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Date:

December 12, 2019

Arcadis Project No.:

30006870

Subject:

Southeast Plant 2 PFAS Investigation Summary
RACER Trust Site, Plant 2, Lansing Township, Michigan

The following provides a summary of the per- and polyfluoroalkyl substances (PFAS) investigation completed at RACER Trust, Plant 2 located in the Lansing Township, Michigan (Site). As described in the Southeastern Plant 2 PFAS Investigation Workplan (Arcadis 2019a), during March 2019, as part of a sitewide evaluation of PFAS impact to storm sewers, concentrations of Perfluorooctanesulfonic acid (PFOS) were identified at concentrations above the Part 201 Groundwater-Surface Water Interface (GSI) criteria of 12 nanograms per liter (ng/L) (EGLE, 2018) at manhole P2-MH-96 and P2-MH-97 (1,160 ng/L and 394 ng/L, respectively). These results are elevated relative to the downgradient sample locations and may indicate an area of the Site that is a primary contributor of PFAS to storm sewers. The location of P2-MH-96 and P2-MH-97 are shown on **Figure 1**.

The primary objectives of the Plant 2 PFAS investigation were as follows:

- Characterize PFAS impacts to soil and groundwater near the storm sewers feeding into P2-MH-96 and P2-MH-97.
- Evaluate nearby areas of interest (AOIs) as potential sources of PFAS. There are several AOIs associated with the investigation areas including:

- AOI 2-15 – Included eight 10,000-gallon underground storage tanks located in the Building 225 Tank Farm Area that held waste process oil, quench oil, cutting oil, and lubrication oil.
- AOI-6-19 – A tunnel between Plants 2 and 6 that transferred process waste through pipes from Plant 6 to the wastewater treatment plant located on southern Plant 2, including waste from the wash water/phosphoric acid process waste cistern known to be a source area for PFAS on Plant 6.
- AOI 2-4 – Storage of nonhazardous used oil and oily wastewater generated from equipment maintenance and cleaning at Plant 2.
- Other AOIs in the area include Bonderite storage roll-off boxes associated with painting operations to the south and east on Plant 6 (AOI 6-9), hazardous waste storage at Plant 6 (AOI 6-2), the wash water and phosphoric acid holding tanks on Plant 6 (AOI 6-7) and the former Plant 2 wastewater treatment facility.

The location of the AOIs in the vicinity of the study area shown on **Figure 1**. Additional details regarding the AOIs are included in the Current Conditions Report (Arcadis 2008).

1. INVESTIGATION ACTIVITIES

The work completed consisted of twenty (20) temporary monitoring wells installed in a total of twelve (12) soil borings at Plant 2. Soil boring locations and relevant AOIs are shown on **Figure 1**. The investigation was conducted from August 19 to August 23, 2019 using methods consistent with the Southeast Plant 2 PFAS Investigation Workplan (Arcadis 2019a).

In general, the unconsolidated overburden stratigraphy at Plant 2 consists of 1 to 10 feet of native sand and/or sandy fill, followed by an interbedded zone of less permeable clay mixes interbedded with more permeable lenses of silt and sand. Between 20 and 30 feet below grade the interbedded zone transitions to a dense, compact, primarily dry, glacial till ranging from 10 to 30 feet thick. Beneath the till, a dry interbedded zone of sand, silt and clay is present above bedrock. Perched groundwater at Plant 2 occurs primarily within the shallow fill/sand and is generally discontinuous. Discontinuous seams of more permeable saturated material also occur within deeper interbedded zone.

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. Soil samples were also collected at each boring near surface from within the fill material, and from the phreatic zone above first groundwater. Where the first saturated zone was confined, collecting a soil sample from the phreatic zone is not practical, therefore a second sample was collected from the vadose zone based on the field observation of potential impacts.

Soil and groundwater samples were sent to SGS Accutest Laboratory located in Orlando, Florida and analyzed for the 24 PFAS outlined in the Michigan Department of Environment Great Lakes and Energy (EGLE) PFAS Minimum Laboratory Analyte List (EGLE, 2018) using modified USEPA Method 537 with isotope dilution (DoD QSM 5.1). 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 EGLE Part 201 Groundwater Surface Water Interface (GSI) criterion for PFOS (12 nanograms per liter [ng/L]) and PFOA (12,000 ng/L). The analytical results for soil samples were compared to EGLE 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 $\mu\text{g}/\text{kg}$). Soil sample locations and analytical results for PFOS are shown on **Figure 2** and groundwater analytical results for PFOS are shown on **Figure 3**. The analytical data summary for soil and groundwater samples is provided in **Tables 1** and **2**, respectively. Laboratory analytical reports are included as **Attachment 1**.

- Geology observed in soil borings completed at Plant 2 is generally consistent with observations from previous on-site investigations. The geology in the southeast portion of Plant 2 generally consists of up to 10 feet of fill material underlain by interbedded clay with lenses of silt and sand. Perched water was 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, encountered at depths of 20 to 35 feet below ground surface (ft bgs). Boring logs are included in **Attachment 2**.
- Groundwater samples collected from six (6) of the twelve soil borings exceed GSI criteria with detections of PFOS ranging from 15.3 to 5,580 ng/L (**Figure 3**). The highest concentrations of PFOS in groundwater were observed in the shallow perched sample intervals at soil boring SB-P2-OB177 (5,580 ng/L at 5-10 ft bgs), located to the west of AOI 2-15, and SB-P2-OT192 (5,040 ng/L at 0-5 ft bgs), located at AOI 2-4.
- PFOS concentrations in deeper samples collected from confined sand/silt seams were typically orders of magnitude lower than concentrations observed within the shallower unconfined samples or were non-detect. Deeper sample results ranged from an estimated (J-flagged) 1.92 ng/L up to 75.1 ng/L. This result suggests the vertical migration of PFAS is limited by the primarily clay matrix underlying the shallow sand/fill.
- Concentrations of other PFAS detected in groundwater including PFOA are generally one to two orders of magnitude lower than PFOS, consistent with the results of the storm sewer sampling and do not exceed GSI criteria. Analytical results for all PFAS are provided on **Table 2**.
- Nine (9) of the twenty-four (24) soil samples collected contained detections of PFOS (**Figure 2**), and all exceed the GSIP Criteria. PFOS concentrations were detected above the laboratory reporting limit in shallow soils at soil borings SB-P2-OP177 (4.34 $\mu\text{g}/\text{kg}$ at 1-2 ft bgs), SB-P2-OH185 (4.01 $\mu\text{g}/\text{kg}$ at 1-2 ft bgs, and 6.63 $\mu\text{g}/\text{kg}$ at 5-6 ft bgs), and SB-P2-OT192 (16.4 $\mu\text{g}/\text{kg}$ at 2-3 ft bgs). The highest concentrations of PFOS in soil (16.4 $\mu\text{g}/\text{kg}$) are located at AOI 2-4 which was used for storage of nonhazardous used oil and oily wastewater.

Based on the soil and groundwater results, there are two potential areas (AOI 2-4 and the area to the west of AOI 2-15) that may be contributing PFAS to storm sewers via groundwater infiltration. The extent of soil impacts in excess of GSI criterion were generally defined by the investigation. Groundwater impacts above GSI criteria are widespread through the area but located in the middle of the Site where off-site migration appears unlikely. PFOS concentration in deeper groundwater samples suggest vertical migration of PFOS in groundwater is limited.

2.1 Additional Activity

Arcadis, on behalf of RACER, is modifying storm sewers to prevent further migration of PFOS off-site through the storm sewer per Arcadis Interim Measures Work Plan for Plants 2 and 3 Storm Sewer Modifications (Arcadis 2019b). Storm water monitoring will be completed after the modifications are completed.

In addition to the storm sewer remedy, Arcadis is currently evaluating the need for further characterization for the southeast Plant 2 area.

If you have any questions, please contact Patrick Curry (Arcadis) at 810-225-1926 or Dave Favero (RACER Trust) at 734-879-9525.

Sincerely,

Arcadis of Michigan, LLC



Alex Villhauer

Staff Geologist



Patrick Curry, PG, CPG

Technical Expert (Geo)

References:

Arcadis. 2008. Current Conditions Report (CCR) for GM Lansing Plants 2, 3 and 6. Lansing, Michigan. August 1.

EGLE. 2018. Part 201 Generic Cleanup Criteria and Screening Levels. GSI Criteria Updated June 25, 2018.

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

Arcadis. 2019a. Southeastern Plant 2 PFAS Investigation Work Plan. RACER Trust, Lansing, Michigan, Plant 2. June 18.

Arcadis. 2019b. Interim Measures Work Plan: Plants 2 and 3 Storm Sewer Modifications. RACER Trust, Lansing, Michigan, Plants 2 and 3. July 24.

Enclosures:

Table 1 – Plant 1 Soil Analytical Results

Table 2 – Plant 2 VAP Groundwater Results

Figure 1 – Plant 2 Sampling Locations

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Figure 2 – Plant 2 Soil Sampling Locations and PFOS Analytical Results

Figure 3 – Plant 2 Groundwater Sampling Locations and PFOS Analytical Results

Attachment 1 – Laboratory Analytical Reports

Attachment 2 – Soil Boring Logs

TABLES



Table 1
2019 Plant 2 PFAS Investigation Soil Analytical Summary
RACER Trust Plant 2
Lansing, Michigan

Location ID: Sample Depth (ft bgs): Date Collected: Sample Name:	MDEQ Non-Residential GSIP Criteria	Units	SB-P2-NR189 9.5-10.5 8/19/2019 SB-P2-NR189_9.5-10.5	SB-P2-NR189 12-13 8/19/2019 SB-P2-NR189_12-13	SB-P2-0A188 2-3 8/19/2019 SB-P2-0A188_2-3	SB-P2-0A188 13-14 8/19/2019 SB-P2-0A188_13-14	SB-P2-0T192 2-3 8/20/2019 SB-P2-0T192_2-3	SB-P2-0T192 6-7 8/20/2019 SB-P2-0T192_6-7	SB-P2-NV185 1-2 8/20/2019 SB-P2-NV185_1-2
Poly- and Perfluorinated Compounds									
4:2 FTS	--	ug/kg	< 0.26	< 0.27	< 0.27	< 0.28	< 0.29	< 0.27	< 0.27 [<lt;0.28]< td=""> </lt;0.28]<>
6:2FTS	--	ug/kg	< 0.26	< 0.27	< 0.27	< 0.28	< 0.29	< 0.27	< 0.27 [<lt;0.28]< td=""> </lt;0.28]<>
8:2FTS	--	ug/kg	< 0.26	< 0.27	< 0.27	< 0.28	< 0.29	< 0.27	< 0.27 [<lt;0.28]< td=""> </lt;0.28]<>
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	--	ug/kg	< 0.53	< 0.53	< 0.54	< 0.56	< 0.57	< 0.55	< 0.53 [<lt;0.56]< td=""> </lt;0.56]<>
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	--	ug/kg	< 0.53	< 0.53	< 0.54	< 0.56	< 0.57	< 0.55	< 0.53 [<lt;0.56]< td=""> </lt;0.56]<>
Perfluorobutanesulfonic acid (PFBS)	--	ug/kg	< 0.26	< 0.27	< 0.27	< 0.28	< 0.29	< 0.27	< 0.27 [<lt;0.28]< td=""> </lt;0.28]<>
Perfluorobutanoic acid (PFBA)	--	ug/kg	< 0.26	< 0.27	< 0.27	< 0.28	< 0.29	< 0.27	< 0.27 [<lt;0.28]< td=""> </lt;0.28]<>
Perfluorodecanesulfonic acid (PFDS)	--	ug/kg	< 0.26	< 0.27	< 0.27	< 0.28	< 0.29	< 0.27	< 0.27 [<lt;0.28]< td=""> </lt;0.28]<>
Perfluorodecanoic acid (PFDA)	--	ug/kg	< 0.26	< 0.27	< 0.27	< 0.28	< 0.29	< 0.27	< 0.27 [<lt;0.28]< td=""> </lt;0.28]<>
Perfluorododecanoic acid (PFDoA)	--	ug/kg	< 0.26	< 0.27	< 0.27	< 0.28	< 0.29	< 0.27	< 0.27 [<lt;0.28]< td=""> </lt;0.28]<>
Perfluoroheptanesulfonic Acid (PFHpS)	--	ug/kg	< 0.26	< 0.27	< 0.27	< 0.28	< 0.29	< 0.27	< 0.27 [<lt;0.28]< td=""> </lt;0.28]<>
Perfluoroheptanoic acid (PFHpA)	--	ug/kg	< 0.26	< 0.27	< 0.27	< 0.28	< 0.29	< 0.27	< 0.27 [<lt;0.28]< td=""> </lt;0.28]<>
Perfluorohexanesulfonic acid (PFHxS)	--	ug/kg	< 0.26	< 0.27	< 0.27	< 0.28	< 0.29	< 0.27	< 0.27 [<lt;0.28]< td=""> </lt;0.28]<>
Perfluorohexanoic acid (PFHxA)	--	ug/kg	< 0.21	< 0.21	< 0.21	< 0.23	< 0.23	< 0.22	< 0.21 [<lt;0.22]< td=""> </lt;0.22]<>
Perfluorononanesulfonic acid (PFNS)	--	ug/kg	< 0.26	< 0.27	< 0.27	< 0.28	0.306 J	< 0.27	< 0.27 [<lt;0.28]< td=""> </lt;0.28]<>
Perfluorononanoic acid (PFNA)	--	ug/kg	< 0.26	< 0.27	< 0.27	< 0.28	< 0.29	< 0.27	< 0.27 [<lt;0.28]< td=""> </lt;0.28]<>
Perfluorooctane Sulfonamide (FOSA)	--	ug/kg	< 0.26	< 0.27	< 0.27	< 0.28	< 0.29	< 0.27	< 0.27 [<lt;0.28]< td=""> </lt;0.28]<>
Perfluorooctane sulfonic acid (PFOS)	0.24	ug/kg	< 0.26	< 0.27	0.447 J	< 0.28	16.4	< 0.27	< 0.27 [<lt;0.28]< td=""> </lt;0.28]<>
Perfluorooctanoic acid (PFOA)	10000	ug/kg	< 0.26	< 0.27	< 0.27	< 0.28	< 0.29	< 0.27	< 0.27 [<lt;0.28]< td=""> </lt;0.28]<>
Perfluoropentanesulfonic acid (PFPeS)	--	ug/kg	< 0.26	< 0.27	< 0.27	< 0.28	< 0.29	< 0.27	< 0.27 [<lt;0.28]< td=""> </lt;0.28]<>
Perfluoropentanoic acid (PFPeA)	--	ug/kg	< 0.21	< 0.21	< 0.21	< 0.23	< 0.23	< 0.22	< 0.21 [<lt;0.22]< td=""> </lt;0.22]<>
Perfluorotetradecanoic acid (PFTeA)	--	ug/kg	< 0.26	< 0.27	< 0.27	< 0.28	< 0.29	< 0.27	< 0.27 [<lt;0.28]< td=""> </lt;0.28]<>
Perfluorotridecanoic Acid (PFTriA)	--	ug/kg	< 0.26	< 0.27	< 0.27	< 0.28	< 0.29	< 0.27	< 0.27 [<lt;0.28]< td=""> </lt;0.28]<>
Perfluoroundecanoic acid (PFUnA)	--	ug/kg	< 0.26	< 0.27	< 0.27	< 0.28	< 0.29	< 0.27	< 0.27 [<lt;0.28]< td=""> </lt;0.28]<>

See notes on last page.

Table 1
2019 Plant 2 PFAS Investigation Soil Analytical Summary
RACER Trust Plant 2
Lansing, Michigan

Location ID: Sample Depth (ft bgs): Date Collected: Sample Name:	MDEQ Non-Residential GSIP Criteria	Units	SB-P2-NV185 6-7 8/20/2019 SB-P2-NV185_6-7	SB-P2-OH185 1-2 8/20/2019 SB-P2-OH185_1-2	SB-P2-OH185 5-6 8/20/2019 SB-P2-OH185_5-6	SB-P2-OT185 0.5-1.5 8/21/2019 SB-P2-OT185_0.5-1.5	SB-P2-OB177 2-3 8/21/2019 SB-P2-OB177_2-3	SB-P2-OB177 7-8 8/21/2019 SB-P2-OB177_7-8	SB-P2-OP177 1-2 8/21/2019 SB-P2-OP177_1-2
Poly- and Perfluorinated Compounds									
4:2 FTS	--	ug/kg	< 0.27	< 0.27	< 0.27	< 0.26	< 0.28	< 0.29	< 0.27
6:2FTS	--	ug/kg	< 0.27	< 0.27	< 0.27	< 0.26	< 0.28	< 0.29	< 0.27
8:2FTS	--	ug/kg	< 0.27	< 0.27	< 0.27	< 0.26	< 0.28	< 0.29	< 0.27
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	--	ug/kg	< 0.54	< 0.55	< 0.55	< 0.53	< 0.56	< 0.58	< 0.55
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	--	ug/kg	< 0.54	< 0.55	< 0.55	< 0.53	< 0.56	< 0.58	< 0.55
Perfluorobutanesulfonic acid (PFBS)	--	ug/kg	< 0.27	< 0.27	< 0.27	< 0.26	< 0.28	< 0.29	< 0.27
Perfluorobutanoic acid (PFBA)	--	ug/kg	< 0.27	< 0.27	< 0.27	< 0.26	< 0.28	< 0.29	< 0.27
Perfluorodecanesulfonic acid (PFDS)	--	ug/kg	< 0.27	< 0.27	< 0.27	< 0.26	< 0.28	< 0.29	< 0.27
Perfluorodecanoic acid (PFDA)	--	ug/kg	< 0.27	< 0.27	< 0.27	< 0.26	< 0.28	< 0.29	< 0.27
Perfluorododecanoic acid (PFDoA)	--	ug/kg	< 0.27	< 0.27	< 0.27	< 0.26	< 0.28	< 0.29	< 0.27
Perfluoroheptanesulfonic Acid (PFHpS)	--	ug/kg	< 0.27	< 0.27	< 0.27	< 0.26	< 0.28	< 0.29	< 0.27
Perfluoroheptanoic acid (PFHpA)	--	ug/kg	< 0.27	< 0.27	< 0.27	< 0.26	< 0.28	< 0.29	< 0.27
Perfluorohexanesulfonic acid (PFHxS)	--	ug/kg	< 0.27	< 0.27	< 0.27	< 0.26	< 0.28	< 0.29	< 0.27
Perfluorohexanoic acid (PFHxA)	--	ug/kg	< 0.21	< 0.22	< 0.22	< 0.21	< 0.22	< 0.23	< 0.22
Perfluorononanesulfonic acid (PFNS)	--	ug/kg	< 0.27	0.335 J	< 0.27	< 0.26	< 0.28	< 0.29	< 0.27
Perfluorononanoic acid (PFNA)	--	ug/kg	< 0.27	< 0.27	< 0.27	< 0.26	< 0.28	< 0.29	< 0.27
Perfluorooctane Sulfonamide (FOSA)	--	ug/kg	< 0.27	< 0.27	< 0.27	< 0.26	< 0.28	< 0.29	< 0.27
Perfluorooctane sulfonic acid (PFOS)	0.24	ug/kg	0.428 J	4.01	6.63	0.546 J	< 0.28	0.803 J	4.34
Perfluorooctanoic acid (PFOA)	10000	ug/kg	< 0.27	< 0.27	< 0.27	< 0.26	< 0.28	< 0.29	< 0.27
Perfluoropentanesulfonic acid (PFPeS)	--	ug/kg	< 0.27	< 0.27	< 0.27	< 0.26	< 0.28	< 0.29	< 0.27
Perfluoropentanoic acid (PFPeA)	--	ug/kg	< 0.21	< 0.22	< 0.22	< 0.21	< 0.22	< 0.23	< 0.22
Perfluorotetradecanoic acid (PFTeA)	--	ug/kg	< 0.27	< 0.27	< 0.27	< 0.26	< 0.28	< 0.29	< 0.27
Perfluorotridecanoic Acid (PFTriA)	--	ug/kg	< 0.27	< 0.27	< 0.27	< 0.26	< 0.28	< 0.29	< 0.27
Perfluoroundecanoic acid (PFUnA)	--	ug/kg	< 0.27	< 0.27	< 0.27	< 0.26	< 0.28	< 0.29	< 0.27

See notes on last page.

Table 1
2019 Plant 2 PFAS Investigation Soil Analytical Summary
RACER Trust Plant 2
Lansing, Michigan

Location ID: Sample Depth (ft bgs): Date Collected: Sample Name:	MDEQ Non-Residential GSIP Criteria	Units	SB-P2-OP177 7-8 8/21/2019 SB-P2-OP177_7-8	SB-P2-PF177 1-2 8/21/2019 SB-P2-PF177_1-2	SB-P2-PF177 4-5 8/22/2019 SB-P2-PF177_4-5	SB-P2-OL164 2.5-5 8/22/2019 SB-P2-OL164_2.5-5	SB-P2-OL164 6-7 8/22/2019 SB-P2-OL164_6-7	SB-P2-OS164 2-3 8/22/2019 SB-P2-OS164_2-3	SB-P2-OS164 6-7 8/22/2019 SB-P2-OS164_6-7
Poly- and Perfluorinated Compounds									
4:2 FTS	--	ug/kg	< 0.28	< 0.27 [<0.28]	< 0.27	< 0.27	< 0.27	< 0.28	< 0.29
6:2FTS	--	ug/kg	< 0.28	< 0.27 [<0.28]	< 0.27	< 0.27	< 0.27	< 0.28	< 0.29
8:2FTS	--	ug/kg	< 0.28	< 0.27 [<0.28]	< 0.27	< 0.27	< 0.27	< 0.28	< 0.29
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	--	ug/kg	< 0.56	< 0.54 [<0.56]	< 0.54	< 0.54	< 0.55	< 0.55	< 0.59
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	--	ug/kg	< 0.56	< 0.54 [<0.56]	< 0.54	< 0.54	< 0.55	< 0.55	< 0.59
Perfluorobutanesulfonic acid (PFBS)	--	ug/kg	< 0.28	< 0.27 [<0.28]	< 0.27	< 0.27	< 0.27	< 0.28	< 0.29
Perfluorobutanoic acid (PFBA)	--	ug/kg	< 0.28	< 0.27 [<0.28]	< 0.27	< 0.27	< 0.27	< 0.28	< 0.29
Perfluorodecanesulfonic acid (PFDS)	--	ug/kg	< 0.28	< 0.27 [<0.28]	< 0.27	< 0.27	< 0.27	< 0.28	< 0.29
Perfluorodecanoic acid (PFDA)	--	ug/kg	< 0.28	< 0.27 [<0.28]	< 0.27	< 0.27	< 0.27	< 0.28	< 0.29
Perfluorododecanoic acid (PFDoA)	--	ug/kg	< 0.28	< 0.27 [<0.28]	< 0.27	< 0.27	< 0.27	< 0.28	< 0.29
Perfluoroheptanesulfonic Acid (PFHpS)	--	ug/kg	< 0.28	< 0.27 [<0.28]	< 0.27	< 0.27	< 0.27	< 0.28	< 0.29
Perfluoroheptanoic acid (PFHpA)	--	ug/kg	< 0.28	< 0.27 [<0.28]	< 0.27	< 0.27	< 0.27	< 0.28	< 0.29
Perfluorohexanesulfonic acid (PFHxS)	--	ug/kg	< 0.28	< 0.27 [<0.28]	< 0.27	< 0.27	< 0.27	< 0.28	< 0.29
Perfluorohexanoic acid (PFHxA)	--	ug/kg	< 0.23	< 0.21 [<0.22]	< 0.22	< 0.22	< 0.22	< 0.22	< 0.23
Perfluorononanesulfonic acid (PFNS)	--	ug/kg	< 0.28	< 0.27 [<0.28]	< 0.27	< 0.27	< 0.27	< 0.28	< 0.29
Perfluorononanoic acid (PFNA)	--	ug/kg	< 0.28	< 0.27 [<0.28]	< 0.27	< 0.27	< 0.27	< 0.28	< 0.29
Perfluorooctane Sulfonamide (FOSA)	--	ug/kg	< 0.28	< 0.27 [<0.28]	< 0.27	< 0.27	< 0.27	< 0.28	< 0.29
Perfluorooctane sulfonic acid (PFOS)	0.24	ug/kg	0.341 J	< 0.27 [<0.28]	< 0.27	< 0.27	< 0.27	< 0.28	< 0.29
Perfluorooctanoic acid (PFOA)	10000	ug/kg	< 0.28	< 0.27 [<0.28]	< 0.27	< 0.27	< 0.27	< 0.28	< 0.29
Perfluoropentanesulfonic acid (PFPeS)	--	ug/kg	< 0.28	< 0.27 [<0.28]	< 0.27	< 0.27	< 0.27	< 0.28	< 0.29
Perfluoropentanoic acid (PFPeA)	--	ug/kg	< 0.23	< 0.21 [<0.22]	< 0.22	< 0.22	< 0.22	< 0.22	< 0.23
Perfluorotetradecanoic acid (PFTeA)	--	ug/kg	< 0.28	< 0.27 [<0.28]	< 0.27	< 0.27	< 0.27	< 0.28	< 0.29
Perfluorotridecanoic Acid (PFTriA)	--	ug/kg	< 0.28	< 0.27 [<0.28]	< 0.27	< 0.27	< 0.27	< 0.28	< 0.29
Perfluoroundecanoic acid (PFUnA)	--	ug/kg	< 0.28	< 0.27 [<0.28]	< 0.27	< 0.27	< 0.27	< 0.28	< 0.29

See notes on last page.

Table 1
 2019 Plant 2 PFAS Investigation Soil Analytical Summary
 RACER Trust Plant 2
 Lansing, Michigan

Location ID: Sample Depth (ft bgs): Date Collected: Sample Name:	MDEQ Non-Residential GSIP Criteria	Units	SB-P2-PF164 1-2 8/22/2019 SB-P2-PF164_1-2	SB-P2-PF164 3-4 8/23/2019 SB-P2-PF164_3-4
Poly- and Perfluorinated Compounds				
4:2 FTS	--	ug/kg	< 0.27	< 0.28
6:2FTS	--	ug/kg	< 0.27	< 0.28
8:2FTS	--	ug/kg	< 0.27	< 0.28
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	--	ug/kg	< 0.54	< 0.56
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	--	ug/kg	< 0.54	< 0.56
Perfluorobutanesulfonic acid (PFBS)	--	ug/kg	< 0.27	< 0.28
Perfluorobutanoic acid (PFBA)	--	ug/kg	< 0.27	< 0.28
Perfluorodecanesulfonic acid (PFDS)	--	ug/kg	< 0.27	< 0.28
Perfluorodecanoic acid (PFDA)	--	ug/kg	< 0.27	< 0.28
Perfluorododecanoic acid (PFDoA)	--	ug/kg	< 0.27	< 0.28
Perfluoroheptanesulfonic Acid (PFHpS)	--	ug/kg	< 0.27	< 0.28
Perfluoroheptanoic acid (PFHpA)	--	ug/kg	< 0.27	< 0.28
Perfluorohexanesulfonic acid (PFHxS)	--	ug/kg	< 0.27	< 0.28
Perfluorohexanoic acid (PFHxA)	--	ug/kg	< 0.22	< 0.22
Perfluorononanesulfonic acid (PFNS)	--	ug/kg	< 0.27	< 0.28
Perfluorononanoic acid (PFNA)	--	ug/kg	< 0.27	< 0.28
Perfluorooctane Sulfonamide (FOSA)	--	ug/kg	< 0.27	< 0.28
Perfluorooctane sulfonic acid (PFOS)	0.24	ug/kg	< 0.27	< 0.28
Perfluorooctanoic acid (PFOA)	10000	ug/kg	< 0.27	< 0.28
Perfluoropentanesulfonic acid (PFPeS)	--	ug/kg	< 0.27	< 0.28
Perfluoropentanoic acid (PFPeA)	--	ug/kg	< 0.22	< 0.22
Perfluorotetradecanoic acid (PFTeA)	--	ug/kg	< 0.27	< 0.28
Perfluorotridecanoic Acid (PFTriA)	--	ug/kg	< 0.27	< 0.28
Perfluoroundecanoic acid (PFUnA)	--	ug/kg	< 0.27	< 0.28
See notes on last page.				

Notes:

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

Acronyms and Abbreviations:

ft bgs - feet below ground surface
Non-Residential GSIP - EGLE Part 201 Non-residential Groundwater Surface Water Interface Protection Criteria
SB - soil boring
EGLE - Michigan Department of Environment Great Lakes and Energy
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
2019 Plant 2 PFAS Investigation Groundwater Analytical Results
RACER Trust Plant 2
Lansing, Michigan

Location ID:		MDEQ Residential Drinking Water Criteria (2017)	EGLE Groundwater Surface Water Interface (GSI) Criteria (2017)	SB-P2-OT192	SB-P2-OT185	SB-P2-OB177	SB-P2-OP177	SB-P2-OB177	SB-P2-OP177	SB-P2-PF177	SB-P2-PF177
Depth:				29-34	23-28	24-29	22-27	5-10	1-6	4-9	27-32
Date Collected:				8/21/2019	8/21/2019	8/21/2019	8/21/2019	8/22/2019	8/22/2019	8/22/2019	8/22/2019
Sample Name:	Units			SB-P2-OT192_29-34	SB-P2-OT185_23-28	SB-P2-OB177_24-29	SB-P2-OP177_22-27	SB-P2-OB177_5-10	SB-P2-OP177_1-6	SB-P2-PF177_4-9	SB-P2-PF177_27-32
Poly- and Perfluorinated Alkyl Substances (USEPA Method 537 Modified with Isotope Dilution)											
4:2 Flourotelemer Sulfonate (4:2 FTS)	ng/L	--	--	< 3.7	< 1.9	< 20	< 20	< 19 [19]	< 19	< 3.8	< 4.2
6:2 Flourotelemer Sulfonate (6:2 FTS)	ng/L	--	--	< 3.7	< 1.9	< 20	< 20	29.7 J [25.1 J]	< 19	< 3.8	< 4.2
8:2 Flourotelemer Sulfonate (8:2 FTS)	ng/L	--	--	< 3.7	< 1.9	< 20	< 20	< 19 [19]	< 19	< 3.8	< 4.2
MeFOSAA	ng/L	--	--	< 7.4	< 3.8	< 40	< 40	< 37 [<37]	< 37	< 7.7	< 8.3
EtFOSAA	ng/L	--	--	< 7.4	< 3.8	< 40	< 40	< 37 [<37]	< 37	< 7.7	< 8.3
Perfluorobutanesulfonic acid (PFBS)	ng/L	--	--	70.8	< 0.96	44.3	< 10	64.1 [59.2]	< 9.3	2.15 J	< 2.1
Perfluorobutanoic acid (PFBA)	ng/L	--	--	47.2	11.6	28.8 J	< 20	< 46 [46]	19.5 J	14.0 J	< 4.2
Perfluorodecanesulfonic acid (PFDS)	ng/L	--	--	< 1.9	< 0.96	< 10	< 10	< 9.3 [<9.3]		< 1.9	< 2.1
Perfluorodecanoic acid (PFDA)	ng/L	--	--	2.31 J	< 0.96	< 10	< 10	< 9.3 [<9.3]	< 9.3	4.54 J	< 2.1
Perfluorododecanoic acid (PFDoA)	ng/L	--	--	< 2.8	< 1.4	< 15	< 15	< 14 [<14]	< 14	< 2.9	< 3.1
Perfluoroheptanesulfonic Acid (PFHpS)	ng/L	--	--	< 1.9	< 0.96	< 10	< 10	124 [102]	< 9.3	< 1.9	< 2.1
Perfluoroheptanoic acid (PFHpA)	ng/L	--	--	25.5	< 0.96	38.4 J	40.8	45.7 [42]	12.9 J	20.8	< 2.1
Perfluorohexanesulfonic acid (PFHxS)	ng/L	--	--	62.4	2.04 J	34.3 J	29.8 J	820 [707]	18.2 J	< 1.9	< 2.1
Perfluorohexanoic acid (PFHxA)	ng/L	--	--	98.1	10.7	94.9	68.1	65.7 [67.5]	15.9 J	14	< 2.1
Perfluorononanesulfonic acid (PFNS)	ng/L	--	--	< 1.9	< 0.96	< 10	< 10	< 9.3 [<9.3]	< 9.3	< 1.9	< 2.1
Perfluorononanoic acid (PFNA)	ng/L	--	--	2.12 J	< 0.96	< 10	< 10	< 9.3 [<9.3]	< 9.3	11.7	< 2.1
Perfluorooctane Sulfonamide (FOSA)	ng/L	--	--	< 1.9	< 0.96	< 10	< 10	< 9.3 [<9.3]	< 9.3	< 1.9	< 2.1
Perfluorooctanesulfonic acid (PFOS)	ng/L	--	12	38.3	1.92 J	< 15	75.1	5580 [4070]	126	11.7	< 3.1
Perfluorooctanoic acid (PFOA)	ng/L	--	12,000	18.5	< 0.96	68.5	55.3	155 [137]	19.8 J	42.1	< 2.1
Combined PFOS and PFOA	ng/L	70	--	56.8	1.92 J	68.5	130	5740 [4210]	146	53.8	< 5.2
Perfluoropentanesulfonic acid (PFPeS)	ng/L	--	--	33.3	< (0.96	33.2 J	< (10	106 [92.3]	< (9.3	< (1.9	< (2.1
Perfluoropentanoic acid (PFPeA)	ng/L	--	--	73.2	7.89	64.7	62.4	28.0 J [<35]	29.0 J	16.2	< (3.1
Perfluorotetradecanoic acid (PFTeA)	ng/L	--	--	< 1.9	< 0.96	< 10	< 10	< 9.3 [<9.3]	< 9.3	< 1.9	< 2.1
Perfluorotridecanoic Acid (PFTriA)	ng/L	--	--	< 1.9	< 0.96	< 10	< 10	< 9.3 [<9.3]	< 9.3	< 1.9	< 2.1
Perfluoroundecanoic acid (PFUnA)	ng/L	--	--	< 1.9	< 0.96	< 10	< 10	< 9.3 [<9.3]	< 9.3	< 1.9	< 2.1

Location ID:		MDEQ Residential Drinking Water Criteria (2017)	EGLE Groundwater Surface Water Interface (GSI) Criteria (2017)	SB-P2-OL164 20-25 8/22/2019 SB-P2-OL164_20-25	SB-P2-PF164 4-9 8/23/2019 SB-P2-PF164_4-9	SB-P2-NR189 24-29 8/19/2019 SB-P2-NR189_24-29	SB-P2-0A188 10-15 8/19/2019 SB-P2-0A188_10-15	SB-P2-0A188 21-26 8/19/2019 SB-P2-0A188_21-26	SB-P2-OH185 25-30 8/20/2019 SB-P2-OH185_25-30	SB-P2-OT192 0-5 8/20/2019 SB-P2-OT192_0-5
Poly- and Perfluorinated Alkyl Substances (USEPA Method 537 Modified with Isotope Dilution)										
4:2 Flourotelemer Sulfonate (4:2 FTS)	ng/L	--	--	< 3.8	< 4.0	< 1.9	< 2.0	< 1.9	< 2.0	< 1.9
6:2 Flourotelemer Sulfonate (6:2 FTS)	ng/L	--	--	< 3.8	< 4.0	2.75 J	< 2.0	< 1.9	< 2.0	< 1.9
8:2 Flourotelemer Sulfonate (8:2 FTS)	ng/L	--	--	< 3.8	< 4.0	< 1.9	< 2.0	< 1.9	< 2.0	2.28 J
MeFOSAA	ng/L	--	--	< 7.7	< 8.0	< 3.7	< 4.0	< 74	< 4.0	< 3.7
EtFOSAA	ng/L	--	--	< 7.7	< 8.0	< 3.7	< 4.0	< 74	< 4.0	< 3.7
Perfluorobutanesulfonic acid (PFBS)	ng/L	--	--	38.3	< 2.0	< 0.93	1.97 J	< 0.93	< 1.0	185
Perfluorobutanoic acid (PFBA)	ng/L	--	--	33.8	18.4	12.4	16.6	< 37	25.5	< 37
Perfluorodecanesulfonic acid (PFDS)	ng/L	--	--	< 1.9	< 2.0	< 0.93	< 1.0	< 0.93	< 1.0	< 0.93
Perfluorodecanoic acid (PFDA)	ng/L	--	--	< 1.9	13.4	2.85 J	0.00166 J	< 19	< 1.0	1.95 J
Perfluorododecanoic acid (PFDoA)	ng/L	--	--	< 2.9	< 3.0	< 28	< 1.5	< 28	< 1.5	< 1.4
Perfluoroheptanesulfonic Acid (PFHpS)	ng/L	--	--	< 1.9	< 2.0	< 0.93	3.19 J	< 0.93	< 1.0	79.5
Perfluoroheptanoic acid (PFHpA)	ng/L	--	--	31.5	10.6	12.8	19.9	< 19	< 1.0	74.4
Perfluorohexanesulfonic acid (PFHxS)	ng/L	--	--	34	< 2.0	3.7	22.5	6.52	1.86 J	1410
Perfluorohexanoic acid (PFHxA)	ng/L	--	--	69.3	9.18	12.1	18	< 19	10.3	193
Perfluorononanesulfonic acid (PFNS)	ng/L	--	--	< 1.9	< 2.0	< 0.93	< 1.0	< 0.93	< 1.0	33.4
Perfluorononanoic acid (PFNA)	ng/L	--	--	5.35 J	8.07	3.84	4.04	< 19	< 1.0	4.91
Perfluorooctane Sulfonamide (FOSA)	ng/L	--	--	< 1.9	0.00242 J	< 19	< 1.0	< 19	< 1.0	22.9
Perfluorooctanesulfonic acid (PFOS)	ng/L	--	12	23.5	26.7	56.9	258	42.2	15.3	5040
Perfluorooctanoic acid (PFOA)	ng/L	--	12,000	38.7	44.9	31.3	37.3	41.7 J	< 1.0	125
Combined PFOS and PFOA	ng/L	70	--	62.2	71.6	88.2	295	83.9	15.3	5170
Perfluoropentanesulfonic acid (PFPeS)	ng/L	--	--	12.7	< (2.0)	< (0.93)	1.78 J	< (0.93)	< (1.0)	230
Perfluoropentanoic acid (PFPeA)	ng/L	--	--	57.5	13.5	18.8	20.1	28.0 J	16.6	70.9
Perfluorotetradecanoic acid (PFTeA)	ng/L	--	--	< 1.9	< 2.0	< 0.93	< 1.0	< 0.93	< 1.0	< 0.93
Perfluorotridecanoic Acid (PFTriA)	ng/L	--	--	< 1.9	< 2.0	< 0.93	< 1.0	< 0.93	< 1.0	< 0.93
Perfluoroundecanoic acid (PFUnA)	ng/L	--	--	< 1.9	< 2.0	< 19	< 1.0	< 19	< 1.0	< 0.93

Location ID:		MDEQ Residential Drinking Water Criteria (2017)	EGLE Groundwater Surface Water Interface (GSI) Criteria (2017)	SB-P2-NV185 21-26 8/20/2019 SB-P2-NV185_21-26	SB-P2-NV185 5-10 8/20/2019 SB-P2-NV185_5-10	DUP-01_GW 8/20/2019 DUP-01_GW
Depth:						
Date Collected:						
Sample Name:	Units					
Poly- and Perfluorinated Alkyl Substances (USEPA Method 537 Modified with Isotope Dilution)						
4:2 Flourotelemer Sulfonate (4:2 FTS)	ng/L	--	--	< 2.4	< 1.9	< 5.5
6:2 Flourotelemer Sulfonate (6:2 FTS)	ng/L	--	--	< 2.4	< 1.9	< 5.5
8:2 Flourotelemer Sulfonate (8:2 FTS)	ng/L	--	--	< 2.4	4.23 J	< 5.5
MeFOSAA	ng/L	--	--	< 4.8	< 3.7	< 11
EtFOSAA	ng/L	--	--	< 4.8	< 3.7	< 11
Perfluorobutanesulfonic acid (PFBS)	ng/L	--	--	113	< 0.93	< 0.0028
Perfluorobutanoic acid (PFBA)	ng/L	--	--	15.1	14.2	9.85 J
Perfluorodecanesulfonic acid (PFDS)	ng/L	--	--	< 0.93	< 0.93	< 0.93
Perfluorodecanoic acid (PFDA)	ng/L	--	--	3.50 J	18.3	2.82 J
Perfluorododecanoic acid (PFDoA)	ng/L	--	--	< 1.8	< 28	< 4.2
Perfluoroheptanesulfonic Acid (PFHpS)	ng/L	--	--	1.49 J	< 0.93	< 2.8
Perfluoroheptanoic acid (PFHpA)	ng/L	--	--	11.9	15.2	8.57 J
Perfluorohexanesulfonic acid (PFHxS)	ng/L	--	--	4.15 J	5.76	< 2.8
Perfluorohexanoic acid (PFHxA)	ng/L	--	--	15.8	14.2	10.9 J
Perfluorononanesulfonic acid (PFNS)	ng/L	--	--	< 1.2	< 0.93	< 2.8
Perfluorononanoic acid (PFNA)	ng/L	--	--	4.86	8.12	3.48 J
Perfluorooctane Sulfonamide (FOSA)	ng/L	--	--	< 19	3.74	< 2.8
Perfluorooctanesulfonic acid (PFOS)	ng/L	--	12	46.4	130	39.7
Perfluorooctanoic acid (PFOA)	ng/L	--	12,000	28.3	44.1	20.1
Combined PFOS and PFOA	ng/L	70	--	74.7	174	59.8
Perfluoropentanesulfonic acid (PFPeS)	ng/L	--	--	4.08 J	< (0.93)	6.00 J
Perfluoropentanoic acid (PFPeA)	ng/L	--	--	18.4	11.5	10.4 J
Perfluorotetradecanoic acid (PFTeA)	ng/L	--	--	< 1.2	< 0.93	< 2.8
Perfluorotridecanoic Acid (PFTriA)	ng/L	--	--	< 1.2	< 0.93	< 2.8
Perfluoroundecanoic acid (PFUnA)	ng/L	--	--	< 1.2	< 0.93	< 2.8

Table 4
On-Site VAP Groundwater Analytical Results
RACER Trust Plant 3
Lansing, Michigan

Notes:

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

Shaded text denotes detection is above EGLE Criteria

GSI Criteria based on a non-drinking water receptor

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

- - = Not listed in the EGLE Criteria Tables.

