-150%

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-QT226-9-10	
Lab Sample ID: FA59665-10	Date Sampled: 11/21/18
Matrix: SO - Soil	Date Received: 11/28/18
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 80.2
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24408.D	1	12/03/18 15:21	NAF	11/30/18 08:00	OP72832	S2Q381
Run #2							

Run #	Initial Weight	Final Volume
Run #1	2.04 g	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND	1.2	0.31	ug/kg	
2706-90-3	Perfluoropentanoic acid	ND	1.2	0.24	ug/kg	
307-24-4	Perfluorohexanoic acid	ND	1.2	0.24	ug/kg	
375-85-9	Perfluoroheptanoic acid	ND	1.2	0.31	ug/kg	
335-67-1	Perfluorooctanoic acid	ND	1.2	0.31	ug/kg	
375-95-1	Perfluorononanoic acid	ND	1.2	0.31	ug/kg	
335-76-2	Perfluorodecanoic acid	ND	1.2	0.31	ug/kg	
2058-94-8	Perfluoroundecanoic acid	ND	1.2	0.31	ug/kg	
307-55-1	Perfluorododecanoic acid	ND	1.2	0.31	ug/kg	
72629-94-8	Perfluorotridecanoic acid	ND	1.2	0.31	ug/kg	
376-06-7	Perfluorotetradecanoic acid	ND	1.2	0.31	ug/kg	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	1.2	0.31	ug/kg	
2706-91-4	Perfluoropentanesulfonic acid	ND	1.2	0.31	ug/kg	
355-46-4	Perfluorohexanesulfonic acid	ND	1.2	0.31	ug/kg	
375-92-8	Perfluoroheptanesulfonic acid	ND	1.2	0.31	ug/kg	
1763-23-1	Perfluorooctanesulfonic acid	ND	1.2	0.31	ug/kg	
68259-12-1	Perfluorononanesulfonic acid	ND	1.2	0.31	ug/kg	
335-77-3	Perfluorodecanesulfonic acid	ND	1.2	0.31	ug/kg	
PERFLUOROCTANESULFONAMIDES						
754-91-6	PFOSA	ND	1.2	0.31	ug/kg	
PERFLUOROCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	3.1	0.61	ug/kg	
2991-50-6	EtFOSAA	ND	3.1	0.61	ug/kg	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	1.2	0.31	ug/kg	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	1.2	0.31	ug/kg	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-QT226-9-10		Date Sampled: 11/21/18
Lab Sample ID: FA59665-10		Date Received: 11/28/18
Matrix: SO - Soil		Percent Solids: 80.2
Method: EPA 537M BY ID IN HOUSE		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	1.2	0.31	ug/kg	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	75%		50-150%
	13C5-PFPeA	77%		50-150%
	13C5-PFHxA	84%		50-150%
	13C4-PFHpA	88%		50-150%
	13C8-PFOA	93%		50-150%
	13C9-PFNA	92%		50-150%
	13C6-PFDA	91%		50-150%
	13C7-PFUnDA	86%		50-150%
	13C2-PFDoDA	89%		50-150%
	13C2-PFTeDA	100%		50-150%
	13C3-PFBS	76%		50-150%
	13C3-PFHxS	80%		50-150%
	13C8-PFOS	79%		50-150%
	13C8-FOSA	66%		50-150%
	d3-MeFOSAA	86%		50-150%
	13C2-4:2FTS	76%		50-150%
	13C2-6:2FTS	79%		50-150%
	13C2-8:2FTS	76%		50-150%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SB-P6-QT226-13-14	Date Sampled:	11/21/18
Lab Sample ID:	FA59665-11	Date Received:	11/28/18
Matrix:	SO - Soil	Percent Solids:	90.8
Method:	EPA 537M BY ID IN HOUSE		
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	1.1	0.28	ug/kg	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	89%		50-150%
	13C5-PFPeA	91%		50-150%
	13C5-PFHxA	100%		50-150%
	13C4-PFHpA	105%		50-150%
	13C8-PFOA	111%		50-150%
	13C9-PFNA	110%		50-150%
	13C6-PFDA	105%		50-150%
	13C7-PFUnDA	114%		50-150%
	13C2-PFDODA	105%		50-150%
	13C2-PFTeDA	115%		50-150%
	13C3-PFBS	90%		50-150%
	13C3-PFHxS	94%		50-150%
	13C8-PFOS	96%		50-150%
	13C8-FOSA	103%		50-150%
	d3-MeFOSAA	105%		50-150%
	13C2-4:2FTS	90%		50-150%
	13C2-6:2FTS	95%		50-150%
	13C2-8:2FTS	91%		50-150%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SB-P6-QT226-2-3			Date Sampled:	11/21/18		
Lab Sample ID:	FA59665-12			Date Received:	11/28/18		
Matrix:	SO - Soil			Percent Solids:	84.6		
Method:	EPA 537M BY ID IN HOUSE						
Project:	Racer Lansing PFAS Delineation; Lansing, MI						

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24413.D	1	12/03/18 16:43	NAF	11/30/18 08:00	OP72832	S2Q381
Run #2							

Run #	Initial Weight	Final Volume
Run #1	2.01 g	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND	1.2	0.29	ug/kg	
2706-90-3	Perfluoropentanoic acid	ND	1.2	0.24	ug/kg	
307-24-4	Perfluorohexanoic acid	ND	1.2	0.24	ug/kg	
375-85-9	Perfluoroheptanoic acid	ND	1.2	0.29	ug/kg	
335-67-1	Perfluorooctanoic acid	ND	1.2	0.29	ug/kg	
375-95-1	Perfluorononanoic acid	ND	1.2	0.29	ug/kg	
335-76-2	Perfluorodecanoic acid	ND	1.2	0.29	ug/kg	
2058-94-8	Perfluoroundecanoic acid	ND	1.2	0.29	ug/kg	
307-55-1	Perfluorododecanoic acid	ND	1.2	0.29	ug/kg	
72629-94-8	Perfluorotridecanoic acid	ND	1.2	0.29	ug/kg	
376-06-7	Perfluorotetradecanoic acid	ND	1.2	0.29	ug/kg	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	1.2	0.29	ug/kg	
2706-91-4	Perfluoropentanesulfonic acid	ND	1.2	0.29	ug/kg	
355-46-4	Perfluorohexanesulfonic acid	ND	1.2	0.29	ug/kg	
375-92-8	Perfluoroheptanesulfonic acid	ND	1.2	0.29	ug/kg	
1763-23-1	Perfluorooctanesulfonic acid	ND	1.2	0.29	ug/kg	
68259-12-1	Perfluorononanesulfonic acid	ND	1.2	0.29	ug/kg	
335-77-3	Perfluorodecanesulfonic acid	ND	1.2	0.29	ug/kg	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	1.2	0.29	ug/kg	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	2.9	0.59	ug/kg	
2991-50-6	EtFOSAA	ND	2.9	0.59	ug/kg	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	1.2	0.29	ug/kg	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	1.2	0.29	ug/kg	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-QT226-2-3	
Lab Sample ID: FA59665-12	Date Sampled: 11/21/18
Matrix: SO - Soil	Date Received: 11/28/18
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 84.6
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	1.2	0.29	ug/kg	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	80%		50-150%
	13C5-PFPeA	82%		50-150%
	13C5-PFHxA	89%		50-150%
	13C4-PFHpA	94%		50-150%
	13C8-PFOA	97%		50-150%
	13C9-PFNA	97%		50-150%
	13C6-PFDA	99%		50-150%
	13C7-PFUnDA	98%		50-150%
	13C2-PFDoDA	93%		50-150%
	13C2-PFTeDA	109%		50-150%
	13C3-PFBS	81%		50-150%
	13C3-PFHxS	84%		50-150%
	13C8-PFOS	83%		50-150%
	13C8-FOSA	77%		50-150%
	d3-MeFOSAA	93%		50-150%
	13C2-4:2FTS	81%		50-150%
	13C2-6:2FTS	85%		50-150%
	13C2-8:2FTS	81%		50-150%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-RH241-9-10		Date Sampled: 11/21/18
Lab Sample ID: FA59665-13		Date Received: 11/28/18
Matrix: SO - Soil		Percent Solids: 89.7
Method: EPA 537M BY ID IN HOUSE		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24414.D	1	12/03/18 16:59	NAF	11/30/18 08:00	OP72832	S2Q381
Run #2							

Run #	Initial Weight	Final Volume
Run #1	1.97 g	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND	1.1	0.28	ug/kg	
2706-90-3	Perfluoropentanoic acid	ND	1.1	0.23	ug/kg	
307-24-4	Perfluorohexanoic acid	ND	1.1	0.23	ug/kg	
375-85-9	Perfluoroheptanoic acid	ND	1.1	0.28	ug/kg	
335-67-1	Perfluorooctanoic acid	ND	1.1	0.28	ug/kg	
375-95-1	Perfluorononanoic acid	ND	1.1	0.28	ug/kg	
335-76-2	Perfluorodecanoic acid	ND	1.1	0.28	ug/kg	
2058-94-8	Perfluoroundecanoic acid	ND	1.1	0.28	ug/kg	
307-55-1	Perfluorododecanoic acid	ND	1.1	0.28	ug/kg	
72629-94-8	Perfluorotridecanoic acid	ND	1.1	0.28	ug/kg	
376-06-7	Perfluorotetradecanoic acid	ND	1.1	0.28	ug/kg	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	1.1	0.28	ug/kg	
2706-91-4	Perfluoropentanesulfonic acid	ND	1.1	0.28	ug/kg	
355-46-4	Perfluorohexanesulfonic acid	ND	1.1	0.28	ug/kg	
375-92-8	Perfluoroheptanesulfonic acid	ND	1.1	0.28	ug/kg	
1763-23-1	Perfluorooctanesulfonic acid	ND	1.1	0.28	ug/kg	
68259-12-1	Perfluorononanesulfonic acid	ND	1.1	0.28	ug/kg	
335-77-3	Perfluorodecanesulfonic acid	ND	1.1	0.28	ug/kg	
PERFLUORO-OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	1.1	0.28	ug/kg	
PERFLUORO-OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	2.8	0.57	ug/kg	
2991-50-6	EtFOSAA	ND	2.8	0.57	ug/kg	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	1.1	0.28	ug/kg	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	1.1	0.28	ug/kg	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-RH241-9-10	
Lab Sample ID: FA59665-13	Date Sampled: 11/21/18
Matrix: SO - Soil	Date Received: 11/28/18
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 89.7
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	1.1	0.28	ug/kg	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	77%		50-150%
	13C5-PFPeA	80%		50-150%
	13C5-PFHxA	88%		50-150%
	13C4-PFHpA	93%		50-150%
	13C8-PFOA	96%		50-150%
	13C9-PFNA	97%		50-150%
	13C6-PFDA	94%		50-150%
	13C7-PFUnDA	90%		50-150%
	13C2-PFDoDA	93%		50-150%
	13C2-PFTeDA	97%		50-150%
	13C3-PFBS	79%		50-150%
	13C3-PFHxS	83%		50-150%
	13C8-PFOS	83%		50-150%
	13C8-FOSA	87%		50-150%
	d3-MeFOSAA	91%		50-150%
	13C2-4:2FTS	79%		50-150%
	13C2-6:2FTS	83%		50-150%
	13C2-8:2FTS	80%		50-150%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-RH241-1-2		
Lab Sample ID: FA59665-14		Date Sampled: 11/21/18
Matrix: SO - Soil		Date Received: 11/28/18
Method: EPA 537M BY ID IN HOUSE		Percent Solids: 87.6
Project: Racer Lansing PFAS Delineation; Lansing, MI		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24415.D	1	12/03/18 17:15	NAF	11/30/18 08:00	OP72832	S2Q381
Run #2							

Run #	Initial Weight	Final Volume
Run #1	1.99 g	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND	1.1	0.29	ug/kg	
2706-90-3	Perfluoropentanoic acid	0.235	1.1	0.23	ug/kg	J
307-24-4	Perfluorohexanoic acid	0.235	1.1	0.23	ug/kg	J
375-85-9	Perfluoroheptanoic acid	ND	1.1	0.29	ug/kg	
335-67-1	Perfluorooctanoic acid	0.342	1.1	0.29	ug/kg	J
375-95-1	Perfluorononanoic acid	ND	1.1	0.29	ug/kg	
335-76-2	Perfluorodecanoic acid	ND	1.1	0.29	ug/kg	
2058-94-8	Perfluoroundecanoic acid	ND	1.1	0.29	ug/kg	
307-55-1	Perfluorododecanoic acid	ND	1.1	0.29	ug/kg	
72629-94-8	Perfluorotridecanoic acid	ND	1.1	0.29	ug/kg	
376-06-7	Perfluorotetradecanoic acid	ND	1.1	0.29	ug/kg	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	1.1	0.29	ug/kg	
2706-91-4	Perfluoropentanesulfonic acid	ND	1.1	0.29	ug/kg	
355-46-4	Perfluorohexanesulfonic acid	ND	1.1	0.29	ug/kg	
375-92-8	Perfluoroheptanesulfonic acid	ND	1.1	0.29	ug/kg	
1763-23-1	Perfluorooctanesulfonic acid	ND	1.1	0.29	ug/kg	
68259-12-1	Perfluorononanesulfonic acid	ND	1.1	0.29	ug/kg	
335-77-3	Perfluorodecanesulfonic acid	ND	1.1	0.29	ug/kg	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	1.1	0.29	ug/kg	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	2.9	0.57	ug/kg	
2991-50-6	EtFOSAA	ND	2.9	0.57	ug/kg	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	1.1	0.29	ug/kg	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	1.1	0.29	ug/kg	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound



Report of Analysis

Client Sample ID:	SB-P6-RH241-1-2	Date Sampled:	11/21/18
Lab Sample ID:	FA59665-14	Date Received:	11/28/18
Matrix:	SO - Soil	Percent Solids:	87.6
Method:	EPA 537M BY ID IN HOUSE		
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	1.1	0.29	ug/kg	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	77%		50-150%
	13C5-PFPeA	81%		50-150%
	13C5-PFHxA	87%		50-150%
	13C4-PFHpA	92%		50-150%
	13C8-PFOA	96%		50-150%
	13C9-PFNA	97%		50-150%
	13C6-PFDA	97%		50-150%
	13C7-PFUnDA	99%		50-150%
	13C2-PFDoDA	80%		50-150%
	13C2-PFTeDA	105%		50-150%
	13C3-PFBS	79%		50-150%
	13C3-PFHxS	80%		50-150%
	13C8-PFOS	83%		50-150%
	13C8-FOSA	87%		50-150%
	d3-MeFOSAA	89%		50-150%
	13C2-4:2FTS	78%		50-150%
	13C2-6:2FTS	82%		50-150%
	13C2-8:2FTS	81%		50-150%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-RH241-4-5	
Lab Sample ID: FA59665-15	Date Sampled: 11/21/18
Matrix: SO - Soil	Date Received: 11/28/18
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 86.9
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24416.D	1	12/03/18 17:31	NAF	11/30/18 08:00	OP72832	S2Q381
Run #2							

Run #	Initial Weight	Final Volume
Run #1	2.02 g	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND	1.1	0.28	ug/kg	
2706-90-3	Perfluoropentanoic acid	ND	1.1	0.23	ug/kg	
307-24-4	Perfluorohexanoic acid	ND	1.1	0.23	ug/kg	
375-85-9	Perfluoroheptanoic acid	ND	1.1	0.28	ug/kg	
335-67-1	Perfluorooctanoic acid	ND	1.1	0.28	ug/kg	
375-95-1	Perfluorononanoic acid	ND	1.1	0.28	ug/kg	
335-76-2	Perfluorodecanoic acid	ND	1.1	0.28	ug/kg	
2058-94-8	Perfluoroundecanoic acid	ND	1.1	0.28	ug/kg	
307-55-1	Perfluorododecanoic acid	ND	1.1	0.28	ug/kg	
72629-94-8	Perfluorotridecanoic acid	ND	1.1	0.28	ug/kg	
376-06-7	Perfluorotetradecanoic acid	ND	1.1	0.28	ug/kg	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	1.1	0.28	ug/kg	
2706-91-4	Perfluoropentanesulfonic acid	ND	1.1	0.28	ug/kg	
355-46-4	Perfluorohexanesulfonic acid	ND	1.1	0.28	ug/kg	
375-92-8	Perfluoroheptanesulfonic acid	ND	1.1	0.28	ug/kg	
1763-23-1	Perfluorooctanesulfonic acid	ND	1.1	0.28	ug/kg	
68259-12-1	Perfluorononanesulfonic acid	ND	1.1	0.28	ug/kg	
335-77-3	Perfluorodecanesulfonic acid	ND	1.1	0.28	ug/kg	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	1.1	0.28	ug/kg	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	2.8	0.57	ug/kg	
2991-50-6	EtFOSAA	ND	2.8	0.57	ug/kg	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	1.1	0.28	ug/kg	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	1.1	0.28	ug/kg	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-RH241-4-5	
Lab Sample ID: FA59665-15	Date Sampled: 11/21/18
Matrix: SO - Soil	Date Received: 11/28/18
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 86.9
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	1.1	0.28	ug/kg	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	79%		50-150%
	13C5-PFPeA	82%		50-150%
	13C5-PFHxA	89%		50-150%
	13C4-PFHpA	94%		50-150%
	13C8-PFOA	96%		50-150%
	13C9-PFNA	101%		50-150%
	13C6-PFDA	94%		50-150%
	13C7-PFUnDA	93%		50-150%
	13C2-PFDoDA	90%		50-150%
	13C2-PFTeDA	97%		50-150%
	13C3-PFBS	80%		50-150%
	13C3-PFHxS	81%		50-150%
	13C8-PFOS	85%		50-150%
	13C8-FOSA	96%		50-150%
	d3-MeFOSAA	96%		50-150%
	13C2-4:2FTS	81%		50-150%
	13C2-6:2FTS	83%		50-150%
	13C2-8:2FTS	82%		50-150%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-QH240-5-6		
Lab Sample ID: FA59665-16		Date Sampled: 11/26/18
Matrix: SO - Soil		Date Received: 11/28/18
Method: EPA 537M BY ID IN HOUSE		Percent Solids: 89.8
Project: Racer Lansing PFAS Delineation; Lansing, MI		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24417.D	1	12/03/18 17:48	NAF	11/30/18 08:00	OP72832	S2Q381
Run #2							

Run #	Initial Weight	Final Volume
Run #1	2.01 g	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND	1.1	0.28	ug/kg	
2706-90-3	Perfluoropentanoic acid	ND	1.1	0.22	ug/kg	
307-24-4	Perfluorohexanoic acid	ND	1.1	0.22	ug/kg	
375-85-9	Perfluoroheptanoic acid	ND	1.1	0.28	ug/kg	
335-67-1	Perfluorooctanoic acid	ND	1.1	0.28	ug/kg	
375-95-1	Perfluorononanoic acid	ND	1.1	0.28	ug/kg	
335-76-2	Perfluorodecanoic acid	ND	1.1	0.28	ug/kg	
2058-94-8	Perfluoroundecanoic acid	ND	1.1	0.28	ug/kg	
307-55-1	Perfluorododecanoic acid	ND	1.1	0.28	ug/kg	
72629-94-8	Perfluorotridecanoic acid	ND	1.1	0.28	ug/kg	
376-06-7	Perfluorotetradecanoic acid	ND	1.1	0.28	ug/kg	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	1.1	0.28	ug/kg	
2706-91-4	Perfluoropentanesulfonic acid	ND	1.1	0.28	ug/kg	
355-46-4	Perfluorohexanesulfonic acid	ND	1.1	0.28	ug/kg	
375-92-8	Perfluoroheptanesulfonic acid	ND	1.1	0.28	ug/kg	
1763-23-1	Perfluorooctanesulfonic acid	ND	1.1	0.28	ug/kg	
68259-12-1	Perfluorononanesulfonic acid	ND	1.1	0.28	ug/kg	
335-77-3	Perfluorodecanesulfonic acid	ND	1.1	0.28	ug/kg	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	1.1	0.28	ug/kg	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	2.8	0.55	ug/kg	
2991-50-6	EtFOSAA	ND	2.8	0.55	ug/kg	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	1.1	0.28	ug/kg	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	1.1	0.28	ug/kg	

ND = Not detected

MDL = Method Detection Limit

J = Indicates an estimated value

RL = Reporting Limit

B = Indicates analyte found in associated method blank

E = Indicates value exceeds calibration range

N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-QH240-5-6	
Lab Sample ID: FA59665-16	Date Sampled: 11/26/18
Matrix: SO - Soil	Date Received: 11/28/18
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 89.8
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	1.1	0.28	ug/kg	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	68%		50-150%
	13C5-PFPeA	72%		50-150%
	13C5-PFHxA	78%		50-150%
	13C4-PFHpA	81%		50-150%
	13C8-PFOA	84%		50-150%
	13C9-PFNA	84%		50-150%
	13C6-PFDA	83%		50-150%
	13C7-PFUnDA	80%		50-150%
	13C2-PFDoDA	80%		50-150%
	13C2-PFTeDA	87%		50-150%
	13C3-PFBS	69%		50-150%
	13C3-PFHxS	72%		50-150%
	13C8-PFOS	73%		50-150%
	13C8-FOSA	79%		50-150%
	d3-MeFOSAA	79%		50-150%
	13C2-4:2FTS	70%		50-150%
	13C2-6:2FTS	72%		50-150%
	13C2-8:2FTS	71%		50-150%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-QH240-11-12	
Lab Sample ID: FA59665-17	Date Sampled: 11/26/18
Matrix: SO - Soil	Date Received: 11/28/18
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 90.8
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24420.D	1	12/03/18 18:36	NAF	11/30/18 08:00	OP72832	S2Q381
Run #2							

Run #	Initial Weight	Final Volume
Run #1	2.02 g	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND	1.1	0.27	ug/kg	
2706-90-3	Perfluoropentanoic acid	ND	1.1	0.22	ug/kg	
307-24-4	Perfluorohexanoic acid	ND	1.1	0.22	ug/kg	
375-85-9	Perfluoroheptanoic acid	ND	1.1	0.27	ug/kg	
335-67-1	Perfluorooctanoic acid	ND	1.1	0.27	ug/kg	
375-95-1	Perfluorononanoic acid	ND	1.1	0.27	ug/kg	
335-76-2	Perfluorodecanoic acid	ND	1.1	0.27	ug/kg	
2058-94-8	Perfluoroundecanoic acid	ND	1.1	0.27	ug/kg	
307-55-1	Perfluorododecanoic acid	ND	1.1	0.27	ug/kg	
72629-94-8	Perfluorotridecanoic acid	ND	1.1	0.27	ug/kg	
376-06-7	Perfluorotetradecanoic acid	ND	1.1	0.27	ug/kg	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	1.1	0.27	ug/kg	
2706-91-4	Perfluoropentanesulfonic acid	ND	1.1	0.27	ug/kg	
355-46-4	Perfluorohexanesulfonic acid	ND	1.1	0.27	ug/kg	
375-92-8	Perfluoroheptanesulfonic acid	ND	1.1	0.27	ug/kg	
1763-23-1	Perfluorooctanesulfonic acid	ND	1.1	0.27	ug/kg	
68259-12-1	Perfluorononanesulfonic acid	ND	1.1	0.27	ug/kg	
335-77-3	Perfluorodecanesulfonic acid	ND	1.1	0.27	ug/kg	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	1.1	0.27	ug/kg	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	2.7	0.55	ug/kg	
2991-50-6	EtFOSAA	ND	2.7	0.55	ug/kg	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	1.1	0.27	ug/kg	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	1.1	0.27	ug/kg	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-QH240-11-12	
Lab Sample ID: FA59665-17	Date Sampled: 11/26/18
Matrix: SO - Soil	Date Received: 11/28/18
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 90.8
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	1.1	0.27	ug/kg	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	80%		50-150%
	13C5-PFPeA	84%		50-150%
	13C5-PFHxA	91%		50-150%
	13C4-PFHpA	95%		50-150%
	13C8-PFOA	100%		50-150%
	13C9-PFNA	97%		50-150%
	13C6-PFDA	98%		50-150%
	13C7-PFUnDA	94%		50-150%
	13C2-PFDoDA	95%		50-150%
	13C2-PFTeDA	105%		50-150%
	13C3-PFBS	83%		50-150%
	13C3-PFHxS	84%		50-150%
	13C8-PFOS	86%		50-150%
	13C8-FOSA	89%		50-150%
	d3-MeFOSAA	96%		50-150%
	13C2-4:2FTS	83%		50-150%
	13C2-6:2FTS	86%		50-150%
	13C2-8:2FTS	82%		50-150%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-QH240-16-17	
Lab Sample ID: FA59665-18	Date Sampled: 11/26/18
Matrix: SO - Soil	Date Received: 11/28/18
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 90.2
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24421.D	1	12/03/18 18:53	NAF	11/30/18 08:00	OP72832	S2Q381
Run #2							

Run #	Initial Weight	Final Volume
Run #1	2.01 g	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND	1.1	0.28	ug/kg	
2706-90-3	Perfluoropentanoic acid	ND	1.1	0.22	ug/kg	
307-24-4	Perfluorohexanoic acid	ND	1.1	0.22	ug/kg	
375-85-9	Perfluoroheptanoic acid	ND	1.1	0.28	ug/kg	
335-67-1	Perfluorooctanoic acid	ND	1.1	0.28	ug/kg	
375-95-1	Perfluorononanoic acid	ND	1.1	0.28	ug/kg	
335-76-2	Perfluorodecanoic acid	ND	1.1	0.28	ug/kg	
2058-94-8	Perfluoroundecanoic acid	ND	1.1	0.28	ug/kg	
307-55-1	Perfluorododecanoic acid	ND	1.1	0.28	ug/kg	
72629-94-8	Perfluorotridecanoic acid	ND	1.1	0.28	ug/kg	
376-06-7	Perfluorotetradecanoic acid	ND	1.1	0.28	ug/kg	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	1.1	0.28	ug/kg	
2706-91-4	Perfluoropentanesulfonic acid	ND	1.1	0.28	ug/kg	
355-46-4	Perfluorohexanesulfonic acid	ND	1.1	0.28	ug/kg	
375-92-8	Perfluoroheptanesulfonic acid	ND	1.1	0.28	ug/kg	
1763-23-1	Perfluorooctanesulfonic acid	ND	1.1	0.28	ug/kg	
68259-12-1	Perfluorononanesulfonic acid	ND	1.1	0.28	ug/kg	
335-77-3	Perfluorodecanesulfonic acid	ND	1.1	0.28	ug/kg	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	1.1	0.28	ug/kg	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	2.8	0.55	ug/kg	
2991-50-6	EtFOSAA	ND	2.8	0.55	ug/kg	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	1.1	0.28	ug/kg	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	1.1	0.28	ug/kg	

ND = Not detected MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-QH240-16-17	
Lab Sample ID: FA59665-18	Date Sampled: 11/26/18
Matrix: SO - Soil	Date Received: 11/28/18
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 90.2
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	1.1	0.28	ug/kg	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	74%		50-150%
	13C5-PFPeA	78%		50-150%
	13C5-PFHxA	85%		50-150%
	13C4-PFHpA	89%		50-150%
	13C8-PFOA	92%		50-150%
	13C9-PFNA	93%		50-150%
	13C6-PFDA	92%		50-150%
	13C7-PFUnDA	86%		50-150%
	13C2-PFDoDA	88%		50-150%
	13C2-PFTeDA	94%		50-150%
	13C3-PFBS	75%		50-150%
	13C3-PFHxS	76%		50-150%
	13C8-PFOS	80%		50-150%
	13C8-FOSA	91%		50-150%
	d3-MeFOSAA	90%		50-150%
	13C2-4:2FTS	76%		50-150%
	13C2-6:2FTS	80%		50-150%
	13C2-8:2FTS	76%		50-150%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: DUP-02-112618		
Lab Sample ID: FA59665-19		Date Sampled: 11/26/18
Matrix: SO - Soil		Date Received: 11/28/18
Method: EPA 537M BY ID IN HOUSE		Percent Solids: 89.9
Project: Racer Lansing PFAS Delineation; Lansing, MI		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24422.D	1	12/03/18 19:09	NAF	11/30/18 08:00	OP72832	S2Q381
Run #2							

Run #	Initial Weight	Final Volume
Run #1	1.99 g	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND	1.1	0.28	ug/kg	
2706-90-3	Perfluoropentanoic acid	ND	1.1	0.22	ug/kg	
307-24-4	Perfluorohexanoic acid	ND	1.1	0.22	ug/kg	
375-85-9	Perfluoroheptanoic acid	ND	1.1	0.28	ug/kg	
335-67-1	Perfluorooctanoic acid	ND	1.1	0.28	ug/kg	
375-95-1	Perfluorononanoic acid	ND	1.1	0.28	ug/kg	
335-76-2	Perfluorodecanoic acid	ND	1.1	0.28	ug/kg	
2058-94-8	Perfluoroundecanoic acid	ND	1.1	0.28	ug/kg	
307-55-1	Perfluorododecanoic acid	ND	1.1	0.28	ug/kg	
72629-94-8	Perfluorotridecanoic acid	ND	1.1	0.28	ug/kg	
376-06-7	Perfluorotetradecanoic acid	ND	1.1	0.28	ug/kg	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	1.1	0.28	ug/kg	
2706-91-4	Perfluoropentanesulfonic acid	ND	1.1	0.28	ug/kg	
355-46-4	Perfluorohexanesulfonic acid	ND	1.1	0.28	ug/kg	
375-92-8	Perfluoroheptanesulfonic acid	ND	1.1	0.28	ug/kg	
1763-23-1	Perfluorooctanesulfonic acid	ND	1.1	0.28	ug/kg	
68259-12-1	Perfluorononanesulfonic acid	ND	1.1	0.28	ug/kg	
335-77-3	Perfluorodecanesulfonic acid	ND	1.1	0.28	ug/kg	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	1.1	0.28	ug/kg	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	2.8	0.56	ug/kg	
2991-50-6	EtFOSAA	ND	2.8	0.56	ug/kg	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	1.1	0.28	ug/kg	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	1.1	0.28	ug/kg	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: DUP-02-112618	
Lab Sample ID: FA59665-19	Date Sampled: 11/26/18
Matrix: SO - Soil	Date Received: 11/28/18
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 89.9
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	1.1	0.28	ug/kg	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	75%		50-150%
	13C5-PFPeA	80%		50-150%
	13C5-PFHxA	86%		50-150%
	13C4-PFHpA	91%		50-150%
	13C8-PFOA	91%		50-150%
	13C9-PFNA	93%		50-150%
	13C6-PFDA	90%		50-150%
	13C7-PFUnDA	88%		50-150%
	13C2-PFDoDA	89%		50-150%
	13C2-PFTeDA	97%		50-150%
	13C3-PFBS	77%		50-150%
	13C3-PFHxS	80%		50-150%
	13C8-PFOS	80%		50-150%
	13C8-FOSA	96%		50-150%
	d3-MeFOSAA	90%		50-150%
	13C2-4:2FTS	78%		50-150%
	13C2-6:2FTS	79%		50-150%
	13C2-8:2FTS	75%		50-150%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-QT239-7-8	
Lab Sample ID: FA59665-20	Date Sampled: 11/26/18
Matrix: SO - Soil	Date Received: 11/28/18
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 89.1
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24425.D	1	12/03/18 19:58	NAF	11/30/18 08:00	OP72832	S2Q381
Run #2							

Run #	Initial Weight	Final Volume
Run #1	1.98 g	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND	1.1	0.28	ug/kg	
2706-90-3	Perfluoropentanoic acid	ND	1.1	0.23	ug/kg	
307-24-4	Perfluorohexanoic acid	ND	1.1	0.23	ug/kg	
375-85-9	Perfluoroheptanoic acid	ND	1.1	0.28	ug/kg	
335-67-1	Perfluorooctanoic acid	ND	1.1	0.28	ug/kg	
375-95-1	Perfluorononanoic acid	ND	1.1	0.28	ug/kg	
335-76-2	Perfluorodecanoic acid	ND	1.1	0.28	ug/kg	
2058-94-8	Perfluoroundecanoic acid	ND	1.1	0.28	ug/kg	
307-55-1	Perfluorododecanoic acid	ND	1.1	0.28	ug/kg	
72629-94-8	Perfluorotridecanoic acid	ND	1.1	0.28	ug/kg	
376-06-7	Perfluorotetradecanoic acid	ND	1.1	0.28	ug/kg	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	1.1	0.28	ug/kg	
2706-91-4	Perfluoropentanesulfonic acid	ND	1.1	0.28	ug/kg	
355-46-4	Perfluorohexanesulfonic acid	ND	1.1	0.28	ug/kg	
375-92-8	Perfluoroheptanesulfonic acid	ND	1.1	0.28	ug/kg	
1763-23-1	Perfluorooctanesulfonic acid	ND	1.1	0.28	ug/kg	
68259-12-1	Perfluorononanesulfonic acid	ND	1.1	0.28	ug/kg	
335-77-3	Perfluorodecanesulfonic acid	ND	1.1	0.28	ug/kg	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	1.1	0.28	ug/kg	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	2.8	0.57	ug/kg	
2991-50-6	EtFOSAA	ND	2.8	0.57	ug/kg	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	1.1	0.28	ug/kg	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	1.1	0.28	ug/kg	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-QT239-7-8	
Lab Sample ID: FA59665-20	Date Sampled: 11/26/18
Matrix: SO - Soil	Date Received: 11/28/18
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 89.1
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	1.1	0.28	ug/kg	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	79%		50-150%
	13C5-PFPeA	84%		50-150%
	13C5-PFHxA	91%		50-150%
	13C4-PFHpA	95%		50-150%
	13C8-PFOA	99%		50-150%
	13C9-PFNA	102%		50-150%
	13C6-PFDA	97%		50-150%
	13C7-PFUnDA	93%		50-150%
	13C2-PFDoDA	95%		50-150%
	13C2-PFTeDA	98%		50-150%
	13C3-PFBS	81%		50-150%
	13C3-PFHxS	83%		50-150%
	13C8-PFOS	86%		50-150%
	13C8-FOSA	106%		50-150%
	d3-MeFOSAA	97%		50-150%
	13C2-4:2FTS	81%		50-150%
	13C2-6:2FTS	86%		50-150%
	13C2-8:2FTS	83%		50-150%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-QT239-11-12	
Lab Sample ID: FA59665-21	Date Sampled: 11/26/18
Matrix: SO - Soil	Date Received: 11/28/18
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 88.5
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24426.D	1	12/03/18 20:14	NAF	11/30/18 08:00	OP72832	S2Q381
Run #2							

Run #	Initial Weight	Final Volume
Run #1	2.00 g	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND	1.1	0.28	ug/kg	
2706-90-3	Perfluoropentanoic acid	ND	1.1	0.23	ug/kg	
307-24-4	Perfluorohexanoic acid	ND	1.1	0.23	ug/kg	
375-85-9	Perfluoroheptanoic acid	ND	1.1	0.28	ug/kg	
335-67-1	Perfluorooctanoic acid	1.02	1.1	0.28	ug/kg	J
375-95-1	Perfluorononanoic acid	ND	1.1	0.28	ug/kg	
335-76-2	Perfluorodecanoic acid	ND	1.1	0.28	ug/kg	
2058-94-8	Perfluoroundecanoic acid	ND	1.1	0.28	ug/kg	
307-55-1	Perfluorododecanoic acid	ND	1.1	0.28	ug/kg	
72629-94-8	Perfluorotridecanoic acid	ND	1.1	0.28	ug/kg	
376-06-7	Perfluorotetradecanoic acid	ND	1.1	0.28	ug/kg	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	1.1	0.28	ug/kg	
2706-91-4	Perfluoropentanesulfonic acid	ND	1.1	0.28	ug/kg	
355-46-4	Perfluorohexanesulfonic acid	ND	1.1	0.28	ug/kg	
375-92-8	Perfluoroheptanesulfonic acid	ND	1.1	0.28	ug/kg	
1763-23-1	Perfluorooctanesulfonic acid	ND	1.1	0.28	ug/kg	
68259-12-1	Perfluorononanesulfonic acid	ND	1.1	0.28	ug/kg	
335-77-3	Perfluorodecanesulfonic acid	ND	1.1	0.28	ug/kg	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	1.1	0.28	ug/kg	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	2.8	0.56	ug/kg	
2991-50-6	EtFOSAA	ND	2.8	0.56	ug/kg	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	1.1	0.28	ug/kg	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	1.1	0.28	ug/kg	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-QT239-11-12	
Lab Sample ID: FA59665-21	Date Sampled: 11/26/18
Matrix: SO - Soil	Date Received: 11/28/18
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 88.5
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	1.1	0.28	ug/kg	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	82%		50-150%
	13C5-PFPeA	86%		50-150%
	13C5-PFHxA	94%		50-150%
	13C4-PFHpA	98%		50-150%
	13C8-PFOA	102%		50-150%
	13C9-PFNA	101%		50-150%
	13C6-PFDA	100%		50-150%
	13C7-PFUnDA	95%		50-150%
	13C2-PFDoDA	99%		50-150%
	13C2-PFTeDA	106%		50-150%
	13C3-PFBS	84%		50-150%
	13C3-PFHxS	84%		50-150%
	13C8-PFOS	87%		50-150%
	13C8-FOSA	105%		50-150%
	d3-MeFOSAA	100%		50-150%
	13C2-4:2FTS	84%		50-150%
	13C2-6:2FTS	87%		50-150%
	13C2-8:2FTS	83%		50-150%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-QT239-15-16	
Lab Sample ID: FA59665-22	Date Sampled: 11/26/18
Matrix: SO - Soil	Date Received: 11/28/18
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 89.9
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24427.D	1	12/03/18 20:30	NAF	11/30/18 08:00	OP72832	S2Q381
Run #2							

Run #	Initial Weight	Final Volume
Run #1	2.04 g	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND	1.1	0.27	ug/kg	
2706-90-3	Perfluoropentanoic acid	ND	1.1	0.22	ug/kg	
307-24-4	Perfluorohexanoic acid	ND	1.1	0.22	ug/kg	
375-85-9	Perfluoroheptanoic acid	ND	1.1	0.27	ug/kg	
335-67-1	Perfluorooctanoic acid	ND	1.1	0.27	ug/kg	
375-95-1	Perfluorononanoic acid	ND	1.1	0.27	ug/kg	
335-76-2	Perfluorodecanoic acid	ND	1.1	0.27	ug/kg	
2058-94-8	Perfluoroundecanoic acid	ND	1.1	0.27	ug/kg	
307-55-1	Perfluorododecanoic acid	ND	1.1	0.27	ug/kg	
72629-94-8	Perfluorotridecanoic acid	ND	1.1	0.27	ug/kg	
376-06-7	Perfluorotetradecanoic acid	ND	1.1	0.27	ug/kg	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	1.1	0.27	ug/kg	
2706-91-4	Perfluoropentanesulfonic acid	ND	1.1	0.27	ug/kg	
355-46-4	Perfluorohexanesulfonic acid	ND	1.1	0.27	ug/kg	
375-92-8	Perfluoroheptanesulfonic acid	ND	1.1	0.27	ug/kg	
1763-23-1	Perfluorooctanesulfonic acid	ND	1.1	0.27	ug/kg	
68259-12-1	Perfluorononanesulfonic acid	ND	1.1	0.27	ug/kg	
335-77-3	Perfluorodecanesulfonic acid	ND	1.1	0.27	ug/kg	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	1.1	0.27	ug/kg	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	2.7	0.55	ug/kg	
2991-50-6	EtFOSAA	ND	2.7	0.55	ug/kg	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	1.1	0.27	ug/kg	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	1.1	0.27	ug/kg	

ND = Not detected MDL = Method Detection Limit

J = Indicates an estimated value

RL = Reporting Limit

B = Indicates analyte found in associated method blank

E = Indicates value exceeds calibration range

N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-QT239-15-16	
Lab Sample ID: FA59665-22	Date Sampled: 11/26/18
Matrix: SO - Soil	Date Received: 11/28/18
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 89.9
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	1.1	0.27	ug/kg	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	78%		50-150%
	13C5-PFPeA	81%		50-150%
	13C5-PFHxA	88%		50-150%
	13C4-PFHpA	91%		50-150%
	13C8-PFOA	94%		50-150%
	13C9-PFNA	98%		50-150%
	13C6-PFDA	92%		50-150%
	13C7-PFUnDA	89%		50-150%
	13C2-PFDoDA	93%		50-150%
	13C2-PFTeDA	100%		50-150%
	13C3-PFBS	79%		50-150%
	13C3-PFHxS	80%		50-150%
	13C8-PFOS	83%		50-150%
	13C8-FOSA	96%		50-150%
	d3-MeFOSAA	91%		50-150%
	13C2-4:2FTS	79%		50-150%
	13C2-6:2FTS	84%		50-150%
	13C2-8:2FTS	80%		50-150%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SB-P6-RQ322-13-18	Date Sampled:	11/26/18
Lab Sample ID:	FA59665-23	Date Received:	11/28/18
Matrix:	AQ - Ground Water	Percent Solids:	n/a
Method:	EPA 537M BY ID EPA 537 MOD		
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24877.D	1	12/11/18 18:32	NAF	12/10/18 08:00	OP72957	S2Q386
Run #2							

Run #	Initial Volume	Final Volume
Run #1	250 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0422	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0894	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0969	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0924	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.157	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00887	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00189	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00196	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.00896	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

ND = Not detected

MDL = Method Detection Limit

J = Indicates an estimated value

RL = Reporting Limit

B = Indicates analyte found in associated method blank

E = Indicates value exceeds calibration range

N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-RQ322-13-18	
Lab Sample ID: FA59665-23	Date Sampled: 11/26/18
Matrix: AQ - Ground Water	Date Received: 11/28/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	81%		30-140%
	13C5-PFPeA	77%		40-140%
	13C5-PFHxA	80%		50-150%
	13C4-PFHpA	85%		50-150%
	13C8-PFOA	93%		50-150%
	13C9-PFNA	94%		50-150%
	13C6-PFDA	90%		50-150%
	13C7-PFUnDA	91%		50-150%
	13C2-PFDoDA	82%		50-150%
	13C2-PFTeDA	80%		40-150%
	13C3-PFBS	75%		50-150%
	13C3-PFHxS	81%		50-150%
	13C8-PFOS	74%		50-150%
	13C8-FOSA	47%		30-140%
	d3-MeFOSAA	78%		50-150%
	13C2-4:2FTS	72%		50-150%
	13C2-6:2FTS	88%		50-150%
	13C2-8:2FTS	89%		50-150%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SB-P6-QM322-15-20	Date Sampled:	11/26/18
Lab Sample ID:	FA59665-24	Date Received:	11/28/18
Matrix:	AQ - Ground Water	Percent Solids:	n/a
Method:	EPA 537M BY ID EPA 537 MOD		
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 ^a	2Q24662.D	5	12/07/18 15:36	NG	12/05/18 10:00	OP72888	S2Q384
Run #2							

Run #	Initial Volume	Final Volume
Run #1	250 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0997	0.040	0.010	ug/l	
2706-90-3	Perfluoropentanoic acid	0.162	0.020	0.0075	ug/l	
307-24-4	Perfluorohexanoic acid	0.157	0.020	0.0050	ug/l	
375-85-9	Perfluoroheptanoic acid	0.131	0.020	0.0050	ug/l	
335-67-1	Perfluorooctanoic acid	0.189	0.020	0.0050	ug/l	
375-95-1	Perfluorononanoic acid	0.0239	0.020	0.0050	ug/l	
335-76-2	Perfluorodecanoic acid	0.0129	0.020	0.0050	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.020	0.0050	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.020	0.0075	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.020	0.0050	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.020	0.0050	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	0.020	0.0050	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.020	0.0050	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.020	0.0050	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.020	0.0050	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0239	0.020	0.0075	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.020	0.0050	ug/l	
335-77-3	Perfluorodecanesulfonic acid ^b	ND	0.020	0.0050	ug/l	
PERFLUOROCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.020	0.0050	ug/l	
PERFLUOROCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.10	0.020	ug/l	
2991-50-6	EtFOSAA	ND	0.10	0.020	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.040	0.010	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.040	0.010	ug/l	

ND = Not detected

MDL = Method Detection Limit

J = Indicates an estimated value

RL = Reporting Limit

B = Indicates analyte found in associated method blank

E = Indicates value exceeds calibration range

N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-QM322-15-20		Date Sampled: 11/26/18
Lab Sample ID: FA59665-24		Date Received: 11/28/18
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.040	0.010	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	88%		30-140%
	13C5-PFPeA	87%		40-140%
	13C5-PFHxA	87%		50-150%
	13C4-PFHpA	89%		50-150%
	13C8-PFOA	93%		50-150%
	13C9-PFNA	95%		50-150%
	13C6-PFDA	95%		50-150%
	13C7-PFUnDA	84%		50-150%
	13C2-PFDoDA	60%		50-150%
	13C2-PFTeDA	77%		40-150%
	13C3-PFBS	93%		50-150%
	13C3-PFHxS	96%		50-150%
	13C8-PFOS	98%		50-150%
	13C8-FOSA	104%		30-140%
	d3-MeFOSAA	116%		50-150%
	13C2-4:2FTS	92%		50-150%
	13C2-6:2FTS	99%		50-150%
	13C2-8:2FTS	96%		50-150%

- (a) Dilution required due to matrix interference.
- (b) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-OX322-18-23	
Lab Sample ID: FA59665-25	Date Sampled: 11/26/18
Matrix: AQ - Ground Water	Date Received: 11/28/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 ^a	2Q24880.D	5	12/11/18 19:19	NAF	12/10/18 08:00	OP72957	S2Q386
Run #2 ^b	2Q24663.D	5	12/07/18 15:53	NG	12/05/18 10:00	OP72888	S2Q384

Run #	Initial Volume	Final Volume
Run #1	250 ml	1.0 ml
Run #2	250 ml	1.0 ml

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0270	0.040	0.010	ug/l	J
2706-90-3	Perfluoropentanoic acid	0.0405	0.020	0.0075	ug/l	
307-24-4	Perfluorohexanoic acid	0.0447	0.020	0.0050	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0346	0.020	0.0050	ug/l	
335-67-1	Perfluorooctanoic acid	0.0656	0.020	0.0050	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.020	0.0050	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.020	0.0050	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.020	0.0050	ug/l	
307-55-1	Perfluorododecanoic acid ^c	ND	0.020	0.0075	ug/l	
72629-94-8	Perfluorotridecanoic acid ^c	ND	0.020	0.0050	ug/l	
376-06-7	Perfluorotetradecanoic acid ^c	ND	0.020	0.0050	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	0.020	0.0050	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.020	0.0050	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.020	0.0050	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.020	0.0050	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.020	0.0075	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.020	0.0050	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.020	0.0050	ug/l	
PERFLUOROOCCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.020	0.0050	ug/l	
PERFLUOROOCCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.10	0.020	ug/l	
2991-50-6	EtFOSAA	ND	0.10	0.020	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.040	0.010	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.040	0.010	ug/l	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-OX322-18-23	
Lab Sample ID: FA59665-25	Date Sampled: 11/26/18
Matrix: AQ - Ground Water	Date Received: 11/28/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.040	0.010	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	60%	87%	30-140%
	13C5-PFPeA	55%	87%	40-140%
	13C5-PFHxA	61%	86%	50-150%
	13C4-PFHpA	67%	91%	50-150%
	13C8-PFOA	78%	96%	50-150%
	13C9-PFNA	86%	93%	50-150%
	13C6-PFDA	79%	94%	50-150%
	13C7-PFUnDA	63%	76%	50-150%
	13C2-PFDoDA	42% ^e	42% ^d	50-150%
	13C2-PFTeDA	31% ^e	27% ^d	40-150%
	13C3-PFBS	57%	89%	50-150%
	13C3-PFHxS	62%	87%	50-150%
	13C8-PFOS	65%	97%	50-150%
	13C8-FOSA	59%	108%	30-140%
	d3-MeFOSAA	59%	98%	50-150%
	13C2-4:2FTS	53%	88%	50-150%
	13C2-6:2FTS	82%	103%	50-150%
	13C2-8:2FTS	76%	95%	50-150%

