

MEMO

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Date:

September 3, 2019

Arcadis Project No.:

30006870

Subject:

Plant 6 PFAS Investigation Summary – Phase 2
RACER Trust Site, Lansing, Michigan

The following provides a summary of Phase 2 activities to complete the delineation of poly and per-fluorinated alkyl substances (PFAS) at RACER Trust, Plant 6 located in the City of Lansing, Michigan (Site).

Previous investigations of PFAS at Plant 6 included sampling of monitoring wells as summarized in *the Monitoring Well PFAS Summary- Plants 2 and 6* (Arcadis 2018) summary, as well as soil/vertical aquifer profile (VAP) borings and sampling of storm sewers as summarized in the *PFAS Phase 1 Investigation Summary Memo* (Arcadis 2019a). Locations of the Phase 2 borings are included on **Figure 1**. In general, the results of Phase 1 work indicated the following:

- Perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) exceed Michigan Part 201 Drinking Water (DW) and Groundwater-Surface Water Interface (GSI) Criteria at several locations along the eastern property boundary of Plant 6, as well as the area of the former rinse water cistern near monitoring well P6-SB-07.
- Groundwater collected from all eight off-site soil borings were either non-detect or below Part 201 Criteria for PFOS and PFOA.

- An absence of significant PFAS detections in soil around the P6-SB-07 source area suggests that vadose zone soils in the area of the former rinse water cistern and P6-SB-07 do not represent an ongoing source of PFAS.

Phase 1 activities included the collection of water samples from six storm sewer manholes and combined sewer manholes located in ROWs adjacent to the Site. PFOS was detected in all six storm sewer samples above the GSI Criteria at concentrations ranging from 17.4 nanograms per liter (ng/L) to 73 ng/L (**Figure 3**). PFOA was also detected in all storm sewer samples at concentrations below GSI Criteria. Additional storm sewer sampling results confirmed the results of the Phase 1 Investigation and will be summarized under a separate cover.

This memorandum describes the Phase 2 activities to delineate PFAS in soil and groundwater consistent with the 2019 Plant 6 PFAS Investigation workplan (Arcadis 2019b). The primary objectives of the Phase 2 PFAS investigation were as follows:

- Further delineation of PFAS impacts in areas along the eastern and southern Plant 6 property boundaries to verify off-site migration is not occurring.
- Complete off-site delineation of PFOS and PFOA detected near the eastern property boundary of Plant 6 to GSI Criteria.

1. INVESTIGATION ACTIVITIES

The work completed consisted of sixteen (16) temporary monitoring wells installed in a total of eleven (11) soil borings at Plant 6 and the adjacent City of Lansing rights-of-way (ROWs). Additionally, a sample was collected from existing perched monitoring well P6-MW-01. Phase 2 sample locations are shown on **Figure 1**. The investigation was conducted from April 29 to May 2, 2019.

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

Vertical aquifer profile (VAP) groundwater samples were collected at each soil boring from the more permeable zones identified within the overburden. At each boring location one to two suitable zones were identified for sampling and groundwater samples were collected using low-flow sampling techniques.

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 the EGLE Part 201 Groundwater Surface Water Interface (GSI) criterion for PFOS (12 nanograms per liter [ng/L]) and PFOA (12,000 ng/L); and Drinking Water (DW) Criteria (70 ng/L for combined concentrations of PFOS and PFOA). Groundwater sample locations and analytical results for combined PFOS and PFOA are shown on **Figure 2** with a comparison to DW criteria, and groundwater analytical results for PFOS compared to GSI criteria are shown on **Figure 4**. PFOS analytical results from storm sewer samples compared to the GSI criterion are shown on **Figure 5**. Groundwater analytical results are provided on **Table 1**. Laboratory analytical reports are included as **Attachment 1**.

- Geology observed in soil borings completed at Plant 6 and the adjacent public ROWs is generally consistent with observations from previous on-site investigations. The geology generally consists of up to 8 feet of fill material (primarily on-site) underlain by interbedded clay with lenses of silt and sand. Perched water was generally encountered within the more permeable sand lenses; however, the permeable zones appear discontinuous. The hydrostratigraphy is illustrated on geologic cross sections included as Figures 6 through 9. The interbedded clays, silts, and sand lenses are underlain by a dense glacial till, generally encountered at depths of 20 to 35 feet bgs. Boring logs are included in Attachment 2.
- Groundwater transport occurs in discrete permeable zones, some of which are located at depths that could potentially interact with storm sewers located to the north and east of the Site (Figures 6 and 7). At the southern Plant 6 boundary, a zone of saturated fill material is encountered and may provide a pathway for PFAS migration southern of the property boundary (Figure 9).
- PFOS and PFOA exceed DW Criteria at several locations (Figure 2) along the eastern and southern property boundaries of Plant 6. Elevated concentrations of PFOA (Figure 3) relative to PFOS, drive DW exceedances on the southern half of Plant 6, suggesting that PFAS in these locations may be related to the former rinse water cistern source area near P6-SB-07 rather than the former paint shop area on the northern portion of the Site where PFOS is more dominant. Concentrations of PFOS in perched groundwater also exceed GSI at most locations containing DW exceedances (Figure 4).
- Groundwater collected from Phase 2 off-site soil borings located to the east of the site were either non-detect or below criteria for PFOS and PFOA. Additional work is proposed to complete delineation of exceedances observed at the southern property boundary.
- In addition to PFOS and PFOA, additional PFAS have been detected at the Site. Figure 5 illustrates total concentrations for the 22 compounds other than PFOS and PFOA included on the EGLE Recommended PFAS Analyte List. In general, other PFAS concentrations appear to correlate to PFOS and PFOA concentrations and decrease with distance from PFOS and PFOA source areas. Four of the additional analytes are under consideration by EGLE for future regulations including perfluorobutanesulfonic acid (PFBS), perfluorohexanoic acid (PFHxA), perfluorohexanesulfonic acid (PFHxS), and perfluorononanoic acid (PFNA).
 - The maximum concentration of PFBS was 5.41 ng/L observed in monitoring well MW-14-70 (Arcadis 2018). All detections of PFBS are below the Michigan PFAS Action Response Team (MPART) Science Advisory Workgroup (SAWG) recommended health-based value of 420 ng/L.

- The highest concentration of PFHxA detected on Site is 1,610 ng/L in source area monitoring well P6-SB-07, below the SAWG health-based value of 400,000 ng/L.
- The only concentration of PFHxS detected above the SAWG health-based value of 51 ng/L was 66.8 ng/L in SB-OS-QR364, a soil boring located approximately 400 feet east of the Site. This concentration is an order of magnitude higher than any PFHxS detections on Site.
- Detections of PFNA exceeded the SAWG health-based value of 6 ng/L at a number of locations across the site including locations along the southern and eastern property boundaries (SB-P6-TA242, SB-P6-TA258, SB-P6-OH322, SB-P6-QM322, SB-P6-MQ312, and SB-P6-RQ322), however PFNA was not detected above the laboratory reporting limit at any off-site locations. In general detections of PFNA appear to be associated with elevated total PFAS concentrations and decrease along with decreasing PFOS and PFOA concentrations.

3. PROPOSED ADDITIONAL ACTIVITIES

Based on the results of VAP samples collected along the Plant 6 property boundaries, installation of permanent monitoring wells is proposed to complete delineation of PFOS and PFOA at the southern boundary and facilitate monitoring. The proposed monitoring wells are shown on **Figure 10**. The monitoring well installation scope of work includes the following:

- A total of eleven (11) additional monitoring wells will be installed using rotary drilling methods. The monitoring wells will be screened to target intervals identified during Phase 1 and 2 investigation. Most will be installed within the shallow zone of first encountered water, several will target deeper saturated zones identified during the VAP sampling. Target depths of the monitoring wells are included on Figure 10.
 - Five monitoring wells installed on Plant 6 along the southern and eastern property boundaries to facilitate monitoring of PFOS and PFOA identified in VAP samples.
 - Two off-site monitoring wells within the southern ROW of Michigan Avenue to provide delineation of impacts identified along the southern boundary of Plant 6.
 - Three off-site monitoring wells within the ROW of Inverness Avenue and one monitoring well in the ROW of Shiawassee Street to act as sentinels for migration to the east of Plant 6.
- Continuous soil cores will be obtained from the ground surface to the target well depth at each boring location. Arcadis will log and describe the soils in accordance with the Arcadis Soil Description Standard Operating Procedures included with the MDEQ-approved FSP (Arcadis 2011). Boring logs will be generated based on the field descriptions.
- Monitoring wells will be constructed with a 5-foot stainless-steel wire-wrapped 0.010-slot screens and 2-inch PVC riser. An appropriate sand pack will be placed around the screen interval to a depth of 1 foot above the well screen followed by 1 to 2 feet of choker sand and then bentonite grout to grade.

Monitoring wells installed as part of the above described work and the additional wells proposed will be integrated into the revised Interim Groundwater Monitoring Plan.

Please direct any questions to Dave Favero at 734-879-9525 or Patrick Curry at Arcadis at 810-225-1926.

REFERENCES:

- Arcadis. 2018. Monitoring Well PFAS Summary. RACER Trust, Lansing, Michigan, Plants 2 and 6. September 14.
- Arcadis. 2019a. PFAS Investigation Phase I Summary. RACER Trust, Lansing, Michigan, Plant 6. January 29.
- Arcadis. 2019b. PFAS Investigation -Phase 2 Scope of Work. RACER Trust, Lansing, Michigan, Plant 6. February 18.

Enclosures:

TABLES

Table 1 – Plant 6 Groundwater Analytical Results

FIGURES

- Figure 1 – Plant 6 Groundwater Sampling Locations and Proposed Phase 2 Soil Boring Locations
- Figure 2 – Plant 6 Groundwater Sampling Locations and PFOS + PFOA Analytical Results
- Figure 3 – Plant 6 Groundwater Sampling Locations and PFOS Analytical Results
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- Figure 5 – Plant 6 Groundwater Sampling Locations and Total PFAS Analytical Results
- Figure 6 – Plant 6 Cross Section A – A'
- Figure 7 – Plant 6 Cross Section B – B'
- Figure 8 – Plant 6 Cross Section C – C'
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- Figure 10 – Proposed Monitoring Well Locations

ATTACHMENTS

- Attachment 1 – Laboratory Analytical Reports
- Attachment 2 – Soil Boring Logs

TABLES



Table 1
 Plant 6 Monitoring Well PFAS Analytical Results
 RACER Trust Plant 6
 Lansing, Michigan

Location ID: Date Collected: Sample Name:	Units	MI GW (EGLE2017) RES DW	MI SW (EGLE2017) GSI (NON- DW)	P6-MW-01 5/2/2019 P6-MW-01-050219	SB-OS-QR364 5/2/2019 SB-OS-QR364_12.5- 17.5_20190502	SB-OS-QR364 5/2/2019 SB-OS-QR364_22.5- 27.5_20190502	SB-OS-RW339 5/2/2019 SB-OS-RW339_18.5- 23.5_20190502	SB-P6-MF293 11/28/2018 SB-P6-MF293_20- 25_20181128	SB-P6-MP275 5/1/2019 SB-P6-MP275_10- 15_20190501	SB-P6-MP275 5/1/2019 SB-P6-MP275_20- 25_20190501	SB-P6-NU322 5/1/2019 SB-P6-NU322_11- 16_20190501
Poly- and Perfluorinated Alkyl Substances											
4:2 FTS	ng/l	--	--	<8	<8	<8	<8	<8	<8.3	<8	<8
6:2FTS	ng/l	--	--	<8	<8	<8	<8	<8	<8.3	<8	<8
8:2FTS	ng/l	--	--	<8	<8	<8	<8	<8	<8.3	<8	<8
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	ng/l	--	--	<20	<20	<20	<20	<20	<21	<20	<20
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	ng/l	--	--	<20	<20	<20	<20	<20	<21	<20	<20
Perfluorobutanesulfonic acid (PFBS)	ng/l	--	--	1.32 J	<4	3.80 J	3.24 J	2.03 J	1.71 J	1.91 J	<4
Perfluorobutanoic acid (PFBA)	ng/l	--	--	14.3	3.67 J	9.39	11.2	20.0	6.44 J	16.5	21.1
Perfluorodecanesulfonic acid (PFDS)	ng/l	--	--	<4	<4	<4	<4	<4	<4.2	<4	<4
Perfluorodecanoic acid (PFDA)	ng/l	--	--	<4	<4	<4	<4	<4	<4.2	<4	<4
Perfluorododecanoic acid (PFDoA)	ng/l	--	--	<4	<4	<4	<4	<4	<4.2	<4	<4
Perfluoroheptanesulfonic Acid (PFHpS)	ng/l	--	--	<4	<4	<4	<4	<4	<4.2	<4	<4
Perfluoroheptanoic acid (PFHpA)	ng/l	--	--	18.6	4.42	5.03	14.1	16.5	2.86 J	9.12	<4
Perfluorohexanesulfonic acid (PFHxS)	ng/l	--	--	<4	1.11 J	66.8	1.46 J	<4	1.20 J	1.77 J	<4
Perfluorohexanoic acid (PFHxA)	ng/l	--	--	25.2	6.41	9.95	19.6	41.0	3.63 J	14.9	5.85
Perfluorononanesulfonic acid (PFNS)	ng/l	--	--	<4	<4	<4	<4	<4	<4.2	<4	<4
Perfluorononanoic acid (PFNA)	ng/l	--	--	<4	<4	<4	<4	1.40 J	<4.2	1.33 J	<4
Perfluorooctane Sulfonamide (FOSA)	ng/l	--	--	<4	<4	<4	<4	<4	<4.2	<4	<4
Perfluorooctane sulfonic acid (PFOS)	ng/l	--	12	<4	3.51 J	2.01 J	<4	<4	3.33 J	3.28 J	<4
Perfluorooctanoic acid (PFOA)	ng/l	--	12,000	25.1	9.43	8.31	37.0	41.5	14.7	34.1	<4
Combined PFOS and PFOA	ng/l	70	--	25.1	12.9	10.3	37.0	41.5	18.0	37.4	<8
Perfluoropentanesulfonic acid (PFPeS)	ng/l	--	--	<4	<4	<4	<4	<4	<4.2	<4	<4
Perfluoropentanoic acid (PFPeA)	ng/l	--	--	25.0	7.00	9.15	17.1	34.1	2.82 J	9.9	14.2
Perfluorotetradecanoic acid (PFTeA)	ng/l	--	--	<4	<4	<4	<4	<4	<4.2	<4	<4
Perfluorotridecanoic Acid (PFTriA)	ng/l	--	--	<4	<4	<4	<4	<4	<4.2	<4	<4
Perfluoroundecanoic acid (PFUnA)	ng/l	--	--	<4	<4	<4	<4	<4	<4.2	<4	<4
Total PFAS	ng/l	--	--	110	35.55	114	104	157	36.69	92.8	41.20

Table 1
 Plant 6 Monitoring Well PFAS Analytical Results
 RACER Trust Plant 6
 Lansing, Michigan

Location ID: Date Collected: Sample Name:	Units	MI GW (EGLE2017) RES DW	MI SW (EGLE2017) GSI (NON- DW)	SB-P6-QQ322 5/1/2019 SB-P6-QQ322_10- 15_20190501	SB-P6-SG322 4/30/2019 SB-P6-SG322_10- 15_20190430	SB-P6-SG322 4/30/2019 SB-P6-SG322_25- 30_20190430	SB-P6-TA242 5/2/2019 SB-P6-TA242_8- 13_20190502	SB-P6-TA258 5/2/2019 SB-P6-TA258_5- 10_20190502	SB-P6-TA258 5/2/2019 SB-P6-TA258_25- 30_20190502	SB-P6-TA272 5/2/2019 SB-P6-TA272_29- 34_20190502	SB-P6-TA228 5/2/2019 SB-P6-TA288_5- 10_20190502
Poly- and Perfluorinated Alkyl Substances											
4:2 FTS	ng/l	--	--	<8 [<8]	<8	<8	<8	<8	<8	<10	<10
6:2FTS	ng/l	--	--	<8 [<8]	<8	<8	<8	<8	<8	<10	<10
8:2FTS	ng/l	--	--	<8 [<8]	<8	<8	<8	<8	<8	<10	<10
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	ng/l	--	--	<20 [<20]	<20	<20	<20	<20	<20	<25	<25
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	ng/l	--	--	<20 [<20]	<20	<20	<20	<20	<20	<25	<25
Perfluorobutanesulfonic acid (PFBS)	ng/l	--	--	2.80 J [3.56 J]	1.74 J	2.02 J	1.89 J	2.11 J	<4	1.54 J	<5
Perfluorobutanoic acid (PFBA)	ng/l	--	--	44.6 [39.9]	12.5	30.1	56.2	12.2	38.6	19.5	14.8
Perfluorodecanesulfonic acid (PFDS)	ng/l	--	--	<4.2 [<4.2]	<4	<4	<4	<4	<4	<5	<5
Perfluorodecanoic acid (PFDA)	ng/l	--	--	1.50 J [<4.2]	1.51 J	<4	1.58 J	6.79	1.80 J	2.77 J	<5
Perfluorododecanoic acid (PFDoA)	ng/l	--	--	<4.2 [<4.2]	<4	<4	<4	<4	<4	<5	<5
Perfluoroheptanesulfonic Acid (PFHpS)	ng/l	--	--	<4.2 [<4.2]	<4	<4	<4	<4	<4	<5	<5
Perfluoroheptanoic acid (PFHpA)	ng/l	--	--	31.9 [25.6]	18.3	57.4	100	18.1	32.1	29.7	26.9
Perfluorohexanesulfonic acid (PFHxS)	ng/l	--	--	2.63 J [2.33 J]	1.32 J	2.21 J	2.03 J	<4	<4	1.77 J	<5
Perfluorohexanoic acid (PFHxA)	ng/l	--	--	57.4 [48.2]	22.0	66.3	185	42.0	137	39.4	30.0
Perfluorononanesulfonic acid (PFNS)	ng/l	--	--	<4.2 [<4.2]	<4	<4	<4	<4	<4	<5	<5
Perfluorononanoic acid (PFNA)	ng/l	--	--	4.88 [3.25 J]	3.21 J	4.26	6.89	10.0	<4	4.10 J	4.14 J
Perfluorooctane Sulfonamide (FOSA)	ng/l	--	--	<4.2 [<4.2]	<4	<4	<4	<4	<4	<5	<5
Perfluorooctane sulfonic acid (PFOS)	ng/l	--	12	19.8 [13.7]	13.5	6.07	13.8	15.3	2.16 J	11.1	5.66
Perfluorooctanoic acid (PFOA)	ng/l	--	12,000	74.1 [52.6]	39.8	91.1	119	74.1	18.7	75.6	45.1
Combined PFOS and PFOA	ng/l	70	--	93.9 [66.3]	53.3	97.2	132.8	89.4	20.9	86.7	50.8
Perfluoropentanesulfonic acid (PFPeS)	ng/l	--	--	<4.2 [<4.2]	<4	<4	<4	<4	<4	<5	<5
Perfluoropentanoic acid (PFPeA)	ng/l	--	--	65.0 [51.7]	20.6	57.0	216	16.1	103	25.6	26.7
Perfluorotetradecanoic acid (PFTeA)	ng/l	--	--	<4.2 [<4.2]	<4	<4	<4	<4	<4	<5	<5
Perfluorotridecanoic Acid (PFTriA)	ng/l	--	--	<4.2 [<4.2]	<4	<4	<4	<4	<4	<5	<5
Perfluoroundecanoic acid (PFUnA)	ng/l	--	--	<4.2 [<4.2]	<4	<4	<4	3.54 J	<4	<5	<5
Total PFAS	ng/l	--	--	305 [241]	134	316	702	200	333	211	153

Table 1
Plant 2 Monitoring Well Analytical Results
RACER Trust Plant 2
Lansing, Michigan

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.