< = Not Detected, less than reference level

Acronyms and Abbreviations:

ng/L - nanograms per liter

NA - Not Analyzed

EGLE - Michigan Department of Environment, Great Lakes, and Energy

USEPA - United States Environmental Protection Agency

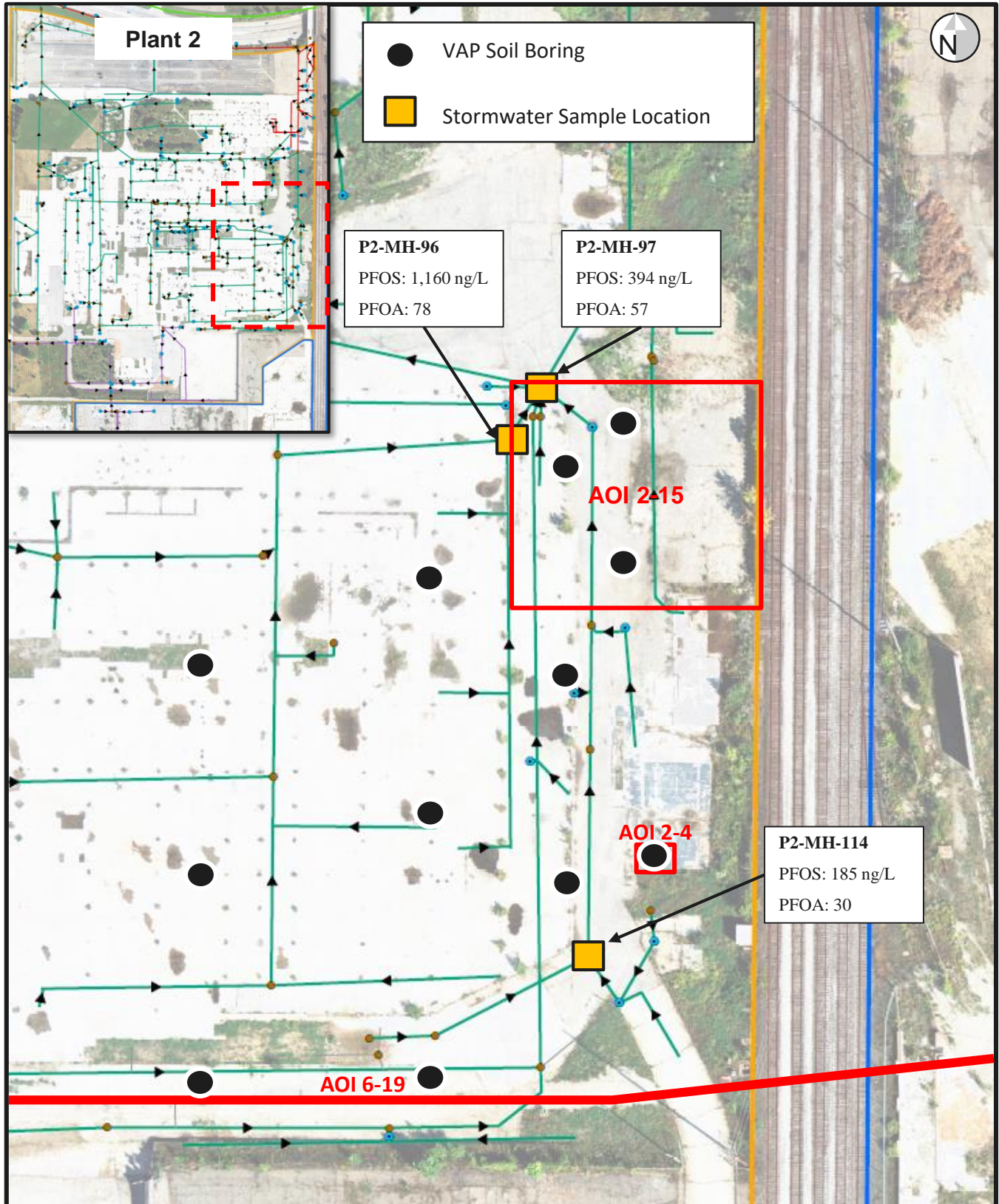
Qualifiers:

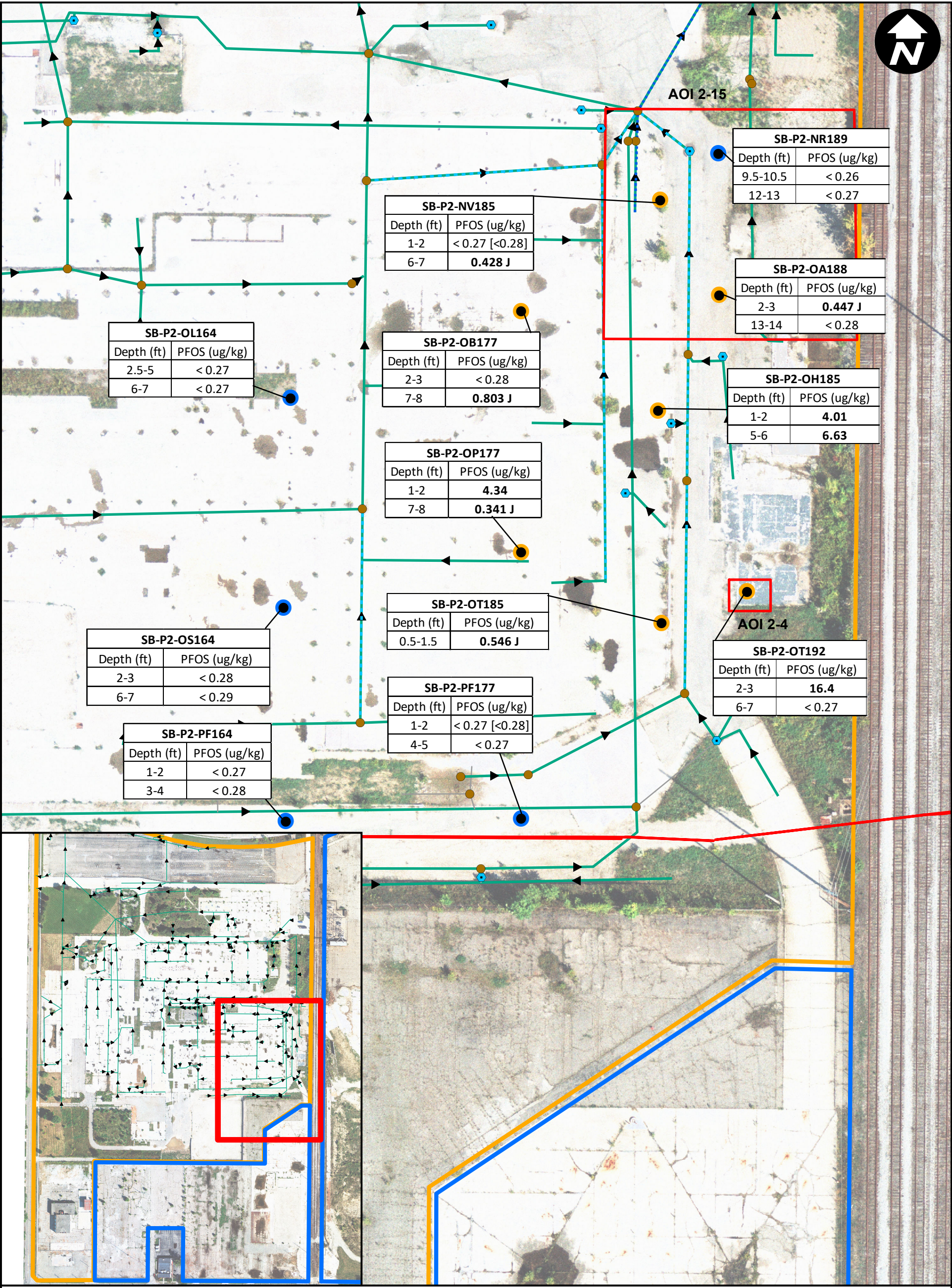
FIGURES



Figure 1
Plant 2 Southeast PFAS
Investigation Area

RACER Trust
Lansing, Michigan





SB-P2-OL164	
Depth (ft)	PFOS (ug/kg)
2.5-5	< 0.27
6-7	< 0.27

SB-P2-NV185	
Depth (ft)	PFOS (ug/kg)
1-2	< 0.27 [<u><0.28</u>]
6-7	0.428 J

SB-P2-NR189	
Depth (ft)	PFOS (ug/kg)
9.5-10.5	< 0.26
12-13	< 0.27

SB-P2-OA188	
Depth (ft)	PFOS (ug/kg)
2-3	0.447 J
13-14	< 0.28

SB-P2-OB177	
Depth (ft)	PFOS (ug/kg)
2-3	< 0.28
7-8	0.803 J

SB-P2-OH185	
Depth (ft)	PFOS (ug/kg)
1-2	4.01
5-6	6.63

SB-P2-OP177	
Depth (ft)	PFOS (ug/kg)
1-2	4.34
7-8	0.341 J

SB-P2-OS164	
Depth (ft)	PFOS (ug/kg)
2-3	< 0.28
6-7	< 0.29

SB-P2-OT185	
Depth (ft)	PFOS (ug/kg)
0.5-1.5	0.546 J

SB-P2-OT192	
Depth (ft)	PFOS (ug/kg)
2-3	16.4
6-7	< 0.27

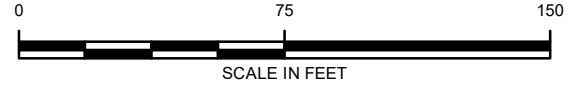
SB-P2-PF164	
Depth (ft)	PFOS (ug/kg)
1-2	< 0.27
3-4	< 0.28

SB-P2-PF177	
Depth (ft)	PFOS (ug/kg)
1-2	< 0.27 [<u><0.28</u>]
4-5	< 0.27

- VAP SOIL BORINGS
- PFOS < GSIP CRITERIA (0.24 ug/Kg)
- PFOS > GSIP CRITERIA (0.24 ug/Kg)
- CATCH BASIN TO REMAIN OPEN
- AREA OF INTREST
- MANHOLE
- OBSERVED FLOW**
- TRICKLE
- LITTLE

- PLANT 2 DRAINAGE NETWORKS**
- CENTRAL
- ABANDONED
- PLANT BOUNDARIES**
- PLANT 2
- PLANT 6

NOTES:
 -UTILITY LOCATIONS ARE APPROXIMATE
 -ARROWS DENOTE FLOW DIRECTION
 -ANALYTICAL DATA IS IN ug/Kg
 -ug/Kg: MICROGRAMS PER KILOGRAM
 -J: COMPOUND DETECTED ABOVE LABORATORY METHOD DETECTION LIMIT AND BELOW THE QUANTITATIVE REPORTING LIMIT



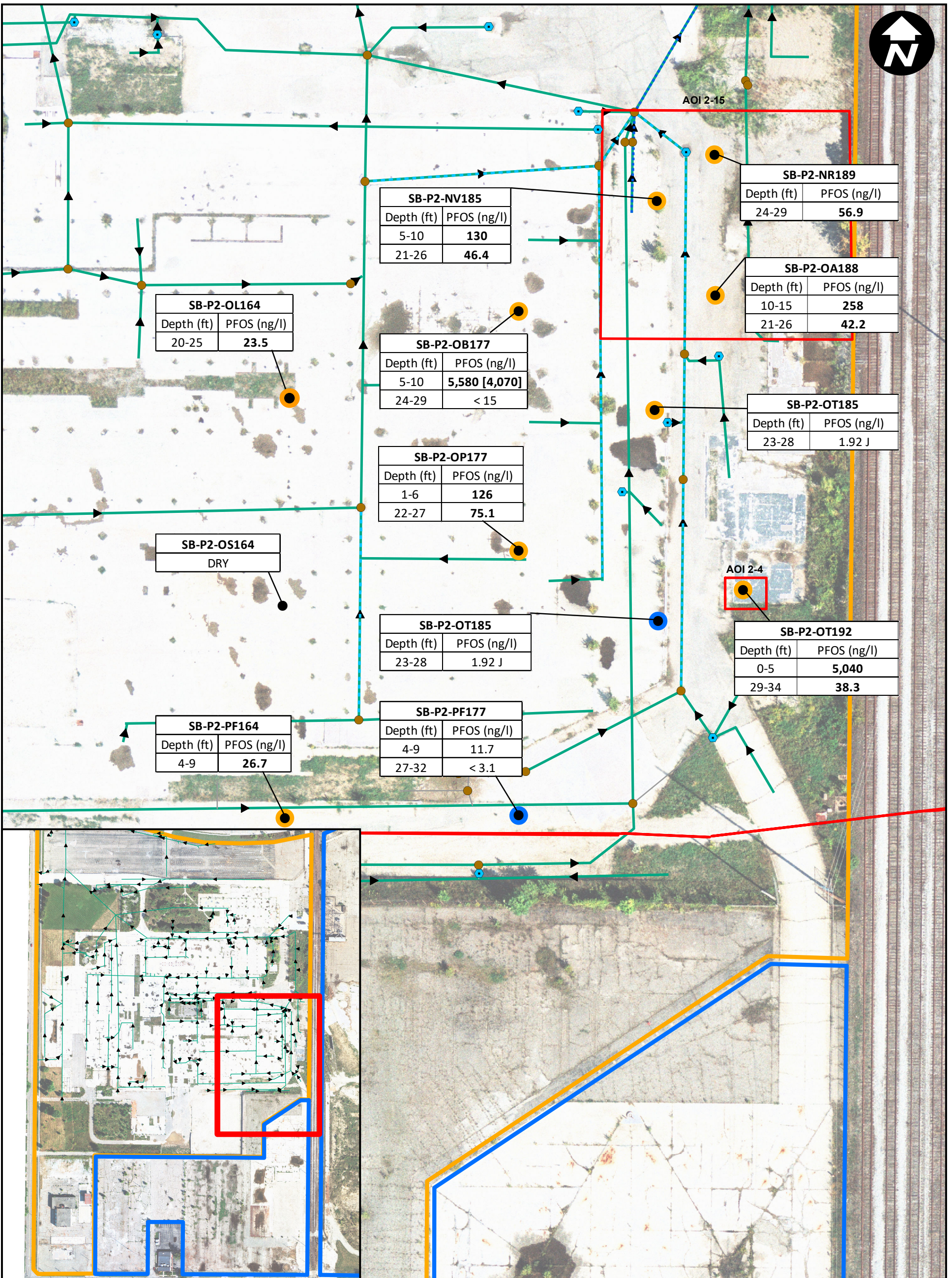
RACER TRUST
 PLANTS 2 & 6
 LANSING, MICHIGAN

**SOIL PFOS RESULTS
 AUGUST 2019**

ARCADIS Design & Consultancy for natural and built assets

DRAFT

CITY: Novi DIV: ENV PIC: J. BARRETT PM: R. CHRISTENSEN TM: A. LORENZ TR: J. SALING PROJECT NUMBER: B0064479.2019.03500 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
 G:\GIS\Project Files\RACER\Lansing\Docs\PFAS\Figure_P2_SOILPFOS_Aug2019.mxd PLOTTED: 12/5/2019 1:06:07 PM BY: SYaqoob



SB-P2-OL164	
Depth (ft)	PFOS (ng/l)
20-25	23.5

SB-P2-NV185	
Depth (ft)	PFOS (ng/l)
5-10	130
21-26	46.4

SB-P2-NR189	
Depth (ft)	PFOS (ng/l)
24-29	56.9

SB-P2-OA188	
Depth (ft)	PFOS (ng/l)
10-15	258
21-26	42.2

SB-P2-OB177	
Depth (ft)	PFOS (ng/l)
5-10	5,580 [4,070]
24-29	< 15

SB-P2-OT185	
Depth (ft)	PFOS (ng/l)
23-28	1.92 J

SB-P2-OP177	
Depth (ft)	PFOS (ng/l)
1-6	126
22-27	75.1

SB-P2-OS164	
DRY	

SB-P2-OT185	
Depth (ft)	PFOS (ng/l)
23-28	1.92 J

SB-P2-OT192	
Depth (ft)	PFOS (ng/l)
0-5	5,040
29-34	38.3

SB-P2-PF164	
Depth (ft)	PFOS (ng/l)
4-9	26.7

SB-P2-PF177	
Depth (ft)	PFOS (ng/l)
4-9	11.7
27-32	< 3.1

- VAP SOIL BORINGS
- PFOS < GSI CRITERIA (12 ng/L)
- PFOS > GSI CRITERIA (12 ng/L)
- CATCH BASIN TO REMAIN
- MANHOLE
- AREA OF INTEREST
- OBSERVED FLOW**
- TRICKLE
- LITTLE

- PLANT 2 DRAINAGE**
- CENTRAL
- ABANDONED
- PLANT BOUNDARIES**
- PLANT 2
- PLANT 6

NOTES:

-UTILITY LOCATIONS ARE APPROXIMATE
 -ARROWS DENOTE FLOW DIRECTION
 -ANALYTICAL DATA IS IN ng/L
 -ng/L: NANOGRAMS PER LITER
 -J: COMPOUND DETECTED ABOVE LABORATORY METHOD DETECTION LIMIT AND BELOW THE QUANTITATIVE REPORTING LIMIT



RACER TRUST
 PLANTS 2 & 6
 LANSING, MICHIGAN

**GROUNDWATER PFOS RESULTS
 AUGUST 2019**

DRAFT



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

B0064479.2019

SGS Job Number: FA67447

Sampling Dates: 08/21/19 - 08/23/19



Report to:

Arcadis
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Lansing, MI 48933
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ATTN: Alex Villhauer

Total number of pages in report: 101



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.

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.

Table of Contents

-1-

Section 1: Sample Summary	3
Section 2: Summary of Hits	6
Section 3: Sample Results	11
3.1: FA67447-1: SB-P2-OT192_29-34	12
3.2: FA67447-2: SB-P2-OT185_0.5-1.5	14
3.3: FA67447-3: SB-P2-OT185_3-4	16
3.4: FA67447-4: SB-P2-OB177_2-3	18
3.5: FA67447-5: SB-P2-OB177_7-8	20
3.6: FA67447-6: SB-P2-OP177_1-2	22
3.7: FA67447-7: SB-P2-OP177_7-8	24
3.8: FA67447-8: DUP-02_SOIL	26
3.9: FA67447-9: EQUIP-BLANK-02	28
3.10: FA67447-10: SB-P2-OT185_23-28	30
3.11: FA67447-11: SB-P2-OB177_24-29	32
3.12: FA67447-12: SB-P2-OP177_22-27	34
3.13: FA67447-13: SB-P2-PF177_1-2	36
3.14: FA67447-14: SB-P2-PF177_4-5	38
3.15: FA67447-15: SB-P2-OL164_2.5-5	40
3.16: FA67447-16: SB-P2-OL164_6-7	42
3.17: FA67447-17: SB-P2-OS164_2-3	44
3.18: FA67447-18: SB-P2-OS164_6-7	46
3.19: FA67447-19: SB-P2-OB177_5-10	48
3.20: FA67447-20: SB-P2-OP177_1-6	50
3.21: FA67447-21: SB-P2-PF177_4-9	52
3.22: FA67447-22: SB-P2-PF177_27-32	54
3.23: FA67447-23: SB-P2-OL164_20-25	56
3.24: FA67447-24: DUP-02_GW	58
3.25: FA67447-25: SB-P2-PF164_1-2	60
3.26: FA67447-26: SB-P2-PF164_3-4	62
3.27: FA67447-27: SB-P2-PF164_4-9	64
Section 4: Misc. Forms	66
4.1: Certification Exceptions	67
4.2: Chain of Custody	69
Section 5: MS Semi-volatiles - QC Data Summaries	73
5.1: Method Blank Summary	74
5.2: Blank Spike Summary	88
5.3: Matrix Spike Summary	94
5.4: Matrix Spike/Matrix Spike Duplicate Summary	96
5.5: Duplicate Summary	100



Sample Summary

Arcadis

Job No: FA67447

**Racer Lansing PFAS Delineation; Lansing, MI
Project No: B0064479.2019**

Sample Number	Collected Date	Time By	Received	Matrix Code	Type	Client Sample ID
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**This report contains results reported as ND = Not detected. The following applies:
Organics ND = Not detected above the MDL**

Actual ID is SB-P2-OH185_25-30

FA67447-1	08/21/19	08:15 ER	08/24/19	AQ	Ground Water	SB-P2-OT192_29-34
FA67447-2	08/21/19	11:40 ER	08/24/19	SO	Soil	SB-P2-OT185_0.5-1.5
FA67447-3	08/21/19	11:45 ER	08/24/19	SO	Soil	SB-P2-OT185_3-4
FA67447-4	08/21/19	13:25 ER	08/24/19	SO	Soil	SB-P2-OB177_2-3
FA67447-5	08/21/19	13:30 ER	08/24/19	SO	Soil	SB-P2-OB177_7-8
FA67447-6	08/21/19	15:30 ER	08/24/19	SO	Soil	SB-P2-OP177_1-2
FA67447-7	08/21/19	15:00 ER	08/24/19	SO	Soil	SB-P2-OP177_7-8
FA67447-8	08/21/19	00:00 ER	08/24/19	SO	Soil	DUP-02_SOIL
FA67447-9	08/21/19	15:40 ER	08/24/19	AQ	Equipment Blank	EQUIP-BLANK-02
FA67447-10	08/21/19	16:10 ER	08/24/19	AQ	Ground Water	SB-P2-OT185_23-28
FA67447-11	08/21/19	16:50 ER	08/24/19	AQ	Ground Water	SB-P2-OB177_24-29
FA67447-12	08/21/19	17:25 ER	08/24/19	AQ	Ground Water	SB-P2-OP177_22-27

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



Sample Summary (continued)

Arcadis

Job No: FA67447

**Racer Lansing PFAS Delineation; Lansing, MI
Project No: B0064479.2019**

Sample Number	Collected		Received	Matrix		Client Sample ID
	Date	Time By		Code	Type	
FA67447-13	08/22/19	10:55 ER	08/24/19	SO	Soil	SB-P2-PF177_1-2
FA67447-14	08/22/19	11:00 ER	08/24/19	SO	Soil	SB-P2-PF177_4-5
FA67447-15	08/22/19	13:25 ER	08/24/19	SO	Soil	SB-P2-OL164_2.5-5
FA67447-16	08/22/19	13:30 ER	08/24/19	SO	Soil	SB-P2-OL164_6-7
FA67447-17	08/22/19	14:45 ER	08/24/19	SO	Soil	SB-P2-OS164_2-3
FA67447-18	08/22/19	14:50 ER	08/24/19	SO	Soil	SB-P2-OS164_6-7
FA67447-19	08/22/19	15:10 ER	08/24/19	AQ	Ground Water	SB-P2-OB177_5-10
FA67447-20	08/22/19	15:35 ER	08/24/19	AQ	Ground Water	SB-P2-OP177_1-6
FA67447-21	08/22/19	16:00 ER	08/24/19	AQ	Ground Water	SB-P2-PF177_4-9
FA67447-22	08/22/19	16:20 ER	08/24/19	AQ	Ground Water	SB-P2-PF177_27-32
FA67447-23	08/22/19	17:00 ER	08/24/19	AQ	Ground Water	SB-P2-OL164_20-25
FA67447-24	08/22/19	00:00 ER	08/24/19	AQ	Ground Water	DUP-02_GW
FA67447-25	08/23/19	09:00 ER	08/24/19	SO	Soil	SB-P2-PF164_1-2

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



Sample Summary (continued)

Arcadis

Job No: FA67447

Racer Lansing PFAS Delineation; Lansing, MI
Project No: B0064479.2019

Sample Number	Collected Date	Time By	Received	Matrix Code	Type	Client Sample ID
FA67447-26	08/23/19	09:05 ER	08/24/19	SO	Soil	SB-P2-PF164_3-4
FA67447-27	08/23/19	09:55 ER	08/24/19	AQ	Ground Water	SB-P2-PF164_4-9

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

Summary of Hits

Job Number: FA67447
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 08/21/19 thru 08/23/19

2

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
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FA67447-1 SB-P2-OT192_29-34

Perfluorobutanoic acid	0.0472	0.015	0.0037	ug/l	EPA 537M BY ID
Perfluoropentanoic acid	0.0732	0.0074	0.0028	ug/l	EPA 537M BY ID
Perfluorohexanoic acid	0.0981	0.0074	0.0019	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid	0.0255	0.0074	0.0019	ug/l	EPA 537M BY ID
Perfluorooctanoic acid	0.0185	0.0074	0.0019	ug/l	EPA 537M BY ID
Perfluorononanoic acid	0.00212 J	0.0074	0.0019	ug/l	EPA 537M BY ID
Perfluorodecanoic acid	0.00231 J	0.0074	0.0019	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid	0.0708	0.0074	0.0019	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid	0.0333	0.0074	0.0019	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid	0.0624	0.0074	0.0019	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid	0.0383	0.0074	0.0028	ug/l	EPA 537M BY ID

FA67447-2 SB-P2-OT185_0.5-1.5

Perfluorooctanesulfonic acid	0.546 J	1.1	0.26	ug/kg	EPA 537M BY ID
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FA67447-3 SB-P2-OT185_3-4

No hits reported in this sample.

FA67447-4 SB-P2-OB177_2-3

Perfluorooctanesulfonic acid	0.803 J	1.2	0.29	ug/kg	EPA 537M BY ID
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FA67447-5 SB-P2-OB177_7-8

Perfluorooctanesulfonic acid	4.34	1.1	0.27	ug/kg	EPA 537M BY ID
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FA67447-6 SB-P2-OP177_1-2

Perfluorooctanesulfonic acid	0.341 J	1.1	0.28	ug/kg	EPA 537M BY ID
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FA67447-7 SB-P2-OP177_7-8

No hits reported in this sample.

FA67447-8 DUP-02_SOIL

No hits reported in this sample.

FA67447-9 EQUIP-BLANK-02

No hits reported in this sample.

Summary of Hits

Job Number: FA67447
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 08/21/19 thru 08/23/19

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
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FA67447-10 SB-P2-OT185_23-28

Perfluorobutanoic acid	0.0116	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluoropentanoic acid	0.00789	0.0038	0.0014	ug/l	EPA 537M BY ID
Perfluorohexanoic acid	0.0107	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid	0.00204 J	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid	0.00192 J	0.0038	0.0014	ug/l	EPA 537M BY ID

FA67447-11 SB-P2-OB177_24-29

Perfluorobutanoic acid ^a	0.0288 J	0.080	0.020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid ^a	0.0647	0.040	0.015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid ^a	0.0949	0.040	0.010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid ^a	0.0384 J	0.040	0.010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid ^a	0.0685	0.040	0.010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid ^a	0.0443	0.040	0.010	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid ^a	0.0332 J	0.040	0.010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid ^a	0.0343 J	0.040	0.010	ug/l	EPA 537M BY ID

FA67447-12 SB-P2-OP177_22-27

Perfluoropentanoic acid ^a	0.0624	0.040	0.015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid ^a	0.0681	0.040	0.010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid ^a	0.0408	0.040	0.010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid ^a	0.0553	0.040	0.010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid ^a	0.0298 J	0.040	0.010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid ^a	0.0751	0.040	0.015	ug/l	EPA 537M BY ID

FA67447-13 SB-P2-PF177_1-2

No hits reported in this sample.

FA67447-14 SB-P2-PF177_4-5

No hits reported in this sample.

FA67447-15 SB-P2-OL164_2.5-5

No hits reported in this sample.

FA67447-16 SB-P2-OL164_6-7

No hits reported in this sample.

Summary of Hits

Job Number: FA67447
 Account: Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI
 Collected: 08/21/19 thru 08/23/19

2

Lab Sample ID	Client Sample ID	Result/ Analyte	RL	MDL	Units	Method
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FA67447-17 SB-P2-OS164_2-3

No hits reported in this sample.

FA67447-18 SB-P2-OS164_6-7

No hits reported in this sample.

FA67447-19 SB-P2-OB177_5-10

Perfluoropentanoic acid	0.0280 J	0.037	0.014	ug/l	EPA 537M BY ID
Perfluorohexanoic acid	0.0657	0.037	0.0093	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid	0.0457	0.037	0.0093	ug/l	EPA 537M BY ID
Perfluorooctanoic acid	0.155	0.037	0.0093	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid	0.0641	0.037	0.0093	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid	0.106	0.037	0.0093	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid	0.820	0.037	0.0093	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid	0.124	0.037	0.0093	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid	5.58	0.093	0.035	ug/l	EPA 537M BY ID
6:2 Fluorotelomer sulfonate	0.0297 J	0.074	0.019	ug/l	EPA 537M BY ID

FA67447-20 SB-P2-OP177_1-6

Perfluorobutanoic acid ^b	0.0195 J	0.074	0.019	ug/l	EPA 537M BY ID
Perfluoropentanoic acid ^b	0.0290 J	0.037	0.014	ug/l	EPA 537M BY ID
Perfluorohexanoic acid ^b	0.0159 J	0.037	0.0093	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid ^b	0.0129 J	0.037	0.0093	ug/l	EPA 537M BY ID
Perfluorooctanoic acid ^b	0.0198 J	0.037	0.0093	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid ^b	0.0182 J	0.037	0.0093	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid ^b	0.126	0.037	0.014	ug/l	EPA 537M BY ID

FA67447-21 SB-P2-PF177_4-9

Perfluorobutanoic acid ^b	0.0140 J	0.015	0.0038	ug/l	EPA 537M BY ID
Perfluoropentanoic acid ^b	0.0162	0.0077	0.0029	ug/l	EPA 537M BY ID
Perfluorohexanoic acid ^b	0.0140	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid ^b	0.0208	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluorooctanoic acid ^b	0.0421	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluorononanoic acid ^b	0.0117	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluorodecanoic acid ^b	0.00454 J	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid ^b	0.00215 J	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid ^b	0.0117	0.0077	0.0029	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA67447
 Account: Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI
 Collected: 08/21/19 thru 08/23/19

2

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
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FA67447-22 SB-P2-PF177_27-32

No hits reported in this sample.

FA67447-23 SB-P2-OL164_20-25

Perfluorobutanoic acid ^b	0.0338	0.015	0.0038	ug/l	EPA 537M BY ID
Perfluoropentanoic acid ^b	0.0575	0.0077	0.0029	ug/l	EPA 537M BY ID
Perfluorohexanoic acid ^b	0.0693	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid ^b	0.0315	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluorooctanoic acid ^b	0.0387	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluorononanoic acid ^b	0.00535 J	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid ^b	0.0383	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid ^b	0.0127	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid ^b	0.0340	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid ^b	0.0235	0.0077	0.0029	ug/l	EPA 537M BY ID

FA67447-24 DUP-02_GW

Perfluorohexanoic acid	0.0675	0.037	0.0093	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid	0.0420	0.037	0.0093	ug/l	EPA 537M BY ID
Perfluorooctanoic acid	0.137	0.037	0.0093	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid	0.0592	0.037	0.0093	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid	0.0923	0.037	0.0093	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid	0.707	0.037	0.0093	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid	0.102	0.037	0.0093	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid	4.07	0.093	0.035	ug/l	EPA 537M BY ID
6:2 Fluorotelomer sulfonate	0.0251 J	0.074	0.019	ug/l	EPA 537M BY ID

FA67447-25 SB-P2-PF164_1-2

No hits reported in this sample.

FA67447-26 SB-P2-PF164_3-4

No hits reported in this sample.

FA67447-27 SB-P2-PF164_4-9

Perfluorobutanoic acid ^b	0.0184	0.016	0.0040	ug/l	EPA 537M BY ID
Perfluoropentanoic acid ^b	0.0135	0.0080	0.0030	ug/l	EPA 537M BY ID
Perfluorohexanoic acid ^b	0.00918	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid ^b	0.0106	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluorooctanoic acid ^b	0.0449	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluorononanoic acid ^b	0.00807	0.0080	0.0020	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA67447
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 08/21/19 thru 08/23/19

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method	
		Perfluorodecanoic acid ^b	0.0134	0.0080	0.0020	ug/l	EPA 537M BY ID
		Perfluorooctanesulfonic acid ^b	0.0267	0.0080	0.0030	ug/l	EPA 537M BY ID
		PFOSA ^b	0.00242 J	0.0080	0.0020	ug/l	EPA 537M BY ID

(a) Dilution required due to matrix interference (internal standard failure).

(b) Dilution required due to matrix interference.

Sample Results

Report of Analysis

Report of Analysis

3.1
3

Client Sample ID:	SB-P2-OT192_29-34	Actual ID is SB-P2-OH185_25-30
Lab Sample ID:	FA67447-1	Date Sampled: 08/21/19
Matrix:	AQ - Ground Water	Date Received: 08/24/19
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	Q63536.D	2	09/11/19 09:51	MRE	09/07/19 08:00	OP76717	SQ1430
Run #2							

Run #	Initial Volume	Final Volume
Run #1	270 ml	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0472	0.015	0.0037	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0732	0.0074	0.0028	ug/l	
307-24-4	Perfluorohexanoic acid	0.0981	0.0074	0.0019	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0255	0.0074	0.0019	ug/l	
335-67-1	Perfluorooctanoic acid	0.0185	0.0074	0.0019	ug/l	
375-95-1	Perfluorononanoic acid	0.00212	0.0074	0.0019	ug/l	J
335-76-2	Perfluorodecanoic acid	0.00231	0.0074	0.0019	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.0074	0.0019	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0074	0.0028	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0074	0.0019	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0074	0.0019	ug/l	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.0708	0.0074	0.0019	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	0.0333	0.0074	0.0019	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.0624	0.0074	0.0019	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0074	0.0019	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0383	0.0074	0.0028	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0074	0.0019	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0074	0.0019	ug/l	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0074	0.0019	ug/l	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.037	0.0074	ug/l	
2991-50-6	EtFOSAA	ND	0.037	0.0074	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.015	0.0037	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.015	0.0037	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-P2-OT192_29-34	
Lab Sample ID: FA67447-1	Date Sampled: 08/21/19
Matrix: AQ - Ground Water	Date Received: 08/24/19
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.015	0.0037	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	76%		30-140%
	13C5-PFPeA	86%		40-140%
	13C5-PFHxA	88%		50-150%
	13C4-PFHpA	99%		50-150%
	13C8-PFOA	117%		50-150%
	13C9-PFNA	123%		50-150%
	13C6-PFDA	120%		50-150%
	13C7-PFUnDA	124%		50-150%
	13C2-PFDoDA	107%		50-150%
	13C2-PFTeDA	91%		40-150%
	13C3-PFBS	89%		50-150%
	13C3-PFHxS	95%		50-150%
	13C8-PFOS	113%		50-150%
	13C8-FOSA	116%		30-140%
	d3-MeFOSAA	114%		50-150%
	13C2-4:2FTS	98%		50-150%
	13C2-6:2FTS	124%		50-150%
	13C2-8:2FTS	111%		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

32
3

Client Sample ID: SB-P2-OT185_0.5-1.5	
Lab Sample ID: FA67447-2	Date Sampled: 08/21/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 95.7
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q35008.D	1	08/27/19 23:54	NAF	08/26/19 12:00	OP76545	S2Q549
Run #2							

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

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND	1.1	0.26	ug/kg	
2706-90-3	Perfluoropentanoic acid	ND	1.1	0.21	ug/kg	
307-24-4	Perfluorohexanoic acid	ND	1.1	0.21	ug/kg	
375-85-9	Perfluoroheptanoic acid	ND	1.1	0.26	ug/kg	
335-67-1	Perfluorooctanoic acid	ND	1.1	0.26	ug/kg	
375-95-1	Perfluorononanoic acid	ND	1.1	0.26	ug/kg	
335-76-2	Perfluorodecanoic acid	ND	1.1	0.26	ug/kg	
2058-94-8	Perfluoroundecanoic acid	ND	1.1	0.26	ug/kg	
307-55-1	Perfluorododecanoic acid	ND	1.1	0.26	ug/kg	
72629-94-8	Perfluorotridecanoic acid	ND	1.1	0.26	ug/kg	
376-06-7	Perfluorotetradecanoic acid	ND	1.1	0.26	ug/kg	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	1.1	0.26	ug/kg	
2706-91-4	Perfluoropentanesulfonic acid	ND	1.1	0.26	ug/kg	
355-46-4	Perfluorohexanesulfonic acid	ND	1.1	0.26	ug/kg	
375-92-8	Perfluoroheptanesulfonic acid	ND	1.1	0.26	ug/kg	
1763-23-1	Perfluorooctanesulfonic acid	0.546	1.1	0.26	ug/kg	J
68259-12-1	Perfluorononanesulfonic acid	ND	1.1	0.26	ug/kg	
335-77-3	Perfluorodecanesulfonic acid	ND	1.1	0.26	ug/kg	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	1.1	0.26	ug/kg	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	2.6	0.53	ug/kg	
2991-50-6	EtFOSAA	ND	2.6	0.53	ug/kg	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	1.1	0.26	ug/kg	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	1.1	0.26	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

32
3

Client Sample ID: SB-P2-OT185_0.5-1.5	Date Sampled: 08/21/19
Lab Sample ID: FA67447-2	Date Received: 08/24/19
Matrix: SO - Soil	Percent Solids: 95.7
Method: EPA 537M BY ID IN HOUSE	
Project: Racer Lansing PFAS Delineation; Lansing, MI	

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	1.1	0.26	ug/kg	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	75%		50-150%
	13C5-PFPeA	75%		50-150%
	13C5-PFHxA	77%		50-150%
	13C4-PFHpA	76%		50-150%
	13C8-PFOA	81%		50-150%
	13C9-PFNA	80%		50-150%
	13C6-PFDA	82%		50-150%
	13C7-PFUnDA	84%		50-150%
	13C2-PFDoDA	84%		50-150%
	13C2-PFTeDA	82%		50-150%
	13C3-PFBS	76%		50-150%
	13C3-PFHxS	77%		50-150%
	13C8-PFOS	79%		50-150%
	13C8-FOSA	84%		50-150%
	d3-MeFOSAA	81%		50-150%
	13C2-4:2FTS	73%		50-150%
	13C2-6:2FTS	77%		50-150%
	13C2-8:2FTS	77%		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-P2-OT185_3-4	
Lab Sample ID: FA67447-3	Date Sampled: 08/21/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 91.6
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q35009.D	1	08/28/19 00:10	NAF	08/26/19 12:00	OP76545	S2Q549
Run #2							

Run #	Initial Weight	Final Volume
Run #1	1.96 g	1.0 ml
Run #2		

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: SB-P2-OT185_3-4	
Lab Sample ID: FA67447-3	Date Sampled: 08/21/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 91.6
Project: Racer Lansing PFAS Delineation; Lansing, MI	