- (a) Dilution required due to matrix interference.
- (b) Confirmation run for internal standard areas.
- (c) Associated ID Standard outside control limits due to matrix interference. Confirmed by re-extraction and reanalysis.
- (d) Outside control limits.
- (e) Outside control limits due to matrix interference. Confirmed by re-extraction and reanalysis.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: EB-01-112718		
Lab Sample ID: FA59665-26		Date Sampled: 11/27/18
Matrix: AQ - Equipment Blank		Date Received: 11/28/18
Method: EPA 537M BY ID EPA 537 MOD		Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24652.D	1	12/07/18 04:05	NG	12/05/18 10:00	OP72888	S2Q383
Run #2							

Run #	Initial Volume	Final Volume
Run #1	250 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid ^a	ND	0.0040	0.0010	ug/l	
PERFLUOROCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound



Report of Analysis

Client Sample ID: EB-01-112718		Date Sampled: 11/27/18
Lab Sample ID: FA59665-26		Date Received: 11/28/18
Matrix: AQ - Equipment Blank		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	93%		30-140%
	13C5-PFPeA	94%		40-140%
	13C5-PFHxA	96%		50-150%
	13C4-PFHpA	98%		50-150%
	13C8-PFOA	100%		50-150%
	13C9-PFNA	94%		50-150%
	13C6-PFDA	94%		50-150%
	13C7-PFUnDA	80%		50-150%
	13C2-PFDoDA	69%		50-150%
	13C2-PFTeDA	69%		40-150%
	13C3-PFBS	95%		50-150%
	13C3-PFHxS	96%		50-150%
	13C8-PFOS	91%		50-150%
	13C8-FOSA	128%		30-140%
	d3-MeFOSAA	112%		50-150%
	13C2-4:2FTS	99%		50-150%
	13C2-6:2FTS	106%		50-150%
	13C2-8:2FTS	105%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-RQ322-27-32		
Lab Sample ID: FA59665-27		Date Sampled: 11/27/18
Matrix: AQ - Ground Water		Date Received: 11/28/18
Method: EPA 537M BY ID EPA 537 MOD		Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI		

Run #1	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24878.D	1	12/11/18 18:48	NAF	12/10/18 08:00	OP72957	S2Q386
Run #2							

Run #1	Initial Volume	Final Volume
Run #1	250 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0195	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0383	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0481	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0595	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0609	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00212	0.0040	0.0010	ug/l	J
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00464	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	0.00138	0.0040	0.0010	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	0.00281	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.00266	0.0040	0.0015	ug/l	J
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

ND = Not detected

MDL = Method Detection Limit

J = Indicates an estimated value

RL = Reporting Limit

B = Indicates analyte found in associated method blank

E = Indicates value exceeds calibration range

N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-RQ322-27-32	
Lab Sample ID: FA59665-27	Date Sampled: 11/27/18
Matrix: AQ - Ground Water	Date Received: 11/28/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	78%		30-140%
	13C5-PFPeA	75%		40-140%
	13C5-PFHxA	82%		50-150%
	13C4-PFHpA	87%		50-150%
	13C8-PFOA	99%		50-150%
	13C9-PFNA	105%		50-150%
	13C6-PFDA	98%		50-150%
	13C7-PFUnDA	93%		50-150%
	13C2-PFDoDA	83%		50-150%
	13C2-PFTeDA	82%		40-150%
	13C3-PFBS	73%		50-150%
	13C3-PFHxS	80%		50-150%
	13C8-PFOS	82%		50-150%
	13C8-FOSA	83%		30-140%
	d3-MeFOSAA	79%		50-150%
	13C2-4:2FTS	71%		50-150%
	13C2-6:2FTS	97%		50-150%
	13C2-8:2FTS	97%		50-150%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody



SGS North America Inc - Orlando
Chain of Custody

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SGS - ORLANDO JOB #: PAGE 1 OF 3

Client / Reporting Information		Project Information		Analytical Information										Matrix Codes		
Company Name: Arcadis		Project Name: RACER Lansing Plant 6		MICHIGAN 24 PFAS										DW - Drinking Water GW - Ground Water WW - Water SW - Surface Water SO - Soil SL - Sludge LIQ - Other Liquid AIR - Air SOL - Other Solid		
Address: 300 S. Washington Sq., Suite 315		Street														
City: Lansing State: MI Zip: 48903		City: Lansing State: MI														
Project Contact: Alex Villhauer Email: Alex.Villhauer@arcadis.com		Project # B0084479.2018.03100														
Phone #: 616-780-3277		Client Purchase Order # B0084479.2018.03100														
Sampler(s) Name(s), (Printed) Sampler 1: Alex Villhauer Sampler 2: Austin Westhuis																
COLLECTION		CONTAINER INFORMATION										LAB USE ONLY				
SGS Orlando Sample #	Field ID / Point of Collection	DATE	TIME	SAMPLED BY	MATRIX	TOTAL # OF BOTTLES	OTHER	PHONE	FOI	INCH	PANOS	USDOA	MACHINAK	WATER	MECH	
1	SB-PG-QT255-4-5	11/21/18	1345	AV	SO	1	1									X
2	SB-PG-QT255-8-9	11/21/18	1355	AV	SO	1	1									X
3	DUP01-112118	11/21/18	—	AV	SO	1	1									X
4	SB-PG-QT255-35-38	11/21/18	1415	AV	SO	1	1									X
5	SB-PG-NF322-19.5-24.5	11/21/18	1600	AV	GW	2	2									X
6	SB-PG-NT322-19-24	11/21/18	1620	AV	GW	2	2									X
7	SB-PG-MQ312-5-10	11/21/18	0915	BP	GW	2	2									X
8	SB-PG-MQ289-15-20	11/20/18	1345	BP	GW	2	2									X
9	Dup-01-112018	11/20/18	—	BP	GW	2	2									X
10	SB-PG-QT226-9-10	11/21/18	1000	BP	SO	1	1									X
11	SB-PG-QT226-13-14	11/21/18	1005	BP	SO	1	1									X
12	SB-PG-QT226-2-3	11/21/18	0955	BP	SO	1	1									X
Turnaround Time (Business days)		Data Deliverable Information										Comments / Remarks				
<input checked="" type="checkbox"/> 10 Day (Business) <input type="checkbox"/> 7 Day <input type="checkbox"/> 5 Day <input type="checkbox"/> 3 Day RUSH <input type="checkbox"/> 2 Day RUSH <input type="checkbox"/> 1 Day RUSH <input type="checkbox"/> Other		Approved By: / Date:		<input type="checkbox"/> COMMERCIAL "A" (RESULTS ONLY) <input type="checkbox"/> COMMERCIAL "B" (RESULTS PLUS QC) <input type="checkbox"/> REDT1 (EPA LEVEL 3) <input type="checkbox"/> FULLT1 (EPA LEVEL 4) <input checked="" type="checkbox"/> EDD'S										PFAs by modified method 537 w/ isotopes dilution for MDEQ 24 comparand list.		
Rush T/A Data Available VIA Email or Lablink																
Sample Custody must be documented below each time samples change possession, including courier delivery.																
Relinquished by Sampler/Affiliation		Date Time:		Received By/Affiliation		Date Time:		Relinquished By/Affiliation		Date Time:		Received By/Affiliation		Date Time:		
1 Alex Villhauer / Arcadis		11/21/18 1115		2 FedEx		11/21/18 1115		3 FedEx		11/21/18 1115		4 FedEx		11/28/18 945		
5		6		7		8		9		10		11		12		
Lab Use Only: Cooler Temperature (c) Celsius (corrected): 2.8																

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FA59665: Chain of Custody

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SGS - ORLANDO JOB # :

PAGE 2 OF 3

Client / Reporting Information			Project Information			Analytical Information											Matrix Codes	
Company Name: <u>Arcadis</u>			Project Name: <u>RACER Lansing Plant 6</u>														DW - Drinking Water	
Address: <u>300 S. Washington Sq., Ste. 315</u>			Street														GW - Ground Water	
City: <u>Lansing</u> State: <u>MI</u> Zip: <u>48909</u>			City <u>Lansing</u> State <u>MI</u>														WW - Water	
Project Contact: <u>Alex Villhauer</u> Email: <u>Alex.Villhauer@arcadis.com</u>			Project # <u>60064479.2018.03100</u>														SW - Surface Water	
Phone #: <u>616-780-3277</u>			Fax #														SO - Soil	
Sampler(s) Name(s) (Printed)			Client Purchase Order # <u>60064479.2018.03100</u>														SL - Sludge	
Sampler 1: <u>Alex Villhauer</u> Sampler 2: <u>Austin Westhuis</u>																	OI - Oil	
SGS Orlando Sample #	Field ID / Point of Collection	DATE	TIME	SAMPLED BY:	MATRIX	TOTAL # OF BOTTLES	CONTAINER INFORMATION										LAB USE ONLY	
							OTTER	AGNE	FBI	NIOSH	HHS	PSCA	INCH/2IN	EL WATER	MICH			
13	SB-P6-RH241-9-10	11/21/18	1240	BP	SO	1	1									X		
14	SB-P6-RH241-1-2	11/21/18	1230	BP	SO	1	1									X		
15	SB-P6-RH241-4-5	11/21/18	1235	BP	SO	1	1									X		
16	SB-P6-QH240-5-6	us/us	1500	AW	SO	3	3									X		
17	SB-P6-QH240-11-12	11/26/18	1510	AW	SO	1	1									X		
18	SB-P6-QH240-16-17	11/26/18	1515	AW	SO	1	1									X		
19	Dup-D2-112618	11/26/18		AW	SO	1	1									X		
20	SB-P6-QT239-7-8	11/26/18	1635	AW	SO	1	1									X		
21	SB-P6-QT239-11-12	11/26/18	1640	AW	SO	1	1									X		
22	SB-P6-QT239-15-16	11/26/18	1645	AW	SO	1	1									X		
23	SB-P6-RQ322-13-18	11/26/18	1545	BP	GW	2	2									X		
24	SB-P6-QM322-15-20	11/26/18	1635	BP	GW	2	2									X		
Turnaround Time (Business days)				Data Deliverable Information				Comments / Remarks										
10 Day (Business) Approved By / Date: _____				<input type="checkbox"/> COMMERCIAL "A" (RESULTS ONLY) <input type="checkbox"/> COMMERCIAL "B" (RESULTS PLUS QC) <input type="checkbox"/> REDT1 (EPA LEVEL 3) <input type="checkbox"/> FULLT1 (EPA LEVEL 4) <input checked="" type="checkbox"/> REDD'S				* PFAS by modified method 537 with isotope dilution for MDEQ 24 compound list.										
Rush T/A Data Available VIA Email or Lablink				Sample Custody must be documented below each time samples change possession, including courier delivery.														
Relinquished by/Sampler/Affiliation	Date/Time	Received By/Affiliation		Relinquished By/Affiliation	Date/Time	Received By/Affiliation												
1 <u>Alex Villhauer/Arcadis</u>	<u>11/27/18 1752</u>	<u>2 FedEx</u>		3 <u>Fed Ex</u>		4 <u>DL/11/28/18</u>												
5		6		7		8												

Michigan 24 PFAS

4.1
4

FA59665: Chain of Custody

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ORLD-SMT-0001-03-FORM-COC (1) Rev 031318





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SGS - ORLANDO JOB #: PAGE 3 OF 3

Client / Reporting Information				Project Information				Analytical Information										Matrix Codes																
Company Name: Arcadis				Project Name: RACER Lansing Plant 6				* Michigan 24 PFAS *										DW - Drinking Water																
Address: 300 S. Washington Sq., Ste. 315				Street														GW - Ground Water																
City: Lansing State: MI Zip: 48907				City: Lansing State: MI														WW - Water																
Project Contact: Alex Villhauer Email: Alex.Villhauer@arcadis.com				Project # B0664479.2018.03100														SW - Surface Water																
Phone #: 616-780-3277				Client Purchase Order # B0664479.2018.03100				SO - Soil																										
Sampler(s) Name(s) (Printed)				Sampler 1: Alex Villhauer Sampler 2: Austin Westhaus				SL - Sludge																										
SGS Orlando Sample #				COLLECTION				CONTAINER INFORMATION										OI - Oil																
Field ID / Point of Collection				DATE				TIME				SAMPLED BY:		MATRIX		TOTAL # OF BOTTLES		OTHER		PCB		MNH		ANOS		PSSOL		MNH-ZNK		DI WATER		MICH		LAB USE ONLY
25 SB-P6-0X322-18-23				11/27/18				1735				BP		6W		2																		
26 EB-01-112718				11/27/18				1845				AW		6W		2																		
27 SB-P6-RQ322-27-32				11/27/18				1600				AW		6W		2																		
Turnaround Time (Business days)				Data Deliverable Information				Comments / Remarks																										
<input checked="" type="checkbox"/> 10 Day (Business) <input type="checkbox"/> 7 Day <input type="checkbox"/> 5 Day <input type="checkbox"/> 3 Day RUSH <input type="checkbox"/> 2 Day RUSH <input type="checkbox"/> 1 Day RUSH <input type="checkbox"/> Other				Approved By: / Date: _____				<input type="checkbox"/> COMMERCIAL "A" (RESULTS ONLY) <input type="checkbox"/> COMMERCIAL "B" (RESULTS PLUS QC) <input type="checkbox"/> REDT1 (EPA LEVEL 3) <input type="checkbox"/> FULLT1 (EPA LEVEL 4) <input checked="" type="checkbox"/> EDD'S				* PFAS by modified method 537 with isotope dilution for MDEQ 24 Compound list.																						
Rush T/A Data Available VIA Email or Lablink				Sample Custody must be documented below each time samples change possession, including courier delivery.																														
Relinquished by Sampler/Affiliation		Date Time:		Received By/Affiliation		Relinquished By/Affiliation		Date Time:		Received By/Affiliation		Relinquished By/Affiliation		Date Time:		Received By/Affiliation																		
Alex Villhauer / Arcadis		11/27/18 1735		FedEx		3		Fed Ex		4		4		11/28/18		11/28/18																		
5				6		7				8																								
Lab Use Only: Cooler Temperature (s) Celsius (corrected):																http://www.sgs.com/en/terms-and-conditions																		

ORLD-SMT-0001-03-FORM-COC (1) Rev 03/1318

FA59665: Chain of Custody

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SGS Sample Receipt Summary

Job Number: FA59665

Client: ARCADIS

Project: RACER LANSING PLANT 6

Date / Time Received: 11/28/2018 9:45:00 AM

Delivery Method: FED EX

Airbill #'s: 1002239574060003281100813921970911

Therm ID: IR 1;

Therm CF: -0.2;

of Coolers: 1

Cooler Temps (Raw Measured) °C: Cooler 1: (3.0);

Cooler Temps (Corrected) °C: Cooler 1: (2.8);

Cooler Information

Y or N

- | | | |
|-----------------------------|-------------------------------------|--------------------------|
| 1. Custody Seals Present | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Custody Seals Intact | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3. Temp criteria achieved | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 4. Cooler temp verification | <u>IR Gun</u> | |
| 5. Cooler media | <u>Ice (Bag)</u> | |

Trip Blank Information

Y or N

N/A

- | | | | |
|--------------------------------|--------------------------|--------------------------|-------------------------------------|
| 1. Trip Blank present / cooler | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2. Trip Blank listed on COC | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| | <u>W or S</u> | | <u>N/A</u> |
| 3. Type Of TB Received | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Sample Information

Y or N

N/A

- | | | | |
|---|-------------------------------------|-------------------------------------|-------------------------------------|
| 1. Sample labels present on bottles | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 2. Samples preserved properly | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 3. Sufficient volume/containers recvd for analysis: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 4. Condition of sample | <u>Intact</u> | | |
| 5. Sample recvd within HT | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 6. Dates/Times/IDs on COC match Sample Label | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 7. VOCs have headspace | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 8. Bottles received for unspecified tests | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 9. Compositing instructions clear | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 10. Voa Soil Kits/Jars received past 48hrs? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 11. % Solids Jar received? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 12. Residual Chlorine Present? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Misc. Information

Number of Encores: 25-Gram _____ 5-Gram _____

Number of 5035 Field Kits: _____

Number of Lab Filtered Metals: _____

Test Strip Lot #s: pH 0-3 _____ 230315 _____

pH 10-12 _____ 219813A _____

Other: (Specify) _____

Residual Chlorine Test Strip Lot #: _____

Comments

SM001
Rev. Date 05/24/17

Technician: SHAYLAP

Date: 11/28/2018 9:45:00 A

Reviewer: _____

Date: _____

FA59665: Chain of Custody

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MS Semi-volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: FA59665
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72832-MB	2Q24402.D	1	12/03/18	NAF	11/30/18	OP72832	S2Q381

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59665-1, FA59665-2, FA59665-3, FA59665-4, FA59665-10, FA59665-11, FA59665-12, FA59665-13, FA59665-14, FA59665-15, FA59665-16, FA59665-17, FA59665-18, FA59665-19, FA59665-20, FA59665-21, FA59665-22

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	1.0	0.25	ug/kg	
2706-90-3	Perfluoropentanoic acid	ND	1.0	0.20	ug/kg	
307-24-4	Perfluorohexanoic acid	ND	1.0	0.20	ug/kg	
375-85-9	Perfluoroheptanoic acid	ND	1.0	0.25	ug/kg	
335-67-1	Perfluorooctanoic acid	ND	1.0	0.25	ug/kg	
375-95-1	Perfluorononanoic acid	ND	1.0	0.25	ug/kg	
335-76-2	Perfluorodecanoic acid	ND	1.0	0.25	ug/kg	
2058-94-8	Perfluoroundecanoic acid	ND	1.0	0.25	ug/kg	
307-55-1	Perfluorododecanoic acid	ND	1.0	0.25	ug/kg	
72629-94-8	Perfluorotridecanoic acid	ND	1.0	0.25	ug/kg	
376-06-7	Perfluorotetradecanoic acid	ND	1.0	0.25	ug/kg	
375-73-5	Perfluorobutanesulfonic acid	ND	1.0	0.25	ug/kg	
2706-91-4	Perfluoropentanesulfonic acid	ND	1.0	0.25	ug/kg	
355-46-4	Perfluorohexanesulfonic acid	ND	1.0	0.25	ug/kg	
375-92-8	Perfluoroheptanesulfonic acid	ND	1.0	0.25	ug/kg	
1763-23-1	Perfluorooctanesulfonic acid	ND	1.0	0.25	ug/kg	
68259-12-1	Perfluorononanesulfonic acid	ND	1.0	0.25	ug/kg	
335-77-3	Perfluorodecanesulfonic acid	ND	1.0	0.25	ug/kg	
754-91-6	PFOSA	ND	1.0	0.25	ug/kg	
2355-31-9	MeFOSAA	ND	2.5	0.50	ug/kg	
2991-50-6	EtFOSAA	ND	2.5	0.50	ug/kg	
757124-72-44:2	Fluorotelomer sulfonate	ND	1.0	0.25	ug/kg	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	1.0	0.25	ug/kg	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	1.0	0.25	ug/kg	

CAS No.	ID Standard Recoveries	Limits
	13C4-PFBA	81% 50-150%
	13C5-PFPeA	81% 50-150%
	13C5-PFHxA	89% 50-150%
	13C4-PFHpA	94% 50-150%
	13C8-PFOA	97% 50-150%
	13C9-PFNA	98% 50-150%
	13C6-PFDA	94% 50-150%
	13C7-PFUnDA	93% 50-150%

5.1.1
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Method Blank Summary

Job Number: FA59665
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72832-MB	2Q24402.D	1	12/03/18	NAF	11/30/18	OP72832	S2Q381

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59665-1, FA59665-2, FA59665-3, FA59665-4, FA59665-10, FA59665-11, FA59665-12, FA59665-13, FA59665-14, FA59665-15, FA59665-16, FA59665-17, FA59665-18, FA59665-19, FA59665-20, FA59665-21, FA59665-22

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	92% 50-150%
	13C2-PFTeDA	99% 50-150%
	13C3-PFBS	81% 50-150%
	13C3-PFHxS	84% 50-150%
	13C8-PFOS	86% 50-150%
	13C8-FOSA	105% 50-150%
	d3-MeFOSAA	93% 50-150%
	13C2-4:2FTS	81% 50-150%
	13C2-6:2FTS	83% 50-150%
	13C2-8:2FTS	80% 50-150%

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Method Blank Summary

Job Number: FA59665
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72888-MB	2Q24630.D	1	12/06/18	NG	12/05/18	OP72888	S2Q383

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59665-5, FA59665-24, FA59665-26

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
757124-72-44:2	Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Limits
	13C4-PFBA	103% 30-140%
	13C5-PFPeA	105% 40-140%
	13C5-PFHxA	108% 50-150%
	13C4-PFHpA	109% 50-150%
	13C8-PFOA	111% 50-150%
	13C9-PFNA	109% 50-150%
	13C6-PFDA	105% 50-150%
	13C7-PFUnDA	89% 50-150%

Method Blank Summary

Job Number: FA59665
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72888-MB	2Q24630.D	1	12/06/18	NG	12/05/18	OP72888	S2Q383

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59665-5, FA59665-24, FA59665-26

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	80% 50-150%
	13C2-PFTeDA	80% 40-150%
	13C3-PFBS	108% 50-150%
	13C3-PFHxS	110% 50-150%
	13C8-PFOS	108% 50-150%
	13C8-FOSA	139% 30-140%
	d3-MeFOSAA	121% 50-150%
	13C2-4:2FTS	110% 50-150%
	13C2-6:2FTS	119% 50-150%
	13C2-8:2FTS	110% 50-150%

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Method Blank Summary

Job Number: FA59665
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72957-MB	2Q24869.D	1	12/11/18	NAF	12/10/18	OP72957	S2Q386

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59665-6, FA59665-7, FA59665-8, FA59665-9, FA59665-23, FA59665-25, FA59665-27

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
757124-72-44:2	Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Limits
	13C4-PFBA	101% 30-140%
	13C5-PFPeA	99% 40-140%
	13C5-PFHxA	107% 50-150%
	13C4-PFHpA	107% 50-150%
	13C8-PFOA	118% 50-150%
	13C9-PFNA	120% 50-150%
	13C6-PFDA	117% 50-150%
	13C7-PFUnDA	122% 50-150%

Method Blank Summary

Job Number: FA59665
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72957-MB	2Q24869.D	1	12/11/18	NAF	12/10/18	OP72957	S2Q386

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59665-6, FA59665-7, FA59665-8, FA59665-9, FA59665-23, FA59665-25, FA59665-27

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	81% 50-150%
	13C2-PFTeDA	84% 40-150%
	13C3-PFBS	101% 50-150%
	13C3-PFHxS	101% 50-150%
	13C8-PFOS	108% 50-150%
	13C8-FOSA	109% 30-140%
	d3-MeFOSAA	103% 50-150%
	13C2-4:2FTS	103% 50-150%
	13C2-6:2FTS	116% 50-150%
	13C2-8:2FTS	111% 50-150%

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Instrument Blank

Job Number: FA59665
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q383-IBLK	2Q24499.D	1	12/05/18	NG	n/a	n/a	S2Q383

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA59665-5, FA59665-26

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0080	0.0020	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
757124-72-44:2	Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Limits
	13C4-PFBA	100% 50-150%
	13C5-PFPeA	99% 50-150%
	13C5-PFHxA	100% 50-150%
	13C4-PFHpA	102% 50-150%
	13C8-PFOA	98% 50-150%
	13C9-PFNA	99% 50-150%
	13C6-PFDA	99% 50-150%
	13C7-PFUnDA	90% 50-150%

Instrument Blank

Job Number: FA59665
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q383-IBLK	2Q24499.D	1	12/05/18	NG	n/a	n/a	S2Q383

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA59665-5, FA59665-26

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	85% 50-150%
	13C2-PFTeDA	91% 50-150%
	13C3-PFBS	104% 50-150%
	13C3-PFHxS	107% 50-150%
	13C8-PFOS	105% 50-150%
	13C8-FOSA	122% 50-150%
	d3-MeFOSAA	107% 50-150%
	13C2-4:2FTS	99% 50-150%
	13C2-6:2FTS	99% 50-150%
	13C2-8:2FTS	95% 50-150%

Instrument Blank

Job Number: FA59665
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q384-IBLK	2Q24659.D	1	12/07/18	NG	n/a	n/a	S2Q384

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA59665-24

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0080	0.0020	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
757124-72-44:2	Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Limits
	13C4-PFBA	96% 50-150%
	13C5-PFPeA	96% 50-150%
	13C5-PFHxA	96% 50-150%
	13C4-PFHpA	97% 50-150%
	13C8-PFOA	95% 50-150%
	13C9-PFNA	94% 50-150%
	13C6-PFDA	95% 50-150%
	13C7-PFUnDA	84% 50-150%

Instrument Blank

Job Number: FA59665
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q384-IBLK	2Q24659.D	1	12/07/18	NG	n/a	n/a	S2Q384

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA59665-24

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	87% 50-150%
	13C2-PFTeDA	93% 50-150%
	13C3-PFBS	99% 50-150%
	13C3-PFHxS	101% 50-150%
	13C8-PFOS	99% 50-150%
	13C8-FOSA	125% 50-150%
	d3-MeFOSAA	113% 50-150%
	13C2-4:2FTS	98% 50-150%
	13C2-6:2FTS	97% 50-150%
	13C2-8:2FTS	93% 50-150%

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Instrument Blank

Job Number: FA59665
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q386-IBLK	2Q24857.D	1	12/11/18	NAF	n/a	n/a	S2Q386

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA59665-6, FA59665-7, FA59665-8, FA59665-9, FA59665-23, FA59665-25, FA59665-27

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0080	0.0020	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
757124-72-44:2	Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Limits
	13C4-PFBA	101% 50-150%
	13C5-PFPeA	99% 50-150%
	13C5-PFHxA	100% 50-150%
	13C4-PFHpA	101% 50-150%
	13C8-PFOA	107% 50-150%
	13C9-PFNA	100% 50-150%
	13C6-PFDA	110% 50-150%
	13C7-PFUnDA	102% 50-150%

5.1.6
5

Instrument Blank

Job Number: FA59665
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q386-IBLK	2Q24857.D	1	12/11/18	NAF	n/a	n/a	S2Q386

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA59665-6, FA59665-7, FA59665-8, FA59665-9, FA59665-23, FA59665-25, FA59665-27

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	105% 50-150%
	13C2-PFTeDA	101% 50-150%
	13C3-PFBS	99% 50-150%
	13C3-PFHxS	99% 50-150%
	13C8-PFOS	104% 50-150%
	13C8-FOSA	108% 50-150%
	d3-MeFOSAA	104% 50-150%
	13C2-4:2FTS	93% 50-150%
	13C2-6:2FTS	101% 50-150%
	13C2-8:2FTS	101% 50-150%

5.1.6
5

Blank Spike Summary

Job Number: FA59665
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72832-BS	2Q24401.D	1	12/03/18	NAF	11/30/18	OP72832	S2Q381

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59665-1, FA59665-2, FA59665-3, FA59665-4, FA59665-10, FA59665-11, FA59665-12, FA59665-13, FA59665-14, FA59665-15, FA59665-16, FA59665-17, FA59665-18, FA59665-19, FA59665-20, FA59665-21, FA59665-22

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
375-22-4	Perfluorobutanoic acid	10	9.00	90	60-134
2706-90-3	Perfluoropentanoic acid	10	10.2	102	62-134
307-24-4	Perfluorohexanoic acid	10	8.61	86	63-130
375-85-9	Perfluoroheptanoic acid	10	9.86	99	63-122
335-67-1	Perfluorooctanoic acid	10	9.61	96	71-128
375-95-1	Perfluorononanoic acid	10	9.47	95	66-124
335-76-2	Perfluorodecanoic acid	10	9.54	95	68-127
2058-94-8	Perfluoroundecanoic acid	10	9.99	100	61-137
307-55-1	Perfluorododecanoic acid	10	9.53	95	71-126
72629-94-8	Perfluorotridecanoic acid	10	10.3	103	60-137
376-06-7	Perfluorotetradecanoic acid	10	8.99	90	61-131
375-73-5	Perfluorobutanesulfonic acid	8.85	8.46	96	70-135
2706-91-4	Perfluoropentanesulfonic acid	9.4	8.94	95	70-130
355-46-4	Perfluorohexanesulfonic acid	9.1	8.27	91	72-129
375-92-8	Perfluoroheptanesulfonic acid	9.5	9.67	102	62-129
1763-23-1	Perfluorooctanesulfonic acid	9.25	9.31	101	69-125
68259-12-1	Perfluorononanesulfonic acid	9.6	9.18	96	70-130
335-77-3	Perfluorodecanesulfonic acid	9.65	8.92	92	63-141
754-91-6	PFOSA	10	9.58	96	65-140
2355-31-9	MeFOSAA	10	9.68	97	71-124
2991-50-6	EtFOSAA	10	10.7	107	63-129
757124-72-44:2	Fluorotelomer sulfonate	9.35	9.60	103	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	9.5	9.63	101	76-131
39108-34-4	8:2 Fluorotelomer sulfonate	9.6	9.12	95	60-138

CAS No.	ID Standard Recoveries	BSP	Limits
	13C4-PFBA	76%	50-150%
	13C5-PFPeA	77%	50-150%
	13C5-PFHxA	84%	50-150%
	13C4-PFHpA	86%	50-150%
	13C8-PFOA	91%	50-150%
	13C9-PFNA	89%	50-150%
	13C6-PFDA	88%	50-150%
	13C7-PFUnDA	87%	50-150%

* = Outside of Control Limits.

5.2.1
5

Blank Spike Summary

Job Number: FA59665
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72832-BS	2Q24401.D	1	12/03/18	NAF	11/30/18	OP72832	S2Q381

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59665-1, FA59665-2, FA59665-3, FA59665-4, FA59665-10, FA59665-11, FA59665-12, FA59665-13, FA59665-14, FA59665-15, FA59665-16, FA59665-17, FA59665-18, FA59665-19, FA59665-20, FA59665-21, FA59665-22

CAS No.	ID Standard Recoveries	BSP	Limits
	13C2-PFDoDA	87%	50-150%
	13C2-PFTeDA	93%	50-150%
	13C3-PFBS	77%	50-150%
	13C3-PFHxS	79%	50-150%
	13C8-PFOS	80%	50-150%
	13C8-FOSA	93%	50-150%
	d3-MeFOSAA	88%	50-150%
	13C2-4:2FTS	80%	50-150%
	13C2-6:2FTS	82%	50-150%
	13C2-8:2FTS	79%	50-150%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA59665
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72888-BS	2Q24629.D	1	12/06/18	NG	12/05/18	OP72888	S2Q383

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59665-5, FA59665-24, FA59665-26

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
375-22-4	Perfluorobutanoic acid	0.08	0.0692	87	70-130
2706-90-3	Perfluoropentanoic acid	0.08	0.0707	88	70-130
307-24-4	Perfluorohexanoic acid	0.08	0.0636	80	70-130
375-85-9	Perfluoroheptanoic acid	0.08	0.0693	87	71-130
335-67-1	Perfluorooctanoic acid	0.08	0.0721	90	74-130
375-95-1	Perfluorononanoic acid	0.08	0.0691	86	76-130
335-76-2	Perfluorodecanoic acid	0.08	0.0636	80	70-130
2058-94-8	Perfluoroundecanoic acid	0.08	0.0720	90	70-130
307-55-1	Perfluorododecanoic acid	0.08	0.0721	90	70-130
72629-94-8	Perfluorotridecanoic acid	0.08	0.0732	92	70-139
376-06-7	Perfluorotetradecanoic acid	0.08	0.0644	81	70-130
375-73-5	Perfluorobutanesulfonic acid	0.0708	0.0599	85	73-130
2706-91-4	Perfluoropentanesulfonic acid	0.0752	0.0656	87	70-130
355-46-4	Perfluorohexanesulfonic acid	0.0728	0.0602	83	74-130
375-92-8	Perfluoroheptanesulfonic acid	0.076	0.0691	91	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.074	0.0682	92	70-130
68259-12-1	Perfluorononanesulfonic acid	0.0768	0.0628	82	70-130
335-77-3	Perfluorodecanesulfonic acid	0.0772	0.0520	67* a	70-130
754-91-6	PFOSA	0.08	0.0720	90	70-131
2355-31-9	MeFOSAA	0.08	0.0723	90	70-130
2991-50-6	EtFOSAA	0.08	0.0763	95	70-130
757124-72-44:2	Fluorotelomer sulfonate	0.0748	0.0691	92	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	0.076	0.0692	91	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	0.0768	0.0670	87	70-130

CAS No.	ID Standard Recoveries	BSP	Limits
	13C4-PFBA	98%	30-140%
	13C5-PFPeA	99%	40-140%
	13C5-PFHxA	101%	50-150%
	13C4-PFHpA	102%	50-150%
	13C8-PFOA	101%	50-150%
	13C9-PFNA	98%	50-150%
	13C6-PFDA	97%	50-150%
	13C7-PFUnDA	84%	50-150%

* = Outside of Control Limits.

5.2.2
5

Blank Spike Summary

Job Number: FA59665
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72888-BS	2Q24629.D	1	12/06/18	NG	12/05/18	OP72888	S2Q383

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59665-5, FA59665-24, FA59665-26

CAS No.	ID Standard Recoveries	BSP	Limits
	13C2-PFDoDA	76%	50-150%
	13C2-PFTeDA	81%	40-150%
	13C3-PFBS	103%	50-150%
	13C3-PFHxS	104%	50-150%
	13C8-PFOS	104%	50-150%
	13C8-FOSA	123%	30-140%
	d3-MeFOSAA	113%	50-150%
	13C2-4:2FTS	108%	50-150%
	13C2-6:2FTS	113%	50-150%
	13C2-8:2FTS	109%	50-150%

(a) Sporadic marginal failure.

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA59665
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72957-BS	2Q24868.D	1	12/11/18	NAF	12/10/18	OP72957	S2Q386

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59665-6, FA59665-7, FA59665-8, FA59665-9, FA59665-23, FA59665-25, FA59665-27

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
375-22-4	Perfluorobutanoic acid	0.08	0.0758	95	70-130
2706-90-3	Perfluoropentanoic acid	0.08	0.0728	91	70-130
307-24-4	Perfluorohexanoic acid	0.08	0.0667	83	70-130
375-85-9	Perfluoroheptanoic acid	0.08	0.0761	95	71-130
335-67-1	Perfluorooctanoic acid	0.08	0.0740	93	74-130
375-95-1	Perfluorononanoic acid	0.08	0.0708	89	76-130
335-76-2	Perfluorodecanoic acid	0.08	0.0750	94	70-130
2058-94-8	Perfluoroundecanoic acid	0.08	0.0705	88	70-130
307-55-1	Perfluorododecanoic acid	0.08	0.0796	100	70-130
72629-94-8	Perfluorotridecanoic acid	0.08	0.0893	112	70-139
376-06-7	Perfluorotetradecanoic acid	0.08	0.0713	89	70-130
375-73-5	Perfluorobutanesulfonic acid	0.0708	0.0639	90	73-130
2706-91-4	Perfluoropentanesulfonic acid	0.0752	0.0722	96	70-130
355-46-4	Perfluorohexanesulfonic acid	0.0728	0.0645	89	74-130
375-92-8	Perfluoroheptanesulfonic acid	0.076	0.0756	99	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.074	0.0694	94	70-130
68259-12-1	Perfluorononanesulfonic acid	0.0768	0.0657	86	70-130
335-77-3	Perfluorodecanesulfonic acid	0.0772	0.0583	76	70-130
754-91-6	PFOSA	0.08	0.0750	94	70-131
2355-31-9	MeFOSAA	0.08	0.0755	94	70-130
2991-50-6	EtFOSAA	0.08	0.0772	97	70-130
757124-72-44:2	Fluorotelomer sulfonate	0.0748	0.0702	94	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	0.076	0.0697	92	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	0.0768	0.0690	90	70-130

CAS No.	ID Standard Recoveries	BSP	Limits
	13C4-PFBA	101%	30-140%
	13C5-PFPeA	100%	40-140%
	13C5-PFHxA	106%	50-150%
	13C4-PFHpA	102%	50-150%
	13C8-PFOA	110%	50-150%
	13C9-PFNA	110%	50-150%
	13C6-PFDA	109%	50-150%
	13C7-PFUnDA	112%	50-150%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA59665
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72957-BS	2Q24868.D	1	12/11/18	NAF	12/10/18	OP72957	S2Q386

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59665-6, FA59665-7, FA59665-8, FA59665-9, FA59665-23, FA59665-25, FA59665-27

CAS No.	ID Standard Recoveries	BSP	Limits
	13C2-PFDoDA	88%	50-150%
	13C2-PFTeDA	90%	40-150%
	13C3-PFBS	101%	50-150%
	13C3-PFHxS	100%	50-150%
	13C8-PFOS	105%	50-150%
	13C8-FOSA	93%	30-140%
	d3-MeFOSAA	101%	50-150%
	13C2-4:2FTS	109%	50-150%
	13C2-6:2FTS	112%	50-150%
	13C2-8:2FTS	111%	50-150%

* = Outside of Control Limits.

Matrix Spike Summary

Job Number: FA59665
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72888-MS	2Q24632.D	1	12/06/18	NG	12/05/18	OP72888	S2Q383
FA59661-1	2Q24631.D	1	12/06/18	NG	12/05/18	OP72888	S2Q383

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59665-5, FA59665-24, FA59665-26

CAS No.	Compound	FA59661-1 ug/l	Spike Q	ug/l	MS ug/l	MS %	Limits
375-22-4	Perfluorobutanoic acid	0.0148	J	0.16	0.174	100	70-130
2706-90-3	Perfluoropentanoic acid	0.0151		0.16	0.172	98	70-130
307-24-4	Perfluorohexanoic acid	0.00467	J	0.16	0.149	90	70-130
375-85-9	Perfluoroheptanoic acid	ND		0.16	0.158	99	71-130
335-67-1	Perfluorooctanoic acid	ND		0.16	0.156	98	74-130
375-95-1	Perfluorononanoic acid	ND		0.16	0.150	94	76-130
335-76-2	Perfluorodecanoic acid	ND		0.16	0.151	94	70-130
2058-94-8	Perfluoroundecanoic acid	ND		0.16	0.174	109	70-130
307-55-1	Perfluorododecanoic acid	ND		0.16	0.170	106	70-130
72629-94-8	Perfluorotridecanoic acid	ND		0.16	0.179	112	70-139
376-06-7	Perfluorotetradecanoic acid	ND		0.16	0.157	98	70-130
375-73-5	Perfluorobutanesulfonic acid	ND		0.142	0.137	97	73-130
2706-91-4	Perfluoropentanesulfonic acid	ND		0.15	0.163	108	70-130
355-46-4	Perfluorohexanesulfonic acid	ND		0.146	0.136	93	74-130
375-92-8	Perfluoroheptanesulfonic acid	ND		0.152	0.161	106	74-130
1763-23-1	Perfluorooctanesulfonic acid	ND		0.148	0.156	105	70-130
68259-12-1	Perfluorononanesulfonic acid	ND		0.154	0.142	92	70-130
335-77-3	Perfluorodecanesulfonic acid	ND		0.154	0.127	82	70-130
754-91-6	PFOSA	ND		0.16	0.163	102	70-131
2355-31-9	MeFOSAA	ND		0.16	0.167	104	70-130
2991-50-6	EtFOSAA	ND		0.16	0.177	111	70-130
757124-72-44:2	Fluorotelomer sulfonate	ND		0.15	0.158	106	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	ND		0.152	0.159	105	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	ND		0.154	0.160	104	70-130

CAS No.	ID Standard Recoveries	MS	FA59661-1	Limits
	13C4-PFBA	67%	81%	30-140%
	13C5-PFPeA	71%	87%	40-140%
	13C5-PFHxA	75%	95%	50-150%
	13C4-PFHpA	81%	99%	50-150%
	13C8-PFOA	86%	107%	50-150%
	13C9-PFNA	84%	98%	50-150%
	13C6-PFDA	76%	91%	50-150%
	13C7-PFUnDA	65%	85%	50-150%

* = Outside of Control Limits.

5.3.1
5

Matrix Spike Summary

Job Number: FA59665
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72888-MS	2Q24632.D	1	12/06/18	NG	12/05/18	OP72888	S2Q383
FA59661-1	2Q24631.D	1	12/06/18	NG	12/05/18	OP72888	S2Q383

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59665-5, FA59665-24, FA59665-26

CAS No.	ID Standard Recoveries	MS	FA59661-1	Limits
	13C2-PFDoDA	61%	80%	50-150%
	13C2-PFTeDA	67%	84%	40-150%
	13C3-PFBS	73%	90%	50-150%
	13C3-PFHxS	82%	99%	50-150%
	13C8-PFOS	82%	89%	50-150%
	13C8-FOSA	103%	122%	30-140%
	d3-MeFOSAA	88%	106%	50-150%
	13C2-4:2FTS	81%	95%	50-150%
	13C2-6:2FTS	95%	115%	50-150%
	13C2-8:2FTS	84%	98%	50-150%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA59665
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72832-MS	2Q24418.D	1	12/03/18	NAF	11/30/18	OP72832	S2Q381
OP72832-MSD	2Q24419.D	1	12/03/18	NAF	11/30/18	OP72832	S2Q381
FA59665-16	2Q24417.D	1	12/03/18	NAF	11/30/18	OP72832	S2Q381

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59665-1, FA59665-2, FA59665-3, FA59665-4, FA59665-10, FA59665-11, FA59665-12, FA59665-13, FA59665-14, FA59665-15, FA59665-16, FA59665-17, FA59665-18, FA59665-19, FA59665-20, FA59665-21, FA59665-22

CAS No.	Compound	FA59665-16 Spike ug/kg	MS Q ug/kg	MS ug/kg	MS %	Spike ug/kg	MSD ug/kg	MSD %	RPD	Limits Rec/RPD
375-22-4	Perfluorobutanoic acid	ND	10.9	9.62	89	11	9.99	91	4	60-134/30
2706-90-3	Perfluoropentanoic acid	ND	10.9	10.7	98	11	11.2	102	5	62-134/30
307-24-4	Perfluorohexanoic acid	ND	10.9	9.22	85	11	9.53	86	3	63-130/30
375-85-9	Perfluoroheptanoic acid	ND	10.9	10.2	94	11	10.6	96	4	63-122/30
335-67-1	Perfluorooctanoic acid	ND	10.9	10.3	95	11	10.6	96	3	71-128/30
375-95-1	Perfluorononanoic acid	ND	10.9	9.75	90	11	10.1	92	4	66-124/30
335-76-2	Perfluorodecanoic acid	ND	10.9	9.70	89	11	10.8	98	11	68-127/30
2058-94-8	Perfluoroundecanoic acid	ND	10.9	10.6	98	11	10.8	98	2	61-137/30
307-55-1	Perfluorododecanoic acid	ND	10.9	10.7	98	11	11.2	102	5	71-126/30
72629-94-8	Perfluorotridecanoic acid	ND	10.9	11.1	102	11	11.1	101	0	60-137/30
376-06-7	Perfluorotetradecanoic acid	ND	10.9	9.83	90	11	9.85	89	0	61-131/30
375-73-5	Perfluorobutanesulfonic acid	ND	9.61	8.92	93	9.76	9.20	94	3	70-135/30
2706-91-4	Perfluoropentanesulfonic acid	ND	10.2	9.67	95	10.4	9.92	96	3	70-130/30
355-46-4	Perfluorohexanesulfonic acid	ND	9.89	8.91	90	10	9.13	91	2	72-129/30
375-92-8	Perfluoroheptanesulfonic acid	ND	10.3	10.2	99	10.5	10.5	100	3	62-129/30
1763-23-1	Perfluorooctanesulfonic acid	ND	10	9.84	98	10.2	10.2	100	4	69-125/30
68259-12-1	Perfluorononanesulfonic acid	ND	10.4	9.83	94	10.6	10.4	98	6	70-130/30
335-77-3	Perfluorodecanesulfonic acid	ND	10.5	9.60	92	10.6	10.2	96	6	63-141/30
754-91-6	PFOSA	ND	10.9	10.3	95	11	10.9	99	6	65-140/30
2355-31-9	MeFOSAA	ND	10.9	10.3	95	11	10.4	94	1	71-124/30
2991-50-6	EtFOSAA	ND	10.9	11.3	104	11	11.4	103	1	63-129/30
757124-72-44:2	Fluorotelomer sulfonate	ND	10.2	10.2	100	10.3	10.6	103	4	70-130/30
27619-97-2	6:2 Fluorotelomer sulfonate	ND	10.3	10.3	100	10.5	10.6	101	3	76-131/30
39108-34-4	8:2 Fluorotelomer sulfonate	ND	10.4	9.93	95	10.6	10.2	96	3	60-138/30

CAS No.	ID Standard Recoveries	MS	MSD	FA59665-16	Limits
13C4-PFBA		76%	77%	68%	50-150%
13C5-PFPeA		80%	81%	72%	50-150%
13C5-PFHxA		87%	88%	78%	50-150%
13C4-PFHpA		91%	93%	81%	50-150%
13C8-PFOA		90%	96%	84%	50-150%
13C9-PFNA		96%	100%	84%	50-150%
13C6-PFDA		91%	89%	83%	50-150%
13C7-PFUnDA		86%	90%	80%	50-150%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA59665
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72832-MS	2Q24418.D	1	12/03/18	NAF	11/30/18	OP72832	S2Q381
OP72832-MSD	2Q24419.D	1	12/03/18	NAF	11/30/18	OP72832	S2Q381
FA59665-16	2Q24417.D	1	12/03/18	NAF	11/30/18	OP72832	S2Q381

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59665-1, FA59665-2, FA59665-3, FA59665-4, FA59665-10, FA59665-11, FA59665-12, FA59665-13, FA59665-14, FA59665-15, FA59665-16, FA59665-17, FA59665-18, FA59665-19, FA59665-20, FA59665-21, FA59665-22

CAS No.	ID Standard Recoveries	MS	MSD	FA59665-16	Limits
13C2-PFDoDA		88%	91%	80%	50-150%
13C2-PFTeDA		94%	101%	87%	50-150%
13C3-PFBS		78%	80%	69%	50-150%
13C3-PFHxS		78%	82%	72%	50-150%
13C8-PFOS		81%	83%	73%	50-150%
13C8-FOSA		97%	52%	79%	50-150%
d3-MeFOSAA		90%	92%	79%	50-150%
13C2-4:2FTS		82%	83%	70%	50-150%
13C2-6:2FTS		83%	86%	72%	50-150%
13C2-8:2FTS		81%	85%	71%	50-150%

* = Outside of Control Limits.