< = Non-detect, analytical result below reporting limit

All analysis completed using modified USEPA Method 537

Acronyms and Abbreviations:

DW - 2017 EGLE Part 201 Drinking Water Criteria

GSI - 2017 EGLE Part 201 Groundwater Surface Water Interface Criteria for a Non-Drinking Water Source

ft bgs - feet below ground surface

ng/L - nanograms per liter

NA - Not Analyzed

Analytical Laboratories:

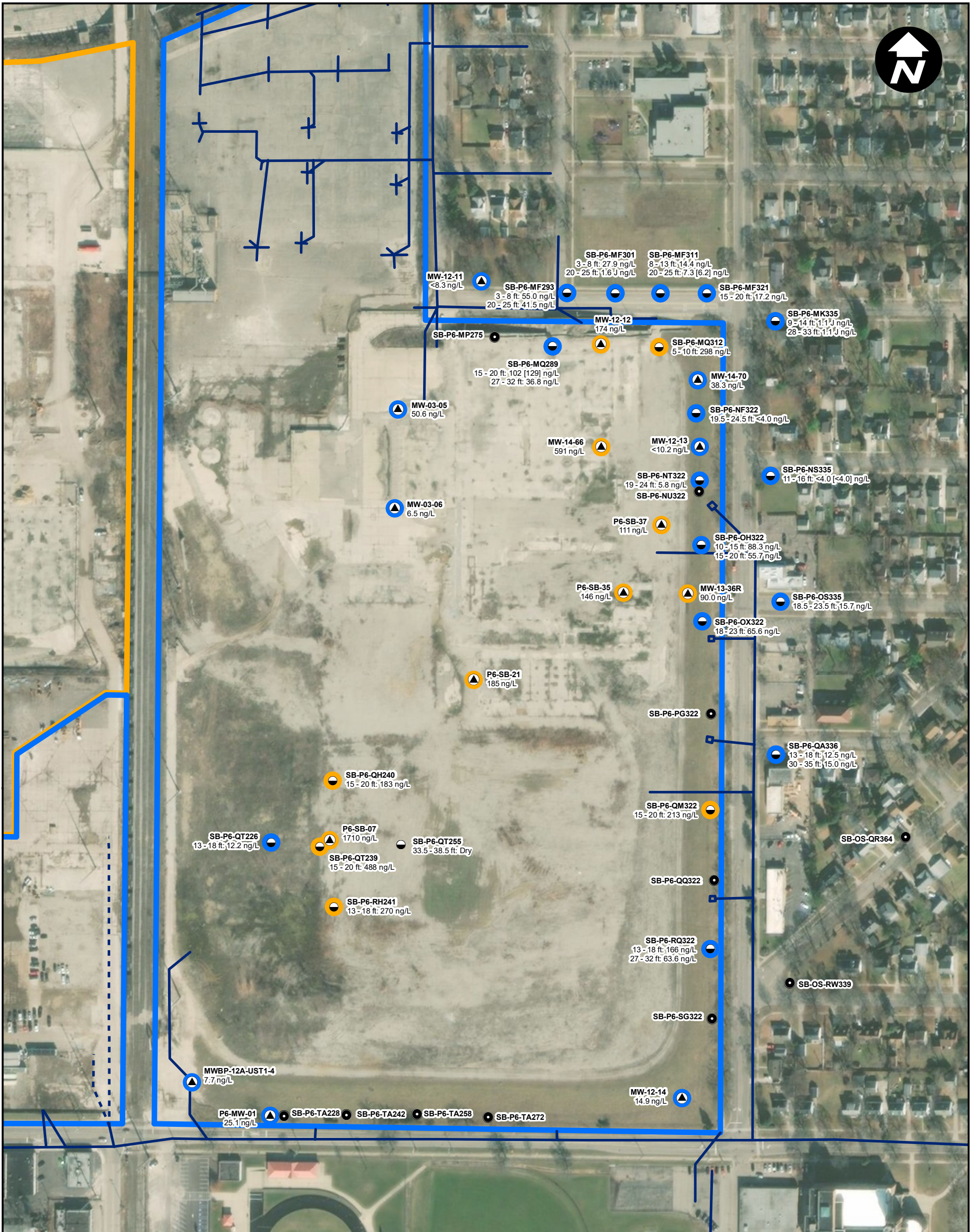
SGS Accutest - SGS Accutest Laboratories, Orlando, FL

Qualifiers:

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

FIGURES





LEGEND

- PROPOSED BORING LOCATIONS
- ▲ MONITORING WELL
- VAP BORING
- PFOS + PFOA <math>< 70\text{ ng/L}</math>
- PFOS + PFOA >math>70\text{ ng/L}</math>
- STORM SEWER LOCATION
- - - ASSUMED/ESTIMATED STORM SEWER LOCATION
- APPROXIMATE PLANT BOUNDARIES**
- ▭ PLANT 2
- ▭ PLANT 3
- ▭ PLANT 6

NOTES:

THE ANALYTICAL RESULTS REPRESENT THE COMBINED PFOS AND PFOA CONCENTRATION IN THE SAMPLE AND ARE PRESENTED IN UNITS OF ng/L. THE MOST RECENT SAMPLING DATA IS SHOWN.

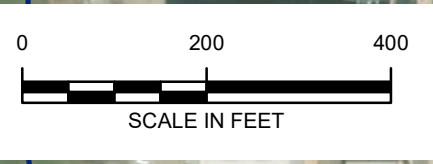
ANALYTICAL RESULTS IN BRACKETS REPRESENT DUPLICATE SAMPLE RESULTS.

THE EGLE PART 201 DRINKING WATER CRITERION FOR COMBINED PFOS AND PFOA 12 ng/L.

J - COMPOUND DETECTED ABOVE LABORATORY METHOD DETECTION LIMIT AND BELOW THE QUANTITATIVE REPORTING LIMIT

ng/L - NANOGRAMS PER LITER

ALL ANALYSES COMPLETED USING MODIFIED USEPA METHOD 537.

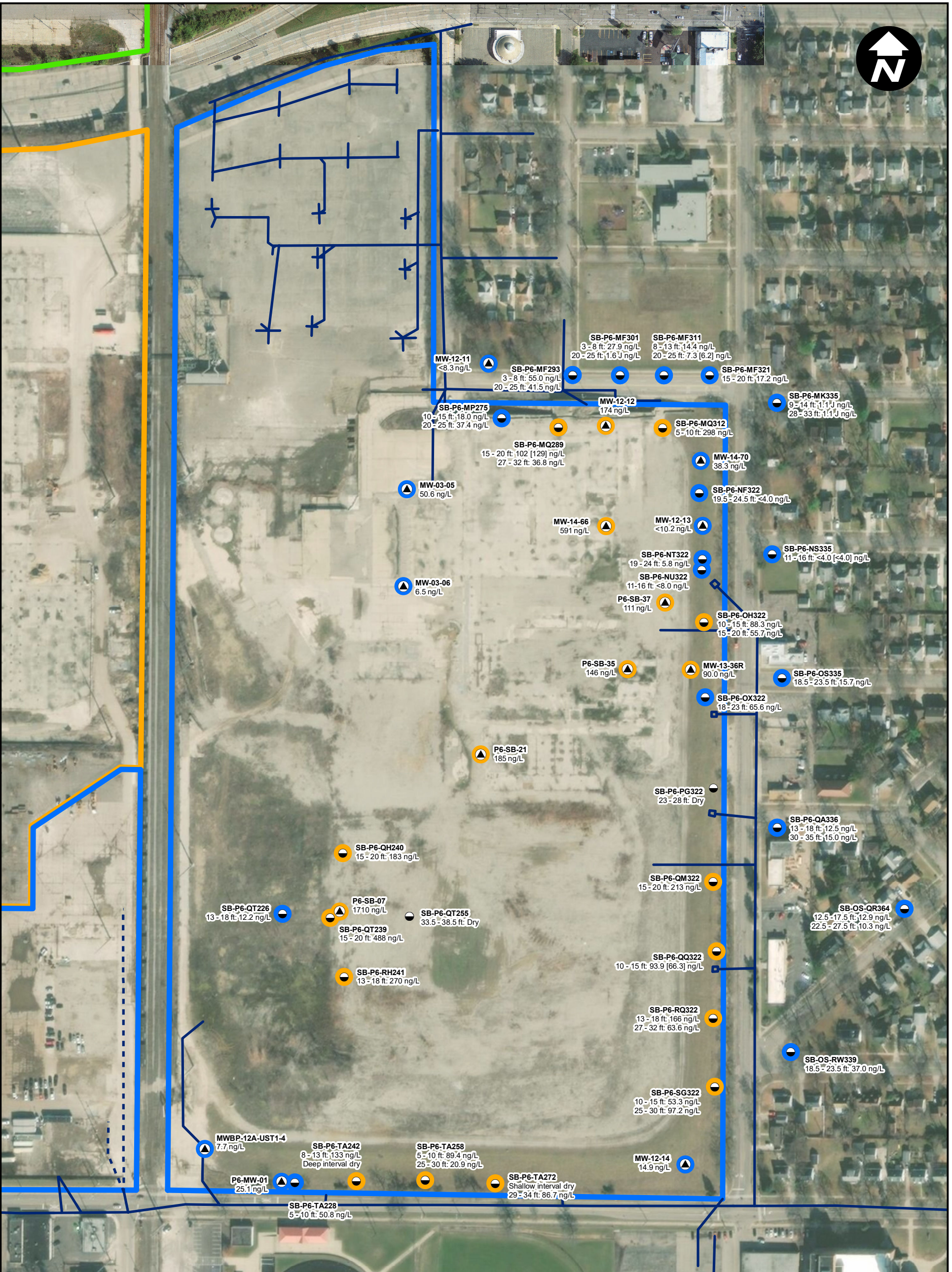


RACER TRUST
 PLANT 6
 LANSING, MICHIGAN

**BORING LOCATIONS AND
 SITE LAYOUT**

ARCADIS | Design & Consultancy
 for natural and
 built assets

FIGURE
1



LEGEND

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

APPROXIMATE PLANT BOUNDARIES

- PLANT 2
- PLANT 3
- PLANT 6

NOTES:

THE ANALYTICAL RESULTS REPRESENT THE COMBINED PFOS AND PFOA CONCENTRATION IN THE SAMPLE AND ARE PRESENTED IN UNITS OF ng/L. THE MOST RECENT SAMPLING DATA IS SHOWN.

ANALYTICAL RESULTS IN BRACKETS REPRESENT DUPLICATE SAMPLE RESULTS.

THE EGLE PART 201 DRINKING WATER CRITERION FOR COMBINED PFOS AND PFOA IS 12 ng/L.

J - COMPOUND DETECTED ABOVE LABORATORY METHOD DETECTION LIMIT AND BELOW THE QUANTITATIVE REPORTING LIMIT

ng/L - NANOGRAMS PER LITER

ALL ANALYSES COMPLETED USING MODIFIED USEPA METHOD 537.

0 200 400

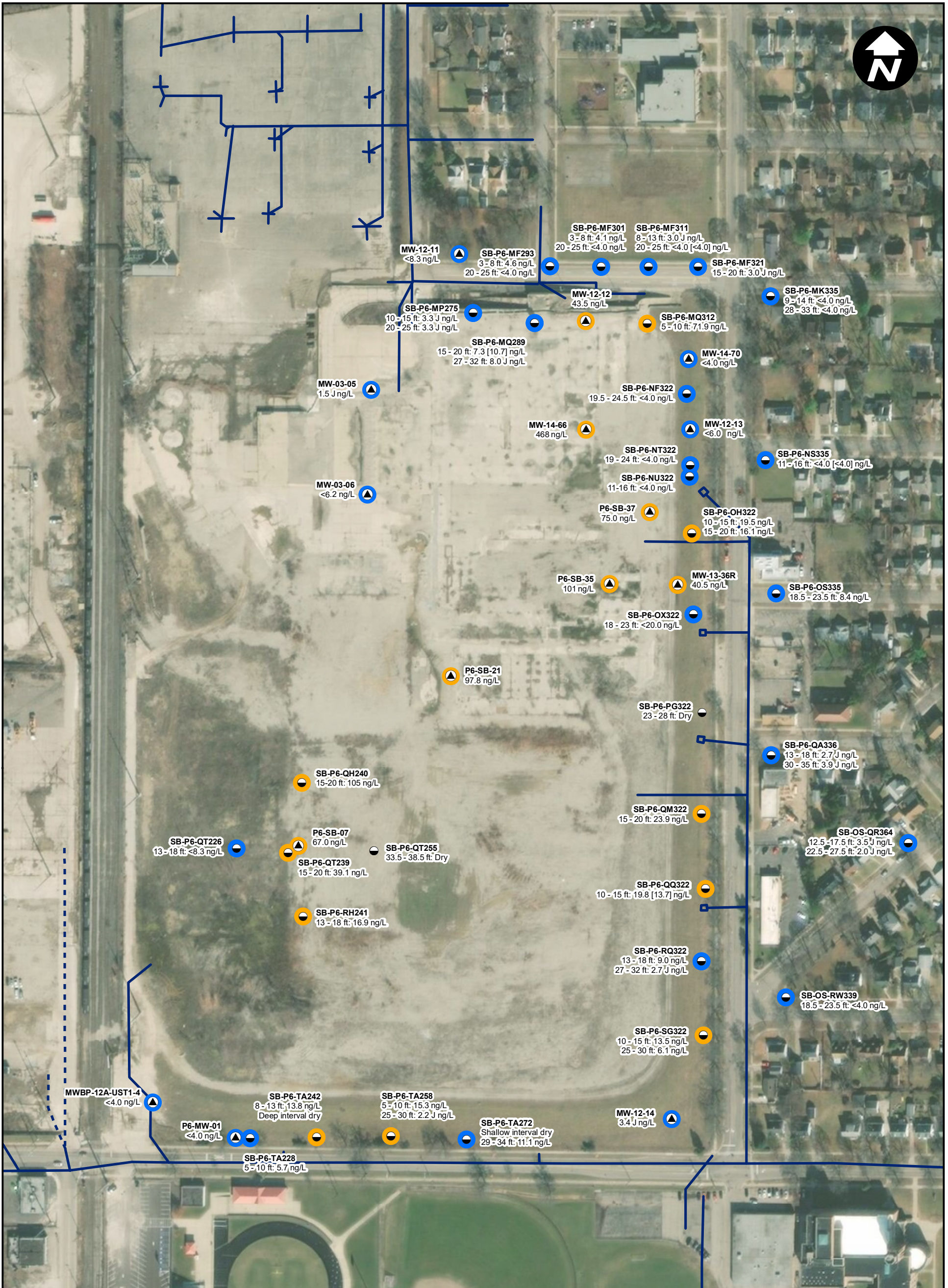
SCALE IN FEET

RACER TRUST
PLANT 6
LANSING, MICHIGAN

**PLANT 6 GW SAMPLING LOCATIONS
PFOS & PFOA ANALYTICAL RESULTS**

FIGURE
2

ARCADIS | Design & Consultancy
for natural and built assets



CITY: Novi DIV: ENV DB: TRY PIC: J.Barrett PM: R.Christensen TR: A.Vilthauer TM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
G:\GIS\Project Files\RACER\Langsing\Docs\PFAS\PFAS_P6AS in GW.mxd PLOTTED: 8/6/2019 3:40:52 PM BY: SYaqoob

NOTES:

THE ANALYTICAL RESULTS REPRESENT THE PFOS CONCENTRATION IN THE SAMPLE AND ARE PRESENTED IN UNITS OF ng/L. THE MOST RECENT SAMPLING DATA IS SHOWN.

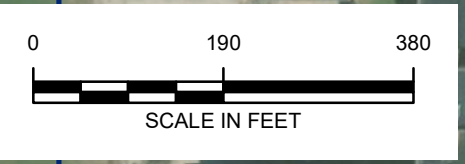
ANALYTICAL RESULTS IN BRACKETS REPRESENT DUPLICATE SAMPLE RESULTS.

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

J - COMPOUND DETECTED ABOVE LABORATORY METHOD DETECTION LIMIT AND BELOW THE QUANTITATIVE REPORTING LIMIT

ng/L - NANOGRAMS PER LITER

ALL ANALYSES COMPLETED USING MODIFIED USEPA METHOD 537.



LEGEND

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

APPROXIMATE PLANT BOUNDARIES

- PLANT 2
- PLANT 3
- PLANT 6

RACER TRUST
PLANT 6
LANSING, MICHIGAN

**PLANT 6 GW SAMPLING LOCATIONS
PFOS ANALYTICAL RESULTS**

ARCADIS Design & Consultancy
for natural and built assets

FIGURE
4

AeroGRID, IIGN, and the GIS



LEGEND

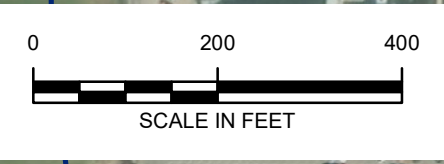
- MONITORING WELL
- VAP BORING
- Non-Detect
- <10 ng/L
- 10 -100 ng/L
- 100 -1000 ng/L
- STORM SEWER LOCATION
- ASSUMED/ESTIMATED STORM SEWER LOCATION
- APPROXIMATE PLANT BOUNDARIES**
- PLANT 2
- PLANT 3
- PLANT 6

NOTES:
 THE ANALYTICAL RESULTS REPRESENT THE TOTAL CONCENTRATION OF ALL COMPOUNDS INCLUDED IN EGLE RECOMMENDED PFAS ANALYTE LIST EXCEPT FOR PFOS AND PFOA. RESULTS ARE PRESENTED IN UNITS OF ng/L. THE MOST RECENT SAMPLING DATA IS SHOWN.