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	77%		50-150%
	13C5-PFHxA	78%		50-150%
	13C4-PFHpA	77%		50-150%
	13C8-PFOA	81%		50-150%
	13C9-PFNA	81%		50-150%
	13C6-PFDA	82%		50-150%
	13C7-PFUnDA	84%		50-150%
	13C2-PFDoDA	81%		50-150%
	13C2-PFTeDA	77%		50-150%
	13C3-PFBS	77%		50-150%
	13C3-PFHxS	78%		50-150%
	13C8-PFOS	80%		50-150%
	13C8-FOSA	73%		50-150%
	d3-MeFOSAA	79%		50-150%
	13C2-4:2FTS	74%		50-150%
	13C2-6:2FTS	78%		50-150%
	13C2-8:2FTS	79%		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-P2-OB177_2-3	
Lab Sample ID: FA67447-4	Date Sampled: 08/21/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 86.6
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q35010.D	1	08/28/19 00:25	NAF	08/26/19 12:00	OP76545	S2Q549
Run #2							

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

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	ND	1.2	0.23	ug/kg	
307-24-4	Perfluorohexanoic acid	ND	1.2	0.23	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	
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	0.803	1.2	0.29	ug/kg	J
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-P2-OB177_2-3	
Lab Sample ID: FA67447-4	Date Sampled: 08/21/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 86.6
Project: Racer Lansing PFAS Delineation; Lansing, MI	

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	80%		50-150%
	13C5-PFHxA	81%		50-150%
	13C4-PFHpA	80%		50-150%
	13C8-PFOA	85%		50-150%
	13C9-PFNA	84%		50-150%
	13C6-PFDA	86%		50-150%
	13C7-PFUnDA	87%		50-150%
	13C2-PFDoDA	86%		50-150%
	13C2-PFTeDA	82%		50-150%
	13C3-PFBS	80%		50-150%
	13C3-PFHxS	80%		50-150%
	13C8-PFOS	83%		50-150%
	13C8-FOSA	85%		50-150%
	d3-MeFOSAA	86%		50-150%
	13C2-4:2FTS	77%		50-150%
	13C2-6:2FTS	81%		50-150%
	13C2-8:2FTS	82%		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-P2-OB177_7-8	Date Sampled:	08/21/19
Lab Sample ID:	FA67447-5	Date Received:	08/24/19
Matrix:	SO - Soil	Percent Solids:	90.4
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	2Q35011.D	1	08/28/19 00:40	NAF	08/26/19 12:00	OP76545	S2Q549
Run #2							

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

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	4.34	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

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-P2-OB177_7-8	
Lab Sample ID: FA67447-5	Date Sampled: 08/21/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 90.4
Project: Racer Lansing PFAS Delineation; Lansing, MI	

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	81%		50-150%
	13C5-PFPeA	82%		50-150%
	13C5-PFHxA	84%		50-150%
	13C4-PFHpA	83%		50-150%
	13C8-PFOA	88%		50-150%
	13C9-PFNA	86%		50-150%
	13C6-PFDA	89%		50-150%
	13C7-PFUnDA	92%		50-150%
	13C2-PFDoDA	91%		50-150%
	13C2-PFTeDA	87%		50-150%
	13C3-PFBS	83%		50-150%
	13C3-PFHxS	84%		50-150%
	13C8-PFOS	86%		50-150%
	13C8-FOSA	95%		50-150%
	d3-MeFOSAA	90%		50-150%
	13C2-4:2FTS	80%		50-150%
	13C2-6:2FTS	84%		50-150%
	13C2-8:2FTS	84%		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-P2-OP177_1-2	
Lab Sample ID: FA67447-6	Date Sampled: 08/21/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 88.1
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q35012.D	1	08/28/19 00:56	NAF	08/26/19 12:00	OP76545	S2Q549
Run #2							

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

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	0.341	1.1	0.28	ug/kg	J
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

3.6
3

Client Sample ID:	SB-P2-OP177_1-2	Date Sampled:	08/21/19
Lab Sample ID:	FA67447-6	Date Received:	08/24/19
Matrix:	SO - Soil	Percent Solids:	88.1
Method:	EPA 537M BY ID IN HOUSE		
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

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	76%		50-150%
	13C5-PFPeA	77%		50-150%
	13C5-PFHxA	78%		50-150%
	13C4-PFHpA	77%		50-150%
	13C8-PFOA	84%		50-150%
	13C9-PFNA	83%		50-150%
	13C6-PFDA	88%		50-150%
	13C7-PFUnDA	90%		50-150%
	13C2-PFDoDA	84%		50-150%
	13C2-PFTeDA	79%		50-150%
	13C3-PFBS	78%		50-150%
	13C3-PFHxS	78%		50-150%
	13C8-PFOS	78%		50-150%
	13C8-FOSA	87%		50-150%
	d3-MeFOSAA	88%		50-150%
	13C2-4:2FTS	73%		50-150%
	13C2-6:2FTS	81%		50-150%
	13C2-8:2FTS	84%		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

37
3

Client Sample ID: SB-P2-OP177_7-8	
Lab Sample ID: FA67447-7	Date Sampled: 08/21/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 91.1
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q35013.D	1	08/28/19 01:11	NAF	08/26/19 12:00	OP76545	S2Q549
Run #2							

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

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

37
3

Client Sample ID: SB-P2-OP177_7-8		Date Sampled: 08/21/19
Lab Sample ID: FA67447-7		Date Received: 08/24/19
Matrix: SO - Soil		Percent Solids: 91.1
Method: EPA 537M BY ID IN HOUSE		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

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	71%		50-150%
	13C5-PFPeA	74%		50-150%
	13C5-PFHxA	75%		50-150%
	13C4-PFHpA	74%		50-150%
	13C8-PFOA	70%		50-150%
	13C9-PFNA	79%		50-150%
	13C6-PFDA	82%		50-150%
	13C7-PFUnDA	84%		50-150%
	13C2-PFDoDA	83%		50-150%
	13C2-PFTeDA	83%		50-150%
	13C3-PFBS	75%		50-150%
	13C3-PFHxS	76%		50-150%
	13C8-PFOS	76%		50-150%
	13C8-FOSA	84%		50-150%
	d3-MeFOSAA	80%		50-150%
	13C2-4:2FTS	69%		50-150%
	13C2-6:2FTS	66%		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: DUP-02_SOIL		
Lab Sample ID: FA67447-8		Date Sampled: 08/21/19
Matrix: SO - Soil		Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE		Percent Solids: 91.7
Project: Racer Lansing PFAS Delineation; Lansing, MI		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q35014.D	1	08/28/19 01:26	NAF	08/26/19 12:00	OP76545	S2Q549
Run #2							

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

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	0.21	ug/kg	
307-24-4	Perfluorohexanoic acid	ND	1.1	0.21	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	0.54	ug/kg	
2991-50-6	EtFOSAA	ND	2.7	0.54	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

38
3

Client Sample ID: DUP-02_SOIL		Date Sampled: 08/21/19
Lab Sample ID: FA67447-8		Date Received: 08/24/19
Matrix: SO - Soil		Percent Solids: 91.7
Method: EPA 537M BY ID IN HOUSE		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

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	68%		50-150%
	13C5-PFPeA	75%		50-150%
	13C5-PFHxA	77%		50-150%
	13C4-PFHpA	78%		50-150%
	13C8-PFOA	69%		50-150%
	13C9-PFNA	82%		50-150%
	13C6-PFDA	84%		50-150%
	13C7-PFUnDA	90%		50-150%
	13C2-PFDoDA	87%		50-150%
	13C2-PFTeDA	87%		50-150%
	13C3-PFBS	77%		50-150%
	13C3-PFHxS	79%		50-150%
	13C8-PFOS	78%		50-150%
	13C8-FOSA	88%		50-150%
	d3-MeFOSAA	83%		50-150%
	13C2-4:2FTS	72%		50-150%
	13C2-6:2FTS	65%		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: EQUIP-BLANK-02		
Lab Sample ID: FA67447-9		Date Sampled: 08/21/19
Matrix: AQ - Equipment Blank		Date Received: 08/24/19
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	Q63479.D	1	09/10/19 15:41	MRE	09/07/19 08:00	OP76717	SQ1429
Run #2							

Run #	Initial Volume	Final Volume
Run #1	270 ml	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
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PERFLUOROALKYL CARBOXYLIC ACIDS

375-22-4	Perfluorobutanoic acid	ND	0.0074	0.0019	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0037	0.0014	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0037	0.00093	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0037	0.00093	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0037	0.00093	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0037	0.00093	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0037	0.00093	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0037	0.00093	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0037	0.0014	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0037	0.00093	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0037	0.00093	ug/l	

PERFLUOROALKYL SULFONATES

375-73-5	Perfluorobutanesulfonic acid	ND	0.0037	0.00093	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0037	0.00093	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0037	0.00093	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0037	0.00093	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0037	0.0014	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0037	0.00093	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0037	0.00093	ug/l	

PERFLUORO OCTANESULFONAMIDES

754-91-6	PFOSA	ND	0.0037	0.00093	ug/l	
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PERFLUORO OCTANESULFONAMIDOACETIC ACIDS

2355-31-9	MeFOSAA	ND	0.019	0.0037	ug/l	
2991-50-6	EtFOSAA	ND	0.019	0.0037	ug/l	

FLUOROTELOMER SULFONATES

757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0074	0.0019	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0074	0.0019	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

39
3

Client Sample ID:	EQUIP-BLANK-02	Date Sampled:	08/21/19
Lab Sample ID:	FA67447-9	Date Received:	08/24/19
Matrix:	AQ - Equipment Blank	Percent Solids:	n/a
Method:	EPA 537M BY ID EPA 537 MOD		
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0074	0.0019	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	117%		30-140%
	13C5-PFPeA	120%		40-140%
	13C5-PFHxA	120%		50-150%
	13C4-PFHpA	117%		50-150%
	13C8-PFOA	134%		50-150%
	13C9-PFNA	127%		50-150%
	13C6-PFDA	110%		50-150%
	13C7-PFUnDA	115%		50-150%
	13C2-PFDoDA	142%		50-150%
	13C2-PFTeDA	86%		40-150%
	13C3-PFBS	115%		50-150%
	13C3-PFHxS	110%		50-150%
	13C8-PFOS	109%		50-150%
	13C8-FOSA	132%		30-140%
	d3-MeFOSAA	107%		50-150%
	13C2-4:2FTS	116%		50-150%
	13C2-6:2FTS	130%		50-150%
	13C2-8:2FTS	99%		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-P2-OT185_23-28	
Lab Sample ID: FA67447-10	Date Sampled: 08/21/19
Matrix: AQ - Ground Water	Date Received: 08/24/19
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	Q63480.D	1	09/10/19 15:56	MRE	09/07/19 08:00	OP76717	SQ1429
Run #2							

Run #	Initial Volume	Final Volume
Run #1	260 ml	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
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PERFLUOROALKYL CARBOXYLIC ACIDS

375-22-4	Perfluorobutanoic acid	0.0116	0.0077	0.0019	ug/l	
2706-90-3	Perfluoropentanoic acid	0.00789	0.0038	0.0014	ug/l	
307-24-4	Perfluorohexanoic acid	0.0107	0.0038	0.00096	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0038	0.00096	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0038	0.00096	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0038	0.00096	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0038	0.00096	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0038	0.00096	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0038	0.0014	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0038	0.00096	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0038	0.00096	ug/l	

PERFLUOROALKYL SULFONATES

375-73-5	Perfluorobutanesulfonic acid	ND	0.0038	0.00096	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0038	0.00096	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00204	0.0038	0.00096	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0038	0.00096	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.00192	0.0038	0.0014	ug/l	J
68259-12-1	Perfluorononanesulfonic acid	ND	0.0038	0.00096	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0038	0.00096	ug/l	

PERFLUORO OCTANESULFONAMIDES

754-91-6	PFOSA	ND	0.0038	0.00096	ug/l	
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PERFLUORO OCTANESULFONAMIDOACETIC ACIDS

2355-31-9	MeFOSAA	ND	0.019	0.0038	ug/l	
2991-50-6	EtFOSAA	ND	0.019	0.0038	ug/l	

FLUOROTELOMER SULFONATES

757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	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-P2-OT185_23-28	
Lab Sample ID: FA67447-10	Date Sampled: 08/21/19
Matrix: AQ - Ground Water	Date Received: 08/24/19
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

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	80%		30-140%
	13C5-PFPeA	82%		40-140%
	13C5-PFHxA	87%		50-150%
	13C4-PFHpA	97%		50-150%
	13C8-PFOA	114%		50-150%
	13C9-PFNA	93%		50-150%
	13C6-PFDA	69%		50-150%
	13C7-PFUnDA	57%		50-150%
	13C2-PFDoDA	51%		50-150%
	13C2-PFTeDA	49%		40-150%
	13C3-PFBS	82%		50-150%
	13C3-PFHxS	86%		50-150%
	13C8-PFOS	67%		50-150%
	13C8-FOSA	82%		30-140%
	d3-MeFOSAA	61%		50-150%
	13C2-4:2FTS	90%		50-150%
	13C2-6:2FTS	112%		50-150%
	13C2-8:2FTS	63%		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-P2-OB177_24-29	Date Sampled:	08/21/19
Lab Sample ID:	FA67447-11	Date Received:	08/24/19
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	Q63538.D	10	09/11/19 10:23	MRE	09/07/19 08:00	OP76717	SQ1430
Run #2							

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

CAS No.	Compound	Result	RL	MDL	Units	Q
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PERFLUOROALKYL CARBOXYLIC ACIDS

375-22-4	Perfluorobutanoic acid	0.0288	0.080	0.020	ug/l	J
2706-90-3	Perfluoropentanoic acid	0.0647	0.040	0.015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0949	0.040	0.010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0384	0.040	0.010	ug/l	J
335-67-1	Perfluorooctanoic acid	0.0685	0.040	0.010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.040	0.010	ug/l	
335-76-2	Perfluorodecanoic acid ^b	ND	0.040	0.010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.040	0.010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.040	0.015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.040	0.010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.040	0.010	ug/l	

PERFLUOROALKYL SULFONATES

375-73-5	Perfluorobutanesulfonic acid	0.0443	0.040	0.010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	0.0332	0.040	0.010	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	0.0343	0.040	0.010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.040	0.010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.040	0.015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.040	0.010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.040	0.010	ug/l	

PERFLUORO OCTANESULFONAMIDES

754-91-6	PFOSA	ND	0.040	0.010	ug/l	
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PERFLUORO OCTANESULFONAMIDOACETIC ACIDS

2355-31-9	MeFOSAA	ND	0.20	0.040	ug/l	
2991-50-6	EtFOSAA	ND	0.20	0.040	ug/l	

FLUOROTELOMER SULFONATES

757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.080	0.020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.080	0.020	ug/l	

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-P2-OB177_24-29		Date Sampled: 08/21/19
Lab Sample ID: FA67447-11		Date Received: 08/24/19
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.080	0.020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	95%		30-140%
	13C5-PFPeA	109%		40-140%
	13C5-PFHxA	104%		50-150%
	13C4-PFHpA	110%		50-150%
	13C8-PFOA	115%		50-150%
	13C9-PFNA	109%		50-150%
	13C6-PFDA	95%		50-150%
	13C7-PFUnDA	65%		50-150%
	13C2-PFDoDA	46% ^c		50-150%
	13C2-PFTeDA	43%		40-150%
	13C3-PFBS	107%		50-150%
	13C3-PFHxS	92%		50-150%
	13C8-PFOS	77%		50-150%
	13C8-FOSA	69%		30-140%
	d3-MeFOSAA	76%		50-150%
	13C2-4:2FTS	112%		50-150%
	13C2-6:2FTS	125%		50-150%
	13C2-8:2FTS	93%		50-150%

- (a) Dilution required due to matrix interference (internal standard failure).
- (b) Associated ID Standard outside control limits due to matrix interference.
- (c) Outside control limits due to matrix interference.

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-P2-OP177_22-27	
Lab Sample ID: FA67447-12	Date Sampled: 08/21/19
Matrix: AQ - Ground Water	Date Received: 08/24/19
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	Q63539.D	10	09/11/19 10:38	MRE	09/07/19 08:00	OP76717	SQ1430
Run #2							

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

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid ^b	ND	0.080	0.020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0624	0.040	0.015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0681	0.040	0.010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0408	0.040	0.010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0553	0.040	0.010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.040	0.010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.040	0.010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.040	0.010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.040	0.015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.040	0.010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.040	0.010	ug/l	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	0.040	0.010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.040	0.010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.0298	0.040	0.010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.040	0.010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0751	0.040	0.015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.040	0.010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.040	0.010	ug/l	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.040	0.010	ug/l	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.20	0.040	ug/l	
2991-50-6	EtFOSAA	ND	0.20	0.040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.080	0.020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.080	0.020	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-P2-OP177_22-27	
Lab Sample ID: FA67447-12	Date Sampled: 08/21/19
Matrix: AQ - Ground Water	Date Received: 08/24/19
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.080	0.020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	11% ^c		30-140%
	13C5-PFPeA	69%		40-140%
	13C5-PFHxA	80%		50-150%
	13C4-PFHpA	85%		50-150%
	13C8-PFOA	92%		50-150%
	13C9-PFNA	95%		50-150%
	13C6-PFDA	90%		50-150%
	13C7-PFUnDA	69%		50-150%
	13C2-PFDoDA	54%		50-150%
	13C2-PFTeDA	57%		40-150%
	13C3-PFBS	87%		50-150%
	13C3-PFHxS	88%		50-150%
	13C8-PFOS	95%		50-150%
	13C8-FOSA	57%		30-140%
	d3-MeFOSAA	99%		50-150%
	13C2-4:2FTS	84%		50-150%
	13C2-6:2FTS	102%		50-150%
	13C2-8:2FTS	91%		50-150%

- (a) Dilution required due to matrix interference (internal standard failure).
- (b) Associated ID Standard outside control limits due to matrix interference.
- (c) Outside control limits due to matrix interference.

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-P2-PF177_1-2	
Lab Sample ID: FA67447-13	Date Sampled: 08/22/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 91.9
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q35430.D	1	09/05/19 16:30	NAF	08/28/19 12:00	OP76577	S2Q555
Run #2							

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

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	0.54	ug/kg	
2991-50-6	EtFOSAA	ND	2.7	0.54	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-P2-PF177_1-2	
Lab Sample ID: FA67447-13	Date Sampled: 08/22/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 91.9
Project: Racer Lansing PFAS Delineation; Lansing, MI	

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	89%		50-150%
	13C5-PFPeA	93%		50-150%
	13C5-PFHxA	93%		50-150%
	13C4-PFHpA	92%		50-150%
	13C8-PFOA	96%		50-150%
	13C9-PFNA	97%		50-150%
	13C6-PFDA	96%		50-150%
	13C7-PFUnDA	88%		50-150%
	13C2-PFDoDA	99%		50-150%
	13C2-PFTeDA	114%		50-150%
	13C3-PFBS	88%		50-150%
	13C3-PFHxS	89%		50-150%
	13C8-PFOS	89%		50-150%
	13C8-FOSA	80%		50-150%
	d3-MeFOSAA	93%		50-150%
	13C2-4:2FTS	83%		50-150%
	13C2-6:2FTS	88%		50-150%
	13C2-8:2FTS	101%		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-P2-PF177_4-5	
Lab Sample ID: FA67447-14	Date Sampled: 08/22/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 91.0
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q35431.D	1	09/05/19 16:46	NAF	08/28/19 12:00	OP76577	S2Q555
Run #2							

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

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	0.54	ug/kg	
2991-50-6	EtFOSAA	ND	2.7	0.54	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-P2-PF177_4-5	Date Sampled:	08/22/19
Lab Sample ID:	FA67447-14	Date Received:	08/24/19
Matrix:	SO - Soil	Percent Solids:	91.0
Method:	EPA 537M BY ID IN HOUSE		
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

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	90%		50-150%
	13C5-PFPeA	93%		50-150%
	13C5-PFHxA	93%		50-150%
	13C4-PFHpA	91%		50-150%
	13C8-PFOA	96%		50-150%
	13C9-PFNA	94%		50-150%
	13C6-PFDA	91%		50-150%
	13C7-PFUnDA	87%		50-150%
	13C2-PFDoDA	91%		50-150%
	13C2-PFTeDA	94%		50-150%
	13C3-PFBS	89%		50-150%
	13C3-PFHxS	89%		50-150%
	13C8-PFOS	90%		50-150%
	13C8-FOSA	81%		50-150%
	d3-MeFOSAA	91%		50-150%
	13C2-4:2FTS	84%		50-150%
	13C2-6:2FTS	86%		50-150%
	13C2-8:2FTS	85%		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-P2-OL164_2.5-5	
Lab Sample ID: FA67447-15	Date Sampled: 08/22/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 93.3
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q35432.D	1	09/05/19 17:01	NAF	08/28/19 12:00	OP76577	S2Q555
Run #2							

Run #	Initial Weight	Final Volume
Run #1	1.96 g	1.0 ml
Run #2		

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-P2-OL164_2.5-5	Date Sampled:	08/22/19
Lab Sample ID:	FA67447-15	Date Received:	08/24/19
Matrix:	SO - Soil	Percent Solids:	93.3
Method:	EPA 537M BY ID IN HOUSE		
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

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	76%		50-150%
	13C5-PFPeA	83%		50-150%
	13C5-PFHxA	84%		50-150%
	13C4-PFHpA	84%		50-150%
	13C8-PFOA	89%		50-150%
	13C9-PFNA	89%		50-150%
	13C6-PFDA	80%		50-150%
	13C7-PFUnDA	80%		50-150%
	13C2-PFDoDA	89%		50-150%
	13C2-PFTeDA	96%		50-150%
	13C3-PFBS	82%		50-150%
	13C3-PFHxS	83%		50-150%
	13C8-PFOS	83%		50-150%
	13C8-FOSA	85%		50-150%
	d3-MeFOSAA	107%		50-150%
	13C2-4:2FTS	76%		50-150%
	13C2-6:2FTS	85%		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-P2-OL164_6-7	Date Sampled:	08/22/19
Lab Sample ID:	FA67447-16	Date Received:	08/24/19
Matrix:	SO - Soil	Percent Solids:	91.0
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	2Q35433.D	1	09/05/19 17:17	NAF	08/28/19 12:00	OP76577	S2Q555
Run #2							

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

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-P2-OL164_6-7	Date Sampled:	08/22/19
Lab Sample ID:	FA67447-16	Date Received:	08/24/19
Matrix:	SO - Soil	Percent Solids:	91.0
Method:	EPA 537M BY ID IN HOUSE		
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

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	80%		50-150%
	13C4-PFHpA	80%		50-150%
	13C8-PFOA	84%		50-150%
	13C9-PFNA	84%		50-150%
	13C6-PFDA	81%		50-150%
	13C7-PFUnDA	74%		50-150%
	13C2-PFDoDA	78%		50-150%
	13C2-PFTeDA	83%		50-150%
	13C3-PFBS	76%		50-150%
	13C3-PFHxS	77%		50-150%
	13C8-PFOS	77%		50-150%
	13C8-FOSA	65%		50-150%
	d3-MeFOSAA	80%		50-150%
	13C2-4:2FTS	72%		50-150%
	13C2-6:2FTS	76%		50-150%
	13C2-8:2FTS	78%		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-P2-OS164_2-3	
Lab Sample ID: FA67447-17	Date Sampled: 08/22/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 85.2
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q35434.D	1	09/05/19 17:33	NAF	08/28/19 12:00	OP76577	S2Q555
Run #2							

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

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	ND	1.2	0.23	ug/kg	
307-24-4	Perfluorohexanoic acid	ND	1.2	0.23	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	
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	0.59	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-P2-OS164_2-3	
Lab Sample ID: FA67447-17	Date Sampled: 08/22/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 85.2
Project: Racer Lansing PFAS Delineation; Lansing, MI	

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	85%		50-150%
	13C5-PFPeA	89%		50-150%
	13C5-PFHxA	90%		50-150%
	13C4-PFHpA	89%		50-150%
	13C8-PFOA	95%		50-150%
	13C9-PFNA	97%		50-150%
	13C6-PFDA	94%		50-150%
	13C7-PFUnDA	81%		50-150%
	13C2-PFDoDA	90%		50-150%
	13C2-PFTeDA	101%		50-150%
	13C3-PFBS	85%		50-150%
	13C3-PFHxS	87%		50-150%
	13C8-PFOS	89%		50-150%
	13C8-FOSA	89%		50-150%
	d3-MeFOSAA	95%		50-150%
	13C2-4:2FTS	82%		50-150%
	13C2-6:2FTS	87%		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: SB-P2-OS164_6-7	
Lab Sample ID: FA67447-18	Date Sampled: 08/22/19
Matrix: SO - Soil	Date Received: 08/24/19
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	2Q35435.D	1	09/05/19 17:49	NAF	08/28/19 12:00	OP76577	S2Q555
Run #2							

Run #	Initial Weight	Final Volume
Run #1	2.05 g	1.0 ml
Run #2		

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	0.54	ug/kg	
2991-50-6	EtFOSAA	ND	2.7	0.54	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-P2-OS164_6-7	
Lab Sample ID: FA67447-18	Date Sampled: 08/22/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 89.9
Project: Racer Lansing PFAS Delineation; Lansing, MI	

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	82%		50-150%
	13C5-PFHxA	83%		50-150%
	13C4-PFHpA	83%		50-150%
	13C8-PFOA	86%		50-150%
	13C9-PFNA	86%		50-150%
	13C6-PFDA	84%		50-150%
	13C7-PFUnDA	80%		50-150%
	13C2-PFDoDA	83%		50-150%
	13C2-PFTeDA	87%		50-150%
	13C3-PFBS	79%		50-150%
	13C3-PFHxS	80%		50-150%
	13C8-PFOS	82%		50-150%
	13C8-FOSA	71%		50-150%
	d3-MeFOSAA	77%		50-150%
	13C2-4:2FTS	74%		50-150%
	13C2-6:2FTS	77%		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-P2-OB177_5-10	Date Sampled:	08/22/19
Lab Sample ID:	FA67447-19	Date Received:	08/24/19
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	Q63540.D	10	09/11/19 10:54	MRE	09/07/19 08:00	OP76717	SQ1430
Run #2	Q63541.D	25	09/11/19 11:09	MRE	09/07/19 08:00	OP76717	SQ1430

Run #	Initial Volume	Final Volume
Run #1	270 ml	1.0 ml
Run #2	270 ml	1.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
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PERFLUOROALKYL CARBOXYLIC ACIDS

375-22-4	Perfluorobutanoic acid	ND ^a	0.19	0.046	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0280	0.037	0.014	ug/l	J
307-24-4	Perfluorohexanoic acid	0.0657	0.037	0.0093	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0457	0.037	0.0093	ug/l	
335-67-1	Perfluorooctanoic acid	0.155	0.037	0.0093	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.037	0.0093	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.037	0.0093	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.037	0.0093	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.037	0.014	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.037	0.0093	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.037	0.0093	ug/l	

PERFLUOROALKYL SULFONATES

375-73-5	Perfluorobutanesulfonic acid	0.0641	0.037	0.0093	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	0.106	0.037	0.0093	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.820	0.037	0.0093	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.124	0.037	0.0093	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	5.58 ^a	0.093	0.035	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.037	0.0093	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.037	0.0093	ug/l	

PERFLUORO OCTANESULFONAMIDES

754-91-6	PFOSA	ND	0.037	0.0093	ug/l	
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PERFLUORO OCTANESULFONAMIDOACETIC ACIDS

2355-31-9	MeFOSAA	ND	0.19	0.037	ug/l	
2991-50-6	EtFOSAA	ND	0.19	0.037	ug/l	

FLUOROTELOMER SULFONATES

757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.074	0.019	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	0.0297	0.074	0.019	ug/l	J

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-P2-OB177_5-10		Date Sampled: 08/22/19
Lab Sample ID: FA67447-19		Date Received: 08/24/19
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.074	0.019	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	9%	86%	30-140%
	13C5-PFPeA	55%	88%	40-140%
	13C5-PFHxA	97%	90%	50-150%
	13C4-PFHpA	113%	91%	50-150%
	13C8-PFOA	118%	97%	50-150%
	13C9-PFNA	113%	93%	50-150%
	13C6-PFDA	102%	94%	50-150%
	13C7-PFUnDA	68%	92%	50-150%
	13C2-PFDoDA	51%	83%	50-150%
	13C2-PFTeDA	49%	71%	40-150%
	13C3-PFBS	102%	90%	50-150%
	13C3-PFHxS	114%	92%	50-150%
	13C8-PFOS	97%	92%	50-150%
	13C8-FOSA	116%	109%	30-140%
	d3-MeFOSAA	81%	87%	50-150%
	13C2-4:2FTS	98%	84%	50-150%
	13C2-6:2FTS	118%	90%	50-150%
	13C2-8:2FTS	91%	86%	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: SB-P2-OP177_1-6	
Lab Sample ID: FA67447-20	Date Sampled: 08/22/19
Matrix: AQ - Ground Water	Date Received: 08/24/19
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	Q63545.D	10	09/11/19 12:15	MRE	09/07/19 08:00	OP76717	SQ1430
Run #2							

Run #	Initial Volume	Final Volume
Run #1	270 ml	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
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PERFLUOROALKYL CARBOXYLIC ACIDS

375-22-4	Perfluorobutanoic acid	0.0195	0.074	0.019	ug/l	J
2706-90-3	Perfluoropentanoic acid	0.0290	0.037	0.014	ug/l	J
307-24-4	Perfluorohexanoic acid	0.0159	0.037	0.0093	ug/l	J
375-85-9	Perfluoroheptanoic acid	0.0129	0.037	0.0093	ug/l	J
335-67-1	Perfluorooctanoic acid	0.0198	0.037	0.0093	ug/l	J
375-95-1	Perfluorononanoic acid	ND	0.037	0.0093	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.037	0.0093	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.037	0.0093	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.037	0.014	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.037	0.0093	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.037	0.0093	ug/l	

PERFLUOROALKYL SULFONATES

375-73-5	Perfluorobutanesulfonic acid	ND	0.037	0.0093	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.037	0.0093	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.0182	0.037	0.0093	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.037	0.0093	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.126	0.037	0.014	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.037	0.0093	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.037	0.0093	ug/l	

PERFLUORO OCTANESULFONAMIDES

754-91-6	PFOSA	ND	0.037	0.0093	ug/l	
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PERFLUORO OCTANESULFONAMIDOACETIC ACIDS

2355-31-9	MeFOSAA	ND	0.19	0.037	ug/l	
2991-50-6	EtFOSAA	ND	0.19	0.037	ug/l	

FLUOROTELOMER SULFONATES

757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.074	0.019	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.074	0.019	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-P2-OP177_1-6	
Lab Sample ID: FA67447-20	Date Sampled: 08/22/19
Matrix: AQ - Ground Water	Date Received: 08/24/19
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.074	0.019	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	68%		30-140%
	13C5-PFPeA	86%		40-140%
	13C5-PFHxA	84%		50-150%
	13C4-PFHpA	87%		50-150%
	13C8-PFOA	95%		50-150%
	13C9-PFNA	99%		50-150%
	13C6-PFDA	89%		50-150%
	13C7-PFUnDA	82%		50-150%
	13C2-PFDoDA	69%		50-150%
	13C2-PFTeDA	40%		40-150%
	13C3-PFBS	95%		50-150%
	13C3-PFHxS	85%		50-150%
	13C8-PFOS	86%		50-150%
	13C8-FOSA	68%		30-140%
	d3-MeFOSAA	90%		50-150%
	13C2-4:2FTS	86%		50-150%
	13C2-6:2FTS	100%		50-150%
	13C2-8:2FTS	97%		50-150%

(a) Dilution required due to matrix interference.

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-P2-PF177_4-9	
Lab Sample ID: FA67447-21	Date Sampled: 08/22/19
Matrix: AQ - Ground Water	Date Received: 08/24/19
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	Q63546.D	2	09/11/19 12:30	MRE	09/07/19 08:00	OP76717	SQ1430
Run #2							

Run #	Initial Volume	Final Volume
Run #1	260 ml	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0140	0.015	0.0038	ug/l	J
2706-90-3	Perfluoropentanoic acid	0.0162	0.0077	0.0029	ug/l	
307-24-4	Perfluorohexanoic acid	0.0140	0.0077	0.0019	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0208	0.0077	0.0019	ug/l	
335-67-1	Perfluorooctanoic acid	0.0421	0.0077	0.0019	ug/l	
375-95-1	Perfluorononanoic acid	0.0117	0.0077	0.0019	ug/l	
335-76-2	Perfluorodecanoic acid	0.00454	0.0077	0.0019	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.0077	0.0019	ug/l	
307-55-1	Perfluorododecanoic acid ^b	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	0.00215	0.0077	0.0019	ug/l	J
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	0.0117	0.0077	0.0029	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	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	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-P2-PF177_4-9	Date Sampled:	08/22/19
Lab Sample ID:	FA67447-21	Date Received:	08/24/19
Matrix:	AQ - Ground Water	Percent Solids:	n/a
Method:	EPA 537M BY ID EPA 537 MOD		
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

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	102%		30-140%
	13C5-PFPeA	105%		40-140%
	13C5-PFHxA	106%		50-150%
	13C4-PFHpA	108%		50-150%
	13C8-PFOA	117%		50-150%
	13C9-PFNA	109%		50-150%
	13C6-PFDA	77%		50-150%
	13C7-PFUnDA	58%		50-150%
	13C2-PFDoDA	47% ^c		50-150%
	13C2-PFTeDA	43%		40-150%
	13C3-PFBS	104%		50-150%
	13C3-PFHxS	99%		50-150%
	13C8-PFOS	72%		50-150%
	13C8-FOSA	53%		30-140%
	d3-MeFOSAA	57%		50-150%
	13C2-4:2FTS	105%		50-150%
	13C2-6:2FTS	115%		50-150%
	13C2-8:2FTS	73%		50-150%

- (a) Dilution required due to matrix interference.
- (b) Associated ID Standard outside control limits due to matrix interference.
- (c) Outside control limits due to matrix interference.

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-P2-PF177_27-32	
Lab Sample ID: FA67447-22	Date Sampled: 08/22/19
Matrix: AQ - Ground Water	Date Received: 08/24/19
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	Q63547.D	2	09/11/19 12:45	MRE	09/07/19 08:00	OP76717	SQ1430
Run #2							

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

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC 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 ^b	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	
PERFLUOROALKYL SULFONATES						
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	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-P2-PF177_27-32	Date Sampled:	08/22/19
Lab Sample ID:	FA67447-22	Date Received:	08/24/19
Matrix:	AQ - Ground Water	Percent Solids:	n/a
Method:	EPA 537M BY ID EPA 537 MOD		
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

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	65%		30-140%
	13C5-PFPeA	78%		40-140%
	13C5-PFHxA	85%		50-150%
	13C4-PFHpA	96%		50-150%
	13C8-PFOA	116%		50-150%
	13C9-PFNA	108%		50-150%
	13C6-PFDA	71%		50-150%
	13C7-PFUnDA	53%		50-150%
	13C2-PFDoDA	43% ^c		50-150%
	13C2-PFTeDA	42%		40-150%
	13C3-PFBS	79%		50-150%
	13C3-PFHxS	91%		50-150%
	13C8-PFOS	67%		50-150%
	13C8-FOSA	83%		30-140%
	d3-MeFOSAA	54%		50-150%
	13C2-4:2FTS	87%		50-150%
	13C2-6:2FTS	109%		50-150%
	13C2-8:2FTS	68%		50-150%

- (a) Dilution required due to matrix interference.
- (b) Associated ID Standard outside control limits due to matrix interference.
- (c) Outside control limits due to matrix interference.

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-P2-OL164_20-25	
Lab Sample ID: FA67447-23	Date Sampled: 08/22/19
Matrix: AQ - Ground Water	Date Received: 08/24/19
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	Q63548.D	2	09/11/19 13:01	MRE	09/07/19 08:00	OP76717	SQ1430
Run #2							

Run #	Initial Volume	Final Volume
Run #1	260 ml	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0338	0.015	0.0038	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0575	0.0077	0.0029	ug/l	
307-24-4	Perfluorohexanoic acid	0.0693	0.0077	0.0019	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0315	0.0077	0.0019	ug/l	
335-67-1	Perfluorooctanoic acid	0.0387	0.0077	0.0019	ug/l	
375-95-1	Perfluorononanoic acid	0.00535	0.0077	0.0019	ug/l	J
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 ^b	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	0.0383	0.0077	0.0019	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	0.0127	0.0077	0.0019	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.0340	0.0077	0.0019	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0077	0.0019	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0235	0.0077	0.0029	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	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	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-P2-OL164_20-25	
Lab Sample ID: FA67447-23	Date Sampled: 08/22/19
Matrix: AQ - Ground Water	Date Received: 08/24/19
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

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	60%		30-140%
	13C5-PFPeA	68%		40-140%
	13C5-PFHxA	64%		50-150%
	13C4-PFHpA	72%		50-150%
	13C8-PFOA	85%		50-150%
	13C9-PFNA	90%		50-150%
	13C6-PFDA	70%		50-150%
	13C7-PFUnDA	59%		50-150%
	13C2-PFDoDA	47% ^c		50-150%
	13C2-PFTeDA	48%		40-150%
	13C3-PFBS	70%		50-150%
	13C3-PFHxS	70%		50-150%
	13C8-PFOS	59%		50-150%
	13C8-FOSA	41%		30-140%
	d3-MeFOSAA	57%		50-150%
	13C2-4:2FTS	78%		50-150%
	13C2-6:2FTS	97%		50-150%
	13C2-8:2FTS	75%		50-150%

- (a) Dilution required due to matrix interference.
- (b) Associated ID Standard outside control limits due to matrix interference.
- (c) Outside control limits due to matrix interference.