5.4.1
5

Duplicate Summary

Job Number: FA59665
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72888-DUP	2Q24634.D	1	12/06/18	NG	12/05/18	OP72888	S2Q383
FA59661-2	2Q24633.D	1	12/06/18	NG	12/05/18	OP72888	S2Q383

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59665-5, FA59665-24, FA59665-26

CAS No.	Compound	FA59661-2 DUP		Q	RPD	Limits
		ug/l	Q ug/l			
375-22-4	Perfluorobutanoic acid	ND	ND		nc	30
2706-90-3	Perfluoropentanoic acid	ND	ND		nc	30
307-24-4	Perfluorohexanoic acid	ND	ND		nc	30
375-85-9	Perfluoroheptanoic acid	ND	ND		nc	30
335-67-1	Perfluorooctanoic acid	ND	ND		nc	30
375-95-1	Perfluorononanoic acid	ND	ND		nc	30
335-76-2	Perfluorodecanoic acid	ND	ND		nc	30
2058-94-8	Perfluoroundecanoic acid	ND	ND		nc	30
307-55-1	Perfluorododecanoic acid	ND	ND		nc	30
72629-94-8	Perfluorotridecanoic acid	ND	ND		nc	30
376-06-7	Perfluorotetradecanoic acid	ND	ND		nc	30
375-73-5	Perfluorobutanesulfonic acid	ND	ND		nc	30
2706-91-4	Perfluoropentanesulfonic acid	ND	ND		nc	30
355-46-4	Perfluorohexanesulfonic acid	ND	ND		nc	30
375-92-8	Perfluoroheptanesulfonic acid	ND	ND		nc	30
1763-23-1	Perfluorooctanesulfonic acid	ND	ND		nc	30
68259-12-1	Perfluorononanesulfonic acid	ND	ND		nc	30
335-77-3	Perfluorodecanesulfonic acid	ND	ND		nc	30
754-91-6	PFOSA	ND	ND		nc	30
2355-31-9	MeFOSAA	ND	ND		nc	30
2991-50-6	EtFOSAA	ND	ND		nc	30
757124-72-44:2	Fluorotelomer sulfonate	ND	ND		nc	30
27619-97-2	6:2 Fluorotelomer sulfonate	ND	ND		nc	30
39108-34-4	8:2 Fluorotelomer sulfonate	ND	ND		nc	30

CAS No.	ID Standard Recoveries	DUP	FA59661-2	Limits
	13C4-PFBA	91%	83%	30-140%
	13C5-PFPeA	92%	84%	40-140%
	13C5-PFHxA	94%	87%	50-150%
	13C4-PFHpA	98%	91%	50-150%
	13C8-PFOA	102%	92%	50-150%
	13C9-PFNA	98%	89%	50-150%
	13C6-PFDA	92%	82%	50-150%
	13C7-PFUnDA	79%	69%	50-150%

* = Outside of Control Limits.

5.5.1
5

Duplicate Summary

Job Number: FA59665
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72888-DUP	2Q24634.D	1	12/06/18	NG	12/05/18	OP72888	S2Q383
FA59661-2	2Q24633.D	1	12/06/18	NG	12/05/18	OP72888	S2Q383

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59665-5, FA59665-24, FA59665-26

CAS No.	ID Standard Recoveries	DUP	FA59661-2	Limits
	13C2-PFDoDA	73%	67%	50-150%
	13C2-PFTeDA	63%	64%	40-150%
	13C3-PFBS	95%	88%	50-150%
	13C3-PFHxS	99%	89%	50-150%
	13C8-PFOS	96%	73%	50-150%
	13C8-FOSA	85%	54%	30-140%
	d3-MeFOSAA	111%	93%	50-150%
	13C2-4:2FTS	97%	90%	50-150%
	13C2-6:2FTS	107%	98%	50-150%
	13C2-8:2FTS	99%	85%	50-150%

* = Outside of Control Limits.

The results set forth herein are provided by SGS North America Inc.

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Automated Report

Technical Report for

Arcadis

Racer Lansing PFAS Delineation; Lansing, MI

B0064479.2018.03100

SGS Job Number: FA59818

Sampling Dates: 11/28/18 - 11/30/18



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Total number of pages in report: 99



Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.

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Certifications: FL(E83510), LA(03051), KS(E-10327), IL(200063), NC(573), NJ(FL002), NY(12022), SC(96038001)
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Test results relate only to samples analyzed.

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Sample Summary

Arcadis

Job No: FA59818

Racer Lansing PFAS Delineation; Lansing, MI
 Project No: B0064479.2018.03100

Sample Number	Collected		Matrix Code	Type	Client Sample ID	
	Date	Time By				
FA59818-1	11/28/18	09:40 BPAW	12/01/18	AQ	Ground Water	SB-P6-MF321_15-20
FA59818-2	11/28/18	10:20 BPAW	12/01/18	AQ	Ground Water	SB-P6-MF311_20-25
FA59818-3	11/28/18	00:00 BPAW	12/01/18	AQ	Ground Water	DUP-02_112818
FA59818-4	11/28/18	10:45 BPAW	12/01/18	AQ	Ground Water	SB-P6-MF311_8-13
FA59818-5	11/28/18	11:30 BPAW	12/01/18	AQ	Ground Water	SB-P6-MF301_20-25
FA59818-5D	11/28/18	11:30 BPAW	12/01/18	AQ	Water Dup/MSD	SB-P6-MF301_20-25
FA59818-5S	11/28/18	11:30 BPAW	12/01/18	AQ	Water Matrix Spike	SB-P6-MF301_20-25
FA59818-6	11/28/18	12:00 BPAW	12/01/18	AQ	Ground Water	SB-P6-MF301_3-8
FA59818-7	11/28/18	12:45 BPAW	12/01/18	AQ	Ground Water	SB-P6-MF293_20-25
FA59818-8	11/28/18	13:05 BPAW	12/01/18	AQ	Ground Water	SB-P6-MF293_3-8
FA59818-9	11/28/18	14:15 BPAW	12/01/18	AQ	Ground Water	SB-P6-OS335_18.5-23.5
FA59818-10	11/28/18	16:10 BPAW	12/01/18	AQ	Ground Water	SB-P6-OH322_10-15
FA59818-11	11/28/18	16:45 BPAW	12/01/18	AQ	Ground Water	SB-P6-OH322_15-20



Sample Summary

(continued)

Arcadis

Job No: FA59818

Racer Lansing PFAS Delineation; Lansing, MI
 Project No: B0064479.2018.03100

Sample Number	Collected		Matrix Code	Type	Client Sample ID	
	Date	Time By				
FA59818-12	11/29/18	09:00 BPAW	12/01/18	AQ	Ground Water	VERLINDEN-MH-2_112918
FA59818-13	11/29/18	09:25 BPAW	12/01/18	AQ	Ground Water	VERLINDEN-MH-3_112918
FA59818-14	11/29/18	12:00 BPAW	12/01/18	AQ	Ground Water	VERLINDEN-MH-4_112918
FA59818-15	11/29/18	00:00 BPAW	12/01/18	AQ	Ground Water	DUP-03_112918
FA59818-16	11/29/18	12:45 BPAW	12/01/18	AQ	Ground Water	VERLINDEN-MH-1_112918
FA59818-17	11/29/18	13:20 BPAW	12/01/18	AQ	Ground Water	OSBORN-MH-1_112918
FA59818-18	11/29/18	14:20 BPAW	12/01/18	AQ	Ground Water	SB-P6-QA336_13-18
FA59818-19	11/29/18	14:30 BPAW	12/01/18	AQ	Ground Water	SB-P6-QA336_30-35
FA59818-20	11/29/18	15:00 BPAW	12/01/18	AQ	Ground Water	SB-P6-NS335_11-16
FA59818-21	11/29/18	00:00 BPAW	12/01/18	AQ	Ground Water	DUP-04_112918
FA59818-22	11/29/18	15:40 BPAW	12/01/18	AQ	Ground Water	SB-P6-MK335_28-33
FA59818-23	11/29/18	15:55 BPAW	12/01/18	AQ	Ground Water	SB-P6-MK335_9-14
FA59818-24	11/30/18	10:00 BPAW	12/01/18	AQ	Ground Water	SB-P6-QH240_15-20



Sample Summary

(continued)

Arcadis

Job No: FA59818

Racer Lansing PFAS Delineation; Lansing, MI

Project No: B0064479.2018.03100

Sample Number	Collected Date	Time By	Received	Matrix Code	Type	Client Sample ID
FA59818-25	11/30/18	10:35	BPAW 12/01/18	AQ	Ground Water	SB-P6-QT226_13-18
FA59818-26	11/30/18	11:15	BPAW 12/01/18	AQ	Ground Water	SB-P6-RH241_13-18
FA59818-26D	11/30/18	11:15	BPAW 12/01/18	AQ	Water Dup/MSD	SB-P6-RH241_13-18
FA59818-26S	11/30/18	11:15	BPAW 12/01/18	AQ	Water Matrix Spike	SB-P6-RH241_13-18
FA59818-27	11/30/18	11:50	BPAW 12/01/18	AQ	Ground Water	SB-P6-QT239_15-20
FA59818-28	11/30/18	12:35	BPAW 12/01/18	AQ	Ground Water	SB-P6-MQ289_27-32
FA59818-29	11/30/18	13:00	BPAW 12/01/18	AQ	Equipment Blank	EB-02_113018

Summary of Hits

Job Number: FA59818
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 11/28/18 thru 11/30/18

Lab Sample ID	Client Sample ID	Result/ Analyte	Qual	RL	MDL	Units	Method
FA59818-1	SB-P6-MF321_15-20						
		Perfluorobutanoic acid	0.00617 J	0.0080	0.0020	ug/l	EPA 537M BY ID
		Perfluoropentanoic acid	0.00536	0.0040	0.0015	ug/l	EPA 537M BY ID
		Perfluorohexanoic acid	0.00557	0.0040	0.0010	ug/l	EPA 537M BY ID
		Perfluoroheptanoic acid	0.00427	0.0040	0.0010	ug/l	EPA 537M BY ID
		Perfluorooctanoic acid	0.0142	0.0040	0.0010	ug/l	EPA 537M BY ID
		Perfluorobutanesulfonic acid	0.00138 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		Perfluorohexanesulfonic acid	0.00154 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		Perfluorooctanesulfonic acid	0.00297 J	0.0040	0.0015	ug/l	EPA 537M BY ID
FA59818-2	SB-P6-MF311_20-25						
		Perfluorobutanoic acid	0.0251	0.0080	0.0020	ug/l	EPA 537M BY ID
		Perfluoropentanoic acid	0.0491	0.0040	0.0015	ug/l	EPA 537M BY ID
		Perfluorohexanoic acid	0.0372	0.0040	0.0010	ug/l	EPA 537M BY ID
		Perfluoroheptanoic acid	0.0133	0.0040	0.0010	ug/l	EPA 537M BY ID
		Perfluorooctanoic acid	0.00725	0.0040	0.0010	ug/l	EPA 537M BY ID
FA59818-3	DUP-02_112818						
		Perfluorobutanoic acid	0.0247	0.0080	0.0020	ug/l	EPA 537M BY ID
		Perfluoropentanoic acid	0.0480	0.0040	0.0015	ug/l	EPA 537M BY ID
		Perfluorohexanoic acid	0.0365	0.0040	0.0010	ug/l	EPA 537M BY ID
		Perfluoroheptanoic acid	0.0130	0.0040	0.0010	ug/l	EPA 537M BY ID
		Perfluorooctanoic acid	0.00624	0.0040	0.0010	ug/l	EPA 537M BY ID
FA59818-4	SB-P6-MF311_8-13						
		Perfluorobutanoic acid	0.0233	0.0083	0.0021	ug/l	EPA 537M BY ID
		Perfluoropentanoic acid	0.0533	0.0042	0.0016	ug/l	EPA 537M BY ID
		Perfluorohexanoic acid	0.0476	0.0042	0.0010	ug/l	EPA 537M BY ID
		Perfluoroheptanoic acid	0.0200	0.0042	0.0010	ug/l	EPA 537M BY ID
		Perfluorooctanoic acid	0.0114	0.0042	0.0010	ug/l	EPA 537M BY ID
		Perfluorobutanesulfonic acid	0.00123 J	0.0042	0.0010	ug/l	EPA 537M BY ID
		Perfluorohexanesulfonic acid	0.00121 J	0.0042	0.0010	ug/l	EPA 537M BY ID
		Perfluorooctanesulfonic acid	0.00301 J	0.0042	0.0016	ug/l	EPA 537M BY ID
FA59818-5	SB-P6-MF301_20-25						
		Perfluorobutanoic acid	0.0117	0.0080	0.0020	ug/l	EPA 537M BY ID
		Perfluoropentanoic acid	0.0117	0.0040	0.0015	ug/l	EPA 537M BY ID
		Perfluorohexanoic acid	0.00715	0.0040	0.0010	ug/l	EPA 537M BY ID
		Perfluoroheptanoic acid	0.00183 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		Perfluorooctanoic acid	0.00161 J	0.0040	0.0010	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA59818
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 11/28/18 thru 11/30/18

Lab Sample ID	Client Sample ID	Result/ Analyte	RL	MDL	Units	Method
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FA59818-6 SB-P6-MF301_3-8

Perfluorobutanoic acid	0.0183	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid	0.0203	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid	0.0217	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid	0.0141	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid	0.0238	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid	0.00133 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid	0.00178 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid	0.00103 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid	0.00408	0.0040	0.0015	ug/l	EPA 537M BY ID

FA59818-7 SB-P6-MF293_20-25

Perfluorobutanoic acid	0.0200	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid	0.0341	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid	0.0410	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid	0.0165	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid	0.0415	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid	0.00140 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid	0.00203 J	0.0040	0.0010	ug/l	EPA 537M BY ID

FA59818-8 SB-P6-MF293_3-8

Perfluorobutanoic acid	0.0199	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid	0.0315	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid	0.0381	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid	0.0157	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid	0.0504	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid	0.00264 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid	0.00223 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid	0.00462	0.0040	0.0015	ug/l	EPA 537M BY ID

FA59818-9 SB-P6-OS335_18.5-23.5

Perfluorobutanoic acid	0.00705 J	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid	0.00651	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid	0.00579	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid	0.00283 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid	0.00731	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid	0.00154 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid	0.00112 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid	0.00841	0.0040	0.0015	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA59818
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 11/28/18 thru 11/30/18

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Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
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FA59818-10 SB-P6-OH322_10-15

Perfluorobutanoic acid	0.0276	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid	0.0500	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid	0.0467	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid	0.0460	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid	0.0688	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid	0.00720	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid	0.00332 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid	0.00488	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid	0.00554	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid	0.0195	0.0040	0.0015	ug/l	EPA 537M BY ID

FA59818-11 SB-P6-OH322_15-20

Perfluorobutanoic acid	0.0211	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid	0.0346	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid	0.0342	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid	0.0293	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid	0.0396	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid	0.00549	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid	0.00536	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid	0.00409	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid	0.00410	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid	0.0161	0.0040	0.0015	ug/l	EPA 537M BY ID

FA59818-12 VERLINDEN-MH-2_112918

Perfluorobutanoic acid	0.0203	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid	0.0292	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid	0.0299	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid	0.0284	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid	0.0485	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid	0.00621	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid	0.00378 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid	0.00358 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid	0.00239 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid	0.0227	0.0040	0.0015	ug/l	EPA 537M BY ID
PFOSA	0.00225 J	0.0040	0.0010	ug/l	EPA 537M BY ID

FA59818-13 VERLINDEN-MH-3_112918

Perfluorobutanoic acid	0.0168	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid	0.0267	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid	0.0244	0.0040	0.0010	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA59818
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 11/28/18 thru 11/30/18

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
		0.0223	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.0384	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00447	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00255 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00548	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00244 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.0174	0.0040	0.0015	ug/l	EPA 537M BY ID
		0.00154 J	0.0040	0.0010	ug/l	EPA 537M BY ID

FA59818-14 VERLINDEN-MH-4_112918

		0.0178	0.0080	0.0020	ug/l	EPA 537M BY ID
		0.0268	0.0040	0.0015	ug/l	EPA 537M BY ID
		0.0252	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.0211	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.0403	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00446	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00310 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00617	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00303 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.0182	0.0040	0.0015	ug/l	EPA 537M BY ID
		0.00155 J	0.0040	0.0010	ug/l	EPA 537M BY ID

FA59818-15 DUP-03_112918

		0.0199	0.0080	0.0020	ug/l	EPA 537M BY ID
		0.0284	0.0040	0.0015	ug/l	EPA 537M BY ID
		0.0279	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.0255	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.0449	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00506	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00272 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00514	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00321 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.0206	0.0040	0.0015	ug/l	EPA 537M BY ID
		0.00173 J	0.0040	0.0010	ug/l	EPA 537M BY ID

FA59818-16 VERLINDEN-MH-1_112918

		0.0263	0.0080	0.0020	ug/l	EPA 537M BY ID
		0.0293	0.0040	0.0015	ug/l	EPA 537M BY ID
		0.0319	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.0327	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.0487	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00623	0.0040	0.0010	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA59818
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 11/28/18 thru 11/30/18

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
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Perfluorodecanoic acid		0.00618	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00470	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00182 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.0188	0.0040	0.0015	ug/l	EPA 537M BY ID
PFOSA		0.00270 J	0.0040	0.0010	ug/l	EPA 537M BY ID

FA59818-17 OSBORN-MH-1_112918

Perfluorobutanoic acid		0.0219	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0282	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0264	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0270	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0532	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00811	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00775	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00278 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00186 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.0470	0.0040	0.0015	ug/l	EPA 537M BY ID
PFOSA		0.00339 J	0.0040	0.0010	ug/l	EPA 537M BY ID

FA59818-18 SB-P6-QA336_13-18

Perfluorobutanoic acid		0.00546 J	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.00671	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.00591	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.00343 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.00981	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00281 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00477	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.00265 J	0.0040	0.0015	ug/l	EPA 537M BY ID

FA59818-19 SB-P6-QA336_30-35

Perfluorobutanoic acid		0.00835 J	0.020	0.0050	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0101	0.010	0.0038	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.00678 J	0.010	0.0025	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.00476 J	0.010	0.0025	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0111	0.010	0.0025	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00292 J	0.010	0.0025	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00286 J	0.010	0.0025	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.00393 J	0.010	0.0038	ug/l	EPA 537M BY ID

FA59818-20 SB-P6-NS335_11-16

Perfluorobutanesulfonic acid		0.00211 J	0.0040	0.0010	ug/l	EPA 537M BY ID
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Summary of Hits

Job Number: FA59818
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 11/28/18 thru 11/30/18

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
		0.00118 J	0.0040	0.0010	ug/l	EPA 537M BY ID
FA59818-21	DUP-04_112918					
		0.00239 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00147 J	0.0040	0.0010	ug/l	EPA 537M BY ID
FA59818-22	SB-P6-MK335_28-33					
		0.00109 J	0.0040	0.0010	ug/l	EPA 537M BY ID
FA59818-23	SB-P6-MK335_9-14					
		0.00155 J	0.0040	0.0015	ug/l	EPA 537M BY ID
		0.00113 J	0.0040	0.0010	ug/l	EPA 537M BY ID
FA59818-24	SB-P6-QH240_15-20					
		0.0193	0.015	0.0038	ug/l	EPA 537M BY ID
		0.0209	0.0077	0.0029	ug/l	EPA 537M BY ID
		0.0211	0.0077	0.0019	ug/l	EPA 537M BY ID
		0.0247	0.0077	0.0019	ug/l	EPA 537M BY ID
		0.0776	0.0077	0.0019	ug/l	EPA 537M BY ID
		0.00994	0.0077	0.0019	ug/l	EPA 537M BY ID
		0.00785	0.0077	0.0019	ug/l	EPA 537M BY ID
		0.105	0.0077	0.0029	ug/l	EPA 537M BY ID
		0.00824	0.0077	0.0019	ug/l	EPA 537M BY ID
FA59818-25	SB-P6-QT226_13-18					
		0.0202	0.017	0.0042	ug/l	EPA 537M BY ID
		0.0306	0.0083	0.0031	ug/l	EPA 537M BY ID
		0.0218	0.0083	0.0021	ug/l	EPA 537M BY ID
		0.00912	0.0083	0.0021	ug/l	EPA 537M BY ID
		0.0122	0.0083	0.0021	ug/l	EPA 537M BY ID
FA59818-26	SB-P6-RH241_13-18					
		0.0486	0.017	0.0042	ug/l	EPA 537M BY ID
		0.108	0.0083	0.0031	ug/l	EPA 537M BY ID
		0.107	0.0083	0.0021	ug/l	EPA 537M BY ID
		0.0793	0.0083	0.0021	ug/l	EPA 537M BY ID
		0.253	0.0083	0.0021	ug/l	EPA 537M BY ID
		0.0181	0.0083	0.0021	ug/l	EPA 537M BY ID
		0.00270 J	0.0083	0.0021	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA59818
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 11/28/18 thru 11/30/18

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
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Perfluorohexanesulfonic acid		0.00449 J	0.0083	0.0021	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.0169	0.0083	0.0031	ug/l	EPA 537M BY ID

FA59818-27 SB-P6-QT239_15-20

Perfluorobutanoic acid		0.100	0.017	0.0042	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.368	0.0083	0.0031	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.350	0.0083	0.0021	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.332	0.0083	0.0021	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.449	0.0083	0.0021	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.0996	0.0083	0.0021	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.0441	0.0083	0.0021	ug/l	EPA 537M BY ID
Perfluoroundecanoic acid		0.00294 J	0.0083	0.0021	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00260 J	0.0083	0.0021	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.0391	0.0083	0.0031	ug/l	EPA 537M BY ID

FA59818-28 SB-P6-MQ289_27-32

Perfluorobutanoic acid		0.0154 J	0.017	0.0042	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0195	0.0083	0.0031	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0302	0.0083	0.0021	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0126	0.0083	0.0021	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0288	0.0083	0.0021	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.00802 J	0.0083	0.0031	ug/l	EPA 537M BY ID

FA59818-29 EB-02_113018

No hits reported in this sample.

(a) Associated ID Standard outside control limits.

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID: SB-P6-MF321_15-20	Date Sampled: 11/28/18
Lab Sample ID: FA59818-1	Date Received: 12/01/18
Matrix: AQ - Ground Water	Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD	
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24787.D	1	12/10/18 14:21	NG	12/06/18 10:00	OP72913	S2Q385
Run #2							

Run #	Initial Volume	Final Volume
Run #1	250 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.00617	0.0080	0.0020	ug/l	J
2706-90-3	Perfluoropentanoic acid	0.00536	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.00557	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.00427	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0142	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00138	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00154	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.00297	0.0040	0.0015	ug/l	J
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-MF321_15-20	
Lab Sample ID: FA59818-1	Date Sampled: 11/28/18
Matrix: AQ - Ground Water	Date Received: 12/01/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	85%		30-140%
	13C5-PFPeA	92%		40-140%
	13C5-PFHxA	95%		50-150%
	13C4-PFHpA	96%		50-150%
	13C8-PFOA	106%		50-150%
	13C9-PFNA	110%		50-150%
	13C6-PFDA	123%		50-150%
	13C7-PFUnDA	103%		50-150%
	13C2-PFDoDA	84%		50-150%
	13C2-PFTeDA	96%		40-150%
	13C3-PFBS	85%		50-150%
	13C3-PFHxS	89%		50-150%
	13C8-PFOS	98%		50-150%
	13C8-FOSA	108%		30-140%
	d3-MeFOSAA	104%		50-150%
	13C2-4:2FTS	92%		50-150%
	13C2-6:2FTS	100%		50-150%
	13C2-8:2FTS	128%		50-150%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-MF311_20-25		Date Sampled: 11/28/18
Lab Sample ID: FA59818-2		Date Received: 12/01/18
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	80%		30-140%
	13C5-PFPeA	81%		40-140%
	13C5-PFHxA	83%		50-150%
	13C4-PFHpA	88%		50-150%
	13C8-PFOA	97%		50-150%
	13C9-PFNA	89%		50-150%
	13C6-PFDA	81%		50-150%
	13C7-PFUnDA	66%		50-150%
	13C2-PFDoDA	60%		50-150%
	13C2-PFTeDA	66%		40-150%
	13C3-PFBS	81%		50-150%
	13C3-PFHxS	86%		50-150%
	13C8-PFOS	84%		50-150%
	13C8-FOSA	109%		30-140%
	d3-MeFOSAA	92%		50-150%
	13C2-4:2FTS	85%		50-150%
	13C2-6:2FTS	98%		50-150%
	13C2-8:2FTS	84%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: DUP-02_112818	Date Sampled: 11/28/18
Lab Sample ID: FA59818-3	Date Received: 12/01/18
Matrix: AQ - Ground Water	Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD	
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #1	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #2	2Q24742.D	1	12/08/18 13:19	NG	12/06/18 10:00	OP72913	S2Q384

Run #1	Initial Volume	Final Volume
Run #2	250 ml	1.0 ml

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0247	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0480	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0365	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0130	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.00624	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid ^a	ND	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: DUP-02_112818		Date Sampled: 11/28/18
Lab Sample ID: FA59818-3		Date Received: 12/01/18
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	76%		30-140%
	13C5-PFPeA	77%		40-140%
	13C5-PFHxA	79%		50-150%
	13C4-PFHpA	84%		50-150%
	13C8-PFOA	90%		50-150%
	13C9-PFNA	88%		50-150%
	13C6-PFDA	86%		50-150%
	13C7-PFUnDA	73%		50-150%
	13C2-PFDoDA	67%		50-150%
	13C2-PFTeDA	71%		40-150%
	13C3-PFBS	78%		50-150%
	13C3-PFHxS	81%		50-150%
	13C8-PFOS	85%		50-150%
	13C8-FOSA	112%		30-140%
	d3-MeFOSAA	100%		50-150%
	13C2-4:2FTS	81%		50-150%
	13C2-6:2FTS	93%		50-150%
	13C2-8:2FTS	89%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

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Client Sample ID:	SB-P6-MF311_8-13	Date Sampled:	11/28/18
Lab Sample ID:	FA59818-4	Date Received:	12/01/18
Matrix:	AQ - Ground Water	Percent Solids:	n/a
Method:	EPA 537M BY ID EPA 537 MOD		
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24743.D	1	12/08/18 13:36	NG	12/06/18 10:00	OP72913	S2Q384
Run #2							

Run #	Initial Volume	Final Volume
Run #1	240 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0233	0.0083	0.0021	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0533	0.0042	0.0016	ug/l	
307-24-4	Perfluorohexanoic acid	0.0476	0.0042	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0200	0.0042	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0114	0.0042	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0042	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0042	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0042	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0042	0.0016	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0042	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0042	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00123	0.0042	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0042	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00121	0.0042	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0042	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.00301	0.0042	0.0016	ug/l	J
68259-12-1	Perfluorononanesulfonic acid	ND	0.0042	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid ^a	ND	0.0042	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0042	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.021	0.0042	ug/l	
2991-50-6	EtFOSAA	ND	0.021	0.0042	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0083	0.0021	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0083	0.0021	ug/l	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-MF311_8-13		Date Sampled: 11/28/18
Lab Sample ID: FA59818-4		Date Received: 12/01/18
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0083	0.0021	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	87%		30-140%
	13C5-PFPeA	88%		40-140%
	13C5-PFHxA	91%		50-150%
	13C4-PFHpA	97%		50-150%
	13C8-PFOA	101%		50-150%
	13C9-PFNA	99%		50-150%
	13C6-PFDA	94%		50-150%
	13C7-PFUnDA	83%		50-150%
	13C2-PFDoDA	74%		50-150%
	13C2-PFTeDA	80%		40-150%
	13C3-PFBS	88%		50-150%
	13C3-PFHxS	93%		50-150%
	13C8-PFOS	95%		50-150%
	13C8-FOSA	125%		30-140%
	d3-MeFOSAA	112%		50-150%
	13C2-4:2FTS	93%		50-150%
	13C2-6:2FTS	104%		50-150%
	13C2-8:2FTS	99%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-MF301_20-25		
Lab Sample ID: FA59818-5		Date Sampled: 11/28/18
Matrix: AQ - Ground Water		Date Received: 12/01/18
Method: EPA 537M BY ID EPA 537 MOD		Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24744.D	1	12/08/18 13:52	NG	12/06/18 10:00	OP72913	S2Q384
Run #2							

Run #	Initial Volume	Final Volume
Run #1	250 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0117	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0117	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.00715	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.00183	0.0040	0.0010	ug/l	J
335-67-1	Perfluorooctanoic acid	0.00161	0.0040	0.0010	ug/l	J
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid ^a	ND	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-MF301_20-25		Date Sampled: 11/28/18
Lab Sample ID: FA59818-5		Date Received: 12/01/18
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	82%		30-140%
	13C5-PFPeA	84%		40-140%
	13C5-PFHxA	88%		50-150%
	13C4-PFHpA	92%		50-150%
	13C8-PFOA	98%		50-150%
	13C9-PFNA	97%		50-150%
	13C6-PFDA	91%		50-150%
	13C7-PFUnDA	75%		50-150%
	13C2-PFDoDA	66%		50-150%
	13C2-PFTeDA	72%		40-150%
	13C3-PFBS	83%		50-150%
	13C3-PFHxS	89%		50-150%
	13C8-PFOS	91%		50-150%
	13C8-FOSA	118%		30-140%
	d3-MeFOSAA	110%		50-150%
	13C2-4:2FTS	88%		50-150%
	13C2-6:2FTS	102%		50-150%
	13C2-8:2FTS	95%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-MF301_3-8	
Lab Sample ID: FA59818-6	Date Sampled: 11/28/18
Matrix: AQ - Ground Water	Date Received: 12/01/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	87%		30-140%
	13C5-PFPeA	89%		40-140%
	13C5-PFHxA	92%		50-150%
	13C4-PFHpA	97%		50-150%
	13C8-PFOA	102%		50-150%
	13C9-PFNA	105%		50-150%
	13C6-PFDA	100%		50-150%
	13C7-PFUnDA	83%		50-150%
	13C2-PFDoDA	71%		50-150%
	13C2-PFTeDA	73%		40-150%
	13C3-PFBS	88%		50-150%
	13C3-PFHxS	94%		50-150%
	13C8-PFOS	95%		50-150%
	13C8-FOSA	123%		30-140%
	d3-MeFOSAA	110%		50-150%
	13C2-4:2FTS	94%		50-150%
	13C2-6:2FTS	106%		50-150%
	13C2-8:2FTS	101%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-MF293_20-25		
Lab Sample ID: FA59818-7		Date Sampled: 11/28/18
Matrix: AQ - Ground Water		Date Received: 12/01/18
Method: EPA 537M BY ID EPA 537 MOD		Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24750.D	1	12/08/18 15:29	NG	12/06/18 10:00	OP72913	S2Q384
Run #2							

Run #	Initial Volume	Final Volume
Run #1	250 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0200	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0341	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0410	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0165	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0415	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00140	0.0040	0.0010	ug/l	J
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00203	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid ^a	ND	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-MF293_20-25		Date Sampled: 11/28/18
Lab Sample ID: FA59818-7		Date Received: 12/01/18
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	85%		30-140%
	13C5-PFPeA	89%		40-140%
	13C5-PFHxA	91%		50-150%
	13C4-PFHpA	99%		50-150%
	13C8-PFOA	102%		50-150%
	13C9-PFNA	105%		50-150%
	13C6-PFDA	106%		50-150%
	13C7-PFUnDA	90%		50-150%
	13C2-PFDoDA	73%		50-150%
	13C2-PFTeDA	76%		40-150%
	13C3-PFBS	88%		50-150%
	13C3-PFHxS	94%		50-150%
	13C8-PFOS	101%		50-150%
	13C8-FOSA	128%		30-140%
	d3-MeFOSAA	118%		50-150%
	13C2-4:2FTS	93%		50-150%
	13C2-6:2FTS	108%		50-150%
	13C2-8:2FTS	106%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis



Client Sample ID: SB-P6-MF293_3-8		Date Sampled: 11/28/18
Lab Sample ID: FA59818-8		Date Received: 12/01/18
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	78%		30-140%
	13C5-PFPeA	81%		40-140%
	13C5-PFHxA	85%		50-150%
	13C4-PFHpA	91%		50-150%
	13C8-PFOA	98%		50-150%
	13C9-PFNA	101%		50-150%
	13C6-PFDA	98%		50-150%
	13C7-PFUnDA	87%		50-150%
	13C2-PFDoDA	71%		50-150%
	13C2-PFTeDA	69%		40-150%
	13C3-PFBS	82%		50-150%
	13C3-PFHxS	88%		50-150%
	13C8-PFOS	91%		50-150%
	13C8-FOSA	119%		30-140%
	d3-MeFOSAA	108%		50-150%
	13C2-4:2FTS	88%		50-150%
	13C2-6:2FTS	102%		50-150%
	13C2-8:2FTS	99%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-OS335_18.5-23.5	
Lab Sample ID: FA59818-9	Date Sampled: 11/28/18
Matrix: AQ - Ground Water	Date Received: 12/01/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	91%		30-140%
	13C5-PFPeA	92%		40-140%
	13C5-PFHxA	95%		50-150%
	13C4-PFHpA	100%		50-150%
	13C8-PFOA	108%		50-150%
	13C9-PFNA	102%		50-150%
	13C6-PFDA	89%		50-150%
	13C7-PFUnDA	67%		50-150%
	13C2-PFDoDA	55%		50-150%
	13C2-PFTeDA	58%		40-150%
	13C3-PFBS	92%		50-150%
	13C3-PFHxS	95%		50-150%
	13C8-PFOS	90%		50-150%
	13C8-FOSA	122%		30-140%
	d3-MeFOSAA	95%		50-150%
	13C2-4:2FTS	97%		50-150%
	13C2-6:2FTS	109%		50-150%
	13C2-8:2FTS	94%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-OH322_10-15		Date Sampled: 11/28/18
Lab Sample ID: FA59818-10		Date Received: 12/01/18
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	68%		30-140%
	13C5-PFPeA	73%		40-140%
	13C5-PFHxA	73%		50-150%
	13C4-PFHpA	78%		50-150%
	13C8-PFOA	87%		50-150%
	13C9-PFNA	91%		50-150%
	13C6-PFDA	88%		50-150%
	13C7-PFUnDA	81%		50-150%
	13C2-PFDoDA	63%		50-150%
	13C2-PFTeDA	66%		40-150%
	13C3-PFBS	76%		50-150%
	13C3-PFHxS	80%		50-150%
	13C8-PFOS	85%		50-150%
	13C8-FOSA	59%		30-140%
	d3-MeFOSAA	104%		50-150%
	13C2-4:2FTS	87%		50-150%
	13C2-6:2FTS	97%		50-150%
	13C2-8:2FTS	90%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

3.11
3

Client Sample ID: SB-P6-OH322_15-20	
Lab Sample ID: FA59818-11	Date Sampled: 11/28/18
Matrix: AQ - Ground Water	Date Received: 12/01/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24754.D	1	12/08/18 16:34	NG	12/06/18 10:00	OP72913	S2Q384
Run #2							

Run #	Initial Volume	Final Volume
Run #1	250 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0211	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0346	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0342	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0293	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0396	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00549	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	0.00536	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00409	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00410	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0161	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid ^a	ND	0.0040	0.0010	ug/l	
PERFLUOROCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-OH322_15-20	
Lab Sample ID: FA59818-11	Date Sampled: 11/28/18
Matrix: AQ - Ground Water	Date Received: 12/01/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	69%		30-140%
	13C5-PFPeA	74%		40-140%
	13C5-PFHxA	75%		50-150%
	13C4-PFHpA	79%		50-150%
	13C8-PFOA	87%		50-150%
	13C9-PFNA	93%		50-150%
	13C6-PFDA	89%		50-150%
	13C7-PFUnDA	77%		50-150%
	13C2-PFDoDA	67%		50-150%
	13C2-PFTeDA	61%		40-150%
	13C3-PFBS	75%		50-150%
	13C3-PFHxS	81%		50-150%
	13C8-PFOS	84%		50-150%
	13C8-FOSA	67%		30-140%
	d3-MeFOSAA	97%		50-150%
	13C2-4:2FTS	87%		50-150%
	13C2-6:2FTS	97%		50-150%
	13C2-8:2FTS	89%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: VERLINDEN-MH-2_112918		Date Sampled: 11/29/18
Lab Sample ID: FA59818-12		Date Received: 12/01/18
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	80%		30-140%
	13C5-PFPeA	83%		40-140%
	13C5-PFHxA	83%		50-150%
	13C4-PFHpA	87%		50-150%
	13C8-PFOA	94%		50-150%
	13C9-PFNA	95%		50-150%
	13C6-PFDA	97%		50-150%
	13C7-PFUnDA	80%		50-150%
	13C2-PFDoDA	80%		50-150%
	13C2-PFTeDA	85%		40-150%
	13C3-PFBS	82%		50-150%
	13C3-PFHxS	85%		50-150%
	13C8-PFOS	91%		50-150%
	13C8-FOSA	71%		30-140%
	d3-MeFOSAA	121%		50-150%
	13C2-4:2FTS	92%		50-150%
	13C2-6:2FTS	102%		50-150%
	13C2-8:2FTS	97%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: VERLINDEN-MH-3_112918	Date Sampled: 11/29/18
Lab Sample ID: FA59818-13	Date Received: 12/01/18
Matrix: AQ - Ground Water	Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD	
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24756.D	1	12/08/18 17:07	NG	12/06/18 10:00	OP72913	S2Q384
Run #2							

Run #	Initial Volume	Final Volume
Run #1	250 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0168	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0267	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0244	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0223	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0384	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00447	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	0.00255	0.0040	0.0010	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00548	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00244	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0174	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid ^a	ND	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	0.00154	0.0040	0.0010	ug/l	J
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: VERLINDEN-MH-3_112918		Date Sampled: 11/29/18
Lab Sample ID: FA59818-13		Date Received: 12/01/18
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	83%		30-140%
	13C5-PFPeA	85%		40-140%
	13C5-PFHxA	86%		50-150%
	13C4-PFHpA	89%		50-150%
	13C8-PFOA	94%		50-150%
	13C9-PFNA	97%		50-150%
	13C6-PFDA	92%		50-150%
	13C7-PFUnDA	73%		50-150%
	13C2-PFDoDA	63%		50-150%
	13C2-PFTeDA	69%		40-150%
	13C3-PFBS	85%		50-150%
	13C3-PFHxS	86%		50-150%
	13C8-PFOS	88%		50-150%
	13C8-FOSA	78%		30-140%
	d3-MeFOSAA	104%		50-150%
	13C2-4:2FTS	92%		50-150%
	13C2-6:2FTS	102%		50-150%
	13C2-8:2FTS	92%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	VERLINDEN-MH-4_112918		
Lab Sample ID:	FA59818-14	Date Sampled:	11/29/18
Matrix:	AQ - Ground Water	Date Received:	12/01/18
Method:	EPA 537M BY ID EPA 537 MOD	Percent Solids:	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24788.D	1	12/10/18 14:36	NG	12/06/18 10:00	OP72913	S2Q385
Run #2							

Run #	Initial Volume	Final Volume
Run #1	250 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0178	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0268	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0252	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0211	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0403	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00446	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	0.00310	0.0040	0.0010	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00617	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00303	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0182	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	0.00155	0.0040	0.0010	ug/l	J
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

ND = Not detected

MDL = Method Detection Limit

J = Indicates an estimated value

RL = Reporting Limit

B = Indicates analyte found in associated method blank

E = Indicates value exceeds calibration range

N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: VERLINDEN-MH-4_112918		Date Sampled: 11/29/18
Lab Sample ID: FA59818-14		Date Received: 12/01/18
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	90%		30-140%
	13C5-PFPeA	97%		40-140%
	13C5-PFHxA	101%		50-150%
	13C4-PFHpA	105%		50-150%
	13C8-PFOA	116%		50-150%
	13C9-PFNA	123%		50-150%
	13C6-PFDA	113%		50-150%
	13C7-PFUnDA	90%		50-150%
	13C2-PFDoDA	71%		50-150%
	13C2-PFTeDA	62%		40-150%
	13C3-PFBS	90%		50-150%
	13C3-PFHxS	93%		50-150%
	13C8-PFOS	102%		50-150%
	13C8-FOSA	114%		30-140%
	d3-MeFOSAA	86%		50-150%
	13C2-4:2FTS	99%		50-150%
	13C2-6:2FTS	116%		50-150%
	13C2-8:2FTS	112%		50-150%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: DUP-03_112918		Date Sampled: 11/29/18
Lab Sample ID: FA59818-15		Date Received: 12/01/18
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	78%		30-140%
	13C5-PFPeA	75%		40-140%
	13C5-PFHxA	79%		50-150%
	13C4-PFHpA	84%		50-150%
	13C8-PFOA	98%		50-150%
	13C9-PFNA	99%		50-150%
	13C6-PFDA	100%		50-150%
	13C7-PFUnDA	94%		50-150%
	13C2-PFDoDA	90%		50-150%
	13C2-PFTeDA	90%		40-150%
	13C3-PFBS	76%		50-150%
	13C3-PFHxS	81%		50-150%
	13C8-PFOS	83%		50-150%
	13C8-FOSA	60%		30-140%
	d3-MeFOSAA	93%		50-150%
	13C2-4:2FTS	78%		50-150%
	13C2-6:2FTS	102%		50-150%
	13C2-8:2FTS	110%		50-150%

(a) Associated BS recovery outside DOD QSM control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: VERLINDEN-MH-1_112918		Date Sampled: 11/29/18
Lab Sample ID: FA59818-16		Date Received: 12/01/18
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	29% ^e	23% ^d	30-140%
	13C5-PFPeA	72%	70%	40-140%
	13C5-PFHxA	70%	70%	50-150%
	13C4-PFHpA	75%	74%	50-150%
	13C8-PFOA	79%	99%	50-150%
	13C9-PFNA	83%	91%	50-150%
	13C6-PFDA	72%	83%	50-150%
	13C7-PFUnDA	56%	101%	50-150%
	13C2-PFDoDA	54%	94%	50-150%
	13C2-PFTeDA	58%	30% ^d	40-150%
	13C3-PFBS	72%	71%	50-150%
	13C3-PFHxS	73%	73%	50-150%
	13C8-PFOS	72%	70%	50-150%
	13C8-FOSA	50%	30%	30-140%
	d3-MeFOSAA	96%	75%	50-150%
	13C2-4:2FTS	81%	73%	50-150%
	13C2-6:2FTS	91%	124%	50-150%
	13C2-8:2FTS	75%	87%	50-150%

- (a) Confirmation run for internal standard areas.
- (b) Associated ID Standard outside control limits.
- (c) Associated BS recovery outside control limits.
- (d) Outside control limits.
- (e) Outside control limits due to matrix interference. Confirmed by re-extraction and reanalysis.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	OSBORN-MH-1_112918	Date Sampled:	11/29/18
Lab Sample ID:	FA59818-17	Date Received:	12/01/18
Matrix:	AQ - Ground Water	Percent Solids:	n/a
Method:	EPA 537M BY ID EPA 537 MOD		
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	79%		30-140%
	13C5-PFPeA	83%		40-140%
	13C5-PFHxA	84%		50-150%
	13C4-PFHpA	87%		50-150%
	13C8-PFOA	91%		50-150%
	13C9-PFNA	95%		50-150%
	13C6-PFDA	90%		50-150%
	13C7-PFUnDA	69%		50-150%
	13C2-PFDoDA	59%		50-150%
	13C2-PFTeDA	62%		40-150%
	13C3-PFBS	83%		50-150%
	13C3-PFHxS	87%		50-150%
	13C8-PFOS	85%		50-150%
	13C8-FOSA	68%		30-140%
	d3-MeFOSAA	110%		50-150%
	13C2-4:2FTS	94%		50-150%
	13C2-6:2FTS	102%		50-150%
	13C2-8:2FTS	91%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-QA336_13-18		Date Sampled: 11/29/18
Lab Sample ID: FA59818-18		Date Received: 12/01/18
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	84%		30-140%
	13C5-PFPeA	85%		40-140%
	13C5-PFHxA	88%		50-150%
	13C4-PFHpA	93%		50-150%
	13C8-PFOA	96%		50-150%
	13C9-PFNA	95%		50-150%
	13C6-PFDA	94%		50-150%
	13C7-PFUnDA	82%		50-150%
	13C2-PFDoDA	70%		50-150%
	13C2-PFTeDA	76%		40-150%
	13C3-PFBS	85%		50-150%
	13C3-PFHxS	90%		50-150%
	13C8-PFOS	93%		50-150%
	13C8-FOSA	115%		30-140%
	d3-MeFOSAA	114%		50-150%
	13C2-4:2FTS	90%		50-150%
	13C2-6:2FTS	101%		50-150%
	13C2-8:2FTS	97%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-QA336_30-35	
Lab Sample ID: FA59818-19	Date Sampled: 11/29/18
Matrix: AQ - Ground Water	Date Received: 12/01/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.020	0.0050	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	90%		30-140%
	13C5-PFPeA	89%		40-140%
	13C5-PFHxA	91%		50-150%
	13C4-PFHpA	94%		50-150%
	13C8-PFOA	99%		50-150%
	13C9-PFNA	98%		50-150%
	13C6-PFDA	94%		50-150%
	13C7-PFUnDA	74%		50-150%
	13C2-PFDoDA	62%		50-150%
	13C2-PFTeDA	71%		40-150%
	13C3-PFBS	89%		50-150%
	13C3-PFHxS	92%		50-150%
	13C8-PFOS	89%		50-150%
	13C8-FOSA	124%		30-140%
	d3-MeFOSAA	104%		50-150%
	13C2-4:2FTS	94%		50-150%
	13C2-6:2FTS	98%		50-150%
	13C2-8:2FTS	97%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SB-P6-NS335_11-16	Date Sampled:	11/29/18
Lab Sample ID:	FA59818-20	Date Received:	12/01/18
Matrix:	AQ - Ground Water	Percent Solids:	n/a
Method:	EPA 537M BY ID EPA 537 MOD		
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24713.D	1	12/08/18 05:29	NG	12/05/18 10:00	OP72896	S2Q384
Run #2 ^a	2Q24991.D	1	12/13/18 16:24	NAF	12/12/18 11:00	OP73004	S2Q388

Run #	Initial Volume	Final Volume
Run #1	250 ml	1.0 ml
Run #2	250 ml	1.0 ml

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid ^b	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid ^b	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00211	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00118	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid ^c	ND	0.0040	0.0010	ug/l	
PERFLUOROCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

ND = Not detected

MDL = Method Detection Limit

J = Indicates an estimated value

RL = Reporting Limit

B = Indicates analyte found in associated method blank

E = Indicates value exceeds calibration range

N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-NS335_11-16	
Lab Sample ID: FA59818-20	Date Sampled: 11/29/18
Matrix: AQ - Ground Water	Date Received: 12/01/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	72%	71%	30-140%
	13C5-PFPeA	73%	68%	40-140%
	13C5-PFHxA	77%	77%	50-150%
	13C4-PFHpA	81%	84%	50-150%
	13C8-PFOA	86%	103%	50-150%
	13C9-PFNA	88%	106%	50-150%
	13C6-PFDA	73%	84%	50-150%
	13C7-PFUnDA	59%	92%	50-150%
	13C2-PFDoDA	51%	82%	50-150%
	13C2-PFTeDA	30% ^e	32% ^d	40-150%
	13C3-PFBS	74%	68%	50-150%
	13C3-PFHxS	78%	77%	50-150%
	13C8-PFOS	69%	73%	50-150%
	13C8-FOSA	94%	78%	30-140%
	d3-MeFOSAA	78%	66%	50-150%
	13C2-4:2FTS	80%	68%	50-150%
	13C2-6:2FTS	113%	184% ^d	50-150%
	13C2-8:2FTS	78%	101%	50-150%

- (a) Confirmation run for internal standard areas.
- (b) Associated ID Standard outside control limits.
- (c) Associated BS recovery outside control limits.
- (d) Outside control limits.
- (e) Outside control limits due to matrix interference. Confirmed by re-extraction and reanalysis.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: DUP-04_112918		Date Sampled: 11/29/18
Lab Sample ID: FA59818-21		Date Received: 12/01/18
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	74%		30-140%
	13C5-PFPeA	73%		40-140%
	13C5-PFHxA	81%		50-150%
	13C4-PFHpA	88%		50-150%
	13C8-PFOA	113%		50-150%
	13C9-PFNA	112%		50-150%
	13C6-PFDA	96%		50-150%
	13C7-PFUnDA	105%		50-150%
	13C2-PFDoDA	90%		50-150%
	13C2-PFTeDA	40%		40-150%
	13C3-PFBS	76%		50-150%
	13C3-PFHxS	85%		50-150%
	13C8-PFOS	81%		50-150%
	13C8-FOSA	88%		30-140%
	d3-MeFOSAA	71%		50-150%
	13C2-4:2FTS	74%		50-150%
	13C2-6:2FTS	181% ^c		50-150%
	13C2-8:2FTS	107%		50-150%