ANALYTICAL RESULTS IN BRACKETS REPRESENT DUPLICATE SAMPLE RESULTS.

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

ALL ANALYSES COMPLETED USING MODIFIED USEPA METHOD 537.

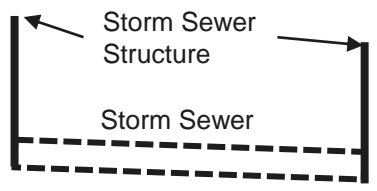
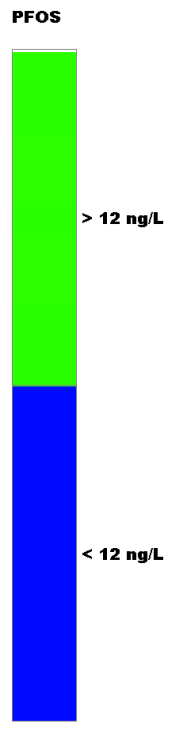
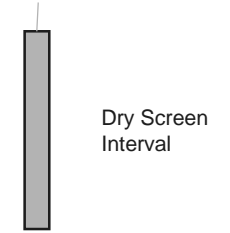
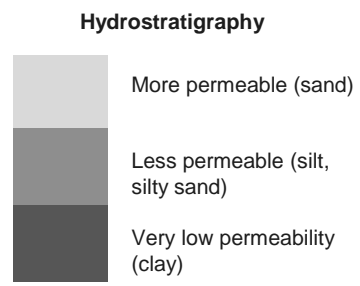
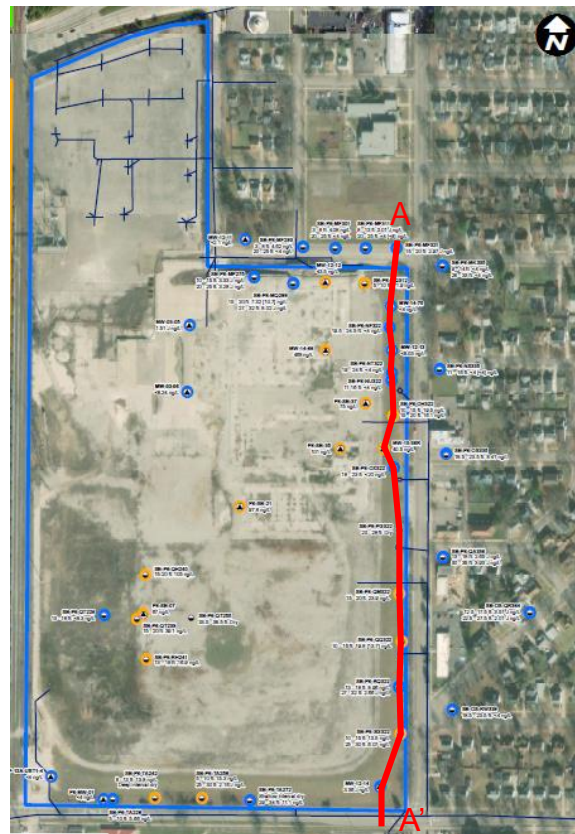
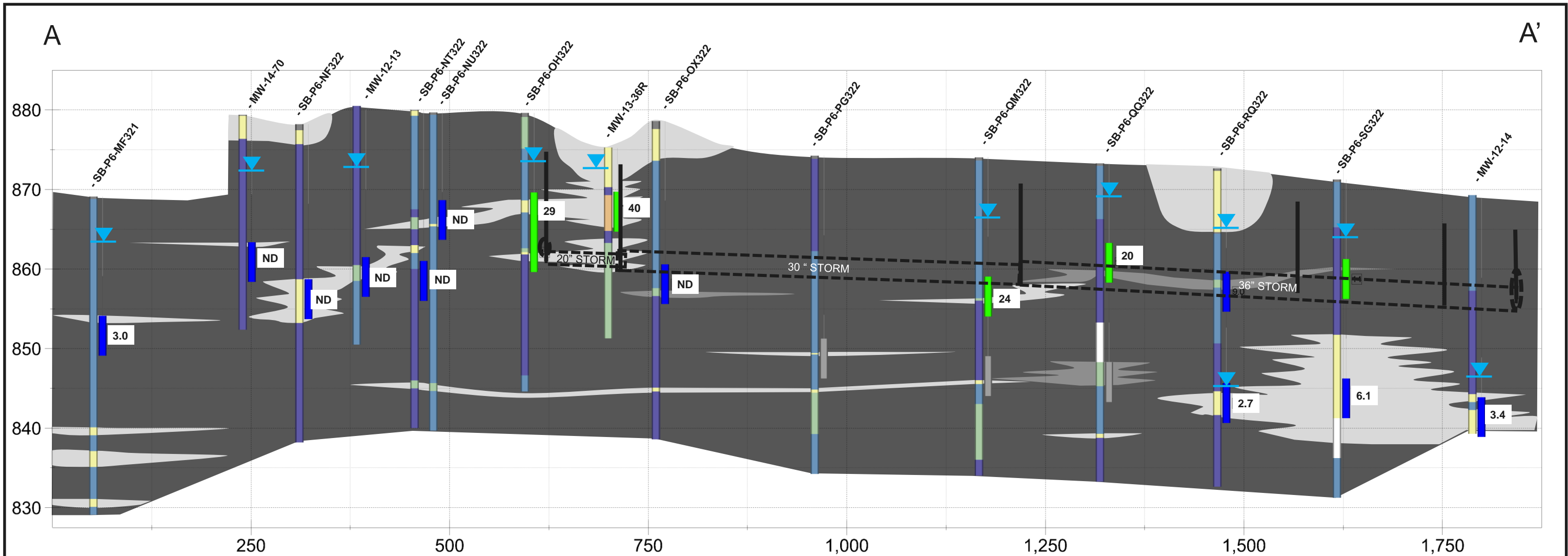


RACER TRUST
 PLANT 6
 LANSING, MICHIGAN

SUMMARY OF OTHER PFAS COMPOUNDS

ARCADIS Design & Consultancy for natural and built assets

FIGURE
5



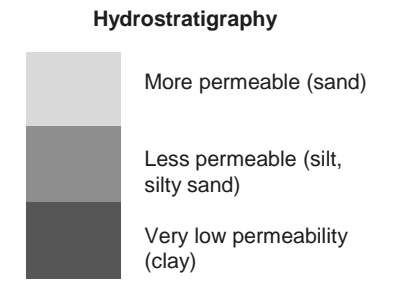
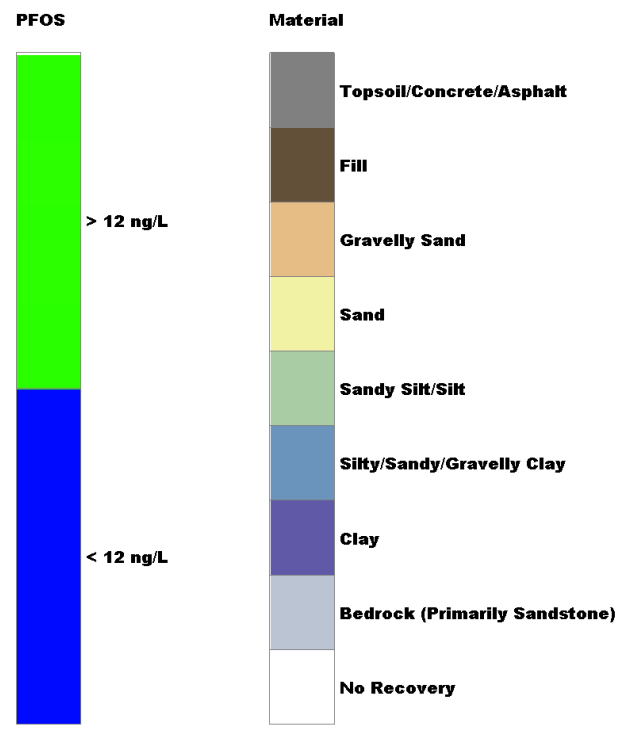
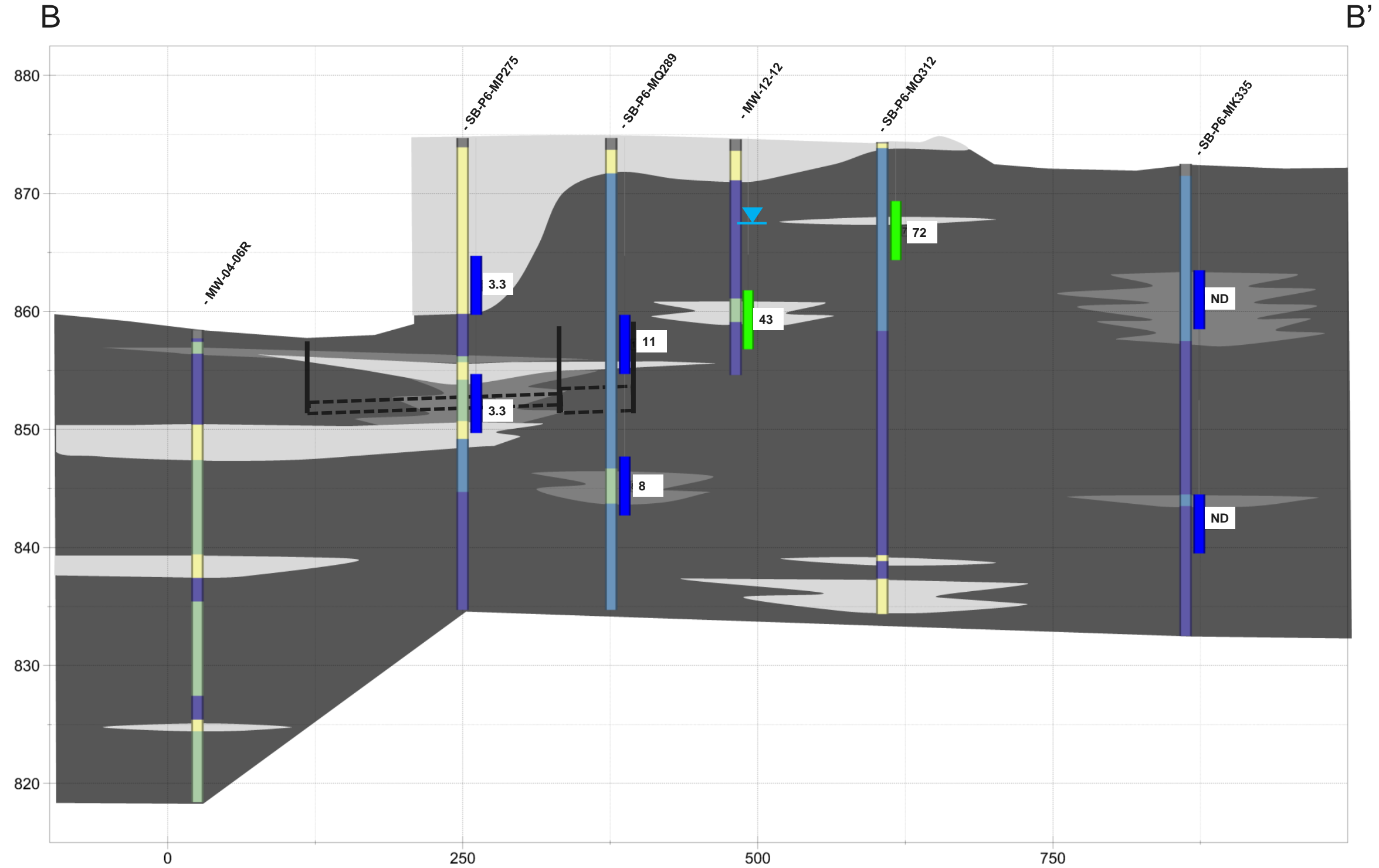
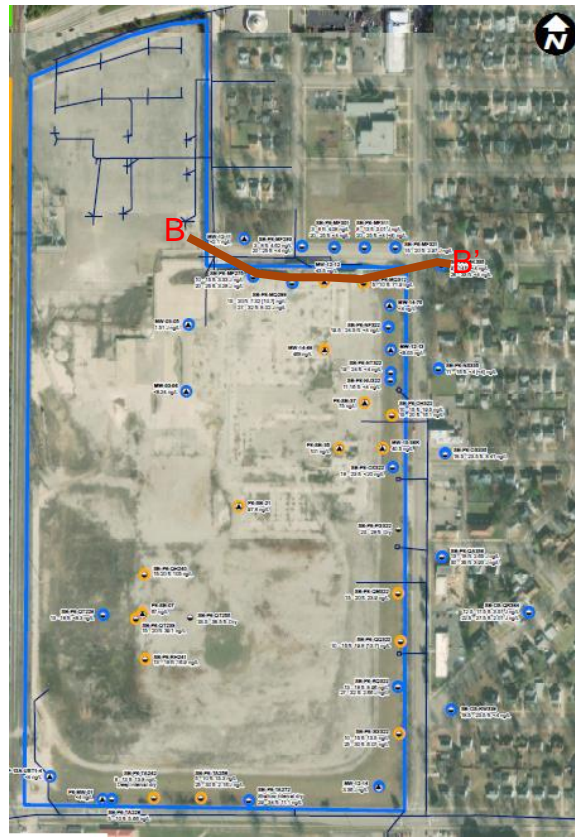
RACER TRUST PLANT 6
LANSING, MICHIGAN

PLANT 6 CROSS SECTION A – A'

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FIGURE
6

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Groundwater Table

Storm Sewer Structure

RACER TRUST PLANT 6
LANSING, MICHIGAN

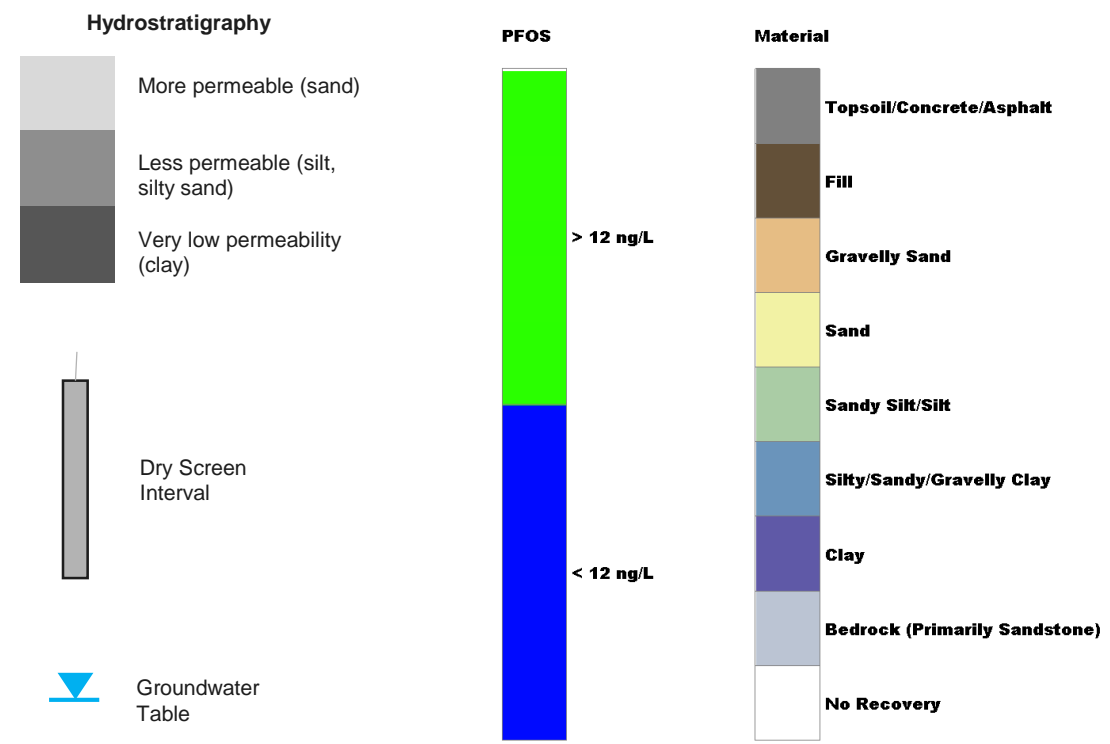
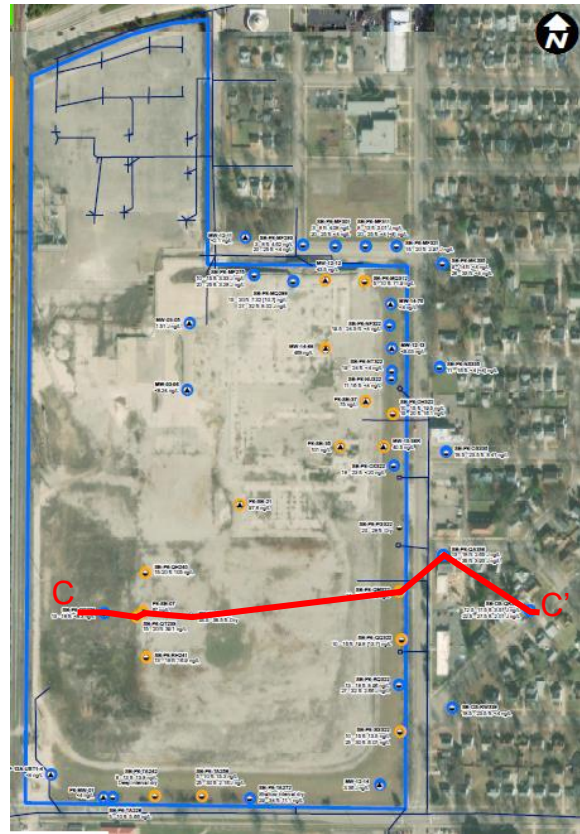
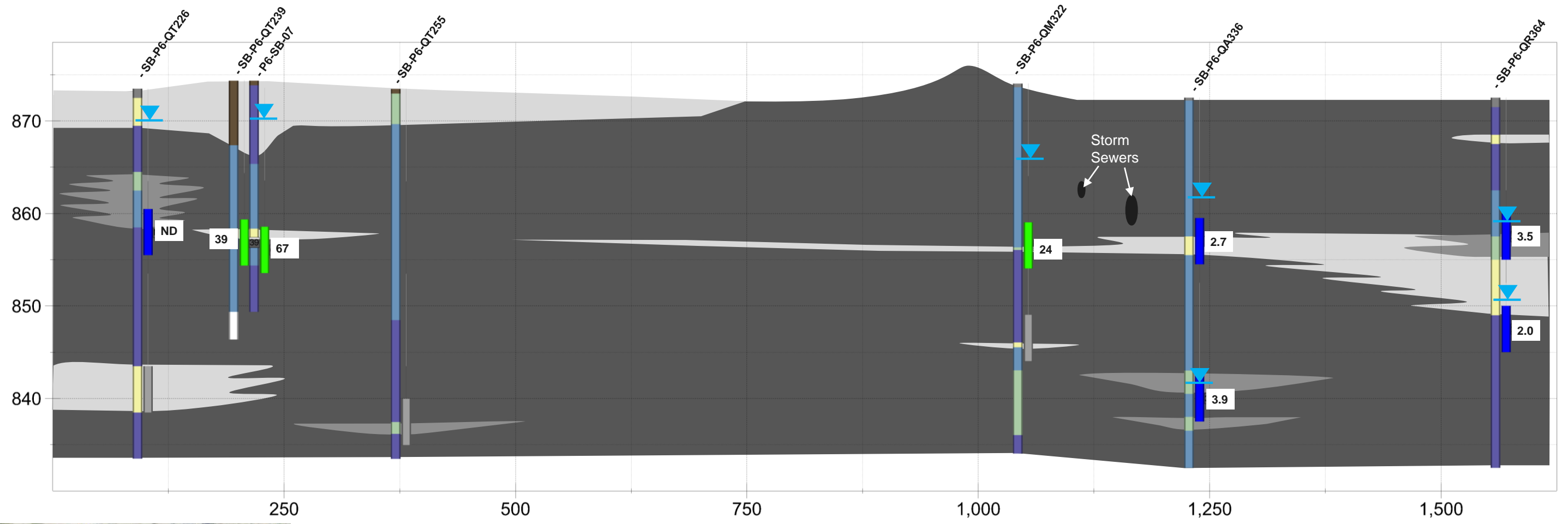
PLANT 6 CROSS SECTION B – B'