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: DUP-02_GW		
Lab Sample ID: FA67447-24		Date Sampled: 08/22/19
Matrix: AQ - Ground Water		Date Received: 08/24/19
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	Q63549.D	10	09/11/19 13:16	MRE	09/07/19 08:00	OP76717	SQ1430
Run #2	Q63550.D	25	09/11/19 13:48	MRE	09/07/19 08:00	OP76717	SQ1430

Run #	Initial Volume	Final Volume
Run #1	270 ml	1.0 ml
Run #2	270 ml	1.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND ^a	0.19	0.046	ug/l	
2706-90-3	Perfluoropentanoic acid	ND ^a	0.093	0.035	ug/l	
307-24-4	Perfluorohexanoic acid	0.0675	0.037	0.0093	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0420	0.037	0.0093	ug/l	
335-67-1	Perfluorooctanoic acid	0.137	0.037	0.0093	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.037	0.0093	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.037	0.0093	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.037	0.0093	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.037	0.014	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.037	0.0093	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.037	0.0093	ug/l	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.0592	0.037	0.0093	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	0.0923	0.037	0.0093	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.707	0.037	0.0093	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.102	0.037	0.0093	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	4.07 ^a	0.093	0.035	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.037	0.0093	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.037	0.0093	ug/l	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.037	0.0093	ug/l	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.19	0.037	ug/l	
2991-50-6	EtFOSAA	ND	0.19	0.037	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.074	0.019	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	0.0251	0.074	0.019	ug/l	J

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_GW		
Lab Sample ID: FA67447-24		Date Sampled: 08/22/19
Matrix: AQ - Ground Water		Date Received: 08/24/19
Method: EPA 537M BY ID EPA 537 MOD		Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI		

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.074	0.019	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	3% ^b	97%	30-140%
	13C5-PFPeA	38% ^b	99%	40-140%
	13C5-PFHxA	97%	102%	50-150%
	13C4-PFHpA	116%	101%	50-150%
	13C8-PFOA	126%	107%	50-150%
	13C9-PFNA	116%	103%	50-150%
	13C6-PFDA	100%	109%	50-150%
	13C7-PFUnDA	67%	108%	50-150%
	13C2-PFDoDA	53%	94%	50-150%
	13C2-PFTeDA	50%	83%	40-150%
	13C3-PFBS	101%	99%	50-150%
	13C3-PFHxS	113%	99%	50-150%
	13C8-PFOS	92%	101%	50-150%
	13C8-FOSA	104%	115%	30-140%
	d3-MeFOSAA	75%	103%	50-150%
	13C2-4:2FTS	102%	94%	50-150%
	13C2-6:2FTS	123%	98%	50-150%
	13C2-8:2FTS	94%	97%	50-150%

- (a) Result is from Run# 2
- (b) 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-P2-PF164_1-2	
Lab Sample ID: FA67447-25	Date Sampled: 08/23/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 91.9
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q35436.D	1	09/05/19 18:05	NAF	08/28/19 12:00	OP76577	S2Q555
Run #2							

Run #	Initial Weight	Final Volume
Run #1	1.96 g	1.0 ml
Run #2		

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: SB-P2-PF164_1-2	
Lab Sample ID: FA67447-25	Date Sampled: 08/23/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 91.9
Project: Racer Lansing PFAS Delineation; Lansing, MI	

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	78%		50-150%
	13C5-PFPeA	81%		50-150%
	13C5-PFHxA	82%		50-150%
	13C4-PFHpA	81%		50-150%
	13C8-PFOA	84%		50-150%
	13C9-PFNA	82%		50-150%
	13C6-PFDA	57%		50-150%
	13C7-PFUnDA	60%		50-150%
	13C2-PFDoDA	81%		50-150%
	13C2-PFTeDA	93%		50-150%
	13C3-PFBS	78%		50-150%
	13C3-PFHxS	77%		50-150%
	13C8-PFOS	75%		50-150%
	13C8-FOSA	72%		50-150%
	d3-MeFOSAA	70%		50-150%
	13C2-4:2FTS	71%		50-150%
	13C2-6:2FTS	91%		50-150%
	13C2-8:2FTS	64%		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-P2-PF164_3-4	
Lab Sample ID: FA67447-26	Date Sampled: 08/23/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 85.1
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q35437.D	1	09/05/19 18:21	NAF	08/28/19 12:00	OP76577	S2Q555
Run #2							

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

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-P2-PF164_3-4	Date Sampled:	08/23/19
Lab Sample ID:	FA67447-26	Date Received:	08/24/19
Matrix:	SO - Soil	Percent Solids:	85.1
Method:	EPA 537M BY ID IN HOUSE		
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

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	87%		50-150%
	13C5-PFPeA	90%		50-150%
	13C5-PFHxA	90%		50-150%
	13C4-PFHpA	89%		50-150%
	13C8-PFOA	93%		50-150%
	13C9-PFNA	93%		50-150%
	13C6-PFDA	88%		50-150%
	13C7-PFUnDA	85%		50-150%
	13C2-PFDoDA	87%		50-150%
	13C2-PFTeDA	91%		50-150%
	13C3-PFBS	85%		50-150%
	13C3-PFHxS	86%		50-150%
	13C8-PFOS	86%		50-150%
	13C8-FOSA	84%		50-150%
	d3-MeFOSAA	104%		50-150%
	13C2-4:2FTS	81%		50-150%
	13C2-6:2FTS	85%		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-P2-PF164_4-9	Date Sampled:	08/23/19
Lab Sample ID:	FA67447-27	Date Received:	08/24/19
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	Q63551.D	2	09/11/19 14:03	MRE	09/07/19 08:00	OP76717	SQ1430
Run #2							

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

CAS No.	Compound	Result	RL	MDL	Units	Q
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PERFLUOROALKYL CARBOXYLIC ACIDS

375-22-4	Perfluorobutanoic acid	0.0184	0.016	0.0040	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0135	0.0080	0.0030	ug/l	
307-24-4	Perfluorohexanoic acid	0.00918	0.0080	0.0020	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0106	0.0080	0.0020	ug/l	
335-67-1	Perfluorooctanoic acid	0.0449	0.0080	0.0020	ug/l	
375-95-1	Perfluorononanoic acid	0.00807	0.0080	0.0020	ug/l	
335-76-2	Perfluorodecanoic acid	0.0134	0.0080	0.0020	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0080	0.0020	ug/l	
307-55-1	Perfluorododecanoic acid ^b	ND	0.0080	0.0030	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0080	0.0020	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0080	0.0020	ug/l	

PERFLUOROALKYL SULFONATES

375-73-5	Perfluorobutanesulfonic acid	ND	0.0080	0.0020	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0080	0.0020	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0080	0.0020	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0080	0.0020	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0267	0.0080	0.0030	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0080	0.0020	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0080	0.0020	ug/l	

PERFLUORO OCTANESULFONAMIDES

754-91-6	PFOSA	0.00242	0.0080	0.0020	ug/l	J
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PERFLUORO OCTANESULFONAMIDOACETIC ACIDS

2355-31-9	MeFOSAA	ND	0.040	0.0080	ug/l	
2991-50-6	EtFOSAA	ND	0.040	0.0080	ug/l	

FLUOROTELOMER SULFONATES

757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.016	0.0040	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.016	0.0040	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-P2-PF164_4-9	Date Sampled:	08/23/19
Lab Sample ID:	FA67447-27	Date Received:	08/24/19
Matrix:	AQ - Ground Water	Percent Solids:	n/a
Method:	EPA 537M BY ID EPA 537 MOD		
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.016	0.0040	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	85%		30-140%
	13C5-PFPeA	95%		40-140%
	13C5-PFHxA	94%		50-150%
	13C4-PFHpA	98%		50-150%
	13C8-PFOA	106%		50-150%
	13C9-PFNA	111%		50-150%
	13C6-PFDA	101%		50-150%
	13C7-PFUnDA	83%		50-150%
	13C2-PFDoDA	62%		50-150%
	13C2-PFTeDA	33% ^c		40-150%
	13C3-PFBS	92%		50-150%
	13C3-PFHxS	92%		50-150%
	13C8-PFOS	89%		50-150%
	13C8-FOSA	106%		30-140%
	d3-MeFOSAA	83%		50-150%
	13C2-4:2FTS	94%		50-150%
	13C2-6:2FTS	107%		50-150%
	13C2-8:2FTS	97%		50-150%

- (a) Dilution required due to matrix interference.
- (b) Associated ID Standard outside control limits due to matrix interference.
- (c) Outside control limits due to matrix interference.

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:

- Certification Exceptions
- Chain of Custody

Parameter Certification Exceptions

Job Number: FA67447
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

The following parameters included in this report are exceptions to NELAC certification.
The certification status of each is indicated below.

Parameter	CAS#	Method	Mat	Certification Status
4:2 Fluorotelomer sulfonate	757124-72-4	EPA 537M BY ID	SO	Certified by SOP MS014
4:2 Fluorotelomer sulfonate	757124-72-4	EPA 537M BY ID	AQ	Certified by SOP MS014
6:2 Fluorotelomer sulfonate	27619-97-2	EPA 537M BY ID	SO	Certified by SOP MS014
6:2 Fluorotelomer sulfonate	27619-97-2	EPA 537M BY ID	AQ	Certified by SOP MS014
8:2 Fluorotelomer sulfonate	39108-34-4	EPA 537M BY ID	SO	Certified by SOP MS014
8:2 Fluorotelomer sulfonate	39108-34-4	EPA 537M BY ID	AQ	Certified by SOP MS014
EtFOSAA	2991-50-6	EPA 537M BY ID	AQ	Certified by SOP MS014
EtFOSAA	2991-50-6	EPA 537M BY ID	SO	Certified by SOP MS014
MeFOSAA	2355-31-9	EPA 537M BY ID	AQ	Certified by SOP MS014
MeFOSAA	2355-31-9	EPA 537M BY ID	SO	Certified by SOP MS014
PFOSA	754-91-6	EPA 537M BY ID	AQ	Certified by SOP MS014
PFOSA	754-91-6	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluorobutanesulfonic acid	375-73-5	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluorobutanesulfonic acid	375-73-5	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluorobutanoic acid	375-22-4	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluorobutanoic acid	375-22-4	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluorodecanesulfonic acid	335-77-3	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluorodecanesulfonic acid	335-77-3	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluorodecanoic acid	335-76-2	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluorodecanoic acid	335-76-2	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluorododecanoic acid	307-55-1	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluorododecanoic acid	307-55-1	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluoroheptanesulfonic acid	375-92-8	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluoroheptanesulfonic acid	375-92-8	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluoroheptanoic acid	375-85-9	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluoroheptanoic acid	375-85-9	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluorohexanesulfonic acid	355-46-4	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluorohexanesulfonic acid	355-46-4	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluorohexanoic acid	307-24-4	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluorohexanoic acid	307-24-4	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluorononanesulfonic acid	68259-12-1	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluorononanesulfonic acid	68259-12-1	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluorononanoic acid	375-95-1	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluorononanoic acid	375-95-1	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluorooctanesulfonic acid	1763-23-1	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluorooctanesulfonic acid	1763-23-1	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluorooctanoic acid	335-67-1	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluorooctanoic acid	335-67-1	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluoropentanesulfonic acid	2706-91-4	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluoropentanesulfonic acid	2706-91-4	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluoropentanoic acid	2706-90-3	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluoropentanoic acid	2706-90-3	EPA 537M BY ID	AQ	Certified by SOP MS014

4.1
4

Parameter Certification Exceptions

Job Number: FA67447
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

The following parameters included in this report are exceptions to NELAC certification.
The certification status of each is indicated below.

Parameter	CAS#	Method	Mat	Certification Status
Perfluorotetradecanoic acid	376-06-7	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluorotetradecanoic acid	376-06-7	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluorotridecanoic acid	72629-94-8	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluorotridecanoic acid	72629-94-8	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluoroundecanoic acid	2058-94-8	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluoroundecanoic acid	2058-94-8	EPA 537M BY ID	AQ	Certified by SOP MS014

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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

FA67447

SGS - ORLANDO JOB #: PAGE 3 OF 3

Client / Reporting Information		Project Information		Analytical Information										Matrix Codes		
Company Name: Arcadis		Project Name: PHS investigation borings/well installation		<p style="writing-mode: vertical-rl; transform: rotate(180deg);"> PHS INVESTIGATION BORINGS/WELL INSTALLATION 2801 W. SAGINAW LANSING MI 48201 300.6870-03100 </p>										DW - Drinking Water GW - Ground Water WW - Water SW - Surface Water SO - Soil SL - Sludge OI - Oil LIQ - Other Liquid AIR - Air SOL - Other Solid		
Address: 28550 Cabot Dr. Suite 500		Street: 2801 W. Saginaw														
City: Novi State: MI Zip: 48377		City: Lansing State: MI														
Project Contact: Alex Willhaver Email: alex.willhaver@arcadis.com		Project # 3006870-03100														
Phone #: 616-780-3277		Fax #														
Sampler(s) Name(s) (Printed) Sampler 1: E. Redner Sampler 2:		Client Purchase Order #														
SGS Orlando Sample #	Field ID / Point of Collection	COLLECTION				CONTAINER INFORMATION										LAB USE ONLY
		DATE	TIME	SAMPLED BY:	MATRIX	TOTAL # OF BOTTLES	OTHER	NON	PC	NRPH	PNRS	PNRSD	ADDITIONAL DI WATER	MECH		
1	SB-P2-0T192-29-34	8/21/19	0815	ER	GW	2	X								X	
2	SB-P2-0T185-05-1.5	8/21/19	1140	ER	SO	1	X								X	
3	SB-P2-0T185-3-4	8/21/19	1145	ER	SO	1	X								X	
4	SB-P2-0B177-2-3	8/21/19	1325	ER	SO	1	X								X	
5	SB-P2-0B177-7-8	8/21/19	1530	ER	SO	1	X								X	
6	SB-P2-0P177-1-2	8/21/19	1530	ER	SO	1	X								X	
7	SB-P2-0P177-7-8	8/21/19	1500	ER	SO	1	X								X	
8	QIP-02-SOIL	8/21/19		ER	SO	1	X								X	
9	EQVIP-BLANK-02	8/21/19	1540	ER	WW	2	X								X	
10	SB-P2-0T185-23-28	8/21/19	1610	ER	GW	2	X								X	
11	SB-P2-0B177-24-29	8/21/19	1650	ER	GW	2	X								X	
12	SB-P2-0P177-22-27	8/21/19	1725	ER	GW	2	X								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 type="checkbox"/> EDD'S												
Rush TIA 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				
1 Alex Willhaver / Arcadis		8/23/19 16:30		2 Redner		8/24/19		3 Redner		8/24/19		4 Alex Willhaver / Arcadis				
5		6		7		8										
Lab Use Only: Cooler Temperature (s) Celsius (corrected): 25														http://www.sgs.com/en/terms-and-conditions		

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

FA67447: Chain of Custody

Page 1 of 4





SGS North America Inc - Orlando
Chain of Custody

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FA67447
SGS - ORLANDO JOB # PAGE 2 OF 3

SGS - ORLANDO Quote # SKIFF #

Client / Reporting Information			Project Information			Analytical Information										Matrix Codes			
Company Name: Arcadis			Project Name: PFA's investigation boring/well installation			SAMPLES FOR ANALYSIS FOR USE										DW - Drinking Water			
Address: 28550 Cabot Dr, Suite 500			Street: 2801 W. Saginaw													GW - Ground Water			
City: Novi State: MI Zip: 48377			City: Lansing State: MI													WW - Water			
Project Contact: Alex Villhaver Email: alex.vilhaver@arcadis.com			Project # 30006870-03100													SW - Surface Water			
Phone #: 616-780-3277			Fax #			SO - Soil													
Sampler(s) Name(s) (Printed): Sampler 1: E. Redner Sampler 2:			Client Purchase Order #			SL - Sludge													
Turnaround Time (Business days)			Data Deliverable Information			Comments / Remarks													
<input checked="" type="checkbox"/> 40 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 type="checkbox"/> EDD'S													
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 Sample/Affiliation 1 Alex Villhaver Arcadis		Date Time: 8/23/19 16:30	Received By/Affiliation 2 E. Redner		Date Time: 8/23/19 16:30	Relinquished By/Affiliation 3 FX		Date Time: 8/23/19 16:30	Received By/Affiliation 4 [Signature]		Date Time: 8/23/19 16:30	Relinquished By/Affiliation 5		Date Time: 8/23/19 16:30	Received By/Affiliation 6	Date Time: 8/23/19 16:30	Relinquished By/Affiliation 7	Date Time: 8/23/19 16:30	Received By/Affiliation 8
Lab Use Only: Cooler Temperature (s) Celsius (corrected):																			

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



SGS Sample Receipt Summary

Job Number: FA67447

Client: ARCADIS

Project: PFAS INVESTIGATION BORINGS WELL INSTAL

Date / Time Received: 8/24/2019 10:00:00 AM

Delivery Method: FED EX

Airbill #'s: _____

Therm ID: IR 1; Therm CF: 1; # of Coolers: 1

Cooler Temps (Raw Measured) °C: Cooler 1: (1.5);

Cooler Temps (Corrected) °C: Cooler 1: (2.5);

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

Number of 5035 Field Kits: _____
 pH 10-12 219813A

Number of Lab Filtered Metals: _____
 Other: (Specify) _____

Comments

SM001
 Rev. Date 05/24/17

Technician: TRINITYM

Date: 8/24/2019 10:00:00 A

Reviewer: _____

Date: _____

FA67447: Chain of Custody

Page 4 of 4

4.2
4

MS Semi-volatiles

QC Data Summaries

Includes the following where applicable:

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

Instrument Blank

Job Number: FA67447
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
SQ1430-IBLK	Q63533.D	1	09/11/19	MRE	n/a	n/a	SQ1430

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67447-1, FA67447-11, FA67447-12, FA67447-19, FA67447-20, FA67447-21, FA67447-22, FA67447-23, FA67447-24, FA67447-27

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	0.00108	0.0040	0.0010	ug/l	J
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	EiFOSAA	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	91% 40-140%
	13C5-PFHxA	92% 50-150%
	13C4-PFHpA	93% 50-150%
	13C8-PFOA	98% 50-150%
	13C9-PFNA	99% 50-150%
	13C6-PFDA	99% 50-150%
	13C7-PFUnDA	99% 50-150%

5.1.1
5

Instrument Blank

Job Number: FA67447
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
SQ1430-IBLK	Q63533.D	1	09/11/19	MRE	n/a	n/a	SQ1430

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67447-1, FA67447-11, FA67447-12, FA67447-19, FA67447-20, FA67447-21, FA67447-22, FA67447-23, FA67447-24, FA67447-27

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	87% 50-150%
	13C2-PFTeDA	72% 40-150%
	13C3-PFBS	90% 50-150%
	13C3-PFHxS	93% 50-150%
	13C8-PFOS	97% 50-150%
	13C8-FOSA	113% 30-140%
	d3-MeFOSAA	95% 50-150%
	13C2-4:2FTS	85% 50-150%
	13C2-6:2FTS	91% 50-150%
	13C2-8:2FTS	88% 50-150%

5.1.1
5

Method Blank Summary

Job Number: FA67447
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76545-MB	2Q34988.D	1	08/27/19	NAF	08/26/19	OP76545	S2Q549

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67447-2, FA67447-3, FA67447-4, FA67447-5, FA67447-6, FA67447-7, FA67447-8

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	EiFOSAA	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	82% 50-150%
	13C5-PFPeA	83% 50-150%
	13C5-PFHxA	84% 50-150%
	13C4-PFHpA	84% 50-150%
	13C8-PFOA	87% 50-150%
	13C9-PFNA	87% 50-150%
	13C6-PFDA	87% 50-150%
	13C7-PFUnDA	88% 50-150%

5.1.2
5

Method Blank Summary

Job Number: FA67447
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76545-MB	2Q34988.D	1	08/27/19	NAF	08/26/19	OP76545	S2Q549

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67447-2, FA67447-3, FA67447-4, FA67447-5, FA67447-6, FA67447-7, FA67447-8

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	88% 50-150%
	13C2-PFTeDA	86% 50-150%
	13C3-PFBS	81% 50-150%
	13C3-PFHxS	83% 50-150%
	13C8-PFOS	84% 50-150%
	13C8-FOSA	88% 50-150%
	d3-MeFOSAA	89% 50-150%
	13C2-4:2FTS	80% 50-150%
	13C2-6:2FTS	82% 50-150%
	13C2-8:2FTS	83% 50-150%
	13C3-HFPO-DA	83% 50-150%

5.1.2
5

Method Blank Summary

Job Number: FA67447
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76577-MB	2Q35429.D	1	09/05/19	NAF	08/28/19	OP76577	S2Q555

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67447-13, FA67447-14, FA67447-15, FA67447-16, FA67447-17, FA67447-18, FA67447-25, FA67447-26

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	EiFOSAA	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	83% 50-150%
	13C5-PFPeA	85% 50-150%
	13C5-PFHxA	85% 50-150%
	13C4-PFHpA	84% 50-150%
	13C8-PFOA	87% 50-150%
	13C9-PFNA	86% 50-150%
	13C6-PFDA	82% 50-150%
	13C7-PFUnDA	79% 50-150%

5.1.3
5

Method Blank Summary

Job Number: FA67447
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76577-MB	2Q35429.D	1	09/05/19	NAF	08/28/19	OP76577	S2Q555

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67447-13, FA67447-14, FA67447-15, FA67447-16, FA67447-17, FA67447-18, FA67447-25, FA67447-26

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	80% 50-150%
	13C2-PFTeDA	85% 50-150%
	13C3-PFBS	81% 50-150%
	13C3-PFHxS	81% 50-150%
	13C8-PFOS	82% 50-150%
	13C8-FOSA	82% 50-150%
	d3-MeFOSAA	83% 50-150%
	13C2-4:2FTS	76% 50-150%
	13C2-6:2FTS	79% 50-150%
	13C2-8:2FTS	75% 50-150%

Method Blank Summary

Job Number: FA67447
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76717-MB	Q63476.D	1	09/10/19	MRE	09/07/19	OP76717	SQ1429

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67447-1, FA67447-9, FA67447-10, FA67447-11, FA67447-12, FA67447-19, FA67447-20, FA67447-21, FA67447-22, FA67447-23, FA67447-24, FA67447-27

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	EiFOSAA	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	107% 40-140%
	13C5-PFHxA	108% 50-150%
	13C4-PFHpA	108% 50-150%
	13C8-PFOA	121% 50-150%
	13C9-PFNA	113% 50-150%
	13C6-PFDA	103% 50-150%
	13C7-PFUnDA	101% 50-150%

5.1.4
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Method Blank Summary

Job Number: FA67447
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76717-MB	Q63476.D	1	09/10/19	MRE	09/07/19	OP76717	SQ1429

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67447-1, FA67447-9, FA67447-10, FA67447-11, FA67447-12, FA67447-19, FA67447-20, FA67447-21, FA67447-22, FA67447-23, FA67447-24, FA67447-27

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	83% 50-150%
	13C2-PFTeDA	73% 40-150%
	13C3-PFBS	105% 50-150%
	13C3-PFHxS	100% 50-150%
	13C8-PFOS	96% 50-150%
	13C8-FOSA	106% 30-140%
	d3-MeFOSAA	91% 50-150%
	13C2-4:2FTS	102% 50-150%
	13C2-6:2FTS	108% 50-150%
	13C2-8:2FTS	94% 50-150%

Instrument Blank

Job Number: FA67447
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q549-IBLK	2Q34978.D	1	08/27/19	NAF	n/a	n/a	S2Q549

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA67447-2, FA67447-3, FA67447-4, FA67447-5, FA67447-6, FA67447-7, FA67447-8

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.0080	0.0020	ug/kg	
2706-90-3	Perfluoropentanoic acid	ND	0.0080	0.0016	ug/kg	
307-24-4	Perfluorohexanoic acid	ND	0.0080	0.0016	ug/kg	
375-85-9	Perfluoroheptanoic acid	ND	0.0080	0.0020	ug/kg	
335-67-1	Perfluorooctanoic acid	ND	0.0080	0.0020	ug/kg	
375-95-1	Perfluorononanoic acid	ND	0.0080	0.0020	ug/kg	
335-76-2	Perfluorodecanoic acid	ND	0.0080	0.0020	ug/kg	
2058-94-8	Perfluoroundecanoic acid	ND	0.0080	0.0020	ug/kg	
307-55-1	Perfluorododecanoic acid	ND	0.0080	0.0020	ug/kg	
72629-94-8	Perfluorotridecanoic acid	ND	0.0080	0.0020	ug/kg	
376-06-7	Perfluorotetradecanoic acid	ND	0.0080	0.0020	ug/kg	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0080	0.0020	ug/kg	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0080	0.0020	ug/kg	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0080	0.0020	ug/kg	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0080	0.0020	ug/kg	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0080	0.0020	ug/kg	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0080	0.0020	ug/kg	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0080	0.0020	ug/kg	
754-91-6	PFOSA	ND	0.0080	0.0020	ug/kg	
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/kg	
2991-50-6	EiFOSAA	ND	0.020	0.0040	ug/kg	
757124-72-44:2	Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/kg	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/kg	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/kg	

CAS No.	ID Standard Recoveries	Limits
	13C4-PFBA	102% 50-150%
	13C5-PFPeA	103% 50-150%
	13C5-PFHxA	103% 50-150%
	13C4-PFHpA	103% 50-150%
	13C8-PFOA	105% 50-150%
	13C9-PFNA	104% 50-150%
	13C6-PFDA	106% 50-150%
	13C7-PFUnDA	104% 50-150%

5.1.5
5

Instrument Blank

Job Number: FA67447
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q549-IBLK	2Q34978.D	1	08/27/19	NAF	n/a	n/a	S2Q549

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA67447-2, FA67447-3, FA67447-4, FA67447-5, FA67447-6, FA67447-7, FA67447-8

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	106% 50-150%
	13C2-PFTeDA	103% 50-150%
	13C3-PFBS	101% 50-150%
	13C3-PFHxS	101% 50-150%
	13C8-PFOS	102% 50-150%
	13C8-FOSA	108% 50-150%
	d3-MeFOSAA	107% 50-150%
	13C2-4:2FTS	97% 50-150%
	13C2-6:2FTS	99% 50-150%
	13C2-8:2FTS	98% 50-150%

5.1.5
5

Instrument Blank

Job Number: FA67447
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q555-IBLK	2Q35401.D	1	09/05/19	NAF	n/a	n/a	S2Q555

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA67447-13, FA67447-14, FA67447-15, FA67447-16, FA67447-17, FA67447-18, FA67447-25, FA67447-26

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	EiFOSAA	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	114% 50-150%
	13C5-PFPeA	114% 50-150%
	13C5-PFHxA	112% 50-150%
	13C4-PFHpA	112% 50-150%
	13C8-PFOA	113% 50-150%
	13C9-PFNA	111% 50-150%
	13C6-PFDA	110% 50-150%
	13C7-PFUnDA	113% 50-150%

5.1.6
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Instrument Blank

Job Number: FA67447
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q555-IBLK	2Q35401.D	1	09/05/19	NAF	n/a	n/a	S2Q555

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA67447-13, FA67447-14, FA67447-15, FA67447-16, FA67447-17, FA67447-18, FA67447-25, FA67447-26

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	109% 50-150%
	13C2-PFTeDA	109% 50-150%
	13C3-PFBS	113% 50-150%
	13C3-PFHxS	115% 50-150%
	13C8-PFOS	115% 50-150%
	13C8-FOSA	110% 50-150%
	d3-MeFOSAA	109% 50-150%
	13C2-4:2FTS	103% 50-150%
	13C2-6:2FTS	103% 50-150%
	13C2-8:2FTS	95% 50-150%

5.1.6
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Instrument Blank

Job Number: FA67447
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
SQ1429-IBLK	Q63469.D	1	09/10/19	MRE	n/a	n/a	SQ1429

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA67447-9, FA67447-10

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.016	0.0040	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0080	0.0030	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0080	0.0020	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0080	0.0020	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0080	0.0020	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0080	0.0020	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0080	0.0020	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0080	0.0020	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0080	0.0030	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0080	0.0020	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0080	0.0020	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0080	0.0020	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0080	0.0020	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0080	0.0020	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0080	0.0020	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0080	0.0030	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0080	0.0020	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0080	0.0020	ug/l	
754-91-6	PFOSA	ND	0.0080	0.0020	ug/l	
2355-31-9	MeFOSAA	ND	0.040	0.0080	ug/l	
2991-50-6	EiFOSAA	ND	0.040	0.0080	ug/l	
757124-72-44:2	Fluorotelomer sulfonate	ND	0.016	0.0040	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.016	0.0040	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.016	0.0040	ug/l	

CAS No.	ID Standard Recoveries	Limits	
	13C4-PFBA	91%	50-150%
	13C5-PFPeA	92%	50-150%
	13C5-PFHxA	92%	50-150%
	13C4-PFHpA	93%	50-150%
	13C8-PFOA	94%	50-150%
	13C9-PFNA	94%	50-150%
	13C6-PFDA	97%	50-150%
	13C7-PFUnDA	96%	50-150%

5.1.7
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Instrument Blank

Job Number: FA67447
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
SQ1429-IBLK	Q63469.D	1	09/10/19	MRE	n/a	n/a	SQ1429

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA67447-9, FA67447-10

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	85% 50-150%
	13C2-PFTeDA	77% 50-150%
	13C3-PFBS	89% 50-150%
	13C3-PFHxS	92% 50-150%
	13C8-PFOS	95% 50-150%
	13C8-FOSA	99% 50-150%
	d3-MeFOSAA	95% 50-150%
	13C2-4:2FTS	85% 50-150%
	13C2-6:2FTS	89% 50-150%
	13C2-8:2FTS	85% 50-150%

5.1.7
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Blank Spike Summary

Job Number: FA67447
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76545-BS	2Q34987.D	1	08/27/19	NAF	08/26/19	OP76545	S2Q549

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67447-2, FA67447-3, FA67447-4, FA67447-5, FA67447-6, FA67447-7, FA67447-8

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
375-22-4	Perfluorobutanoic acid	10	11.2	112	60-134
2706-90-3	Perfluoropentanoic acid	10	10.4	104	62-134
307-24-4	Perfluorohexanoic acid	10	10.7	107	63-130
375-85-9	Perfluoroheptanoic acid	10	10.5	105	63-122
335-67-1	Perfluorooctanoic acid	10	10.7	107	71-128
375-95-1	Perfluorononanoic acid	10	10.6	106	66-124
335-76-2	Perfluorodecanoic acid	10	10.7	107	68-127
2058-94-8	Perfluoroundecanoic acid	10	10.6	106	61-137
307-55-1	Perfluorododecanoic acid	10	10.6	106	71-126
72629-94-8	Perfluorotridecanoic acid	10	10.2	102	60-137
376-06-7	Perfluorotetradecanoic acid	10	10.7	107	61-131
375-73-5	Perfluorobutanesulfonic acid	10	10.8	108	70-135
2706-91-4	Perfluoropentanesulfonic acid	10	10.7	107	70-130
355-46-4	Perfluorohexanesulfonic acid	10	10.4	104	72-129
375-92-8	Perfluoroheptanesulfonic acid	10	10.9	109	62-129
1763-23-1	Perfluorooctanesulfonic acid	10	11.1	111	69-125
68259-12-1	Perfluorononanesulfonic acid	10	11.1	111	70-130
335-77-3	Perfluorodecanesulfonic acid	10	10.6	106	63-141
754-91-6	PFOSA	10	10.4	104	65-140
2355-31-9	MeFOSAA	10	10.7	107	71-124
2991-50-6	EiFOSAA	10	10.6	106	63-129
757124-72-44:2	Fluorotelomer sulfonate	10	11.1	111	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	10	10.8	108	76-131
39108-34-4	8:2 Fluorotelomer sulfonate	10	10.8	108	60-138

CAS No.	ID Standard Recoveries	BSP	Limits
	13C4-PFBA	88%	50-150%
	13C5-PFPeA	90%	50-150%
	13C5-PFHxA	90%	50-150%
	13C4-PFHpA	89%	50-150%
	13C8-PFOA	91%	50-150%
	13C9-PFNA	91%	50-150%
	13C6-PFDA	90%	50-150%
	13C7-PFUnDA	92%	50-150%

* = Outside of Control Limits.

5.2.1
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Blank Spike Summary

Job Number: FA67447
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76545-BS	2Q34987.D	1	08/27/19	NAF	08/26/19	OP76545	S2Q549

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67447-2, FA67447-3, FA67447-4, FA67447-5, FA67447-6, FA67447-7, FA67447-8

CAS No.	ID Standard Recoveries	BSP	Limits
	13C2-PFDoDA	94%	50-150%
	13C2-PFTeDA	91%	50-150%
	13C3-PFBS	87%	50-150%
	13C3-PFHxS	88%	50-150%
	13C8-PFOS	88%	50-150%
	13C8-FOSA	90%	50-150%
	d3-MeFOSAA	92%	50-150%
	13C2-4:2FTS	90%	50-150%
	13C2-6:2FTS	91%	50-150%
	13C2-8:2FTS	91%	50-150%
	13C3-HFPO-DA	85%	50-150%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA67447
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76577-BS	2Q35428.D	1	09/05/19	NAF	08/28/19	OP76577	S2Q555

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67447-13, FA67447-14, FA67447-15, FA67447-16, FA67447-17, FA67447-18, FA67447-25, FA67447-26

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
375-22-4	Perfluorobutanoic acid	10	10.2	102	60-134
2706-90-3	Perfluoropentanoic acid	10	9.21	92	62-134
307-24-4	Perfluorohexanoic acid	10	9.94	99	63-130
375-85-9	Perfluoroheptanoic acid	10	9.48	95	63-122
335-67-1	Perfluorooctanoic acid	10	9.69	97	71-128
375-95-1	Perfluorononanoic acid	10	9.53	95	66-124
335-76-2	Perfluorodecanoic acid	10	10.2	102	68-127
2058-94-8	Perfluoroundecanoic acid	10	9.92	99	61-137
307-55-1	Perfluorododecanoic acid	10	9.91	99	71-126
72629-94-8	Perfluorotridecanoic acid	10	9.01	90	60-137
376-06-7	Perfluorotetradecanoic acid	10	9.73	97	61-131
375-73-5	Perfluorobutanesulfonic acid	10	9.76	98	70-135
2706-91-4	Perfluoropentanesulfonic acid	10	10.0	100	70-130
355-46-4	Perfluorohexanesulfonic acid	10	9.85	99	72-129
375-92-8	Perfluoroheptanesulfonic acid	10	10.4	104	62-129
1763-23-1	Perfluorooctanesulfonic acid	10	9.41	94	69-125
68259-12-1	Perfluorononanesulfonic acid	10	9.97	100	70-130
335-77-3	Perfluorodecanesulfonic acid	10	9.83	98	63-141
754-91-6	PFOSA	10	9.90	99	65-140
2355-31-9	MeFOSAA	10	9.91	99	71-124
2991-50-6	EiFOSAA	10	10.2	102	63-129
757124-72-44:2	Fluorotelomer sulfonate	10	9.81	98	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	10	9.55	96	76-131
39108-34-4	8:2 Fluorotelomer sulfonate	10	9.59	96	60-138

CAS No.	ID Standard Recoveries	BSP	Limits
	13C4-PFBA	90%	50-150%
	13C5-PFPeA	92%	50-150%
	13C5-PFHxA	91%	50-150%
	13C4-PFHpA	90%	50-150%
	13C8-PFOA	92%	50-150%
	13C9-PFNA	91%	50-150%
	13C6-PFDA	87%	50-150%
	13C7-PFUnDA	84%	50-150%

* = Outside of Control Limits.

5.2.2
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Blank Spike Summary

Job Number: FA67447
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76577-BS	2Q35428.D	1	09/05/19	NAF	08/28/19	OP76577	S2Q555

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67447-13, FA67447-14, FA67447-15, FA67447-16, FA67447-17, FA67447-18, FA67447-25, FA67447-26

CAS No.	ID Standard Recoveries	BSP	Limits
	13C2-PFDoDA	86%	50-150%
	13C2-PFTeDA	92%	50-150%
	13C3-PFBS	86%	50-150%
	13C3-PFHxS	86%	50-150%
	13C8-PFOS	88%	50-150%
	13C8-FOSA	83%	50-150%
	d3-MeFOSAA	89%	50-150%
	13C2-4:2FTS	88%	50-150%
	13C2-6:2FTS	88%	50-150%
	13C2-8:2FTS	85%	50-150%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA67447
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76717-BS	Q63475.D	1	09/10/19	MRE	09/07/19	OP76717	SQ1429

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67447-1, FA67447-9, FA67447-10, FA67447-11, FA67447-12, FA67447-19, FA67447-20, FA67447-21, FA67447-22, FA67447-23, FA67447-24, FA67447-27

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
375-22-4	Perfluorobutanoic acid	0.08	0.0809	101	70-130
2706-90-3	Perfluoropentanoic acid	0.08	0.0778	97	70-130
307-24-4	Perfluorohexanoic acid	0.08	0.0767	96	70-130
375-85-9	Perfluoroheptanoic acid	0.08	0.0777	97	71-130
335-67-1	Perfluorooctanoic acid	0.08	0.0769	96	74-130
375-95-1	Perfluorononanoic acid	0.08	0.0788	99	76-130
335-76-2	Perfluorodecanoic acid	0.08	0.0784	98	70-130
2058-94-8	Perfluoroundecanoic acid	0.08	0.0784	98	70-130
307-55-1	Perfluorododecanoic acid	0.08	0.0801	100	70-130
72629-94-8	Perfluorotridecanoic acid	0.08	0.0794	99	70-139
376-06-7	Perfluorotetradecanoic acid	0.08	0.0762	95	70-130
375-73-5	Perfluorobutanesulfonic acid	0.08	0.0802	100	73-130
2706-91-4	Perfluoropentanesulfonic acid	0.08	0.0830	104	70-130
355-46-4	Perfluorohexanesulfonic acid	0.08	0.0797	100	74-130
375-92-8	Perfluoroheptanesulfonic acid	0.08	0.0784	98	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.08	0.0753	94	70-130
68259-12-1	Perfluorononanesulfonic acid	0.08	0.0802	100	70-130
335-77-3	Perfluorodecanesulfonic acid	0.08	0.0779	97	70-130
754-91-6	PFOSA	0.08	0.0779	97	70-131
2355-31-9	MeFOSAA	0.08	0.0801	100	70-130
2991-50-6	EiFOSAA	0.08	0.0760	95	70-130
757124-72-44:2	Fluorotelomer sulfonate	0.08	0.0809	101	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	0.08	0.0787	98	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	0.08	0.0805	101	70-130

CAS No.	ID Standard Recoveries	BSP	Limits
	13C4-PFBA	104%	30-140%
	13C5-PFPeA	108%	40-140%
	13C5-PFHxA	108%	50-150%
	13C4-PFHpA	109%	50-150%
	13C8-PFOA	121%	50-150%
	13C9-PFNA	112%	50-150%
	13C6-PFDA	105%	50-150%
	13C7-PFUnDA	104%	50-150%

* = Outside of Control Limits.

5.2.3
5

Blank Spike Summary

Job Number: FA67447
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76717-BS	Q63475.D	1	09/10/19	MRE	09/07/19	OP76717	SQ1429

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67447-1, FA67447-9, FA67447-10, FA67447-11, FA67447-12, FA67447-19, FA67447-20, FA67447-21, FA67447-22, FA67447-23, FA67447-24, FA67447-27

CAS No.	ID Standard Recoveries	BSP	Limits
	13C2-PFDoDA	88%	50-150%
	13C2-PFTeDA	78%	40-150%
	13C3-PFBS	105%	50-150%
	13C3-PFHxS	103%	50-150%
	13C8-PFOS	95%	50-150%
	13C8-FOSA	98%	30-140%
	d3-MeFOSAA	94%	50-150%
	13C2-4:2FTS	107%	50-150%
	13C2-6:2FTS	114%	50-150%
	13C2-8:2FTS	101%	50-150%

* = Outside of Control Limits.

Matrix Spike Summary

Job Number: FA67447
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76717-MS	Q63537.D	2	09/11/19	MRE	09/07/19	OP76717	SQ1430
FA67447-1	Q63536.D	2	09/11/19	MRE	09/07/19	OP76717	SQ1430

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67447-1, FA67447-9, FA67447-10, FA67447-11, FA67447-12, FA67447-19, FA67447-20, FA67447-21, FA67447-22, FA67447-23, FA67447-24, FA67447-27

CAS No.	Compound	FA67447-1 ug/l	Spike Q	MS ug/l	MS %	Limits	
375-22-4	Perfluorobutanoic acid	0.0472		0.0741	0.124	104	70-130
2706-90-3	Perfluoropentanoic acid	0.0732		0.0741	0.163	121	70-130
307-24-4	Perfluorohexanoic acid	0.0981		0.0741	0.179	109	70-130
375-85-9	Perfluoroheptanoic acid	0.0255		0.0741	0.105	107	71-130
335-67-1	Perfluorooctanoic acid	0.0185		0.0741	0.0920	99	74-130
375-95-1	Perfluorononanoic acid	0.00212 J		0.0741	0.0757	99	76-130
335-76-2	Perfluorodecanoic acid	0.00231 J		0.0741	0.0766	100	70-130
2058-94-8	Perfluoroundecanoic acid	ND		0.0741	0.0738	100	70-130
307-55-1	Perfluorododecanoic acid	ND		0.0741	0.0736	99	70-130
72629-94-8	Perfluorotridecanoic acid	ND		0.0741	0.0722	97	70-139
376-06-7	Perfluorotetradecanoic acid	ND		0.0741	0.0713	96	70-130
375-73-5	Perfluorobutanesulfonic acid	0.0708		0.0741	0.160	120	73-130
2706-91-4	Perfluoropentanesulfonic acid	0.0333		0.0741	0.110	104	70-130
355-46-4	Perfluorohexanesulfonic acid	0.0624		0.0741	0.130	91	74-130
375-92-8	Perfluoroheptanesulfonic acid	ND		0.0741	0.0795	107	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.0383		0.0741	0.102	86	70-130
68259-12-1	Perfluorononanesulfonic acid	ND		0.0741	0.0751	101	70-130
335-77-3	Perfluorodecanesulfonic acid	ND		0.0741	0.0709	96	70-130
754-91-6	PFOSA	ND		0.0741	0.0711	96	70-131
2355-31-9	MeFOSAA	ND		0.0741	0.0742	100	70-130
2991-50-6	EiFOSAA	ND		0.0741	0.0704	95	70-130
757124-72-44:2	Fluorotelomer sulfonate	ND		0.0741	0.0733	99	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	ND		0.0741	0.0754	102	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	ND		0.0741	0.0792	107	70-130

CAS No.	ID Standard Recoveries	MS	FA67447-1	Limits
	13C4-PFBA	67%	76%	30-140%
	13C5-PFPeA	77%	86%	40-140%
	13C5-PFHxA	79%	88%	50-150%
	13C4-PFHpA	90%	99%	50-150%
	13C8-PFOA	109%	117%	50-150%
	13C9-PFNA	112%	123%	50-150%
	13C6-PFDA	108%	120%	50-150%
	13C7-PFUnDA	110%	124%	50-150%

* = Outside of Control Limits.

5.3.1
5

Matrix Spike Summary

Job Number: FA67447
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76717-MS	Q63537.D	2	09/11/19	MRE	09/07/19	OP76717	SQ1430
FA67447-1	Q63536.D	2	09/11/19	MRE	09/07/19	OP76717	SQ1430

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67447-1, FA67447-9, FA67447-10, FA67447-11, FA67447-12, FA67447-19, FA67447-20, FA67447-21, FA67447-22, FA67447-23, FA67447-24, FA67447-27

CAS No.	ID Standard Recoveries	MS	FA67447-1	Limits
	13C2-PFDoDA	98%	107%	50-150%
	13C2-PFTeDA	84%	91%	40-150%
	13C3-PFBS	81%	89%	50-150%
	13C3-PFHxS	88%	95%	50-150%
	13C8-PFOS	98%	113%	50-150%
	13C8-FOSA	104%	116%	30-140%
	d3-MeFOSAA	104%	114%	50-150%
	13C2-4:2FTS	95%	98%	50-150%
	13C2-6:2FTS	122%	124%	50-150%
	13C2-8:2FTS	107%	111%	50-150%

* = Outside of Control Limits.