- (a) Associated BS recovery outside DOD QSM control limits.
- (b) Associated ID Standard outside control limits high, however sample is ND.
- (c) Outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SB-P6-MK335_28-33	Date Sampled:	11/29/18
Lab Sample ID:	FA59818-22	Date Received:	12/01/18
Matrix:	AQ - Ground Water	Percent Solids:	n/a
Method:	EPA 537M BY ID EPA 537 MOD		
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24715.D	1	12/08/18 06:01	NG	12/05/18 10:00	OP72896	S2Q384
Run #2							

Run #	Initial Volume	Final Volume
Run #1	250 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.00109	0.0040	0.0010	ug/l	J
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid ^a	ND	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-MK335_28-33	
Lab Sample ID: FA59818-22	Date Sampled: 11/29/18
Matrix: AQ - Ground Water	Date Received: 12/01/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	90%		30-140%
	13C5-PFPeA	92%		40-140%
	13C5-PFHxA	92%		50-150%
	13C4-PFHpA	91%		50-150%
	13C8-PFOA	87%		50-150%
	13C9-PFNA	81%		50-150%
	13C6-PFDA	69%		50-150%
	13C7-PFUnDA	62%		50-150%
	13C2-PFDoDA	60%		50-150%
	13C2-PFTeDA	69%		40-150%
	13C3-PFBS	89%		50-150%
	13C3-PFHxS	82%		50-150%
	13C8-PFOS	64%		50-150%
	13C8-FOSA	84%		30-140%
	d3-MeFOSAA	84%		50-150%
	13C2-4:2FTS	95%		50-150%
	13C2-6:2FTS	86%		50-150%
	13C2-8:2FTS	72%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-MK335_9-14		Date Sampled: 11/29/18
Lab Sample ID: FA59818-23		Date Received: 12/01/18
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	87%		30-140%
	13C5-PFPeA	91%		40-140%
	13C5-PFHxA	94%		50-150%
	13C4-PFHpA	96%		50-150%
	13C8-PFOA	98%		50-150%
	13C9-PFNA	98%		50-150%
	13C6-PFDA	86%		50-150%
	13C7-PFUnDA	73%		50-150%
	13C2-PFDoDA	65%		50-150%
	13C2-PFTeDA	46%		40-150%
	13C3-PFBS	91%		50-150%
	13C3-PFHxS	84%		50-150%
	13C8-PFOS	85%		50-150%
	13C8-FOSA	121%		30-140%
	d3-MeFOSAA	98%		50-150%
	13C2-4:2FTS	97%		50-150%
	13C2-6:2FTS	117%		50-150%
	13C2-8:2FTS	94%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-QH240_15-20		
Lab Sample ID: FA59818-24		Date Sampled: 11/30/18
Matrix: AQ - Ground Water		Date Received: 12/01/18
Method: EPA 537M BY ID EPA 537 MOD		Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24993.D	1	12/13/18 16:55	NAF	12/12/18 11:00	OP73004	S2Q388
Run #2							

Run #	Initial Volume	Final Volume
Run #1	130 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0193	0.015	0.0038	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0209	0.0077	0.0029	ug/l	
307-24-4	Perfluorohexanoic acid	0.0211	0.0077	0.0019	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0247	0.0077	0.0019	ug/l	
335-67-1	Perfluorooctanoic acid	0.0776	0.0077	0.0019	ug/l	
375-95-1	Perfluorononanoic acid	0.00994	0.0077	0.0019	ug/l	
335-76-2	Perfluorodecanoic acid	0.00785	0.0077	0.0019	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0077	0.0019	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0077	0.0029	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0077	0.0019	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0077	0.0019	ug/l	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	0.0077	0.0019	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0077	0.0019	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0077	0.0019	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0077	0.0019	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.105	0.0077	0.0029	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0077	0.0019	ug/l	
335-77-3	Perfluorodecanesulfonic acid ^a	ND	0.0077	0.0019	ug/l	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	0.00824	0.0077	0.0019	ug/l	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.038	0.0077	ug/l	
2991-50-6	EtFOSAA	ND	0.038	0.0077	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-QH240_15-20		Date Sampled: 11/30/18
Lab Sample ID: FA59818-24		Date Received: 12/01/18
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	81%		30-140%
	13C5-PFPeA	76%		40-140%
	13C5-PFHxA	82%		50-150%
	13C4-PFHpA	89%		50-150%
	13C8-PFOA	107%		50-150%
	13C9-PFNA	113%		50-150%
	13C6-PFDA	116%		50-150%
	13C7-PFUnDA	111%		50-150%
	13C2-PFDODA	100%		50-150%
	13C2-PFTeDA	106%		40-150%
	13C3-PFBS	78%		50-150%
	13C3-PFHxS	88%		50-150%
	13C8-PFOS	97%		50-150%
	13C8-FOSA	97%		30-140%
	d3-MeFOSAA	102%		50-150%
	13C2-4:2FTS	77%		50-150%
	13C2-6:2FTS	114%		50-150%
	13C2-8:2FTS	121%		50-150%

(a) Associated BS recovery outside DOD QSM control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SB-P6-QT226_13-18	Date Sampled:	11/30/18
Lab Sample ID:	FA59818-25	Date Received:	12/01/18
Matrix:	AQ - Ground Water	Percent Solids:	n/a
Method:	EPA 537M BY ID EPA 537 MOD		
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24720.D	1	12/08/18 07:22	NG	12/05/18 10:00	OP72896	S2Q384
Run #2							

Run #	Initial Volume	Final Volume
Run #1	120 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0202	0.017	0.0042	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0306	0.0083	0.0031	ug/l	
307-24-4	Perfluorohexanoic acid	0.0218	0.0083	0.0021	ug/l	
375-85-9	Perfluoroheptanoic acid	0.00912	0.0083	0.0021	ug/l	
335-67-1	Perfluorooctanoic acid	0.0122	0.0083	0.0021	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0083	0.0021	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0083	0.0021	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0083	0.0021	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0083	0.0031	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0083	0.0021	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0083	0.0021	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	0.0083	0.0021	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0083	0.0021	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0083	0.0021	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0083	0.0021	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0083	0.0031	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0083	0.0021	ug/l	
335-77-3	Perfluorodecanesulfonic acid ^a	ND	0.0083	0.0021	ug/l	
PERFLUOROCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0083	0.0021	ug/l	
PERFLUOROCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.042	0.0083	ug/l	
2991-50-6	EtFOSAA	ND	0.042	0.0083	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.017	0.0042	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.017	0.0042	ug/l	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-QT226_13-18	
Lab Sample ID: FA59818-25	Date Sampled: 11/30/18
Matrix: AQ - Ground Water	Date Received: 12/01/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.017	0.0042	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	76%		30-140%
	13C5-PFPeA	75%		40-140%
	13C5-PFHxA	77%		50-150%
	13C4-PFHpA	81%		50-150%
	13C8-PFOA	83%		50-150%
	13C9-PFNA	85%		50-150%
	13C6-PFDA	84%		50-150%
	13C7-PFUnDA	61%		50-150%
	13C2-PFDoDA	51%		50-150%
	13C2-PFTeDA	75%		40-150%
	13C3-PFBS	78%		50-150%
	13C3-PFHxS	80%		50-150%
	13C8-PFOS	83%		50-150%
	13C8-FOSA	82%		30-140%
	d3-MeFOSAA	99%		50-150%
	13C2-4:2FTS	82%		50-150%
	13C2-6:2FTS	89%		50-150%
	13C2-8:2FTS	87%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-RH241_13-18	
Lab Sample ID: FA59818-26	Date Sampled: 11/30/18
Matrix: AQ - Ground Water	Date Received: 12/01/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24721.D	1	12/08/18 07:38	NG	12/05/18 10:00	OP72896	S2Q384
Run #2							

Run #	Initial Volume	Final Volume
Run #1	120 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0486	0.017	0.0042	ug/l	
2706-90-3	Perfluoropentanoic acid	0.108	0.0083	0.0031	ug/l	
307-24-4	Perfluorohexanoic acid	0.107	0.0083	0.0021	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0793	0.0083	0.0021	ug/l	
335-67-1	Perfluorooctanoic acid	0.253	0.0083	0.0021	ug/l	
375-95-1	Perfluorononanoic acid	0.0181	0.0083	0.0021	ug/l	
335-76-2	Perfluorodecanoic acid	0.00270	0.0083	0.0021	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.0083	0.0021	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0083	0.0031	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0083	0.0021	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0083	0.0021	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	0.0083	0.0021	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0083	0.0021	ug/l	
355-46-4	Perfluoroheptanesulfonic acid	0.00449	0.0083	0.0021	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0083	0.0021	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0169	0.0083	0.0031	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0083	0.0021	ug/l	
335-77-3	Perfluorodecanesulfonic acid ^a	ND	0.0083	0.0021	ug/l	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0083	0.0021	ug/l	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.042	0.0083	ug/l	
2991-50-6	EtFOSAA	ND	0.042	0.0083	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.017	0.0042	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.017	0.0042	ug/l	

ND = Not detected

MDL = Method Detection Limit

J = Indicates an estimated value

RL = Reporting Limit

B = Indicates analyte found in associated method blank

E = Indicates value exceeds calibration range

N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-RH241_13-18	
Lab Sample ID: FA59818-26	Date Sampled: 11/30/18
Matrix: AQ - Ground Water	Date Received: 12/01/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.017	0.0042	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	75%		30-140%
	13C5-PFPeA	76%		40-140%
	13C5-PFHxA	77%		50-150%
	13C4-PFHpA	79%		50-150%
	13C8-PFOA	81%		50-150%
	13C9-PFNA	81%		50-150%
	13C6-PFDA	74%		50-150%
	13C7-PFUnDA	66%		50-150%
	13C2-PFDoDA	59%		50-150%
	13C2-PFTeDA	71%		40-150%
	13C3-PFBS	77%		50-150%
	13C3-PFHxS	76%		50-150%
	13C8-PFOS	70%		50-150%
	13C8-FOSA	59%		30-140%
	d3-MeFOSAA	84%		50-150%
	13C2-4:2FTS	81%		50-150%
	13C2-6:2FTS	87%		50-150%
	13C2-8:2FTS	77%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-QT239_15-20	
Lab Sample ID: FA59818-27	Date Sampled: 11/30/18
Matrix: AQ - Ground Water	Date Received: 12/01/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #1	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24724.D	1	12/08/18 08:27	NG	12/05/18 10:00	OP72896	S2Q384
Run #2							

Run #1	Initial Volume	Final Volume
Run #1	120 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.100	0.017	0.0042	ug/l	
2706-90-3	Perfluoropentanoic acid	0.368	0.0083	0.0031	ug/l	
307-24-4	Perfluorohexanoic acid	0.350	0.0083	0.0021	ug/l	
375-85-9	Perfluoroheptanoic acid	0.332	0.0083	0.0021	ug/l	
335-67-1	Perfluorooctanoic acid	0.449	0.0083	0.0021	ug/l	
375-95-1	Perfluorononanoic acid	0.0996	0.0083	0.0021	ug/l	
335-76-2	Perfluorodecanoic acid	0.0441	0.0083	0.0021	ug/l	
2058-94-8	Perfluoroundecanoic acid	0.00294	0.0083	0.0021	ug/l	J
307-55-1	Perfluorododecanoic acid	ND	0.0083	0.0031	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0083	0.0021	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0083	0.0021	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00260	0.0083	0.0021	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0083	0.0021	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0083	0.0021	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0083	0.0021	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0391	0.0083	0.0031	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0083	0.0021	ug/l	
335-77-3	Perfluorodecanesulfonic acid ^a	ND	0.0083	0.0021	ug/l	
PERFLUOROCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0083	0.0021	ug/l	
PERFLUOROCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.042	0.0083	ug/l	
2991-50-6	EtFOSAA	ND	0.042	0.0083	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.017	0.0042	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.017	0.0042	ug/l	

ND = Not detected

MDL = Method Detection Limit

J = Indicates an estimated value

RL = Reporting Limit

B = Indicates analyte found in associated method blank

E = Indicates value exceeds calibration range

N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-QT239_15-20		Date Sampled: 11/30/18
Lab Sample ID: FA59818-27		Date Received: 12/01/18
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.017	0.0042	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	81%		30-140%
	13C5-PFPeA	80%		40-140%
	13C5-PFHxA	82%		50-150%
	13C4-PFHpA	84%		50-150%
	13C8-PFOA	89%		50-150%
	13C9-PFNA	84%		50-150%
	13C6-PFDA	79%		50-150%
	13C7-PFUnDA	64%		50-150%
	13C2-PFDoDA	59%		50-150%
	13C2-PFTeDA	69%		40-150%
	13C3-PFBS	83%		50-150%
	13C3-PFHxS	82%		50-150%
	13C8-PFOS	75%		50-150%
	13C8-FOSA	63%		30-140%
	d3-MeFOSAA	90%		50-150%
	13C2-4:2FTS	87%		50-150%
	13C2-6:2FTS	93%		50-150%
	13C2-8:2FTS	82%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-MQ289_27-32	
Lab Sample ID: FA59818-28	Date Sampled: 11/30/18
Matrix: AQ - Ground Water	Date Received: 12/01/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.017	0.0042	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	76%		30-140%
	13C5-PFPeA	78%		40-140%
	13C5-PFHxA	78%		50-150%
	13C4-PFHpA	81%		50-150%
	13C8-PFOA	74%		50-150%
	13C9-PFNA	80%		50-150%
	13C6-PFDA	71%		50-150%
	13C7-PFUnDA	60%		50-150%
	13C2-PFDoDA	56%		50-150%
	13C2-PFTeDA	64%		40-150%
	13C3-PFBS	77%		50-150%
	13C3-PFHxS	73%		50-150%
	13C8-PFOS	62%		50-150%
	13C8-FOSA	77%		30-140%
	d3-MeFOSAA	83%		50-150%
	13C2-4:2FTS	81%		50-150%
	13C2-6:2FTS	77%		50-150%
	13C2-8:2FTS	73%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: EB-02_113018		Date Sampled: 11/30/18
Lab Sample ID: FA59818-29		Date Received: 12/01/18
Matrix: AQ - Equipment Blank		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q24726.D	1	12/08/18 09:00	NG	12/05/18 10:00	OP72896	S2Q384
Run #2							

Run #	Initial Volume	Final Volume
Run #1	120 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND	0.017	0.0042	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0083	0.0031	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0083	0.0021	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0083	0.0021	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0083	0.0021	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0083	0.0021	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0083	0.0021	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0083	0.0021	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0083	0.0031	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0083	0.0021	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0083	0.0021	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	0.0083	0.0021	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0083	0.0021	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0083	0.0021	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0083	0.0021	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0083	0.0031	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0083	0.0021	ug/l	
335-77-3	Perfluorodecanesulfonic acid ^a	ND	0.0083	0.0021	ug/l	
PERFLUOROCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0083	0.0021	ug/l	
PERFLUOROCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.042	0.0083	ug/l	
2991-50-6	EtFOSAA	ND	0.042	0.0083	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.017	0.0042	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.017	0.0042	ug/l	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: EB-02_113018	
Lab Sample ID: FA59818-29	Date Sampled: 11/30/18
Matrix: AQ - Equipment Blank	Date Received: 12/01/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.017	0.0042	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	84%		30-140%
	13C5-PFPeA	84%		40-140%
	13C5-PFHxA	86%		50-150%
	13C4-PFHpA	85%		50-150%
	13C8-PFOA	88%		50-150%
	13C9-PFNA	84%		50-150%
	13C6-PFDA	78%		50-150%
	13C7-PFUnDA	62%		50-150%
	13C2-PFDoDA	53%		50-150%
	13C2-PFTeDA	54%		40-150%
	13C3-PFBS	84%		50-150%
	13C3-PFHxS	83%		50-150%
	13C8-PFOS	76%		50-150%
	13C8-FOSA	85%		30-140%
	d3-MeFOSAA	90%		50-150%
	13C2-4:2FTS	88%		50-150%
	13C2-6:2FTS	91%		50-150%
	13C2-8:2FTS	84%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody



SGS North America Inc - Orlando

Chain of Custody

4405 Vineland Road, Suite C-15 Orlando, FL 32811
TEL: 407-425-6700 FAX: 407-425-0707
www.sgs.com

FA59818

SGS - ORLANDO JOB # :

PAGE 1 OF 3

Client / Reporting Information		Project Information		Analytical Information										Matrix Codes		
Company Name: Arcadis of Michigan, LLC		Project Name: RACER Lansing Plant 6		* Michigan 24 PFAS										DW - Drinking		
Address: 300 South Washington Square, Suite 315		Street												GW - Ground		
City: Lansing State: MI Zip: 48933		City: Lansing State: MI												Water		
Project Contact: Alex Villhauer Alex.Villhauer@arcadis.com		Project # 80064479.2018.03100												WW - Water		
Phone #: 616-780-3277		Fax #												SW - Surface		
Sampler(s) Name(s) (Printed) Sampler 1: Austin Westly Sampler 2: Brett Pentunen		Client Purchase Order # 80064479.2018.03100		Water												
SGS Orlando Sample #		COLLECTION		CONTAINER INFORMATION										LIQ - Other Liquid		
Field ID / Point of Collection		DATE	TIME	SAMPLED BY:	MATRIX	TOTAL # OF BOTTLES	OTHER	NONE	PC	NACH	HANDS	PESDA	MACH/24K	WATER	MEDI	LAB USE ONLY
1 SB-P6-MF321-15-20		11/20/18	0940	BP	GW	2	2	2								
2 SB-P6-MF311-20-25		11/20/18	1020	BP	GW	2	2	2								
3 Dup-02-112818		11/25/18		BP	GW	2	2	2								
4 SB-P6-MF311-8-13		11/25/18	1045	BP	GW	2	2	2								
5 SB-P6-MF301-20-25 ms/MS		11/25/18	1130	BP	GW	6	6	6								
6 SB-P6-MF301-3-8		11/28/18	1200	BP	GW	2	2	2								
7 SB-P6-MF393-20-25		11/28/18	1245	BP	GW	2	2	2								
8 SB-P6-MF393-3-8		11/28/18	1305	BP	GW	2	2	2								
9 SB-P6-OS335-18.5-23.5		11/28/18	1415	BP	GW	2	2	2								
10 SB-P6-OH322-10-15		11/28/18	1610	BP	GW	2	2	2								
11 SB-P6-OH302-15-20		11/28/18	1645	BP	GW	2	2	2								
12 Verhuden-MH-2-112918		11/29/18	0900	GU	GW	2	2	2								
Turnaround Time (Business days)		Data Deliverable Information		Comments / Remarks												
<input checked="" type="checkbox"/> 10 Day (Business) <input type="checkbox"/> 7 Day <input type="checkbox"/> 5 Day <input type="checkbox"/> 3 Day RUSH <input type="checkbox"/> 2 Day RUSH <input type="checkbox"/> 1 Day RUSH <input type="checkbox"/> Other		Approved By: / Date:		<input type="checkbox"/> COMMERCIAL "A" (RESULTS ONLY) <input type="checkbox"/> COMMERCIAL "B" (RESULTS PLUS QC) <input type="checkbox"/> REDT1 (EPA LEVEL 3) <input type="checkbox"/> FULLT1 (EPA LEVEL 4) <input checked="" type="checkbox"/> EDD'S												
Rush T/A Data Available VIA Email or Lablink				* PFAS by modified method 537 with isotope dilution for MDEQ 24 Compound list												
Sample Custody must be documented below each time samples change possession, including courier delivery.																
Relinquished by Sample/Affiliation		Date Time:		Received By/Affiliation		Date Time:		Relinquished By/Affiliation		Date Time:		Received By/Affiliation		Date Time:		
Chris Wink / Arcadis		11/30/18 1545		FedEx				3				4		12/11/18 106		
Relinquished by/Affiliation		Date Time:		Received By/Affiliation		Date Time:		Relinquished By/Affiliation		Date Time:		Received By/Affiliation		Date Time:		
5		6		7		8		9		10		11		12		
Lab Use Only : Cooler Temperature (s) Celsius (corrected): 12.3.8 http://www.sgs.com/en/terms-and-conditions																

ORLD-SMT-0001-03-FORM-COC (1) Rev 031318

FA59818: Chain of Custody

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SGS North America Inc - Orlando

Chain of Custody

4405 Vineland Road, Suite C-15 Orlando, FL 32811
TEL: 407-425-6700 FAX: 407-425-0707
www.sgs.com

FA59818

SGS - ORLANDO JOB # :

PAGE 2 OF 3

Client / Reporting Information		Project Information		Analytical Information		Matrix Codes										
Company Name: Arcaadis of Michigan, LLC		Project Name: RACER Lansing Plant 6				DW - Drinking Water										
Address: 300 South Washington Square, Suite 315		Street				GW - Ground Water										
City: Lansing State: MI Zip: 48933		City: Lansing State: MI				WW - Water SW - Surface Water										
Project Contact: Alex Villhauer Email: Alex.Vilhauer@arcaadis.com		Project #: 80064479.2018.03100				SL - Sludge OI - Oil										
Phone #: 616-780-3277		Fax #				LIQ - Other Liquid AIR - Air SOL - Other Solid										
Sampler(s) Name(s) (Printed) Sampler 1: Austin Westhuis Sampler 2: Brett Pentunen		Client Purchase Order #: 00064479.2018.03100														
SGS Orlando Sample #	Field ID / Point of Collection	COLLECTION			CONTAINER INFORMATION										LAB USE ONLY	
		DATE	TIME	SAMPLED BY	MATRIX	TOTAL # OF BOTTLES	OTHER	PHONE	PC	NO3	PHOS	POSSA	NACH-ZNAC	D/WATER		MEDI
13	Verlinden - MH-3 - 112918	11/29/18	0925	AW	GW	2										X
14	Verlinden - MH-4 - 112918	11/29/18	1200	AW	GW	2										X
16	Ap - 03 - 112918	11/29/18		AW	GW	2										X
15	Verlinden - MH-1 - 112918	11/29/18	1245	AW	GW	2										X
17	Ostorn - MH-1 - 112918	11/29/18	1320	AW	GW	2										X
18	SB-Pl - QA336 - 13-18	11/29/18	1420	BP	GW	2										X
19	SB-Pl - QA336 - 30-35	11/29/18	1430	BP	GW	2										X
20	SB-Pl - NS335 - 11-16	11/29/18	1500	BP	GW	2										X
21	Ap - 04 - 112918	11/29/18		BP	GW	2										X
22	SB-Pl - MK335 - 28-33	11/29/18	1540	BP	GW	2										X
23	SB-Pl - MK335 - 9-14	11/29/18	1555	BP	GW	2										X
24	SB-Pl - QH242 15-20	11/29/18	1000	BP	GW	4										X
Turnaround Time (Business days)		Data Deliverable Information				Comments / Remarks										
<input type="radio"/> 10 Day (Business) <input type="radio"/> 7 Day <input type="radio"/> 5 Day <input type="radio"/> 3 Day RUSH <input type="radio"/> 2 Day RUSH <input type="radio"/> 1 Day RUSH <input type="radio"/> Other		Approved By: / Date:		<input type="checkbox"/> COMMERCIAL "A" (RESULTS ONLY) <input type="checkbox"/> COMMERCIAL "B" (RESULTS PLUS QC) <input type="checkbox"/> REDT1 (EPA LEVEL 3) <input type="checkbox"/> FULLT1 (EPA LEVEL 4) <input checked="" type="checkbox"/> EDO'S		* FA5 by modified method 537 with isotope dilution for MDEQ 24 compound list										
Rush T/A Data Available VIA Email or Lablink		Sample Custody must be documented below each time samples change possession, including courier delivery.														
Relinquished by/Sampler/Affiliation Arcaadis of Michigan		Date Time: 11/20/18 1545		Received By/Affiliation FedEx		Relinquished By/Affiliation EF		Date Time: 12/11/18 1000		Received By/Affiliation PLATT						
Relinquished by/Affiliation		Date Time:		Received By/Affiliation		Relinquished By/Affiliation		Date Time:		Received By/Affiliation						
5		6		7		8										

Lab Use Only: Cooler Temperature (s) Celsius (corrected):

<http://www.sgs.com/en/terms-and-conditions>

ORLD-SMT-0001-03-FORM-COC (1) Rev 031318

FA59818: Chain of Custody

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SGS North America Inc - Orlando

Chain of Custody

4405 Vineland Road, Suite C-15 Orlando, FL 32811
TEL: 407-425-6700 FAX: 407-425-0707
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FA59818

SGS - ORLANDO JOB #:

PAGE 3 OF 3

Client / Reporting Information		Project Information		Analytical Information										Matrix Codes				
Company Name: <u>Accards of Michigan, LLC</u>		Project Name: <u>RACER Lansing Plant Co</u>		* Michigan 24 PFAS										DW - Drinking Water				
Address: <u>300 South Washington Square, Suite 315</u>		Street: _____												GW - Ground Water				
City: <u>Lansing</u> State: <u>MI</u> Zip: <u>48933</u>		City: <u>Lansing</u> State: <u>MI</u>												WW - Water				
Project Contact: <u>Alex Villaver</u> Email: <u>Alex.Villaver@accards.com</u>		Project #: <u>60064479.2018.03100</u>												SW - Surface Water				
Phone #: <u>616-780-3277</u>		Client Purchase Order #: _____												SO - Soil				
Sampler(s) Name(s) (Printed): Sampler 1: <u>Adam Westhus</u> Sampler 2: <u>Brett Parkinen</u>		Client Purchase Order #: _____		SL - Sludge														
SGS Orlando		COLLECTION		CONTAINER INFORMATION										LIQ - Other Liquid				
Sample #		Field ID / Point of Collection		DATE	TIME	SAMPLED BY:	MATRIX	TOTAL # OF BOTTLES	OTHER	NONE	LD	RSH	PHOS	SSECA	MADHZN/AM	DI WATER	MECH	LAB USE ONLY
25		SB-P6-QT226-13-13		11/20/18	1035	BP	6W	4	4									
26		SB-P6-RH241-13-13 MS/USD		11/20/18	1115	BP	6W	6	6									
27		SB-P6-QT239-15-20		11/20/18	1150	BP	6W	4	4									
28		SB-P6-M6289-27-32		11/20/18	1235	BP	6W	4	4									
29		EB-02-113018		11/20/18	1300	BP	6W	2	2									
Turnaround Time (Business days)		Data Deliverable Information		Comments / Remarks														
<input checked="" type="radio"/> 10 Day (Business) <input type="radio"/> 7 Day <input type="radio"/> 5 Day <input type="radio"/> 3 Day RUSH <input type="radio"/> 2 Day RUSH <input type="radio"/> 1 Day RUSH <input type="radio"/> Other		Approved By: / Date: _____		<input type="checkbox"/> COMMERCIAL "A" (RESULTS ONLY) <input type="checkbox"/> COMMERCIAL "B" (RESULTS PLUS QC) <input type="checkbox"/> REDT1 (EPA LEVEL 3) <input type="checkbox"/> FULLT1 (EPA LEVEL 4) <input checked="" type="checkbox"/> EDD'S										* PFAS by modified method 537 with isotope dilution for MDEQ 24 compound list				
Rush T/A Data Available VIA Email or Lablink		Sample Custody must be documented below each time samples change possession, including courier delivery.																
Relinquished by/Sampler/Affiliation: <u>Adam Westhus/Accards</u>		Date Time: <u>11/20/18 1545</u>		Received By/Affiliation: <u>FedEx</u>		Date Time: _____		Relinquished By/Affiliation: _____		Date Time: _____		Received By/Affiliation: <u>12/11/18</u>						
Relinquished by/Affiliation: _____		Date Time: _____		Received By/Affiliation: _____		Date Time: _____		Relinquished By/Affiliation: _____		Date Time: _____		Received By/Affiliation: <u>1000</u>						
5		6		7		8		9		10		11						

Lab Use Only: Cooler Temperature (s) Celsius (corrected):

http://www.sgs.com/en/terms-and-conditions

ORLD-SMT-0001-03-FORM-COC (1) Rev 031318

FA59818: Chain of Custody

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SGS Sample Receipt Summary

Job Number: FA59818

Client: ARCAIS OF MICHIGAN

Project: RACER LANSING PLANT

Date / Time Received: 12/1/2018 10:00:00 AM

Delivery Method: FX

Airbill #s: 1002241174510003281100813921970933

Therm ID: IR 1;

Therm CF: -0.2;

of Coolers: 2

Cooler Temps (Raw Measured) °C: Cooler 1: (1.4); Cooler 2: (4.0);

Cooler Temps (Corrected) °C: Cooler 1: (1.2); Cooler 2: (3.8);

Cooler Information

Y or N

- 1. Custody Seals Present
- 2. Custody Seals Intact
- 3. Temp criteria achieved
- 4. Cooler temp verification IR Gun
- 5. Cooler media Ice (Bag)

Trip Blank Information

Y or N N/A

- 1. Trip Blank present / cooler
 - 2. Trip Blank listed on COC
- W or S N/A
- 3. Type Of TB Received

Sample Information

Y or N N/A

- 1. Sample labels present on bottles
- 2. Samples preserved properly
- 3. Sufficient volume/containers recvd for analysis:
- 4. Condition of sample Intact
- 5. Sample recvd within HT
- 6. Dates/Times/IDs on COC match Sample Label
- 7. VOCs have headspace
- 8. Bottles received for unspecified tests
- 9. Compositing instructions clear
- 10. Voa Soil Kits/Jars received past 48hrs?
- 11. % Solids Jar received?
- 12. Residual Chlorine Present?

Misc. Information

Number of Encores: 25-Gram _____ 5-Gram _____ Number of 5035 Field Kits: _____ Number of Lab Filtered Metals: _____
 Test Strip Lot #s: pH 0-3 230315 pH 10-12 219813A Other: (Specify) _____
 Residual Chlorine Test Strip Lot #: _____

Comments

SM001
Rev. Date 05/24/17

Technician: PETERH

Date: 12/1/2018 10:00:00 A

Reviewer: _____

Date: _____

FA59818: Chain of Custody

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4.1
4

MS Semi-volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: FA59818
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72896-MB	2Q24708.D	1	12/08/18	NG	12/05/18	OP72896	S2Q384

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59818-20, FA59818-22, FA59818-23, FA59818-25, FA59818-26, FA59818-27, FA59818-28, FA59818-29

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
757124-72-44:2	Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Limits
	13C4-PFBA	92% 30-140%
	13C5-PFPeA	92% 40-140%
	13C5-PFHxA	94% 50-150%
	13C4-PFHpA	94% 50-150%
	13C8-PFOA	96% 50-150%
	13C9-PFNA	93% 50-150%
	13C6-PFDA	86% 50-150%
	13C7-PFUnDA	66% 50-150%

Method Blank Summary

Job Number: FA59818
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72896-MB	2Q24708.D	1	12/08/18	NG	12/05/18	OP72896	S2Q384

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59818-20, FA59818-22, FA59818-23, FA59818-25, FA59818-26, FA59818-27, FA59818-28, FA59818-29

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	59% 50-150%
	13C2-PFTeDA	63% 40-150%
	13C3-PFBS	92% 50-150%
	13C3-PFHxS	92% 50-150%
	13C8-PFOS	87% 50-150%
	13C8-FOSA	115% 30-140%
	d3-MeFOSAA	95% 50-150%
	13C2-4:2FTS	96% 50-150%
	13C2-6:2FTS	100% 50-150%
	13C2-8:2FTS	87% 50-150%

5.1.1
5

Method Blank Summary

Job Number: FA59818
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72913-MB	2Q24739.D	1	12/08/18	NG	12/06/18	OP72913	S2Q384

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59818-1, FA59818-2, FA59818-3, FA59818-4, FA59818-5, FA59818-6, FA59818-7, FA59818-8, FA59818-9, FA59818-10, FA59818-11, FA59818-12, FA59818-13, FA59818-14, FA59818-16, FA59818-17, FA59818-18, FA59818-19

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
757124-72-44:2	Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Limits
	13C4-PFBA	87% 30-140%
	13C5-PFPeA	86% 40-140%
	13C5-PFHxA	88% 50-150%
	13C4-PFHpA	89% 50-150%
	13C8-PFOA	93% 50-150%
	13C9-PFNA	89% 50-150%
	13C6-PFDA	83% 50-150%
	13C7-PFUnDA	61% 50-150%

5.1.2
5

Method Blank Summary

Job Number: FA59818
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72913-MB	2Q24739.D	1	12/08/18	NG	12/06/18	OP72913	S2Q384

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59818-1, FA59818-2, FA59818-3, FA59818-4, FA59818-5, FA59818-6, FA59818-7, FA59818-8, FA59818-9, FA59818-10, FA59818-11, FA59818-12, FA59818-13, FA59818-14, FA59818-16, FA59818-17, FA59818-18, FA59818-19

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	51% 50-150%
	13C2-PFTeDA	54% 40-150%
	13C3-PFBS	86% 50-150%
	13C3-PFHxS	87% 50-150%
	13C8-PFOS	83% 50-150%
	13C8-FOSA	109% 30-140%
	d3-MeFOSAA	90% 50-150%
	13C2-4:2FTS	91% 50-150%
	13C2-6:2FTS	95% 50-150%
	13C2-8:2FTS	83% 50-150%

5.1.2
5

Method Blank Summary

Job Number: FA59818
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73004-MB	2Q24988.D	1	12/13/18	NAF	12/12/18	OP73004	S2Q388

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59818-15, FA59818-21, FA59818-24

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
757124-72-44:2	Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Limits
	13C4-PFBA	92% 30-140%
	13C5-PFPeA	90% 40-140%
	13C5-PFHxA	97% 50-150%
	13C4-PFHpA	96% 50-150%
	13C8-PFOA	108% 50-150%
	13C9-PFNA	100% 50-150%
	13C6-PFDA	102% 50-150%
	13C7-PFUnDA	97% 50-150%

Method Blank Summary

Job Number: FA59818
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73004-MB	2Q24988.D	1	12/13/18	NAF	12/12/18	OP73004	S2Q388

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59818-15, FA59818-21, FA59818-24

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	79% 50-150%
	13C2-PFTeDA	71% 40-150%
	13C3-PFBS	93% 50-150%
	13C3-PFHxS	97% 50-150%
	13C8-PFOS	96% 50-150%
	13C8-FOSA	94% 30-140%
	d3-MeFOSAA	88% 50-150%
	13C2-4:2FTS	96% 50-150%
	13C2-6:2FTS	108% 50-150%
	13C2-8:2FTS	100% 50-150%

Instrument Blank

Job Number: FA59818
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q384-IBLK	2Q24659.D	1	12/07/18	NG	n/a	n/a	S2Q384

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA59818-2, FA59818-3, FA59818-4, FA59818-5, FA59818-6, FA59818-7, FA59818-8, FA59818-9, FA59818-10, FA59818-11, FA59818-12, FA59818-13, FA59818-16, FA59818-17, FA59818-18, FA59818-19, FA59818-20, FA59818-22, FA59818-23, FA59818-25, FA59818-26, FA59818-27, FA59818-28, FA59818-29

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0080	0.0020	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
757124-72-44:2	Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Limits
	13C4-PFBA	96% 50-150%
	13C5-PFPeA	96% 50-150%
	13C5-PFHxA	96% 50-150%
	13C4-PFHpA	97% 50-150%
	13C8-PFOA	95% 50-150%
	13C9-PFNA	94% 50-150%
	13C6-PFDA	95% 50-150%
	13C7-PFUnDA	84% 50-150%

5.1.4
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Job Number: FA59818
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q384-IBLK	2Q24659.D	1	12/07/18	NG	n/a	n/a	S2Q384

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA59818-2, FA59818-3, FA59818-4, FA59818-5, FA59818-6, FA59818-7, FA59818-8, FA59818-9, FA59818-10, FA59818-11, FA59818-12, FA59818-13, FA59818-16, FA59818-17, FA59818-18, FA59818-19, FA59818-20, FA59818-22, FA59818-23, FA59818-25, FA59818-26, FA59818-27, FA59818-28, FA59818-29

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	87% 50-150%
	13C2-PFTeDA	93% 50-150%
	13C3-PFBS	99% 50-150%
	13C3-PFHxS	101% 50-150%
	13C8-PFOS	99% 50-150%
	13C8-FOSA	125% 50-150%
	d3-MeFOSAA	113% 50-150%
	13C2-4:2FTS	98% 50-150%
	13C2-6:2FTS	97% 50-150%
	13C2-8:2FTS	93% 50-150%

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Job Number: FA59818
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q385-IBLK	2Q24780.D	1	12/10/18	NG	n/a	n/a	S2Q385

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA59818-1, FA59818-14

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0080	0.0020	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
757124-72-44:2	Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Limits
	13C4-PFBA	101% 50-150%
	13C5-PFPeA	100% 50-150%
	13C5-PFHxA	103% 50-150%
	13C4-PFHpA	102% 50-150%
	13C8-PFOA	103% 50-150%
	13C9-PFNA	106% 50-150%
	13C6-PFDA	110% 50-150%
	13C7-PFUnDA	109% 50-150%

5.1.5
5

Instrument Blank

Job Number: FA59818
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q385-IBLK	2Q24780.D	1	12/10/18	NG	n/a	n/a	S2Q385

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA59818-1, FA59818-14

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	108% 50-150%
	13C2-PFTeDA	106% 50-150%
	13C3-PFBS	101% 50-150%
	13C3-PFHxS	103% 50-150%
	13C8-PFOS	103% 50-150%
	13C8-FOSA	111% 50-150%
	d3-MeFOSAA	103% 50-150%
	13C2-4:2FTS	95% 50-150%
	13C2-6:2FTS	98% 50-150%
	13C2-8:2FTS	101% 50-150%

5.1.5
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Instrument Blank

Job Number: FA59818
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q388-IBLK	2Q24965.D	1	12/13/18	NAF	n/a	n/a	S2Q388

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA59818-15, FA59818-21, FA59818-24

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0080	0.0020	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
757124-72-44:2	Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Limits
	13C4-PFBA	99% 50-150%
	13C5-PFPeA	88% 50-150%
	13C5-PFHxA	88% 50-150%
	13C4-PFHpA	85% 50-150%
	13C8-PFOA	84% 50-150%
	13C9-PFNA	84% 50-150%
	13C6-PFDA	86% 50-150%
	13C7-PFUnDA	85% 50-150%

5.1.6
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Instrument Blank

Job Number: FA59818
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q388-IBLK	2Q24965.D	1	12/13/18	NAF	n/a	n/a	S2Q388

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA59818-15, FA59818-21, FA59818-24

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	79% 50-150%
	13C2-PFTeDA	82% 50-150%
	13C3-PFBS	96% 50-150%
	13C3-PFHxS	99% 50-150%
	13C8-PFOS	96% 50-150%
	13C8-FOSA	91% 50-150%
	d3-MeFOSAA	94% 50-150%
	13C2-4:2FTS	84% 50-150%
	13C2-6:2FTS	90% 50-150%
	13C2-8:2FTS	87% 50-150%

5.1.6
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Blank Spike Summary

Job Number: FA59818
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72896-BS	2Q24707.D	1	12/08/18	NG	12/05/18	OP72896	S2Q384

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59818-20, FA59818-22, FA59818-23, FA59818-25, FA59818-26, FA59818-27, FA59818-28, FA59818-29

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
375-22-4	Perfluorobutanoic acid	0.08	0.0742	93	70-130
2706-90-3	Perfluoropentanoic acid	0.08	0.0752	94	70-130
307-24-4	Perfluorohexanoic acid	0.08	0.0673	84	70-130
375-85-9	Perfluoroheptanoic acid	0.08	0.0746	93	71-130
335-67-1	Perfluorooctanoic acid	0.08	0.0753	94	74-130
375-95-1	Perfluorononanoic acid	0.08	0.0709	89	76-130
335-76-2	Perfluorodecanoic acid	0.08	0.0672	84	70-130
2058-94-8	Perfluoroundecanoic acid	0.08	0.0791	99	70-130
307-55-1	Perfluorododecanoic acid	0.08	0.0753	94	70-130
72629-94-8	Perfluorotridecanoic acid	0.08	0.0753	94	70-139
376-06-7	Perfluorotetradecanoic acid	0.08	0.0703	88	70-130
375-73-5	Perfluorobutanesulfonic acid	0.0708	0.0647	91	73-130
2706-91-4	Perfluoropentanesulfonic acid	0.0752	0.0711	95	70-130
355-46-4	Perfluorohexanesulfonic acid	0.0728	0.0642	88	74-130
375-92-8	Perfluoroheptanesulfonic acid	0.076	0.0735	97	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.074	0.0704	95	70-130
68259-12-1	Perfluorononanesulfonic acid	0.0768	0.0640	83	70-130
335-77-3	Perfluorodecanesulfonic acid	0.0772	0.0491	64* a	70-130
754-91-6	PFOSA	0.08	0.0760	95	70-131
2355-31-9	MeFOSAA	0.08	0.0757	95	70-130
2991-50-6	EtFOSAA	0.08	0.0742	93	70-130
757124-72-44:2	Fluorotelomer sulfonate	0.0748	0.0739	99	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	0.076	0.0742	98	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	0.0768	0.0710	92	70-130

CAS No.	ID Standard Recoveries	BSP	Limits
	13C4-PFBA	86%	30-140%
	13C5-PFPeA	87%	40-140%
	13C5-PFHxA	90%	50-150%
	13C4-PFHpA	89%	50-150%
	13C8-PFOA	91%	50-150%
	13C9-PFNA	91%	50-150%
	13C6-PFDA	85%	50-150%
	13C7-PFUnDA	71%	50-150%

* = Outside of Control Limits.

5.2.1
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Blank Spike Summary

Job Number: FA59818
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72896-BS	2Q24707.D	1	12/08/18	NG	12/05/18	OP72896	S2Q384

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59818-20, FA59818-22, FA59818-23, FA59818-25, FA59818-26, FA59818-27, FA59818-28, FA59818-29

CAS No.	ID Standard Recoveries	BSP	Limits
	13C2-PFDoDA	66%	50-150%
	13C2-PFTeDA	71%	40-150%
	13C3-PFBS	88%	50-150%
	13C3-PFHxS	90%	50-150%
	13C8-PFOS	88%	50-150%
	13C8-FOSA	64%	30-140%
	d3-MeFOSAA	101%	50-150%
	13C2-4:2FTS	95%	50-150%
	13C2-6:2FTS	102%	50-150%
	13C2-8:2FTS	94%	50-150%

(a) Sporadic marginal failure.

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA59818
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72913-BS	2Q24738.D	1	12/08/18	NG	12/06/18	OP72913	S2Q384

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59818-1, FA59818-2, FA59818-3, FA59818-4, FA59818-5, FA59818-6, FA59818-7, FA59818-8, FA59818-9, FA59818-10, FA59818-11, FA59818-12, FA59818-13, FA59818-14, FA59818-16, FA59818-17, FA59818-18, FA59818-19

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
375-22-4	Perfluorobutanoic acid	0.08	0.0758	95	70-130
2706-90-3	Perfluoropentanoic acid	0.08	0.0770	96	70-130
307-24-4	Perfluorohexanoic acid	0.08	0.0693	87	70-130
375-85-9	Perfluoroheptanoic acid	0.08	0.0751	94	71-130
335-67-1	Perfluorooctanoic acid	0.08	0.0730	91	74-130
375-95-1	Perfluorononanoic acid	0.08	0.0745	93	76-130
335-76-2	Perfluorodecanoic acid	0.08	0.0716	90	70-130
2058-94-8	Perfluoroundecanoic acid	0.08	0.0791	99	70-130
307-55-1	Perfluorododecanoic acid	0.08	0.0770	96	70-130
72629-94-8	Perfluorotridecanoic acid	0.08	0.0787	98	70-139
376-06-7	Perfluorotetradecanoic acid	0.08	0.0710	89	70-130
375-73-5	Perfluorobutanesulfonic acid	0.0708	0.0660	93	73-130
2706-91-4	Perfluoropentanesulfonic acid	0.0752	0.0727	97	70-130
355-46-4	Perfluorohexanesulfonic acid	0.0728	0.0650	89	74-130
375-92-8	Perfluoroheptanesulfonic acid	0.076	0.0751	99	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.074	0.0749	101	70-130
68259-12-1	Perfluorononanesulfonic acid	0.0768	0.0698	91	70-130
335-77-3	Perfluorodecanesulfonic acid	0.0772	0.0507	66* a	70-130
754-91-6	PFOSA	0.08	0.0779	97	70-131
2355-31-9	MeFOSAA	0.08	0.0769	96	70-130
2991-50-6	EtFOSAA	0.08	0.0747	93	70-130
757124-72-44:2	Fluorotelomer sulfonate	0.0748	0.0751	100	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	0.076	0.0762	100	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	0.0768	0.0732	95	70-130

CAS No.	ID Standard Recoveries	BSP	Limits
	13C4-PFBA	90%	30-140%
	13C5-PFPeA	90%	40-140%
	13C5-PFHxA	91%	50-150%
	13C4-PFHpA	92%	50-150%
	13C8-PFOA	95%	50-150%
	13C9-PFNA	92%	50-150%
	13C6-PFDA	86%	50-150%
	13C7-PFUnDA	75%	50-150%

* = Outside of Control Limits.

5.2.2
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Blank Spike Summary

Job Number: FA59818
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72913-BS	2Q24738.D	1	12/08/18	NG	12/06/18	OP72913	S2Q384

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59818-1, FA59818-2, FA59818-3, FA59818-4, FA59818-5, FA59818-6, FA59818-7, FA59818-8, FA59818-9, FA59818-10, FA59818-11, FA59818-12, FA59818-13, FA59818-14, FA59818-16, FA59818-17, FA59818-18, FA59818-19

CAS No.	ID Standard Recoveries	BSP	Limits
	13C2-PFDoDA	59%	50-150%
	13C2-PFTeDA	64%	40-150%
	13C3-PFBS	90%	50-150%
	13C3-PFHxS	90%	50-150%
	13C8-PFOS	90%	50-150%
	13C8-FOSA	111%	30-140%
	d3-MeFOSAA	107%	50-150%
	13C2-4:2FTS	98%	50-150%
	13C2-6:2FTS	102%	50-150%
	13C2-8:2FTS	97%	50-150%

(a) Sporadic marginal failure.

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA59818
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73004-BS	2Q24987.D	1	12/13/18	NAF	12/12/18	OP73004	S2Q388

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59818-15, FA59818-21, FA59818-24

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
375-22-4	Perfluorobutanoic acid	0.08	0.0682	85	70-130
2706-90-3	Perfluoropentanoic acid	0.08	0.0628	79	70-130
307-24-4	Perfluorohexanoic acid	0.08	0.0587	73	70-130
375-85-9	Perfluoroheptanoic acid	0.08	0.0659	82	71-130
335-67-1	Perfluorooctanoic acid	0.08	0.0673	84	74-130
375-95-1	Perfluorononanoic acid	0.08	0.0619	77	76-130
335-76-2	Perfluorodecanoic acid	0.08	0.0648	81	70-130
2058-94-8	Perfluoroundecanoic acid	0.08	0.0641	80	70-130
307-55-1	Perfluorododecanoic acid	0.08	0.0649	81	70-130
72629-94-8	Perfluorotridecanoic acid	0.08	0.0801	100	70-139
376-06-7	Perfluorotetradecanoic acid	0.08	0.0611	76	70-130
375-73-5	Perfluorobutanesulfonic acid	0.0708	0.0558	79	73-130
2706-91-4	Perfluoropentanesulfonic acid	0.0752	0.0609	81	70-130
355-46-4	Perfluorohexanesulfonic acid	0.0728	0.0554	76	74-130
375-92-8	Perfluoroheptanesulfonic acid	0.076	0.0627	83	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.074	0.0622	84	70-130
68259-12-1	Perfluorononanesulfonic acid	0.0768	0.0588	77	70-130
335-77-3	Perfluorodecanesulfonic acid	0.0772	0.0485	63* a	70-130
754-91-6	PFOSA	0.08	0.0653	82	70-131
2355-31-9	MeFOSAA	0.08	0.0642	80	70-130
2991-50-6	EtFOSAA	0.08	0.0668	84	70-130
757124-72-44:2	Fluorotelomer sulfonate	0.0748	0.0620	83	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	0.076	0.0612	81	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	0.0768	0.0603	79	70-130

CAS No.	ID Standard Recoveries	BSP	Limits
	13C4-PFBA	96%	30-140%
	13C5-PFPeA	93%	40-140%
	13C5-PFHxA	98%	50-150%
	13C4-PFHpA	96%	50-150%
	13C8-PFOA	102%	50-150%
	13C9-PFNA	99%	50-150%
	13C6-PFDA	98%	50-150%
	13C7-PFUnDA	93%	50-150%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA59818
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73004-BS	2Q24987.D	1	12/13/18	NAF	12/12/18	OP73004	S2Q388

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59818-15, FA59818-21, FA59818-24

CAS No.	ID Standard Recoveries	BSP	Limits
	13C2-PFDoDA	87%	50-150%
	13C2-PFTeDA	79%	40-150%
	13C3-PFBS	96%	50-150%
	13C3-PFHxS	98%	50-150%
	13C8-PFOS	95%	50-150%
	13C8-FOSA	97%	30-140%
	d3-MeFOSAA	91%	50-150%
	13C2-4:2FTS	102%	50-150%
	13C2-6:2FTS	108%	50-150%
	13C2-8:2FTS	103%	50-150%

(a) Sporadic marginal failure.