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for natural and built assets

FIGURE
7

C

C'



RACER TRUST PLANT 6
LANSING, MICHIGAN

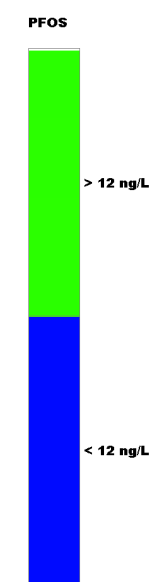
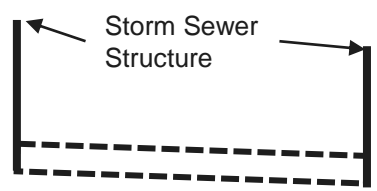
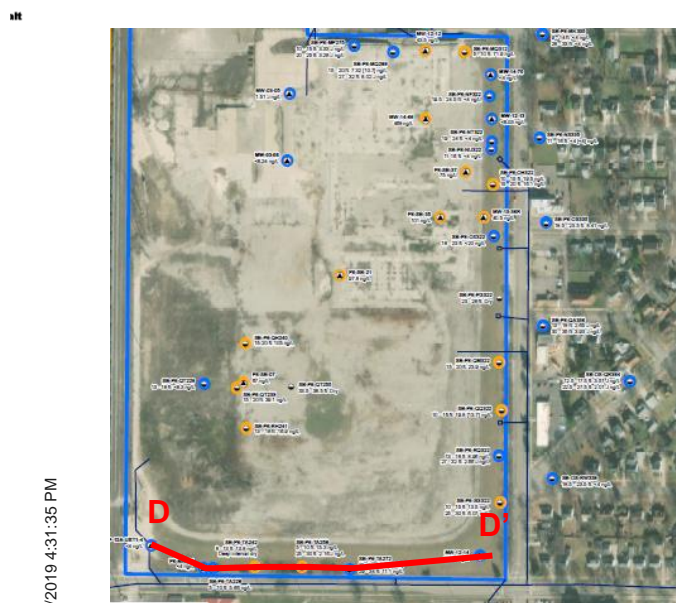
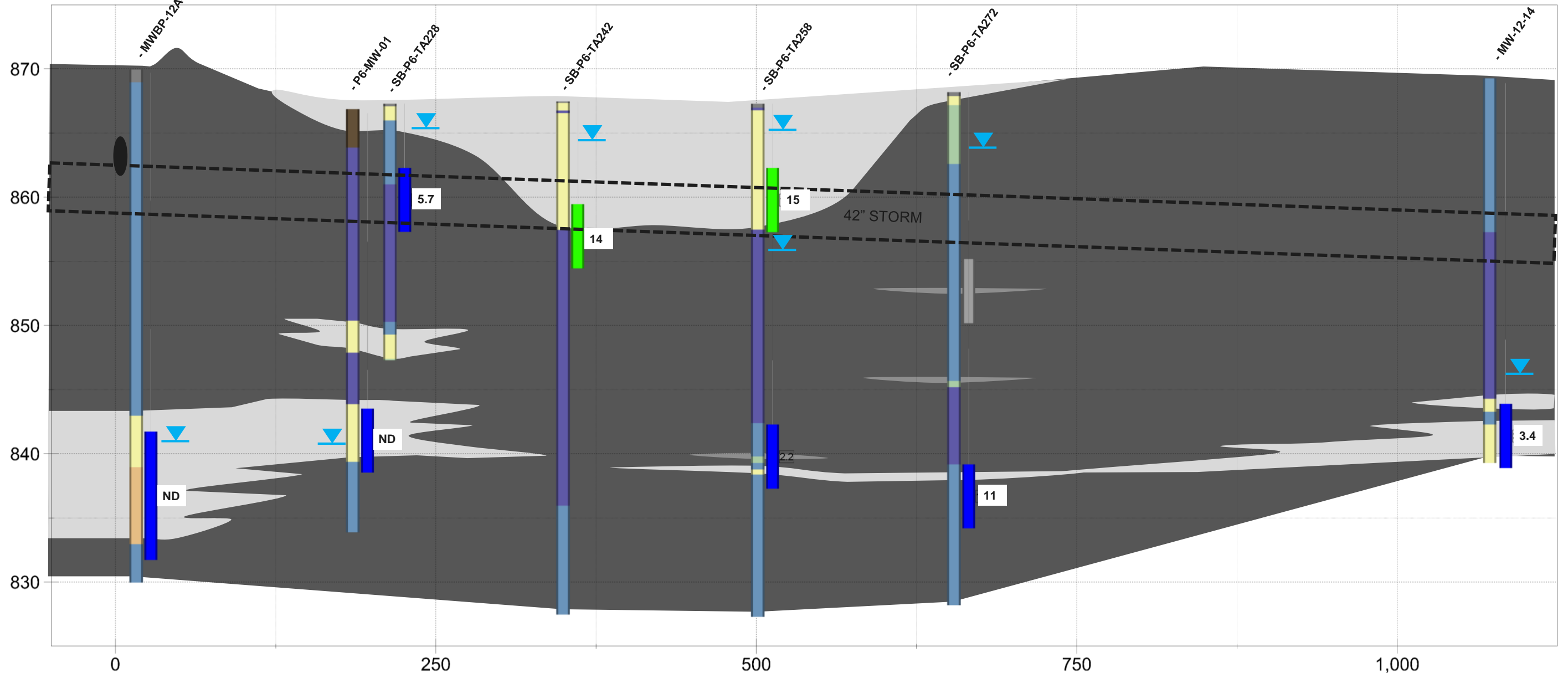
PLANT 6 CROSS SECTION C – C'


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FIGURE
8

D

D'



- Material**
- Topsoil/Concrete/Asphalt
 - Fill
 - Gravelly Sand
 - Sand
 - Sandy Silt/Silt
 - Silty/Sandy/Gravelly Clay
 - Clay
 - Bedrock (Primarily Sandstone)
 - No Recovery

- Hydrostratigraphy**
- More permeable (sand)
 - Less permeable (silt, silty sand)
 - Very low permeability (clay)

RACER TRUST PLANT 6
LANSING, MICHIGAN

PLANT 6 CROSS SECTION D – D'


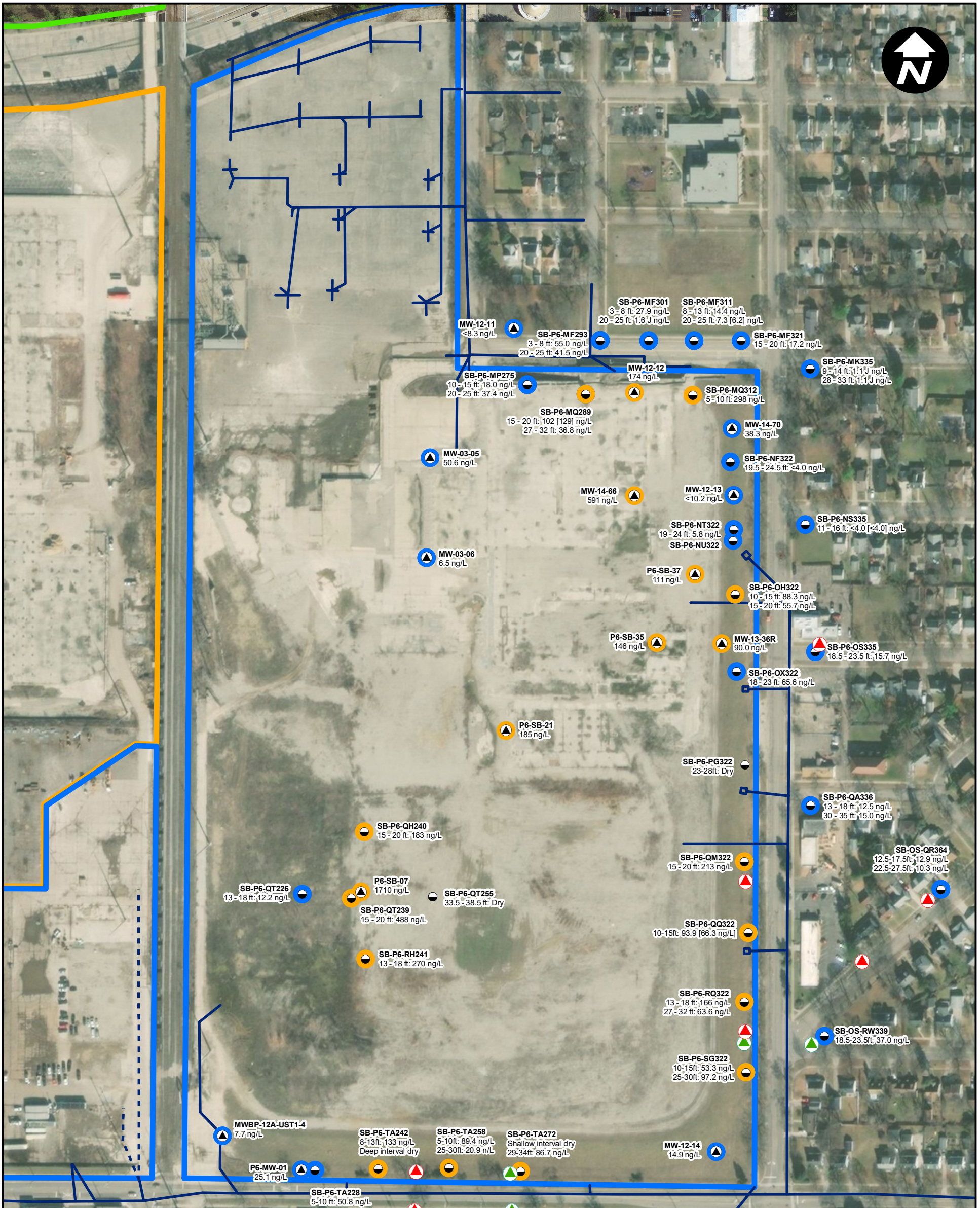

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FIGURE
9

8/22/2019 4:31:35 PM



LEGEND

- MONITORING WELL
- VAP BORING
- PROPOSED MW LOCATIONS**
- DEEP (20-35' BELOW GRADE)
- SHALLOW (< 20' BELOW GRADE)
- PFOS + PFOA < 70 ng/L
- PFOS + PFOA > 70 ng/L
- STORM SEWER LOCATION
- ASSUMED/ESTIMATED STORM SEWER LOCATION
- APPROXIMATE PLANT BOUNDARIES**
- PLANT 2
- PLANT 3
- PLANT 6

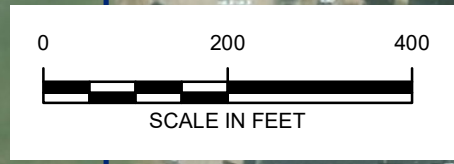
NOTES:

THE ANALYTICAL RESULTS REPRESENT THE COMBINED PFOS AND PFOA CONCENTRATION IN THE SAMPLE AND ARE PRESENTED IN UNITS OF ng/L. THE MOST RECENT SAMPLING DATA IS SHOWN AND INCLUDES ALL COMPOUNDS INCLUDED IN EGLE RECOMMENDED PFAS ANALYTE LIST.

ANALYTICAL RESULTS IN BRACKETS REPRESENT DUPLICATE SAMPLE RESULTS.

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

ALL ANALYSES COMPLETED USING MODIFIED USEPA METHOD 537.



RACER TRUST
 PLANT 6
 LANSING, MICHIGAN

PLANT 6 PROPOSED MW LOCATIONS

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 for natural and built assets

FIGURE
10

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: FA63853

Sampling Dates: 04/30/19 - 05/02/19



Report to:

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Lansing, MI 48933
alex.villhauer@arcadis.com; christine.gregg@arcadis.com;
daniel.stockard@arcadis.com
ATTN: Alex Villhauer

Total number of pages in report: 57



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.

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1

2

3

4

5



Sample Summary

Arcadis

Job No: FA63853

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

Sample Number	Collected		Received	Matrix		Client Sample ID
	Date	Time By		Code	Type	
FA63853-1	04/30/19	16:00 AV	05/03/19	AQ	Ground Water	SB-P6-SG322_10-15
FA63853-2	04/30/19	16:05 AV	05/03/19	AQ	Ground Water	SB-P6-SG322_25-30
FA63853-2D	04/30/19	16:05 AV	05/03/19	AQ	Water Dup/MSD	SB-P6-SG322_25-30
FA63853-2S	04/30/19	16:05 AV	05/03/19	AQ	Water Matrix Spike	SB-P6-SG322_25-30
FA63853-5	05/01/19	15:25 AV	05/03/19	AQ	Ground Water	SB-P6-QQ322_10-15
FA63853-6	05/01/19	00:00 AV	05/03/19	AQ	Ground Water	DUP-01_050119
FA63853-7	05/01/19	17:00 AV	05/03/19	AQ	Ground Water	SB-P6-NU322_11-16
FA63853-8	05/01/19	17:25 AV	05/03/19	AQ	Ground Water	SB-P6-MP275_20-25
FA63853-9	05/01/19	17:45 AV	05/03/19	AQ	Ground Water	SB-P6-MP275_10-15
FA63853-10	05/02/19	12:55 AV	05/03/19	AQ	Ground Water	SB-P6-TA272_29-34
FA63853-11	05/02/19	13:35 AV	05/03/19	AQ	Ground Water	SB-P6-TA258_5-10
FA63853-12	05/02/19	13:50 AV	05/03/19	AQ	Ground Water	SB-P6-TA258_25-30
FA63853-13	05/02/19	14:15 AV	05/03/19	AQ	Ground Water	SB-P6-TA242_8-13



Sample Summary (continued)

Arcadis

Job No: FA63853

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

Sample Number	Collected		Received	Matrix		Client Sample ID
	Date	Time By		Code	Type	
FA63853-14	05/02/19	14:40 AV	05/03/19	AQ	Ground Water	P6-MW-01-050219
FA63853-15	05/02/19	14:55 AV	05/03/19	AQ	Ground Water	SB-P6-TA228_5-10
FA63853-16	05/02/19	15:10 AV	05/03/19	AQ	Ground Water	SB-OS-RW339_18.5-23.5
FA63853-17	05/02/19	15:20 AV	05/03/19	AQ	Ground Water	SB-OS-QR364_12.5-17.5
FA63853-18	05/02/19	15:40 AV	05/03/19	AQ	Ground Water	SB-OS-QR364_22.5-27.5
FA63853-19	05/02/19	16:00 AV	05/03/19	AQ	Equipment Blank	EB-01-050219

Summary of Hits

Job Number: FA63853
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 04/30/19 thru 05/02/19

2

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

FA63853-1 SB-P6-SG322_10-15

Perfluorobutanoic acid	0.0125	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid	0.0206	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid	0.0220	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid	0.0183	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid	0.0398	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid	0.00321 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid	0.00151 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid	0.00174 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid	0.00132 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid	0.0135	0.0040	0.0015	ug/l	EPA 537M BY ID

FA63853-2 SB-P6-SG322_25-30

Perfluorobutanoic acid	0.0301	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid	0.0570	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid	0.0663	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid	0.0574	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid	0.0911	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid	0.00426	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid	0.00202 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid	0.00221 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid	0.00607	0.0040	0.0015	ug/l	EPA 537M BY ID

FA63853-5 SB-P6-QQ322_10-15

Perfluorobutanoic acid	0.0446	0.0083	0.0021	ug/l	EPA 537M BY ID
Perfluoropentanoic acid	0.0650	0.0042	0.0016	ug/l	EPA 537M BY ID
Perfluorohexanoic acid	0.0574	0.0042	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid	0.0319	0.0042	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid	0.0741	0.0042	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid	0.00488	0.0042	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid	0.00150 J	0.0042	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid	0.00280 J	0.0042	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid	0.00263 J	0.0042	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid	0.0198	0.0042	0.0016	ug/l	EPA 537M BY ID

FA63853-6 DUP-01_050119

Perfluorobutanoic acid	0.0399	0.0083	0.0021	ug/l	EPA 537M BY ID
Perfluoropentanoic acid	0.0517	0.0042	0.0016	ug/l	EPA 537M BY ID
Perfluorohexanoic acid	0.0482	0.0042	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid	0.0256	0.0042	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid	0.0526	0.0042	0.0010	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA63853
 Account: Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI
 Collected: 04/30/19 thru 05/02/19