5.3.1
5

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA67447
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76545-MS	2Q34991.D	1	08/27/19	NAF	08/26/19	OP76545	S2Q549
OP76545-MSD	2Q34992.D	1	08/27/19	NAF	08/26/19	OP76545	S2Q549
JC93739-5	2Q34990.D	1	08/27/19	NAF	08/26/19	OP76545	S2Q549

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67447-2, FA67447-3, FA67447-4, FA67447-5, FA67447-6, FA67447-7, FA67447-8

CAS No.	Compound	JC93739-5 ug/kg	Spike Q	MS ug/kg	MS %	Spike ug/kg	MSD ug/kg	MSD %	RPD	Limits Rec/RPD	
375-22-4	Perfluorobutanoic acid	ND		13.6	15.1	111	13.5	13.3	98	13	60-134/30
2706-90-3	Perfluoropentanoic acid	ND		13.6	14.5	106	13.5	12.7	94	13	62-134/30
307-24-4	Perfluorohexanoic acid	ND		13.6	14.6	107	13.5	12.8	95	13	63-130/30
375-85-9	Perfluoroheptanoic acid	ND		13.6	14.4	106	13.5	12.6	93	13	63-122/30
335-67-1	Perfluorooctanoic acid	ND		13.6	14.6	107	13.5	12.7	94	14	71-128/30
375-95-1	Perfluorononanoic acid	ND		13.6	14.3	105	13.5	12.6	93	13	66-124/30
335-76-2	Perfluorodecanoic acid	ND		13.6	14.3	105	13.5	12.7	94	12	68-127/30
2058-94-8	Perfluoroundecanoic acid	ND		13.6	14.4	106	13.5	12.7	94	13	61-137/30
307-55-1	Perfluorododecanoic acid	ND		13.6	14.4	106	13.5	12.6	93	13	71-126/30
72629-94-8	Perfluorotridecanoic acid	ND		13.6	14.5	106	13.5	12.7	94	13	60-137/30
376-06-7	Perfluorotetradecanoic acid	ND		13.6	14.4	106	13.5	12.7	94	13	61-131/30
375-73-5	Perfluorobutanesulfonic acid	ND		13.6	14.5	106	13.5	12.9	95	12	70-135/30
2706-91-4	Perfluoropentanesulfonic acid	ND		13.6	14.4	106	13.5	12.7	94	13	70-130/30
355-46-4	Perfluorohexanesulfonic acid	ND		13.6	14.2	104	13.5	12.4	92	14	72-129/30
375-92-8	Perfluoroheptanesulfonic acid	ND		13.6	15.0	110	13.5	13.0	96	14	62-129/30
1763-23-1	Perfluorooctanesulfonic acid	ND		13.6	14.5	106	13.5	12.9	95	12	69-125/30
68259-12-1	Perfluorononanesulfonic acid	ND		13.6	14.6	107	13.5	13.0	96	12	70-130/30
335-77-3	Perfluorodecanesulfonic acid	ND		13.6	14.1	103	13.5	12.5	92	12	63-141/30
754-91-6	PFOSA	ND		13.6	14.1	103	13.5	12.4	92	13	65-140/30
2355-31-9	MeFOSAA	ND		13.6	14.5	106	13.5	12.6	93	14	71-124/30
2991-50-6	EtFOSAA	ND		13.6	14.0	103	13.5	12.5	92	11	63-129/30
757124-72-44:2	Fluorotelomer sulfonate	ND		13.6	14.9	109	13.5	13.2	98	12	70-130/30
27619-97-2	6:2 Fluorotelomer sulfonate	ND		13.6	14.9	109	13.5	13.0	96	14	76-131/30
39108-34-4	8:2 Fluorotelomer sulfonate	ND		13.6	14.5	106	13.5	13.0	96	11	60-138/30

CAS No.	ID Standard Recoveries	MS	MSD	JC93739-5	Limits
	13C4-PFBA	79%	99%	82%	50-150%
	13C5-PFPeA	81%	100%	83%	50-150%
	13C5-PFHxA	82%	102%	85%	50-150%
	13C4-PFHpA	81%	100%	84%	50-150%
	13C8-PFOA	84%	104%	88%	50-150%
	13C9-PFNA	84%	104%	88%	50-150%
	13C6-PFDA	84%	104%	90%	50-150%
	13C7-PFUnDA	86%	106%	90%	50-150%

* = Outside of Control Limits.

5.4.1
5

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA67447
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76545-MS	2Q34991.D	1	08/27/19	NAF	08/26/19	OP76545	S2Q549
OP76545-MSD	2Q34992.D	1	08/27/19	NAF	08/26/19	OP76545	S2Q549
JC93739-5	2Q34990.D	1	08/27/19	NAF	08/26/19	OP76545	S2Q549

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67447-2, FA67447-3, FA67447-4, FA67447-5, FA67447-6, FA67447-7, FA67447-8

CAS No.	ID Standard Recoveries	MS	MSD	JC93739-5	Limits
	13C2-PFDoDA	87%	108%	89%	50-150%
	13C2-PFTeDA	82%	100%	84%	50-150%
	13C3-PFBS	81%	99%	83%	50-150%
	13C3-PFHxS	81%	101%	83%	50-150%
	13C8-PFOS	83%	102%	85%	50-150%
	13C8-FOSA	71%	77%	76%	50-150%
	d3-MeFOSAA	85%	106%	87%	50-150%
	13C2-4:2FTS	82%	101%	79%	50-150%
	13C2-6:2FTS	84%	103%	84%	50-150%
	13C2-8:2FTS	88%	108%	86%	50-150%

* = Outside of Control Limits.

5.4.1
5

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA67447
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76577-MS	2Q35441.D	1	09/05/19	NAF	08/28/19	OP76577	S2Q555
OP76577-MSD	2Q35442.D	1	09/05/19	NAF	08/28/19	OP76577	S2Q555
FA67448-1	2Q35440.D	1	09/05/19	NAF	08/28/19	OP76577	S2Q555

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67447-13, FA67447-14, FA67447-15, FA67447-16, FA67447-17, FA67447-18, FA67447-25, FA67447-26

CAS No.	Compound	FA67448-1 ug/kg	Spike Q ug/kg	MS ug/kg	MS %	Spike ug/kg	MSD ug/kg	MSD %	RPD	Limits Rec/RPD
375-22-4	Perfluorobutanoic acid	ND	10.4	10.2	98	10.5	9.59	91	6	60-134/30
2706-90-3	Perfluoropentanoic acid	ND	10.4	9.40	90	10.5	8.86	84	6	62-134/30
307-24-4	Perfluorohexanoic acid	ND	10.4	10.1	97	10.5	9.36	89	8	63-130/30
375-85-9	Perfluoroheptanoic acid	ND	10.4	9.80	94	10.5	9.24	88	6	63-122/30
335-67-1	Perfluorooctanoic acid	ND	10.4	9.92	95	10.5	9.33	89	6	71-128/30
375-95-1	Perfluorononanoic acid	ND	10.4	9.82	94	10.5	9.23	88	6	66-124/30
335-76-2	Perfluorodecanoic acid	ND	10.4	10.4	100	10.5	9.72	92	7	68-127/30
2058-94-8	Perfluoroundecanoic acid	ND	10.4	10.0	96	10.5	9.55	91	5	61-137/30
307-55-1	Perfluorododecanoic acid	ND	10.4	10.2	98	10.5	9.57	91	6	71-126/30
72629-94-8	Perfluorotridecanoic acid	ND	10.4	8.61	83	10.5	8.05	77	7	60-137/30
376-06-7	Perfluorotetradecanoic acid	ND	10.4	9.94	95	10.5	9.21	88	8	61-131/30
375-73-5	Perfluorobutanesulfonic acid	ND	10.4	10.0	96	10.5	9.37	89	7	70-135/30
2706-91-4	Perfluoropentanesulfonic acid	ND	10.4	10.2	98	10.5	9.71	92	5	70-130/30
355-46-4	Perfluorohexanesulfonic acid	ND	10.4	9.88	95	10.5	9.39	89	5	72-129/30
375-92-8	Perfluoroheptanesulfonic acid	ND	10.4	10.5	101	10.5	9.86	94	6	62-129/30
1763-23-1	Perfluorooctanesulfonic acid	ND	10.4	9.43	91	10.5	8.70	83	8	69-125/30
68259-12-1	Perfluorononanesulfonic acid	ND	10.4	10.1	97	10.5	9.46	90	7	70-130/30
335-77-3	Perfluorodecanesulfonic acid	ND	10.4	9.94	95	10.5	9.24	88	7	63-141/30
754-91-6	PFOSA	ND	10.4	10.0	96	10.5	9.46	90	6	65-140/30
2355-31-9	MeFOSAA	ND	10.4	10.1	97	10.5	9.59	91	5	71-124/30
2991-50-6	EtFOSAA	ND	10.4	10.5	101	10.5	9.81	93	7	63-129/30
757124-72-44:2	Fluorotelomer sulfonate	ND	10.4	10.1	97	10.5	9.42	90	7	70-130/30
27619-97-2	6:2 Fluorotelomer sulfonate	ND	10.4	9.78	94	10.5	9.31	89	5	76-131/30
39108-34-4	8:2 Fluorotelomer sulfonate	ND	10.4	9.79	94	10.5	9.39	89	4	60-138/30

CAS No.	ID Standard Recoveries	MS	MSD	FA67448-1	Limits
13C4-PFBA		90%	97%	86%	50-150%
13C5-PFPeA		92%	99%	89%	50-150%
13C5-PFHxA		92%	100%	90%	50-150%
13C4-PFHpA		90%	97%	88%	50-150%
13C8-PFOA		93%	100%	92%	50-150%
13C9-PFNA		92%	100%	91%	50-150%
13C6-PFDA		89%	96%	88%	50-150%
13C7-PFUnDA		84%	91%	81%	50-150%

* = Outside of Control Limits.

5.4.2
5

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA67447
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76577-MS	2Q35441.D	1	09/05/19	NAF	08/28/19	OP76577	S2Q555
OP76577-MSD	2Q35442.D	1	09/05/19	NAF	08/28/19	OP76577	S2Q555
FA67448-1	2Q35440.D	1	09/05/19	NAF	08/28/19	OP76577	S2Q555

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67447-13, FA67447-14, FA67447-15, FA67447-16, FA67447-17, FA67447-18, FA67447-25, FA67447-26

CAS No.	ID Standard Recoveries	MS	MSD	FA67448-1	Limits
	13C2-PFDoDA	86%	92%	81%	50-150%
	13C2-PFTeDA	98%	101%	88%	50-150%
	13C3-PFBS	86%	94%	84%	50-150%
	13C3-PFHxS	87%	94%	85%	50-150%
	13C8-PFOS	88%	95%	86%	50-150%
	13C8-FOSA	76%	86%	61%	50-150%
	d3-MeFOSAA	89%	97%	83%	50-150%
	13C2-4:2FTS	87%	94%	81%	50-150%
	13C2-6:2FTS	89%	96%	84%	50-150%
	13C2-8:2FTS	87%	93%	81%	50-150%

* = Outside of Control Limits.

5.4.2
5

Duplicate Summary

Job Number: FA67447
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76717-DUP	Q63542.D	25	09/11/19	MRE	09/07/19	OP76717	SQ1430
FA67447-19	Q63540.D	10	09/11/19	MRE	09/07/19	OP76717	SQ1430
FA67447-19	Q63541.D	25	09/11/19	MRE	09/07/19	OP76717	SQ1430

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67447-1, FA67447-9, FA67447-10, FA67447-11, FA67447-12, FA67447-19, FA67447-20, FA67447-21, FA67447-22, FA67447-23, FA67447-24, FA67447-27

CAS No.	Compound	FA67447-19 DUP		Q	RPD	Limits
		ug/l	Q ug/l			
375-22-4	Perfluorobutanoic acid	ND ^a	ND		nc	30
2706-90-3	Perfluoropentanoic acid	0.0280	J ND		200*	30
307-24-4	Perfluorohexanoic acid	0.0657	0.0738	J	12	30
375-85-9	Perfluoroheptanoic acid	0.0457	0.0500	J	9	30
335-67-1	Perfluorooctanoic acid	0.155	0.174		12	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	0.0641	0.0713	J	11	30
2706-91-4	Perfluoropentanesulfonic acid	0.106	0.109		3	30
355-46-4	Perfluorohexanesulfonic acid	0.820	0.959		16	30
375-92-8	Perfluoroheptanesulfonic acid	0.124	0.152		20	30
1763-23-1	Perfluorooctanesulfonic acid	5.58 ^a	5.85		5	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	EiFOSAA	ND	ND		nc	30
757124-72-44:2	Fluorotelomer sulfonate	ND	ND		nc	30
27619-97-2	6:2 Fluorotelomer sulfonate	0.0297	J ND		200*	30
39108-34-4	8:2 Fluorotelomer sulfonate	ND	ND		nc	30

CAS No.	ID Standard Recoveries	DUP	FA67447-19	FA67447-19	Limits
	13C4-PFBA	83%	9%*	86%	30-140%
	13C5-PFPeA	86%	55%	88%	40-140%
	13C5-PFHxA	88%	97%	90%	50-150%
	13C4-PFHpA	89%	113%	91%	50-150%
	13C8-PFOA	95%	118%	97%	50-150%
	13C9-PFNA	92%	113%	93%	50-150%
	13C6-PFDA	92%	102%	94%	50-150%
	13C7-PFUnDA	91%	68%	92%	50-150%

* = Outside of Control Limits.

5.5.1
5

Duplicate Summary

Job Number: FA67447
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76717-DUP	Q63542.D	25	09/11/19	MRE	09/07/19	OP76717	SQ1430
FA67447-19	Q63540.D	10	09/11/19	MRE	09/07/19	OP76717	SQ1430
FA67447-19	Q63541.D	25	09/11/19	MRE	09/07/19	OP76717	SQ1430

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67447-1, FA67447-9, FA67447-10, FA67447-11, FA67447-12, FA67447-19, FA67447-20, FA67447-21, FA67447-22, FA67447-23, FA67447-24, FA67447-27

CAS No.	ID Standard Recoveries	DUP	FA67447-19	FA67447-19	Limits
	13C2-PFDoDA	82%	51%	83%	50-150%
	13C2-PFTeDA	70%	49%	71%	40-150%
	13C3-PFBS	86%	102%	90%	50-150%
	13C3-PFHxS	89%	114%	92%	50-150%
	13C8-PFOS	92%	97%	92%	50-150%
	13C8-FOSA	108%	116%	109%	30-140%
	d3-MeFOSAA	89%	81%	87%	50-150%
	13C2-4:2FTS	83%	98%	84%	50-150%
	13C2-6:2FTS	90%	118%	90%	50-150%
	13C2-8:2FTS	82%	91%	86%	50-150%

(a) Result is from Run #2.

* = Outside of Control Limits.

5.5.1
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

B0064479.2019

SGS Job Number: FA67448

Sampling Dates: 08/19/19 - 08/20/19



Report to:

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Total number of pages in report: 78



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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General Manager

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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),
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.

Table of Contents

-1-

Section 1: Sample Summary	3
Section 2: Summary of Hits	5
Section 3: Sample Results	9
3.1: FA67448-1: SB-P2-NR189_9.5-10.5	10
3.2: FA67448-2: SB-P2-NR189_12-13	12
3.3: FA67448-3: SB-P2-NR189_24-29	14
3.4: FA67448-4: SB-P2-0A188_2-3	16
3.5: FA67448-5: SB-P2-0A188_13-14	18
3.6: FA67448-6: SB-P2-0A188_10-15	20
3.7: FA67448-7: SB-P2-0A188_21-26	22
3.8: FA67448-8: SB-P2-0T192_2-3	24
3.9: FA67448-9: SB-P2-0T192_6-7	26
3.10: FA67448-10: EQUIP-BLANK-01	28
3.11: FA67448-11: SB-P2-NV185_1-2	30
3.12: FA67448-12: DUP-01_SOIL	32
3.13: FA67448-13: SB-P2-NV185_6-7	34
3.14: FA67448-14: SB-P2-OH185_1-2	36
3.15: FA67448-15: SB-P2-OH185_5-6	38
3.16: FA67448-16: SB-P2-OT192_29-34	40
3.17: FA67448-17: SB-P2-OT192_0-5	42
3.18: FA67448-18: SB-P2-NV185_21-26	44
3.19: FA67448-19: SB-P2-NV185_5-10	46
3.20: FA67448-20: DUP-01_GW	48
Section 4: Misc. Forms	50
4.1: Certification Exceptions	51
4.2: Chain of Custody	53
Section 5: MS Semi-volatiles - QC Data Summaries	56
5.1: Method Blank Summary	57
5.2: Blank Spike Summary	69
5.3: Matrix Spike/Matrix Spike Duplicate Summary	75



Sample Summary

Arcadis

Job No: FA67448

**Racer Lansing PFAS Delineation; Lansing, MI
Project No: B0064479.2019**

Sample Number	Collected Date	Time By	Received	Matrix Code	Type	Client Sample ID
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**This report contains results reported as ND = Not detected. The following applies:
Organics ND = Not detected above the MDL**

FA67448-1	08/19/19	14:15 ER	08/24/19	SO	Soil	SB-P2-NR189_9.5-10.5
FA67448-2	08/19/19	14:20 ER	08/24/19	SO	Soil	SB-P2-NR189_12-13
FA67448-3	08/19/19	17:00 ER	08/24/19	AQ	Ground Water	SB-P2-NR189_24-29
FA67448-4	08/19/19	16:15 ER	08/24/19	SO	Soil	SB-P2-0A188_2-3
FA67448-5	08/19/19	16:20 ER	08/24/19	SO	Soil	SB-P2-0A188_13-14
FA67448-6	08/19/19	18:20 ER	08/24/19	AQ	Ground Water	SB-P2-0A188_10-15
FA67448-7	08/19/19	17:40 ER	08/24/19	AQ	Ground Water	SB-P2-0A188_21-26
FA67448-8	08/20/19	10:50 ER	08/24/19	SO	Soil	SB-P2-0T192_2-3
FA67448-9	08/20/19	10:55 ER	08/24/19	SO	Soil	SB-P2-0T192_6-7
FA67448-10	08/20/19	11:45 ER	08/24/19	AQ	Equipment Blank	EQUIP-BLANK-01
FA67448-11	08/20/19	13:20 ER	08/24/19	SO	Soil	SB-P2-NV185_1-2
FA67448-12	08/20/19	00:00 ER	08/24/19	SO	Soil	DUP-01_SOIL

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



Sample Summary (continued)

Arcadis

Job No: FA67448

**Racer Lansing PFAS Delineation; Lansing, MI
Project No: B0064479.2019**

Sample Number	Collected		Received	Matrix		Client Sample ID
	Date	Time By		Code	Type	
FA67448-13	08/20/19	13:25 ER	08/24/19	SO	Soil	SB-P2-NV185_6-7
FA67448-14	08/20/19	15:45 ER	08/24/19	SO	Soil	SB-P2-OH185_1-2
FA67448-15	08/20/19	15:50 ER	08/24/19	SO	Soil	SB-P2-OH185_5-6
FA67448-16	08/20/19	16:35 ER	08/24/19	AQ	Ground Water	SB-P2-OT192_29-34
FA67448-17	08/20/19	17:10 ER	08/24/19	AQ	Ground Water	SB-P2-OT192_0-5
FA67448-17D	08/20/19	17:10 ER	08/24/19	AQ	Water Dup/MSD	SB-P2-OT192_0-5
FA67448-17S	08/20/19	17:10 ER	08/24/19	AQ	Water Matrix Spike	SB-P2-OT192_0-5
FA67448-18	08/20/19	17:50 ER	08/24/19	AQ	Ground Water	SB-P2-NV185_21-26
FA67448-19	08/20/19	18:10 ER	08/24/19	AQ	Ground Water	SB-P2-NV185_5-10
FA67448-20	08/20/19	00:00 ER	08/24/19	AQ	Ground Water	DUP-01_GW

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

Summary of Hits

Job Number: FA67448
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 08/19/19 thru 08/20/19

2

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
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FA67448-1 SB-P2-NR189_9.5-10.5

No hits reported in this sample.

FA67448-2 SB-P2-NR189_12-13

No hits reported in this sample.

FA67448-3 SB-P2-NR189_24-29

Perfluorobutanoic acid	0.0124	0.0074	0.0019	ug/l	EPA 537M BY ID
Perfluoropentanoic acid	0.0188	0.0037	0.0014	ug/l	EPA 537M BY ID
Perfluorohexanoic acid	0.0121	0.0037	0.00093	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid	0.0128	0.0037	0.00093	ug/l	EPA 537M BY ID
Perfluorooctanoic acid	0.0313	0.0037	0.00093	ug/l	EPA 537M BY ID
Perfluorononanoic acid	0.00384	0.0037	0.00093	ug/l	EPA 537M BY ID
Perfluorodecanoic acid	0.00285 J	0.0037	0.00093	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid	0.00370	0.0037	0.00093	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid	0.0569	0.0037	0.0014	ug/l	EPA 537M BY ID
6:2 Fluorotelomer sulfonate	0.00275 J	0.0074	0.0019	ug/l	EPA 537M BY ID

FA67448-4 SB-P2-0A188_2-3

Perfluorooctanesulfonic acid	0.447 J	1.1	0.27	ug/kg	EPA 537M BY ID
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FA67448-5 SB-P2-0A188_13-14

No hits reported in this sample.

FA67448-6 SB-P2-0A188_10-15

Perfluorobutanoic acid	0.0166	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid	0.0201	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid	0.0180	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid	0.0199	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid	0.0373	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid	0.00404	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid	0.00166 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid	0.00197 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid	0.00178 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid	0.0225	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid	0.00319 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid	0.258	0.0040	0.0015	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA67448
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 08/19/19 thru 08/20/19

2

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
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FA67448-7 SB-P2-0A188_21-26

Perfluoropentanoic acid ^a	0.0280 J	0.074	0.028	ug/l	EPA 537M BY ID
Perfluorooctanoic acid ^a	0.0417 J	0.074	0.019	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid	0.00652	0.0037	0.00093	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid	0.0422	0.0037	0.0014	ug/l	EPA 537M BY ID

FA67448-8 SB-P2-0T192_2-3

Perfluorooctanesulfonic acid	16.4	1.1	0.29	ug/kg	EPA 537M BY ID
Perfluorononanesulfonic acid	0.306 J	1.1	0.29	ug/kg	EPA 537M BY ID

FA67448-9 SB-P2-0T192_6-7

No hits reported in this sample.

FA67448-10 EQUIP-BLANK-01

No hits reported in this sample.

FA67448-11 SB-P2-NV185_1-2

No hits reported in this sample.

FA67448-12 DUP-01_SOIL

No hits reported in this sample.

FA67448-13 SB-P2-NV185_6-7

Perfluorooctanesulfonic acid	0.428 J	1.1	0.27	ug/kg	EPA 537M BY ID
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FA67448-14 SB-P2-OH185_1-2

Perfluorooctanesulfonic acid	4.01	1.1	0.27	ug/kg	EPA 537M BY ID
Perfluorononanesulfonic acid	0.335 J	1.1	0.27	ug/kg	EPA 537M BY ID

FA67448-15 SB-P2-OH185_5-6

Perfluorooctanesulfonic acid	6.63	1.1	0.27	ug/kg	EPA 537M BY ID
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FA67448-16 SB-P2-OT192_29-34

Perfluorobutanoic acid	0.0255	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid	0.0166	0.0040	0.0015	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA67448
 Account: Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI
 Collected: 08/19/19 thru 08/20/19

2

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
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Perfluorohexanoic acid		0.0103	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		0.0153	0.0040	0.0015	ug/l	EPA 537M BY ID

FA67448-17 SB-P2-OT192_0-5

Perfluoropentanoic acid		0.0709	0.0037	0.0014	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.193	0.0037	0.00093	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0744	0.0037	0.00093	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.125	0.0037	0.00093	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00491	0.0037	0.00093	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00195 J	0.0037	0.00093	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.185	0.0037	0.00093	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid		0.230	0.0037	0.00093	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid ^a		1.41	0.074	0.019	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.0795	0.0037	0.00093	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid ^a		5.04	0.074	0.028	ug/l	EPA 537M BY ID
Perfluorononanesulfonic acid		0.0334	0.0037	0.00093	ug/l	EPA 537M BY ID
PFOSA		0.0229	0.0037	0.00093	ug/l	EPA 537M BY ID
8:2 Fluorotelomer sulfonate		0.00228 J	0.0074	0.0019	ug/l	EPA 537M BY ID

FA67448-18 SB-P2-NV185_21-26

Perfluorobutanoic acid		0.0151	0.0095	0.0024	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0184	0.0048	0.0018	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0158	0.0048	0.0012	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0119	0.0048	0.0012	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0283	0.0048	0.0012	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00486	0.0048	0.0012	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00350 J	0.0048	0.0012	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.113	0.0048	0.0012	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid		0.00408 J	0.0048	0.0012	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00415 J	0.0048	0.0012	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.00149 J	0.0048	0.0012	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.0464	0.0048	0.0018	ug/l	EPA 537M BY ID

FA67448-19 SB-P2-NV185_5-10

Perfluorobutanoic acid		0.0142	0.0074	0.0019	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0115	0.0037	0.0014	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0142	0.0037	0.00093	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0152	0.0037	0.00093	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0441	0.0037	0.00093	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00812	0.0037	0.00093	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.0183	0.0037	0.00093	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA67448
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 08/19/19 thru 08/20/19

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
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	Perfluorohexanesulfonic acid	0.00576	0.0037	0.00093	ug/l	EPA 537M BY ID
	Perfluorooctanesulfonic acid	0.130	0.0037	0.0014	ug/l	EPA 537M BY ID
	PFOSA	0.00374	0.0037	0.00093	ug/l	EPA 537M BY ID
	8:2 Fluorotelomer sulfonate	0.00423 J	0.0074	0.0019	ug/l	EPA 537M BY ID

FA67448-20 DUP-01_GW

	Perfluorobutanoic acid	0.00985 J	0.022	0.0055	ug/l	EPA 537M BY ID
	Perfluoropentanoic acid	0.0104 J	0.011	0.0042	ug/l	EPA 537M BY ID
	Perfluorohexanoic acid	0.0109 J	0.011	0.0028	ug/l	EPA 537M BY ID
	Perfluoroheptanoic acid	0.00857 J	0.011	0.0028	ug/l	EPA 537M BY ID
	Perfluorooctanoic acid	0.0201	0.011	0.0028	ug/l	EPA 537M BY ID
	Perfluorononanoic acid	0.00348 J	0.011	0.0028	ug/l	EPA 537M BY ID
	Perfluorodecanoic acid	0.00282 J	0.011	0.0028	ug/l	EPA 537M BY ID
	Perfluoropentanesulfonic acid	0.00600 J	0.011	0.0028	ug/l	EPA 537M BY ID
	Perfluorooctanesulfonic acid	0.0397	0.011	0.0042	ug/l	EPA 537M BY ID

(a) Dilution required due to matrix interference (internal standard failure).

Sample Results

Report of Analysis

Report of Analysis

3.1
3

Client Sample ID: SB-P2-NR189_9.5-10.5 Lab Sample ID: FA67448-1 Matrix: SO - Soil Method: EPA 537M BY ID IN HOUSE Project: Racer Lansing PFAS Delineation; Lansing, MI	Date Sampled: 08/19/19 Date Received: 08/24/19 Percent Solids: 93.7
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Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q35440.D	1	09/05/19 19:08	NAF	08/28/19 12:00	OP76577	S2Q555
Run #2							

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

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND	1.1	0.26	ug/kg	
2706-90-3	Perfluoropentanoic acid	ND	1.1	0.21	ug/kg	
307-24-4	Perfluorohexanoic acid	ND	1.1	0.21	ug/kg	
375-85-9	Perfluoroheptanoic acid	ND	1.1	0.26	ug/kg	
335-67-1	Perfluorooctanoic acid	ND	1.1	0.26	ug/kg	
375-95-1	Perfluorononanoic acid	ND	1.1	0.26	ug/kg	
335-76-2	Perfluorodecanoic acid	ND	1.1	0.26	ug/kg	
2058-94-8	Perfluoroundecanoic acid	ND	1.1	0.26	ug/kg	
307-55-1	Perfluorododecanoic acid	ND	1.1	0.26	ug/kg	
72629-94-8	Perfluorotridecanoic acid	ND	1.1	0.26	ug/kg	
376-06-7	Perfluorotetradecanoic acid	ND	1.1	0.26	ug/kg	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	1.1	0.26	ug/kg	
2706-91-4	Perfluoropentanesulfonic acid	ND	1.1	0.26	ug/kg	
355-46-4	Perfluorohexanesulfonic acid	ND	1.1	0.26	ug/kg	
375-92-8	Perfluoroheptanesulfonic acid	ND	1.1	0.26	ug/kg	
1763-23-1	Perfluorooctanesulfonic acid	ND	1.1	0.26	ug/kg	
68259-12-1	Perfluorononanesulfonic acid	ND	1.1	0.26	ug/kg	
335-77-3	Perfluorodecanesulfonic acid	ND	1.1	0.26	ug/kg	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	1.1	0.26	ug/kg	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	2.6	0.53	ug/kg	
2991-50-6	EtFOSAA	ND	2.6	0.53	ug/kg	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	1.1	0.26	ug/kg	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	1.1	0.26	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

31
3

Client Sample ID: SB-P2-NR189_9.5-10.5	
Lab Sample ID: FA67448-1	Date Sampled: 08/19/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 93.7
Project: Racer Lansing PFAS Delineation; Lansing, MI	

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	1.1	0.26	ug/kg	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	86%		50-150%
	13C5-PFPeA	89%		50-150%
	13C5-PFHxA	90%		50-150%
	13C4-PFHpA	88%		50-150%
	13C8-PFOA	92%		50-150%
	13C9-PFNA	91%		50-150%
	13C6-PFDA	88%		50-150%
	13C7-PFUnDA	81%		50-150%
	13C2-PFDoDA	81%		50-150%
	13C2-PFTeDA	88%		50-150%
	13C3-PFBS	84%		50-150%
	13C3-PFHxS	85%		50-150%
	13C8-PFOS	86%		50-150%
	13C8-FOSA	61%		50-150%
	d3-MeFOSAA	83%		50-150%
	13C2-4:2FTS	81%		50-150%
	13C2-6:2FTS	84%		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-P2-NR189_12-13	
Lab Sample ID: FA67448-2	Date Sampled: 08/19/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 93.2
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q35443.D	1	09/05/19 19:56	NAF	08/28/19 12:00	OP76577	S2Q555
Run #2							

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

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	0.21	ug/kg	
307-24-4	Perfluorohexanoic acid	ND	1.1	0.21	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	0.53	ug/kg	
2991-50-6	EtFOSAA	ND	2.7	0.53	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-P2-NR189_12-13	
Lab Sample ID: FA67448-2	Date Sampled: 08/19/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 93.2
Project: Racer Lansing PFAS Delineation; Lansing, MI	

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	97%		50-150%
	13C5-PFPeA	100%		50-150%
	13C5-PFHxA	101%		50-150%
	13C4-PFHpA	99%		50-150%
	13C8-PFOA	104%		50-150%
	13C9-PFNA	102%		50-150%
	13C6-PFDA	100%		50-150%
	13C7-PFUnDA	96%		50-150%
	13C2-PFDoDA	97%		50-150%
	13C2-PFTeDA	101%		50-150%
	13C3-PFBS	95%		50-150%
	13C3-PFHxS	95%		50-150%
	13C8-PFOS	98%		50-150%
	13C8-FOSA	93%		50-150%
	d3-MeFOSAA	94%		50-150%
	13C2-4:2FTS	90%		50-150%
	13C2-6:2FTS	95%		50-150%
	13C2-8:2FTS	93%		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-P2-NR189_24-29	Date Sampled:	08/19/19
Lab Sample ID:	FA67448-3	Date Received:	08/24/19
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	3Q8740.D	1	09/11/19 02:12	NG	09/07/19 12:00	OP76718	S3Q164
Run #2 ^a	3Q8783.D	20	09/11/19 13:45	NG	09/07/19 12:00	OP76718	S3Q164

Run #	Initial Volume	Final Volume
Run #1	270 ml	1.0 ml
Run #2	270 ml	1.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
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PERFLUOROALKYL CARBOXYLIC ACIDS

375-22-4	Perfluorobutanoic acid	0.0124	0.0074	0.0019	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0188	0.0037	0.0014	ug/l	
307-24-4	Perfluorohexanoic acid	0.0121	0.0037	0.00093	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0128	0.0037	0.00093	ug/l	
335-67-1	Perfluorooctanoic acid	0.0313	0.0037	0.00093	ug/l	
375-95-1	Perfluorononanoic acid	0.00384	0.0037	0.00093	ug/l	
335-76-2	Perfluorodecanoic acid	0.00285	0.0037	0.00093	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND ^b	0.074	0.019	ug/l	
307-55-1	Perfluorododecanoic acid	ND ^b	0.074	0.028	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0037	0.00093	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0037	0.00093	ug/l	

PERFLUOROALKYL SULFONATES

375-73-5	Perfluorobutanesulfonic acid	ND	0.0037	0.00093	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0037	0.00093	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00370	0.0037	0.00093	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0037	0.00093	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0569	0.0037	0.0014	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0037	0.00093	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0037	0.00093	ug/l	

PERFLUORO OCTANESULFONAMIDES

754-91-6	PFOSA	ND ^b	0.074	0.019	ug/l	
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PERFLUORO OCTANESULFONAMIDOACETIC ACIDS

2355-31-9	MeFOSAA	ND	0.019	0.0037	ug/l	
2991-50-6	EtFOSAA	ND	0.019	0.0037	ug/l	

FLUOROTELOMER SULFONATES

757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0074	0.0019	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	0.00275	0.0074	0.0019	ug/l	J

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-P2-NR189_24-29 Lab Sample ID: FA67448-3 Matrix: AQ - Ground Water Method: EPA 537M BY ID EPA 537 MOD Project: Racer Lansing PFAS Delineation; Lansing, MI	Date Sampled: 08/19/19 Date Received: 08/24/19 Percent Solids: n/a
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CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0074	0.0019	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	54%	102%	30-140%
	13C5-PFPeA	66%	101%	40-140%
	13C5-PFHxA	57%	100%	50-150%
	13C4-PFHpA	55%	100%	50-150%
	13C8-PFOA	61%	103%	50-150%
	13C9-PFNA	63%	106%	50-150%
	13C6-PFDA	61%	106%	50-150%
	13C7-PFUnDA	49% ^c	105%	50-150%
	13C2-PFDoDA	39% ^c	104%	50-150%
	13C2-PFTeDA	49%	102%	40-150%
	13C3-PFBS	71%	101%	50-150%
	13C3-PFHxS	63%	99%	50-150%
	13C8-PFOS	59%	99%	50-150%
	13C8-FOSA	14% ^c	98%	30-140%
	d3-MeFOSAA	53%	117%	50-150%
	13C2-4:2FTS	67%	102%	50-150%
	13C2-6:2FTS	78%	109%	50-150%
	13C2-8:2FTS	85%	106%	50-150%

- (a) Dilution required due to matrix interference (internal standard failure).
- (b) Result is from Run# 2
- (c) Outside control limits due to matrix interference.

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-P2-0A188_2-3	
Lab Sample ID: FA67448-4	Date Sampled: 08/19/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 91.3
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q35444.D	1	09/05/19 20:11	NAF	08/28/19 12:00	OP76577	S2Q555
Run #2							

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

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	0.21	ug/kg	
307-24-4	Perfluorohexanoic acid	ND	1.1	0.21	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	0.447	1.1	0.27	ug/kg	J
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	0.54	ug/kg	
2991-50-6	EtFOSAA	ND	2.7	0.54	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

34
3

Client Sample ID: SB-P2-0A188_2-3 Lab Sample ID: FA67448-4 Matrix: SO - Soil Method: EPA 537M BY ID IN HOUSE Project: Racer Lansing PFAS Delineation; Lansing, MI	Date Sampled: 08/19/19 Date Received: 08/24/19 Percent Solids: 91.3
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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	98%		50-150%
	13C5-PFPeA	100%		50-150%
	13C5-PFHxA	100%		50-150%
	13C4-PFHpA	99%		50-150%
	13C8-PFOA	105%		50-150%
	13C9-PFNA	105%		50-150%
	13C6-PFDA	105%		50-150%
	13C7-PFUnDA	95%		50-150%
	13C2-PFDoDA	104%		50-150%
	13C2-PFTeDA	120%		50-150%
	13C3-PFBS	95%		50-150%
	13C3-PFHxS	95%		50-150%
	13C8-PFOS	96%		50-150%
	13C8-FOSA	89%		50-150%
	d3-MeFOSAA	106%		50-150%
	13C2-4:2FTS	90%		50-150%
	13C2-6:2FTS	98%		50-150%
	13C2-8:2FTS	113%		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-P2-0A188_13-14	
Lab Sample ID: FA67448-5	Date Sampled: 08/19/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 91.1
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q35445.D	1	09/05/19 20:27	NAF	08/28/19 12:00	OP76577	S2Q555
Run #2							

Run #	Initial Weight	Final Volume
Run #1	1.95 g	1.0 ml
Run #2		

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	0.56	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

3.5
3

Client Sample ID: SB-P2-0A188_13-14	
Lab Sample ID: FA67448-5	Date Sampled: 08/19/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 91.1
Project: Racer Lansing PFAS Delineation; Lansing, MI	

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	105%		50-150%
	13C5-PFPeA	109%		50-150%
	13C5-PFHxA	109%		50-150%
	13C4-PFHpA	107%		50-150%
	13C8-PFOA	113%		50-150%
	13C9-PFNA	112%		50-150%
	13C6-PFDA	111%		50-150%
	13C7-PFUnDA	106%		50-150%
	13C2-PFDoDA	107%		50-150%
	13C2-PFTeDA	111%		50-150%
	13C3-PFBS	103%		50-150%
	13C3-PFHxS	104%		50-150%
	13C8-PFOS	107%		50-150%
	13C8-FOSA	106%		50-150%
	d3-MeFOSAA	109%		50-150%
	13C2-4:2FTS	98%		50-150%
	13C2-6:2FTS	103%		50-150%
	13C2-8:2FTS	102%		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-P2-0A188_10-15	
Lab Sample ID: FA67448-6	Date Sampled: 08/19/19
Matrix: AQ - Ground Water	Date Received: 08/24/19
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	3Q8741.D	1	09/11/19 02:27	NG	09/07/19 12:00	OP76718	S3Q164
Run #2 ^a	3Q8784.D	10	09/11/19 14:01	NG	09/07/19 12:00	OP76718	S3Q164

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

CAS No.	Compound	Result	RL	MDL	Units	Q
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PERFLUOROALKYL CARBOXYLIC ACIDS

375-22-4	Perfluorobutanoic acid	0.0166	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0201	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0180	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0199	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0373	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00404	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	0.00166	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	0.00197	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	0.00178	0.0040	0.0010	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	0.0225	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.00319	0.0040	0.0010	ug/l	J
1763-23-1	Perfluorooctanesulfonic acid	0.258	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 ^b	0.040	0.010	ug/l	
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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-P2-0A188_10-15	
Lab Sample ID: FA67448-6	Date Sampled: 08/19/19
Matrix: AQ - Ground Water	Date Received: 08/24/19
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

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%	100%	30-140%
	13C5-PFPeA	84%	101%	40-140%
	13C5-PFHxA	77%	100%	50-150%
	13C4-PFHpA	74%	100%	50-150%
	13C8-PFOA	80%	103%	50-150%
	13C9-PFNA	78%	97%	50-150%
	13C6-PFDA	75%	88%	50-150%
	13C7-PFUnDA	59%	69%	50-150%
	13C2-PFDoDA	52%	52%	50-150%
	13C2-PFTeDA	56%	54%	40-150%
	13C3-PFBS	84%	103%	50-150%
	13C3-PFHxS	77%	99%	50-150%
	13C8-PFOS	66%	82%	50-150%
	13C8-FOSA	27% ^c	75%	30-140%
	d3-MeFOSAA	87%	90%	50-150%
	13C2-4:2FTS	85%	102%	50-150%
	13C2-6:2FTS	97%	110%	50-150%
	13C2-8:2FTS	100%	93%	50-150%

- (a) Dilution required due to matrix interference (internal standard failure).
- (b) Result is from Run# 2
- (c) Outside control limits due to matrix interference.