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA59818
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72896-MS	2Q24722.D	1	12/08/18	NG	12/05/18	OP72896	S2Q384
OP72896-MSD	2Q24723.D	1	12/08/18	NG	12/05/18	OP72896	S2Q384
FA59818-26	2Q24721.D	1	12/08/18	NG	12/05/18	OP72896	S2Q384

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59818-20, FA59818-22, FA59818-23, FA59818-25, FA59818-26, FA59818-27, FA59818-28, FA59818-29

CAS No.	Compound	FA59818-26 ug/l	Spike Q ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
375-22-4	Perfluorobutanoic acid	0.0486	0.167	0.202	92	0.167	0.188	84	7	70-130/30
2706-90-3	Perfluoropentanoic acid	0.108	0.167	0.253	87	0.167	0.241	80	5	70-130/30
307-24-4	Perfluorohexanoic acid	0.107	0.167	0.215	65*	0.167	0.230	74	7	70-130/30
375-85-9	Perfluoroheptanoic acid	0.0793	0.167	0.176	58*	0.167	0.216	82	20	71-130/30
335-67-1	Perfluorooctanoic acid	0.253	0.167	0.182	-43*	0.167	0.378	75	70*	74-130/30
375-95-1	Perfluorononanoic acid	0.0181	0.167	0.162	86	0.167	0.154	82	5	76-130/30
335-76-2	Perfluorodecanoic acid	0.00270 J	0.167	0.140	82	0.167	0.141	83	1	70-130/30
2058-94-8	Perfluoroundecanoic acid	ND	0.167	0.174	104	0.167	0.146	88	18	70-130/30
307-55-1	Perfluorododecanoic acid	ND	0.167	0.178	107	0.167	0.149	89	18	70-130/30
72629-94-8	Perfluorotridecanoic acid	ND	0.167	0.163	98	0.167	0.142	85	14	70-139/30
376-06-7	Perfluorotetradecanoic acid	ND	0.167	0.162	97	0.167	0.143	86	12	70-130/30
375-73-5	Perfluorobutanesulfonic acid	ND	0.147	0.134	91	0.147	0.125	85	7	73-130/30
2706-91-4	Perfluoropentanesulfonic acid	ND	0.157	0.147	94	0.157	0.137	87	7	70-130/30
355-46-4	Perfluorohexanesulfonic acid	0.00449 J	0.152	0.133	85	0.152	0.127	81	5	74-130/30
375-92-8	Perfluoroheptanesulfonic acid	ND	0.158	0.156	99	0.158	0.140	88	11	74-130/30
1763-23-1	Perfluorooctanesulfonic acid	0.0169	0.154	0.155	90	0.154	0.152	88	2	70-130/30
68259-12-1	Perfluorononanesulfonic acid	ND	0.16	0.139	87	0.16	0.116	73	18	70-130/30
335-77-3	Perfluorodecanesulfonic acid	ND	0.161	0.111	69*	0.161	0.105	65*	6	70-130/30
754-91-6	PFOSA	ND	0.167	0.162	97	0.167	0.146	88	10	70-131/30
2355-31-9	MeFOSAA	ND	0.167	0.169	101	0.167	0.145	87	15	70-130/30
2991-50-6	EtFOSAA	ND	0.167	0.176	106	0.167	0.148	89	17	70-130/30
757124-72-44:2	Fluorotelomer sulfonate	ND	0.156	0.153	98	0.156	0.142	91	7	70-130/30
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.158	0.156	99	0.158	0.145	92	7	70-133/30
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.16	0.156	98	0.16	0.136	85	14	70-130/30

CAS No.	ID Standard Recoveries	MS	MSD	FA59818-26	Limits
13C4-PFBA		77%	87%	75%	30-140%
13C5-PFPeA		78%	88%	76%	40-140%
13C5-PFHxA		79%	89%	77%	50-150%
13C4-PFHpA		82%	90%	79%	50-150%
13C8-PFOA		86%	92%	81%	50-150%
13C9-PFNA		82%	91%	81%	50-150%
13C6-PFDA		77%	80%	74%	50-150%
13C7-PFUnDA		63%	69%	66%	50-150%

* = Outside of Control Limits.

5.3.1
5

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA59818
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72896-MS	2Q24722.D	1	12/08/18	NG	12/05/18	OP72896	S2Q384
OP72896-MSD	2Q24723.D	1	12/08/18	NG	12/05/18	OP72896	S2Q384
FA59818-26	2Q24721.D	1	12/08/18	NG	12/05/18	OP72896	S2Q384

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59818-20, FA59818-22, FA59818-23, FA59818-25, FA59818-26, FA59818-27, FA59818-28, FA59818-29

CAS No.	ID Standard Recoveries	MS	MSD	FA59818-26	Limits
	13C2-PFDoDA	53%	60%	59%	50-150%
	13C2-PFTeDA	64%	78%	71%	40-150%
	13C3-PFBS	79%	88%	77%	50-150%
	13C3-PFHxS	81%	88%	76%	50-150%
	13C8-PFOS	79%	82%	70%	50-150%
	13C8-FOSA	87%	90%	59%	30-140%
	d3-MeFOSAA	88%	91%	84%	50-150%
	13C2-4:2FTS	86%	97%	81%	50-150%
	13C2-6:2FTS	93%	102%	87%	50-150%
	13C2-8:2FTS	85%	91%	77%	50-150%

* = Outside of Control Limits.

5.3.1
5

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA59818
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72913-MS	2Q24745.D	1	12/08/18	NG	12/06/18	OP72913	S2Q384
OP72913-MSD	2Q24746.D	1	12/08/18	NG	12/06/18	OP72913	S2Q384
FA59818-5	2Q24744.D	1	12/08/18	NG	12/06/18	OP72913	S2Q384

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59818-1, FA59818-2, FA59818-3, FA59818-4, FA59818-5, FA59818-6, FA59818-7, FA59818-8, FA59818-9, FA59818-10, FA59818-11, FA59818-12, FA59818-13, FA59818-14, FA59818-16, FA59818-17, FA59818-18, FA59818-19

CAS No.	Compound	FA59818-5 ug/l	Spike Q ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
375-22-4	Perfluorobutanoic acid	0.0117	0.08	0.0806	86	0.08	0.0905	99	12	70-130/30
2706-90-3	Perfluoropentanoic acid	0.0117	0.08	0.0813	87	0.08	0.0917	100	12	70-130/30
307-24-4	Perfluorohexanoic acid	0.00715	0.08	0.0697	78	0.08	0.0788	90	12	70-130/30
375-85-9	Perfluoroheptanoic acid	0.00183 J	0.08	0.0712	87	0.08	0.0781	95	9	71-130/30
335-67-1	Perfluorooctanoic acid	0.00161 J	0.08	0.0696	85	0.08	0.0785	96	12	74-130/30
375-95-1	Perfluorononanoic acid	ND	0.08	0.0683	85	0.08	0.0718	90	5	76-130/30
335-76-2	Perfluorodecanoic acid	ND	0.08	0.0637	80	0.08	0.0756	95	17	70-130/30
2058-94-8	Perfluoroundecanoic acid	ND	0.08	0.0723	90	0.08	0.0815	102	12	70-130/30
307-55-1	Perfluorododecanoic acid	ND	0.08	0.0708	89	0.08	0.0802	100	12	70-130/30
72629-94-8	Perfluorotridecanoic acid	ND	0.08	0.0732	92	0.08	0.0844	106	14	70-139/30
376-06-7	Perfluorotetradecanoic acid	ND	0.08	0.0656	82	0.08	0.0704	88	7	70-130/30
375-73-5	Perfluorobutanesulfonic acid	ND	0.0708	0.0610	86	0.0708	0.0684	97	11	73-130/30
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0752	0.0692	92	0.0752	0.0772	103	11	70-130/30
355-46-4	Perfluorohexanesulfonic acid	ND	0.0728	0.0597	82	0.0728	0.0663	91	10	74-130/30
375-92-8	Perfluoroheptanesulfonic acid	ND	0.076	0.0701	92	0.076	0.0779	103	11	74-130/30
1763-23-1	Perfluorooctanesulfonic acid	ND	0.074	0.0675	91	0.074	0.0750	101	11	70-130/30
68259-12-1	Perfluorononanesulfonic acid	ND	0.0768	0.0623	81	0.0768	0.0688	90	10	70-130/30
335-77-3	Perfluorodecanesulfonic acid	ND	0.0772	0.0437	57*	0.0772	0.0520	67*	17	70-130/30
754-91-6	PFOSA	ND	0.08	0.0697	87	0.08	0.0785	98	12	70-131/30
2355-31-9	MeFOSAA	ND	0.08	0.0726	91	0.08	0.0805	101	10	70-130/30
2991-50-6	EtFOSAA	ND	0.08	0.0698	87	0.08	0.0785	98	12	70-130/30
757124-72-44:2	Fluorotelomer sulfonate	ND	0.0748	0.0689	92	0.0748	0.0775	104	12	70-130/30
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.076	0.0703	93	0.076	0.0777	102	10	70-133/30
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0768	0.0667	87	0.0768	0.0739	96	10	70-130/30

CAS No.	ID Standard Recoveries	MS	MSD	FA59818-5	Limits
	13C4-PFBA	89%	83%	82%	30-140%
	13C5-PFPeA	91%	84%	84%	40-140%
	13C5-PFHxA	93%	86%	88%	50-150%
	13C4-PFHpA	97%	93%	92%	50-150%
	13C8-PFOA	103%	95%	98%	50-150%
	13C9-PFNA	104%	94%	97%	50-150%
	13C6-PFDA	99%	90%	91%	50-150%
	13C7-PFUnDA	78%	78%	75%	50-150%

* = Outside of Control Limits.

5.3.2
5

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA59818
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP72913-MS	2Q24745.D	1	12/08/18	NG	12/06/18	OP72913	S2Q384
OP72913-MSD	2Q24746.D	1	12/08/18	NG	12/06/18	OP72913	S2Q384
FA59818-5	2Q24744.D	1	12/08/18	NG	12/06/18	OP72913	S2Q384

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA59818-1, FA59818-2, FA59818-3, FA59818-4, FA59818-5, FA59818-6, FA59818-7, FA59818-8, FA59818-9, FA59818-10, FA59818-11, FA59818-12, FA59818-13, FA59818-14, FA59818-16, FA59818-17, FA59818-18, FA59818-19

CAS No.	ID Standard Recoveries	MS	MSD	FA59818-5	Limits
	13C2-PFDoDA	68%	67%	66%	50-150%
	13C2-PFTeDA	76%	71%	72%	40-150%
	13C3-PFBS	90%	84%	83%	50-150%
	13C3-PFHxS	95%	90%	89%	50-150%
	13C8-PFOS	97%	93%	91%	50-150%
	13C8-FOSA	123%	111%	118%	30-140%
	d3-MeFOSAA	114%	112%	110%	50-150%
	13C2-4:2FTS	99%	93%	88%	50-150%
	13C2-6:2FTS	112%	106%	102%	50-150%
	13C2-8:2FTS	107%	102%	95%	50-150%

* = Outside of Control Limits.

5.3.2
5

The results set forth herein are provided by SGS North America Inc.

e-Hardcopy 2.0
Automated Report

Technical Report for

Arcadis

Racer Lansing PFAS Delineation; Lansing, MI

B0064479.2018.03700

SGS Job Number: FA60008

Sampling Dates: 12/04/18 - 12/07/18

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Total number of pages in report: **68**



Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.

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Certifications: FL(E83510), LA(03051), KS(E-10327), IL(200063), NC(573), NJ(FL002), NY(12022), SC(96038001)
DoD ELAP(ANAB L2229), AZ(AZ0806), CA(2937), TX(T104704404), PA(68-03573), VA(460177),
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Test results relate only to samples analyzed.

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Sample Summary

Arcadis

Job No: FA60008

Racer Lansing PFAS Delineation; Lansing, MI
 Project No: B0064479.2018.03700

Sample Number	Collected		Matrix Received	Code	Type	Client Sample ID
	Date	Time By				
FA60008-1	12/04/18	14:35 AWDA	12/08/18	AQ	Ground Water	MW-91-2_120418
FA60008-2	12/05/18	10:45 AWDA	12/08/18	AQ	Ground Water	MW-02-04(3)_120518
FA60008-3	12/05/18	12:20 AWDA	12/08/18	AQ	Ground Water	MW-18-92_120518
FA60008-4	12/05/18	13:40 AWDA	12/08/18	AQ	Ground Water	MW-18-88_120518
FA60008-5	12/05/18	15:15 AWDA	12/08/18	AQ	Ground Water	MW-18-89_120518
FA60008-6	12/06/18	10:45 AWDA	12/08/18	AQ	Ground Water	MW-18-90_120618
FA60008-7	12/06/18	12:15 AWDA	12/08/18	AQ	Ground Water	MW-18-91_120618
FA60008-8	12/06/18	14:40 AWDA	12/08/18	AQ	Ground Water	CH-14-RO_120618
FA60008-9	12/06/18	00:00 AWDA	12/08/18	AQ	Ground Water	DUP-04
FA60008-10	12/07/18	11:40 AWDA	12/08/18	AQ	Ground Water	AS-17-05_120718
FA60008-11	12/07/18	12:50 AWDA	12/08/18	AQ	Ground Water	AS-17-04_120718
FA60008-12	12/07/18	14:20 AWDA	12/08/18	AQ	Ground Water	P6-MH2-SW_120718
FA60008-13	12/07/18	15:10 AWDA	12/08/18	AQ	Ground Water	P3-MH-NE_120718



Sample Summary

(continued)

Arcadis

Job No: FA60008

Racer Lansing PFAS Delineation; Lansing, MI
Project No: B0064479.2018.03700

Sample Number	Collected Date	Time By	Received	Matrix Code	Type	Client Sample ID
FA60008-14	12/07/18	15:40	AWDA12/08/18	AQ	Ground Water	P2-MH-NW_120718
FA60008-15	12/07/18	00:00	AWDA12/08/18	AQ	Ground Water	DUP-08_120718

Summary of Hits

Job Number: FA60008
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 12/04/18 thru 12/07/18

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
FA60008-1		MW-91-2_120418				
	Perfluoropentanoic acid	0.00157 J	0.0040	0.0015	ug/l	EPA 537M BY ID
	Perfluoropentanesulfonic acid	0.00156 J	0.0040	0.0010	ug/l	EPA 537M BY ID
	Perfluorohexanesulfonic acid	0.00145 J	0.0040	0.0010	ug/l	EPA 537M BY ID
	Perfluorooctanesulfonic acid	0.00582	0.0040	0.0015	ug/l	EPA 537M BY ID
FA60008-2		MW-02-04(3)_120518				
	Perfluorobutanoic acid	0.00266 J	0.0077	0.0019	ug/l	EPA 537M BY ID
FA60008-3		MW-18-92_120518				
	Perfluorobutanoic acid	0.00267 J	0.0077	0.0019	ug/l	EPA 537M BY ID
	Perfluoropentanoic acid	0.00156 J	0.0038	0.0014	ug/l	EPA 537M BY ID
	Perfluorooctanoic acid	0.00105 J	0.0038	0.00096	ug/l	EPA 537M BY ID
FA60008-4		MW-18-88_120518				
	Perfluorobutanoic acid	0.00596 J	0.0077	0.0019	ug/l	EPA 537M BY ID
	Perfluorooctanoic acid	0.00322 J	0.0038	0.00096	ug/l	EPA 537M BY ID
	Perfluorobutanesulfonic acid	0.00179 J	0.0038	0.00096	ug/l	EPA 537M BY ID
	Perfluorohexanesulfonic acid	0.00135 J	0.0038	0.00096	ug/l	EPA 537M BY ID
	Perfluorooctanesulfonic acid	0.106	0.0038	0.0014	ug/l	EPA 537M BY ID
FA60008-5		MW-18-89_120518				
	Perfluorobutanoic acid	0.0126	0.0080	0.0020	ug/l	EPA 537M BY ID
	Perfluoropentanoic acid	0.0145	0.0040	0.0015	ug/l	EPA 537M BY ID
	Perfluorohexanoic acid	0.0102	0.0040	0.0010	ug/l	EPA 537M BY ID
	Perfluoroheptanoic acid	0.00778	0.0040	0.0010	ug/l	EPA 537M BY ID
	Perfluorooctanoic acid	0.0214	0.0040	0.0010	ug/l	EPA 537M BY ID
	Perfluorononanoic acid	0.00229 J	0.0040	0.0010	ug/l	EPA 537M BY ID
	Perfluorodecanoic acid	0.00297 J	0.0040	0.0010	ug/l	EPA 537M BY ID
	Perfluorobutanesulfonic acid	0.00223 J	0.0040	0.0010	ug/l	EPA 537M BY ID
	Perfluoropentanesulfonic acid	0.00128 J	0.0040	0.0010	ug/l	EPA 537M BY ID
	Perfluorohexanesulfonic acid	0.00848	0.0040	0.0010	ug/l	EPA 537M BY ID
	Perfluoroheptanesulfonic acid	0.00705	0.0040	0.0010	ug/l	EPA 537M BY ID
	Perfluorooctanesulfonic acid	0.289	0.0040	0.0015	ug/l	EPA 537M BY ID
	Perfluorodecanesulfonic acid ^a	0.00248 J	0.0040	0.0010	ug/l	EPA 537M BY ID
FA60008-6		MW-18-90_120618				
	Perfluoropentanoic acid ^b	0.00618	0.0040	0.0015	ug/l	EPA 537M BY ID
	Perfluorohexanoic acid ^c	0.00614	0.0040	0.0010	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA60008
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 12/04/18 thru 12/07/18

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method	
		Perfluoroheptanoic acid ^c	0.00516	0.0040	0.0010	ug/l	EPA 537M BY ID
		Perfluorooctanoic acid ^c	0.0191	0.0040	0.0010	ug/l	EPA 537M BY ID
		Perfluorononanoic acid ^d	0.00155 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		Perfluorodecanoic acid ^c	0.00111 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		Perfluorobutanesulfonic acid ^c	0.00273 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		Perfluoropentanesulfonic acid ^c	0.00512	0.0040	0.0010	ug/l	EPA 537M BY ID
		Perfluorohexanesulfonic acid ^c	0.0360	0.0040	0.0010	ug/l	EPA 537M BY ID
		Perfluoroheptanesulfonic acid ^c	0.0549	0.0040	0.0010	ug/l	EPA 537M BY ID
		Perfluorooctanesulfonic acid ^c	0.940	0.040	0.015	ug/l	EPA 537M BY ID
FA60008-7		MW-18-91_120618					
		Perfluorobutanoic acid	0.0105	0.0077	0.0019	ug/l	EPA 537M BY ID
		Perfluoropentanoic acid	0.00649	0.0038	0.0014	ug/l	EPA 537M BY ID
		Perfluorohexanoic acid	0.00435	0.0038	0.00096	ug/l	EPA 537M BY ID
		Perfluoroheptanoic acid	0.00401	0.0038	0.00096	ug/l	EPA 537M BY ID
		Perfluorooctanoic acid	0.00899	0.0038	0.00096	ug/l	EPA 537M BY ID
		Perfluorononanoic acid	0.00133 J	0.0038	0.00096	ug/l	EPA 537M BY ID
		Perfluorodecanoic acid	0.00176 J	0.0038	0.00096	ug/l	EPA 537M BY ID
		Perfluorobutanesulfonic acid	0.00182 J	0.0038	0.00096	ug/l	EPA 537M BY ID
		Perfluorohexanesulfonic acid	0.00177 J	0.0038	0.00096	ug/l	EPA 537M BY ID
		Perfluorooctanesulfonic acid	0.0760	0.0038	0.0014	ug/l	EPA 537M BY ID
		Perfluorodecanesulfonic acid ^a	0.00529	0.0038	0.00096	ug/l	EPA 537M BY ID
		PFOSA	0.00212 J	0.0038	0.00096	ug/l	EPA 537M BY ID
FA60008-8		CH-14-RO_120618					
		Perfluorooctanoic acid	0.126 J	0.38	0.096	ug/l	EPA 537M BY ID
		Perfluorobutanesulfonic acid	0.102 J	0.38	0.096	ug/l	EPA 537M BY ID
		Perfluoropentanesulfonic acid	0.290 J	0.38	0.096	ug/l	EPA 537M BY ID
		Perfluorohexanesulfonic acid	1.54	0.38	0.096	ug/l	EPA 537M BY ID
		Perfluoroheptanesulfonic acid	0.651	0.38	0.096	ug/l	EPA 537M BY ID
		Perfluorooctanesulfonic acid	10.1	0.38	0.14	ug/l	EPA 537M BY ID
FA60008-9		DUP-04					
		Perfluorooctanoic acid	0.108 J	0.38	0.096	ug/l	EPA 537M BY ID
		Perfluorobutanesulfonic acid	0.120 J	0.38	0.096	ug/l	EPA 537M BY ID
		Perfluoropentanesulfonic acid	0.336 J	0.38	0.096	ug/l	EPA 537M BY ID
		Perfluorohexanesulfonic acid	1.78	0.38	0.096	ug/l	EPA 537M BY ID
		Perfluoroheptanesulfonic acid	0.758	0.38	0.096	ug/l	EPA 537M BY ID
		Perfluorooctanesulfonic acid	11.0	0.38	0.14	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA60008
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 12/04/18 thru 12/07/18

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Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
FA60008-10	AS-17-05_120718					
Perfluorobutanoic acid		0.00549 J	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.00256 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00473	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.00114 J	0.0040	0.0010	ug/l	EPA 537M BY ID
FA60008-11	AS-17-04_120718					
Perfluorobutanoic acid		0.00655 J	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.00640	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.00113 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00103 J	0.0040	0.0010	ug/l	EPA 537M BY ID
FA60008-12	P6-MH2-SW_120718					
Perfluorobutanoic acid		0.0167	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0253	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0232	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0207	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0394	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00303 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00217 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00186 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00126 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.0730	0.0040	0.0015	ug/l	EPA 537M BY ID
PFOSA		0.0141	0.0040	0.0010	ug/l	EPA 537M BY ID
FA60008-13	P3-MH-NE_120718					
Perfluorobutanoic acid ^c		0.00289 J	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluorooctanoic acid ^c		0.00163 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid ^c		0.00148 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid ^c		0.00161 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid ^c		0.0219 B	0.0040	0.0015	ug/l	EPA 537M BY ID
FA60008-14	P2-MH-NW_120718					
Perfluorobutanoic acid		0.0136	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0182	0.0038	0.0014	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0177	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0161	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0312	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00360 J	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00453	0.0038	0.00096	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA60008
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 12/04/18 thru 12/07/18

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
		0.00807	0.0038	0.00096	ug/l	EPA 537M BY ID
		0.00331 J	0.0038	0.00096	ug/l	EPA 537M BY ID
		0.0220	0.0038	0.00096	ug/l	EPA 537M BY ID
		0.00196 J	0.0038	0.00096	ug/l	EPA 537M BY ID
		0.176	0.0038	0.0014	ug/l	EPA 537M BY ID
		0.00221 J	0.0077	0.0019	ug/l	EPA 537M BY ID

FA60008-15 DUP-08_120718

		0.0162	0.0080	0.0020	ug/l	EPA 537M BY ID
		0.0243	0.0040	0.0015	ug/l	EPA 537M BY ID
		0.0216	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.0193	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.0374	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00304 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00205 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00200 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00103 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.0620	0.0040	0.0015	ug/l	EPA 537M BY ID
		0.0133	0.0040	0.0010	ug/l	EPA 537M BY ID

- (a) Associated BS recovery outside control limits.
- (b) Insufficient sample for re-extraction. Associated ID Standard outside control limits.
- (c) Insufficient sample for re-extraction.
- (d) Insufficient sample for re-extraction. Associated BS recovery outside control limits.

Sample Results

Report of Analysis

Report of Analysis

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Client Sample ID: MW-91-2_120418		Date Sampled: 12/04/18
Lab Sample ID: FA60008-1		Date Received: 12/08/18
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	94%		30-140%
	13C5-PFPeA	99%		40-140%
	13C5-PFHxA	103%		50-150%
	13C4-PFHpA	107%		50-150%
	13C8-PFOA	126%		50-150%
	13C9-PFNA	111%		50-150%
	13C6-PFDA	103%		50-150%
	13C7-PFUnDA	102%		50-150%
	13C2-PFDoDA	77%		50-150%
	13C2-PFTeDA	84%		40-150%
	13C3-PFBS	95%		50-150%
	13C3-PFHxS	100%		50-150%
	13C8-PFOS	83%		50-150%
	13C8-FOSA	95%		30-140%
	d3-MeFOSAA	84%		50-150%
	13C2-4:2FTS	110%		50-150%
	13C2-6:2FTS	119%		50-150%
	13C2-8:2FTS	94%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

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Client Sample ID: MW-02-04(3)_120518		Date Sampled: 12/05/18
Lab Sample ID: FA60008-2		Date Received: 12/08/18
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	100%		30-140%
	13C5-PFPeA	107%		40-140%
	13C5-PFHxA	115%		50-150%
	13C4-PFHpA	115%		50-150%
	13C8-PFOA	121%		50-150%
	13C9-PFNA	107%		50-150%
	13C6-PFDA	106%		50-150%
	13C7-PFUnDA	103%		50-150%
	13C2-PFDoDA	94%		50-150%
	13C2-PFTeDA	91%		40-150%
	13C3-PFBS	105%		50-150%
	13C3-PFHxS	105%		50-150%
	13C8-PFOS	90%		50-150%
	13C8-FOSA	100%		30-140%
	d3-MeFOSAA	92%		50-150%
	13C2-4:2FTS	109%		50-150%
	13C2-6:2FTS	112%		50-150%
	13C2-8:2FTS	90%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: MW-18-92_120518	
Lab Sample ID: FA60008-3	Date Sampled: 12/05/18
Matrix: AQ - Ground Water	Date Received: 12/08/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	76%		30-140%
	13C5-PFPeA	83%		40-140%
	13C5-PFHxA	91%		50-150%
	13C4-PFHpA	92%		50-150%
	13C8-PFOA	105%		50-150%
	13C9-PFNA	98%		50-150%
	13C6-PFDA	88%		50-150%
	13C7-PFUnDA	95%		50-150%
	13C2-PFDoDA	68%		50-150%
	13C2-PFTeDA	74%		40-150%
	13C3-PFBS	79%		50-150%
	13C3-PFHxS	84%		50-150%
	13C8-PFOS	78%		50-150%
	13C8-FOSA	94%		30-140%
	d3-MeFOSAA	79%		50-150%
	13C2-4:2FTS	90%		50-150%
	13C2-6:2FTS	102%		50-150%
	13C2-8:2FTS	84%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: MW-18-88_120518	
Lab Sample ID: FA60008-4	Date Sampled: 12/05/18
Matrix: AQ - Ground Water	Date Received: 12/08/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	98%		30-140%
	13C5-PFPeA	101%		40-140%
	13C5-PFHxA	104%		50-150%
	13C4-PFHpA	109%		50-150%
	13C8-PFOA	125%		50-150%
	13C9-PFNA	109%		50-150%
	13C6-PFDA	97%		50-150%
	13C7-PFUnDA	97%		50-150%
	13C2-PFDoDA	71%		50-150%
	13C2-PFTeDA	74%		40-150%
	13C3-PFBS	98%		50-150%
	13C3-PFHxS	101%		50-150%
	13C8-PFOS	86%		50-150%
	13C8-FOSA	94%		30-140%
	d3-MeFOSAA	77%		50-150%
	13C2-4:2FTS	103%		50-150%
	13C2-6:2FTS	119%		50-150%
	13C2-8:2FTS	94%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: MW-18-89_120518		
Lab Sample ID: FA60008-5		Date Sampled: 12/05/18
Matrix: AQ - Ground Water		Date Received: 12/08/18
Method: EPA 537M BY ID EPA 537 MOD		Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q25515.D	1	12/24/18 18:57	NAF	12/19/18 09:00	OP73096	S2Q395
Run #2							

Run #	Initial Volume	Final Volume
Run #1	250 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0126	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0145	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0102	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.00778	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0214	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00229	0.0040	0.0010	ug/l	J
335-76-2	Perfluorodecanoic acid	0.00297	0.0040	0.0010	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00223	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	0.00128	0.0040	0.0010	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	0.00848	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.00705	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.289	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid ^a	0.00248	0.0040	0.0010	ug/l	J
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

ND = Not detected

MDL = Method Detection Limit

J = Indicates an estimated value

RL = Reporting Limit

B = Indicates analyte found in associated method blank

E = Indicates value exceeds calibration range

N = Indicates presumptive evidence of a compound

Report of Analysis

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Client Sample ID: MW-18-89_120518		Date Sampled: 12/05/18
Lab Sample ID: FA60008-5		Date Received: 12/08/18
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	86%		30-140%
	13C5-PFPeA	94%		40-140%
	13C5-PFHxA	98%		50-150%
	13C4-PFHpA	103%		50-150%
	13C8-PFOA	114%		50-150%
	13C9-PFNA	114%		50-150%
	13C6-PFDA	109%		50-150%
	13C7-PFUnDA	113%		50-150%
	13C2-PFD _o DA	102%		50-150%
	13C2-PFTeDA	93%		40-150%
	13C3-PFBS	94%		50-150%
	13C3-PFHxS	95%		50-150%
	13C8-PFOS	98%		50-150%
	13C8-FOSA	64%		30-140%
	d3-MeFOSAA	105%		50-150%
	13C2-4:2FTS	102%		50-150%
	13C2-6:2FTS	115%		50-150%
	13C2-8:2FTS	112%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-18-90_120618	Date Sampled:	12/06/18
Lab Sample ID:	FA60008-6	Date Received:	12/08/18
Matrix:	AQ - Ground Water	Percent Solids:	n/a
Method:	EPA 537M BY ID EPA 537 MOD		
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 ^a	2Q25394.D	1	12/21/18 15:21	NAF	12/19/18 09:00	OP73096	S2Q394
Run #2 ^a	2Q25517.D	10	12/24/18 19:28	NAF	12/19/18 09:00	OP73096	S2Q395
Run #3 ^b	2Q25516.D	1	12/24/18 19:12	NAF	12/19/18 09:00	OP73096	S2Q395

	Initial Volume	Final Volume
Run #1	250 ml	1.0 ml
Run #2	250 ml	1.0 ml
Run #3	250 ml	1.0 ml

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
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PERFLUOROALKYL CARBOXYLIC ACIDS

375-22-4	Perfluorobutanoic acid ^c	ND	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid ^c	0.00618	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.00614	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.00516	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0191	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid ^d	0.00155	0.0040	0.0010	ug/l	J
335-76-2	Perfluorodecanoic acid	0.00111	0.0040	0.0010	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	

PERFLUOROALKYL SULFONATES

375-73-5	Perfluorobutanesulfonic acid	0.00273	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	0.00512	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.0360	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.0549	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.940 ^e	0.040	0.015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	

PERFLUOROCTANESULFONAMIDES

754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
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PERFLUOROCTANESULFONAMIDOACETIC ACIDS

2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	

FLUOROTELOMER SULFONATES

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: MW-18-90_120618		Date Sampled: 12/06/18
Lab Sample ID: FA60008-6		Date Received: 12/08/18
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Run# 3	Limits
	13C4-PFBA	3% ^f	3% ^f	3% ^f	30-140%
	13C5-PFPeA	35% ^f	37% ^f	36% ^f	40-140%
	13C5-PFHxA	91%	104%	97%	50-150%
	13C4-PFHpA	93%	109%	102%	50-150%
	13C8-PFOA	94%	107%	102%	50-150%
	13C9-PFNA	86%	107%	92%	50-150%
	13C6-PFDA	73%	94%	77%	50-150%
	13C7-PFUnDA	63%	91%	63%	50-150%
	13C2-PFDoDA	70%	85%	77%	50-150%
	13C2-PFTeDA	81%	78%	80%	40-150%
	13C3-PFBS	91%	102%	98%	50-150%
	13C3-PFHxS	85%	102%	92%	50-150%
	13C8-PFOS	72%	89%	78%	50-150%
	13C8-FOSA	62%	113%	52%	30-140%
	d3-MeFOSAA	68%	82%	74%	50-150%
	13C2-4:2FTS	91%	97%	96%	50-150%
	13C2-6:2FTS	98%	103%	100%	50-150%
	13C2-8:2FTS	72%	93%	76%	50-150%

- (a) Insufficient sample for re-extraction.
- (b) Confirmation run for internal standard areas.
- (c) Associated ID Standard outside control limits.
- (d) Associated BS recovery outside control limits.
- (e) Result is from Run# 2
- (f) Outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: MW-18-91_120618		Date Sampled: 12/06/18
Lab Sample ID: FA60008-7		Date Received: 12/08/18
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	81%		30-140%
	13C5-PFPeA	86%		40-140%
	13C5-PFHxA	90%		50-150%
	13C4-PFHpA	93%		50-150%
	13C8-PFOA	106%		50-150%
	13C9-PFNA	107%		50-150%
	13C6-PFDA	101%		50-150%
	13C7-PFUnDA	83%		50-150%
	13C2-PFDoDA	73%		50-150%
	13C2-PFTeDA	78%		40-150%
	13C3-PFBS	85%		50-150%
	13C3-PFHxS	87%		50-150%
	13C8-PFOS	90%		50-150%
	13C8-FOSA	56%		30-140%
	d3-MeFOSAA	101%		50-150%
	13C2-4:2FTS	93%		50-150%
	13C2-6:2FTS	108%		50-150%
	13C2-8:2FTS	103%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CH-14-RO_120618		
Lab Sample ID: FA60008-8		Date Sampled: 12/06/18
Matrix: AQ - Ground Water		Date Received: 12/08/18
Method: EPA 537M BY ID EPA 537 MOD		Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q25519.D	100	12/24/18 20:00	NAF	12/19/18 09:00	OP73096	S2Q395
Run #2							

Run #	Initial Volume	Final Volume
Run #1	260 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND	0.77	0.19	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.38	0.14	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.38	0.096	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.38	0.096	ug/l	
335-67-1	Perfluorooctanoic acid	0.126	0.38	0.096	ug/l	J
375-95-1	Perfluorononanoic acid	ND	0.38	0.096	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.38	0.096	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.38	0.096	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.38	0.14	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.38	0.096	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.38	0.096	ug/l	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.102	0.38	0.096	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	0.290	0.38	0.096	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	1.54	0.38	0.096	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.651	0.38	0.096	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	10.1	0.38	0.14	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.38	0.096	ug/l	
335-77-3	Perfluorodecanesulfonic acid ^a	ND	0.38	0.096	ug/l	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.38	0.096	ug/l	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	1.9	0.38	ug/l	
2991-50-6	EtFOSAA	ND	1.9	0.38	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.77	0.19	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.77	0.19	ug/l	

ND = Not detected

MDL = Method Detection Limit

J = Indicates an estimated value

RL = Reporting Limit

B = Indicates analyte found in associated method blank

E = Indicates value exceeds calibration range

N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CH-14-RO_120618		Date Sampled: 12/06/18
Lab Sample ID: FA60008-8		Date Received: 12/08/18
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.77	0.19	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	98%		30-140%
	13C5-PFPeA	104%		40-140%
	13C5-PFHxA	108%		50-150%
	13C4-PFHpA	105%		50-150%
	13C8-PFOA	107%		50-150%
	13C9-PFNA	110%		50-150%
	13C6-PFDA	117%		50-150%
	13C7-PFUnDA	110%		50-150%
	13C2-PFDODA	110%		50-150%
	13C2-PFTeDA	107%		40-150%
	13C3-PFBS	102%		50-150%
	13C3-PFHxS	103%		50-150%
	13C8-PFOS	106%		50-150%
	13C8-FOSA	117%		30-140%
	d3-MeFOSAA	104%		50-150%
	13C2-4:2FTS	99%		50-150%
	13C2-6:2FTS	100%		50-150%
	13C2-8:2FTS	102%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound



Report of Analysis

Client Sample ID: DUP-04		
Lab Sample ID: FA60008-9		Date Sampled: 12/06/18
Matrix: AQ - Ground Water		Date Received: 12/08/18
Method: EPA 537M BY ID EPA 537 MOD		Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q25520.D	100	12/24/18 20:15	NAF	12/19/18 09:00	OP73096	S2Q395
Run #2							

Run #	Initial Volume	Final Volume
Run #1	260 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND	0.77	0.19	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.38	0.14	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.38	0.096	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.38	0.096	ug/l	
335-67-1	Perfluorooctanoic acid	0.108	0.38	0.096	ug/l	J
375-95-1	Perfluorononanoic acid	ND	0.38	0.096	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.38	0.096	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.38	0.096	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.38	0.14	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.38	0.096	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.38	0.096	ug/l	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.120	0.38	0.096	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	0.336	0.38	0.096	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	1.78	0.38	0.096	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.758	0.38	0.096	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	11.0	0.38	0.14	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.38	0.096	ug/l	
335-77-3	Perfluorodecanesulfonic acid ^a	ND	0.38	0.096	ug/l	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.38	0.096	ug/l	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	1.9	0.38	ug/l	
2991-50-6	EtFOSAA	ND	1.9	0.38	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.77	0.19	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.77	0.19	ug/l	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: DUP-04		Date Sampled: 12/06/18
Lab Sample ID: FA60008-9		Date Received: 12/08/18
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.77	0.19	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	95%		30-140%
	13C5-PFPeA	99%		40-140%
	13C5-PFHxA	103%		50-150%
	13C4-PFHpA	102%		50-150%
	13C8-PFOA	103%		50-150%
	13C9-PFNA	105%		50-150%
	13C6-PFDA	112%		50-150%
	13C7-PFUnDA	109%		50-150%
	13C2-PFD _o DA	107%		50-150%
	13C2-PFTeDA	100%		40-150%
	13C3-PFBS	98%		50-150%
	13C3-PFHxS	98%		50-150%
	13C8-PFOS	101%		50-150%
	13C8-FOSA	112%		30-140%
	d3-MeFOSAA	97%		50-150%
	13C2-4:2FTS	95%		50-150%
	13C2-6:2FTS	95%		50-150%
	13C2-8:2FTS	99%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: AS-17-05_120718	
Lab Sample ID: FA60008-10	Date Sampled: 12/07/18
Matrix: AQ - Ground Water	Date Received: 12/08/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q25523.D	1	12/24/18 21:02	NAF	12/19/18 09:00	OP73096	S2Q395
Run #2							

Run #	Initial Volume	Final Volume
Run #1	250 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.00549	0.0080	0.0020	ug/l	J
2706-90-3	Perfluoropentanoic acid	ND	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.00256	0.0040	0.0010	ug/l	J
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00473	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.00114	0.0040	0.0010	ug/l	J
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid ^a	ND	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: AS-17-05_120718	
Lab Sample ID: FA60008-10	Date Sampled: 12/07/18
Matrix: AQ - Ground Water	Date Received: 12/08/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	71%		30-140%
	13C5-PFPeA	80%		40-140%
	13C5-PFHxA	91%		50-150%
	13C4-PFHpA	89%		50-150%
	13C8-PFOA	98%		50-150%
	13C9-PFNA	97%		50-150%
	13C6-PFDA	91%		50-150%
	13C7-PFUnDA	86%		50-150%
	13C2-PFDoDA	59%		50-150%
	13C2-PFTeDA	56%		40-150%
	13C3-PFBS	86%		50-150%
	13C3-PFHxS	94%		50-150%
	13C8-PFOS	90%		50-150%
	13C8-FOSA	41%		30-140%
	d3-MeFOSAA	74%		50-150%
	13C2-4:2FTS	93%		50-150%
	13C2-6:2FTS	99%		50-150%
	13C2-8:2FTS	97%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: AS-17-04_120718	
Lab Sample ID: FA60008-11	Date Sampled: 12/07/18
Matrix: AQ - Ground Water	Date Received: 12/08/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	77%		30-140%
	13C5-PFPeA	83%		40-140%
	13C5-PFHxA	94%		50-150%
	13C4-PFHpA	98%		50-150%
	13C8-PFOA	104%		50-150%
	13C9-PFNA	108%		50-150%
	13C6-PFDA	101%		50-150%
	13C7-PFUnDA	88%		50-150%
	13C2-PFDoDA	67%		50-150%
	13C2-PFTeDA	57%		40-150%
	13C3-PFBS	85%		50-150%
	13C3-PFHxS	93%		50-150%
	13C8-PFOS	89%		50-150%
	13C8-FOSA	49%		30-140%
	d3-MeFOSAA	75%		50-150%
	13C2-4:2FTS	91%		50-150%
	13C2-6:2FTS	105%		50-150%
	13C2-8:2FTS	120%		50-150%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: P6-MH2-SW_120718	
Lab Sample ID: FA60008-12	Date Sampled: 12/07/18
Matrix: AQ - Ground Water	Date Received: 12/08/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q25403.D	1	12/21/18 17:43	NAF	12/19/18 09:00	OP73096	S2Q394
Run #2	2Q25526.D	1	12/24/18 21:50	NAF	12/19/18 09:00	OP73096	S2Q395

Run #	Initial Volume	Final Volume
Run #1	250 ml	1.0 ml
Run #2	250 ml	1.0 ml

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0167	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0253	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0232	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0207	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0394	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00303 ^a	0.0040	0.0010	ug/l	J
335-76-2	Perfluorodecanoic acid	0.00217	0.0040	0.0010	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00186	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00126	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0730	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	0.0141	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: P6-MH2-SW_120718		Date Sampled: 12/07/18
Lab Sample ID: FA60008-12		Date Received: 12/08/18
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	86%	92%	30-140%
	13C5-PFPeA	89%	96%	40-140%
	13C5-PFHxA	93%	102%	50-150%
	13C4-PFHpA	96%	107%	50-150%
	13C8-PFOA	110%	116%	50-150%
	13C9-PFNA	105%	115%	50-150%
	13C6-PFDA	91%	94%	50-150%
	13C7-PFUnDA	90%	92%	50-150%
	13C2-PFDoDA	65%	78%	50-150%
	13C2-PFTeDA	73%	74%	40-150%
	13C3-PFBS	86%	94%	50-150%
	13C3-PFHxS	91%	97%	50-150%
	13C8-PFOS	82%	88%	50-150%
	13C8-FOSA	96%	100%	30-140%
	d3-MeFOSAA	73%	79%	50-150%
	13C2-4:2FTS	95%	97%	50-150%
	13C2-6:2FTS	113%	114%	50-150%
	13C2-8:2FTS	91%	94%	50-150%

(a) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: P3-MH-NE_120718	
Lab Sample ID: FA60008-13	Date Sampled: 12/07/18
Matrix: AQ - Ground Water	Date Received: 12/08/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	90%		30-140%
	13C5-PFPeA	91%		40-140%
	13C5-PFHxA	98%		50-150%
	13C4-PFHpA	101%		50-150%
	13C8-PFOA	112%		50-150%
	13C9-PFNA	105%		50-150%
	13C6-PFDA	90%		50-150%
	13C7-PFUnDA	80%		50-150%
	13C2-PFDoDA	75%		50-150%
	13C2-PFTeDA	81%		40-150%
	13C3-PFBS	90%		50-150%
	13C3-PFHxS	90%		50-150%
	13C8-PFOS	72%		50-150%
	13C8-FOSA	91%		30-140%
	d3-MeFOSAA	68%		50-150%
	13C2-4:2FTS	90%		50-150%
	13C2-6:2FTS	99%		50-150%
	13C2-8:2FTS	83%		50-150%

- (a) Insufficient sample for re-extraction.
- (b) Associated BS recovery outside control limits.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound



Report of Analysis

Client Sample ID: P2-MH-NW_120718	
Lab Sample ID: FA60008-14	Date Sampled: 12/07/18
Matrix: AQ - Ground Water	Date Received: 12/08/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	74%	80%	30-140%
	13C5-PFPeA	77%	84%	40-140%
	13C5-PFHxA	78%	87%	50-150%
	13C4-PFHpA	80%	91%	50-150%
	13C8-PFOA	89%	100%	50-150%
	13C9-PFNA	85%	99%	50-150%
	13C6-PFDA	80%	84%	50-150%
	13C7-PFUnDA	71%	75%	50-150%
	13C2-PFDoDA	59%	69%	50-150%
	13C2-PFTeDA	66%	71%	40-150%
	13C3-PFBS	73%	81%	50-150%
	13C3-PFHxS	73%	82%	50-150%
	13C8-PFOS	73%	79%	50-150%
	13C8-FOSA	69%	61%	30-140%
	d3-MeFOSAA	67%	74%	50-150%
	13C2-4:2FTS	81%	87%	50-150%
	13C2-6:2FTS	95%	101%	50-150%
	13C2-8:2FTS	79%	83%	50-150%

(a) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: DUP-08_120718		
Lab Sample ID: FA60008-15		Date Sampled: 12/07/18
Matrix: AQ - Ground Water		Date Received: 12/08/18
Method: EPA 537M BY ID EPA 537 MOD		Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q25407.D	1	12/21/18 18:46	NAF	12/19/18 09:00	OP73096	S2Q394
Run #2	2Q25528.D	1	12/24/18 22:21	NAF	12/19/18 09:00	OP73096	S2Q395

Run #	Initial Volume	Final Volume
Run #1	250 ml	1.0 ml
Run #2	250 ml	1.0 ml

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0162	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0243	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0216	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0193	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0374	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00304 ^a	0.0040	0.0010	ug/l	J
335-76-2	Perfluorodecanoic acid	0.00205	0.0040	0.0010	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00200	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00103	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0620	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	0.0133	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: DUP-08_120718	
Lab Sample ID: FA60008-15	Date Sampled: 12/07/18
Matrix: AQ - Ground Water	Date Received: 12/08/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	84%	89%	30-140%
	13C5-PFPeA	87%	93%	40-140%
	13C5-PFHxA	88%	98%	50-150%
	13C4-PFHpA	94%	103%	50-150%
	13C8-PFOA	99%	113%	50-150%
	13C9-PFNA	102%	111%	50-150%
	13C6-PFDA	96%	101%	50-150%
	13C7-PFUnDA	108%	107%	50-150%
	13C2-PFDoDA	81%	91%	50-150%
	13C2-PFTeDA	84%	89%	40-150%
	13C3-PFBS	83%	91%	50-150%
	13C3-PFHxS	88%	94%	50-150%
	13C8-PFOS	95%	100%	50-150%
	13C8-FOSA	82%	89%	30-140%
	d3-MeFOSAA	88%	96%	50-150%
	13C2-4:2FTS	92%	94%	50-150%
	13C2-6:2FTS	105%	111%	50-150%
	13C2-8:2FTS	98%	104%	50-150%

(a) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody



SGS North America Inc - Orlando
Chain of Custody

4405 Vineland Road, Suite C-15 Orlando, FL 32811
TEL: 407-425-6700 FAX: 407-425-0707
www.sgs.com

FA60008

SGS - ORLANDO JOB # : PAGE 2 OF 2

Client / Reporting Information		Project Information		Analytical Information										Matrix Codes					
Company Name: ARANDS of Michigan LLC		Project Name: River Lenses												DW - Drinking Water					
Address: 3850 Cabot Dr. SE 500		Street												GW - Ground Water					
City: Novi State: MI Zip: 48321		City: LANSING State: MI												WW - Water SW - Surface Water					
Project Contact: Christine Gregg Email: christine.gregg@arands.com		Project # B0064479.0018.0370												Water					
Phone #: 248-483-6634		Fax # 248-494-2241												SO - Soil					
Sampler(s) Name(s) (Printed)		Client Purchase Order #												SL - Sludge					
Sampler 1: Ansicht Westh...		B0064479.0018.0370												OI - Oil					
Sampler 2: Dale A...														LIQ - Other Liquid					
														AIR - Air					
														SOL - Other Solid					
SGS Orlando Sample #		Field ID / Point of Collection		COLLECTION		CONTAINER INFORMATION										LAB USE ONLY			
				DATE	TIME	SAMPLED BY:	MATRIX	TOTAL # OF BOTTLES	OTHER	NOISE	NO3	NO2	PHOS	PERC	ANION-ZN4	D WATER	MEDI		
13		P3-MH-NE-120718		11/7/18	1510	DA	GW	2	2									X	
14		P3-MH-NW-120718		12/7/18	1540	DA	GW	2	2									X	
15		Dup-08-120718		11/7/18	-	DA	GW	2	2									X	
Turnaround Time (Business days)		Data Deliverable Information		Comments / Remarks															
10 Day (Business) Approved By / Date:		<input type="checkbox"/> COMMERCIAL "A" (RESULTS ONLY) <input type="checkbox"/> COMMERCIAL "B" (RESULTS PLUS QC) <input type="checkbox"/> REDT1 (EPA LEVEL 3) <input type="checkbox"/> FULLT1 (EPA LEVEL 4) <input type="checkbox"/> EDD'S		* PFAS method 537 mod. w/ isotope dilution per ASM S1 MDEQ D4-comp and list															
7 Day																			
5 Day																			
3 Day RUSH																			
2 Day RUSH																			
1 Day RUSH																			
Other																			
Rush T/A Data Available VIA Email or Lablink		Sample Custody must be documented below each time samples change possession, including courier delivery.																	
Relinquished by/Sampler/Affiliation		Date Time:		Received By/Affiliation		Date Time:		Relinquished By/Affiliation		Date Time:		Received By/Affiliation		Date Time:		Received By/Affiliation		Date Time:	
1 [Signature] / ARANDS		11/7/18 1700		2 [Signature]				3 [Signature]				4 [Signature]		12/8/18		1000			
5				6				7				8							
Lab Use Only : Cooler Temperature (s) Celsius (corrected):		16.2		http://www.sgs.com/en/terms-and-conditions															

ORLD-SMT-0001-03-FORM-COC (1) Rev 031318

FA60008: Chain of Custody

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SGS Sample Receipt Summary

Job Number: FA60008

Client: ARCADIS OF MICHIGAN

Project: RACER LANSING

Date / Time Received: 12/8/2018 10:00:00 AM

Delivery Method: FX

Airbill #s: 1002241571060003281100813921966404

Therm ID: IR 1;

Therm CF: -0.2;

of Coolers: 1

Cooler Temps (Raw Measured) °C: Cooler 1: (1.4);

Cooler Temps (Corrected) °C: Cooler 1: (1.2);

Cooler Information

Y or N

- 1. Custody Seals Present
- 2. Custody Seals Intact
- 3. Temp criteria achieved
- 4. Cooler temp verification IR Gun
- 5. Cooler media Ice (Bag)

Trip Blank Information

Y or N N/A

- 1. Trip Blank present / cooler
 - 2. Trip Blank listed on COC
- W or S N/A
- 3. Type Of TB Received

Sample Information

Y or N N/A

- 1. Sample labels present on bottles
- 2. Samples preserved properly
- 3. Sufficient volume/containers recvd for analysis:
- 4. Condition of sample Intact
- 5. Sample recvd within HT
- 6. Dates/Times/IDs on COC match Sample Label
- 7. VOCs have headspace
- 8. Bottles received for unspecified tests
- 9. Compositing instructions clear
- 10. Voa Soil Kits/Jars received past 48hrs?
- 11. % Solids Jar received?
- 12. Residual Chlorine Present?