2

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

		Perfluorononanoic acid	0.00325 J	0.0042	0.0010	ug/l	EPA 537M BY ID
		Perfluorobutanesulfonic acid	0.00356 J	0.0042	0.0010	ug/l	EPA 537M BY ID
		Perfluorohexanesulfonic acid	0.00233 J	0.0042	0.0010	ug/l	EPA 537M BY ID
		Perfluorooctanesulfonic acid	0.0137	0.0042	0.0016	ug/l	EPA 537M BY ID

FA63853-7 SB-P6-NU322_11-16

		Perfluorobutanoic acid	0.0211	0.0080	0.0020	ug/l	EPA 537M BY ID
		Perfluoropentanoic acid	0.0142	0.0040	0.0015	ug/l	EPA 537M BY ID
		Perfluorohexanoic acid	0.00585	0.0040	0.0010	ug/l	EPA 537M BY ID

FA63853-8 SB-P6-MP275_20-25

		Perfluorobutanoic acid	0.0165	0.0080	0.0020	ug/l	EPA 537M BY ID
		Perfluoropentanoic acid	0.00989	0.0040	0.0015	ug/l	EPA 537M BY ID
		Perfluorohexanoic acid	0.0149	0.0040	0.0010	ug/l	EPA 537M BY ID
		Perfluoroheptanoic acid	0.00912	0.0040	0.0010	ug/l	EPA 537M BY ID
		Perfluorooctanoic acid	0.0341	0.0040	0.0010	ug/l	EPA 537M BY ID
		Perfluorononanoic acid	0.00133 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		Perfluorobutanesulfonic acid	0.00191 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		Perfluorohexanesulfonic acid	0.00177 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		Perfluorooctanesulfonic acid	0.00328 J	0.0040	0.0015	ug/l	EPA 537M BY ID

FA63853-9 SB-P6-MP275_10-15

		Perfluorobutanoic acid	0.00644 J	0.0083	0.0021	ug/l	EPA 537M BY ID
		Perfluoropentanoic acid	0.00282 J	0.0042	0.0016	ug/l	EPA 537M BY ID
		Perfluorohexanoic acid	0.00363 J	0.0042	0.0010	ug/l	EPA 537M BY ID
		Perfluoroheptanoic acid	0.00286 J	0.0042	0.0010	ug/l	EPA 537M BY ID
		Perfluorooctanoic acid	0.0147	0.0042	0.0010	ug/l	EPA 537M BY ID
		Perfluorobutanesulfonic acid	0.00171 J	0.0042	0.0010	ug/l	EPA 537M BY ID
		Perfluorohexanesulfonic acid	0.00120 J	0.0042	0.0010	ug/l	EPA 537M BY ID
		Perfluorooctanesulfonic acid	0.00333 J	0.0042	0.0016	ug/l	EPA 537M BY ID

FA63853-10 SB-P6-TA272_29-34

		Perfluorobutanoic acid	0.0195	0.010	0.0025	ug/l	EPA 537M BY ID
		Perfluoropentanoic acid	0.0256	0.0050	0.0019	ug/l	EPA 537M BY ID
		Perfluorohexanoic acid	0.0394	0.0050	0.0013	ug/l	EPA 537M BY ID
		Perfluoroheptanoic acid	0.0297	0.0050	0.0013	ug/l	EPA 537M BY ID
		Perfluorooctanoic acid	0.0756	0.0050	0.0013	ug/l	EPA 537M BY ID
		Perfluorononanoic acid	0.00410 J	0.0050	0.0013	ug/l	EPA 537M BY ID
		Perfluorodecanoic acid	0.00277 J	0.0050	0.0013	ug/l	EPA 537M BY ID
		Perfluorobutanesulfonic acid	0.00154 J	0.0050	0.0013	ug/l	EPA 537M BY ID
		Perfluorohexanesulfonic acid	0.00177 J	0.0050	0.0013	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA63853
 Account: Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI
 Collected: 04/30/19 thru 05/02/19

2

Lab Sample ID	Client Sample ID	Result/ Analyte Qual	RL	MDL	Units	Method
		0.0111	0.0050	0.0019	ug/l	EPA 537M BY ID
FA63853-11	SB-P6-TA258_5-10					
		0.0122	0.0080	0.0020	ug/l	EPA 537M BY ID
		0.0161	0.0040	0.0015	ug/l	EPA 537M BY ID
		0.0420	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.0181	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.0741	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.0100	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00679	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00354 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00211 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.0153	0.0040	0.0015	ug/l	EPA 537M BY ID
FA63853-12	SB-P6-TA258_25-30					
		0.0386	0.0080	0.0020	ug/l	EPA 537M BY ID
		0.103	0.0040	0.0015	ug/l	EPA 537M BY ID
		0.137	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.0321	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.0187	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00180 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00216 J	0.0040	0.0015	ug/l	EPA 537M BY ID
FA63853-13	SB-P6-TA242_8-13					
		0.0562	0.0080	0.0020	ug/l	EPA 537M BY ID
		0.216	0.0080	0.0030	ug/l	EPA 537M BY ID
		0.185	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.100	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.119	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00689	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00158 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00189 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.00203 J	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.0138	0.0040	0.0015	ug/l	EPA 537M BY ID
FA63853-14	P6-MW-01-050219					
		0.0143	0.0080	0.0020	ug/l	EPA 537M BY ID
		0.0250	0.0040	0.0015	ug/l	EPA 537M BY ID
		0.0252	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.0186	0.0040	0.0010	ug/l	EPA 537M BY ID
		0.0251	0.0040	0.0010	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA63853
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 04/30/19 thru 05/02/19

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
		0.00132 J	0.0040	0.0010	ug/l	EPA 537M BY ID
FA63853-15	SB-P6-TA228_5-10					
Perfluorobutanoic acid		0.0148	0.010	0.0025	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0267	0.0050	0.0019	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0300	0.0050	0.0013	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0269	0.0050	0.0013	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0451	0.0050	0.0013	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00414 J	0.0050	0.0013	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.00566	0.0050	0.0019	ug/l	EPA 537M BY ID
FA63853-16	SB-OS-RW339_18.5-23.5					
Perfluorobutanoic acid		0.0112	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0171	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0196	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0141	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0370	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00324 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00146 J	0.0040	0.0010	ug/l	EPA 537M BY ID
FA63853-17	SB-OS-QR364_12.5-17.5					
Perfluorobutanoic acid		0.00367 J	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.00700	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.00641	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.00442	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.00943	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00111 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.00351 J	0.0040	0.0015	ug/l	EPA 537M BY ID
FA63853-18	SB-OS-QR364_22.5-27.5					
Perfluorobutanoic acid		0.00939	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.00915	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.00995	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.00503	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.00831	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00380 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.0668	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.00201 J	0.0040	0.0015	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA63853
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 04/30/19 thru 05/02/19

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
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FA63853-19 EB-01-050219

No hits reported in this sample.

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID: SB-P6-SG322_10-15	
Lab Sample ID: FA63853-1	Date Sampled: 04/30/19
Matrix: AQ - Ground Water	Date Received: 05/03/19
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	3Q3656.D	1	05/08/19 17:52	NAF	05/08/19 07:30	OP74943	S3Q92
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	0.0125	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0206	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0220	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0183	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0398	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00321	0.0040	0.0010	ug/l	J
335-76-2	Perfluorodecanoic acid	0.00151	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	0.00174	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00132	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0135	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

3.1
3

Client Sample ID: SB-P6-SG322_10-15 Lab Sample ID: FA63853-1 Matrix: AQ - Ground Water Method: EPA 537M BY ID EPA 537 MOD Project: Racer Lansing PFAS Delineation; Lansing, MI	Date Sampled: 04/30/19 Date Received: 05/03/19 Percent Solids: n/a
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CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	123%		30-140%
	13C5-PFPeA	127%		40-140%
	13C5-PFHxA	129%		50-150%
	13C4-PFHpA	128%		50-150%
	13C8-PFOA	128%		50-150%
	13C9-PFNA	121%		50-150%
	13C6-PFDA	105%		50-150%
	13C7-PFUnDA	89%		50-150%
	13C2-PFDoDA	81%		50-150%
	13C2-PFTeDA	90%		40-150%
	13C3-PFBS	124%		50-150%
	13C3-PFHxS	123%		50-150%
	13C8-PFOS	115%		50-150%
	13C8-FOSA	98%		30-140%
	d3-MeFOSAA	89%		50-150%
	13C2-4:2FTS	128%		50-150%
	13C2-6:2FTS	131%		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-P6-SG322_25-30	
Lab Sample ID: FA63853-2	Date Sampled: 04/30/19
Matrix: AQ - Ground Water	Date Received: 05/03/19
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	3Q3657.D	1	05/08/19 18:07	NAF	05/08/19 07:30	OP74943	S3Q92
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	0.0301	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0570	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0663	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0574	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0911	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00426	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	

PERFLUOROALKYL SULFONATES

375-73-5	Perfluorobutanesulfonic acid	0.00202	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00221	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.00607	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

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3

Client Sample ID: SB-P6-SG322_25-30 Lab Sample ID: FA63853-2 Matrix: AQ - Ground Water Method: EPA 537M BY ID EPA 537 MOD Project: Racer Lansing PFAS Delineation; Lansing, MI	Date Sampled: 04/30/19 Date Received: 05/03/19 Percent Solids: n/a
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CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	113%		30-140%
	13C5-PFPeA	121%		40-140%
	13C5-PFHxA	118%		50-150%
	13C4-PFHpA	117%		50-150%
	13C8-PFOA	122%		50-150%
	13C9-PFNA	120%		50-150%
	13C6-PFDA	106%		50-150%
	13C7-PFUnDA	96%		50-150%
	13C2-PFDoDA	90%		50-150%
	13C2-PFTeDA	94%		40-150%
	13C3-PFBS	117%		50-150%
	13C3-PFHxS	109%		50-150%
	13C8-PFOS	110%		50-150%
	13C8-FOSA	103%		30-140%
	d3-MeFOSAA	93%		50-150%
	13C2-4:2FTS	128%		50-150%
	13C2-6:2FTS	130%		50-150%
	13C2-8:2FTS	106%		50-150%

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

Report of Analysis

Client Sample ID: SB-P6-QQ322_10-15	
Lab Sample ID: FA63853-5	Date Sampled: 05/01/19
Matrix: AQ - Ground Water	Date Received: 05/03/19
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	3Q3660.D	1	05/08/19 18:53	NAF	05/08/19 07:30	OP74943	S3Q92
Run #2							

Run #	Initial Volume	Final Volume
Run #1	240 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	0.0446	0.0083	0.0021	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0650	0.0042	0.0016	ug/l	
307-24-4	Perfluorohexanoic acid	0.0574	0.0042	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0319	0.0042	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0741	0.0042	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00488	0.0042	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	0.00150	0.0042	0.0010	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.0042	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0042	0.0016	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0042	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0042	0.0010	ug/l	

PERFLUOROALKYL SULFONATES

375-73-5	Perfluorobutanesulfonic acid	0.00280	0.0042	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0042	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00263	0.0042	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0042	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0198	0.0042	0.0016	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0042	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0042	0.0010	ug/l	

PERFLUORO OCTANESULFONAMIDES

754-91-6	PFOSA	ND	0.0042	0.0010	ug/l	
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PERFLUORO OCTANESULFONAMIDOACETIC ACIDS

2355-31-9	MeFOSAA	ND	0.021	0.0042	ug/l	
2991-50-6	EtFOSAA	ND	0.021	0.0042	ug/l	

FLUOROTELOMER SULFONATES

757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0083	0.0021	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0083	0.0021	ug/l	

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

Report of Analysis

Client Sample ID: SB-P6-QQ322_10-15		
Lab Sample ID: FA63853-5		Date Sampled: 05/01/19
Matrix: AQ - Ground Water		Date Received: 05/03/19
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	0.0083	0.0021	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	115%		30-140%
	13C5-PFPeA	121%		40-140%
	13C5-PFHxA	122%		50-150%
	13C4-PFHpA	121%		50-150%
	13C8-PFOA	123%		50-150%
	13C9-PFNA	113%		50-150%
	13C6-PFDA	97%		50-150%
	13C7-PFUnDA	86%		50-150%
	13C2-PFDoDA	81%		50-150%
	13C2-PFTeDA	81%		40-150%
	13C3-PFBS	119%		50-150%
	13C3-PFHxS	109%		50-150%
	13C8-PFOS	101%		50-150%
	13C8-FOSA	84%		30-140%
	d3-MeFOSAA	88%		50-150%
	13C2-4:2FTS	121%		50-150%
	13C2-6:2FTS	127%		50-150%
	13C2-8:2FTS	91%		50-150%

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

Report of Analysis

Client Sample ID: DUP-01_050119		
Lab Sample ID: FA63853-6		Date Sampled: 05/01/19
Matrix: AQ - Ground Water		Date Received: 05/03/19
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	3Q3661.D	1	05/08/19 19:08	NAF	05/08/19 07:30	OP74943	S3Q92
Run #2							

Run #	Initial Volume	Final Volume
Run #1	240 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	0.0399	0.0083	0.0021	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0517	0.0042	0.0016	ug/l	
307-24-4	Perfluorohexanoic acid	0.0482	0.0042	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0256	0.0042	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0526	0.0042	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00325	0.0042	0.0010	ug/l	J
335-76-2	Perfluorodecanoic acid	ND	0.0042	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0042	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0042	0.0016	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0042	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0042	0.0010	ug/l	

PERFLUOROALKYL SULFONATES

375-73-5	Perfluorobutanesulfonic acid	0.00356	0.0042	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0042	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00233	0.0042	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0042	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0137	0.0042	0.0016	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0042	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0042	0.0010	ug/l	

PERFLUORO OCTANESULFONAMIDES

754-91-6	PFOSA	ND	0.0042	0.0010	ug/l	
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PERFLUORO OCTANESULFONAMIDOACETIC ACIDS

2355-31-9	MeFOSAA	ND	0.021	0.0042	ug/l	
2991-50-6	EtFOSAA	ND	0.021	0.0042	ug/l	

FLUOROTELOMER SULFONATES

757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0083	0.0021	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0083	0.0021	ug/l	

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

Report of Analysis

Client Sample ID: DUP-01_050119	
Lab Sample ID: FA63853-6	Date Sampled: 05/01/19
Matrix: AQ - Ground Water	Date Received: 05/03/19
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	0.0083	0.0021	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	114%		30-140%
	13C5-PFPeA	122%		40-140%
	13C5-PFHxA	122%		50-150%
	13C4-PFHpA	124%		50-150%
	13C8-PFOA	127%		50-150%
	13C9-PFNA	117%		50-150%
	13C6-PFDA	100%		50-150%
	13C7-PFUnDA	82%		50-150%
	13C2-PFDoDA	72%		50-150%
	13C2-PFTeDA	63%		40-150%
	13C3-PFBS	120%		50-150%
	13C3-PFHxS	117%		50-150%
	13C8-PFOS	105%		50-150%
	13C8-FOSA	75%		30-140%
	d3-MeFOSAA	87%		50-150%
	13C2-4:2FTS	122%		50-150%
	13C2-6:2FTS	129%		50-150%
	13C2-8:2FTS	97%		50-150%

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

Report of Analysis

Client Sample ID:	SB-P6-NU322_11-16	Date Sampled:	05/01/19
Lab Sample ID:	FA63853-7	Date Received:	05/03/19
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	3Q3664.D	1	05/08/19 19:53	NAF	05/08/19 07:30	OP74943	S3Q92
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	0.0211	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0142	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.00585	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	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	

PERFLUORO OCTANESULFONAMIDES

754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
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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

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-NU322_11-16	Date Sampled: 05/01/19
Lab Sample ID: FA63853-7	Date Received: 05/03/19
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	117%		30-140%
	13C5-PFPeA	121%		40-140%
	13C5-PFHxA	127%		50-150%
	13C4-PFHpA	128%		50-150%
	13C8-PFOA	131%		50-150%
	13C9-PFNA	125%		50-150%
	13C6-PFDA	107%		50-150%
	13C7-PFUnDA	93%		50-150%
	13C2-PFDoDA	85%		50-150%
	13C2-PFTeDA	78%		40-150%
	13C3-PFBS	119%		50-150%
	13C3-PFHxS	122%		50-150%
	13C8-PFOS	112%		50-150%
	13C8-FOSA	114%		30-140%
	d3-MeFOSAA	98%		50-150%
	13C2-4:2FTS	130%		50-150%
	13C2-6:2FTS	129%		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-P6-MP275_20-25	
Lab Sample ID: FA63853-8	Date Sampled: 05/01/19
Matrix: AQ - Ground Water	Date Received: 05/03/19
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	3Q3665.D	1	05/08/19 20:08	NAF	05/08/19 07:30	OP74943	S3Q92
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	0.0165	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.00989	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0149	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.00912	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0341	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00133	0.0040	0.0010	ug/l	J
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	

PERFLUOROALKYL SULFONATES

375-73-5	Perfluorobutanesulfonic acid	0.00191	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00177	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.00328	0.0040	0.0015	ug/l	J
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	

PERFLUORO OCTANESULFONAMIDES

754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
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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

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Client Sample ID: SB-P6-MP275_20-25	
Lab Sample ID: FA63853-8	Date Sampled: 05/01/19
Matrix: AQ - Ground Water	Date Received: 05/03/19
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	115%		30-140%
	13C5-PFPeA	123%		40-140%
	13C5-PFHxA	123%		50-150%
	13C4-PFHpA	125%		50-150%
	13C8-PFOA	129%		50-150%
	13C9-PFNA	125%		50-150%
	13C6-PFDA	108%		50-150%
	13C7-PFUnDA	92%		50-150%
	13C2-PFDoDA	83%		50-150%
	13C2-PFTeDA	76%		40-150%
	13C3-PFBS	118%		50-150%
	13C3-PFHxS	118%		50-150%
	13C8-PFOS	112%		50-150%
	13C8-FOSA	109%		30-140%
	d3-MeFOSAA	91%		50-150%
	13C2-4:2FTS	129%		50-150%
	13C2-6:2FTS	136%		50-150%
	13C2-8:2FTS	107%		50-150%