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-P2-0A188_21-26	
Lab Sample ID: FA67448-7	Date Sampled: 08/19/19
Matrix: AQ - Ground Water	Date Received: 08/24/19
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	3Q8742.D	1	09/11/19 02:42	NG	09/07/19 12:00	OP76718	S3Q164
Run #2 ^a	2Q36068.D	1.19	09/16/19 12:35	NAF	09/13/19 07:00	OP76828	S2Q563
Run #3 ^b	3Q8786.D	20	09/11/19 14:31	NG	09/07/19 12:00	OP76718	S3Q164

Run #	Initial Volume	Final Volume
Run #1	270 ml	1.0 ml
Run #2	250 ml	1.0 ml
Run #3	270 ml	1.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND ^c	0.15	0.037	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0280 ^c	0.074	0.028	ug/l	J
307-24-4	Perfluorohexanoic acid	ND ^c	0.074	0.019	ug/l	
375-85-9	Perfluoroheptanoic acid	ND ^c	0.074	0.019	ug/l	
335-67-1	Perfluorooctanoic acid	0.0417 ^c	0.074	0.019	ug/l	J
375-95-1	Perfluorononanoic acid	ND ^c	0.074	0.019	ug/l	
335-76-2	Perfluorodecanoic acid	ND ^c	0.074	0.019	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND ^c	0.074	0.019	ug/l	
307-55-1	Perfluorododecanoic acid	ND ^c	0.074	0.028	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0037	0.00093	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0037	0.00093	ug/l	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	0.0037	0.00093	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0037	0.00093	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00652	0.0037	0.00093	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0037	0.00093	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0422	0.0037	0.0014	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0037	0.00093	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0037	0.00093	ug/l	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND ^c	0.074	0.019	ug/l	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND ^c	0.37	0.074	ug/l	
2991-50-6	EiFOSAA	ND ^c	0.37	0.074	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

37
3

Client Sample ID: SB-P2-0A188_21-26	
Lab Sample ID: FA67448-7	Date Sampled: 08/19/19
Matrix: AQ - Ground Water	Date Received: 08/24/19
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

CAS No.	Compound	Result	RL	MDL	Units	Q
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0074	0.0019	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0074	0.0019	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0074	0.0019	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Run# 3	Limits
	13C4-PFBA	27% ^d	56%	106%	30-140%
	13C5-PFPeA	0% ^d	47%	105%	40-140%
	13C5-PFHxA	33% ^d	39%	102%	50-150%
	13C4-PFHpA	24% ^d	36%	99%	50-150%
	13C8-PFOA	22% ^d	42%	104%	50-150%
	13C9-PFNA	23% ^d	50%	104%	50-150%
	13C6-PFDA	39% ^d	64%	104%	50-150%
	13C7-PFUnDA	47% ^d	74%	104%	50-150%
	13C2-PFDoDA	41% ^d	78%	109%	50-150%
	13C2-PFTeDA	46%	83%	110%	40-150%
	13C3-PFBS	60%	60%	104%	50-150%
	13C3-PFHxS	53%	57%	98%	50-150%
	13C8-PFOS	54%	0%	98%	50-150%
	13C8-FOSA	2% ^d	6%	72%	30-140%
	d3-MeFOSAA	20% ^d	32%	127%	50-150%
	13C2-4:2FTS	54%	59%	107%	50-150%
	13C2-6:2FTS	54%	74%	114%	50-150%
	13C2-8:2FTS	71%	107%	111%	50-150%

- (a) Confirmation Run.
- (b) Dilution required due to matrix interference (internal standard failure).
- (c) Result is from Run# 3
- (d) Outside control limits due to matrix interference.

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

38
3

Client Sample ID: SB-P2-0T192_2-3	
Lab Sample ID: FA67448-8	Date Sampled: 08/20/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 87.2
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q35446.D	1	09/05/19 20:43	NAF	08/28/19 12:00	OP76577	S2Q555
Run #2							

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

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	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	
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	16.4	1.1	0.29	ug/kg	
68259-12-1	Perfluorononanesulfonic acid	0.306	1.1	0.29	ug/kg	J
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-P2-0T192_2-3	Date Sampled:	08/20/19
Lab Sample ID:	FA67448-8	Date Received:	08/24/19
Matrix:	SO - Soil	Percent Solids:	87.2
Method:	EPA 537M BY ID IN HOUSE		
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

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	99%		50-150%
	13C5-PFPeA	101%		50-150%
	13C5-PFHxA	102%		50-150%
	13C4-PFHpA	101%		50-150%
	13C8-PFOA	106%		50-150%
	13C9-PFNA	105%		50-150%
	13C6-PFDA	105%		50-150%
	13C7-PFUnDA	96%		50-150%
	13C2-PFDoDA	100%		50-150%
	13C2-PFTeDA	108%		50-150%
	13C3-PFBS	98%		50-150%
	13C3-PFHxS	99%		50-150%
	13C8-PFOS	98%		50-150%
	13C8-FOSA	86%		50-150%
	d3-MeFOSAA	107%		50-150%
	13C2-4:2FTS	92%		50-150%
	13C2-6:2FTS	97%		50-150%
	13C2-8:2FTS	102%		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-P2-0T192_6-7	
Lab Sample ID: FA67448-9	Date Sampled: 08/20/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 89.6
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q35447.D	1	09/05/19 20:59	NAF	08/28/19 12:00	OP76577	S2Q555
Run #2							

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

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-P2-0T192_6-7	
Lab Sample ID: FA67448-9	Date Sampled: 08/20/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 89.6
Project: Racer Lansing PFAS Delineation; Lansing, MI	

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	93%		50-150%
	13C5-PFPeA	98%		50-150%
	13C5-PFHxA	99%		50-150%
	13C4-PFHpA	98%		50-150%
	13C8-PFOA	103%		50-150%
	13C9-PFNA	103%		50-150%
	13C6-PFDA	101%		50-150%
	13C7-PFUnDA	95%		50-150%
	13C2-PFDoDA	98%		50-150%
	13C2-PFTeDA	102%		50-150%
	13C3-PFBS	95%		50-150%
	13C3-PFHxS	95%		50-150%
	13C8-PFOS	98%		50-150%
	13C8-FOSA	95%		50-150%
	d3-MeFOSAA	99%		50-150%
	13C2-4:2FTS	90%		50-150%
	13C2-6:2FTS	94%		50-150%
	13C2-8:2FTS	91%		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: EQUIP-BLANK-01		
Lab Sample ID: FA67448-10		Date Sampled: 08/20/19
Matrix: AQ - Equipment Blank		Date Received: 08/24/19
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	3Q8743.D	1	09/11/19 02:57	NG	09/07/19 12:00	OP76718	S3Q164
Run #2							

Run #	Initial Volume	Final Volume
Run #1	270 ml	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
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PERFLUOROALKYL CARBOXYLIC ACIDS

375-22-4	Perfluorobutanoic acid	ND	0.0074	0.0019	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0037	0.0014	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0037	0.00093	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0037	0.00093	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0037	0.00093	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0037	0.00093	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0037	0.00093	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0037	0.00093	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0037	0.0014	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0037	0.00093	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0037	0.00093	ug/l	

PERFLUOROALKYL SULFONATES

375-73-5	Perfluorobutanesulfonic acid	ND	0.0037	0.00093	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0037	0.00093	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0037	0.00093	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0037	0.00093	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0037	0.0014	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0037	0.00093	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0037	0.00093	ug/l	

PERFLUORO OCTANESULFONAMIDES

754-91-6	PFOSA	ND	0.0037	0.00093	ug/l	
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PERFLUORO OCTANESULFONAMIDOACETIC ACIDS

2355-31-9	MeFOSAA	ND	0.019	0.0037	ug/l	
2991-50-6	EtFOSAA	ND	0.019	0.0037	ug/l	

FLUOROTELOMER SULFONATES

757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0074	0.0019	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0074	0.0019	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: EQUIP-BLANK-01	
Lab Sample ID: FA67448-10	Date Sampled: 08/20/19
Matrix: AQ - Equipment Blank	Date Received: 08/24/19
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0074	0.0019	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	106%		30-140%
	13C5-PFPeA	105%		40-140%
	13C5-PFHxA	104%		50-150%
	13C4-PFHpA	105%		50-150%
	13C8-PFOA	110%		50-150%
	13C9-PFNA	111%		50-150%
	13C6-PFDA	97%		50-150%
	13C7-PFUnDA	71%		50-150%
	13C2-PFDoDA	67%		50-150%
	13C2-PFTeDA	85%		40-150%
	13C3-PFBS	102%		50-150%
	13C3-PFHxS	101%		50-150%
	13C8-PFOS	83%		50-150%
	13C8-FOSA	99%		30-140%
	d3-MeFOSAA	107%		50-150%
	13C2-4:2FTS	103%		50-150%
	13C2-6:2FTS	113%		50-150%
	13C2-8:2FTS	117%		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-P2-NV185_1-2	
Lab Sample ID: FA67448-11	Date Sampled: 08/20/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 94.3
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q35448.D	1	09/05/19 21:15	NAF	08/28/19 12:00	OP76577	S2Q555
Run #2							

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

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	0.21	ug/kg	
307-24-4	Perfluorohexanoic acid	ND	1.1	0.21	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	0.53	ug/kg	
2991-50-6	EtFOSAA	ND	2.7	0.53	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-P2-NV185_1-2	
Lab Sample ID: FA67448-11	Date Sampled: 08/20/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 94.3
Project: Racer Lansing PFAS Delineation; Lansing, MI	

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	97%		50-150%
	13C5-PFPeA	100%		50-150%
	13C5-PFHxA	100%		50-150%
	13C4-PFHpA	99%		50-150%
	13C8-PFOA	103%		50-150%
	13C9-PFNA	103%		50-150%
	13C6-PFDA	101%		50-150%
	13C7-PFUnDA	94%		50-150%
	13C2-PFDoDA	101%		50-150%
	13C2-PFTeDA	107%		50-150%
	13C3-PFBS	95%		50-150%
	13C3-PFHxS	96%		50-150%
	13C8-PFOS	98%		50-150%
	13C8-FOSA	93%		50-150%
	d3-MeFOSAA	102%		50-150%
	13C2-4:2FTS	90%		50-150%
	13C2-6:2FTS	95%		50-150%
	13C2-8:2FTS	94%		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_SOIL		
Lab Sample ID: FA67448-12		Date Sampled: 08/20/19
Matrix: SO - Soil		Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE		Percent Solids: 90.5
Project: Racer Lansing PFAS Delineation; Lansing, MI		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q35449.D	1	09/05/19 21:30	NAF	08/28/19 12:00	OP76577	S2Q555
Run #2							

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

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-01_SOIL		
Lab Sample ID: FA67448-12		Date Sampled: 08/20/19
Matrix: SO - Soil		Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE		Percent Solids: 90.5
Project: Racer Lansing PFAS Delineation; Lansing, MI		

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	88%		50-150%
	13C5-PFPeA	90%		50-150%
	13C5-PFHxA	90%		50-150%
	13C4-PFHpA	89%		50-150%
	13C8-PFOA	93%		50-150%
	13C9-PFNA	92%		50-150%
	13C6-PFDA	91%		50-150%
	13C7-PFUnDA	85%		50-150%
	13C2-PFDoDA	88%		50-150%
	13C2-PFTeDA	93%		50-150%
	13C3-PFBS	86%		50-150%
	13C3-PFHxS	85%		50-150%
	13C8-PFOS	88%		50-150%
	13C8-FOSA	87%		50-150%
	d3-MeFOSAA	91%		50-150%
	13C2-4:2FTS	81%		50-150%
	13C2-6:2FTS	86%		50-150%
	13C2-8:2FTS	82%		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-P2-NV185_6-7	
Lab Sample ID: FA67448-13	Date Sampled: 08/20/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 92.3
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q35452.D	1	09/05/19 22:18	NAF	08/28/19 12:00	OP76577	S2Q555
Run #2							

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

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	0.21	ug/kg	
307-24-4	Perfluorohexanoic acid	ND	1.1	0.21	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	0.428	1.1	0.27	ug/kg	J
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	0.54	ug/kg	
2991-50-6	EtFOSAA	ND	2.7	0.54	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-P2-NV185_6-7	Date Sampled:	08/20/19
Lab Sample ID:	FA67448-13	Date Received:	08/24/19
Matrix:	SO - Soil	Percent Solids:	92.3
Method:	EPA 537M BY ID IN HOUSE		
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

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	107%		50-150%
	13C5-PFPeA	109%		50-150%
	13C5-PFHxA	109%		50-150%
	13C4-PFHpA	108%		50-150%
	13C8-PFOA	113%		50-150%
	13C9-PFNA	112%		50-150%
	13C6-PFDA	108%		50-150%
	13C7-PFUnDA	103%		50-150%
	13C2-PFDoDA	107%		50-150%
	13C2-PFTeDA	110%		50-150%
	13C3-PFBS	103%		50-150%
	13C3-PFHxS	104%		50-150%
	13C8-PFOS	107%		50-150%
	13C8-FOSA	104%		50-150%
	d3-MeFOSAA	109%		50-150%
	13C2-4:2FTS	98%		50-150%
	13C2-6:2FTS	103%		50-150%
	13C2-8:2FTS	100%		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-P2-OH185_1-2	
Lab Sample ID: FA67448-14	Date Sampled: 08/20/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 92.8
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q35453.D	1	09/05/19 22:34	NAF	08/28/19 12:00	OP76577	S2Q555
Run #2							

Run #	Initial Weight	Final Volume
Run #1	1.96 g	1.0 ml
Run #2		

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	4.01	1.1	0.27	ug/kg	
68259-12-1	Perfluorononanesulfonic acid	0.335	1.1	0.27	ug/kg	J
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-P2-OH185_1-2	
Lab Sample ID: FA67448-14	Date Sampled: 08/20/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 92.8
Project: Racer Lansing PFAS Delineation; Lansing, MI	

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	103%		50-150%
	13C5-PFPeA	105%		50-150%
	13C5-PFHxA	105%		50-150%
	13C4-PFHpA	103%		50-150%
	13C8-PFOA	108%		50-150%
	13C9-PFNA	107%		50-150%
	13C6-PFDA	103%		50-150%
	13C7-PFUnDA	98%		50-150%
	13C2-PFDoDA	101%		50-150%
	13C2-PFTeDA	104%		50-150%
	13C3-PFBS	99%		50-150%
	13C3-PFHxS	100%		50-150%
	13C8-PFOS	102%		50-150%
	13C8-FOSA	101%		50-150%
	d3-MeFOSAA	104%		50-150%
	13C2-4:2FTS	95%		50-150%
	13C2-6:2FTS	99%		50-150%
	13C2-8:2FTS	94%		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-P2-OH185_5-6	
Lab Sample ID: FA67448-15	Date Sampled: 08/20/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 91.6
Project: Racer Lansing PFAS Delineation; Lansing, MI	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q35454.D	1	09/05/19 22:50	NAF	08/28/19 12:00	OP76577	S2Q555
Run #2							

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

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	6.63	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-P2-OH185_5-6	
Lab Sample ID: FA67448-15	Date Sampled: 08/20/19
Matrix: SO - Soil	Date Received: 08/24/19
Method: EPA 537M BY ID IN HOUSE	Percent Solids: 91.6
Project: Racer Lansing PFAS Delineation; Lansing, MI	

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	92%		50-150%
	13C5-PFPeA	94%		50-150%
	13C5-PFHxA	93%		50-150%
	13C4-PFHpA	93%		50-150%
	13C8-PFOA	97%		50-150%
	13C9-PFNA	96%		50-150%
	13C6-PFDA	93%		50-150%
	13C7-PFUnDA	87%		50-150%
	13C2-PFDoDA	91%		50-150%
	13C2-PFTeDA	93%		50-150%
	13C3-PFBS	90%		50-150%
	13C3-PFHxS	90%		50-150%
	13C8-PFOS	92%		50-150%
	13C8-FOSA	88%		50-150%
	d3-MeFOSAA	93%		50-150%
	13C2-4:2FTS	85%		50-150%
	13C2-6:2FTS	89%		50-150%
	13C2-8:2FTS	85%		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-P2-OT192_29-34	
Lab Sample ID: FA67448-16	Date Sampled: 08/20/19
Matrix: AQ - Ground Water	Date Received: 08/24/19
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	3Q8744.D	1	09/11/19 03:13	NG	09/07/19 12:00	OP76718	S3Q164
Run #2							

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

CAS No.	Compound	Result	RL	MDL	Units	Q
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PERFLUOROALKYL CARBOXYLIC ACIDS

375-22-4	Perfluorobutanoic acid	0.0255	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0166	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0103	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	

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	0.00186	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0153	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	
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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-P2-OT192_29-34	Date Sampled:	08/20/19
Lab Sample ID:	FA67448-16	Date Received:	08/24/19
Matrix:	AQ - Ground Water	Percent Solids:	n/a
Method:	EPA 537M BY ID EPA 537 MOD		
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

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	82%		50-150%
	13C4-PFHpA	84%		50-150%
	13C8-PFOA	92%		50-150%
	13C9-PFNA	86%		50-150%
	13C6-PFDA	67%		50-150%
	13C7-PFUnDA	53%		50-150%
	13C2-PFDoDA	51%		50-150%
	13C2-PFTeDA	54%		40-150%
	13C3-PFBS	82%		50-150%
	13C3-PFHxS	79%		50-150%
	13C8-PFOS	58%		50-150%
	13C8-FOSA	67%		30-140%
	d3-MeFOSAA	58%		50-150%
	13C2-4:2FTS	88%		50-150%
	13C2-6:2FTS	98%		50-150%
	13C2-8:2FTS	66%		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-P2-OT192_0-5	
Lab Sample ID: FA67448-17	Date Sampled: 08/20/19
Matrix: AQ - Ground Water	Date Received: 08/24/19
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	3Q8745.D	1	09/11/19 03:28	NG	09/07/19 12:00	OP76718	S3Q164
Run #2 ^a	3Q8787.D	20	09/11/19 14:46	NG	09/07/19 12:00	OP76718	S3Q164

Run #	Initial Volume	Final Volume
Run #1	270 ml	1.0 ml
Run #2	270 ml	1.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
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PERFLUOROALKYL CARBOXYLIC ACIDS

375-22-4	Perfluorobutanoic acid	ND ^b	0.15	0.037	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0709	0.0037	0.0014	ug/l	
307-24-4	Perfluorohexanoic acid	0.193	0.0037	0.00093	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0744	0.0037	0.00093	ug/l	
335-67-1	Perfluorooctanoic acid	0.125	0.0037	0.00093	ug/l	
375-95-1	Perfluorononanoic acid	0.00491	0.0037	0.00093	ug/l	
335-76-2	Perfluorodecanoic acid	0.00195	0.0037	0.00093	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.0037	0.00093	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0037	0.0014	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0037	0.00093	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0037	0.00093	ug/l	

PERFLUOROALKYL SULFONATES

375-73-5	Perfluorobutanesulfonic acid	0.185	0.0037	0.00093	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	0.230	0.0037	0.00093	ug/l	
355-46-4	Perfluorohexanesulfonic acid	1.41 ^b	0.074	0.019	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.0795	0.0037	0.00093	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	5.04 ^b	0.074	0.028	ug/l	
68259-12-1	Perfluorononanesulfonic acid	0.0334	0.0037	0.00093	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0037	0.00093	ug/l	

PERFLUORO OCTANESULFONAMIDES

754-91-6	PFOSA	0.0229	0.0037	0.00093	ug/l	
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PERFLUORO OCTANESULFONAMIDOACETIC ACIDS

2355-31-9	MeFOSAA	ND	0.019	0.0037	ug/l	
2991-50-6	EtFOSAA	ND	0.019	0.0037	ug/l	

FLUOROTELOMER SULFONATES

757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0074	0.0019	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0074	0.0019	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-P2-OT192_0-5	
Lab Sample ID: FA67448-17	Date Sampled: 08/20/19
Matrix: AQ - Ground Water	Date Received: 08/24/19
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	0.00228	0.0074	0.0019	ug/l	J

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	15% ^c	110%	30-140%
	13C5-PFPeA	82%	111%	40-140%
	13C5-PFHxA	92%	113%	50-150%
	13C4-PFHpA	86%	113%	50-150%
	13C8-PFOA	97%	117%	50-150%
	13C9-PFNA	80%	116%	50-150%
	13C6-PFDA	93%	118%	50-150%
	13C7-PFUnDA	66%	115%	50-150%
	13C2-PFDoDA	53%	113%	50-150%
	13C2-PFTeDA	58%	110%	40-150%
	13C3-PFBS	93%	111%	50-150%
	13C3-PFHxS	82%	111%	50-150%
	13C8-PFOS	65%	112%	50-150%
	13C8-FOSA	80%	119%	30-140%
	d3-MeFOSAA	82%	120%	50-150%
	13C2-4:2FTS	93%	108%	50-150%
	13C2-6:2FTS	101%	111%	50-150%
	13C2-8:2FTS	98%	109%	50-150%

- (a) Dilution required due to matrix interference (internal standard failure).
- (b) Result is from Run# 2
- (c) Outside control limits due to matrix interference.

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-P2-NV185_21-26	
Lab Sample ID: FA67448-18	Date Sampled: 08/20/19
Matrix: AQ - Ground Water	Date Received: 08/24/19
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	3Q8750.D	1	09/11/19 04:43	NG	09/07/19 12:00	OP76718	S3Q164
Run #2	2Q36069.D	1.19	09/16/19 12:51	NAF	09/13/19 07:00	OP76828	S2Q563
Run #3 ^a	3Q8790.D	20	09/11/19 15:31	NG	09/07/19 12:00	OP76718	S3Q164

Run #	Initial Volume	Final Volume
Run #1	270 ml	1.0 ml
Run #2	250 ml	1.0 ml
Run #3	270 ml	1.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0151 ^b	0.0095	0.0024	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0184 ^b	0.0048	0.0018	ug/l	
307-24-4	Perfluorohexanoic acid	0.0158 ^b	0.0048	0.0012	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0119 ^b	0.0048	0.0012	ug/l	
335-67-1	Perfluorooctanoic acid	0.0283 ^b	0.0048	0.0012	ug/l	
375-95-1	Perfluorononanoic acid	0.00486 ^b	0.0048	0.0012	ug/l	
335-76-2	Perfluorodecanoic acid	0.00350 ^b	0.0048	0.0012	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND ^b	0.0048	0.0012	ug/l	
307-55-1	Perfluorododecanoic acid	ND ^b	0.0048	0.0018	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND ^b	0.0048	0.0012	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND ^b	0.0048	0.0012	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.113 ^b	0.0048	0.0012	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	0.00408 ^b	0.0048	0.0012	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	0.00415 ^b	0.0048	0.0012	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	0.00149 ^b	0.0048	0.0012	ug/l	J
1763-23-1	Perfluorooctanesulfonic acid	0.0464 ^b	0.0048	0.0018	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND ^b	0.0048	0.0012	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0037	0.00093	ug/l	
PERFLUOROOCETANESULFONAMIDES						
754-91-6	PFOSA	ND ^c	0.074	0.019	ug/l	
PERFLUOROOCETANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND ^b	0.024	0.0048	ug/l	
2991-50-6	EiFOSAA	ND ^b	0.024	0.0048	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: SB-P2-NV185_21-26		Date Sampled: 08/20/19
Lab Sample ID: FA67448-18		Date Received: 08/24/19
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

CAS No.	Compound	Result	RL	MDL	Units	Q
757124-72-4	4:2 Fluorotelomer sulfonate	ND ^b	0.0095	0.0024	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND ^b	0.0095	0.0024	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND ^b	0.0095	0.0024	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Run# 3	Limits
	13C4-PFBA	44%	71%	109%	30-140%
	13C5-PFPeA	60%	63%	109%	40-140%
	13C5-PFHxA	49% ^d	58%	107%	50-150%
	13C4-PFHpA	47% ^d	59%	105%	50-150%
	13C8-PFOA	51%	69%	110%	50-150%
	13C9-PFNA	52%	75%	111%	50-150%
	13C6-PFDA	52%	75%	111%	50-150%
	13C7-PFUnDA	44% ^d	80%	110%	50-150%
	13C2-PFDoDA	38% ^d	81%	112%	50-150%
	13C2-PFTeDA	52%	94%	111%	40-150%
	13C3-PFBS	65%	71%	108%	50-150%
	13C3-PFHxS	58%	72%	103%	50-150%
	13C8-PFOS	51%	69%	103%	50-150%
	13C8-FOSA	10% ^d	18% ^d	97%	30-140%
	d3-MeFOSAA	40% ^d	63%	125%	50-150%
	13C2-4:2FTS	59%	73%	109%	50-150%
	13C2-6:2FTS	69%	99%	117%	50-150%
	13C2-8:2FTS	74%	98%	112%	50-150%

- (a) Dilution required due to matrix interference (internal standard failure).
- (b) Result is from Run# 2
- (c) Result is from Run# 3
- (d) Outside control limits due to matrix interference.

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-P2-NV185_5-10	
Lab Sample ID: FA67448-19	Date Sampled: 08/20/19
Matrix: AQ - Ground Water	Date Received: 08/24/19
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	3Q8751.D	1	09/11/19 04:58	NG	09/07/19 12:00	OP76718	S3Q164
Run #2 ^a	3Q8791.D	20	09/11/19 15:46	NG	09/07/19 12:00	OP76718	S3Q164

Run #	Initial Volume	Final Volume
Run #1	270 ml	1.0 ml
Run #2	270 ml	1.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
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PERFLUOROALKYL CARBOXYLIC ACIDS

375-22-4	Perfluorobutanoic acid	0.0142	0.0074	0.0019	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0115	0.0037	0.0014	ug/l	
307-24-4	Perfluorohexanoic acid	0.0142	0.0037	0.00093	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0152	0.0037	0.00093	ug/l	
335-67-1	Perfluorooctanoic acid	0.0441	0.0037	0.00093	ug/l	
375-95-1	Perfluorononanoic acid	0.00812	0.0037	0.00093	ug/l	
335-76-2	Perfluorodecanoic acid	0.0183	0.0037	0.00093	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0037	0.00093	ug/l	
307-55-1	Perfluorododecanoic acid	ND ^b	0.074	0.028	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0037	0.00093	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0037	0.00093	ug/l	

PERFLUOROALKYL SULFONATES

375-73-5	Perfluorobutanesulfonic acid	ND	0.0037	0.00093	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0037	0.00093	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00576	0.0037	0.00093	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0037	0.00093	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.130	0.0037	0.0014	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0037	0.00093	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0037	0.00093	ug/l	

PERFLUORO OCTANESULFONAMIDES

754-91-6	PFOSA	0.00374	0.0037	0.00093	ug/l	
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PERFLUORO OCTANESULFONAMIDOACETIC ACIDS

2355-31-9	MeFOSAA	ND	0.019	0.0037	ug/l	
2991-50-6	EtFOSAA	ND	0.019	0.0037	ug/l	

FLUOROTELOMER SULFONATES

757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0074	0.0019	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0074	0.0019	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-P2-NV185_5-10	
Lab Sample ID: FA67448-19	Date Sampled: 08/20/19
Matrix: AQ - Ground Water	Date Received: 08/24/19
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: Racer Lansing PFAS Delineation; Lansing, MI	

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	0.00423	0.0074	0.0019	ug/l	J

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	60%	109%	30-140%
	13C5-PFPeA	87%	110%	40-140%
	13C5-PFHxA	83%	110%	50-150%
	13C4-PFHpA	79%	110%	50-150%
	13C8-PFOA	84%	113%	50-150%
	13C9-PFNA	82%	114%	50-150%
	13C6-PFDA	72%	114%	50-150%
	13C7-PFUnDA	51%	112%	50-150%
	13C2-PFDoDA	42% ^c	110%	50-150%
	13C2-PFTeDA	45%	109%	40-150%
	13C3-PFBS	86%	109%	50-150%
	13C3-PFHxS	75%	109%	50-150%
	13C8-PFOS	62%	109%	50-150%
	13C8-FOSA	45%	115%	30-140%
	d3-MeFOSAA	78%	118%	50-150%
	13C2-4:2FTS	89%	106%	50-150%
	13C2-6:2FTS	96%	110%	50-150%
	13C2-8:2FTS	87%	109%	50-150%

- (a) Dilution required due to matrix interference (internal standard failure).
- (b) Result is from Run# 2
- (c) Outside control limits due to matrix interference.

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: DUP-01_GW		
Lab Sample ID: FA67448-20		Date Sampled: 08/20/19
Matrix: AQ - Ground Water		Date Received: 08/24/19
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	3Q8752.D	1	09/11/19 05:13	NG	09/07/19 12:00	OP76718	S3Q164
Run #2	2Q36070.D	2.77	09/16/19 13:07	NAF	09/13/19 07:00	OP76828	S2Q563

Run #	Initial Volume	Final Volume
Run #1	270 ml	1.0 ml
Run #2	250 ml	1.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.00985 ^a	0.022	0.0055	ug/l	J
2706-90-3	Perfluoropentanoic acid	0.0104 ^a	0.011	0.0042	ug/l	J
307-24-4	Perfluorohexanoic acid	0.0109 ^a	0.011	0.0028	ug/l	J
375-85-9	Perfluoroheptanoic acid	0.00857 ^a	0.011	0.0028	ug/l	J
335-67-1	Perfluorooctanoic acid	0.0201 ^a	0.011	0.0028	ug/l	
375-95-1	Perfluorononanoic acid	0.00348 ^a	0.011	0.0028	ug/l	J
335-76-2	Perfluorodecanoic acid	0.00282 ^a	0.011	0.0028	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND ^a	0.011	0.0028	ug/l	
307-55-1	Perfluorododecanoic acid	ND ^a	0.011	0.0042	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND ^a	0.011	0.0028	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND ^a	0.011	0.0028	ug/l	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND ^a	0.011	0.0028	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	0.00600 ^a	0.011	0.0028	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	ND ^a	0.011	0.0028	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND ^a	0.011	0.0028	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0397 ^a	0.011	0.0042	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND ^a	0.011	0.0028	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0037	0.00093	ug/l	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND ^a	0.011	0.0028	ug/l	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND ^a	0.055	0.011	ug/l	
2991-50-6	EtFOSAA	ND ^a	0.055	0.011	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND ^a	0.022	0.0055	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND ^a	0.022	0.0055	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-01_GW		Date Sampled: 08/20/19
Lab Sample ID: FA67448-20		Date Received: 08/24/19
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: Racer Lansing PFAS Delineation; Lansing, MI		

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND ^a	0.022	0.0055	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	49%	119%	30-140%
	13C5-PFPeA	61%	112%	40-140%
	13C5-PFHxA	51%	110%	50-150%
	13C4-PFHpA	47% ^b	111%	50-150%
	13C8-PFOA	52%	119%	50-150%
	13C9-PFNA	52%	115%	50-150%
	13C6-PFDA	52%	109%	50-150%
	13C7-PFUnDA	44% ^b	122%	50-150%
	13C2-PFDoDA	33% ^b	126%	50-150%
	13C2-PFTeDA	42%	133%	40-150%
	13C3-PFBS	66%	116%	50-150%
	13C3-PFHxS	58%	111%	50-150%
	13C8-PFOS	52%	98%	50-150%
	13C8-FOSA	8% ^b	34%	30-140%
	d3-MeFOSAA	39% ^b	126%	50-150%
	13C2-4:2FTS	60%	125%	50-150%
	13C2-6:2FTS	70%	148%	50-150%
	13C2-8:2FTS	74%	121%	50-150%

- (a) Result is from Run# 2
- (b) Outside control limits due to matrix interference.

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:

- Certification Exceptions
- Chain of Custody

Parameter Certification Exceptions

Job Number: FA67448
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

The following parameters included in this report are exceptions to NELAC certification.
The certification status of each is indicated below.

Parameter	CAS#	Method	Mat	Certification Status
4:2 Fluorotelomer sulfonate	757124-72-4	EPA 537M BY ID	SO	Certified by SOP MS014
4:2 Fluorotelomer sulfonate	757124-72-4	EPA 537M BY ID	AQ	Certified by SOP MS014
6:2 Fluorotelomer sulfonate	27619-97-2	EPA 537M BY ID	SO	Certified by SOP MS014
6:2 Fluorotelomer sulfonate	27619-97-2	EPA 537M BY ID	AQ	Certified by SOP MS014
8:2 Fluorotelomer sulfonate	39108-34-4	EPA 537M BY ID	SO	Certified by SOP MS014
8:2 Fluorotelomer sulfonate	39108-34-4	EPA 537M BY ID	AQ	Certified by SOP MS014
EtFOSAA	2991-50-6	EPA 537M BY ID	AQ	Certified by SOP MS014
EtFOSAA	2991-50-6	EPA 537M BY ID	SO	Certified by SOP MS014
MeFOSAA	2355-31-9	EPA 537M BY ID	AQ	Certified by SOP MS014
MeFOSAA	2355-31-9	EPA 537M BY ID	SO	Certified by SOP MS014
PFOSA	754-91-6	EPA 537M BY ID	AQ	Certified by SOP MS014
PFOSA	754-91-6	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluorobutanesulfonic acid	375-73-5	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluorobutanesulfonic acid	375-73-5	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluorobutanoic acid	375-22-4	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluorobutanoic acid	375-22-4	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluorodecanesulfonic acid	335-77-3	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluorodecanesulfonic acid	335-77-3	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluorodecanoic acid	335-76-2	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluorodecanoic acid	335-76-2	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluorododecanoic acid	307-55-1	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluorododecanoic acid	307-55-1	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluoroheptanesulfonic acid	375-92-8	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluoroheptanesulfonic acid	375-92-8	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluoroheptanoic acid	375-85-9	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluoroheptanoic acid	375-85-9	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluorohexanesulfonic acid	355-46-4	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluorohexanesulfonic acid	355-46-4	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluorohexanoic acid	307-24-4	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluorohexanoic acid	307-24-4	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluorononanesulfonic acid	68259-12-1	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluorononanesulfonic acid	68259-12-1	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluorononanoic acid	375-95-1	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluorononanoic acid	375-95-1	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluorooctanesulfonic acid	1763-23-1	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluorooctanesulfonic acid	1763-23-1	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluorooctanoic acid	335-67-1	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluorooctanoic acid	335-67-1	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluoropentanesulfonic acid	2706-91-4	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluoropentanesulfonic acid	2706-91-4	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluoropentanoic acid	2706-90-3	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluoropentanoic acid	2706-90-3	EPA 537M BY ID	AQ	Certified by SOP MS014

4.1
4

Parameter Certification Exceptions

Job Number: FA67448
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

The following parameters included in this report are exceptions to NELAC certification.
The certification status of each is indicated below.

Parameter	CAS#	Method	Mat	Certification Status
Perfluorotetradecanoic acid	376-06-7	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluorotetradecanoic acid	376-06-7	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluorotridecanoic acid	72629-94-8	EPA 537M BY ID	AQ	Certified by SOP MS014
Perfluorotridecanoic acid	72629-94-8	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluoroundecanoic acid	2058-94-8	EPA 537M BY ID	SO	Certified by SOP MS014
Perfluoroundecanoic acid	2058-94-8	EPA 537M BY ID	AQ	Certified by SOP MS014

4.1
4



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FA67448
SGS - ORLANDO JOB #: _____ PAGE _____ OF 2

SGS - ORLANDO Quote # _____ SKIFF # _____

Client / Reporting Information			Project Information			Analytical Information												Matrix Codes
Company Name: <u>Arcadis</u>			Project Name: <u>PFA's investigation borings/well installation</u>			Analytical Information Table with columns for various parameters and checkboxes.												Matrix Codes: DW - Drinking Water GW - Ground Water WW - Water SW - Surface Water SO - Soil SL - Sludge OL - Oil LIQ - Other Liquid AIR - Air SOL - Other Solid
Address: <u>28550 Cabot Dr., Suite 500</u>			Street: <u>2801 W Saginaw St.</u>															
City: <u>NOVI</u> State: <u>MI</u> Zip: <u>48377</u>			City: <u>Lansing</u> State: <u>MI</u>															
Project Contact: <u>Alex Villhaver</u> Email: <u>alex.vilhaver@arcadis.com</u>			Project # <u>3006870 - 03100</u>															
Phone #: <u>666-780-3277</u>			Fax # _____															
Sampler(s) Name(s) (Printed) Sampler 1: <u>E. Redner</u> Sampler 2: _____			Client Purchase Order # _____															
SGS Orlando Sample #	Field ID / Point of Collection	DATE	TIME	SAMPLED BY	MATRIX	TOTAL # OF BOTTLES	OTHER	NONE	HCl	NaOH	HNO3	H2SO4	NaOH/Na2	DI WATER	MEDI	LAB USE ONLY		
																	COLLECTION	CONTAINER INFORMATION
1	SB-P2-NR189-95-10.5	8/19/19	1415	ER	SO	1		X								X		
2	SB-P2-NR189-12-13	8/19/19	1420	ER	SO	1		A								X		
3	SB-P2-NR189-24-29	8/19/19	1700	ER	GW	2		X								X		
4	SB-P2-DA188-2-3	8/19/19	1615	ER	SO	1		A								X		
5	SB-P2-DA188-13-14	8/19/19	1620	ER	SO	1		A								X		
6	SB-P2-DA188-10-15	8/19/19	1820	ER	GW	2		X								X		
7	SB-P2-DA188-21-26	8/19/19	1740	ER	GW	2		X								X		
8	SB-P2-OT192-27-3	8/20/19	1050	ER	SO	1		A								X		
9	SB-P2-OT192-6-7	8/20/19	1055	ER	SO	1		A								X		
10	EQUIP-BLANK-01	8/20/19	1145	ER	WW	2		X								X		
11	SB-P2-NV185-1-2	8/20/19	1320	ER	SO	1		X								X		
12	DUP-01-S01L	8/20/19	-	ER	SO	1		X								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 type="checkbox"/> EDD'S												
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>EVV / Arcadis</u>		Date Time: <u>8/20/19 2040</u>		Received By/Affiliation <u>NOVI Cold Storage / Arcadis</u>		Relinquished By/Affiliation <u>NOVI Cold Storage</u>		Date Time: <u>8/21/19 1905</u>		Received By/Affiliation <u>Elen Redner / Arcadis</u>								
Relinquished by/Affiliation <u>EVV / Arcadis</u>		Date Time: <u>8/23/19 1630</u>		Received By/Affiliation <u>Redner</u>		Relinquished By/Affiliation <u>FIX</u>		Date Time: <u>8/24/19</u>		Received By/Affiliation <u>Redner</u>								
Lab Use Only : Cooler Temperature (s) Celsius (corrected): <u>36</u>																		
http://www.sgs.com/en/terms-and-conditions																		

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





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SGS - ORLANDO JOB #:

PAGE 2 OF 2

FA67448

Client / Reporting Information		Project Information		Analytical Information										Matrix Codes			
Company Name: Arcadis		Project Name: PFAS Investigation borings/well installation												DW - Drinking Water			
Address: 2850 Cabot Dr., Suite 500		Street: 2801 W. Saginaw St												GW - Ground Water			
City: Novi State: MI Zip: 48377		City: Lansing State: MI												WW - Water			
Project Contact: Alex Villhaver Email: alex.vilhaver@arcadis.com		Project #												SW - Surface Water			
Phone #: 616-780-3277		Fax #												SO - Soil			
Sampler(s) Name(s) (Printed)		Client Purchase Order #												SL - Sludge			
Sampler 1: E. Redner Sampler 2:														OI - Oil			
SGS Orlando Sample #	Field ID / Point of Collection	COLLECTION			CONTAINER INFORMATION										LAB USE ONLY		
		DATE	TIME	SAMPLED BY	MATRIX	TOTAL # OF BOTTLES	OTHER	NONE	PCI	NICH	INCO	HS04	NOCH/204	DI WATER		MICH	
13	SB-P2-NV185-6-7	8/20/19	1325	ER	SO	1		X									
14	SB-P2-OH185-1-2	8/20/19	1545	ER	SO	1		X									
15	SB-P2-OH185-5-6	8/20/19	1550	ER	SO	1		X									
16	SB-P2-OT192-2A-34	8/20/19	1635	ER	GW	2		X									
17	SB-P2-OT192-0-5	8/20/19	1710	ER	GW	6		X									MSMSD
18	SB-P2-NV185-21-26	8/20/19	1750	ER	GW	2		X									
19	SB-P2-NV185-5-10	8/20/19	1810	ER	GW	2		X									
20	DVP-01-GW	8/20/19		ER	GW	2		X									
21	Trip Blank					1											
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 type="checkbox"/> EDD'S										SB-P2-07192-0-5 is MSMSD sample as well			
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	Relinquished By/Affiliation	Date Time:	Received By/Affiliation	Relinquished By/Affiliation	Date Time:	Received By/Affiliation			
1 gvr / Arcadis	8/20/19 2049	2 Novi Cold Storage / Arcadis	3 NDU Cold Storage	8/22/19 1405	4 Ellen Redner / Arcadis	5 gvr / Arcadis	8/23/19 1639	6 Pd-R	7 fx	8/24/19	8/24/19						
Lab Use Only: Cooler Temperature (s) Celsius (corrected):																	