Misc. Information

Number of Encores: 25-Gram _____ 5-Gram _____

Number of 5035 Field Kits: _____

Number of Lab Filtered Metals: _____

Test Strip Lot #s: pH 0-3 _____ 230315 _____

pH 10-12 _____ 219813A _____

Other: (Specify) _____

Residual Chlorine Test Strip Lot #: _____

Comments

SM001
Rev. Date 05/24/17

Technician: PETERH

Date: 12/8/2018 10:00:00 A

Reviewer: _____

Date: _____

FA60008: Chain of Custody

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MS Semi-volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73096-MB	2Q25388.D	1	12/21/18	NAF	12/19/18	OP73096	S2Q394

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60008-1, FA60008-2, FA60008-3, FA60008-4, FA60008-5, FA60008-6, FA60008-7, FA60008-8, FA60008-9, FA60008-10, FA60008-11, FA60008-12, FA60008-14, FA60008-15

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
757124-72-44:2	Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Limits
	13C4-PFBA	98% 30-140%
	13C5-PFPeA	97% 40-140%
	13C5-PFHxA	99% 50-150%
	13C4-PFHpA	101% 50-150%
	13C8-PFOA	117% 50-150%
	13C9-PFNA	106% 50-150%
	13C6-PFDA	90% 50-150%
	13C7-PFUnDA	88% 50-150%

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Method Blank Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73096-MB	2Q25388.D	1	12/21/18	NAF	12/19/18	OP73096	S2Q394

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60008-1, FA60008-2, FA60008-3, FA60008-4, FA60008-5, FA60008-6, FA60008-7, FA60008-8, FA60008-9, FA60008-10, FA60008-11, FA60008-12, FA60008-14, FA60008-15

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	62% 50-150%
	13C2-PFTeDA	66% 40-150%
	13C3-PFBS	95% 50-150%
	13C3-PFHxS	96% 50-150%
	13C8-PFOS	79% 50-150%
	13C8-FOSA	99% 30-140%
	d3-MeFOSAA	72% 50-150%
	13C2-4:2FTS	94% 50-150%
	13C2-6:2FTS	112% 50-150%
	13C2-8:2FTS	81% 50-150%

Method Blank Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73191-MB	2Q25692.D	1	12/27/18	NAF	12/26/18	OP73191	S2Q397

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60008-13

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.015	0.0038	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0077	0.0029	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0077	0.0019	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0077	0.0019	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0077	0.0019	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0077	0.0019	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0077	0.0019	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0077	0.0019	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0077	0.0029	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0077	0.0019	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0077	0.0019	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0077	0.0019	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0077	0.0019	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0077	0.0019	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0077	0.0019	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.00546	0.0077	0.0029	ug/l	J
68259-12-1	Perfluorononanesulfonic acid	ND	0.0077	0.0019	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0077	0.0019	ug/l	
754-91-6	PFOSA	ND	0.0077	0.0019	ug/l	
2355-31-9	MeFOSAA	ND	0.038	0.0077	ug/l	
2991-50-6	EtFOSAA	ND	0.038	0.0077	ug/l	
757124-72-44:2	Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	

CAS No.	ID Standard Recoveries	Limits
	13C4-PFBA	102% 30-140%
	13C5-PFPeA	107% 40-140%
	13C5-PFHxA	111% 50-150%
	13C4-PFHpA	110% 50-150%
	13C8-PFOA	116% 50-150%
	13C9-PFNA	114% 50-150%
	13C6-PFDA	109% 50-150%
	13C7-PFUnDA	101% 50-150%

5.1.2
5

Method Blank Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73191-MB	2Q25692.D	1	12/27/18	NAF	12/26/18	OP73191	S2Q397

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60008-13

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	84% 50-150%
	13C2-PFTeDA	80% 40-150%
	13C3-PFBS	102% 50-150%
	13C3-PFHxS	104% 50-150%
	13C8-PFOS	102% 50-150%
	13C8-FOSA	108% 30-140%
	d3-MeFOSAA	86% 50-150%
	13C2-4:2FTS	103% 50-150%
	13C2-6:2FTS	107% 50-150%
	13C2-8:2FTS	96% 50-150%

Method Blank Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73191-MB	2Q25757.D	1	12/28/18	NAF	12/26/18	OP73191	S2Q397

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60008-13

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.015	0.0038	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0077	0.0029	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0077	0.0019	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0077	0.0019	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0077	0.0019	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0077	0.0019	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0077	0.0019	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0077	0.0019	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0077	0.0029	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0077	0.0019	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0077	0.0019	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0077	0.0019	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0077	0.0019	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0077	0.0019	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0077	0.0019	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.00578	0.0077	0.0029	ug/l	J
68259-12-1	Perfluorononanesulfonic acid	ND	0.0077	0.0019	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0077	0.0019	ug/l	
754-91-6	PFOSA	ND	0.0077	0.0019	ug/l	
2355-31-9	MeFOSAA	ND	0.038	0.0077	ug/l	
2991-50-6	EtFOSAA	ND	0.038	0.0077	ug/l	
757124-72-44:2	Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	

CAS No.	ID Standard Recoveries	Limits
	13C4-PFBA	104% 30-140%
	13C5-PFPeA	110% 40-140%
	13C5-PFHxA	114% 50-150%
	13C4-PFHpA	111% 50-150%
	13C8-PFOA	120% 50-150%
	13C9-PFNA	120% 50-150%
	13C6-PFDA	118% 50-150%
	13C7-PFUnDA	101% 50-150%

Method Blank Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73191-MB	2Q25757.D	1	12/28/18	NAF	12/26/18	OP73191	S2Q397

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60008-13

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	86% 50-150%
	13C2-PFTeDA	87% 40-150%
	13C3-PFBS	106% 50-150%
	13C3-PFHxS	107% 50-150%
	13C8-PFOS	104% 50-150%
	13C8-FOSA	113% 30-140%
	d3-MeFOSAA	99% 50-150%
	13C2-4:2FTS	108% 50-150%
	13C2-6:2FTS	115% 50-150%
	13C2-8:2FTS	103% 50-150%

Instrument Blank

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q394-IBLK	2Q25384.D	1	12/21/18	NAF	n/a	n/a	S2Q394

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA60008-1, FA60008-3, FA60008-4, FA60008-6, FA60008-12, FA60008-14, FA60008-15

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.015	0.0038	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0077	0.0029	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0077	0.0019	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0077	0.0019	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0077	0.0019	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0077	0.0019	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0077	0.0019	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0077	0.0019	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0077	0.0029	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0077	0.0019	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0077	0.0019	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0077	0.0019	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0077	0.0019	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0077	0.0019	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0077	0.0019	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.015	0.0038	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0077	0.0019	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0077	0.0019	ug/l	
754-91-6	PFOSA	ND	0.0077	0.0019	ug/l	
2355-31-9	MeFOSAA	ND	0.038	0.0077	ug/l	
2991-50-6	EtFOSAA	ND	0.038	0.0077	ug/l	
757124-72-44:2	Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	

CAS No.	ID Standard Recoveries	Limits
	13C4-PFBA	97% 50-150%
	13C5-PFPeA	98% 50-150%
	13C5-PFHxA	100% 50-150%
	13C4-PFHpA	100% 50-150%
	13C8-PFOA	101% 50-150%
	13C9-PFNA	105% 50-150%
	13C6-PFDA	110% 50-150%
	13C7-PFUnDA	107% 50-150%

5.1.4
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Instrument Blank

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q394-IBLK	2Q25384.D	1	12/21/18	NAF	n/a	n/a	S2Q394

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA60008-1, FA60008-3, FA60008-4, FA60008-6, FA60008-12, FA60008-14, FA60008-15

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	105% 50-150%
	13C2-PFTeDA	105% 50-150%
	13C3-PFBS	97% 50-150%
	13C3-PFHxS	97% 50-150%
	13C8-PFOS	101% 50-150%
	13C8-FOSA	109% 50-150%
	d3-MeFOSAA	105% 50-150%
	13C2-4:2FTS	93% 50-150%
	13C2-6:2FTS	95% 50-150%
	13C2-8:2FTS	99% 50-150%

Instrument Blank

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q395-IBLK	2Q25509.D	1	12/24/18	NAF	n/a	n/a	S2Q395

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA60008-2, FA60008-5, FA60008-6, FA60008-7, FA60008-8, FA60008-9, FA60008-10, FA60008-11, FA60008-12, FA60008-14, FA60008-15

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.015	0.0038	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0077	0.0029	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0077	0.0019	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0077	0.0019	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0077	0.0019	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0077	0.0019	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0077	0.0019	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0077	0.0019	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0077	0.0029	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0077	0.0019	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0077	0.0019	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0077	0.0019	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0077	0.0019	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0077	0.0019	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0077	0.0019	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.015	0.0038	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0077	0.0019	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0077	0.0019	ug/l	
754-91-6	PFOSA	ND	0.0077	0.0019	ug/l	
2355-31-9	MeFOSAA	ND	0.038	0.0077	ug/l	
2991-50-6	EtFOSAA	ND	0.038	0.0077	ug/l	
757124-72-44:2	Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	

CAS No.	ID Standard Recoveries	Limits
	13C4-PFBA	98% 50-150%
	13C5-PFPeA	99% 50-150%
	13C5-PFHxA	102% 50-150%
	13C4-PFHpA	102% 50-150%
	13C8-PFOA	102% 50-150%
	13C9-PFNA	100% 50-150%
	13C6-PFDA	109% 50-150%
	13C7-PFUnDA	105% 50-150%

5.1.5
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Instrument Blank

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q395-IBLK	2Q25509.D	1	12/24/18	NAF	n/a	n/a	S2Q395

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA60008-2, FA60008-5, FA60008-6, FA60008-7, FA60008-8, FA60008-9, FA60008-10, FA60008-11, FA60008-12, FA60008-14, FA60008-15

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	102% 50-150%
	13C2-PFTeDA	100% 50-150%
	13C3-PFBS	99% 50-150%
	13C3-PFHxS	100% 50-150%
	13C8-PFOS	99% 50-150%
	13C8-FOSA	108% 50-150%
	d3-MeFOSAA	99% 50-150%
	13C2-4:2FTS	93% 50-150%
	13C2-6:2FTS	95% 50-150%
	13C2-8:2FTS	97% 50-150%

5.1.5
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Instrument Blank

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q397-IBLK	2Q25674.D	1	12/27/18	NAF	n/a	n/a	S2Q397

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA60008-13

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.015	0.0038	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0077	0.0029	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0077	0.0019	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0077	0.0019	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0077	0.0019	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0077	0.0019	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0077	0.0019	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0077	0.0019	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0077	0.0029	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0077	0.0019	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0077	0.0019	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0077	0.0019	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0077	0.0019	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0077	0.0019	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0077	0.0019	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.015	0.0038	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0077	0.0019	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0077	0.0019	ug/l	
754-91-6	PFOSA	ND	0.0077	0.0019	ug/l	
2355-31-9	MeFOSAA	ND	0.038	0.0077	ug/l	
2991-50-6	EtFOSAA	ND	0.038	0.0077	ug/l	
757124-72-44:2	Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	

CAS No.	ID Standard Recoveries	Limits
	13C4-PFBA	105% 50-150%
	13C5-PFPeA	104% 50-150%
	13C5-PFHxA	107% 50-150%
	13C4-PFHpA	105% 50-150%
	13C8-PFOA	108% 50-150%
	13C9-PFNA	107% 50-150%
	13C6-PFDA	113% 50-150%
	13C7-PFUnDA	114% 50-150%

5.1.6
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Instrument Blank

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q397-IBLK	2Q25674.D	1	12/27/18	NAF	n/a	n/a	S2Q397

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA60008-13

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	111% 50-150%
	13C2-PFTeDA	103% 50-150%
	13C3-PFBS	104% 50-150%
	13C3-PFHxS	104% 50-150%
	13C8-PFOS	106% 50-150%
	13C8-FOSA	112% 50-150%
	d3-MeFOSAA	109% 50-150%
	13C2-4:2FTS	99% 50-150%
	13C2-6:2FTS	102% 50-150%
	13C2-8:2FTS	101% 50-150%

5.1.6
5

Blank Spike Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73096-BS	2Q25387.D	1	12/21/18	NAF	12/19/18	OP73096	S2Q394

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60008-1, FA60008-2, FA60008-3, FA60008-4, FA60008-5, FA60008-6, FA60008-7, FA60008-8, FA60008-9, FA60008-10, FA60008-11, FA60008-12, FA60008-14, FA60008-15

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
375-22-4	Perfluorobutanoic acid	0.08	0.0692	87	70-130
2706-90-3	Perfluoropentanoic acid	0.08	0.0689	86	70-130
307-24-4	Perfluorohexanoic acid	0.08	0.0609	76	70-130
375-85-9	Perfluoroheptanoic acid	0.08	0.0682	85	71-130
335-67-1	Perfluorooctanoic acid	0.08	0.0661	83	74-130
375-95-1	Perfluorononanoic acid	0.08	0.0571	71* a	76-130
335-76-2	Perfluorodecanoic acid	0.08	0.0601	75	70-130
2058-94-8	Perfluoroundecanoic acid	0.08	0.0653	82	70-130
307-55-1	Perfluorododecanoic acid	0.08	0.0722	90	70-130
72629-94-8	Perfluorotridecanoic acid	0.08	0.0787	98	70-139
376-06-7	Perfluorotetradecanoic acid	0.08	0.0654	82	70-130
375-73-5	Perfluorobutanesulfonic acid	0.0708	0.0593	84	73-130
2706-91-4	Perfluoropentanesulfonic acid	0.0752	0.0630	84	70-130
355-46-4	Perfluorohexanesulfonic acid	0.0728	0.0587	81	74-130
375-92-8	Perfluoroheptanesulfonic acid	0.076	0.0657	86	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.074	0.0669	90	70-130
68259-12-1	Perfluorononanesulfonic acid	0.0768	0.0594	77	70-130
335-77-3	Perfluorodecanesulfonic acid	0.0772	0.0568	74	70-130
754-91-6	PFOSA	0.08	0.0699	87	70-131
2355-31-9	MeFOSAA	0.08	0.0681	85	70-130
2991-50-6	EtFOSAA	0.08	0.0686	86	70-130
757124-72-44:2	Fluorotelomer sulfonate	0.0748	0.0659	88	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	0.076	0.0682	90	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	0.0768	0.0658	86	70-130

CAS No.	ID Standard Recoveries	BSP	Limits
	13C4-PFBA	114%	30-140%
	13C5-PFPeA	113%	40-140%
	13C5-PFHxA	115%	50-150%
	13C4-PFHpA	113%	50-150%
	13C8-PFOA	126%	50-150%
	13C9-PFNA	114%	50-150%
	13C6-PFDA	106%	50-150%
	13C7-PFUnDA	117%	50-150%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73096-BS	2Q25387.D	1	12/21/18	NAF	12/19/18	OP73096	S2Q394

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60008-1, FA60008-2, FA60008-3, FA60008-4, FA60008-5, FA60008-6, FA60008-7, FA60008-8, FA60008-9, FA60008-10, FA60008-11, FA60008-12, FA60008-14, FA60008-15

CAS No.	ID Standard Recoveries	BSP	Limits
	13C2-PFDoDA	85%	50-150%
	13C2-PFTeDA	90%	40-150%
	13C3-PFBS	110%	50-150%
	13C3-PFHxS	106%	50-150%
	13C8-PFOS	94%	50-150%
	13C8-FOSA	107%	30-140%
	d3-MeFOSAA	94%	50-150%
	13C2-4:2FTS	114%	50-150%
	13C2-6:2FTS	126%	50-150%
	13C2-8:2FTS	102%	50-150%

(a) Sporadic marginal failure.

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73096-BS	2Q25512.D	1	12/24/18	NAF	12/19/18	OP73096	S2Q395

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60008-1, FA60008-2, FA60008-3, FA60008-4, FA60008-5, FA60008-6, FA60008-7, FA60008-8, FA60008-9, FA60008-10, FA60008-11, FA60008-12, FA60008-14, FA60008-15

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
375-22-4	Perfluorobutanoic acid	0.08	0.0666	83	70-130
2706-90-3	Perfluoropentanoic acid	0.08	0.0665	83	70-130
307-24-4	Perfluorohexanoic acid	0.08	0.0605	76	70-130
375-85-9	Perfluoroheptanoic acid	0.08	0.0659	82	71-130
335-67-1	Perfluorooctanoic acid	0.08	0.0694	87	74-130
375-95-1	Perfluorononanoic acid	0.08	0.0618	77	76-130
335-76-2	Perfluorodecanoic acid	0.08	0.0612	77	70-130
2058-94-8	Perfluoroundecanoic acid	0.08	0.0697	87	70-130
307-55-1	Perfluorododecanoic acid	0.08	0.0650	81	70-130
72629-94-8	Perfluorotridecanoic acid	0.08	0.0724	91	70-139
376-06-7	Perfluorotetradecanoic acid	0.08	0.0662	83	70-130
375-73-5	Perfluorobutanesulfonic acid	0.0708	0.0580	82	73-130
2706-91-4	Perfluoropentanesulfonic acid	0.0752	0.0628	84	70-130
355-46-4	Perfluorohexanesulfonic acid	0.0728	0.0567	78	74-130
375-92-8	Perfluoroheptanesulfonic acid	0.076	0.0642	84	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.074	0.0660	89	70-130
68259-12-1	Perfluorononanesulfonic acid	0.0768	0.0577	75	70-130
335-77-3	Perfluorodecanesulfonic acid	0.0772	0.0520	67* a	70-130
754-91-6	PFOSA	0.08	0.0681	85	70-131
2355-31-9	MeFOSAA	0.08	0.0661	83	70-130
2991-50-6	EtFOSAA	0.08	0.0673	84	70-130
757124-72-44:2	Fluorotelomer sulfonate	0.0748	0.0638	85	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	0.076	0.0651	86	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	0.0768	0.0617	80	70-130

CAS No.	ID Standard Recoveries	BSP	Limits
	13C4-PFBA	113%	30-140%
	13C5-PFPeA	116%	40-140%
	13C5-PFHxA	118%	50-150%
	13C4-PFHpA	118%	50-150%
	13C8-PFOA	123%	50-150%
	13C9-PFNA	116%	50-150%
	13C6-PFDA	101%	50-150%
	13C7-PFUnDA	99%	50-150%

* = Outside of Control Limits.

5.2.2
5

Blank Spike Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73096-BS	2Q25512.D	1	12/24/18	NAF	12/19/18	OP73096	S2Q395

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60008-1, FA60008-2, FA60008-3, FA60008-4, FA60008-5, FA60008-6, FA60008-7, FA60008-8, FA60008-9, FA60008-10, FA60008-11, FA60008-12, FA60008-14, FA60008-15

CAS No.	ID Standard Recoveries	BSP	Limits
	13C2-PFDoDA	91%	50-150%
	13C2-PFTeDA	89%	40-150%
	13C3-PFBS	115%	50-150%
	13C3-PFHxS	111%	50-150%
	13C8-PFOS	96%	50-150%
	13C8-FOSA	108%	30-140%
	d3-MeFOSAA	92%	50-150%
	13C2-4:2FTS	118%	50-150%
	13C2-6:2FTS	121%	50-150%
	13C2-8:2FTS	99%	50-150%

(a) Sporadic marginal failure.

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73191-BS	2Q25691.D	1	12/27/18	NAF	12/26/18	OP73191	S2Q397

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60008-13

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
375-22-4	Perfluorobutanoic acid	0.154	0.134	87	70-130
2706-90-3	Perfluoropentanoic acid	0.154	0.126	82	70-130
307-24-4	Perfluorohexanoic acid	0.154	0.117	76	70-130
375-85-9	Perfluoroheptanoic acid	0.154	0.127	83	71-130
335-67-1	Perfluorooctanoic acid	0.154	0.137	89	74-130
375-95-1	Perfluorononanoic acid	0.154	0.118	77	76-130
335-76-2	Perfluorodecanoic acid	0.154	0.122	79	70-130
2058-94-8	Perfluoroundecanoic acid	0.154	0.131	85	70-130
307-55-1	Perfluorododecanoic acid	0.154	0.140	91	70-130
72629-94-8	Perfluorotridecanoic acid	0.154	0.142	92	70-139
376-06-7	Perfluorotetradecanoic acid	0.154	0.123	80	70-130
375-73-5	Perfluorobutanesulfonic acid	0.136	0.113	83	73-130
2706-91-4	Perfluoropentanesulfonic acid	0.145	0.122	84	70-130
355-46-4	Perfluorohexanesulfonic acid	0.14	0.114	81	74-130
375-92-8	Perfluoroheptanesulfonic acid	0.146	0.126	86	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.142	0.141	99	70-130
68259-12-1	Perfluorononanesulfonic acid	0.148	0.116	79	70-130
335-77-3	Perfluorodecanesulfonic acid	0.148	0.103	69* a	70-130
754-91-6	PFOSA	0.154	0.135	88	70-131
2355-31-9	MeFOSAA	0.154	0.133	86	70-130
2991-50-6	EtFOSAA	0.154	0.136	88	70-130
757124-72-44:2	Fluorotelomer sulfonate	0.144	0.125	87	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	0.146	0.128	88	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	0.148	0.122	83	70-130

CAS No.	ID Standard Recoveries	BSP	Limits
	13C4-PFBA	94%	30-140%
	13C5-PFPeA	98%	40-140%
	13C5-PFHxA	102%	50-150%
	13C4-PFHpA	102%	50-150%
	13C8-PFOA	100%	50-150%
	13C9-PFNA	104%	50-150%
	13C6-PFDA	102%	50-150%
	13C7-PFUnDA	99%	50-150%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73191-BS	2Q25691.D	1	12/27/18	NAF	12/26/18	OP73191	S2Q397

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60008-13

CAS No.	ID Standard Recoveries	BSP	Limits
	13C2-PFDoDA	88%	50-150%
	13C2-PFTeDA	91%	40-150%
	13C3-PFBS	96%	50-150%
	13C3-PFHxS	98%	50-150%
	13C8-PFOS	95%	50-150%
	13C8-FOSA	80%	30-140%
	d3-MeFOSAA	88%	50-150%
	13C2-4:2FTS	101%	50-150%
	13C2-6:2FTS	101%	50-150%
	13C2-8:2FTS	95%	50-150%

(a) Sporadic marginal failure.

* = Outside of Control Limits.

Matrix Spike Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73096-MS	2Q25524.D	1	12/24/18	NAF	12/19/18	OP73096	S2Q395
FA60008-10	2Q25523.D	1	12/24/18	NAF	12/19/18	OP73096	S2Q395

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60008-1, FA60008-2, FA60008-3, FA60008-4, FA60008-5, FA60008-6, FA60008-7, FA60008-8, FA60008-9, FA60008-10, FA60008-11, FA60008-12, FA60008-14, FA60008-15

CAS No.	Compound	FA60008-10 Spike		MS	MS	Limits
		ug/l	Q ug/l	ug/l	%	
375-22-4	Perfluorobutanoic acid	0.00549	J 0.08	0.0791	92	70-130
2706-90-3	Perfluoropentanoic acid	ND	0.08	0.0773	97	70-130
307-24-4	Perfluorohexanoic acid	ND	0.08	0.0672	84	70-130
375-85-9	Perfluoroheptanoic acid	ND	0.08	0.0742	93	71-130
335-67-1	Perfluorooctanoic acid	0.00256	J 0.08	0.0767	93	74-130
375-95-1	Perfluorononanoic acid	ND	0.08	0.0662	83	76-130
335-76-2	Perfluorodecanoic acid	ND	0.08	0.0728	91	70-130
2058-94-8	Perfluoroundecanoic acid	ND	0.08	0.0810	101	70-130
307-55-1	Perfluorododecanoic acid	ND	0.08	0.0830	104	70-130
72629-94-8	Perfluorotridecanoic acid	ND	0.08	0.0736	92	70-139
376-06-7	Perfluorotetradecanoic acid	ND	0.08	0.0757	95	70-130
375-73-5	Perfluorobutanesulfonic acid	0.00473	0.0708	0.0677	89	73-130
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0752	0.0739	98	70-130
355-46-4	Perfluorohexanesulfonic acid	ND	0.0728	0.0635	87	74-130
375-92-8	Perfluoroheptanesulfonic acid	0.00114	J 0.076	0.0766	99	74-130
1763-23-1	Perfluorooctanesulfonic acid	ND	0.074	0.0728	98	70-130
68259-12-1	Perfluorononanesulfonic acid	ND	0.0768	0.0564	73	70-130
335-77-3	Perfluorodecanesulfonic acid	ND	0.0772	0.0420	54*	70-130
754-91-6	PFOSA	ND	0.08	0.0797	100	70-131
2355-31-9	MeFOSAA	ND	0.08	0.0772	97	70-130
2991-50-6	EtFOSAA	ND	0.08	0.0796	100	70-130
757124-72-44:2	Fluorotelomer sulfonate	ND	0.0748	0.0700	94	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.076	0.0709	93	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0768	0.0692	90	70-130

CAS No.	ID Standard Recoveries	MS	FA60008-10	Limits
	13C4-PFBA	75%	71%	30-140%
	13C5-PFPeA	83%	80%	40-140%
	13C5-PFHxA	94%	91%	50-150%
	13C4-PFHpA	93%	89%	50-150%
	13C8-PFOA	98%	98%	50-150%
	13C9-PFNA	103%	97%	50-150%
	13C6-PFDA	93%	91%	50-150%
	13C7-PFUnDA	82%	86%	50-150%

* = Outside of Control Limits.

5.3.1
5

Matrix Spike Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73096-MS	2Q25524.D	1	12/24/18	NAF	12/19/18	OP73096	S2Q395
FA60008-10	2Q25523.D	1	12/24/18	NAF	12/19/18	OP73096	S2Q395

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60008-1, FA60008-2, FA60008-3, FA60008-4, FA60008-5, FA60008-6, FA60008-7, FA60008-8, FA60008-9, FA60008-10, FA60008-11, FA60008-12, FA60008-14, FA60008-15

CAS No.	ID Standard Recoveries	MS	FA60008-10	Limits
	13C2-PFDoDA	52%	59%	50-150%
	13C2-PFTeDA	38% * a	56%	40-150%
	13C3-PFBS	89%	86%	50-150%
	13C3-PFHxS	97%	94%	50-150%
	13C8-PFOS	92%	90%	50-150%
	13C8-FOSA	51%	41%	30-140%
	d3-MeFOSAA	74%	74%	50-150%
	13C2-4:2FTS	99%	93%	50-150%
	13C2-6:2FTS	105%	99%	50-150%
	13C2-8:2FTS	120%	97%	50-150%

(a) Outside control limits.

* = Outside of Control Limits.

5.3.1
5

Matrix Spike Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73191-MS	2Q25695.D	1	12/27/18	NAF	12/26/18	OP73191	S2Q397
JC80150-21 ^a	2Q25694.D	1	12/27/18	NAF	12/26/18	OP73191	S2Q397

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60008-13

CAS No.	Compound	JC80150-21 ug/l	Spike Q	MS ug/l	MS %	Limits
375-22-4	Perfluorobutanoic acid	ND		0.16	83	70-130
2706-90-3	Perfluoropentanoic acid	0.00339	J	0.16	79	70-130
307-24-4	Perfluorohexanoic acid	0.00585	J	0.16	71	70-130
375-85-9	Perfluoroheptanoic acid	0.0450		0.16	80	71-130
335-67-1	Perfluorooctanoic acid	0.0630		0.16	82	74-130
375-95-1	Perfluorononanoic acid	0.614		0.16	68* ^b	76-130
335-76-2	Perfluorodecanoic acid	ND		0.16	78	70-130
2058-94-8	Perfluoroundecanoic acid	ND		0.16	81	70-130
307-55-1	Perfluorododecanoic acid	ND		0.16	84	70-130
72629-94-8	Perfluorotridecanoic acid	ND		0.16	95	70-139
376-06-7	Perfluorotetradecanoic acid	ND		0.16	80	70-130
375-73-5	Perfluorobutanesulfonic acid	ND		0.142	79	73-130
2706-91-4	Perfluoropentanesulfonic acid	ND		0.15	79	70-130
355-46-4	Perfluorohexanesulfonic acid	0.00210	J	0.146	75	74-130
375-92-8	Perfluoroheptanesulfonic acid	ND		0.152	84	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.00966	B	0.148	84	70-130
68259-12-1	Perfluorononanesulfonic acid	ND		0.154	76	70-130
335-77-3	Perfluorodecanesulfonic acid	ND		0.154	64*	70-130
754-91-6	PFOSA	ND		0.16	82	70-131
2355-31-9	MeFOSAA	ND		0.16	83	70-130
2991-50-6	EtFOSAA	ND		0.16	81	70-130
757124-72-44:2	Fluorotelomer sulfonate	ND		0.15	82	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	ND		0.152	84	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	ND		0.154	79	70-130

CAS No.	ID Standard Recoveries	MS	JC80150-21	Limits
	13C4-PFBA	38%		30-140%
	13C5-PFPeA	112%		40-140%
	13C5-PFHxA	120%	107%	50-150%
	13C4-PFHpA	116%	106%	50-150%
	13C8-PFOA	121%	113%	50-150%
	13C9-PFNA	114%	105%	50-150%
	13C6-PFDA	111%	112%	50-150%
	13C7-PFUnDA	113%	103%	50-150%

* = Outside of Control Limits.

5.3.2
5

Matrix Spike Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73191-MS	2Q25695.D	1	12/27/18	NAF	12/26/18	OP73191	S2Q397
JC80150-21 ^a	2Q25694.D	1	12/27/18	NAF	12/26/18	OP73191	S2Q397

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60008-13

CAS No.	ID Standard Recoveries	MS	JC80150-21	Limits
	13C2-PFDoDA	100%	95%	50-150%
	13C2-PFTeDA	97%	90%	40-150%
	13C3-PFBS	112%	100%	50-150%
	13C3-PFHxS	109%	101%	50-150%
	13C8-PFOS	107%	99%	50-150%
	13C8-FOSA	120%		30-140%
	d3-MeFOSAA	102%		50-150%
	13C2-4:2FTS	115%		50-150%
	13C2-6:2FTS	118%		50-150%
	13C2-8:2FTS	109%		50-150%

- (a) Insufficient sample for re-extraction.
- (b) Outside control limits due to high level in sample relative to spike amount.

* = Outside of Control Limits.

Duplicate Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73096-DUP	2Q25406.D	1	12/21/18	NAF	12/19/18	OP73096	S2Q394
FA60008-14	2Q25405.D	1	12/21/18	NAF	12/19/18	OP73096	S2Q394
FA60008-14	2Q25527.D	1	12/24/18	NAF	12/19/18	OP73096	S2Q395

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60008-1, FA60008-2, FA60008-3, FA60008-4, FA60008-5, FA60008-6, FA60008-7, FA60008-8, FA60008-9, FA60008-10, FA60008-11, FA60008-12, FA60008-14, FA60008-15

CAS No.	Compound	FA60008-14 DUP		Q	RPD	Limits
		ug/l	Q ug/l			
375-22-4	Perfluorobutanoic acid	0.0136	0.0143	5		30
2706-90-3	Perfluoropentanoic acid	0.0182	0.0207	13		30
307-24-4	Perfluorohexanoic acid	0.0177	0.0185	4		30
375-85-9	Perfluoroheptanoic acid	0.0161	0.0176	9		30
335-67-1	Perfluorooctanoic acid	0.0312	0.0341	9		30
375-95-1	Perfluorononanoic acid	0.00360 ^{aj}	0.00437	19		30
335-76-2	Perfluorodecanoic acid	0.00453	0.00444	2		30
2058-94-8	Perfluoroundecanoic acid	ND	ND	nc		30
307-55-1	Perfluorododecanoic acid	ND	ND	nc		30
72629-94-8	Perfluorotridecanoic acid	ND	ND	nc		30
376-06-7	Perfluorotetradecanoic acid	ND	ND	nc		30
375-73-5	Perfluorobutanesulfonic acid	0.00807	0.0128	45*		30
2706-91-4	Perfluoropentanesulfonic acid	0.00331 J	0.00337 J	2		30
355-46-4	Perfluorohexanesulfonic acid	0.0220	0.0233	6		30
375-92-8	Perfluoroheptanesulfonic acid	0.00196 J	0.00199 J	2		30
1763-23-1	Perfluorooctanesulfonic acid	0.176	0.192	9		30
68259-12-1	Perfluorononanesulfonic acid	ND	ND	nc		30
335-77-3	Perfluorodecanesulfonic acid	ND	ND	nc		30
754-91-6	PFOSA	ND	ND	nc		30
2355-31-9	MeFOSAA	ND	ND	nc		30
2991-50-6	EtFOSAA	ND	ND	nc		30
757124-72-44:2	Fluorotelomer sulfonate	ND	ND	nc		30
27619-97-2	6:2 Fluorotelomer sulfonate	0.00221 J	0.00233 J	5		30
39108-34-4	8:2 Fluorotelomer sulfonate	ND	ND	nc		30

CAS No.	ID Standard Recoveries	DUP	FA60008-14	FA60008-14	Limits
	13C4-PFBA	83%	74%	80%	30-140%
	13C5-PFPeA	86%	77%	84%	40-140%
	13C5-PFHxA	88%	78%	87%	50-150%
	13C4-PFHpA	89%	80%	91%	50-150%
	13C8-PFOA	99%	89%	100%	50-150%
	13C9-PFNA	99%	85%	99%	50-150%
	13C6-PFDA	87%	80%	84%	50-150%
	13C7-PFUnDA	82%	71%	75%	50-150%

* = Outside of Control Limits.

5.4.1
5

Duplicate Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73096-DUP	2Q25406.D	1	12/21/18	NAF	12/19/18	OP73096	S2Q394
FA60008-14	2Q25405.D	1	12/21/18	NAF	12/19/18	OP73096	S2Q394
FA60008-14	2Q25527.D	1	12/24/18	NAF	12/19/18	OP73096	S2Q395

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60008-1, FA60008-2, FA60008-3, FA60008-4, FA60008-5, FA60008-6, FA60008-7, FA60008-8, FA60008-9, FA60008-10, FA60008-11, FA60008-12, FA60008-14, FA60008-15

CAS No.	ID Standard Recoveries	DUP	FA60008-14	FA60008-14	Limits
	13C2-PFDoDA	72%	59%	69%	50-150%
	13C2-PFTeDA	79%	66%	71%	40-150%
	13C3-PFBS	83%	73%	81%	50-150%
	13C3-PFHxS	83%	73%	82%	50-150%
	13C8-PFOS	81%	73%	79%	50-150%
	13C8-FOSA	77%	69%	61%	30-140%
	d3-MeFOSAA	79%	67%	74%	50-150%
	13C2-4:2FTS	93%	81%	87%	50-150%
	13C2-6:2FTS	109%	95%	101%	50-150%
	13C2-8:2FTS	90%	79%	83%	50-150%

(a) Result is from Run #2.

* = Outside of Control Limits.

5.4.1
5



Analytical Laboratory Report

Report ID: S97206.01(01)
Generated on 12/07/2018

Report to

Attention: Alex Villhauer
ARCADIS U.S., Inc.
300 S. Washington Square
Suite 315
Lansing, MI 48933

Phone: 616-780-3277 FAX: 248-994-2241
Email: alex.villhauer@arcadis.com

Additional Contacts: Christine Gregg

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:

John Lavery (johnlavery@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S97206.01-S97206.06
Project: B0064479.2018.03100 / RACER Lansing
Collected Date: 11/29/2018
Submitted Date/Time: 11/29/2018 14:27
Sampled by: Unknown
P.O. #: B0064479.2018.03100

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Maya Murshak
Technical Director



Analytical Laboratory Report

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the 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. Starred (*) analytes are not NELAP accredited.

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.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

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
Alaska CSLAP	#17-001

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
LN	Linear
BR	Branched



Analytical Laboratory Report

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs



Analytical Laboratory Report

Sample Summary (6 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S97206.01	Verlinden-MH-2_112918	Groundwater	11/29/18 09:00
S97206.02	Verlinden-MH-3_112918	Groundwater	11/29/18 09:25
S97206.03	Verlinden-MH-4_112918	Groundwater	11/29/18 12:00
S97206.04	Dup-03_112918	Groundwater	11/29/18 00:01
S97206.05	Verlinden-MH-1_112918	Groundwater	11/29/18 12:45
S97206.06	Osborn-MH-1_112918	Groundwater	11/29/18 13:20



Analytical Laboratory Report

Lab Sample ID: S97206.01

Sample Tag: Verlinden-MH-2_112918

Collected Date/Time: 11/29/2018 09:00

Matrix: Groundwater

COC Reference: 120302

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	12/07/18 13:44	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 12/06/18 14:21, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	



Analytical Laboratory Report

Lab Sample ID: S97206.02

Sample Tag: Verlinden-MH-3_112918

Collected Date/Time: 11/29/2018 09:25

Matrix: Groundwater

COC Reference: 120302

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	12/07/18 13:44	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 12/06/18 14:42, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	



Analytical Laboratory Report

Lab Sample ID: S97206.03

Sample Tag: Verlinden-MH-4_112918

Collected Date/Time: 11/29/2018 12:00

Matrix: Groundwater

COC Reference: 120302

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	12/07/18 13:44	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 12/06/18 15:04, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	



Analytical Laboratory Report

Lab Sample ID: S97206.04

Sample Tag: Dup-03_112918

Collected Date/Time: 11/29/2018 00:01

Matrix: Groundwater

COC Reference: 120302

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	12/07/18 13:44	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 12/06/18 15:25, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	



Analytical Laboratory Report

Lab Sample ID: S97206.05

Sample Tag: Verlinden-MH-1_112918

Collected Date/Time: 11/29/2018 12:45

Matrix: Groundwater

COC Reference: 120302

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	12/07/18 13:44	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 12/06/18 15:46, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	



Analytical Laboratory Report

Lab Sample ID: S97206.06

Sample Tag: Osborn-MH-1_112918

Collected Date/Time: 11/29/2018 13:20

Matrix: Groundwater

COC Reference: 120302

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	12/07/18 13:44	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 12/06/18 16:07, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID:S97206

Client:ARCADIS_NOVI (ARCADIS U.S., Inc.)

Project: B0064479.2018.03100 / RACER Lansing

Submitted: 11/29/2018 14:27 Login User: MMC

Attention: Alex Villhauer

Address: ARCADIS U.S., Inc.
300 S. Washington Square
Suite 315
Lansing, MI 48933

Phone: 616-780-3277

FAX: 248-994-2241

Email: alex.villhauer@arcadis.com

Selection	Description	Note
Sample Receiving		
01.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples are received at 4C +/- 2C Thermometer # IR 5.8
02.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Received on ice/ cooling process begun
03.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples shipped
04.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples left in 24 hr. drop box
05.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Are there custody seals/tape or is the drop box locked
Chain of Custody		
06.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC adequately filled out
07.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC signed and relinquished to the lab
08.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sample tag on bottles match COC
09.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Subcontracting needed? Subcontracted to:
Preservation		
10.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Do sample have correct chemical preservation
11.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Completed pH checks on preserved samples? (no VOAs)
12.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Did any samples need to be preserved in the lab?
Bottle Conditions		
13.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	All bottles intact
14.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Appropriate analytical bottles are used
15.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Merit bottles used
16.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sufficient sample volume received
17.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples require laboratory filtration
18.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples submitted within holding time
19.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Do water VOC or TOX bottles contain headspace

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____



2680 East Lansing Dr., East Lansing, MI 48823
 Phone (517) 332-0167 Fax (517) 332-4034
 www.meritlabs.com

C.O.C. PAGE # 1 OF 1 120302

REPORT TO

CHAIN OF CUSTODY RECORD

INVOICE TO

CONTACT NAME: Alex Villhauer
 COMPANY: Arcadis of Michigan, LLC.
 ADDRESS: 300 South Washington Square, Suite 315
 CITY: Lansing STATE: MI ZIP CODE: 48933
 PHONE NO.: 616-780-3277 FAX NO.: _____ P.O. NO.: B0064479.2018.03100
 E-MAIL ADDRESS: Alex.Vilhauer@arcadis.com QUOTE NO.: _____

CONTACT NAME: SAME
 COMPANY: _____
 ADDRESS: _____
 CITY: _____ STATE: _____ ZIP CODE: _____
 PHONE NO.: _____ E-MAIL ADDRESS: _____

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

PROJECT NO./NAME: B0064479.2018.03100 / RACER Lansing SAMPLER(S) - PLEASE PRINT/SIGN NAME: _____
 TURNAROUND TIME REQUIRED: 1 DAY 2 DAYS 3 DAYS STANDARD OTHER _____
 DELIVERABLES REQUIRED: STD LEVEL II LEVEL III LEVEL IV EDD OTHER _____

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID
 SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIFE A=AIR W=WASTE

Containers & Preservatives

Certifications
 OHIO VAP Drinking Water
 DoD NPDES
 Project Locations
 Detroit New York
 Other _____
 Special Instructions

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	NONE	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	OTHER								
	DATE	TIME																		
<u>17206.01</u>	<u>11/29/18</u>	<u>0900</u>	<u>Verlinden-MH-2-112918</u>	<u>GW</u>	<u>3</u>		<u>3</u>						<u>X</u>							
<u>.02</u>	<u>11/29/18</u>	<u>0925</u>	<u>Verlinden-MH-3-112918</u>	<u>GW</u>	<u>3</u>		<u>3</u>						<u>X</u>							
<u>.03</u>	<u>11/29/18</u>	<u>1200</u>	<u>Verlinden-MH-4-112918</u>	<u>GW</u>	<u>3</u>		<u>3</u>						<u>X</u>							
<u>.04</u>	<u>11/29/18</u>	<u>—</u>	<u>Dup-03-112918</u>	<u>GW</u>	<u>3</u>		<u>3</u>						<u>X</u>							
<u>.05</u>	<u>11/29/18</u>	<u>1245</u>	<u>Verlinden-MH-1-112918</u>	<u>GW</u>	<u>3</u>		<u>3</u>						<u>X</u>							
<u>.06</u>	<u>11/29/18</u>	<u>1320</u>	<u>Ostern-MH-1-112918</u>	<u>GW</u>	<u>3</u>		<u>3</u>						<u>X</u>							

14-Dioxane 8260
SEMS

RELINQUISHED BY: Alex Villhauer / Arcadis Sampler DATE: 11/29/18 TIME: 1427
 RECEIVED BY: M. Calce DATE: 11/29/18 TIME: 1427
 RELINQUISHED BY: _____ DATE: _____ TIME: _____
 RECEIVED BY: _____ DATE: _____ TIME: _____

RELINQUISHED BY: _____ DATE: _____ TIME: _____
 RECEIVED BY: _____ DATE: _____ TIME: _____
 SEAL NO. SEAL INTACT YES NO INITIALS _____
 SEAL NO. SEAL INTACT YES NO INITIALS _____
 NOTES: TEMP. ON ARRIVAL 5.8



Analytical Laboratory Report

Report ID: S97828.01(01)
Generated on 12/21/2018

Report to

Attention: Christine Gregg
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 734-585-7817 FAX: 248-994-2241
Email: christine.gregg@arcadis.com

Additional Contacts: Alex Villhauer, Kristen Padron, Randy Christensen

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:
John Lavery (johnlavery@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S97828.01-S97828.05
Project: RACER Lansing / B0064479.2018.03100
Collected Date: 12/07/2018
Submitted Date/Time: 12/14/2018 11:50
Sampled by: Dale Arnett
P.O. #: B0064479.2018.03100

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Maya Murshak
Technical Director



Analytical Laboratory Report

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the 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. Starred (*) analytes are not NELAP accredited.