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

Report of Analysis

Client Sample ID: SB-P6-MP275_10-15	
Lab Sample ID: FA63853-9	Date Sampled: 05/01/19
Matrix: AQ - Ground Water	Date Received: 05/03/19
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	3Q3666.D	1	05/08/19 20:23	NAF	05/08/19 07:30	OP74943	S3Q92
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	0.00644	0.0083	0.0021	ug/l	J
2706-90-3	Perfluoropentanoic acid	0.00282	0.0042	0.0016	ug/l	J
307-24-4	Perfluorohexanoic acid	0.00363	0.0042	0.0010	ug/l	J
375-85-9	Perfluoroheptanoic acid	0.00286	0.0042	0.0010	ug/l	J
335-67-1	Perfluorooctanoic acid	0.0147	0.0042	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0042	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0042	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0042	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0042	0.0016	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0042	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0042	0.0010	ug/l	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00171	0.0042	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0042	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00120	0.0042	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0042	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.00333	0.0042	0.0016	ug/l	J
68259-12-1	Perfluorononanesulfonic acid	ND	0.0042	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0042	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0042	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.021	0.0042	ug/l	
2991-50-6	EtFOSAA	ND	0.021	0.0042	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0083	0.0021	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0083	0.0021	ug/l	

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

Report of Analysis

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Client Sample ID: SB-P6-MP275_10-15	
Lab Sample ID: FA63853-9	Date Sampled: 05/01/19
Matrix: AQ - Ground Water	Date Received: 05/03/19
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	0.0083	0.0021	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	121%		30-140%
	13C5-PFPeA	123%		40-140%
	13C5-PFHxA	121%		50-150%
	13C4-PFHpA	122%		50-150%
	13C8-PFOA	121%		50-150%
	13C9-PFNA	118%		50-150%
	13C6-PFDA	106%		50-150%
	13C7-PFUnDA	98%		50-150%
	13C2-PFDoDA	92%		50-150%
	13C2-PFTeDA	83%		40-150%
	13C3-PFBS	117%		50-150%
	13C3-PFHxS	112%		50-150%
	13C8-PFOS	102%		50-150%
	13C8-FOSA	101%		30-140%
	d3-MeFOSAA	89%		50-150%
	13C2-4:2FTS	124%		50-150%
	13C2-6:2FTS	129%		50-150%
	13C2-8:2FTS	111%		50-150%

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

Report of Analysis

Client Sample ID: SB-P6-TA272_29-34	
Lab Sample ID: FA63853-10	Date Sampled: 05/02/19
Matrix: AQ - Ground Water	Date Received: 05/03/19
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	3Q3689.D	1	05/09/19 11:52	NG	05/08/19 07:30	OP74943	S3Q93
Run #2							

Run #	Initial Volume	Final Volume
Run #1	200 ml	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYL CARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0195	0.010	0.0025	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0256	0.0050	0.0019	ug/l	
307-24-4	Perfluorohexanoic acid	0.0394	0.0050	0.0013	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0297	0.0050	0.0013	ug/l	
335-67-1	Perfluorooctanoic acid	0.0756	0.0050	0.0013	ug/l	
375-95-1	Perfluorononanoic acid	0.00410	0.0050	0.0013	ug/l	J
335-76-2	Perfluorodecanoic acid	0.00277	0.0050	0.0013	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.0050	0.0013	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0050	0.0019	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0050	0.0013	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0050	0.0013	ug/l	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00154	0.0050	0.0013	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0050	0.0013	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00177	0.0050	0.0013	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0050	0.0013	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0111	0.0050	0.0019	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0050	0.0013	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0050	0.0013	ug/l	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0050	0.0013	ug/l	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.025	0.0050	ug/l	
2991-50-6	EtFOSAA	ND	0.025	0.0050	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.010	0.0025	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.010	0.0025	ug/l	

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

Report of Analysis



Client Sample ID:	SB-P6-TA272_29-34	Date Sampled:	05/02/19
Lab Sample ID:	FA63853-10	Date Received:	05/03/19
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	0.010	0.0025	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	112%		30-140%
	13C5-PFPeA	114%		40-140%
	13C5-PFHxA	115%		50-150%
	13C4-PFHpA	115%		50-150%
	13C8-PFOA	116%		50-150%
	13C9-PFNA	105%		50-150%
	13C6-PFDA	90%		50-150%
	13C7-PFUnDA	78%		50-150%
	13C2-PFDoDA	73%		50-150%
	13C2-PFTeDA	72%		40-150%
	13C3-PFBS	114%		50-150%
	13C3-PFHxS	106%		50-150%
	13C8-PFOS	92%		50-150%
	13C8-FOSA	96%		30-140%
	d3-MeFOSAA	78%		50-150%
	13C2-4:2FTS	117%		50-150%
	13C2-6:2FTS	119%		50-150%
	13C2-8:2FTS	81%		50-150%

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

Report of Analysis

Client Sample ID: SB-P6-TA258_5-10	
Lab Sample ID: FA63853-11	Date Sampled: 05/02/19
Matrix: AQ - Ground Water	Date Received: 05/03/19
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	3Q3668.D	1	05/08/19 20:53	NAF	05/08/19 07:30	OP74943	S3Q92
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	0.0122	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0161	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0420	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0181	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0741	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.0100	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	0.00679	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	0.00354	0.0040	0.0010	ug/l	J
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	0.00211	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
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	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

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

Report of Analysis

Client Sample ID: SB-P6-TA258_5-10	
Lab Sample ID: FA63853-11	Date Sampled: 05/02/19
Matrix: AQ - Ground Water	Date Received: 05/03/19
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	109%		30-140%
	13C5-PFPeA	115%		40-140%
	13C5-PFHxA	116%		50-150%
	13C4-PFHpA	117%		50-150%
	13C8-PFOA	126%		50-150%
	13C9-PFNA	130%		50-150%
	13C6-PFDA	129%		50-150%
	13C7-PFUnDA	112%		50-150%
	13C2-PFDoDA	103%		50-150%
	13C2-PFTeDA	86%		40-150%
	13C3-PFBS	111%		50-150%
	13C3-PFHxS	108%		50-150%
	13C8-PFOS	110%		50-150%
	13C8-FOSA	118%		30-140%
	d3-MeFOSAA	109%		50-150%
	13C2-4:2FTS	123%		50-150%
	13C2-6:2FTS	140%		50-150%
	13C2-8:2FTS	149%		50-150%

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

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

Report of Analysis

Client Sample ID:	SB-P6-TA258_25-30	Date Sampled:	05/02/19
Lab Sample ID:	FA63853-12	Date Received:	05/03/19
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	3Q3669.D	1	05/08/19 21:09	NAF	05/08/19 07:30	OP74943	S3Q92
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	0.0386	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.103	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.137	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0321	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0187	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	0.00180	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	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	0.00216	0.0040	0.0015	ug/l	J
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

ND = Not detected MDL = Method Detection Limit

J = Indicates an estimated value

RL = Reporting Limit

B = Indicates analyte found in associated method blank

E = Indicates value exceeds calibration range

N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SB-P6-TA258_25-30		Date Sampled: 05/02/19
Lab Sample ID: FA63853-12		Date Received: 05/03/19
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	104%		30-140%
	13C5-PFPeA	109%		40-140%
	13C5-PFHxA	109%		50-150%
	13C4-PFHpA	113%		50-150%
	13C8-PFOA	126%		50-150%
	13C9-PFNA	121%		50-150%
	13C6-PFDA	100%		50-150%
	13C7-PFUnDA	86%		50-150%
	13C2-PFDoDA	78%		50-150%
	13C2-PFTeDA	71%		40-150%
	13C3-PFBS	107%		50-150%
	13C3-PFHxS	102%		50-150%
	13C8-PFOS	103%		50-150%
	13C8-FOSA	105%		30-140%
	d3-MeFOSAA	89%		50-150%
	13C2-4:2FTS	120%		50-150%
	13C2-6:2FTS	142%		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-P6-TA242_8-13	
Lab Sample ID: FA63853-13	Date Sampled: 05/02/19
Matrix: AQ - Ground Water	Date Received: 05/03/19
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	3Q3670.D	1	05/08/19 21:24	NAF	05/08/19 07:30	OP74943	S3Q92
Run #2	3Q3691.D	2	05/09/19 12:22	NG	05/08/19 07:30	OP74943	S3Q93

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	0.0562	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.216 ^a	0.0080	0.0030	ug/l	
307-24-4	Perfluorohexanoic acid	0.185	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.100	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.119	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00689	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	0.00158	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	0.00189	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00203	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0138	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-P6-TA242_8-13	
Lab Sample ID: FA63853-13	Date Sampled: 05/02/19
Matrix: AQ - Ground Water	Date Received: 05/03/19
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	105%	117%	30-140%
	13C5-PFPeA	107%	117%	40-140%
	13C5-PFHxA	106%	118%	50-150%
	13C4-PFHpA	106%	118%	50-150%
	13C8-PFOA	111%	121%	50-150%
	13C9-PFNA	109%	119%	50-150%
	13C6-PFDA	91%	102%	50-150%
	13C7-PFUnDA	76%	83%	50-150%
	13C2-PFDoDA	68%	75%	50-150%
	13C2-PFTeDA	63%	70%	40-150%
	13C3-PFBS	105%	117%	50-150%
	13C3-PFHxS	99%	112%	50-150%
	13C8-PFOS	95%	103%	50-150%
	13C8-FOSA	93%	104%	30-140%
	d3-MeFOSAA	76%	88%	50-150%
	13C2-4:2FTS	115%	122%	50-150%
	13C2-6:2FTS	121%	123%	50-150%
	13C2-8:2FTS	89%	93%	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:	P6-MW-01-050219	Date Sampled:	05/02/19
Lab Sample ID:	FA63853-14	Date Received:	05/03/19
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	3Q3671.D	1	05/08/19 21:39	NAF	05/08/19 07:30	OP74943	S3Q92
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	0.0143	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0250	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0252	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0186	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0251	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	

PERFLUOROALKYL SULFONATES

375-73-5	Perfluorobutanesulfonic acid	0.00132	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	

PERFLUORO OCTANESULFONAMIDES

754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
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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: P6-MW-01-050219	
Lab Sample ID: FA63853-14	Date Sampled: 05/02/19
Matrix: AQ - Ground Water	Date Received: 05/03/19
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	102%		30-140%
	13C5-PFPeA	107%		40-140%
	13C5-PFHxA	109%		50-150%
	13C4-PFHpA	112%		50-150%
	13C8-PFOA	116%		50-150%
	13C9-PFNA	112%		50-150%
	13C6-PFDA	97%		50-150%
	13C7-PFUnDA	81%		50-150%
	13C2-PFDoDA	71%		50-150%
	13C2-PFTeDA	63%		40-150%
	13C3-PFBS	104%		50-150%
	13C3-PFHxS	107%		50-150%
	13C8-PFOS	107%		50-150%
	13C8-FOSA	86%		30-140%
	d3-MeFOSAA	84%		50-150%
	13C2-4:2FTS	114%		50-150%
	13C2-6:2FTS	121%		50-150%
	13C2-8:2FTS	92%		50-150%

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

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

Report of Analysis

Client Sample ID:	SB-P6-TA228_5-10	Date Sampled:	05/02/19
Lab Sample ID:	FA63853-15	Date Received:	05/03/19
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	3Q3672.D	1.25	05/08/19 21:54	NAF	05/08/19 07:30	OP74943	S3Q92
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	0.0148	0.010	0.0025	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0267	0.0050	0.0019	ug/l	
307-24-4	Perfluorohexanoic acid	0.0300	0.0050	0.0013	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0269	0.0050	0.0013	ug/l	
335-67-1	Perfluorooctanoic acid	0.0451	0.0050	0.0013	ug/l	
375-95-1	Perfluorononanoic acid	0.00414	0.0050	0.0013	ug/l	J
335-76-2	Perfluorodecanoic acid	ND	0.0050	0.0013	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0050	0.0013	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0050	0.0019	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0050	0.0013	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0050	0.0013	ug/l	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	0.0050	0.0013	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0050	0.0013	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0050	0.0013	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0050	0.0013	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.00566	0.0050	0.0019	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0050	0.0013	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0050	0.0013	ug/l	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0050	0.0013	ug/l	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.025	0.0050	ug/l	
2991-50-6	EtFOSAA	ND	0.025	0.0050	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.010	0.0025	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate ^a	ND	0.010	0.0025	ug/l	

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

Report of Analysis

Client Sample ID:	SB-P6-TA228_5-10	
Lab Sample ID:	FA63853-15	Date Sampled: 05/02/19
Matrix:	AQ - Ground Water	Date Received: 05/03/19
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	0.010	0.0025	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	127%		30-140%
	13C5-PFPeA	131%		40-140%
	13C5-PFHxA	132%		50-150%
	13C4-PFHpA	136%		50-150%
	13C8-PFOA	141%		50-150%
	13C9-PFNA	137%		50-150%
	13C6-PFDA	121%		50-150%
	13C7-PFUnDA	99%		50-150%
	13C2-PFDoDA	88%		50-150%
	13C2-PFTeDA	73%		40-150%
	13C3-PFBS	129%		50-150%
	13C3-PFHxS	129%		50-150%
	13C8-PFOS	123%		50-150%
	13C8-FOSA	110%		30-140%
	d3-MeFOSAA	103%		50-150%
	13C2-4:2FTS	142%		50-150%
	13C2-6:2FTS	151% ^b		50-150%
	13C2-8:2FTS	121%		50-150%

- (a) Associated ID Standard outside control limits high, however sample is ND.
 (b) Outside control limits. However, sample was ND.

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-OS-RW339_18.5-23.5	
Lab Sample ID: FA63853-16	Date Sampled: 05/02/19
Matrix: AQ - Ground Water	Date Received: 05/03/19
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	3Q3673.D	1	05/08/19 22:09	NAF	05/08/19 07:30	OP74943	S3Q92
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	0.0112	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0171	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0196	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0141	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0370	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	

PERFLUOROALKYL SULFONATES

375-73-5	Perfluorobutanesulfonic acid	0.00324	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00146	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	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-OS-RW339_18.5-23.5	Date Sampled:	05/02/19
Lab Sample ID:	FA63853-16	Date Received:	05/03/19
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	112%		30-140%
	13C5-PFPeA	116%		40-140%
	13C5-PFHxA	118%		50-150%
	13C4-PFHpA	118%		50-150%
	13C8-PFOA	119%		50-150%
	13C9-PFNA	112%		50-150%
	13C6-PFDA	99%		50-150%
	13C7-PFUnDA	87%		50-150%
	13C2-PFDoDA	79%		50-150%
	13C2-PFTeDA	64%		40-150%
	13C3-PFBS	114%		50-150%
	13C3-PFHxS	113%		50-150%
	13C8-PFOS	109%		50-150%
	13C8-FOSA	99%		30-140%
	d3-MeFOSAA	93%		50-150%
	13C2-4:2FTS	122%		50-150%
	13C2-6:2FTS	121%		50-150%
	13C2-8:2FTS	92%		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-OS-QR364_12.5-17.5	
Lab Sample ID: FA63853-17	Date Sampled: 05/02/19
Matrix: AQ - Ground Water	Date Received: 05/03/19
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	3Q3676.D	1	05/08/19 22:54	NAF	05/08/19 07:30	OP74943	S3Q92
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	0.00367	0.0080	0.0020	ug/l	J
2706-90-3	Perfluoropentanoic acid	0.00700	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.00641	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.00442	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.00943	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	0.00111	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.00351	0.0040	0.0015	ug/l	J
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

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

Report of Analysis

Client Sample ID: SB-OS-QR364_12.5-17.5	
Lab Sample ID: FA63853-17	Date Sampled: 05/02/19
Matrix: AQ - Ground Water	Date Received: 05/03/19
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	130%		30-140%
	13C5-PFPeA	132%		40-140%
	13C5-PFHxA	133%		50-150%
	13C4-PFHpA	133%		50-150%
	13C8-PFOA	132%		50-150%
	13C9-PFNA	121%		50-150%
	13C6-PFDA	109%		50-150%
	13C7-PFUnDA	90%		50-150%
	13C2-PFDoDA	72%		50-150%
	13C2-PFTeDA	61%		40-150%
	13C3-PFBS	131%		50-150%
	13C3-PFHxS	129%		50-150%
	13C8-PFOS	119%		50-150%
	13C8-FOSA	111%		30-140%
	d3-MeFOSAA	96%		50-150%
	13C2-4:2FTS	134%		50-150%
	13C2-6:2FTS	129%		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-OS-QR364_22.5-27.5	
Lab Sample ID: FA63853-18	Date Sampled: 05/02/19
Matrix: AQ - Ground Water	Date Received: 05/03/19
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	3Q3677.D	1	05/08/19 23:10	NAF	05/08/19 07:30	OP74943	S3Q92
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	0.00939	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.00915	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.00995	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.00503	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.00831	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	

PERFLUOROALKYL SULFONATES

375-73-5	Perfluorobutanesulfonic acid	0.00380	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.0668	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.00201	0.0040	0.0015	ug/l	J
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	

PERFLUORO OCTANESULFONAMIDES

754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
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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-OS-QR364_22.5-27.5	
Lab Sample ID: FA63853-18	Date Sampled: 05/02/19
Matrix: AQ - Ground Water	Date Received: 05/03/19
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	117%		30-140%
	13C5-PFPeA	121%		40-140%
	13C5-PFHxA	123%		50-150%
	13C4-PFHpA	125%		50-150%
	13C8-PFOA	128%		50-150%
	13C9-PFNA	124%		50-150%
	13C6-PFDA	110%		50-150%
	13C7-PFUnDA	92%		50-150%
	13C2-PFDoDA	73%		50-150%
	13C2-PFTeDA	58%		40-150%
	13C3-PFBS	119%		50-150%
	13C3-PFHxS	119%		50-150%
	13C8-PFOS	112%		50-150%
	13C8-FOSA	98%		30-140%
	d3-MeFOSAA	95%		50-150%
	13C2-4:2FTS	126%		50-150%
	13C2-6:2FTS	132%		50-150%
	13C2-8:2FTS	109%		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:	EB-01-050219	Date Sampled:	05/02/19
Lab Sample ID:	FA63853-19	Date Received:	05/03/19
Matrix:	AQ - Equipment Blank	Percent Solids:	n/a
Method:	EPA 537M BY ID EPA 537 MOD		
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3Q3678.D	1	05/08/19 23:25	NAF	05/08/19 07:30	OP74943	S3Q92
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	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	
PERFLUOROALKYL SULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUORO OCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