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

FA67448: Chain of Custody

Page 2 of 3



SGS Sample Receipt Summary

Job Number: FA67448

Client: ARCADIS

Project: PFAS INVESTIGATION BONINGS WELL INSTAL

Date / Time Received: 8/24/2019 10:00:00 AM

Delivery Method: FED EX

Airbill #'s: _____

Therm ID: IR 1;

Therm CF: 1;

of Coolers: 1

Cooler Temps (Raw Measured) °C: Cooler 1: (2.6);

Cooler Temps (Corrected) °C: Cooler 1: (3.6);

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 checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Trip Blank listed on COC | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input 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 _____
 Test Strip Lot #: pH 0-3 230315
 Residual Chlorine Test Strip Lot #: _____

Number of 5035 Field Kits: _____
 pH 10-12 219813A

Number of Lab Filtered Metals: _____
 Other: (Specify) _____

Comments

SM001
 Rev. Date 05/24/17

Technician: TRINITYM

Date: 8/24/2019 10:00:00 A

Reviewer: _____

Date: _____

FA67448: Chain of Custody

Page 3 of 3

4.2
4

MS Semi-volatiles

5

QC Data Summaries

Includes the following where applicable:

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

Method Blank Summary

Job Number: FA67448
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76577-MB	2Q35429.D	1	09/05/19	NAF	08/28/19	OP76577	S2Q555

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67448-1, FA67448-2, FA67448-4, FA67448-5, FA67448-8, FA67448-9, FA67448-11, FA67448-12, FA67448-13, FA67448-14, FA67448-15

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	EiFOSAA	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	83% 50-150%
	13C5-PFPeA	85% 50-150%
	13C5-PFHxA	85% 50-150%
	13C4-PFHpA	84% 50-150%
	13C8-PFOA	87% 50-150%
	13C9-PFNA	86% 50-150%
	13C6-PFDA	82% 50-150%
	13C7-PFUnDA	79% 50-150%

5.1.1
5

Method Blank Summary

Job Number: FA67448
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76577-MB	2Q35429.D	1	09/05/19	NAF	08/28/19	OP76577	S2Q555

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67448-1, FA67448-2, FA67448-4, FA67448-5, FA67448-8, FA67448-9, FA67448-11, FA67448-12, FA67448-13, FA67448-14, FA67448-15

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	80% 50-150%
	13C2-PFTeDA	85% 50-150%
	13C3-PFBS	81% 50-150%
	13C3-PFHxS	81% 50-150%
	13C8-PFOS	82% 50-150%
	13C8-FOSA	82% 50-150%
	d3-MeFOSAA	83% 50-150%
	13C2-4:2FTS	76% 50-150%
	13C2-6:2FTS	79% 50-150%
	13C2-8:2FTS	75% 50-150%

5.1.1
5

Method Blank Summary

Job Number: FA67448
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76718-MB	3Q8739.D	1	09/11/19	NG	09/07/19	OP76718	S3Q164

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67448-3, FA67448-6, FA67448-7, FA67448-10, FA67448-16, FA67448-17, FA67448-18, FA67448-19, FA67448-20

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	EiFOSAA	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	99% 40-140%
	13C5-PFHxA	97% 50-150%
	13C4-PFHpA	97% 50-150%
	13C8-PFOA	99% 50-150%
	13C9-PFNA	97% 50-150%
	13C6-PFDA	93% 50-150%
	13C7-PFUnDA	90% 50-150%

5.1.2
5

Method Blank Summary

Job Number: FA67448
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76718-MB	3Q8739.D	1	09/11/19	NG	09/07/19	OP76718	S3Q164

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67448-3, FA67448-6, FA67448-7, FA67448-10, FA67448-16, FA67448-17, FA67448-18, FA67448-19, FA67448-20

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	88% 50-150%
	13C2-PFTeDA	85% 40-150%
	13C3-PFBS	95% 50-150%
	13C3-PFHxS	91% 50-150%
	13C8-PFOS	82% 50-150%
	13C8-FOSA	91% 30-140%
	d3-MeFOSAA	95% 50-150%
	13C2-4:2FTS	93% 50-150%
	13C2-6:2FTS	95% 50-150%
	13C2-8:2FTS	91% 50-150%
	13C3-HFPO-DA	99% 50-150%

5.1.2
5

Method Blank Summary

Job Number: FA67448
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76828-MB	2Q36057.D	1	09/16/19	NAF	09/13/19	OP76828	S2Q563

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67448-7, FA67448-18, FA67448-20

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	
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	EiFOSAA	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	93% 30-140%
	13C5-PFPeA	92% 40-140%
	13C5-PFHxA	94% 50-150%
	13C4-PFHpA	96% 50-150%
	13C8-PFOA	97% 50-150%
	13C9-PFNA	97% 50-150%
	13C6-PFDA	98% 50-150%
	13C7-PFUnDA	85% 50-150%
	13C2-PFDoDA	74% 50-150%

5.1.3
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Method Blank Summary

Job Number: FA67448
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76828-MB	2Q36057.D	1	09/16/19	NAF	09/13/19	OP76828	S2Q563

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67448-7, FA67448-18, FA67448-20

CAS No.	ID Standard Recoveries	Limits
	13C2-PFTeDA	66% 40-150%
	13C3-PFBS	93% 50-150%
	13C3-PFHxS	93% 50-150%
	13C8-PFOS	91% 50-150%
	13C8-FOSA	83% 30-140%
	d3-MeFOSAA	85% 50-150%
	13C2-4:2FTS	87% 50-150%
	13C2-6:2FTS	93% 50-150%
	13C2-8:2FTS	90% 50-150%
	13C3-HFPO-DA	97% 50-150%

Instrument Blank

Job Number: FA67448
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q555-IBLK	2Q35401.D	1	09/05/19	NAF	n/a	n/a	S2Q555

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA67448-1, FA67448-2, FA67448-4, FA67448-5, FA67448-8, FA67448-9, FA67448-11, FA67448-12, FA67448-13, FA67448-14, FA67448-15

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	EiFOSAA	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	114% 50-150%
	13C5-PFPeA	114% 50-150%
	13C5-PFHxA	112% 50-150%
	13C4-PFHpA	112% 50-150%
	13C8-PFOA	113% 50-150%
	13C9-PFNA	111% 50-150%
	13C6-PFDA	110% 50-150%
	13C7-PFUnDA	113% 50-150%

5.1.4
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Instrument Blank

Job Number: FA67448
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q555-IBLK	2Q35401.D	1	09/05/19	NAF	n/a	n/a	S2Q555

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA67448-1, FA67448-2, FA67448-4, FA67448-5, FA67448-8, FA67448-9, FA67448-11, FA67448-12, FA67448-13, FA67448-14, FA67448-15

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	109% 50-150%
	13C2-PFTeDA	109% 50-150%
	13C3-PFBS	113% 50-150%
	13C3-PFHxS	115% 50-150%
	13C8-PFOS	115% 50-150%
	13C8-FOSA	110% 50-150%
	d3-MeFOSAA	109% 50-150%
	13C2-4:2FTS	103% 50-150%
	13C2-6:2FTS	103% 50-150%
	13C2-8:2FTS	95% 50-150%

5.1.4
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Instrument Blank

Job Number: FA67448
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S3Q164-IBLK	3Q8671.D	1	09/10/19	NG	n/a	n/a	S3Q164

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA67448-3, FA67448-6, FA67448-7, FA67448-10, FA67448-16, FA67448-17, FA67448-18, FA67448-19, FA67448-20

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	0.0077	0.0029	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	EiFOSAA	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	106% 50-150%
	13C5-PFPeA	107% 50-150%
	13C5-PFHxA	105% 50-150%
	13C4-PFHpA	106% 50-150%
	13C8-PFOA	111% 50-150%
	13C9-PFNA	112% 50-150%
	13C6-PFDA	114% 50-150%
	13C7-PFUnDA	114% 50-150%

5.1.5
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Instrument Blank

Job Number: FA67448
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S3Q164-IBLK	3Q8671.D	1	09/10/19	NG	n/a	n/a	S3Q164

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA67448-3, FA67448-6, FA67448-7, FA67448-10, FA67448-16, FA67448-17, FA67448-18, FA67448-19, FA67448-20

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	114% 50-150%
	13C2-PFTeDA	111% 50-150%
	13C3-PFBS	103% 50-150%
	13C3-PFHxS	103% 50-150%
	13C8-PFOS	105% 50-150%
	13C8-FOSA	116% 50-150%
	d3-MeFOSAA	116% 50-150%
	13C2-4:2FTS	100% 50-150%
	13C2-6:2FTS	106% 50-150%
	13C2-8:2FTS	109% 50-150%
	13C3-HFPO-DA	130% 50-150%

5.1.5
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Instrument Blank

Job Number: FA67448
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q563-IBLK	2Q36053.D	1	09/16/19	NAF	n/a	n/a	S2Q563

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA67448-7, FA67448-18, FA67448-20

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	
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	EiFOSAA	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	89% 50-150%
	13C5-PFPeA	89% 50-150%
	13C5-PFHxA	90% 50-150%
	13C4-PFHpA	92% 50-150%
	13C8-PFOA	94% 50-150%
	13C9-PFNA	94% 50-150%
	13C6-PFDA	97% 50-150%
	13C7-PFUnDA	97% 50-150%
	13C2-PFDoDA	94% 50-150%

5.1.6
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Instrument Blank

Job Number: FA67448
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q563-IBLK	2Q36053.D	1	09/16/19	NAF	n/a	n/a	S2Q563

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA67448-7, FA67448-18, FA67448-20

CAS No.	ID Standard Recoveries	Limits
	13C2-PFTeDA	93% 50-150%
	13C3-PFBS	91% 50-150%
	13C3-PFHxS	92% 50-150%
	13C8-PFOS	91% 50-150%
	13C8-FOSA	102% 50-150%
	d3-MeFOSAA	94% 50-150%
	13C2-4:2FTS	84% 50-150%
	13C2-6:2FTS	90% 50-150%
	13C2-8:2FTS	91% 50-150%

5.1.6
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Blank Spike Summary

Job Number: FA67448
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76577-BS	2Q35428.D	1	09/05/19	NAF	08/28/19	OP76577	S2Q555

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67448-1, FA67448-2, FA67448-4, FA67448-5, FA67448-8, FA67448-9, FA67448-11, FA67448-12, FA67448-13, FA67448-14, FA67448-15

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
375-22-4	Perfluorobutanoic acid	10	10.2	102	60-134
2706-90-3	Perfluoropentanoic acid	10	9.21	92	62-134
307-24-4	Perfluorohexanoic acid	10	9.94	99	63-130
375-85-9	Perfluoroheptanoic acid	10	9.48	95	63-122
335-67-1	Perfluorooctanoic acid	10	9.69	97	71-128
375-95-1	Perfluorononanoic acid	10	9.53	95	66-124
335-76-2	Perfluorodecanoic acid	10	10.2	102	68-127
2058-94-8	Perfluoroundecanoic acid	10	9.92	99	61-137
307-55-1	Perfluorododecanoic acid	10	9.91	99	71-126
72629-94-8	Perfluorotridecanoic acid	10	9.01	90	60-137
376-06-7	Perfluorotetradecanoic acid	10	9.73	97	61-131
375-73-5	Perfluorobutanesulfonic acid	10	9.76	98	70-135
2706-91-4	Perfluoropentanesulfonic acid	10	10.0	100	70-130
355-46-4	Perfluorohexanesulfonic acid	10	9.85	99	72-129
375-92-8	Perfluoroheptanesulfonic acid	10	10.4	104	62-129
1763-23-1	Perfluorooctanesulfonic acid	10	9.41	94	69-125
68259-12-1	Perfluorononanesulfonic acid	10	9.97	100	70-130
335-77-3	Perfluorodecanesulfonic acid	10	9.83	98	63-141
754-91-6	PFOSA	10	9.90	99	65-140
2355-31-9	MeFOSAA	10	9.91	99	71-124
2991-50-6	EiFOSAA	10	10.2	102	63-129
757124-72-44:2	Fluorotelomer sulfonate	10	9.81	98	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	10	9.55	96	76-131
39108-34-4	8:2 Fluorotelomer sulfonate	10	9.59	96	60-138

CAS No.	ID Standard Recoveries	BSP	Limits
	13C4-PFBA	90%	50-150%
	13C5-PFPeA	92%	50-150%
	13C5-PFHxA	91%	50-150%
	13C4-PFHpA	90%	50-150%
	13C8-PFOA	92%	50-150%
	13C9-PFNA	91%	50-150%
	13C6-PFDA	87%	50-150%
	13C7-PFUnDA	84%	50-150%

* = Outside of Control Limits.

5.2.1
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Blank Spike Summary

Job Number: FA67448
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76577-BS	2Q35428.D	1	09/05/19	NAF	08/28/19	OP76577	S2Q555

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67448-1, FA67448-2, FA67448-4, FA67448-5, FA67448-8, FA67448-9, FA67448-11, FA67448-12, FA67448-13, FA67448-14, FA67448-15

CAS No.	ID Standard Recoveries	BSP	Limits
	13C2-PFDoDA	86%	50-150%
	13C2-PFTeDA	92%	50-150%
	13C3-PFBS	86%	50-150%
	13C3-PFHxS	86%	50-150%
	13C8-PFOS	88%	50-150%
	13C8-FOSA	83%	50-150%
	d3-MeFOSAA	89%	50-150%
	13C2-4:2FTS	88%	50-150%
	13C2-6:2FTS	88%	50-150%
	13C2-8:2FTS	85%	50-150%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA67448
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76718-BS	3Q8738.D	1	09/11/19	NG	09/07/19	OP76718	S3Q164

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67448-3, FA67448-6, FA67448-7, FA67448-10, FA67448-16, FA67448-17, FA67448-18, FA67448-19, FA67448-20

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
375-22-4	Perfluorobutanoic acid	0.08	0.0774	97	70-130
2706-90-3	Perfluoropentanoic acid	0.08	0.0771	96	70-130
307-24-4	Perfluorohexanoic acid	0.08	0.0789	99	70-130
375-85-9	Perfluoroheptanoic acid	0.08	0.0802	100	71-130
335-67-1	Perfluorooctanoic acid	0.08	0.0786	98	74-130
375-95-1	Perfluorononanoic acid	0.08	0.0757	95	76-130
335-76-2	Perfluorodecanoic acid	0.08	0.0760	95	70-130
2058-94-8	Perfluoroundecanoic acid	0.08	0.0750	94	70-130
307-55-1	Perfluorododecanoic acid	0.08	0.0745	93	70-130
72629-94-8	Perfluorotridecanoic acid	0.08	0.0700	88	70-139
376-06-7	Perfluorotetradecanoic acid	0.08	0.0668	84	70-130
375-73-5	Perfluorobutanesulfonic acid	0.08	0.0779	97	73-130
2706-91-4	Perfluoropentanesulfonic acid	0.08	0.0782	98	70-130
355-46-4	Perfluorohexanesulfonic acid	0.08	0.0817	102	74-130
375-92-8	Perfluoroheptanesulfonic acid	0.08	0.0789	99	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.08	0.0785	98	70-130
68259-12-1	Perfluorononanesulfonic acid	0.08	0.0775	97	70-130
335-77-3	Perfluorodecanesulfonic acid	0.08	0.0652	82	70-130
754-91-6	PFOSA	0.08	0.0699	87	70-131
2355-31-9	MeFOSAA	0.08	0.0744	93	70-130
2991-50-6	EiFOSAA	0.08	0.0747	93	70-130
757124-72-44:2	Fluorotelomer sulfonate	0.08	0.0776	97	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	0.08	0.0764	96	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	0.08	0.0741	93	70-130

CAS No.	ID Standard Recoveries	BSP	Limits
	13C4-PFBA	100%	30-140%
	13C5-PFPeA	101%	40-140%
	13C5-PFHxA	98%	50-150%
	13C4-PFHpA	98%	50-150%
	13C8-PFOA	98%	50-150%
	13C9-PFNA	96%	50-150%
	13C6-PFDA	93%	50-150%
	13C7-PFUnDA	94%	50-150%

* = Outside of Control Limits.

5.2.2
5

Blank Spike Summary

Job Number: FA67448
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76718-BS	3Q8738.D	1	09/11/19	NG	09/07/19	OP76718	S3Q164

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67448-3, FA67448-6, FA67448-7, FA67448-10, FA67448-16, FA67448-17, FA67448-18, FA67448-19, FA67448-20

CAS No.	ID Standard Recoveries	BSP	Limits
	13C2-PFDoDA	93%	50-150%
	13C2-PFTeDA	96%	40-150%
	13C3-PFBS	96%	50-150%
	13C3-PFHxS	88%	50-150%
	13C8-PFOS	83%	50-150%
	13C8-FOSA	88%	30-140%
	d3-MeFOSAA	102%	50-150%
	13C2-4:2FTS	99%	50-150%
	13C2-6:2FTS	100%	50-150%
	13C2-8:2FTS	97%	50-150%
	13C3-HFPO-DA	100%	50-150%

* = Outside of Control Limits.

5.2.2
5

Blank Spike Summary

Job Number: FA67448
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76828-BS ^a	2Q36056.D	1	09/16/19	NAF	09/13/19	OP76828	S2Q563

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67448-7, FA67448-18, FA67448-20

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	0.0673	84	70-130
307-24-4	Perfluorohexanoic acid	0.08	0.0648	81	70-130
375-85-9	Perfluoroheptanoic acid	0.08	0.0658	82	71-130
335-67-1	Perfluorooctanoic acid	0.08	0.0667	83	74-130
375-95-1	Perfluorononanoic acid	0.08	0.0660	83	76-130
335-76-2	Perfluorodecanoic acid	0.08	0.0650	81	70-130
2058-94-8	Perfluoroundecanoic acid	0.08	0.0658	82	70-130
307-55-1	Perfluorododecanoic acid	0.08	0.0666	83	70-130
72629-94-8	Perfluorotridecanoic acid	0.08	0.0845	106	70-139
376-06-7	Perfluorotetradecanoic acid	0.08	0.0679	85	70-130
375-73-5	Perfluorobutanesulfonic acid	0.08	0.0670	84	73-130
2706-91-4	Perfluoropentanesulfonic acid	0.08	0.0684	86	70-130
355-46-4	Perfluorohexanesulfonic acid	0.08	0.0658	82	74-130
375-92-8	Perfluoroheptanesulfonic acid	0.08	0.0673	84	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.08	0.0639	80	70-130
68259-12-1	Perfluorononanesulfonic acid	0.08	0.0617	77	70-130
754-91-6	PFOSA	0.08	0.0654	82	70-131
2355-31-9	MeFOSAA	0.08	0.0683	85	70-130
2991-50-6	EiFOSAA	0.08	0.0670	84	70-130
757124-72-44:2	Fluorotelomer sulfonate	0.08	0.0671	84	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	0.08	0.0678	85	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	0.08	0.0682	85	70-130

CAS No.	ID Standard Recoveries	BSP	Limits
	13C4-PFBA	105%	30-140%
	13C5-PFPeA	104%	40-140%
	13C5-PFHxA	106%	50-150%
	13C4-PFHpA	107%	50-150%
	13C8-PFOA	108%	50-150%
	13C9-PFNA	108%	50-150%
	13C6-PFDA	110%	50-150%
	13C7-PFUnDA	100%	50-150%
	13C2-PFDoDA	91%	50-150%

* = Outside of Control Limits.

5.2.3
5

Blank Spike Summary

Job Number: FA67448
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76828-BS ^a	2Q36056.D	1	09/16/19	NAF	09/13/19	OP76828	S2Q563

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67448-7, FA67448-18, FA67448-20

CAS No.	ID Standard Recoveries	BSP	Limits
	13C2-PFTeDA	68%	40-150%
	13C3-PFBS	105%	50-150%
	13C3-PFHxS	105%	50-150%
	13C8-PFOS	102%	50-150%
	13C8-FOSA	81%	30-140%
	d3-MeFOSAA	98%	50-150%
	13C2-4:2FTS	104%	50-150%
	13C2-6:2FTS	108%	50-150%
	13C2-8:2FTS	108%	50-150%
	13C3-HFPO-DA	106%	50-150%

(a) Insufficient sample for MS/MSD.

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA67448
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76577-MS	2Q35441.D	1	09/05/19	NAF	08/28/19	OP76577	S2Q555
OP76577-MSD	2Q35442.D	1	09/05/19	NAF	08/28/19	OP76577	S2Q555
FA67448-1	2Q35440.D	1	09/05/19	NAF	08/28/19	OP76577	S2Q555

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67448-1, FA67448-2, FA67448-4, FA67448-5, FA67448-8, FA67448-9, FA67448-11, FA67448-12, FA67448-13, FA67448-14, FA67448-15

CAS No.	Compound	FA67448-1 ug/kg	Spike Q ug/kg	MS ug/kg	MS %	Spike ug/kg	MSD ug/kg	MSD %	RPD	Limits Rec/RPD
375-22-4	Perfluorobutanoic acid	ND	10.4	10.2	98	10.5	9.59	91	6	60-134/30
2706-90-3	Perfluoropentanoic acid	ND	10.4	9.40	90	10.5	8.86	84	6	62-134/30
307-24-4	Perfluorohexanoic acid	ND	10.4	10.1	97	10.5	9.36	89	8	63-130/30
375-85-9	Perfluoroheptanoic acid	ND	10.4	9.80	94	10.5	9.24	88	6	63-122/30
335-67-1	Perfluorooctanoic acid	ND	10.4	9.92	95	10.5	9.33	89	6	71-128/30
375-95-1	Perfluorononanoic acid	ND	10.4	9.82	94	10.5	9.23	88	6	66-124/30
335-76-2	Perfluorodecanoic acid	ND	10.4	10.4	100	10.5	9.72	92	7	68-127/30
2058-94-8	Perfluoroundecanoic acid	ND	10.4	10.0	96	10.5	9.55	91	5	61-137/30
307-55-1	Perfluorododecanoic acid	ND	10.4	10.2	98	10.5	9.57	91	6	71-126/30
72629-94-8	Perfluorotridecanoic acid	ND	10.4	8.61	83	10.5	8.05	77	7	60-137/30
376-06-7	Perfluorotetradecanoic acid	ND	10.4	9.94	95	10.5	9.21	88	8	61-131/30
375-73-5	Perfluorobutanesulfonic acid	ND	10.4	10.0	96	10.5	9.37	89	7	70-135/30
2706-91-4	Perfluoropentanesulfonic acid	ND	10.4	10.2	98	10.5	9.71	92	5	70-130/30
355-46-4	Perfluorohexanesulfonic acid	ND	10.4	9.88	95	10.5	9.39	89	5	72-129/30
375-92-8	Perfluoroheptanesulfonic acid	ND	10.4	10.5	101	10.5	9.86	94	6	62-129/30
1763-23-1	Perfluorooctanesulfonic acid	ND	10.4	9.43	91	10.5	8.70	83	8	69-125/30
68259-12-1	Perfluorononanesulfonic acid	ND	10.4	10.1	97	10.5	9.46	90	7	70-130/30
335-77-3	Perfluorodecanesulfonic acid	ND	10.4	9.94	95	10.5	9.24	88	7	63-141/30
754-91-6	PFOSA	ND	10.4	10.0	96	10.5	9.46	90	6	65-140/30
2355-31-9	MeFOSAA	ND	10.4	10.1	97	10.5	9.59	91	5	71-124/30
2991-50-6	EtFOSAA	ND	10.4	10.5	101	10.5	9.81	93	7	63-129/30
757124-72-44:2	Fluorotelomer sulfonate	ND	10.4	10.1	97	10.5	9.42	90	7	70-130/30
27619-97-2	6:2 Fluorotelomer sulfonate	ND	10.4	9.78	94	10.5	9.31	89	5	76-131/30
39108-34-4	8:2 Fluorotelomer sulfonate	ND	10.4	9.79	94	10.5	9.39	89	4	60-138/30

CAS No.	ID Standard Recoveries	MS	MSD	FA67448-1	Limits
	13C4-PFBA	90%	97%	86%	50-150%
	13C5-PFPeA	92%	99%	89%	50-150%
	13C5-PFHxA	92%	100%	90%	50-150%
	13C4-PFHpA	90%	97%	88%	50-150%
	13C8-PFOA	93%	100%	92%	50-150%
	13C9-PFNA	92%	100%	91%	50-150%
	13C6-PFDA	89%	96%	88%	50-150%
	13C7-PFUnDA	84%	91%	81%	50-150%

* = Outside of Control Limits.

5.3.1
5

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA67448
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76577-MS	2Q35441.D	1	09/05/19	NAF	08/28/19	OP76577	S2Q555
OP76577-MSD	2Q35442.D	1	09/05/19	NAF	08/28/19	OP76577	S2Q555
FA67448-1	2Q35440.D	1	09/05/19	NAF	08/28/19	OP76577	S2Q555

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67448-1, FA67448-2, FA67448-4, FA67448-5, FA67448-8, FA67448-9, FA67448-11, FA67448-12, FA67448-13, FA67448-14, FA67448-15

CAS No.	ID Standard Recoveries	MS	MSD	FA67448-1	Limits
	13C2-PFDoDA	86%	92%	81%	50-150%
	13C2-PFTeDA	98%	101%	88%	50-150%
	13C3-PFBS	86%	94%	84%	50-150%
	13C3-PFHxS	87%	94%	85%	50-150%
	13C8-PFOS	88%	95%	86%	50-150%
	13C8-FOSA	76%	86%	61%	50-150%
	d3-MeFOSAA	89%	97%	83%	50-150%
	13C2-4:2FTS	87%	94%	81%	50-150%
	13C2-6:2FTS	89%	96%	84%	50-150%
	13C2-8:2FTS	87%	93%	81%	50-150%

* = Outside of Control Limits.

5.3.1
5

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA67448
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76718-MS	3Q8788.D	20	09/11/19	NG	09/07/19	OP76718	S3Q164
OP76718-MSD	3Q8789.D	20	09/11/19	NG	09/07/19	OP76718	S3Q164
FA67448-17	3Q8745.D	1	09/11/19	NG	09/07/19	OP76718	S3Q164
FA67448-17 ^a	3Q8787.D	20	09/11/19	NG	09/07/19	OP76718	S3Q164

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67448-3, FA67448-6, FA67448-7, FA67448-10, FA67448-16, FA67448-17, FA67448-18, FA67448-19, FA67448-20

CAS No.	Compound	FA67448-17 ug/l	Spike Q	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
375-22-4	Perfluorobutanoic acid	ND ^b	0.0741	ND	0*	0.0741	ND	0*	nc	70-130/30
2706-90-3	Perfluoropentanoic acid	0.0709	0.0741	0.0919	28*	0.0741	0.0825	16*	11	70-130/30
307-24-4	Perfluorohexanoic acid	0.193	0.0741	0.229	49* ^c	0.0741	0.287	127	22	70-130/30
375-85-9	Perfluoroheptanoic acid	0.0744	0.0741	0.123	66*	0.0741	0.144	94	16	71-130/30
335-67-1	Perfluorooctanoic acid	0.125	0.0741	0.166	55*	0.0741	0.188	85	12	74-130/30
375-95-1	Perfluorononanoic acid	0.00491	0.0741	0.0608	75*	0.0741	0.0588	73*	3	76-130/30
335-76-2	Perfluorodecanoic acid	0.00195 ^J	0.0741	0.0564	74	0.0741	0.0510	66*	10	70-130/30
2058-94-8	Perfluoroundecanoic acid	ND	0.0741	0.0520	70	0.0741	0.0459	62*	12	70-130/30
307-55-1	Perfluorododecanoic acid	ND	0.0741	0.0486	66*	0.0741	0.0433	58*	12	70-130/30
72629-94-8	Perfluorotridecanoic acid	ND	0.0741	0.0486	66*	0.0741	0.0422	57*	14	70-139/30
376-06-7	Perfluorotetradecanoic acid	ND	0.0741	0.0498	67*	0.0741	0.0421	57*	17	70-130/30
375-73-5	Perfluorobutanesulfonic acid	0.185	0.0741	0.224	53* ^c	0.0741	0.311	170* ^c	33*	73-130/30
2706-91-4	Perfluoropentanesulfonic acid	0.230	0.0741	0.270	54* ^c	0.0741	0.367	185* ^c	30	70-130/30
355-46-4	Perfluorohexanesulfonic acid	1.41 ^b	0.0741	1.42	13* ^c	0.0741	1.89	648* ^c	28	74-130/30
375-92-8	Perfluoroheptanesulfonic acid	0.0795	0.0741	0.120	55*	0.0741	0.128	65*	6	74-130/30
1763-23-1	Perfluorooctanesulfonic acid	5.04 ^b	0.0741	5.69	877* ^c	0.0741	4.60	-594* ^c	21	70-130/30
68259-12-1	Perfluorononanesulfonic acid	0.0334	0.0741	0.0559	30*	0.0741	0.0497	22*	12	70-130/30
335-77-3	Perfluorodecanesulfonic acid	ND	0.0741	0.0480	65*	0.0741	0.0378	51*	24	70-130/30
754-91-6	PFOSA	0.0229	0.0741	0.0759	72	0.0741	0.0720	66*	5	70-131/30
2355-31-9	MeFOSAA	ND	0.0741	ND	0*	0.0741	ND	0*	nc	70-130/30
2991-50-6	EtFOSAA	ND	0.0741	ND	0*	0.0741	ND	0*	nc	70-130/30
757124-72-44:2	Fluorotelomer sulfonate	ND	0.0741	0.0637	86	0.0741	0.0650	88	2	70-130/30
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0741	0.0666	90	0.0741	0.0649	88	3	70-133/30
39108-34-4	8:2 Fluorotelomer sulfonate	0.00228 ^J	0.0741	0.0630	82	0.0741	0.0564	73	11	70-130/30

CAS No.	ID Standard Recoveries	MS	MSD	FA67448-17	FA67448-17	Limits
13C4-PFBA		107%	109%	15%* ^d	110%	30-140%
13C5-PFPeA		109%	110%	82%	111%	40-140%
13C5-PFHxA		111%	112%	92%	113%	50-150%
13C4-PFHpA		111%	113%	86%	113%	50-150%
13C8-PFOA		114%	116%	97%	117%	50-150%
13C9-PFNA		113%	115%	80%	116%	50-150%
13C6-PFDA		115%	118%	93%	118%	50-150%
13C7-PFUnDA		114%	116%	66%	115%	50-150%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA67448
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP76718-MS	3Q8788.D	20	09/11/19	NG	09/07/19	OP76718	S3Q164
OP76718-MSD	3Q8789.D	20	09/11/19	NG	09/07/19	OP76718	S3Q164
FA67448-17	3Q8745.D	1	09/11/19	NG	09/07/19	OP76718	S3Q164
FA67448-17 ^a	3Q8787.D	20	09/11/19	NG	09/07/19	OP76718	S3Q164

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA67448-3, FA67448-6, FA67448-7, FA67448-10, FA67448-16, FA67448-17, FA67448-18, FA67448-19, FA67448-20

CAS No.	ID Standard Recoveries	MS	MSD	FA67448-17	FA67448-17	Limits
13C2-PFDoDA		112%	115%	53%	113%	50-150%
13C2-PFTeDA		109%	114%	58%	110%	40-150%
13C3-PFBS		109%	111%	93%	111%	50-150%
13C3-PFHxS		111%	112%	82%	111%	50-150%
13C8-PFOS		110%	112%	65%	112%	50-150%
13C8-FOSA		116%	118%	80%	119%	30-140%
d3-MeFOSAA		118%	121%	82%	120%	50-150%
13C2-4:2FTS		106%	107%	93%	108%	50-150%
13C2-6:2FTS		110%	112%	101%	111%	50-150%
13C2-8:2FTS		108%	110%	98%	109%	50-150%

- (a) Dilution required due to matrix interference (internal standard failure).
- (b) Result is from Run #2.
- (c) Outside control limits due to high level in sample relative to spike amount.
- (d) Outside control limits due to matrix interference.

* = Outside of Control Limits.

5.3.2
5

ATTACHMENT 2

Soil Boring Logs



Soil Boring Log

Project Name: RACER Lansing Date Started: 08/19/2019 Logger: E. Redner
 Project Number: 30006870.03100 Date Completed: 08/19/2019 Editor: C. O'Neill
 Project Location: Lansing, MI Weather Conditions: Sunny, 81F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					NR		(0.0-5.0') NO RECOVERY.		
2					NR				
3			0		NR				
4					NR				
5					NR				
6					0.0		(5.0-10.5') SAND, very fine to medium, subangular to subrounded; trace very coarse sand; poorly sorted; moist; medium dense; dark gray (10YR 4/1).		
7					0.0				
8			7		0.0				
9					0.0				
10					0.0				
11				SB-P2-NR189_9.5-10.5 @ 1415	0.0		(10.5-24.5') CLAY, low to medium plasticity, no to slow dilatancy; some to little sand, very fine to fine; some to little silt; trace very coarse sand, subrounded; poorly sorted; moist; dense; gray (10YR 5/1). Note: Moist at 13.0' bgs.	(0.0-40.0') Backfilled with bentonite.	
12					0.0				
13			47	SB-P2-NR189_12-13 @ 1420	0.0				
14					0.0				
15					0.0				
16					0.0				
17					0.0				
18			53		0.0				
19					0.0				
20					0.0				

Drilling Co.: Stock Drilling Sampling Method: Dual Tube
 Driller: Ryan Brown Sampling Interval: Continuous
 Drilling Method: Hand Auger/Hollow Stem Auger Water Level Start (ft. bgs.): 11.78
 Drilling Fluid: None Water Level Finish (ft. btoc.): NA
 Remarks: Temporary well screen set from 24.0-29.0' bgs. Converted to Well: Yes No
 bgs = below ground surface. NR = not recorded. Surface Elev.: NA
 North Coor.: _____
 East Coor.: _____

SOIL BORING LOG - 2013 C:\USERS\CONELLO\ONE\DRIVE - ARCADIS\DESKTOP\RACER LANSING - BORING LOGS - P2 PFAS DELINEATION AND P3 MW/GPJ ARCADIS_2013.GDT 9/9/19

Soil Boring Log

Project Name: RACER Lansing Date Started: 08/19/2019 Logger: E. Redner
 Project Number: 30006870.03100 Date Completed: 08/19/2019 Editor: C. O'Neill
 Project Location: Lansing, MI Weather Conditions: Sunny, 81F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(10.5-24.5') CLAY, low to medium plasticity, no to slow dilatancy; some to little sand, very fine to fine; some to little silt; trace very coarse sand, subrounded; poorly sorted; moist; dense; gray (10YR 5/1).		
22				0.0					
23			39		0.0				
24					0.0				
25					0.0		(24.5-25.0') SAND, fine to medium, subangular to subrounded; well sorted; moist; medium dense; grayish brown (10YR 5/2).	(0.0-40.0') Backfilled with bentonite.	
26					0.0		(25.0-29.0') CLAY, medium to high plasticity, slow dilatancy; some to little silt; some to little sand, very fine to fine; trace sand, very coarse, subrounded; trace granules, subrounded; well sorted; moist to wet; medium dense to dense; dark gray (10YR 4/1).		
27					0.0				
28			60	SB-P2-NR189_24-29 @ 1700	0.0				
29					0.0				
30					0.0		(29.0-30.0') SAND, very fine to fine; and SILT; well sorted; wet; medium dense; gray (10YR 5/1).		
31					0.0		(30.0-40.0') CLAY, medium to high plasticity, slow to rapid dilatancy; some silt; some sand, very fine to fine; wet to moist; very soft to soft; gray (10YR 5/1).		
32					0.0				
33			60		0.0				
34					0.0				
35					0.0				
36					0.0				
37					0.0				
38			45		0.0				
39					0.0				
40					0.0		End of boring at 40.0' bgs.		
41									

Remarks: See first page.

Soil Boring Log

Project Name: RACER Lansing Date Started: 08/20/2019 Logger: E. Redner
 Project Number: 30006870.03100 Date Completed: 08/20/2019 Editor: C. O'Neill
 Project Location: Lansing, MI Weather Conditions: Partly Cloudy, 85F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
			0		NR		(0.0-0.5') CONCRETE.		
1				SB-P2-NV185_1-2 @ 1320	21.4		(0.5-4.5') FILL: SAND, very fine to coarse, subangular to subrounded; little silt, nonplastic to low plasticity, rapid dilatancy; trace clay; poorly sorted; dry to moist; loose to medium dense; yellowish brown (10YR 5/4) to light gray (10YR 7/2).		
2			9.8						
3		35	0.8						
4			1.6						
5				SB-P2-NV185_6-7 @ 1325 SB-P2-NV185_5-10 @ 1810	0.0		(4.5-8.5') SAND, very fine to very coarse, subangular to subrounded; and GRANULES to SMALL PEBBLES, subangular to subrounded; little to trace silt; poorly sorted; moist to wet; loose; yellowish brown (10YR 5/4). Note: Wet at 7.5' bgs.		
6			0.0						
7		30	0.0						
8					0.0		(8.5-12.0') CLAY, high plasticity, slow to rapid dilatancy; and SAND, very fine; little silt; moist; soft to medium stiff; gray (10YR 5/1).	(0.0-40.0') Backfilled with bentonite.	
9			0.0						
10			0.0						
11					0.0		(12.0-21.5') CLAY, medium to high plasticity, slow to rapid dilatancy; some silt; little sand, very fine to fine; trace sand, medium, subrounded; moist; soft to medium stiff; gray (10YR 5/1).		
12			0.0						
13		39	0.0						
14					0.0				
15			0.0						
16			0.0						
17					0.0				
18		42	0.0						
19			0.0						
20					0.0				

Drilling Co.: Stock Drilling Sampling Method: Dual Tube
 Driller: Ryan Brown Sampling Interval: Continuous
 Drilling Method: Hand Auger/Hollow Stem Auger Water Level Start (ft. bgs.): 4.57
 Drilling Fluid: None Water Level Finish (ft. btoc.): NA
 Remarks: Temporary well screen set from 5.0-10.0' bgs and 21.0-26.0' bgs. bgs = below ground surface. Converted to Well: Yes No
 Surface Elev.: NA
 North Coor.: _____
 East Coor.: _____

Soil Boring Log

Project Name: RACER Lansing Date Started: 08/20/2019 Logger: E. Redner
 Project Number: 30006870.03100 Date Completed: 08/20/2019 Editor: C. O'Neill
 Project Location: Lansing, MI Weather Conditions: Partly Cloudy, 85F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21				SB-P2-NV185_21-26 @ 1750 and DUP-01_GW	0.0		(12.0-21.5') CLAY, medium to high plasticity, slow to rapid dilatancy; some silt; little sand, very fine to fine; trace sand, medium, subrounded; moist; soft to medium stiff; gray (10YR 5/1).	(0.0-40.0') Backfilled with bentonite.	
22			60		0.0		(21.5-22.0') SAND, very fine to medium, subangular to subrounded; trace silt; poorly sorted; wet; loose; grayish brown (10YR 5/2).		
23					0.0		(22.0-27.0') CLAY, medium plasticity, slow to rapid dilatancy; and SAND, very fine to fine; little silt; moist; medium stiff to stiff; gray (10YR 5/1).		
24					0.0				
25					0.0				
26					0.0				
27					0.0				
28			60		0.0		(27.0-32.0') SILT, medium to high plasticity, rapid dilatancy; some sand, very fine to fine; some clay; well sorted; moist to wet; medium dense; gray (10YR 6/1). Note: Wet at 27.5' bgs.		
29					0.0				
30					0.0				
31					0.0				
32					0.0				
33					0.0		(32.0-35.0') CLAY, high plasticity, no dilatancy; trace silt; moist; soft; gray (10YR 6/1).		
34					0.0				
35					0.0				
36					0.0		(35.0-39.0') SILT, low plasticity, rapid dilatancy; some sand, very fine to fine; some to little clay; well sorted; moist; medium dense to very dense; dark gray (10YR 4/1).		
37					0.0				
38					0.0				
39					0.0				
40					0.0		(39.0-39.5') SAND, very fine to very coarse, subangular to subrounded; trace silt; poorly sorted; moist; medium dense; grayish brown (10YR 5/2).		
41							(39.5-40.0') CLAY, medium plasticity, slow dilatancy; some silt; little sand, very fine to fine; moist; very stiff; dark gray (10YR 4/1). End of boring at 40.0' bgs.		

Remarks: See first page.