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.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

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
Alaska CSLAP	#17-001

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
LN	Linear
BR	Branched



Analytical Laboratory Report

Method Summary

Method	Version
N/A	Not Applicable
SW3015A	SW 846 Method 3015A Revision 1 February 2007
SW5030C/8260C	SW 846 Method 8260C Revision 3 August 2006 / 5030C Revision 3 May 2003
SW6020A	SW 846 Method 6020A Revision 1 February 2007
SW7471B	SW 846 Method 7471B Revision 2 February 2007
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs



Analytical Laboratory Report

Sample Summary (5 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S97828.01	P6-MH2-SW_120718	Groundwater	12/07/18 14:00
S97828.02	P3-MH-NE_120718	Groundwater	12/07/18 15:10
S97828.03	P2-MH-NW_120718	Groundwater	12/07/18 15:40
S97828.04	Dup-08_120718	Groundwater	12/07/18 00:01
S97828.05	Trip Blank	Water	12/07/18 00:01



Analytical Laboratory Report

Lab Sample ID: S97828.01

Sample Tag: P6-MH2-SW_120718

Collected Date/Time: 12/07/2018 14:00

Matrix: Groundwater

COC Reference: 120336

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	4.4	IR
1	125ml Plastic	HNO3	Yes	4.4	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	12/18/18 14:00	JML	
Metal Digestion	Completed	SW3015A	12/18/18 09:00	JRH	
Mercury Digestion*	Completed	SW7471B	12/21/18 10:00	JRH	

Metals

Method: SW6020A, Run Date: 12/19/18 12:57, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Boron	0.11	0.04		mg/L	5	7440-42-8	

Method: SW6020A, Run Date: 12/18/18 13:55, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005		mg/L	5	7440-36-0	
Arsenic	0.002	0.002		mg/L	5	7440-38-2	
Barium	0.058	0.005		mg/L	5	7440-39-3	
Cadmium	Not detected	0.0005		mg/L	5	7440-43-9	
Chromium	Not detected	0.005		mg/L	5	7440-47-3	
Cobalt	Not detected	0.005		mg/L	5	7440-48-4	
Copper	Not detected	0.005		mg/L	5	7440-50-8	
Lead	Not detected	0.003		mg/L	5	7439-92-1	
Manganese	0.054	0.005		mg/L	5	7439-96-5	
Nickel	Not detected	0.005		mg/L	5	7440-02-0	
Selenium	Not detected	0.004		mg/L	5	7782-49-2	
Silver	Not detected	0.0005		mg/L	5	7440-22-4	
Vanadium	Not detected	0.005		mg/L	5	7440-62-2	
Zinc	0.005	0.005		mg/L	5	7440-66-6	

Method: SW7471B, Run Date: 12/21/18 14:08, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury*	Not detected	0.0002		mg/L	1	7439-97-6	

Organics - Volatiles

Method: SW5030C/8260C, Run Date: 12/17/18 20:19, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,2-Dibromo-3-chloropropane	Not detected	1		ug/L	1	96-12-8	
1,2-Dibromoethane	Not detected	1		ug/L	1	106-93-4	

Method: SW8260B - SIM, Run Date: 12/21/18 14:58, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	



Analytical Laboratory Report

Lab Sample ID: S97828.01 (continued)

Sample Tag: P6-MH2-SW_120718

TCL Volatile Organics 8260, Method: SW5030C/8260C, Run Date: 12/17/18 20:19, Analyst: KAG

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



Analytical Laboratory Report

Lab Sample ID: S97828.02

Sample Tag: P3-MH-NE_120718

Collected Date/Time: 12/07/2018 15:10

Matrix: Groundwater

COC Reference: 120336

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	4.4	IR
1	125ml Plastic	HNO3	Yes	4.4	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	12/18/18 14:00	JML	
Metal Digestion	Completed	SW3015A	12/18/18 09:00	JRH	
Mercury Digestion*	Completed	SW7471B	12/21/18 10:00	JRH	

Metals

Method: SW6020A, Run Date: 12/19/18 12:58, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Boron	Not detected	0.04		mg/L	5	7440-42-8	

Method: SW6020A, Run Date: 12/18/18 13:59, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005		mg/L	5	7440-36-0	
Arsenic	Not detected	0.002		mg/L	5	7440-38-2	
Barium	0.045	0.005		mg/L	5	7440-39-3	
Cadmium	Not detected	0.0005		mg/L	5	7440-43-9	
Chromium	Not detected	0.005		mg/L	5	7440-47-3	
Cobalt	Not detected	0.005		mg/L	5	7440-48-4	
Copper	Not detected	0.005		mg/L	5	7440-50-8	
Lead	Not detected	0.003		mg/L	5	7439-92-1	
Manganese	0.018	0.005		mg/L	5	7439-96-5	
Nickel	Not detected	0.005		mg/L	5	7440-02-0	
Selenium	Not detected	0.004		mg/L	5	7782-49-2	
Silver	Not detected	0.0005		mg/L	5	7440-22-4	
Vanadium	Not detected	0.005		mg/L	5	7440-62-2	
Zinc	Not detected	0.005		mg/L	5	7440-66-6	

Method: SW7471B, Run Date: 12/21/18 14:10, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury*	Not detected	0.0002		mg/L	1	7439-97-6	

Organics - Volatiles

Method: SW5030C/8260C, Run Date: 12/17/18 20:39, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,2-Dibromo-3-chloropropane	Not detected	1		ug/L	1	96-12-8	
1,2-Dibromoethane	Not detected	1		ug/L	1	106-93-4	

Method: SW8260B - SIM, Run Date: 12/21/18 03:59, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	



Analytical Laboratory Report

Lab Sample ID: S97828.02 (continued)

Sample Tag: P3-MH-NE_120718

TCL Volatile Organics 8260, Method: SW5030C/8260C, Run Date: 12/17/18 20:39, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,1,2-Trichloro-1,2,2-trifluoroethane	Not detected	1		ug/L	1	76-13-1	
Acetone	11	10		ug/L	1	67-64-1	
Carbon disulfide	Not detected	1		ug/L	1	75-15-0	
Methyl Acetate	Not detected	10		ug/L	1	79-20-9	
tert-Methyl butyl ether (MTBE)	Not detected	1		ug/L	1	1634-04-4	
2-Butanone (MEK)	Not detected	10		ug/L	1	78-93-3	
Dichlorodifluoromethane	Not detected	1		ug/L	1	75-71-8	
Chloromethane	Not detected	1		ug/L	1	74-87-3	
Vinyl chloride	Not detected	1		ug/L	1	75-01-4	
Bromomethane	Not detected	1		ug/L	1	74-83-9	
Chloroethane	Not detected	1		ug/L	1	75-00-3	
Trichlorofluoromethane	Not detected	1		ug/L	1	75-69-4	
1,1-Dichloroethene	Not detected	1		ug/L	1	75-35-4	
Methylene chloride	Not detected	1		ug/L	1	75-09-2	
trans-1,2-Dichloroethene	Not detected	1		ug/L	1	156-60-5	
1,1-Dichloroethane	Not detected	1		ug/L	1	75-34-3	
cis-1,2-Dichloroethene	Not detected	1		ug/L	1	156-59-2	
Chloroform	Not detected	1		ug/L	1	67-66-3	
1,1,1-Trichloroethane	Not detected	1		ug/L	1	71-55-6	
Cyclohexane	Not detected	1		ug/L	1	110-82-7	
4-Methyl-2-pentanone (MIBK)	Not detected	10		ug/L	1	108-10-1	
2-Hexanone	Not detected	10		ug/L	1	591-78-6	
Carbon tetrachloride	Not detected	1		ug/L	1	56-23-5	
Benzene	Not detected	1		ug/L	1	71-43-2	
1,2-Dichloroethane	Not detected	1		ug/L	1	107-06-2	
Trichloroethene	Not detected	1		ug/L	1	79-01-6	
1,2-Dichloropropane	Not detected	1		ug/L	1	78-87-5	
Bromodichloromethane	Not detected	1		ug/L	1	75-27-4	
Methyl cyclohexane	Not detected	1		ug/L	1	108-87-2	
cis-1,3-Dichloropropene	Not detected	1		ug/L	1	10061-01-5	
Toluene	Not detected	1		ug/L	1	108-88-3	
trans-1,3-Dichloropropene	Not detected	1		ug/L	1	10061-02-6	
1,1,2-Trichloroethane	Not detected	1		ug/L	1	79-00-5	
Tetrachloroethene	Not detected	1		ug/L	1	127-18-4	
Dibromochloromethane	Not detected	1		ug/L	1	124-48-1	
Chlorobenzene	Not detected	1		ug/L	1	108-90-7	
1,1,2,2-Tetrachloroethane	Not detected	1		ug/L	1	79-34-5	
Ethylbenzene	Not detected	1		ug/L	1	100-41-4	
p,m-Xylene*	Not detected	2		ug/L	1		
o-Xylene	Not detected	1		ug/L	1	95-47-6	
Styrene	Not detected	1		ug/L	1	100-42-5	
Isopropylbenzene	Not detected	1		ug/L	1	98-82-8	
Bromoform	Not detected	1		ug/L	1	75-25-2	
1,3-Dichlorobenzene	Not detected	1		ug/L	1	541-73-1	
1,4-Dichlorobenzene	Not detected	1		ug/L	1	106-46-7	
1,2-Dichlorobenzene	Not detected	1		ug/L	1	95-50-1	
1,2,4-Trichlorobenzene	Not detected	1		ug/L	1	120-82-1	



Analytical Laboratory Report

Lab Sample ID: S97828.03

Sample Tag: P2-MH-NW_120718

Collected Date/Time: 12/07/2018 15:40

Matrix: Groundwater

COC Reference: 120336

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	4.4	IR
1	125ml Plastic	HNO3	Yes	4.4	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	12/19/18 12:30	JML	
Metal Digestion	Completed	SW3015A	12/18/18 09:00	JRH	
Mercury Digestion*	Completed	SW7471B	12/21/18 10:00	JRH	

Metals

Method: SW6020A, Run Date: 12/19/18 12:59, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Boron	0.13	0.04		mg/L	5	7440-42-8	

Method: SW6020A, Run Date: 12/18/18 14:03, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005		mg/L	5	7440-36-0	
Arsenic	0.003	0.002		mg/L	5	7440-38-2	
Barium	0.055	0.005		mg/L	5	7440-39-3	
Cadmium	Not detected	0.0005		mg/L	5	7440-43-9	
Chromium	Not detected	0.005		mg/L	5	7440-47-3	
Cobalt	Not detected	0.005		mg/L	5	7440-48-4	
Copper	Not detected	0.005		mg/L	5	7440-50-8	
Lead	Not detected	0.003		mg/L	5	7439-92-1	
Manganese	0.082	0.005		mg/L	5	7439-96-5	
Nickel	Not detected	0.005		mg/L	5	7440-02-0	
Selenium	Not detected	0.004		mg/L	5	7782-49-2	
Silver	Not detected	0.0005		mg/L	5	7440-22-4	
Vanadium	Not detected	0.005		mg/L	5	7440-62-2	
Zinc	0.013	0.005		mg/L	5	7440-66-6	

Method: SW7471B, Run Date: 12/21/18 14:12, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury*	Not detected	0.0002		mg/L	1	7439-97-6	

Organics - Volatiles

Method: SW5030C/8260C, Run Date: 12/19/18 06:16, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,2-Dibromo-3-chloropropane	Not detected	1		ug/L	1	96-12-8	
1,2-Dibromoethane	Not detected	1		ug/L	1	106-93-4	

Method: SW8260B - SIM, Run Date: 12/21/18 04:20, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	



Analytical Laboratory Report

Lab Sample ID: S97828.03 (continued)

Sample Tag: P2-MH-NW_120718

TCL Volatile Organics 8260, Method: SW5030C/8260C, Run Date: 12/19/18 06:16, Analyst: KAG

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



Analytical Laboratory Report

Lab Sample ID: S97828.04

Sample Tag: Dup-08_120718

Collected Date/Time: 12/07/2018 00:01

Matrix: Groundwater

COC Reference: 120336

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	4.4	IR
1	125ml Plastic	HNO3	Yes	4.4	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	12/19/18 12:30	JML	
Metal Digestion	Completed	SW3015A	12/18/18 09:00	JRH	
Mercury Digestion*	Completed	SW7471B	12/21/18 10:00	JRH	

Metals

Method: SW6020A, Run Date: 12/19/18 13:00, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Boron	0.11	0.04		mg/L	5	7440-42-8	

Method: SW6020A, Run Date: 12/18/18 14:07, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005		mg/L	5	7440-36-0	
Arsenic	0.002	0.002		mg/L	5	7440-38-2	
Barium	0.060	0.005		mg/L	5	7440-39-3	
Cadmium	Not detected	0.0005		mg/L	5	7440-43-9	
Chromium	Not detected	0.005		mg/L	5	7440-47-3	
Cobalt	Not detected	0.005		mg/L	5	7440-48-4	
Copper	Not detected	0.005		mg/L	5	7440-50-8	
Lead	0.003	0.003		mg/L	5	7439-92-1	
Manganese	0.092	0.005		mg/L	5	7439-96-5	
Nickel	Not detected	0.005		mg/L	5	7440-02-0	
Selenium	Not detected	0.004		mg/L	5	7782-49-2	
Silver	Not detected	0.0005		mg/L	5	7440-22-4	
Vanadium	Not detected	0.005		mg/L	5	7440-62-2	
Zinc	0.011	0.005		mg/L	5	7440-66-6	

Method: SW7471B, Run Date: 12/21/18 14:14, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury*	Not detected	0.0002		mg/L	1	7439-97-6	

Organics - Volatiles

Method: SW5030C/8260C, Run Date: 12/19/18 06:35, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,2-Dibromo-3-chloropropane	Not detected	1		ug/L	1	96-12-8	
1,2-Dibromoethane	Not detected	1		ug/L	1	106-93-4	

Method: SW8260B - SIM, Run Date: 12/21/18 04:42, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	



Analytical Laboratory Report

Lab Sample ID: S97828.04 (continued)

Sample Tag: Dup-08_120718

TCL Volatile Organics 8260, Method: SW5030C/8260C, Run Date: 12/19/18 06:35, Analyst: KAG

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



Analytical Laboratory Report

Lab Sample ID: S97828.05

Sample Tag: Trip Blank

Collected Date/Time: 12/07/2018 00:01

Matrix: Water

COC Reference: 120336

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	125ml Plastic	HNO3	Yes	4.4	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	12/18/18 14:00	JML	

Organics - Volatiles

Method: SW5030C/8260C, Run Date: 12/17/18 15:33, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,2-Dibromo-3-chloropropane	Not detected	1		ug/L	1	96-12-8	
1,2-Dibromoethane	Not detected	1		ug/L	1	106-93-4	

Method: SW8260B - SIM, Run Date: 12/21/18 01:30, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	

TCL Volatile Organics 8260, Method: SW5030C/8260C, Run Date: 12/17/18 15:33, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,1,2-Trichloro-1,2,2-trifluoroethane	Not detected	1		ug/L	1	76-13-1	
Acetone	Not detected	10		ug/L	1	67-64-1	
Carbon disulfide	Not detected	1		ug/L	1	75-15-0	
Methyl Acetate	Not detected	10		ug/L	1	79-20-9	
tert-Methyl butyl ether (MTBE)	Not detected	1		ug/L	1	1634-04-4	
2-Butanone (MEK)	Not detected	10		ug/L	1	78-93-3	
Dichlorodifluoromethane	Not detected	1		ug/L	1	75-71-8	
Chloromethane	Not detected	1		ug/L	1	74-87-3	
Vinyl chloride	Not detected	1		ug/L	1	75-01-4	
Bromomethane	Not detected	1		ug/L	1	74-83-9	
Chloroethane	Not detected	1		ug/L	1	75-00-3	
Trichlorofluoromethane	Not detected	1		ug/L	1	75-69-4	
1,1-Dichloroethene	Not detected	1		ug/L	1	75-35-4	
Methylene chloride	Not detected	1		ug/L	1	75-09-2	
trans-1,2-Dichloroethene	Not detected	1		ug/L	1	156-60-5	
1,1-Dichloroethane	Not detected	1		ug/L	1	75-34-3	
cis-1,2-Dichloroethene	Not detected	1		ug/L	1	156-59-2	
Chloroform	Not detected	1		ug/L	1	67-66-3	
1,1,1-Trichloroethane	Not detected	1		ug/L	1	71-55-6	
Cyclohexane	Not detected	1		ug/L	1	110-82-7	
4-Methyl-2-pentanone (MIBK)	Not detected	10		ug/L	1	108-10-1	
2-Hexanone	Not detected	10		ug/L	1	591-78-6	
Carbon tetrachloride	Not detected	1		ug/L	1	56-23-5	
Benzene	Not detected	1		ug/L	1	71-43-2	
1,2-Dichloroethane	Not detected	1		ug/L	1	107-06-2	
Trichloroethene	Not detected	1		ug/L	1	79-01-6	
1,2-Dichloropropane	Not detected	1		ug/L	1	78-87-5	
Bromodichloromethane	Not detected	1		ug/L	1	75-27-4	



Analytical Laboratory Report

Lab Sample ID: S97828.05 (continued)

Sample Tag: Trip Blank

TCL Volatile Organics 8260, Method: SW5030C/8260C, Run Date: 12/17/18 15:33, Analyst: JML (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Methyl cyclohexane	Not detected	1		ug/L	1	108-87-2	
cis-1,3-Dichloropropene	Not detected	1		ug/L	1	10061-01-5	
Toluene	Not detected	1		ug/L	1	108-88-3	
trans-1,3-Dichloropropene	Not detected	1		ug/L	1	10061-02-6	
1,1,2-Trichloroethane	Not detected	1		ug/L	1	79-00-5	
Tetrachloroethene	Not detected	1		ug/L	1	127-18-4	
Dibromochloromethane	Not detected	1		ug/L	1	124-48-1	
Chlorobenzene	Not detected	1		ug/L	1	108-90-7	
1,1,2,2-Tetrachloroethane	Not detected	1		ug/L	1	79-34-5	
Ethylbenzene	Not detected	1		ug/L	1	100-41-4	
p,m-Xylene*	Not detected	2		ug/L	1		
o-Xylene	Not detected	1		ug/L	1	95-47-6	
Styrene	Not detected	1		ug/L	1	100-42-5	
Isopropylbenzene	Not detected	1		ug/L	1	98-82-8	
Bromoform	Not detected	1		ug/L	1	75-25-2	
1,3-Dichlorobenzene	Not detected	1		ug/L	1	541-73-1	
1,4-Dichlorobenzene	Not detected	1		ug/L	1	106-46-7	
1,2-Dichlorobenzene	Not detected	1		ug/L	1	95-50-1	
1,2,4-Trichlorobenzene	Not detected	1		ug/L	1	120-82-1	

Merit Laboratories Login Checklist

Lab Set ID:S97828

Client:ARCADIS_NOVI (ARCADIS U.S., Inc.)

Project: RACER Lansing / B0064479.2018.03100

Submitted: 12/14/2018 11:50 Login User: MMC

Attention: Christine Gregg

Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 734-585-7817 FAX: 248-994-2241

Email: christine.gregg@arcadis.com

Selection	Description	Note
Sample Receiving		
01.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples are received at 4C +/- 2C Thermometer # IR 4.4
02.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Received on ice/ cooling process begun
03.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples shipped
04.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples left in 24 hr. drop box
05.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Are there custody seals/tape or is the drop box locked
Chain of Custody		
06.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC adequately filled out
07.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC signed and relinquished to the lab
08.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sample tag on bottles match COC
09.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Subcontracting needed? Subcontracted to:
Preservation		
10.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Do sample have correct chemical preservation
11.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Completed pH checks on preserved samples? (no VOAs)
12.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Did any samples need to be preserved in the lab?
Bottle Conditions		
13.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	All bottles intact
14.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Appropriate analytical bottles are used
15.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Merit bottles used
16.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sufficient sample volume received
17.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples require laboratory filtration
18.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples submitted within holding time
19.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Do water VOC or TOX bottles contain headspace

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories Bottle Preservation Check

Lab Set ID: S97828 Initials: MMC

Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)

Project: RACER Lansing / B0064479.2018.03100

Submitted: 12/14/2018 11:50 Login User:

Attention: Christine Gregg
 Address: Arcadis
 28550 Cabot Drive
 Suite 500
 Novi, MI 48377

Phone: 734-585-7817 FAX: 248-994-2241
 Email: christine.gregg@arcadis.com






Lab ID	125 ml Plastic HNO ₃	250 ml Plastic HNO ₃	1 L Plastic HNO ₃	250 ml Plastic H ₂ SO ₄	125 ml Amber H ₂ SO ₄	32 oz Glass HCl	125 ml Plastic NaOH	125 ml Amber PbCO ₃ NaOH	pH					Notes
									<2	>12	other	ml add	new pH	
S97828.01	X								X					
S97828.02	X								X					
S97828.03	X								X					
S97828.04	X								X					
S97828.05	X								X					


ATTACHMENT 2

Soil Boring Logs

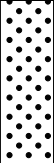
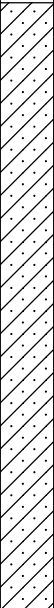


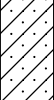


Date Start: 11/27/2018 Date Finish: 11/27/2018 Drilling Company: Stock Drilling Driller's Name: Earnest Plyler Drilling Method: Hand auger/Geoprobe Sampling Method: DT22 Dual Tube Rig Type: Geoprobe 3230 DT Water Level Start (ft. bgs.): 3.0 Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: B. Pertunen	Well/Boring ID: SB-P6-MF293 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 28F, Cloudy
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DEPTH (feet bgl.)	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 - 1.0') TOPSOIL		
		1	0.0-6.0'	5.9	NA			(1.0 - 2.0') CLAY, medium plasticity, no dilatency; moist; medium stiff; dark gray (10YR 3/1).		
		2	6.0-10.0'	4.0	NA			(2.0 - 9.0') CLAY, medium plasticity, slow dilatency, and SAND, very fine to coarse, subangular; some granules, subangular; poorly sorted; loose; wet to moist; soft to medium stiff; brown (10YR 5/6).		
		3	10.0-15.0'	5.0	NA			(9.0 - 20.0') CLAY, low plasticity, no dilatency; trace silt; trace sand, very fine to coarse, subangular; trace granules to medium pebbles, subangular to subrounded; poorly sorted; moist to dry; very stiff; gray (10YR 5/1).		
		4	15.0-20.0'	5.0	NA					

 <small>Design & Consultancy for natural and built assets</small>	Remarks: bgs = below ground surface Temporary wells screened from 3.0 to 8.0' and 20.0 to 25.0' bgs.
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Date Start: 11/27/2018 Date Finish: 11/27/2018 Drilling Company: Stock Drilling Driller's Name: Earnest Plyler Drilling Method: Hand auger/Geoprobe Sampling Method: DT22 Dual Tube Rig Type: Geoprobe 3230 DT Water Level Start (ft. bgs.): 3.0 Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: B. Pertunen	Well/Boring ID: SB-P6-MF293 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 28F, Cloudy
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DEPTH (feet bgl.)	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	NA			(20.0 - 23.0') SAND, very fine to coarse, subangular to subrounded; trace granules, subrounded; trace silt; trace clay; poorly sorted; loose; wet; brown (10YR 6/3).		Borehole backfilled with Bentonite.
25.0	-25.0	6	25.0-30.0	3.75	NA		(23.0 - 34.0') CLAY, low plasticity, no dilatency and SAND, very fine to coarse, subangular to subrounded; trace silt; trace granules, subrounded; poorly sorted; moist; stiff; gray (10YR 4/1).			
30.0	-30.0		30.0-35.0	4.2	NA					
35.0	-35.0						(34.0 - 37.0') SAND, very fine to coarse, subrounded; trace granules, subrounded; poorly sorted; loose; dry; gray (10YR 5/1).			
37.0	-37.0		35.0-40.0	3.3	NA		(37.0 - 38.0') CLAY, low plasticity, no dilatency; moist; stiff; gray (10YR 3/1).			
38.0	-38.0						(38.0 - 40.0') SAND, very fine to coarse, subrounded and CLAY, low plasticity, no dilatency; trace small pebbles; poorly sorted; moist; medium stiff; gray (10YR 4/1).			
40.0	-40.0							End of boring at 40' bgs.		

Remarks: bgs = below ground surface
 Temporary wells screened from 3.0 to 8.0' and 20.0 to 25.0' bgs.



Date Start: 11/27/2018 Date Finish: 11/27/2018 Drilling Company: Stock Drilling Driller's Name: Earnest Plyler Drilling Method: Hand auger/Geoprobe Sampling Method: DT22 Rig Type: Geoprobe 3230 DT Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Eastings: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 25.0 Surface Elevation: NA Descriptions By: B. Pertunen	Well/Boring ID: SB-P6-MF301 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 28 F, Overcast
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DEPTH (feet bgl.)	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	0.0-6.0'	6.0	NA		(0.0 - 3.0') CLAY, low plasticity, no dilatancy and SAND, very fine to coarse, subrounded; poorly sorted; moist; medium dense; soft; brown (10YR 4/3).			Borehole backfilled with Bentonite.
5	-5						(3.0 - 11.0') CLAY, medium plasticity and SAND, very fine to coarse, subangular to subrounded, trace granules, subangular, trace small pebbles, subangular; poorly sorted; wet to moist; soft; brown (10YR 5/6). NOTE: Trace coal fragments.			
		2	6.0-10.0'	4.0	NA		(11.0 - 14.0') CLAY, medium plasticity, no dilatancy; some sand, very fine to coarse, subrounded; trace granules, subrounded; poorly sorted; moist; stiff; gray (10YR 4/1).			
10	-10						(14.0 - 17.0') SAND, very fine to coarse and CLAY, low plasticity; poorly sorted; loose; moist; gray (10YR 4/1).			
		3	10.0-15.0'	4.3	NA		(17.0 - 20.0') CLAY, medium plasticity, no dilatancy; some sand, very fine to coarse, subangular; trace granules; poorly sorted; moist; stiff; gray (10YR 4/1).			
15	-15						(20.0 - 21.5') SAND, very fine to coarse, subangular to angular and CLAY, low plasticity, no dilatancy; trace granules, subangular; poorly sorted; loose; wet; brown (10YR 4/3).			
		4	15.0-20.0'	3.75	NA		(21.5 - 25.0') CLAY, medium plasticity to high plasticity, no dilatancy; some sand, very fine to coarse, subangular; trace granules, subangular; poorly sorted; moist; gray (10YR 4/1).			
20	-20						(21.5 - 25.0') CLAY, medium plasticity to high plasticity, no dilatancy; some sand, very fine to coarse, subangular; trace granules, subangular; poorly sorted; moist; gray (10YR 4/1).			
		5	20.0-25.0'	5.0	NA		(21.5 - 25.0') CLAY, medium plasticity to high plasticity, no dilatancy; some sand, very fine to coarse, subangular; trace granules, subangular; poorly sorted; moist; gray (10YR 4/1).			
25	-25						End of boring at 25' bgs.			

Remarks: bgs = below ground surface
Temporary wells screened from 3.0 to 8.0' and 20.0 to 25.0' bgs.



Date Start: 11/27/2018
Date Finish: 11/27/2018
Drilling Company: Stock Drilling
Driller's Name: Tom Bacome Jr.
Drilling Method: Hand auger/Geoprobe
Sampling Method: DT22 Dual Tube
Rig Type: Geoprobe 3230 DT
Water Level Start (ft. bgs.): 24.0
Water Level Finish (ft. btoc.): NA

Northing: NA
Easting: NA
Casing Elevation: NA

Borehole Depth (ft. bgs.): 30.0
Surface Elevation: NA

Descriptions By: A. Westhuis

Well/Boring ID: SB-P6-MF311
Client: RACER
Location: RACER Lansing Plant 6




Weather Conditions: 28 F, Cloudy


DEPTH (feet bgl.)	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.		
		1	0.0-6.0'	6.0	NA			(0.3 - 1.0') SAND, fine to medium, subrounded; trace granules, subrounded; trace silt; well sorted; moist; yellowish brown (10YR 5/6).		
-5	-5							(1.0 - 13.0') CLAY, some silt, medium plasticity, no dilatancy; little fine sand, subrounded; trace granules to small pebbles, subrounded; moist; medium stiff; yellowish brown (10YR 5/6).		
		2	6.0-10.0'	4.0	NA			NOTE: SAND SEAM, fine, wet at 8.0 and 9.0' bgs.		Borehole backfilled with Bentonite.
-10	-10							NOTE: Soft from 11.0 to 12.5' bgs.		
		3	10.0-15.0'	5.0	NA			(13.0 - 24.0') CLAY, some silt, medium to high plasticity, no dilatancy; little sand, fine, subrounded; trace granules to medium pebbles, subrounded; moist; medium stiff to stiff; grayish brown (10YR 5/2).		
-15	-15									

Remarks: bgs = below ground surface
 Temporary wells screened from 8.0 to 13' bgs and 20.0 to 25.0' bgs.



Date Start: 11/27/2018 Date Finish: 11/27/2018 Drilling Company: Stock Drilling Driller's Name: Tom Bacome Jr. Drilling Method: Hand auger/Geoprobe Sampling Method: DT22 Dual Tube Rig Type: Geoprobe 3230 DT Water Level Start (ft. bgs.): 24.0 Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 30.0 Surface Elevation: NA Descriptions By: A. Westhuis	Well/Boring ID: SB-P6-MF311 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 28 F, Cloudy
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DEPTH (feet bgl.)	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	4	15.0-20.0'	5.0	NA					
25	-25	5	20.0-25.0'	5.0	NA			NOTE: SILT, rapid dilatancy from 23.0 to 23.5' bgs. (24.0 - 24.5') SAND, fine to medium; trace coarse sand, subrounded; trace granules to small pebbles, subrounded; trace to little silt; poorly sorted; wet; light brownish gray (10YR 6/2).		Borehole backfilled with Bentonite.
30	-30	6	25.0-30.0'	5.0	NA			(24.5 - 30.0') CLAY, some silt, high plasticity, no dilatancy; trace sand, fine, subrounded; trace granules to medium kpebbles, subrounded; moist; stiff; gray (10YR 5/1).		
								End of boring at 30' bgs.		

	Remarks: bgs = below ground surface Temporary wells screened from 8.0 to 13' bgs and 20.0 to 25.0' bgs.
--	---

Date Start: 11/27/2018
Date Finish: 11/27/2018
Drilling Company: Stock Drilling
Driller's Name: Tom Bacome Jr.
Drilling Method: Hand auger/Geoprobe
Sampling Method: DT22 Dual Tube
Rig Type: Geoprobe 3230 DT
Water Level Start (ft. bgs.): 10.0
Water Level Finish (ft. btoc.): NA

Northing: NA
Eastings: NA
Casing Elevation: NA

Borehole Depth (ft. bgs.): 40.0
Surface Elevation: NA

Descriptions By: A. Westhuis

Well/Boring ID: SB-P6-MF321
Client: RACER
Location: RACER Lansing Plant 6

Weather Conditions: 28 F, Cloudy


DEPTH (feet bgl.)	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.		
		1	0.0-6.0'	6.0	NA			(0.3 - 11.5') CLAY, some silt, medium plasticity, no dilatancy; little to some sand, fine to medium, subrounded; trace granules to small pebbles, subrounded; moist; medium stiff; yellowish brown (10YR 5/6).		
-5										
		2	6.0-10.0'	4.0	NA					
-10								NOTE: Sand seam, fine; wet from 10.0 to 11.0' bgs.		
		3	10.0-15.0'	5.0	NA			(11.5 - 29.0') CLAY, some silt, medium to high plasticity, no dilatancy; little sand, fine, subrounded; trace granules to medium pebbles, subrounded; moist; medium stiff; grayish brown (10YR 5/2).		
-15								NOTE: Sand seam, fine; wet from 12.5 to 12.7' bgs.		
		4	15.0-20.0'	5.0	NA					
-20										

Remarks: bgs = below ground surface
 Temporary well screened from 10.0 to 15.0' bgs.



Date Start: 11/27/2018 Date Finish: 11/27/2018 Drilling Company: Stock Drilling Driller's Name: Tom Bacome Jr. Drilling Method: Hand auger/Geoprobe Sampling Method: DT22 Dual Tube Rig Type: Geoprobe 3230 DT Water Level Start (ft. bgs.): 10.0 Water Level Finish (ft. btoc.): NA	Northing: NA Eastings: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: A. Westhuis	Well/Boring ID: SB-P6-MF321 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 28 F, Cloudy
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DEPTH (feet bgl.)	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
		5	20.0-25.0'	5.0	NA					
25	-25	6	25.0-30.0'	5.0	NA					
30	-30	7	30.0-35.0'	5.0	NA			(29.0 - 30.0') SAND, very fine, subrounded; trace silt; well sorted; dry; light gray (10YR 7/2).		Borehole backfilled with Bentonite.
								(30.0 - 32.0') CLAY, some silt, medium plasticity, no dilatancy; moist; hard; gray (10YR 5/1).		
								(32.0 - 34.0') SAND, very fine, subrounded; trace silt; well sorted; dry; light gray (10YR 7/2).		
35	-35	8	35.0-40.0'	5.0	NA			(34.0 - 38.0') CLAY, some silt, low plasticity to non-plastic, no dilatancy; trace sand, fine, subrounded; moist; soft; gray (10YR 5/1).		
								(38.0 - 39.0') SAND, very fine, subrounded; trace silt; well sorted; dry; gray (10YR 6/1).		
40	-40							(39.0 - 40.0') CLAY, some silt, low plasticity, no dilatancy; moist; hard; gray (10YR 5/1).		
								End of boring at 40' bgs.		

	Remarks: bgs = below ground surface Temporary well screened from 10.0 to 15.0' bgs.
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Date Start: 11/29/2018 Date Finish: 11/29/2018 Drilling Company: Stock Drilling Driller's Name: Earnest Plyler Drilling Method: Hand auger/Geoprobe Sampling Method: Macro Core Rig Type: Geoprobe 3230 DT Water Level Start (ft. bgs.): 28.0 Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: B. Pertunen	Well/Boring ID: SB-P6-MK335 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 24 F, Overcast
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DEPTH (feet bgl.)	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 - 1.0') TOPSOIL		
		1	0.0-6.0'	6.0	NA			(1.0 - 2.0') CLAY, medium plasticity; some sand, very fine to coarse, subangular; poorly sorted; dry; brown (10YR 5/6). NOTE: Contains tree roots.		
		2	6.0-10.0'	4.0	NA			(2.0 - 9.0') CLAY, medium plasticity, no dilatancy and SAND, very fine to coarse, subangular; trace silt; poorly sorted; moist; stiff; brown (10YR 5/6).		
		3	10.0-15.0'	5.0	NA			(9.0 - 14.0') CLAY, medium plasticity, no dilatancy; some sand, very fine to coarse, subangular; some small pebbles, subrounded; trace silt; poorly sorted; moist; soft; brown (10YR 5/6).		
		4	15.0-20.0'	5.0	NA			(14.0 - 15.0') CLAY, medium plasticity, no dilatancy and SAND, very fine to coarse, subrounded; trace silt; trace granules, subrounded; poorly sorted; moist; soft; gray (10YR 4/1).		
								(15.0 - 28.0') CLAY, medium plasticity, no dilatancy; trace silt; trace sand, very fine to medium, subrounded; trace granules, subrounded; trace small to medium pebbles, subrounded; moist; medium stiff; gray (10YR 4/1).		

Remarks: bgs = below ground surface
 Temporary wells screened from 9.0 to 14.0' and 28.0 to 33.0' bgs.



Date Start: 11/29/2018
Date Finish: 11/29/2018
Drilling Company: Stock Drilling
Driller's Name: Earnest Plyler
Drilling Method: Hand auger/Geoprobe
Sampling Method: Macro Core
Rig Type: Geoprobe 3230 DT
Water Level Start (ft. bgs.): 28.0
Water Level Finish (ft. btoc.): NA

Northing: NA
Easting: NA
Casing Elevation: NA

Borehole Depth (ft. bgs.): 40.0
Surface Elevation: NA

Descriptions By: B. Pertunen

Well/Boring ID: SB-P6-MK335
Client: RACER
Location: RACER Lansing Plant 6

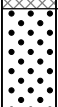


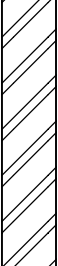
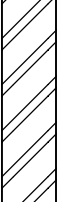
Weather Conditions: 24 F, Overcast


DEPTH (feet bgl.)	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	NA					
25.0 - 30.0		6	25.0-30.0	5.0	NA			(28.0 - 29.0') CLAY, low plasticity, slow dilatancy; some sand, very fine to medium, subrounded; poorly sorted; wet; soft; gray (10YR 4/1).		Borehole backfilled with Bentonite.
30.0 - 31.0							(29.0 - 31.0') CLAY, medium plasticity, no dilatancy; trace sand; trace silt; trace medium pebbles, subangular; moist; medium stiff to stiff; gray (10YR 4/1).			
31.0 - 32.0							(31.0 - 32.0') CLAY, low plasticity, slow dilatancy; some sand, very fine to medium, subrounded; trace silt; poorly sorted; wet; soft; gray (10YR 4/1).			
32.0 - 40.0		7	30.0-35.0	3.4	NA		(32.0 - 40.0') CLAY, medium to high plasticity, trace silt; trace sand, very fine to medium, subrounded; trace granules, subrounded; poorly sorted; moist; medium stiff, gray (10YR 4/1) and very dark gray (10YR 1/1)			
35.0 - 40.0		8	35.0-40.0	5.0	NA					
40.0								End of boring at 40' bgs.		

Remarks: bgs = below ground surface
 Temporary wells screened from 9.0 to 14.0' and 28.0 to 33.0' bgs.







Date Start: 11/19/2018 Date Finish: 11/19/2018 Drilling Company: Stock Drilling Driller's Name: Tom Bacome Jr. Drilling Method: Geoprobe Sampling Method: DT22 Dual Tube Rig Type: Geoprobe 3230 DT Water Level Start (ft. bgs.): 5.0 Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: A. Westhuis	Well/Boring ID: SB-P6-MQ289 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 30 F, Cloudy
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DEPTH (feet bgl.)	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 - 1.0') CONCRETE		
		1	0.0-5.0'	3.0	NA			(1.0 - 3.0') SAND, very fine to fine, subangular; little granules to medium pebbles, subrounded; trace silt; poorly sorted; dry; brownish yellow (10YR 6/6).		
5	-5	2	5.0-10.0'	3.8	NA			(3.0 - 11.0') CLAY, some silt, high plasticity, no dilatancy; trace sand, fine, subrounded; trace granules to small pebbles, subrounded; moist; medium stiff; yellowish brown (10YR 5/6).		 Borehole backfilled with Bentonite.
10	-10	3	10.0-15.0'	3.8	NA			(11.0 - 16.0') CLAY, some silt, medium plasticity, no dilatancy; little sand, fine, subrounded; trace granules, subrounded; moist; medium stiff to soft; dark grayish brown (10YR 5/2).		
15	-15	4	15.0-20.0'	5.0	NA			(16.0 - 21.0') CLAY, some silt, medium to low plasticity, no dilatancy; little to some sand, fine, subrounded; trace granules to small pebbles, subrounded; moist; medium stiff; light yellowish brown (10YR 6/4).		
20	-20							NOTE: Small sand seam, fine; wet from 18.7 to 19.0' bgs.		

 <small>Design & Consultancy for natural and built assets</small>	Remarks: bgs = below ground surface Temporary wells screened from 15.0 to 20.0' and 27.0 to 32.0' bgs.
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Date Start: 11/19/2018 Date Finish: 11/19/2018 Drilling Company: Stock Drilling Driller's Name: Tom Bacome Jr. Drilling Method: Geoprobe Sampling Method: DT22 Dual Tube Rig Type: Geoprobe 3230 DT Water Level Start (ft. bgs.): 5.0 Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: A. Westhuis	Well/Boring ID: SB-P6-MQ289 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 30 F, Cloudy
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DEPTH (feet bgl.)	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'	4.8	NA			(21.0 - 28.0') CLAY, some silt, medium to low plasticity, no dilatancy; trace sand, fine, subrounded; trace granules to large pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
25.0	-25.0	6	25.0-30.0	4.4	NA			(28.0 - 31.0') SAND, very fine and SILT; well sorted; wet; yellowish brown (10YR 5/4).		
30.0	-30.0		30.0-35.0	5.0	NA			(31.0 - 40.0') CLAY, some silt, medium plasticity, no dilatancy; trace sand, fine, subrounded; trace granules to medium pebbles, subrounded; grayish brown (10YR 5/2).		Borehole backfilled with Bentonite.
35.0	-35.0		35.0-40.0	5.0	NA			NOTE: Small sand seam, fine; wet from 39.3 to 29.5' bgs.		
40.0	-40.0							End of boring at 40' bgs.		

Remarks: bgs = below ground surface
 Temporary wells screened from 15.0 to 20.0' and 27.0 to 32.0' bgs.



Date Start: 11/19/2018 Date Finish: 11/19/2018 Drilling Company: Stock Drilling Driller's Name: Earnest Plyler Drilling Method: Geoprobe Sampling Method: DT22 Dual Tube Rig Type: Geoprobe 3230 DT Water Level Start (ft. bgs.): 5.0 Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: A. Westhuis	Well/Boring ID: SB-P6-MQ312 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 30 F, Cloudy
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DEPTH (feet bgl.)	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') TOPSOIL, grass.		
		1	0.0-5.0'	2.75	NA			(0.1 - 0.5') SAND, very fine to fine, little medium to coarse, subangular; little small to large pebbles, subrounded; little silt; poorly sorted; moist to wet; yellowish brown (10YR 5/4). NOTE: Fill.		
5	-5	2	5.0-10.0'	4.75	NA			(0.5 - 16.0') CLAY, some silt, high plasticity, no dilatancy; trace sand, fine, subrounded; trace granules to small pebbles, subrounded; moist; medium stiff; yellowish brown (10YR 5/6).		
								NOTE: Small sand lense, fine; wet at 7.0' bgs.		
10	-10	3	10.0-15.0'	5.0	NA					
15	-15	4	15.0-20.0'	5.0	NA			(16.0 - 35.0') CLAY, little silt, high plasticity, no dilatancy; trace sand, fine, subrounded; trace to little granules to medium pebbles, subrounded; moist; medium stiff to stiff; grayish brown (10YR 5/2).		
20	-20									Borehole backfilled with Bentonite.

	Remarks: bgs = below ground surface Temporary well screened from 5.0 to 10.0' bgs.
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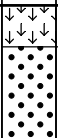
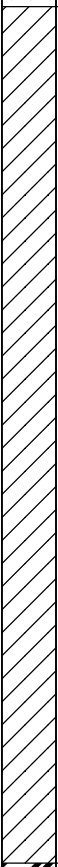
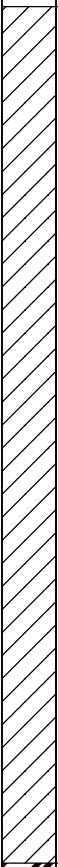
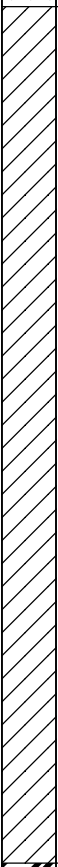


Date Start: 11/19/2018 Date Finish: 11/19/2018 Drilling Company: Stock Drilling Driller's Name: Earnest Plyler Drilling Method: Geoprobe Sampling Method: DT22 Dual Tube Rig Type: Geoprobe 3230 DT Water Level Start (ft. bgs.): 5.0 Water Level Finish (ft. btoc.): NA	Northing: NA Eastings: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: A. Westhuis	Well/Boring ID: SB-P6-MQ312 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 30 F, Cloudy
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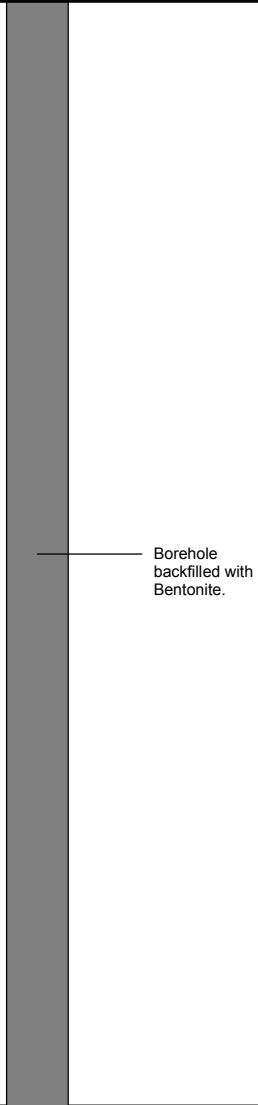
DEPTH (feet bgl.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
0		5	20.0-25.0'	3.25	NA					
25	-25	6	25.0-30.0	4.6	NA					
30	-30		30.0-35.0	5.0	NA					
35	-35							(35.0 - 35.5') SAND, very fine to fine, subrounded; trace silt; well sorted; dry; light gray (10YR 7/1).		
								(35.5 - 37.0') CLAY, little silt, high plasticity, no dilatancy; trace sand, fine, subrounded; trace granules to medium pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
			35.0-40.0	2.6	NA			(37.0 - 40.0') SAND, very fine; trace silt; well sorted; dry; light gray (10YR 7/1).		
40	-40							End of boring at 40' bgs.		Borehole backfilled with Bentonite.

Remarks: bgs = below ground surface
Temporary well screened from 5.0 to 10.0' bgs.



Date Start: 11/19/2018 Date Finish: 11/19/2018 Drilling Company: Stock Drilling Driller's Name: Earnest Plyler Drilling Method: Geoprobe Sampling Method: DT22 Dual Tube Rig Type: Geoprobe 3230 DT Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Eastings: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: B. Pertunen	Well/Boring ID: SB-P6-NF322 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 34F, Partly Sunny
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DEPTH (feet bgl.)	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 - 0.8') TOPSOIL, grass		
		1	0.0-5.0'	3.1	NA			(0.8 - 2.5') SAND, very fine to coarse, subangular to subrounded; some silt; little clay, low plasticity; little small pebbles; poorly sorted; dry to moist; stiff, brown (10YR 5/4).		
		2	5.0-10.0'	5.0	NA			(2.5 - 18.0') CLAY, low plasticity, no dilatancy; trace sand, subangular; trace granules, subrounded; dry to moist; stiff, yellowish brown (10YR 5/6).		
		3	10.0-15.0'	4.9	NA					
		4	15.0-20.0'	4.2	NA					
								(18.0 - 19.5') CLAY, high plasticity, no dilatancy; trace granules, fine to coarse, subrounded; moist; medim stiff; (10YR 6/1) GLEY.		
								(19.5 - 25.0') SAND, very fine to coarse; little silt; trace granules to medium pebbles.		



Remarks: bgs = below ground surface
 Temporary well screened from 18.0 to 23.0' bgs.



Date Start: 11/19/2018 Date Finish: 11/19/2018 Drilling Company: Stock Drilling Driller's Name: Earnest Plyler Drilling Method: Geoprobe Sampling Method: DT22 Dual Tube Rig Type: Geoprobe 3230 DT Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: B. Pertunen	Well/Boring ID: SB-P6-NF322 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 34F, Partly Sunny
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DEPTH (feet bgl.)	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
18.0		5	20.0-25.0'	2.1	NA			subangular; poorly sorted; wet; soft; dark gray (10YR 4/1).		
25	-25	6	25.0-30.0	4.8	NA			(25.0 - 40.0') CLAY, high plasticity, no dilatancy; little silt; trace sand, fine; trace granules to medum pebbles, subrounded; moist; medium stiff to stiff; dark gray (10YR 4/1).		
30	-30		30.0-35.0	5.0	NA					
35	-35		35.0-40.0	5.0	NA					
40	-40							End of boring at 40' bgs.		