ND = Not detected MDL = Method Detection Limit

J = Indicates an estimated value

RL = Reporting Limit

B = Indicates analyte found in associated method blank

E = Indicates value exceeds calibration range

N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: EB-01-050219		
Lab Sample ID: FA63853-19		Date Sampled: 05/02/19
Matrix: AQ - Equipment Blank		Date Received: 05/03/19
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	128%		30-140%
	13C5-PFPeA	121%		40-140%
	13C5-PFHxA	121%		50-150%
	13C4-PFHpA	119%		50-150%
	13C8-PFOA	120%		50-150%
	13C9-PFNA	113%		50-150%
	13C6-PFDA	103%		50-150%
	13C7-PFUnDA	92%		50-150%
	13C2-PFDoDA	74%		50-150%
	13C2-PFTeDA	64%		40-150%
	13C3-PFBS	121%		50-150%
	13C3-PFHxS	118%		50-150%
	13C8-PFOS	115%		50-150%
	13C8-FOSA	108%		30-140%
	d3-MeFOSAA	94%		50-150%
	13C2-4:2FTS	121%		50-150%
	13C2-6:2FTS	115%		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

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

SGS Sample Receipt Summary

Job Number: FA63853

Client: ARCADIS

Project: RACER LANSING

Date / Time Received: 5/3/2019 10:00:00 AM

Delivery Method: FED EX

Airbill #s:

Therm ID: IR 1;

Therm CF: 0.4;

of Coolers: 1

Cooler Temps (Raw Measured) °C: Cooler 1: (1.2);

Cooler Temps (Corrected) °C: Cooler 1: (1.6);

Cooler Information

Y or N

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

Trip Blank Information

Y or N N/A

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

Sample Information

Y or N N/A

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

Misc. Information

Number of Encores: 25-Gram _____ 5-Gram _____
 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: 5/3/2019 10:00:00 AM

Reviewer: _____

Date: _____

FA63853: Chain of Custody

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MS Semi-volatiles

QC Data Summaries

Includes the following where applicable:

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

Instrument Blank

Job Number: FA63853
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S3Q92-IBLK	3Q3644.D	1	05/08/19	NAF	n/a	n/a	S3Q92

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA63853-1, FA63853-2, FA63853-5, FA63853-6, FA63853-7, FA63853-8, FA63853-9, FA63853-11, FA63853-12, FA63853-13, FA63853-14, FA63853-15, FA63853-16, FA63853-17, FA63853-18, FA63853-19

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	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	125% 30-140%
	13C5-PFPeA	127% 40-140%
	13C5-PFHxA	125% 50-150%
	13C4-PFHpA	125% 50-150%
	13C8-PFOA	123% 50-150%
	13C9-PFNA	120% 50-150%
	13C6-PFDA	122% 50-150%
	13C7-PFUnDA	118% 50-150%

5.1.1
5

Instrument Blank

Job Number: FA63853
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S3Q92-IBLK	3Q3644.D	1	05/08/19	NAF	n/a	n/a	S3Q92

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA63853-1, FA63853-2, FA63853-5, FA63853-6, FA63853-7, FA63853-8, FA63853-9, FA63853-11, FA63853-12, FA63853-13, FA63853-14, FA63853-15, FA63853-16, FA63853-17, FA63853-18, FA63853-19

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	120% 50-150%
	13C2-PFTeDA	106% 40-150%
	13C3-PFBS	127% 50-150%
	13C3-PFHxS	126% 50-150%
	13C8-PFOS	124% 50-150%
	13C8-FOSA	124% 30-140%
	d3-MeFOSAA	119% 50-150%
	13C2-4:2FTS	120% 50-150%
	13C2-6:2FTS	117% 50-150%
	13C2-8:2FTS	111% 50-150%

5.1.1
5

Method Blank Summary

Job Number: FA63853
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP74943-MB	3Q3653.D	1	05/08/19	NAF	05/08/19	OP74943	S3Q92

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA63853-1, FA63853-2, FA63853-5, FA63853-6, FA63853-7, FA63853-8, FA63853-9, FA63853-10, FA63853-11, FA63853-12, FA63853-13, FA63853-14, FA63853-15, FA63853-16, FA63853-17, FA63853-18, FA63853-19

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	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	142%* a 30-140%
	13C5-PFPeA	138% 40-140%
	13C5-PFHxA	138% 50-150%
	13C4-PFHpA	132% 50-150%
	13C8-PFOA	131% 50-150%
	13C9-PFNA	122% 50-150%
	13C6-PFDA	111% 50-150%
	13C7-PFUnDA	96% 50-150%

5.1.2
5

Method Blank Summary

Job Number: FA63853
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP74943-MB	3Q3653.D	1	05/08/19	NAF	05/08/19	OP74943	S3Q92

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA63853-1, FA63853-2, FA63853-5, FA63853-6, FA63853-7, FA63853-8, FA63853-9, FA63853-10, FA63853-11,
 FA63853-12, FA63853-13, FA63853-14, FA63853-15, FA63853-16, FA63853-17, FA63853-18, FA63853-19

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	84% 50-150%
	13C2-PFTeDA	73% 40-150%
	13C3-PFBS	135% 50-150%
	13C3-PFHxS	132% 50-150%
	13C8-PFOS	123% 50-150%
	13C8-FOSA	116% 30-140%
	d3-MeFOSAA	101% 50-150%
	13C2-4:2FTS	142% 50-150%
	13C2-6:2FTS	123% 50-150%
	13C2-8:2FTS	104% 50-150%

(a) Outside control limits.

Blank Spike Summary

Job Number: FA63853
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP74943-BS	3Q3652.D	1	05/08/19	NAF	05/08/19	OP74943	S3Q92

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA63853-1, FA63853-2, FA63853-5, FA63853-6, FA63853-7, FA63853-8, FA63853-9, FA63853-10, FA63853-11, FA63853-12, FA63853-13, FA63853-14, FA63853-15, FA63853-16, FA63853-17, FA63853-18, FA63853-19

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
375-22-4	Perfluorobutanoic acid	0.08	0.0873	109	70-130
2706-90-3	Perfluoropentanoic acid	0.08	0.0852	107	70-130
307-24-4	Perfluorohexanoic acid	0.08	0.0843	105	70-130
375-85-9	Perfluoroheptanoic acid	0.08	0.0843	105	71-130
335-67-1	Perfluorooctanoic acid	0.08	0.0877	110	74-130
375-95-1	Perfluorononanoic acid	0.08	0.0844	106	76-130
335-76-2	Perfluorodecanoic acid	0.08	0.0867	108	70-130
2058-94-8	Perfluoroundecanoic acid	0.08	0.0902	113	70-130
307-55-1	Perfluorododecanoic acid	0.08	0.0865	108	70-130
72629-94-8	Perfluorotridecanoic acid	0.08	0.0907	113	70-139
376-06-7	Perfluorotetradecanoic acid	0.08	0.0877	110	70-130
375-73-5	Perfluorobutanesulfonic acid	0.08	0.0894	112	73-130
2706-91-4	Perfluoropentanesulfonic acid	0.08	0.0821	103	70-130
355-46-4	Perfluorohexanesulfonic acid	0.08	0.0851	106	74-130
375-92-8	Perfluoroheptanesulfonic acid	0.08	0.0811	101	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.08	0.0812	102	70-130
68259-12-1	Perfluorononanesulfonic acid	0.08	0.0795	99	70-130
335-77-3	Perfluorodecanesulfonic acid	0.08	0.0911	114	70-130
754-91-6	PFOSA	0.08	0.0852	107	70-131
2355-31-9	MeFOSAA	0.08	0.0813	102	70-130
2991-50-6	EiFOSAA	0.08	0.0706	88	70-130
757124-72-44:2	Fluorotelomer sulfonate	0.08	0.0775	97	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	0.08	0.0823	103	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	0.08	0.0810	101	70-130

CAS No.	ID Standard Recoveries	BSP	Limits
	13C4-PFBA	143%* a	30-140%
	13C5-PFPeA	140%	40-140%
	13C5-PFHxA	139%	50-150%
	13C4-PFHpA	132%	50-150%
	13C8-PFOA	128%	50-150%
	13C9-PFNA	122%	50-150%
	13C6-PFDA	111%	50-150%
	13C7-PFUnDA	102%	50-150%

* = Outside of Control Limits.

5.2.1
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Blank Spike Summary

Job Number: FA63853
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP74943-BS	3Q3652.D	1	05/08/19	NAF	05/08/19	OP74943	S3Q92

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA63853-1, FA63853-2, FA63853-5, FA63853-6, FA63853-7, FA63853-8, FA63853-9, FA63853-10, FA63853-11, FA63853-12, FA63853-13, FA63853-14, FA63853-15, FA63853-16, FA63853-17, FA63853-18, FA63853-19

CAS No.	ID Standard Recoveries	BSP	Limits
	13C2-PFDoDA	93%	50-150%
	13C2-PFTeDA	82%	40-150%
	13C3-PFBS	138%	50-150%
	13C3-PFHxS	133%	50-150%
	13C8-PFOS	127%	50-150%
	13C8-FOSA	112%	30-140%
	d3-MeFOSAA	106%	50-150%
	13C2-4:2FTS	153%* a	50-150%
	13C2-6:2FTS	130%	50-150%
	13C2-8:2FTS	113%	50-150%

(a) Outside control limits.

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA63853
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP74943-MS	3Q3658.D	1	05/08/19	NAF	05/08/19	OP74943	S3Q92
OP74943-MSD	3Q3659.D	1	05/08/19	NAF	05/08/19	OP74943	S3Q92
FA63853-2	3Q3657.D	1	05/08/19	NAF	05/08/19	OP74943	S3Q92

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA63853-1, FA63853-2, FA63853-5, FA63853-6, FA63853-7, FA63853-8, FA63853-9, FA63853-10, FA63853-11, FA63853-12, FA63853-13, FA63853-14, FA63853-15, FA63853-16, FA63853-17, FA63853-18, FA63853-19

CAS No.	Compound	FA63853-2 ug/l	Spike Q ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
375-22-4	Perfluorobutanoic acid	0.0301	0.08	0.119	111	0.08	0.112	102	6	70-130/30
2706-90-3	Perfluoropentanoic acid	0.0570	0.08	0.141	105	0.08	0.130	91	8	70-130/30
307-24-4	Perfluorohexanoic acid	0.0663	0.08	0.151	106	0.08	0.137	88	10	70-130/30
375-85-9	Perfluoroheptanoic acid	0.0574	0.08	0.140	103	0.08	0.128	88	9	71-130/30
335-67-1	Perfluorooctanoic acid	0.0911	0.08	0.174	104	0.08	0.160	86	8	74-130/30
375-95-1	Perfluorononanoic acid	0.00426	0.08	0.0911	109	0.08	0.0822	97	10	76-130/30
335-76-2	Perfluorodecanoic acid	ND	0.08	0.0897	112	0.08	0.0826	103	8	70-130/30
2058-94-8	Perfluoroundecanoic acid	ND	0.08	0.0922	115	0.08	0.0829	104	11	70-130/30
307-55-1	Perfluorododecanoic acid	ND	0.08	0.0900	113	0.08	0.0812	102	10	70-130/30
72629-94-8	Perfluorotridecanoic acid	ND	0.08	0.0870	109	0.08	0.0777	97	11	70-139/30
376-06-7	Perfluorotetradecanoic acid	ND	0.08	0.0930	116	0.08	0.0838	105	10	70-130/30
375-73-5	Perfluorobutanesulfonic acid	0.00202 J	0.08	0.0961	118	0.08	0.0883	108	8	73-130/30
2706-91-4	Perfluoropentanesulfonic acid	ND	0.08	0.0856	107	0.08	0.0784	98	9	70-130/30
355-46-4	Perfluorohexanesulfonic acid	0.00221 J	0.08	0.0921	112	0.08	0.0830	101	10	74-130/30
375-92-8	Perfluoroheptanesulfonic acid	ND	0.08	0.0888	111	0.08	0.0775	97	14	74-130/30
1763-23-1	Perfluorooctanesulfonic acid	0.00607	0.08	0.0921	108	0.08	0.0815	94	12	70-130/30
68259-12-1	Perfluorononanesulfonic acid	ND	0.08	0.0830	104	0.08	0.0729	91	13	70-130/30
335-77-3	Perfluorodecanesulfonic acid	ND	0.08	0.0876	110	0.08	0.0898	112	2	70-130/30
754-91-6	PFOSA	ND	0.08	0.0861	108	0.08	0.0811	101	6	70-131/30
2355-31-9	MeFOSAA	ND	0.08	0.0867	108	0.08	0.0805	101	7	70-130/30
2991-50-6	EtFOSAA	ND	0.08	0.0729	91	0.08	0.0692	87	5	70-130/30
757124-72-44:2	Fluorotelomer sulfonate	ND	0.08	0.0808	101	0.08	0.0750	94	7	70-130/30
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.08	0.0862	108	0.08	0.0780	98	10	70-133/30
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.08	0.0820	103	0.08	0.0744	93	10	70-130/30

CAS No.	ID Standard Recoveries	MS	MSD	FA63853-2	Limits
13C4-PFBA		111%	119%	113%	30-140%
13C5-PFPeA		119%	127%	121%	40-140%
13C5-PFHxA		115%	122%	118%	50-150%
13C4-PFHpA		114%	121%	117%	50-150%
13C8-PFOA		119%	124%	122%	50-150%
13C9-PFNA		119%	122%	120%	50-150%
13C6-PFDA		105%	100%	106%	50-150%
13C7-PFUnDA		95%	90%	96%	50-150%

* = Outside of Control Limits.

5.3.1
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Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA63853
 Account: ARCMIL Arcadis
 Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP74943-MS	3Q3658.D	1	05/08/19	NAF	05/08/19	OP74943	S3Q92
OP74943-MSD	3Q3659.D	1	05/08/19	NAF	05/08/19	OP74943	S3Q92
FA63853-2	3Q3657.D	1	05/08/19	NAF	05/08/19	OP74943	S3Q92

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA63853-1, FA63853-2, FA63853-5, FA63853-6, FA63853-7, FA63853-8, FA63853-9, FA63853-10, FA63853-11, FA63853-12, FA63853-13, FA63853-14, FA63853-15, FA63853-16, FA63853-17, FA63853-18, FA63853-19

CAS No.	ID Standard Recoveries	MS	MSD	FA63853-2	Limits
13C2-PFDoDA		83%	87%	90%	50-150%
13C2-PFTeDA		81%	88%	94%	40-150%
13C3-PFBS		114%	120%	117%	50-150%
13C3-PFHxS		108%	113%	109%	50-150%
13C8-PFOS		111%	108%	110%	50-150%
13C8-FOSA		93%	100%	103%	30-140%
d3-MeFOSAA		91%	88%	93%	50-150%
13C2-4:2FTS		133%	140%	128%	50-150%
13C2-6:2FTS		136%	140%	130%	50-150%
13C2-8:2FTS		115%	108%	106%	50-150%

* = Outside of Control Limits.

5.3.1
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ATTACHMENT 2

Soil Boring Logs


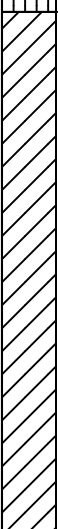


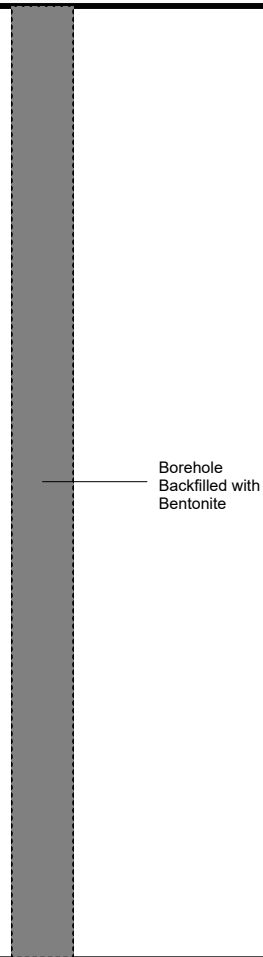
Date Start: 04/30/19 Date Finish: 04/30/19 Drilling Company: Stock Drilling Driller's Name: Jess Stromberger Drilling Method: Hand Auger / Geoprobe Sampling Method: Dual Tube Rig Type: NA Water Level Start (ft. bgs.): 14.4 Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: J. Lust	Well/Boring ID: SB-P6-MP275 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 40F, Cloudy
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DEPTH (feet bgl.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
0	0							(0.0-0.8') CONCRETE.		
		1	0.0-5.0'	3.0	NR			(0.8-14.9') SAND, fine to medium; trace small to medium pebbles, subangular to subrounded; well sorted; dry to moist; pale brown (10YR 6/3).		
5	-5	2	5.0-10.0'	3.75	NR					
10	-10	3	10.0-15.0'	2.5	NR			NOTE: Concrete caught in dual tube from 10.0 to 15.0' bgs sample interval, poor recovery.		
15	-15	4	15.0-20.0'	3.3	NR			NOTE: Wet at 14.0' bgs. (14.9-18.5') CLAY, some silt, medium plasticity, no dilatancy; trace medium pebbles, subangular; moist; medium stiff to stiff; very dark gray (10YR 3/1). NOTE: Dark staining, chemical odor.		
								(18.5-19.0') SILT, non-plastic; some very fine to fine sand; little clay; well sorted; moist; gray (10YR 5/1).		
								(19.0-20.5') SAND, very fine to fine, subangular; trace silt; trace small to medium pebbles; moist; grayish brown (10YR 5/2).		
20	-20							(20.5-24.0') SILT, medium plasticity; little very fine to fine sand, subangular; trace clay; trace small pebbles, subangular; grayish brown (10YR 5/2).		