SOIL BORING LOG 2013 C:\USERS\CONNELL\ONE\DRIVE - ARCADIS\DESKTOP\RACER LANSING - BORING LOGS - P2 PFAS DELINEATION AND P3 MW GPU ARCADIS 2013.GDT 9/9/19

Soil Boring Log

Project Name: RACER Lansing Date Started: 08/19/2019 Logger: E. Redner
 Project Number: 30006870.03100 Date Completed: 08/19/2019 Editor: C. O'Neill
 Project Location: Lansing, MI Weather Conditions: Sunny, 84F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
			0				(0.0-0.5') CONCRETE.		
1					0.0		(0.5-4.7') FILL: SAND, very fine to very coarse, subangular to subrounded; and GRANULES to small pebbles, subangular to subrounded; little clay, nonplastic to low plasticity; little silt; poorly sorted; dry to moist; loose to medium dense; gray (10YR 5/1) to dark grayish brown (10YR 4/2) to yellowish brown (10YR 5/6) to black (10YR 2/1).		
2				0.0					
3		23		SB-P2-OA188_2-3 @ 1615	0.0				
4					0.0				
5					0.0				
6					0.0		(4.7-6.5') CLAY, high plasticity, no to slow dilatancy; little silt; moist; soft; gray (10YR 5/1).	(0.0-40.0') Backfilled with bentonite.	
7					0.0				
8		52			0.0	(6.5-10.5') CLAY, low to medium plasticity, slow to rapid dilatancy; and SAND, very fine to fine; some silt; moist; medium stiff; grayish brown (10YR 5/2).			
9					0.0				
10					0.0				
11					0.0	(10.5-11.0') SAND, very fine to medium, subangular to subrounded; some silt; poorly sorted; loose; wet; dark grayish brown (10YR 4/2).			
12					0.0	(11.0-21.0') CLAY, low to high plasticity, slow to rapid dilatancy; and SAND, very fine to fine; some to little silt; trace sand, medium, subrounded; dark gray (10YR 4/1).			
13			60	SB-P2-OA188_10-15 @ 1820	0.0				
14				SB-P2-OA188_13-14 @ 1620	0.0				
15					0.0				
16					0.0				
17					0.0				
18			57		0.0				
19					0.0				
20					0.0				

Drilling Co.: Stock Drilling Sampling Method: Dual Tube
 Driller: Ryan Brown Sampling Interval: Continuous
 Drilling Method: Hand Auger/Hollow Stem Auger Water Level Start (ft. bgs.): 12.09
 Drilling Fluid: None Water Level Finish (ft. btoc.): NA
 Remarks: Temporary well screen set from 10.0-15.0' bgs and 21.0-26.0' bgs. bgs = below ground surface. Converted to Well: Yes No
 Surface Elev.: NA
 North Coor.: _____
 East Coor.: _____

Soil Boring Log

Project Name: RACER Lansing Date Started: 08/19/2019 Logger: E. Redner
 Project Number: 30006870.03100 Date Completed: 08/19/2019 Editor: C. O'Neill
 Project Location: Lansing, MI Weather Conditions: Sunny, 84F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21				SB-P2-OA188_21-26 @ 1740	0.0		(11.0-21.0') CLAY, low to high plasticity, slow to rapid dilatancy; and SAND, very fine to fine; some to little silt; trace sand, medium, subrounded; dark gray (10YR 4/1).	(0.0-40.0') Backfilled with bentonite.	
22		60	0.0			(21.0-22.5') SAND, very fine to coarse, subangular to subrounded; some silt; poorly sorted; wet; very loose; gray (10YR 5/1). Note: Wet at 22.0' bgs.			
23			0.0			(22.5-37.5') CLAY, medium to high plasticity, slow dilatancy; some to little silt; some to little sand, very fine to fine; trace sand, medium to very coarse, subangular to subrounded; moist to wet; very soft to medium stiff; gray (10YR 5/1).			
24			0.0						
25			0.0						
26			0.0			Note: Wet at 26.0' bgs.			
27			0.0						
28		60	0.0						
29			0.0						
30			0.0			Note: Wet at 30.0' bgs.			
31			0.0						
32			0.0						
33		60	0.0						
34			0.0						
35			0.0						
36			0.0						
37			0.0						
38		60	0.0			(37.5-39.5') SAND, very fine to very coarse, subrounded; little silt; poorly sorted; wet; loose to medium dense; gray (10YR 5/1).			
39			0.0						
40			0.0			(39.5-40.0') Not recorded.			
						End of boring at 40.0' bgs.			
41									

Remarks: See first page.

Soil Boring Log

Project Name: RACER Lansing Date Started: 08/21/2019 Logger: E. Redner
 Project Number: 30006870.03100 Date Completed: 08/21/2019 Editor: C. O'Neill
 Project Location: Lansing, MI Weather Conditions: Partly Cloudy, 83F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
0			0		NR		(0.0-0.5') CONCRETE.		
1					0.0		(0.5-4.5') FILL: SAND, very fine to medium, subangular to rounded; some to and clay, low to high plasticity, slow to rapid dilatancy; some silt; poorly sorted; moist; medium dense; dark gray (10YR 4/1) to dark yellowish brown (10YR 4/6) to yellowish brown (10YR 5/4).		
2				0.0					
3		26		SB-P2-OB177_2-3 @ 1325 on 8/21/19	0.0				
4				0.0					
5					0.0		(4.5-7.0') CLAY, medium plasticity, slow dilatancy; some silt; some sand, very fine to fine; trace sand, very coarse, subangular to subrounded; trace granules, subangular to subrounded; moist; medium stiff; dark yellowish brown (10YR 4/6).		
6					0.0		(7.0-8.0') SILT; and SAND, very fine to fine; trace sand, very coarse, subrounded; poorly sorted; moist; loose; reddish brown (5YR 5/4).		
7					0.0				
8		51		SB-P2-OB177_5-10 @ 1510 on 8/22/19 and DUP-02_GW SB-P2-OB177_7-8 @ 1330 on 8/21/19	0.0				
9					0.0		(8.0-12.0') CLAY, medium plasticity, slow to rapid dilatancy; some sand, very fine to fine; trace sand, very coarse, subrounded; trace granules, subrounded; some silt; moist; soft; grayish brown (10YR 5/2).	(0.0-30.0') Backfilled with bentonite.	
10					0.0				
11					0.0				
12					0.0				
13		45			0.0		(12.0-20.0') CLAY, medium to high plasticity, slow dilatancy; some silt; little sand, very fine to fine; trace sand, very coarse; brown (10YR 5/3) to grayish brown (10YR 5/2).		
14					0.0				
15					0.0				
16					0.0				
17					0.0				
18		50			0.0				
19					0.0				
20					0.0				

Drilling Co.: Stock Drilling Sampling Method: Dual Tube
 Driller: Ryan Brown Sampling Interval: Continuous
 Drilling Method: Hand Auger/Hollow Stem Auger Water Level Start (ft. bgs.): 7.99
 Drilling Fluid: None Water Level Finish (ft. btoc.): NA
 Remarks: Temporary well screen set from 5.0-10.0' bgs and 24.0-29.0' bgs. bgs = below ground surface. Converted to Well: Yes No
 Surface Elev.: NA
 North Coor.: _____
 East Coor.: _____

SOIL BORING LOG - 2013 C:\USER\CONELL\ONE\DRIVE - ARCADIS\DESIGN\PROJECTS\RACER LANSING - BORING LOGS - P2 PFAS DELINEATION AND P3 MW/GPJ ARCADIS - 2013.GDT 9/9/19

Soil Boring Log

Project Name: RACER Lansing Date Started: 08/21/2019 Logger: E. Redner
 Project Number: 30006870.03100 Date Completed: 08/21/2019 Editor: C. O'Neill
 Project Location: Lansing, MI Weather Conditions: Partly Cloudy, 83F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well		
21	X		43		0.0		(20.0-24.0') SILT, some to and clay, low to high plasticity, rapid dilatancy; little to some sand, very fine to fine; moist; medium stiff; dark gray (10YR 4/1).	(0.0-30.0') Backfilled with bentonite.			
22					0.0						
23					0.0						
24					0.0						
25					0.0						
26	X		60		0.0			(25.5-29.5') SILT; and CLAY, medium plasticity, rapid dilatancy; little sand, very fine to fine; wet' very soft; gray (10YR 5/1).			
27					0.0						
28					0.0						
29					0.0						
30					0.0						(29.5-30.0') CLAY, high plasticity, slow dilatancy; some silt; moist; soft; gray (10YR 5/1). End of boring at 30.0' bgs.
31											
32											
33											
34											
35											
36											
37											
38											
39											
40											
41											

Remarks: See first page.

Soil Boring Log

Project Name: RACER Lansing Date Started: 08/20/2019 Logger: E. Redner
 Project Number: 30006870.03100 Date Completed: 08/20/2019 Editor: C. O'Neill
 Project Location: Lansing, MI Weather Conditions: Partly Cloudy, 86F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
0			0				(0.0-0.5') CONCRETE.		
1				SB-P2-OH185_1-2 @ 1545 on 8/20/19	0.0		(0.5-6.0') FILL: SAND, very fine to very coarse, subangular to subrounded; and GRANULES to SMALL PEBBLES, subangular to subrounded; some to little silt, low plasticity, rapid dilatancy; little clay; poorly sorted; dry to moist; loose to dense; dark yellowish brown (10YR 4/6) to light gray (10YR 7/2).		
2			0.0						
3		34	0.0						
4			0.0						
5			0.0						
6				SB-P2-OH185_5-6 @ 1550 on 8/20/19	0.0		(6.0-20.0') CLAY, medium to high plasticity, slow to rapid dilatancy; some silt; some sand, very fine to fine; moist; stiff to soft; brown (10YR 4/3) to dark grayish brown (10YR 4/2) to dark gray (10YR 4/1).		
7			0.0						
8		60	0.0						
9			0.0						
10			0.0						
11				49	0.0				
12			0.0						
13			0.0						
14			0.0						
15			0.0						
16				57	0.0				
17			0.0						
18			0.0						
19			0.0						
20			0.0						

(0.0-40.0')
Backfilled
with
bentonite.

Drilling Co.: Stock Drilling Sampling Method: Dual Tube
 Driller: Ryan Brown Sampling Interval: Continuous
 Drilling Method: Hand Auger/Hollow Stem Auger Water Level Start (ft. bgs.): 22.33
 Drilling Fluid: None Water Level Finish (ft. btoc.): NA
 Remarks: Temporary well screen set from 1.0-6.0' bgs and 25.0-30.0' bgs. Could not collect GW sample from 1.0-6.0' bgs - well is dry. bgs = below ground surface. Converted to Well: Yes No
 Surface Elev.: NA
 North Coor.: _____
 East Coor.: _____

Soil Boring Log

Project Name: RACER Lansing Date Started: 08/20/2019 Logger: E. Redner
 Project Number: 30006870.03100 Date Completed: 08/20/2019 Editor: C. O'Neill
 Project Location: Lansing, MI Weather Conditions: Partly Cloudy, 86F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(20.0-24.0') CLAY, high plasticity, no dilatancy; little silt; little sand, very fine to fine; moist; soft; gray (10YR 5/1).		
22			60		0.0				
23					0.0				
24					0.0				
25					0.0		(24.0-26.5') CLAY, medium to high plasticity, no to slow dilatancy; some silt; some sand, very fine to fine; trace sand, very coarse, subangular to subrounded; moist; medium stiff; gray (10YR 5/1).		
26					0.0				
27			60	SB-P2-OH185_25-30 @ 0815 on 8/21/19	0.0		(26.5-30.0') SILT, medium plasticity, rapid dilatancy; some sand, very fine to fine; some clay; trace sand, coarse, subangular to subrounded; wet to moist; medium dense; gray (10YR 6/1).		
28					0.0				
29					0.0				
30					0.0			(0.0-40.0') Backfilled with bentonite.	
31					0.0		(30.0-32.0') CLAY, high plasticity, no dilatancy; little silt; trace sand, very fine to fine; moist; soft to medium stiff; gray (10YR 6/1). Note: Red streaking/staining from 30.0-35.0' bgs.		
32					0.0				
33					0.0		(32.0-40.0') CLAY, medium plasticity, slow dilatancy; and SILT; little sand, very fine to fine; moist; medium stiff to stiff; gray (10YR 5/1).		
34					0.0				
35					0.0				
36					0.0				
37					0.0				
38					0.0				
39					0.0				
40					0.0		End of boring at 40.0' bgs.		
41									

Remarks: See first page.

Soil Boring Log

Project Name: RACER Lansing Date Started: 08/22/2019 Logger: E. Redner
 Project Number: 30006870.03100 Date Completed: 08/22/2019 Editor: C. O'Neill
 Project Location: Lansing, MI Weather Conditions: Sunny, 71F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1			0		NR		(0.0-2.5') CONCRETE.		
2					0.0				
3					0.0		(2.5-7.0') FILL: SILT; and SAND, very fine to very coarse, subrounded.		
4			6	SB-P2-OL164_2.5-5 @ 1325	0.0				
5					0.0				
6					0.0		Note: 1.0" sand seam at 6.5' bgs. SAND, very fine to medium, subrounded; poorly sorted.		
7				SB-P2-OL164_6-7 @ 1330	0.0				
8					0.0		(7.0-12.5') SILT, nonplastic to low plasticity, rapid dilatancy; some sand, very fine to fine; trace sand, very coarse, subrounded; little to some clay; trace granules to medium pebbles, subrounded; well sorted; moist; dense; brown (10YR 5/3).		
9					0.0		Note: 1.0" sand seam at 7.5' bgs. SAND, very fine to medium, subrounded; poorly sorted.		
10					0.0			(0.0-30.0') Backfilled with bentonite.	
11					0.0				
12					0.0				
13					0.0		(12.5-20.0') CLAY, medium to high plasticity, slow dilatancy; and SILT; little sand, very fine to fine; dry to moist; stiff to very stiff; dark gray (10YR 4/1).		
14					0.0				
15					0.0				
16					0.0				
17					0.0				
18					0.0				
19					0.0				
20					0.0				

Drilling Co.: Stock Drilling Sampling Method: Dual Tube
 Driller: Ryan Brown Sampling Interval: Continuous
 Drilling Method: Hand Auger/Hollow Stem Auger Water Level Start (ft. bgs.): 11.21
 Drilling Fluid: None Water Level Finish (ft. btoc.): NA
 Remarks: Temporary well screen set from 20.0-25.0' bgs. Converted to Well: Yes No
 bgs = below ground surface. Surface Elev.: NA
 North Coor.: _____
 East Coor.: _____

SOIL BORING LOG - 2013 C:\USERS\CONELL\ONE\DRIVE - ARCADIS\DESIGN\PROJECTS\RACER LANSING - BORING LOGS - P2 PFAS DELINEATION AND P3 MW/GPJ ARCADIS_2013.GDT 9/9/19

Soil Boring Log

Project Name: RACER Lansing Date Started: 08/22/2019 Logger: E. Redner
 Project Number: 30006870.03100 Date Completed: 08/22/2019 Editor: C. O'Neill
 Project Location: Lansing, MI Weather Conditions: Sunny, 71F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21	X		25	SB-P2-OL164_20-25 @ 1700	0.0	(20.0-26.0') SAND, very fine to medium, subangular to subrounded; some silt; poorly sorted; wet; very loose to loose; dark gray (10YR 4/1).		(0.0-30.0') Backfilled with bentonite.	
22					0.0				
23					0.0				
24					0.0				
25					0.0				
26	X		40		0.0	(26.0-30.0') CLAY, high plasticity, slow dilatancy; some silt; wet to moist; very soft to medium stiff; dark gray (10YR 4/1).			
27					0.0				
28					0.0				
29					0.0				
30					0.0				
31						End of boring at 30.0' bgs.			
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks: See first page.

SOIL BORING LOG 2013 C:\USERS\CONELL\ONE\DRIVE - ARCADIS\DESIGN\PROJECTS\RACER - BORING LOGS - P2 PFAS DELINEATION AND P3 MW/GPJ ARCADIS 2013.GDT 9/9/19

Soil Boring Log

Project Name: RACER Lansing Date Started: 08/21/2019 Logger: E. Redner
 Project Number: 30006870.03100 Date Completed: 08/21/2019 Editor: C. O'Neill
 Project Location: Lansing, MI Weather Conditions: Mostly Cloudy, 84F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
			0		NR		(0.0-0.5') CONCRETE.		
1				SB-P2-OP177_1-2 @ 1530 on 8/21/19 SB-P2-OP177_1-6 @ 1535 on 8/22/19	0.0	[Pattern]	(0.5-6.5') FILL: SAND, very fine to very coarse, subangular to subrounded; and GRANULES, subangular to subrounded; some silt; poorly sorted; wet to moist; loose; reddish brown (5YR 5/4) to yellowish brown (10YR 5/8) to gray (10YR 5/1). Note: Wet around 2.0' bgs. Possible void from 2.0-3.0' bgs.		
2			0.0						
3		12.5	0.0						
4			0.0						
5			0.0						
6				SB-P2-OP177_7-8 @ 1500 and DUP-02_SOIL on 8/21/19	0.0	[Pattern]	(6.5-13.0') SILT, low plasticity, rapid dilatancy; some sand, very fine to verycoarse, subangular to subrounded; little clay; well sorted; moist; medium dense to dense; grayish brown (10YR 5/2).		
7			0.0						
8		58	0.0						
9			0.0						
10					0.0	[Pattern]	(13.0-18.5') CLAY, medium to high plasticity slow dilatancy; some silt; some sand, very fine to fine; trace small pebbles, round; moist; medium stiff; grayish brown (10YR 5/2).		
11			0.0						
12			0.0						
13		58	0.0						
14					0.0	[Pattern]	(18.5-20.0') SILT, low plasticity, rapid dilatancy; some sand, very fine to fine; trace sand, very coarse, subrounded; some to little clay; well sorted; moist; dense; dark grayish brown (10YR 4/2).		
15			0.0						
16			0.0						
17			0.0						
18			43		0.0				
19					0.0				
20					0.0				

(0.0-30.0')
Backfilled
with
bentonite.

Drilling Co.: Stock Drilling Sampling Method: Dual Tube
 Driller: Ryan Brown Sampling Interval: Continuous
 Drilling Method: Hand Auger/Hollow Stem Auger Water Level Start (ft. bgs.): 2.5
 Drilling Fluid: None Water Level Finish (ft. btoc.): NA
 Remarks: Temporary well screen set from 1.0-6.0' bgs and 22.0-27.0' bgs. bgs = below ground surface. Converted to Well: Yes No
 Surface Elev.: NA
 North Coor.: _____
 East Coor.: _____

SOIL BORING LOG - 2013 C:\USER\CONELLI\ONEEDRIVE - ARCADIS\DESKTOP\RACER LANSING - BORING LOGS - P2 PFAS DELINEATION AND P3 MW/GPJ ARCADIS 2013.GDT 9/9/19

Soil Boring Log

Project Name: RACER Lansing Date Started: 08/21/2019 Logger: E. Redner
 Project Number: 30006870.03100 Date Completed: 08/21/2019 Editor: C. O'Neill
 Project Location: Lansing, MI Weather Conditions: Mostly Cloudy, 84F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21	X		48		0.0		(20.0-23.5') CLAY, high plasticity, no dilatancy; little silt; moist; soft to medium stiff; dark gray (10YR 4/1).		
22					0.0				
23					0.0				
24					0.0				
25					0.0				
24				SB-P2-OP177 22-27 @ 1725 on 8/21/19			(23.5-25.0') SILT, medium to low plasticity, slow to rapid dilatancy; some sand, very fine to fine; trace granules to small pebbles, subrounded; some clay; poorly sorted; moist; medium dense to dense; dark grayish brown (10YR 4/2).	(0.0-30.0') Backfilled with bentonite.	
26	0.0		(25.0-30.0') CLAY, medium to high plasticity, slow to rapid dilatancy; and SILT; little sand, very fine to fine; wet; very soft; gray (10YR 5/1).						
27	0.0								
28	0.0								
29	0.0								
30	0.0								
30							End of boring at 30.0' bgs.		
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks: See first page.

SOIL BORING LOG 2013 C:\USERS\CONELL\ONE\DRIVE - ARCADIS\DESIGN\PROJECTS\RACER LANSING - BORING LOGS - P2 PFAS DELINEATION AND P3 MW GPU ARCADIS 2013.GDT 9/9/19

Soil Boring Log

Project Name: RACER Lansing Date Started: 08/22/2019 Logger: E. Redner
 Project Number: 30006870.03100 Date Completed: 08/22/2019 Editor: C. O'Neill
 Project Location: Lansing, MI Weather Conditions: Sunny, 73F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1			0		0.0 NR 0.0		(0.0-2.0') CONCRETE.		
2				SB-P2-OS164_2-3 @ 1445	0.0 0.0 0.0		(2.0-7.0') FILL: SILT, low to medium plasticity, slow to rapid dilatancy; some to and clay; little to some sand, very fine to fine; trace granules to small pebbles, subrounded; poorly sorted; dry to moist; medium dense to dense; brown (10YR 4/3).		
3			29		0.0 0.0 0.0		(7.0-7.5') CLAY, medium plasticity, slow dilatancy; some silt; little sand, very fine to fine; trace sand, very coarse, subrounded; trace granules, subrounded; dry to moist; stiff; yellowish brown (10YR 5/4).		
4				SB-P2-OS164_6-7 @ 1450	0.0 0.0 0.0		(7.5-9.5') SAND, very fine to coarse, subangular to subrounded; some silt; poorly sorted; wet; medium dense to dense; grayish brown (10YR 5/2).		
5					0.0 0.0 0.0		(9.5-12.5') SILT, low to medium plasticity, rapid dilatancy; some clay; some sand, very fine to fine; well sorted; moist; dense; grayish brown (10YR 5/2).	(0.0-30.0') Backfilled with bentonite.	
6					0.0 0.0 0.0		(12.5-14.5') CLAY; little to some silt; trace sand, very fine to fine; moist; soft to medium stiff; grayish brown (10YR 5/2).		
7			60		0.0 0.0 0.0		(14.5-20.0') SILT, low to medium plasticity, slow to rapid dilatancy; some clay; some sand, very fine to medium; poorly sorted; moist; dense; grayish brown (10YR 5/2).		
8					0.0 0.0 0.0				
9					0.0 0.0 0.0				
10					0.0 0.0 0.0				
11					0.0 0.0 0.0				
12			54		0.0 0.0 0.0				
13					0.0 0.0 0.0				
14					0.0 0.0 0.0				
15					0.0 0.0 0.0				
16					0.0 0.0 0.0				
17					0.0 0.0 0.0				
18			12		0.0 0.0 0.0				
19					0.0 0.0 0.0				
20					0.0 0.0 0.0				

Drilling Co.: Stock Drilling Sampling Method: Dual Tube
 Driller: Ryan Brown Sampling Interval: Continuous
 Drilling Method: Hand Auger/Hollow Stem Auger Water Level Start (ft. bgs.): 11.55
 Drilling Fluid: None Water Level Finish (ft. btoc.): NA
 Remarks: Temporary well screen set from 7.0-12.0' bgs. Converted to Well: Yes No
Could not collect GW sample from 7.0-12.0' bgs - well is dry. bgs = Surface Elev.: NA
below ground surface. North Coor.: _____
 East Coor.: _____

SOIL BORING LOG - 2013 C:\USERS\CONELL\ONE\DRIVE - ARCADIS\DESKTOP\RACER LANSING - BORING LOGS - P2 PFAS DELINEATION AND P3 MW/GPJ ARCADIS_2013.GDT 9/9/19

Soil Boring Log

Project Name: RACER Lansing Date Started: 08/21/2019 Logger: E. Redner
 Project Number: 30006870.03100 Date Completed: 08/21/2019 Editor: C. O'Neill
 Project Location: Lansing, MI Weather Conditions: Sunny, 75F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
			0		NR		(0.0-0.5') CONCRETE.		
1				SB-P2-OT185_0.5-1.5 @ 1140	4.5		(0.5-1.5') FILL: SAND, fine to medium, subangular to subrounded; trace silt, well sorted; dry to moist; loose to very loose; light gray (10YR 7/1) to dark yellowish brown (10YR 4/6).		
2					5.0				
3			39	SB-P2-OT185_3-4 @ 1145	44.0		(1.5-4.0') CLAY, medium plasticity, rapid dilatancy; and SILT; little sand, very fine; moist; stiff to very stiff; dark grayish brown (10YR 4/2).		
4					16.9				
5					9.1		(4.0-13.0') CLAY, high plasticity, slow dilatancy; some silt; some to little sand, very fine to fine; moist; soft to medium stiff; brown (10YR 5/3) to dark grayish brown (10YR 4/2).		
6				16.7					
7					21.0				
8			51		30.0				
9					20.7				
10					55.0			(0.0-40.0') Backfilled with bentonite.	
11					1.0				
12					4.6				
13			60		17.0				
14					3.0		(13.0-25.0') SILT, medium plasticity, rapid dilatancy; some to and clay; little to some sand, very fine to fine; moist; dense; dark grayish brown (10YR 4/2) to gray (10YR 5/1).		
15					2.7				
16					1.4				
17					3.0				
18			60		8.0				
19					1.8				
20					1.5		Note: 1.0" sand seam at 19.0' bgs. SAND, fine to coarse, subrounded; poorly sorted; moist.		

Drilling Co.: Stock Drilling Sampling Method: Dual Tube
 Driller: Ryan Brown Sampling Interval: Continuous
 Drilling Method: Hand Auger/Hollow Stem Auger Water Level Start (ft. bgs.): 2.369
 Drilling Fluid: None Water Level Finish (ft. btoc.): NA
 Remarks: Temporary well screen set from 23.0-28.0' bgs. Converted to Well: Yes No
 bgs = below ground surface. Surface Elev.: NA
 North Coor.: _____
 East Coor.: _____

SOIL BORING LOG: 2013 C:\USER\CONELLI\ONE\DRIVE - ARCADIS\DESKTOP\RACER LANSING - BORING LOGS - P2 PFAS DELINEATION AND P3 MW/GPJ ARCADIS_2013.GDT 9/9/19

Soil Boring Log

Project Name: RACER Lansing Date Started: 08/21/2019 Logger: E. Redner
 Project Number: 30006870.03100 Date Completed: 08/21/2019 Editor: C. O'Neill
 Project Location: Lansing, MI Weather Conditions: Sunny, 75F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(13.0-25.0') SILT, medium plasticity, rapid dilatancy; some to and clay; little to some sand, very fine to fine; moist; dense; dark grayish brown (10YR 4/2) to gray (10YR 5/1).		
22				0.0					
23			49	8.6					
24				8.6					
25				0.0					
26				SB-P2-OT185_23-28 @ 1610	0.0		(25.0-26.5') SAND, very fine to coarse, subangular to subrounded; some silt; poorly sorted; wet; loose to medium dense; dark grayish brown (10YR 4/2).	(0.0-40.0') Backfilled with bentonite.	
27				1.3		(26.5-31.5') SILT, medium to high plasticity, slow to rapid dilatancy; and CLAY; some to little sand, very fine to fine; poorly sorted; wet to moist; medium dense; dark grayish brown (10YR 4/2). Note: Wet at 27.5' bgs.			
28			60	1.7					
29				1.9					
30				0.0					
31				0.0		(31.5-32.5') CLAY, high plasticity, slow dilatancy; some silt; some sand, very fine to fine; moist; soft; dark grayish brown (10YR 4/2).			
32				0.0					
33			60	0.6					
34					1.4		(32.5-40.0') SILT, nonplastic to low plasticity, rapid dilatancy; and SAND, very fine to medium, subrounded; little clay; wet to moist; medium dense to loose; dark grayish brown (10YR 4/2). Note: Wet at 33.0' bgs.		
35				2.8					
36				0.0					
37				0.1					
38			43	0.0					
39				0.4					
40				0.1					
41							End of boring at 40.0' bgs.		

Remarks: See first page.

Soil Boring Log

Project Name: RACER Lansing Date Started: 08/20/2019 Logger: E. Redner
 Project Number: 30006870.03100 Date Completed: 08/20/2019 Editor: C. O'Neill
 Project Location: Lansing, MI Weather Conditions: Sunny, 74F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1				SB-P2-OT192_0-5 @ 1710 and MS/MSD SB-P2-OT192_2-3 @ 1050	0.0		(0.0-5.0') FILL: SAND, very fine to very coarse, subangular to subrounded; and GRANULES to SMALL PEBBLES, subangular to subrounded; some to little clay, low to medium plasticity, slow to rapid dilatancy; some silt; poorly sorted; dry to wet; very loose to medium dense; yellowish brown (10YR 5/4) to light gray (10YR 7/1). Note: Wet at 3.0' bgs.		
2			18.1						
3		36	20.0						
4			21.0						
5			6.1						
6				SB-P2-OT192_6-7 @ 1055 and DUP-01_SOIL	7.5		(5.0-10.0') CLAY, medium to high plasticity, slow dilatancy; some silt; little sand, very fine to fine; trace sand, very coarse, subrounded; trace granules to small pebbles, subrounded; moist to wet; very soft to medium stiff; grayish brown (10 YR 5/2). Note: Streaks/patches of red (2.5YR 5/6).		
7			2.8						
8		60	2.7						
9			3.4						
10					0.0		(10.0-24.8') CLAY, medium to high plasticity, slow to rapid dilatancy; some silt; some sand, very fine to fine; trace sand, very coarse, subrounded; trace granules to small pebbles, subrounded; moist to wet; very soft to medium stiff; grayish brown (10YR 5/2). Note: Wet at 12.5' bgs.	(0.0-40.0') Backfilled with bentonite.	
11			0.0						
12			2.5						
13		43	0.0						
14			0.0						
15			0.0						
16			0.0						
17			0.0						
18		45	0.0						
19			0.0						
20			0.0						

Drilling Co.: Stock Drilling Sampling Method: Dual Tube
 Driller: Ryan Brown Sampling Interval: Continuous
 Drilling Method: Hand Auger/Hollow Stem Auger Water Level Start (ft. bgs.): 2.67
 Drilling Fluid: None Water Level Finish (ft. btoc.): NA
 Remarks: Temporary well screen set from 0.0-5.0' bgs and 29.0-34.0' bgs. bgs = below ground surface. Converted to Well: Yes No
 Surface Elev.: NA
 North Coor.: _____
 East Coor.: _____

Soil Boring Log

Project Name: RACER Lansing Date Started: 08/20/2019 Logger: E. Redner
 Project Number: 30006870.03100 Date Completed: 08/20/2019 Editor: C. O'Neill
 Project Location: Lansing, MI Weather Conditions: Sunny, 74F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(10.0-24.8') CLAY, medium to high plasticity, slow to rapid dilatancy; some silt; some sand, very fine to fine; trace sand, very coarse, subrounded; trace granules to small pebbles, subrounded; moist to wet; very soft to medium stiff; grayish brown (10YR 5/2).		
22				0.0					
23			46	0.0					
24				0.0					
25				0.0					
26					0.0		(24.8-26.0') SAND, very fine to medium, subangular to subrounded; some silt; poorly sorted; moist; medium dense; brown (10YR 5/3).	(0.0-40.0') Backfilled with bentonite.	
27				0.0		(26.0-27.0') CLAY, medium to high plasticity, rapid dilatancy; and SAND, very fine to fine; little silt; moist to wet; very soft to soft; gray (10YR 6/1).			
28			60	0.0		(27.0-34.0') SILT, low plasticity, rapid dilatancy; some sand, very fine to fine; little clay; poorly sorted; moist to wet; very loose to medium dense; gray (10YR 6/1).			
29				0.0		Note: Wet from 28.5 to 34.0' bgs.			
30				0.0					
31				0.0					
32				0.0					
33			49	0.0					
34				0.0					
35				0.0		(34.0-34.5') SAND, very fine to medium, subrounded; some silt, low to medium plasticity, rapid dilatancy; little clay; poorly sorted; moist; loose to medium dense; gray (10YR 6/1).			
36				0.0		(34.5-40.0') CLAY, medium plasticity, slow to rapid dilatancy; some silt; some sand, very fine to fine; wet; very soft; gray (10YR 6/1).			
37				0.0					
38			5	0.0		Note: Wet at 38.0' bgs.			
39				0.0					
40				0.0		End of boring at 40.0' bgs.			
41									

Remarks: See first page.

Soil Boring Log

Project Name: RACER Lansing Date Started: 08/23/2019 Logger: E. Redner
 Project Number: 30006870.03100 Date Completed: 08/23/2019 Editor: C. O'Neill
 Project Location: Lansing, MI Weather Conditions: Sunny, 55F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
0			0		NR		(0.0-0.8') CONCRETE.		
1				SB-P2-PF164_1-2 @ 0900	0.0		(0.8-4.5') FILL: SAND, very fine to very coarse, angular to subrounded; and GRANULES to SMALL PEBBLES, angular to subrounded; some to little clay, low plasticity, slow to rapid dilatancy; dark brown (10YR 3/3) to light gray (10YR 7/1) to gray (10YR 5/1). Note: organics present.		
2			0.0						
3		13	0.0						
4			0.0						
5				SB-P2-PF164_3-4 @ 0905	1.6		(4.5-6.0') SAND, very fine to medium; some silt; trace sand, very coarse, subrounded; trace granules, subrounded; poorly sorted; wet; loose; dark yellowish brown (10YR 4/6).		
6				SB-P2-PF164_4-9 @ 0955	0.0		(6.0-7.5') SILT, medium to high plasticity, slow to rapid dilatancy; and CLAY; little sand, very fine to fine; trace sand, very coarse, subrounded; well sorted; moist; medium dense; gray (10YR 5/1).		
7			5.6						
8		33	15.0						
9			10.0						
10					7.0		(7.5-16.0') CLAY, medium to high plasticity, slow dilatancy; some to and silt; trace granules to small pebbles, subrounded; moist; soft; gray (10YR 5/1).	(0.0-30.0') Backfilled with bentonite.	
11			0.0						
12			5.5						
13		60	4.6						
14					3.0		(16.0-20.5') CLAY, high plasticity, no dilatancy; little silt; moist; medium stiff; gray (10YR 5/1).		
15			3.2						
16			0.0						
17		60	0.0						
18					0.0				
19					0.0				
20					0.0				

Drilling Co.: Stock Drilling Sampling Method: Dual Tube
 Driller: Ryan Brown Sampling Interval: Continuous
 Drilling Method: Hand Auger/Hollow Stem Auger Water Level Start (ft. bgs.): 2.98
 Drilling Fluid: None Water Level Finish (ft. btoc.): NA
 Remarks: Temporary well screen set from 4.0-9.0' bgs. Converted to Well: Yes No
 bgs = below ground surface. Surface Elev.: NA
 North Coor.: _____
 East Coor.: _____

SOIL BORING LOG - 2013 C:\USER\CONELL\ONEEDRIVE - ARCADIS\DESKTOP\RACER LANSING - BORING LOGS - P2 PFAS DELINEATION AND P3 MW/GPJ ARCADIS 2013.GDT 9/9/19

Soil Boring Log

Project Name: RACER Lansing Date Started: 08/23/2019 Logger: E. Redner
 Project Number: 30006870.03100 Date Completed: 08/23/2019 Editor: C. O'Neill
 Project Location: Lansing, MI Weather Conditions: Sunny, 55F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21	X		47		0.0		(16.0-20.5') See description on previous page.	(0.0-30.0') Backfilled with bentonite.	
22					0.0		(20.5-21.0') SILT, medium plasticity, slow to rapid dilatancy; some clay; some sand, very fine to fine; well sorted; moist; medium dense; gray (10YR 5/1).		
23					0.0		(21.0-24.8') SAND, very fine to medium, subrounded; little to trace silt; well sorted; moist; medium dense; brown (10YR 4/3).		
24					0.0				
25					0.0				
26	X		60		0.0		(24.8-30.0') CLAY, medium to high plasticity, slow to rapid dilatancy; and SILT; trace sand, very coarse, subrounded; trace granules to small pebbles, subrounded; moist; soft; gray (10YR 5/1).	(0.0-30.0') Backfilled with bentonite.	
27					0.0				
28					0.0				
29					0.0				
30					0.0		End of boring at 30.0' bgs.		
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks: See first page.

SOIL BORING LOG 2013 C:\USERS\CONELL\ONE\DRIVE - ARCADIS\DESIGN\PROJECTS\RACER LANSING - BORING LOGS - P2 PFAS DELINEATION AND P3 MW/GPJ ARCADIS 2013.GDT 9/9/19

Soil Boring Log

Project Name: RACER Lansing Date Started: 08/22/2019 Logger: E. Redner
 Project Number: 30006870.03100 Date Completed: 08/22/2019 Editor: C. O'Neill
 Project Location: Lansing, MI Weather Conditions: Overcast, 62F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1				SB-P2-PF177_1-2 @ 1055	0.0		(0.0-5.5') FILL: SAND, very fine to very coarse, subangular; and GRANULES, subangular; some silt, low plasticity, rapid dilatancy; trace to little clay; poorly sorted; dry to wet; very loose to medium dense; light gray (10YR 7/1) to yellowish brown (10YR 5/6).		
2			0.0						
3		24	0.0						
4			0.0						
5				SB-P2-PF177_4-5 @ 1100	0.0				
6				SB-P2-PF177_4-9 @ 1600	0.0		(5.5-6.0') CLAY, high plasticity, slow to rapid dilatancy; some silt; some sand, very fine to fine; moist; soft; yellowish brown (10YR 5/4).		
7			0.0						
8		44	0.0						
9			0.0						
10					0.0		(6.0-16.0') SILT, low to medium plasticity, slow to rapid dilatancy; some clay; little to some sand, very fine to fine; trace sand, very coarse, subrounded; well sorted; moist; dense; dark grayish brown (10YR 4/2).	(0.0-33.5') Backfilled with bentonite.	
11			0.0						
12			0.0						
13		53	0.0						
14					0.0		(16.0-22.0') CLAY, high plasticity, slow dilatancy; some silt; trace sand, very fine to fine; trace sand, very coarse, subrounded; moist; soft to medium stiff; dark grayish brown (10YR 4/2).		
15			0.0						
16			0.0						
17		60	0.0						
18					0.0				
19					0.0				
20					0.0				

Drilling Co.: Stock Drilling Sampling Method: Dual Tube
 Driller: Ryan Brown Sampling Interval: Continuous
 Drilling Method: Hand Auger/Hollow Stem Auger Water Level Start (ft. bgs.): 2.54
 Drilling Fluid: None Water Level Finish (ft. btoc.): NA
 Remarks: Temporary well screen set from 4.0-9.0' bgs and 27.0-32.0' bgs. bgs = below ground surface. Converted to Well: Yes No
 Surface Elev.: NA
 North Coor.: _____
 East Coor.: _____

SOIL BORING LOG - 2013 C:\USERS\CONELLI\ONE\DRIVE - ARCADIS\DESKTOP\RACER LANSING - BORING LOGS - P2 PFAS DELINEATION AND P3 MW/GPJ ARCADIS_2013.GDT 9/9/19

Soil Boring Log

Project Name: RACER Lansing Date Started: 08/22/2019 Logger: E. Redner
 Project Number: 30006870.03100 Date Completed: 08/22/2019 Editor: C. O'Neill
 Project Location: Lansing, MI Weather Conditions: Overcast, 62F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well	
21					0.0	[Diagonal Hatching]	(16.0-22.0') CLAY, high plasticity, slow dilatancy; some silt; trace sand, very fine to fine; trace sand, very coarse, subrounded; moist; soft to medium stiff; dark grayish brown (10YR 4/2).	(0.0-33.5') Backfilled with bentonite.	[Black Bar]	
22				0.0						
23			60		0.0	[Vertical Stripes]				
24				0.0						
25				0.0						
26					0.0	[Vertical Stripes]				
27			60		0.0					
28				0.0						
29				0.0						
30				SB-P2-PF177 27-32 @ 1620	0.0	[Dotted Pattern]	(29.5-30.5') SAND, very fine to fine; and SILT; well sorted; wet; very loose; dark grayish brown (10YR 4/2). Note: Wet from 29.5-32.0' bgs.			
31					0.0	[Vertical Stripes]	(30.5-31.5') SILT; and SAND, very fine to fine; well sorted; wet; very loose; dark grayish brown (10YR 4/2).			
32					0.0	[Vertical Stripes]	(31.5-33.5') SILT, rapid dilatancy, nonplastic to low plasticity; little sand, very fine to fine; little clay; well sorted; moist; dense to very dense; dark gray (10YR 4/1).			
33					0.0		End of boring at 33.5' bgs.			
34					0.0					
35										
36										
37										
38										
39										
40										
41										

Remarks: See first page.

SOIL BORING LOG 2013 C:\USERS\CONELL\ONE\DRIVE - ARCADIS\DESKTOP\RACER LANSING - BORING LOGS - P2 PFAS DELINEATION AND P3 MW GPJ ARCADIS 2013.GDT 9/9/19