Borehole backfilled with Bentonite.

Remarks: bgs = below ground surface
Temporary well screened from 18.0 to 23.0' bgs.



Date Start: 11/29/2018 Date Finish: 11/29/2018 Drilling Company: Stock Drilling Driller's Name: Earnest Plyler Drilling Method: Hand auger/Geoprobe Sampling Method: Macro Core Rig Type: Geoprobe 3230 DT Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: B. Pertunen	Well/Boring ID: SB-P6-NS335 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 25 F, Overcast
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DEPTH (feet bgl.)	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 - 2.0') TOPSOIL		
		1	0.0-6.0'	6.0	NA			(2.0 - 7.0') CLAY, low plasticity, no dilatancy and SAND, very fine to coarse, subangular; trace silt; trace granules, subrounded; poorly sorted; dense; dry; medium stiff; brown (10YR 5/6).		
-5	-5							(7.0 - 12.0') CLAY, medium plasticity, no dilatancy; some sand, very fine to medium, subrounded; trace silt; trace granules, subrounded; poorly sorted; dense; moist; stiff; brown (10YR 5/6).		
		2	6.0-10.0'	4.0	NA			(12.0 - 14.0') SAND, very fine to coarse, subrounded to subangular; some clay, medium plasticity, no dilatancy; trace silt; trace granules, subrounded; poorly sorted; loose; moist; soft; brown (10YR 5/6).		
-10	-10							(14.0 - 17.0') CLAY, medium plasticity, no dilatancy; trace sand; trace silt; moist; medium stiff; brown (10YR 5/6).		
		3	10.0-15.0'	5.0	NA			(17.0 - 19.0') CLAY, medium plasticity, no dilatancy; some sand, very fine to medium, subangular; some granules, subangular; trace silt; poorly sorted; moist; gray (10YR 4/1).		
-15	-15							(19.0 - 23.0') CLAY, medium plasticity, no dilatancy and SAND, very fine to coarse, subangular; poorly sorted; dry; stiff; gray (10YR 4/1).		
		4	15.0-20.0'	4.9	NA					
-20	-20									

Remarks: bgs = below ground surface
Temporary well screened from 11.0 to 16.0' bgs.



Date Start: 11/29/2018
Date Finish: 11/29/2018
Drilling Company: Stock Drilling
Driller's Name: Earnest Plyler
Drilling Method: Hand auger/Geoprobe
Sampling Method: Macro Core
Rig Type: Geoprobe 3230 DT
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA

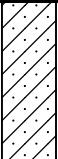

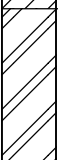
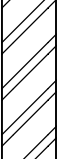
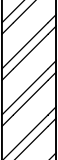
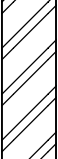
Northing: NA
Eastings: NA
Casing Elevation: NA

Borehole Depth (ft. bgs.): 40.0
Surface Elevation: NA

Descriptions By: B. Pertunen

Well/Boring ID: SB-P6-NS335
Client: RACER
Location: RACER Lansing Plant 6

Weather Conditions: 25 F, Overcast

DEPTH (feet bgl.)	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'	4.3	NA			(23.0 - 39.0') CLAY, medium to high plasticity, no dilatancy; some granules, subangular; trace sand; trace silt; moist to dry; stiff to medium stiff; gray (10YR 4/1).		
25.0	-30.0	6	25.0-30.0	5.0	NA					
30.0	-35.0	7	30.0-35.0	5.0	NA					
35.0	-40.0	8	35.0-40.0	3.3	NA					
39.0	-40.0						(39.0 - 40.0') SAND, very fine to coarse, subrounded; trace silt; poorly sorted; gray (10YR 4/1).			
40.0	-40.0							End of boring at 40' bgs.		

Remarks: bgs = below ground surface
 Temporary well screened from 11.0 to 16.0' bgs.









Date Start: 11/20/2018 Date Finish: 11/20/2018 Drilling Company: Stock Drilling Driller's Name: Earnest Plyler Drilling Method: Geoprobe Sampling Method: DT22 Dual Tube Rig Type: Geoprobe 3230 DT Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: B. Pertunen	Well/Boring ID: SB-P6-NT322 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 34 F, Partly Sunny
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DEPTH (feet bgl.)	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') TOPSOIL		
		1	0.0-5.0'	1.5	NA			(0.1 - 0.8') SAND, fine to medium, subangular; some clay; trace silt; medium plasticity, no dilatancy; trace buiding material, brick; moist; brown (10YR 5/4). (0.8 - 12.5') CLAY, low to medium plasticity, no dilatancy; some sand, fine to medcium, subangular; little small pebbles, subrounded; moist; medium stiff to stiff; brown (10YR 5/4).		
5	-5	2	5.0-10.0'	4.3	NA					
10	-10	3	10.0-15.0'	5.0	NA			(12.5 - 13.5') CLAY, medium plasticity, no dilatancy; trace silt, trace sand, fine, subangular; moist; soft; gray (10YR 5/1). (13.5 - 15.0') SAND, fine to medium, subangular; some clay; trace silt, medium plasticity, slow dilatancy; wet; soft; gray (10YR 5/1).		
15	-15	4	15.0-20.0'	5.0	NA			(15.0 - 17.0') CLAY, medium plasticity, no dilatancy; trace silt; trace sand, fine to medium, subangular; wet; medium stiff; gray (10YR 5/1). (17.0 - 18.0') SAND, fine to medium, subrounded; trace silt; trace clay; wet; gray (10YR 5/1). (18.0 - 20.0') CLAY, medium plasticity; some sand, fine to medium, subangular; wet; gray (10YR 5/1).		Borehole backfilled with Bentonite.
20	-20									

Remarks: bgs = below ground surface
Temporary well screened from 19.0 to 24.0' bgs.



Date Start: 11/20/2018 Date Finish: 11/20/2018 Drilling Company: Stock Drilling Driller's Name: Earnest Plyler Drilling Method: Geoprobe Sampling Method: DT22 Dual Tube Rig Type: Geoprobe 3230 DT Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: B. Pertunen	Well/Boring ID: SB-P6-NT322 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 34 F, Partly Sunny
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DEPTH (feet bgl.)	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	NA			(20.0 - 34.0') CLAY, high plasticity, no dilatancy; trace silt; trace sand, fine, subrounded, trace granules to small pebbles, subrounded to angular; moist; stiff; gray (10YR 4/1).		 Borehole backfilled with Bentonite.
25.0	-25.0	6	25.0-30.0	5.0	NA					
30.0	-30.0		30.0-35.0	5.0	NA					
35.0	-35.0		35.0-40.0	4.0	NA					
34.0	-35.0						(34.0 - 35.0') SAND, fine to medium, subangular, and CLAY, medium plasticity, no dilatancy; trace silt, moist; medium stiff; gray (10YR 5/1).			
35.0	-35.0							(35.0 - 40.0') CLAY, high plasticity, no dilatancy; some large pebbles, angular; trace silt; trace sand, fine to medium, subrounded; moist; stiff; gray (10YR 5/1).		
40.0	-40.0							End of boring at 40' bgs.		

	Remarks: bgs = below ground surface Temporary well screened from 19.0 to 24.0' bgs.
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Date Start: 11/20/2018
Date Finish: 11/20/2018
Drilling Company: Stock Drilling
Driller's Name: Tom Bacome Jr.
Drilling Method: Geoprobe
Sampling Method: DT22 Dual Tube
Rig Type: Geoprobe 3230 DT
Water Level Start (ft. bgs.): 10.0 and 15.0
Water Level Finish (ft. btoc.): NA

Northing: NA
Easting: NA
Casing Elevation: NA

Borehole Depth (ft. bgs.): 40.0
Surface Elevation: NA

Descriptions By: A. Villhauer

Well/Boring ID: SB-P6-OH322
Client: RACER
Location: RACER Lansing Plant 6

Weather Conditions: 20 F, Clear

DEPTH (feet bgl.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headpace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
0	0							(0.0 - 0.5') TOPSOIL; sand, very fine; organics.		
		1	0.0-5.0'	1.6	NA			(0.5 - 4.5') SAND, very fine to fine; some silt; trace small pebbles, subangular; poorly sorted; moist; brown (10YR 4/3).		
5	-5	2	5.0-10.0'	3.5	NA			(4.5 - 11.0') CLAY, some silt, low plasticity, no dilatancy; little sand, fine; trace granules, subangular; dry; stiff; dark grayish brown (10YR 4/2).		
10	-10	3	10.0-15.0'	5.0	NA			(11.0 - 12.5') SAND, fine; little silt; wet; yellowish brown (10YR 4/6).		Borehole backfilled with Bentonite.
								(12.5 - 17.0') CLAY, some silt, medium plasticity; trace granules to medium pebbles, subangular to round; moist; medium stiff; gray (10YR 5/1).		
15	-15	4	15.0-20.0'	4.8	NA			(17.0 - 17.5') SILT, non-plastic, rapid dilatancy; little sand, fine; wet; dense; gray (10YR 5/1).		
								(17.5 - 17.8') SAND, fine to medium; little silt; poorly sorted; loose; wet; dark grayish brown (10YR 4/2).		
20	-20							(17.8 - 33.0') CLAY, medium plasticity; little silt; trace sand, fine to coarse; trace granules to large pebbles, subangular to angular; moist to dry; stiff; gray (10YR 5/1).		

Remarks: bgs = below ground surface
 Temporary wells screened from 10.0 to 15.0' bgs and 15.0 to 20.0' bgs



Date Start: 11/20/2018
Date Finish: 11/20/2018
Drilling Company: Stock Drilling
Driller's Name: Tom Bacome Jr.
Drilling Method: Geoprobe
Sampling Method: DT22 Dual Tube
Rig Type: Geoprobe 3230 DT
Water Level Start (ft. bgs.): 10.0 and 15.0
Water Level Finish (ft. btoc.): NA

Northing: NA
Easting: NA
Casing Elevation: NA

Borehole Depth (ft. bgs.): 40.0
Surface Elevation: NA

Descriptions By: A. Villhauer

Well/Boring ID: SB-P6-OH322
Client: RACER
Location: RACER Lansing Plant 6

Weather Conditions: 20 F, Clear

DEPTH (feet bgl.)	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	20.0-25.0'	5.0	NA					
25	-25	6	25.0-30.0'	4.9	NA					
30	-30	7	30.0-35.0'	5.0	NA			(33.0 - 35.0') CLAY and SILT, low plasticity, no dilatancy; little sand, fine, trace granules, subangular; dry; very stiff; dark grayish brown (10YR 4/2).		
35	-35							End of boring at 35' bgs.		
40	-40									

Remarks: bgs = below ground surface
 Temporary wells screened from 10.0 to 15.0' bgs and 15.0 to 20.0' bgs



Date Start: 11/28/2018
Date Finish: 11/28/2018
Drilling Company: Stock Drilling
Driller's Name: Earnest Plyler
Drilling Method: Hand auger/Geoprobe
Sampling Method: Macro Core
Rig Type: Geoprobe 3230 DT
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA

Northing: NA
Eastings: NA
Casing Elevation: NA

Borehole Depth (ft. bgs.): 40.0
Surface Elevation: NA

Descriptions By: A. Westhuis

Well/Boring ID: SB-P6-OS335
Client: RACER
Location: RACER Lansing Plant 6

Weather Conditions: 26 F, Cloudy

DEPTH (feet bgl.)	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		1	0.0-6.0'	6.0	NA			(0.3 - 12.0') CLAY, some silt, medium plasticity, no dilatancy; trace to little sand, fine, subrounded; trace granules to small pebbles, subrounded; moist; stiff; yellowish brown (10YR 5/6).		
5	-5							NOTE: Small sand seam, fine; wet at 6.0' bgs.		
5		2	6.0-10.0'	4.0	NA					
10	-10									
10		3	10.0-15.0'	5.0	NA			(12.0 - 20.0') CLAY, some silt, high plasticity, no dilatancy; trace sand, fine, subrounded; trace granules to small pebbles, subrounded; moist; medium stiff; grayish brown (10YR 5/2).		
15	-15									
15		4	15.0-20.0'	5.0	NA					
20	-20									

Remarks: bgs = below ground surface
 Temporary wells screened from 4.0 to 9.0' and 18.5 to 23.5' bgs.



Date Start: 11/28/2018
Date Finish: 11/28/2018
Drilling Company: Stock Drilling
Driller's Name: Earnest Plyler
Drilling Method: Hand auger/Geoprobe
Sampling Method: Macro Core
Rig Type: Geoprobe 3230 DT
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA

Northing: NA
Easting: NA
Casing Elevation: NA

Borehole Depth (ft. bgs.): 40.0
Surface Elevation: NA

Descriptions By: A. Westhuis

Well/Boring ID: SB-P6-OS335
Client: RACER

Location: RACER Lansing Plant 6

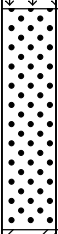
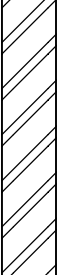
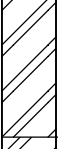
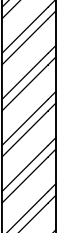
Weather Conditions: 26 F, Cloudy

DEPTH (feet bgl.)	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'	1.0	NA			(20.0 - 25.0') SAND, fine to medium, subrounded; trace granules to large pebbles, subrounded; trace silt; poorly sorted; wet; grayish brown (10YR 5/2).		Borehole backfilled with Bentonite.
25.0 - 30.0		6		2.0	NA			(25.0 - 30.0') CLAY, some silt, medium plasticity, no dilatancy; trace granules to medium pebbles, subrounded; moist; stiff; gray (10YR 5/1).		
30.0 - 34.0		7		2.0	NA			(30.0 - 34.0') SAND, very fine and SILT, non-plastic, no dilatancy; little clay; well sorted; moist; kight brownish gray (10YR 6/2).		
34.0 - 40.0		8		2.0	NA			(34.0 - 40.0') CLAY, some silt, medium to low plasticity, no dilatancy; little sand, fine, subrounded; moist; medium stiff; gray (10YR 6/1).		
40.0								End of boring at 40' bgs.		

Remarks: bgs = below ground surface
 Temporary wells screened from 4.0 to 9.0' and 18.5 to 23.5' bgs.



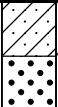



Date Start: 11/21/2018 Date Finish: 11/21/2018 Drilling Company: Stock Drilling Driller's Name: Earnest Plyler Drilling Method: Hand auger/Geoprobe Sampling Method: DT22 Dual Tube Rig Type: Geoprobe 3230 DT Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: B. Pertunen	Well/Boring ID: SB-P6-OX322 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 32F, Cold
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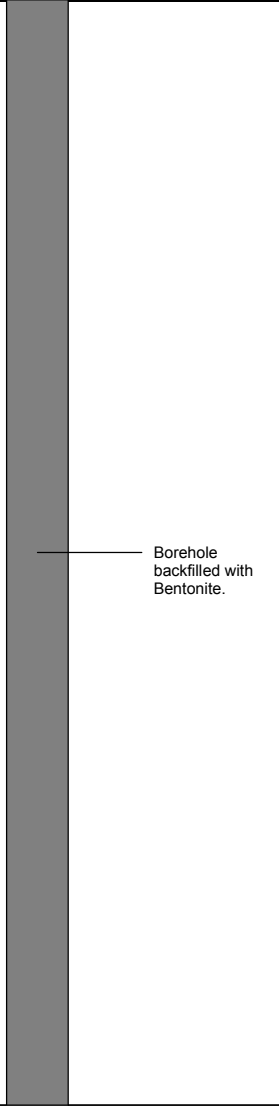
DEPTH (feet bgl.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
0	0							(0.0 - 1.0') TOPSOIL		
		1	0.0-5.0'	2.08	NA			(1.0 - 5.0') SAND, fine to coarse, subangular to subrounded; some silt; some clay, medium plasticity, no dilatancy; moist; medium stiff; dark yellowish brown (10YR 3/4).		
5	-5	2	5.0-10.0'	3.9	NA			(5.0 - 12.5') CLAY, medium to high plasticity, no dilatancy; some silt; some sand, vine to medium, subrounded; some granules, subangular; moist; medium stiff; yellowish brown (10YR 5/1).		
10	-10	3	10.0-15.0'	5.0	NA			(12.5 - 17.0') CLAY, medium plasticity, no dilatancy; some silt; trace sand, fine, rounded; dry to moist; stiff; dark gray (10YR 4/1).		
15	-15	4	15.0-20.0'	5.0	NA			(17.0 - 21.0') CLAY, medium plasticity, slow dilatancy and SAND, very fine to coarse, subangular to subrounded; trace silt, trace pebbles, subangular; poorly sorted; wet; soft; medium density; brown (10YR 5/3).		
20	-20									Borehole backfilled with Bentonite.

Remarks: bgs = below ground surface
Temporary well screened from 18.0 to 23.0' bgs.



Date Start: 11/21/2018 Date Finish: 11/21/2018 Drilling Company: Stock Drilling Driller's Name: Earnest Plyler Drilling Method: Hand auger/Geoprobe Sampling Method: DT22 Dual Tube Rig Type: Geoprobe 3230 DT Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: B. Pertunen	Well/Boring ID: SB-P6-OX322 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 32F, Cold
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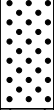

DEPTH (feet bgl.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
20.0	-25.0	5	20.0-25.0'	5.0	NA			(21.0 - 22.0') SAND, very fine to coarse, subangular to subrounded; some clay, medium plasticity, no dilatancy, trace silt; trace large pebbles, subrounded; poorly sorted; loose to medium dense; wet; brown (10YR 5/1).		
25.0	-25.0	6	25.0-30.0	3.4	NA			(22.0 - 33.5') CLAY, high plasticity, no dilatancy, trace silt; trace sand, fine, subrounded, trace granules, subrounded; stiff to medium stiff; dark gray (10YR 4/1).		
30.0	-30.0		30.0-35.0	3.25	NA			(33.5 - 34.0') SAND, medium to coarse, subangular to subrounded; trace silt; poorly sorted; loose; dry.		
35.0	-35.0		35.0-40.0	0.0	NA			(34.0 - 35.0') CLAY, high plasticity, no dilatancy; trace silt; trace sand, coarse, angular; trace granules; medium stiff; gray (10YR 4/1).		
35.0	-35.0							(35.0 - 40.0') NO RECOVERY		
40.0	-40.0							End of boring at 40' bgs.		

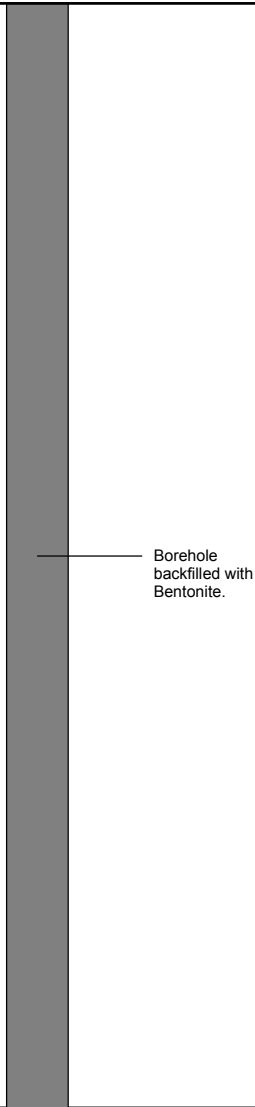



Remarks: bgs = below ground surface
 Temporary well screened from 18.0 to 23.0' bgs.



Date Start: 11/28/2018 Date Finish: 11/28/2018 Drilling Company: Stock Drilling Driller's Name: Earnest Plyler Drilling Method: Hand auger/Geoprobe Sampling Method: Macro Core Rig Type: Geoprobe 3230 DT Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Eastng: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: A. Westhuis	Well/Boring ID: SB-P6-QA336 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 26 F, Cloudy
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DEPTH (feet bgl.)	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		
		1	0.0-6.0'	6.0	NA			(0.3 - 15.0') CLAY, some silt, medium to high plasticity, no dilatancy; little sand, fine, subrounded; trace to little granules to medium pebbles, subrounded; moist; medium stiff; yellowish brown (10YR 5/6).		
-5	-5	2	6.0-10.0'	4.0	NA					
-10	-10	3	10.0-15.0'	4.0	NA					
-15	-15	4	15.0-20.0'	5.0	NA			(15.0 - 17.0') SAND, very fine to coarse, subrounded; trace to little silt; poorly sorted; wet; yellowish brown (10YR 5/4). NOTE: Wet at 15.0' bgs.		
								(17.0 - 29.5') CLAY, some silt, medium to high plasticity, no dilatancy; trace to little sand, fine, subrounded; trace granules to large pebbles, subrounded; moist; medium stiff to stiff; grayish brown (10YR 5/2).		



	Remarks: bgs = below ground surface Temporary wells screened from 13.0 to 18.0' and 30.0 to 35.0' bgs.
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Date Start: 11/28/2018 Date Finish: 11/28/2018 Drilling Company: Stock Drilling Driller's Name: Earnest Plyler Drilling Method: Hand auger/Geoprobe Sampling Method: Macro Core Rig Type: Geoprobe 3230 DT Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: A. Westhuis	Well/Boring ID: SB-P6-QA336 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 26 F, Cloudy
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DEPTH (feet bgl.)	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	20.0-25.0'	5.0	NA					
25	-25	6	25.0-30.0	5.0	NA					
30	-30	7	30.0-35.0	3.5	NA			(29.5 - 32.0') SAND, very fine, subrounded; some silt; non-plastic; rapid dilatancy; well sorted; wet; light brownish gray (10YR 6/2).		Borehole backfilled with Bentonite.
								(32.0 - 34.5') CLAY, some silt, medium to high plasticity, no dilatancy; moist; stiff; gray (10YR 5/1).		
35	-35							(34.5 - 36.0') SAND, very fine, subrounded and SILT, non-plastic, slow dilatancy; well sorted; moist to wet; pale brown (10YR 6/3).		
		8	35.0-40.0	5.0	NA			(36.0 - 40.0') CLAY, some silt, medium to low plasticity, no dilatancy; trace to little sand, fine, subrounded; trace granules to medium pebbles, subrounded; moist; stiff; grayish brown (10YR 5/2).		
40	-40							End of boring at 40' bgs.		

 <small>Design & Consultancy for natural and built assets</small>	Remarks: bgs = below ground surface Temporary wells screened from 13.0 to 18.0' and 30.0 to 35.0' bgs.
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Date Start: 11/26/2018
Date Finish: 11/26/2018
Drilling Company: Stock Drilling
Driller's Name: Earnest Plyler
Drilling Method: Geoprobe
Sampling Method: DT22 Dual Tube
Rig Type: Geoprobe 3230 DT
Water Level Start (ft. bgs.): 17.0
Water Level Finish (ft. btoc.): NA

Northing: NA
Easting: NA
Casing Elevation: NA

Borehole Depth (ft. bgs.): 28.0
Surface Elevation: NA

Descriptions By: A. Villhauer

Well/Boring ID: SB-P6-QH240
Client: RACER
Location: RACER Lansing Plant 6

Weather Conditions: 30 F, Cloudy, Snow


DEPTH (feet bgl.)	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	NA			NOTE: Medium stiff to soft from 22.0 to 23.0' bgs.		
25.0 - 30.0		6	25.0-30.0	5.0	NA					
30.0 - 35.0			30.0-35.0	3.4	NA			(31.0 - 32.0') CLAY and SILT, medium plasticity, no dilatancy; medium stiff; moist; gray (10YR 5/1).		Borehole backfilled with Bentonite.
								(32.0 - 40.0') CLAY, some silt, medium to low plasticity, no dilatancy; dry to moist; stiff; gray (10YR 5/1).		
35.0 - 40.0			35.0-40.0	5.0	NA					
40.0								End of boring at 40' bgs.		

Remarks: bgs = below ground surface
 Temporary well screened from 15.0 to 20.0' bgs.




Date Start: 11/20/2018 Date Finish: 11/20/2018 Drilling Company: Stock Drilling Driller's Name: Tom Bacome Jr. Drilling Method: Geoprobe Sampling Method: DT22 Dual Tube Rig Type: Geoprobe 3230 DT Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: A. Villhauer	Well/Boring ID: SB-P6-QM322 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 32 F, Clear
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DEPTH (feet bgl.)	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 - 0.4') TOPSOIL; sand, very fine; organics.		
		1	0.0-5.0'	2.5	NA		(0.4 - 4.0') CLAY, low plasticity; some sand, fine to medium; little silt; trace small to large pebbles, subangular; dry; medium stiff; brown (10YR 4/3).			
5	-5	2	5.0-10.0'	2.5	NA		(4.0 - 16.0') CLAY, some silt, low plasticity; little sand, fine; trace small pebbles, subangular; dry; medium stiff; brown (10YR 4/3).			
10	-10	3	10.0-15.0'	0.5	NA					
15	-15	4	15.0-20.0'	4.8	NA		(16.0 - 17.7') CLAY and SILT, low plasticity, slow dilatancy; little sand, fine; wet; dark yellowish brown (10YR 4/6).			
							(17.7 - 18.0') SAND, fine; some silt; trace granules, subangular; wet; dark yellowish brown (10YR 4/6).			
							(18.0 - 28.0') CLAY, medium plasticity; little silt; trace granules to large pebbles, subangular to angular; dry; stiff; dark grayish brown (10YR 4/2).			
20	-20									Borehole backfilled with Bentonite.

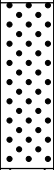
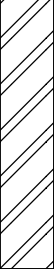


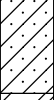

 <small>Design & Consultancy for natural and built assets</small>	Remarks: bgs = below ground surface Temporary wells screened from 15.0 to 20.0' bgs and 25.0 to 30.0' bgs
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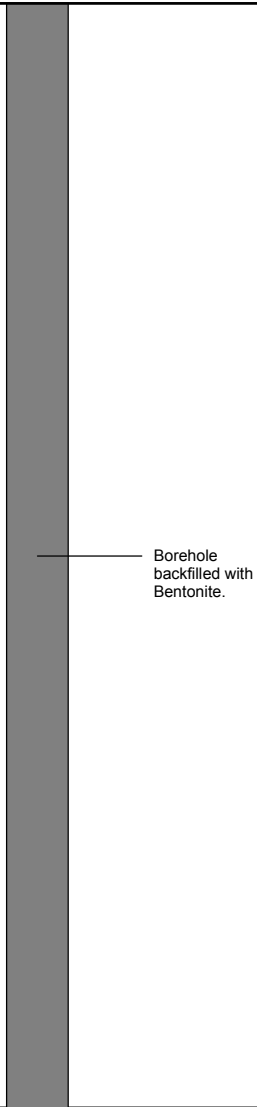
Date Start: 11/20/2018 Date Finish: 11/20/2018 Drilling Company: Stock Drilling Driller's Name: Tom Bacome Jr. Drilling Method: Geoprobe Sampling Method: DT22 Dual Tube Rig Type: Geoprobe 3230 DT Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: A. Villhauer	Well/Boring ID: SB-P6-QM322 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 32 F, Clear
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DEPTH (feet bgl.)	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
		5	20.0-25.0'	5.0	NA			NOTE: Color change to gray (10YR 5/1) at 20.0' bgs.		
25	-25	6	25.0-30.0'	5.0	NA			(28.0 - 28.5') SAND, fine to medium; well sorted; dense; wet; dark gray (10YR 4/2).		Borehole backfilled with Bentonite.
								(28.5 - 31.0') CLAY and SILT, low plasticity; slow dilatancy; moist; medium stiff; dark gray (10YR 4/1).		
30	-30	7	30.0-35.0'	5.0	NA			(31.0 - 38.0') SILT, nonk-plastic, rapid dilatancy; little clay; dense; moist; dark gray (10YR 4/1).		
		8	35.0-40.0'	5.0	NA			(38.0 - 40.0') CLAY, medium plasticity; little silt; trace granules to medium pebbles, subrounded to angular; dry; stiff; gray (10YR 5/1).		
40	-40							End of boring at 40' bgs.		

 <small>Design & Consultancy for natural and built assets</small>	Remarks: bgs = below ground surface Temporary wells screened from 15.0 to 20.0' bgs and 25.0 to 30.0' bgs
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Date Start: 11/21/2018 Date Finish: 11/21/2018 Drilling Company: Stock Drilling Driller's Name: Earnest Plyler Drilling Method: Hand auger/Geoprobe Sampling Method: DT22 Dual Tube Rig Type: Geoprobe 3230 DT Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: B. Pertunen	Well/Boring ID: SB-P6-QT226 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 32F, Cold
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DEPTH (feet bgl.)	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 - 1.0') TOPSOIL and FILL MATERIAL		
		1	0.0-5.0'	2.25	NA			(1.0 - 4.0') SAND, very fine to medium, subangular to subrounded; some silt; some clay, low plasticity, no dilatancy, brittle; dry stiff; dense to medium dense; brown 10YR 5/6).		
5	-5	2	5.0-10.0'	5.0	NA			(4.0 - 9.0') CLAY, medium plasticity, no dilatancy; trace silt; trace sand, fine to coarse, subangular; trace granules, subrounded, poorly sorted; moist; medium stiff; gray (10YR 5/1).		
10	-10	3	10.0-15.0'	5.0	NA			(9.0 - 11.0') SAND, very fine to medium, subangular to subrounded; some silt; some clay, low plasticity, no dilatancy; trace granules, subrounded; poorly sorted; dry; stiff; brown (10YR 5/6).		
								(11.0 - 13.0') CLAY, low plasticity, no dilatancy and SAND, very fine to medium; some silt; poorly sorted; dry to moist; brown (10YR 5/6).		
								(13.0 - 15.0') CLAY, medium plasticity, no dilatancy and SAND, very fine to medium, subrounded; some silt; poorly sorted; moist; medium stiff; gray (10YR 5/1).		
15	-15	4	15.0-20.0'	5.0	NA			(15.0 - 30.0') CLAY, medium to high plasticity, slow dilatancy; little sand, very fine to coarse, subangular; trace granules to small pebbles, subrounded to subangular; poorly sorted; moist to wet; gray (10YR 5/1).		




Remarks: bgs = below ground surface
Temporary well screened from 13.0 to 18.0' bgs.

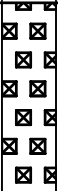


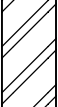





Date Start: 11/21/2018 Date Finish: 11/21/2018 Drilling Company: Stock Drilling Driller's Name: Earnest Plyler Drilling Method: Hand auger/Geoprobe Sampling Method: DT22 Dual Tube Rig Type: Geoprobe 3230 DT Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: B. Pertunen	Well/Boring ID: SB-P6-QT226 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 32F, Cold
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DEPTH (feet bgl.)	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	-20.0	5	20.0-25.0'	5.0	NA					
25.0	-25.0	6	25.0-30.0	5.0	NA					
30.0	-30.0		30.0-35.0	3.0	NA		(30.0 - 35.0') SAND, fine to coarse, subrounded; trace silt, no dilatancy; well sorted; loose; dry; gray (10YR 7/1).			Borehole backfilled with Bentonite.
35.0	-35.0		35.0-40.0	5.0	NA		(35.0 - 40.0') CLAY, medium to high plasticity, no dilatancy; trace silt; trace sand, very fine, subrounded; trace granules, subangular; moist; gray (10YR 4/1).			
40.0	-40.0							End of boring at 40' bgs.		

	Remarks: bgs = below ground surface Temporary well screened from 13.0 to 18.0' bgs.
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Date Start: 11/21/2018 Date Finish: 11/21/2018 Drilling Company: Stock Drilling Driller's Name: Tom Bacome Jr. Drilling Method: Geoprobe Sampling Method: DT22 Dual Tube Rig Type: Geoprobe 3230 DT Water Level Start (ft. bgs.): 16.0 Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 28.0 Surface Elevation: NA Descriptions By: A. Villhauer	Well/Boring ID: SB-P6-QT239 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 30 F, Overcast
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DEPTH (feet bgl.)	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	0.0-5.0'	2.4	NA			(0.0 - 7.0') PEBBLES, small to large, subrounded to angular, and COBBLES, small, subangular to angular; little sand, fine to coarse; poorly sorted; dry; gray (10YR 6/1). NOTE: Fill material.		
5	-5	2	5.0-10.0'	3.9	NA			(7.0 - 12.0') CLAY, some silt, medium to high plasticity, no dilatancy; trace sand, fine, subrounded; trace granules to medium pebbles, subrounded; moist; medium stiff; yellowish brown (10YR 5/4). Note Glacial till.		
10	-10	3	10.0-15.0'	5.0	NA			(12.0 - 16.0') CLAY, some silt, high plasticity, no dilatancy; trace sand, fine, subrounded; trace granules to medium pebbles, subrounded; moist; medium stiff; grayish brown (10YR 5/2). NOTE: Glacial till.		
15	-15	4	15.0-20.0'	2.3	NA			(16.0 - 17.0') SAND, fine to medium, subrounded; trace silt; well sorted; wet; grayish brown (10YR 5/2).		
20	-20	5	20.0-25.0'	3.25	NA			(17.0 - 25.0') CLAY, some silt, high plasticity, no dilatancy; trace sand, fine, subrounded; trace granules to large pebbles, subrounded; moist; stiff; gray (10YR 5/1).		
25	-25	6	25.0-28.0	0.0	NA			(25.0 - 28.0') NO RECOVERY - Refusal at 28.0' bgs.		
28	-28							End of boring at 28' bgs.		

	Remarks: bgs = below ground surface Temporary well screened from 15.0 to 20.0' bgs.
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Date Start: 12/21/2018
Date Finish: 12/21/2018
Drilling Company: Stock Drilling
Driller's Name: Tom Bacome Jr.
Drilling Method: Hand auger/Geoprobe
Sampling Method: DT22 Dual Tube
Rig Type: Geoprobe 3230 DT
Water Level Start (ft. bgs.): 10.0
Water Level Finish (ft. btoc.): NA

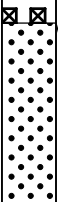
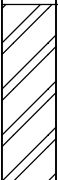
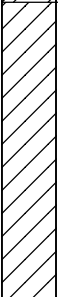
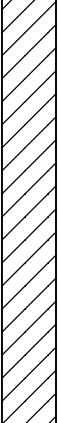
Northing: NA
Easting: NA
Casing Elevation: NA

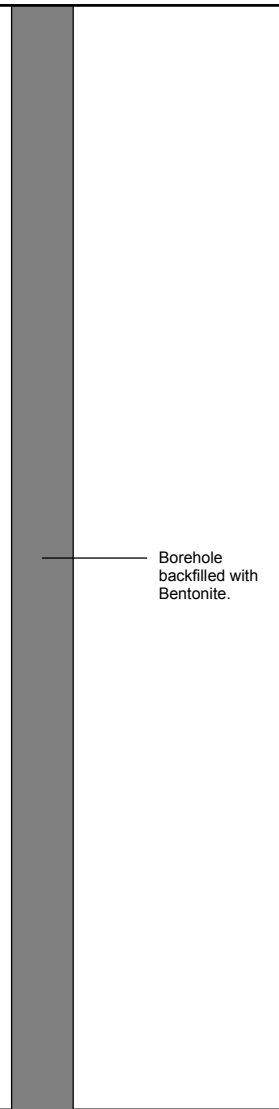
Borehole Depth (ft. bgs.): 40.0
Surface Elevation: NA

Descriptions By: A. Villhauer

Well/Boring ID: SB-P6-QT255
Client: RACER
Location: RACER Lansing Plant 6

Weather Conditions: 30 F, Sun

DEPTH (feet bgl.)	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	0.0-5.0'	2.5	NA			(0.0 - 0.5') PEBBLES, small to large, subangular to subrounded; some cobbles, small to medium, subangular to angular; some sand, fine to coarse; poorly sorted; moist; light gray (10YR 6/1). NOTE: Fill. (0.5 - 3.8') SAND, fine to medium; some clay, some silt; little granules to large pebbles, subrounded to angular; poorly sorted; dark brown (10YR 4/3). NOTE: Fill.		
5	-5							(3.8 - 7.0') CLAY, some silt, medium plasticity; trace granules to small pebbles, subangular; dry; stiff; brown (10YR 4/3).		
		2	5.0-10.0'	4.5	NA			(7.0 - 25.0') CLAY, low plasticity, and SAND, fine; little silt; trace granules to small pebbles, subangular to angular; moist; soft; brown (10YR 5/3). NOTE: Reddish discoloration from 8.0 to 9.0' bgs.		
10	-10							(10.0 - 15.0') CLAY, low plasticity, and SAND, fine; little silt; trace granules to small pebbles, subangular to angular; moist; soft; brown (10YR 5/3). NOTE: Gradual color change to dark gray (10YR 4/1) starting at 13.5' bgs.		
		3	10.0-15.0'	NA	NA					
15	-15									
		4	15.0-20.0'	NA	NA					
20	-20									



Borehole backfilled with Bentonite.

Remarks: bgs = below ground surface
 Temporary well screened from 33.5 to 38.5' bgs.



Date Start: 12/21/2018
Date Finish: 12/21/2018
Drilling Company: Stock Drilling
Driller's Name: Tom Bacome Jr.
Drilling Method: Hand auger/Geoprobe
Sampling Method: DT22 Dual Tube
Rig Type: Geoprobe 3230 DT
Water Level Start (ft. bgs.): 10.0
Water Level Finish (ft. btoc.): NA

Northing: NA
Easting: NA
Casing Elevation: NA

Borehole Depth (ft. bgs.): 40.0
Surface Elevation: NA

Descriptions By: A. Villhauer

Well/Boring ID: SB-P6-QT255
Client: RACER
Location: RACER Lansing Plant 6















Weather Conditions: 30 F, Sun

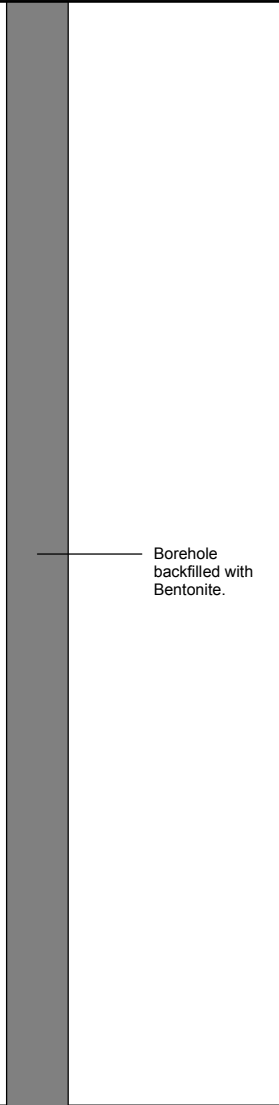
DEPTH (feet bgl.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
20.0 - 25.0		5	20.0-25.0'	NA	NA					
25.0 - 30.0	-25	6	25.0-30.0'	NA	NA			(25.0 - 36.0') CLAY, medium plasticity; little silt; trace sand, fine to medium; trace granules to small pebbles, subangular; dry; stiff, gray (10YR 4/1). Note Fill.		
30.0 - 35.0	-30	7	30.0-35.0'	NA	NA					Borehole backfilled with Bentonite.
35.0 - 40.0	-35	8	35.0-40.0'	NA	NA			(36.0 - 37.3') SILT and SAND, rapid dilatancy; wet; dense; gray (10YR 5/1). (37.3 - 40.0') CLAY, medium plasticity; little silt; trace sand, fine to medium; trace granules to small pebbles, subangular; dry; stiff, gray (10YR 4/1). Note Fill.		
40.0	-40							End of boring at 40' bgs.		

Remarks: bgs = below ground surface
 Temporary well screened from 33.5 to 38.5' bgs.



Date Start: 11/21/2018 Date Finish: 11/21/2018 Drilling Company: Stock Drilling Driller's Name: Earnest Plyler Drilling Method: Hand auger/Geoprobe Sampling Method: DT22 Dual Tube Rig Type: Geoprobe 3230 DT Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: B. Pertunen	Well/Boring ID: SB-P6-RH241 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 32F, Cold
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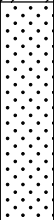


DEPTH (feet bgl.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
0	0	1	0.0-5.0'	2.25	NA		 (0.0 - 1.0') SAND, very fine to coarse, subrounded; poorly sorted; loose; moist to wet; brown (10YR 4/6).			
							 (1.0 - 2.0') SAND, very fine to coarse, subrounded; poorly sorted; loose; wet; coated in oily black (10YR 2/1).			
							 (2.0 - 14.0') SAND, very fine to coarse, subangular; trace silt; trace clay; poorly sorted; loose; moist; brown (10YR 4/6).			
5	-5	2	5.0-10.0'	4.6	NA		 (2.0 - 14.0') SAND, very fine to coarse, subangular; trace silt; trace clay; poorly sorted; loose; moist; brown (10YR 4/6).			
							 (2.0 - 14.0') SAND, very fine to coarse, subangular; trace silt; trace clay; poorly sorted; loose; moist; brown (10YR 4/6).			
							 (2.0 - 14.0') SAND, very fine to coarse, subangular; trace silt; trace clay; poorly sorted; loose; moist; brown (10YR 4/6).			
10	-10	3	10.0-15.0'	3.1	NA		 (2.0 - 14.0') SAND, very fine to coarse, subangular; trace silt; trace clay; poorly sorted; loose; moist; brown (10YR 4/6).			
							 (2.0 - 14.0') SAND, very fine to coarse, subangular; trace silt; trace clay; poorly sorted; loose; moist; brown (10YR 4/6).			
							 (2.0 - 14.0') SAND, very fine to coarse, subangular; trace silt; trace clay; poorly sorted; loose; moist; brown (10YR 4/6).			
15	-15	4	15.0-20.0'	4.2	NA		 (14.0 - 16.0') CLAY, medium plasticity, trace silt, trace sand, very fine to coarse, subangular; trace granules, subangular; gray (10YR 5/1).			
							 (14.0 - 16.0') CLAY, medium plasticity, trace silt, trace sand, very fine to coarse, subangular; trace granules, subangular; gray (10YR 5/1).			
							 (16.0 - 19.0') CLAY, medium plasticity and SAND, very fine to coarse, subangular; traces silt; trace medium pebbles, subrounded; moist gray (10YR 5/1).			
							 (16.0 - 19.0') CLAY, medium plasticity and SAND, very fine to coarse, subangular; traces silt; trace medium pebbles, subrounded; moist gray (10YR 5/1).			
20	-20						 (19.0 - 20.0') SAND, very fine to coarse, subangular; trace silt; poorly sorted; moist; gray (10YR 5/1).			




Remarks: bgs = below ground surface
 Temporary well screened from 13.0 to 18.0' bgs.



Date Start: 11/21/2018 Date Finish: 11/21/2018 Drilling Company: Stock Drilling Driller's Name: Earnest Plyler Drilling Method: Hand auger/Geoprobe Sampling Method: DT22 Dual Tube Rig Type: Geoprobe 3230 DT Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: B. Pertunen	Well/Boring ID: SB-P6-RH241 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 32F, Cold
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DEPTH (feet bgl.)	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	-20.0	5	20.0-25.0'	3.75	NA			(20.0 - 24.0') CLAY, medium plasticity, no dilatancy; some sand, very fine to coarse, subangular; trace silt; trace granules; poorly sorted; moist; medium stiff; gray (10YR 5/1).		 Borehole backfilled with Bentonite.
25.0	-25.0	6	25.0-30.0	5.0	NA			(24.0 - 28.0') SAND, very fine to coarse, subrounded; trace silt; well sorted; loose; dry; gray (10YR 6/1).		
30.0	-30.0		30.0-35.0	5.0	NA			(28.0 - 40.0') CLAY, medium to high plasticity, no dilatancy; trace silt; trace sand, very fine to coarse, subangular; trace granules to small pebbles, subrounded; poorly sorted; ; stiff to medium stiff; gray (10YR 5/1).		
35.0	-35.0		35.0-40.0	5.0	NA					
40.0	-40.0							End of boring at 40' bgs.		

	Remarks: bgs = below ground surface Temporary well screened from 13.0 to 18.0' bgs.
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Date Start: 11/19/2018
Date Finish: 11/19/2018
Drilling Company: Stock Drilling
Driller's Name: Earnest Plyler
Drilling Method: Geoprobe
Sampling Method: DT22 Dual Tube
Rig Type: Geoprobe 3230 DT
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA

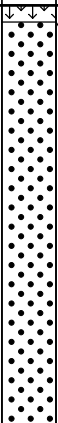
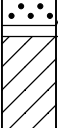
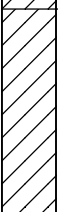
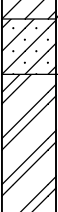

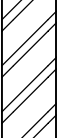
Northing: NA
Easting: NA
Casing Elevation: NA

Borehole Depth (ft. bgs.): 40.0
Surface Elevation: NA

Descriptions By: B. Pertunen

Well/Boring ID: SB-P6-RQ322
Client: RACER
Location: RACER Lansing Plant 6





Weather Conditions: 34F, Partly Sunny

DEPTH (feet bgl.)	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		
		1	0.0-5.0'	2.2	NA			(0.3 - 8.0') SAND, very fine to medium, subangular to subrounded; some silt; some clay, low plasticity, no dilatancy; poorly sorted; dry; dense and stiff; brownish yellow (10YR 6/6).		
5	-5	2	5.0-10.0'	2.5	NA			(8.0 - 8.2') FILL, building material, concrete.		
								(8.2 - 10.0') CLAY, low plasticity, no dilatancy; some silt; some sand, very fine to coarse, subrounded; trace granules, subangular; poorly sorted; dry to moist; stiff and dense; brown (10YR 5/3).		
10	-10	3	10.0-15.0'	5.0	NA			(10.0 - 14.0') CLAY, low plasticity, no dilatancy; some silt; some sand, very fine to medium, subrounded; trace large pebble, subrounded; poorly sorted; dry to moist; stiff and dense; brownish yellow (10pYR 6/6).		 Borehole backfilled with Bentonite.
							(14.0 - 15.0') SAND, fine to coarse, subangular to subrounded, and CLAY, low plasticity, slow dilatancy; trace silt; poorly sorted; loose to medium dense; wet; soft to medium stiff; brownish yellow (10YR 6/6).			
15	-15	4	15.0-20.0'	5.0	NA			(15.0 - 22.0') CLAY, medum plasticity, no dilatancy; some silt; some sand, fine, subrounded; trace granules; subrounded; moist; medium stiff; brown (10YR 6/6).		
20	-20									

Remarks: bgs = below ground surface
 Temporary wells screened from 11.0 to 17.0' and 27.0 to 32.0' bgs.



Date Start: 11/19/2018 Date Finish: 11/19/2018 Drilling Company: Stock Drilling Driller's Name: Earnest Plyler Drilling Method: Geoprobe Sampling Method: DT22 Dual Tube Rig Type: Geoprobe 3230 DT Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: B. Pertunen	Well/Boring ID: SB-P6-RQ322 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 34F, Partly Sunny
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DEPTH (feet bgl.)	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'	2.9	NA			(22.0 - 28.0') CLAY, low to medium plasticity, no dilatancy; trace silt; trace sand, very fine to fine, subrounded; wet; stiff, dark gray (10YR 4/1).		Borehole backfilled with Bentonite.
25.0 - 30.0		6	25.0-30.0	4.9	NA			(28.0 - 31.0') SAND, very fine to medium, subrounded; well sorted; loose; dry; brown (120YR 6/6).		
30.0 - 35.0			30.0-35.0	5.0	NA			(31.0 - 40.0') CLAY, high plasticity, slow dilatancy; trace silt, trace sand, fine, subrounded; trace granules, subrounded; moist to wet; soft to medium stiff; dark gray (10YR 4/1).		
35.0 - 40.0			35.0-40.0	5.0	NA					
40.0								End of boring at 40' bgs.		

Remarks: bgs = below ground surface
 Temporary wells screened from 11.0 to 17.0' and 27.0 to 32.0' bgs.