 <small>Design & Consultancy for natural and built assets</small>	Remarks: bgs = below ground surface NA = not applicable NR = not recorded Groundwater encountered at 14.0' bgs. Temporary Monitoring Wells screened from 10.0 to 15.0' and 20.0 to 25.0' bgs.
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Date Start: 04/30/19 Date Finish: 04/30/19 Drilling Company: Stock Drilling Driller's Name: Jess Stromberger Drilling Method: Hand Auger / Geoprobe Sampling Method: Dual Tube Rig Type: NA Water Level Start (ft. bgs.): 14.4 Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: J. Lust	Well/Boring ID: SB-P6-MP275 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 40F, Cloudy
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DEPTH (feet bgl.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
		5	20.0-25.0'	5.0	NR			NOTE: Color change to gray (10YR 5/1) at 22.0' bgs.		
25	-25							(24.0-25.5') SAND, fine to medium, subangular; little silt; little small pebbles, subangular; well sorted; moist; gray (10YR 5/1).		
		6	25.0-30.0'	5.0	NR			(25.5-30.0') SILT, some clay, low plasticity, no dilatancy; trace small pebbles, subangular; dry; stiff; gray (10YR 5/1).		
30	-30							(30.0-40.0') CLAY, some silt, low plasticity; trace small pebbles, subangular; dry; medium stiff to stiff; gray (10YR 5/1).		
		7	30.0-35.0'	5.0	NR					
35	-35									
		8	35.0-40.0'	5.0	NR					
40	-40							End of boring at 40.0' bgs.		
45	-45									



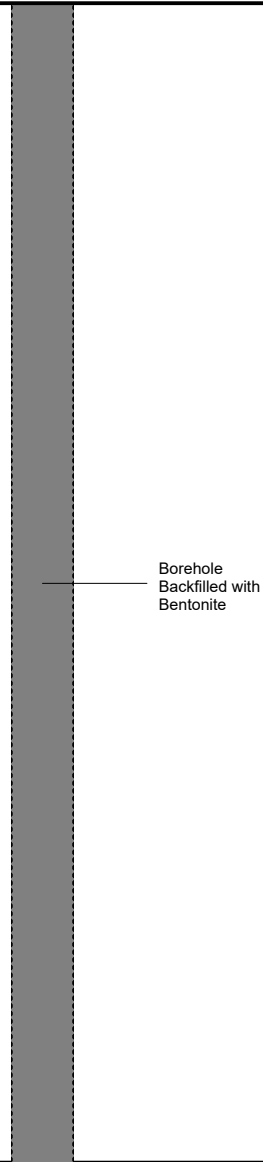
 <small>Design & Consultancy for natural and built assets</small>	Remarks: bgs = below ground surface NA = not applicable NR = not recorded Groundwater encountered at 14.0' bgs. Temporary Monitoring Wells screened from 10.0 to 15.0' and 20.0 to 25.0' bgs.
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Date Start: 04/30/19
Date Finish: 04/30/19
Drilling Company: Stock Drilling
Driller's Name: Jess Stromberger
Drilling Method: Geoprobe
Sampling Method: Dual Tube
Rig Type: NA
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA

Northing: NA
Easting: NA
Casing Elevation: NA
Borehole Depth (ft. bgs.): 40.0
Surface Elevation: NA
Descriptions By: J. Lust

Well/Boring ID: SB-P6-NU322
Client: RACER
Location: RACER Lansing Plant 6
Weather Conditions: 40F, Cloudy

DEPTH (feet bgl.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
0	0							(0.0-0.3') GRASS and TOPSOIL.		
		1	0.0-5.0'	3.8	NR			(0.3-10.0') CLAY, some silt, low plasticity, no dilatancy; trace pebbles; dry; stiff; brown (10YR 5/3).		
5	-5							NOTE: Moist at 7.0' bgs.		
		2	5.0-10.0'	5.0	NR			(10.0-14.0') SILT, some clay, low plasticity, slow dilatancy; trace small pebbles; well sorted; moist; soft; gray (10YR 5/1).		
10	-10							(14.0-14.3') SAND, fine to medium, subangular to subrounded; well sorted; moist; brown (10YR 5/3).		
		3	10.0-15.0'	5.0	NR			(14.3-34.0') SILT, some clay, low plasticity, no dilatancy; some sand, very fine to fine; trace small to large pebbles; well sorted; moist; medium stiff to stiff; gray (10YR 5/1).		
15	-15									
		4	15.0-20.0'	5.0	NR					
20	-20									




Remarks: bgs = below ground surface
 NA = not applicable
 NR = not recorded
 No odor or staining observed.
 Temporary Monitoring Well screened from 11.0 to 16.0' bgs.



Date Start: 04/30/19 Date Finish: 04/30/19 Drilling Company: Stock Drilling Driller's Name: Jess Stromberger Drilling Method: Geoprobe Sampling Method: Dual Tube Rig Type: NA Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: J. Lust	Well/Boring ID: SB-P6-NU322 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 40F, Cloudy
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DEPTH (feet bgl.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
25	-25	5	20.0-25.0'	5.0	NR			NOTE: Slow dilatancy, soft from 24.5 to 24.7' bgs. NOTE: Medium plasticity at 25.0' bgs.		Borehole Backfilled with Bentonite
		6	25.0-30.0'	5.0	NR					
30	-30	7	30.0-35.0'	5.0	NR					
35	-35							(34.0-35.0') SILT; some fine to very fine sand; trace small pebbles, subangular to subrounded; well sorted; dry; light brownish gray(10YR 6/2). (35.0-40.0') SILT, some clay, medium plasticity, slow dilatancy; trace very fine sand; trace small pebbles; well sorted; moist; stiff; gray (10YR 5/1).		
40	40	8	35.0-40.0'	2.0	NR			End of boring at 40.0' bgs.		

	Remarks: bgs = below ground surface NA = not applicable NR = not recorded No odor or staining observed. Temporary Monitoring Well screened from 11.0 to 16.0' bgs.
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Date Start: 04/30/19
Date Finish: 04/30/19
Drilling Company: Stock Drilling
Driller's Name: Jess Stromberger
Drilling Method: Geoprobe
Sampling Method: Dual Tube
Rig Type: NA
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA

Northing: NA
Easting: NA
Casing Elevation: NA
Borehole Depth (ft. bgs.): 40.0
Surface Elevation: NA
Descriptions By: J. Lust

Well/Boring ID: SB-P6-PG322
Client: RACER
Location: RACER Lansing Plant 6
Weather Conditions: 40F, Cloudy

DEPTH (feet bgl.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
0	0							(0.0-0.4') GRASS and TOPSOIL.		
		1	0.0-5.0'	3.0	NR			(0.4-12.0') CLAY, high plasticity, no dilatancy; trace pebbles; well sorted; stiff; moist; brownish yellow (10YR 6/6).		
5	-5	2	5.0-10.0'	4.0	NR			NOTE: Soft from 6.5 to 7.0' bgs.		
10	-10	3	10.0-15.0'	5.0	NR			(12.0-24.8') CLAY, high plasticity, low dilatancy; some sand, very fine to fine; trace small to large pebbles, subangular to subrounded; well sorted; moist; stiff; brown (10YR 5/3). NOTE: Large pebbles from 13.0 to 13.2' bgs. NOTE: Color change to gray (10YR 6/1) at 14.0' bgs.		
15	-15	4	15.0-20.0'	5.0	NR			NOTE: Soft from 17.0 to 18.0' bgs.		
20	-20									



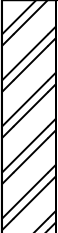
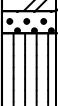
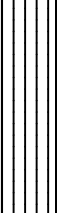
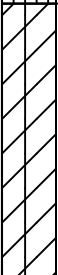
Remarks: bgs = below ground surface
 NA = not applicable
 NR = not recorded
 No odor or staining observed.
 Temporary Monitoring Well screened from 23.0 to 28.0' bgs.



Date Start: 04/30/19
Date Finish: 04/30/19
Drilling Company: Stock Drilling
Driller's Name: Jess Stromberger
Drilling Method: Geoprobe
Sampling Method: Dual Tube
Rig Type: NA
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA

Northing: NA
Easting: NA
Casing Elevation: NA
Borehole Depth (ft. bgs.): 40.0
Surface Elevation: NA
Descriptions By: J. Lust

Well/Boring ID: SB-P6-PG322
Client: RACER
Location: RACER Lansing Plant 6
Weather Conditions: 40F, Cloudy

DEPTH (feet bgl.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
25	-25	5	20.0-25.0'	5.0	NR			(24.8-25.0') SAND, fine to medium; trace silt; well sorted.		
		6	25.0-30.0'	5.0	NR			(25.0-29.4') CLAY, some silt, medium plasticity, no dilatancy; some sand, very fine to medium; trace small pebbles; well sorted; dry; stiff; gray (10YR 6/1).		
30	-30							(29.4-29.8') SAND, very fine to fine; well sorted; dry; gray (10YR 6/1). (29.8-35.0') SILT, non-plastic, rapid dilatancy; trace very fine sand; well sorted; dry; gray (10YR 6/1).		
		7	30.0-35.0'	5.0	NR			NOTE: Moist at 32.5' bgs.		
35	-35	8	35.0-40.0'	5.0	NR			(35.0-40.0') CLAY, some silt, low plasticity, no dilatancy; little very fine sand, trace small to large pebbles; medium stiff; gray (10YR 6/1).		
40	-40							End of boring at 40.0' bgs.		

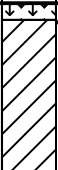
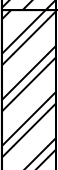


Remarks: bgs = below ground surface
 NA = not applicable
 NR = not recorded
 No odor or staining observed.
 Temporary Monitoring Well screened from 23.0 to 28.0' bgs.

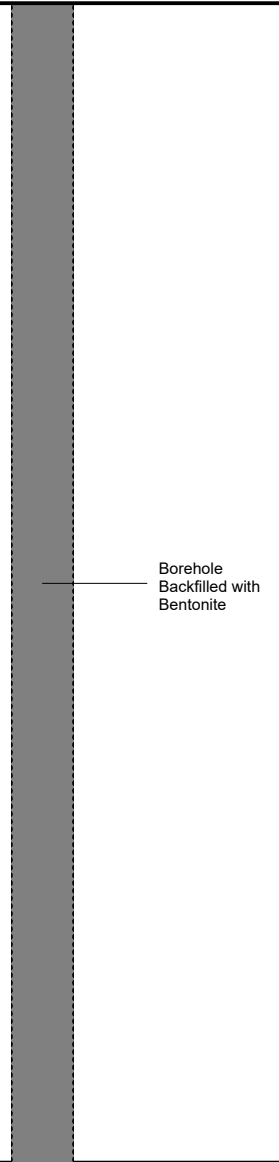


Date Start: 04/29/19
Date Finish: 04/29/19
Drilling Company: Stock Drilling
Driller's Name: Jess Stromberger
Drilling Method: Hand Auger / Geoprobe
Sampling Method: Dual Tube
Rig Type: NA
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA

Northing: NA
Easting: NA
Casing Elevation: NA
Borehole Depth (ft. bgs.): 40.0
Surface Elevation: NA
Descriptions By: A. Westhuis

Well/Boring ID: SB-P6-QQ322
Client: RACER
Location: RACER Lansing Plant 6
Weather Conditions: 40F, Cloudy, Rain

DEPTH (feet bgl.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
0	0							(0.0-0.3') GRASS and TOPSOIL		
		1	0.0-5.0'	3.3	NR			(0.3-7.0') CLAY, some silt, low plasticity, no dilatancy; trace fine sand, subrounded; trace granules, subrounded; dry; stiff; brown (10YR 4/3).		
5	-5	2	5.0-10.0'	4.4	NR			(7.0-15.0') CLAY, medium to high plasticity, no dilatancy; little silt; little fine sand, subrounded; trace granules to small pebbles, subrounded; moist; medium stiff; light yellowish brown (10YR 6/4). NOTE: Soft from 7.5 to 8.5' bgs.		
10	-10	3	10.0-15.0'	5.0	NR			NOTE: Sand seam, fine; wet from 13.5 to 13.8' bgs.		
15	-15	4	15.0-20.0'	2.9	NR			(15.0-20.0') CLAY, high plasticity, no dilatancy; little silt; moist; soft; light yellowish brown (10YR 6/4).		
20	-20							(20.0-25.0') NO RECOVERY		



Remarks: bgs = below ground surface
 NA = not applicable
 NR = not recorded
 Groundwater not encountered .
 No odor or staining observed.
 Temporary Monitoring Wells screened from 10.0 to 15.0' and 25.0 to 30.0' bgs.

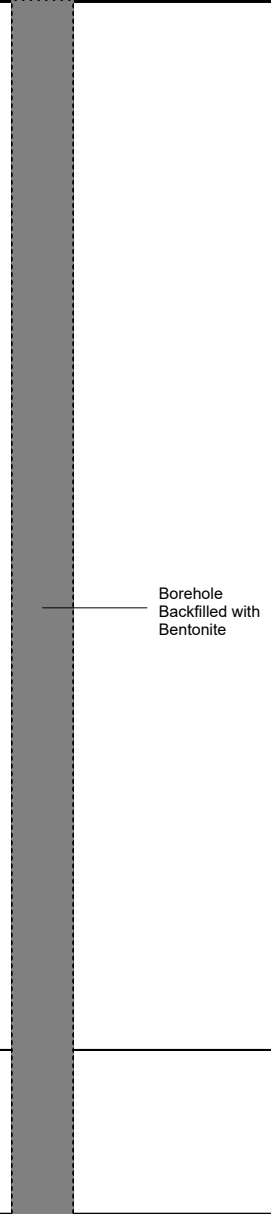


Date Start: 04/29/19
Date Finish: 04/29/19
Drilling Company: Stock Drilling
Driller's Name: Jess Stromberger
Drilling Method: Hand Auger / Geoprobe
Sampling Method: Dual Tube
Rig Type: NA
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA

Northing: NA
Easting: NA
Casing Elevation: NA
Borehole Depth (ft. bgs.): 40.0
Surface Elevation: NA
Descriptions By: A. Westhuis

Well/Boring ID: SB-P6-QQ322
Client: RACER
Location: RACER Lansing Plant 6
Weather Conditions: 40F, Cloudy, Rain

DEPTH (feet bgl.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
		5	20.0-25.0'	0.0	NR					
25	-25							(25.0-28.0') SILT, non-plastic, rapid dilatancy; little very fine sand, well sorted; trace clay; wet; grayish brown (10YR 5/2).		
		6	25.0-30.0'	3.3	NR			(28.0-34.0') CLAY, some silt, medium to high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to medium pebbles, subrounded; moist; medium stiff; grayish brown (10YR 5/2).		
30	-30							NOTE: Soft from 31.0 to 34.0' bgs.		
		7	30.0-35.0'	5.0	NR			(34.0-34.5') SAND, fine, subrounded; trace to little silt; well sorted; dry to moist; pale brown (10YR 6/3).		
35	-35							(34.5-40.0') CLAY, high plasticity, no dilatancy; little to some silt; trace fine sand, subrounded; trace granules to large pebbles, subrounded; moist; medium stiff to soft; gray (10YR 4/1).		
		8	35.0-40.0'	5.0	NR					
40	-40							End of boring at 40.0' bgs.		



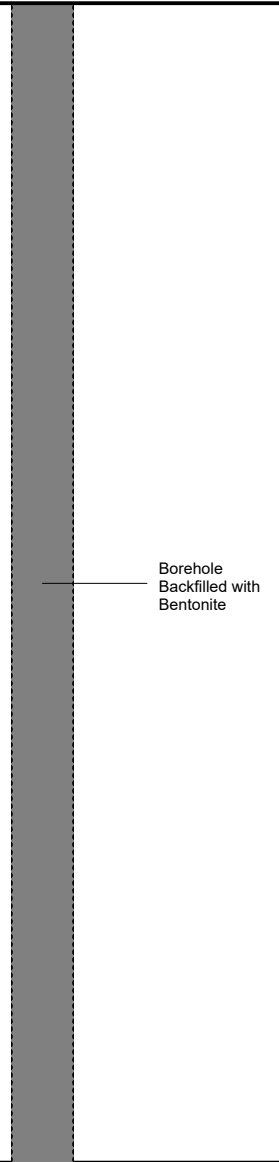
Remarks: bgs = below ground surface
 NA = not applicable
 NR = not recorded
 Groundwater not encountered .
 No odor or staining observed.
 Temporary Monitoring Wells screened from 10.0 to 15.0' and 25.0 to 30.0' bgs.

Date Start: 05/02/19
Date Finish: 05/02/19
Drilling Company: Stock Drilling
Driller's Name: Jess Stromberger
Drilling Method: Hand Auger / Geoprobe
Sampling Method: Dual Tube
Rig Type: NA
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA

Northing: NA
Easting: NA
Casing Elevation: NA
Borehole Depth (ft. bgs.): 40.0
Surface Elevation: NA
Descriptions By: A. Westhuis

Well/Boring ID: SB-P6-RW339
Client: RACER
Location: RACER Lansing Plant 6
Weather Conditions: 45F, Cloudy

DEPTH (feet bgl.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
0	0							(0.0-0.5') GRASS and TOPSOIL		
		1	0.0-6.5'	6.5	NR			(0.5-3.0') SAND, very fine to fine, subrounded; some silt; trace to little clay; well sorted; moist; yellowish brown (10YR 5/4).		
								(3.0-7.5') CLAY, little silt, medium to high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to small pebbles, subrounded; moist; medium stiff; dark yellowish brown (10YR 4/6).		
		2	6.5-10.0'	3.6	NR			(7.5-8.5') SAND, very fine, and SILT; trace to little clay, non-plastic, no dilatancy; dry to moist; well sorted; yellowish brown (10YR 5/6).		
								(8.5-11.0') CLAY, little silt, medium plasticity, no dilatancy; trace to little fine sand, subrounded; trace granules to medium pebbles, subrounded; moist; medium stiff; dark yellowish brown (10YR 4/6)		
								NOTE: Sand seam, fine; dry from 9.3 to 9.5' bgs.		
		3	10.0-15.0'	4.2	NR			(11.0-12.5') SAND, fine, subrounded; trace silt; trace granules, subrounded; dry; well sorted; light yellowish brown (10YR 6/4).		
								(12.5-12.8') CLAY, some silt, low plasticity to non-plastic, no dilatancy; little fine sand, subrounded; moist; stiff; yellowish brown (10YR 5/6).		
								(12.8-13.2') SAND, fine, subrounded; trace silt; trace granules, subrounded; dry to moist; well sorted; light yellowish brown (10YR 6/4).		
								(13.2-14.5') CLAY, high plasticity, no dilatancy; trace to little silt; trace very fine sand; trace granules, angular; moist; stiff; dark yellowish brown (10YR 4/6).		
		4	15.0-20.0'	5.0	NR			(14.5-22.0') SAND, very fine to fine, subrounded; little silt; well sorted; moist to wet; pale brown (10YR 6/3).		
								NOTE: Brownish yellow (10YR 6/6) from 15.0 to 17.5' bgs.		
								NOTE: Wet at 18.0' bgs.		




Remarks: bgs = below ground surface
 NA = not applicable
 NR = not recorded
 Groundwater not encountered.
 No odor or staining observed.
 Temporary Monitoring Well screened from 18.5 to 23.5' bgs.



Date Start: 05/02/19 Date Finish: 05/02/19 Drilling Company: Stock Drilling Driller's Name: Jess Stromberger Drilling Method: Hand Auger / Geoprobe Sampling Method: Dual Tube Rig Type: NA Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: A. Westhuis	Well/Boring ID: SB-P6-RW339 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 45F, Cloudy
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DEPTH (feet bgl.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
								NOTE: Poorly sorted fromn 21.0 to 22.0' bgs.		
		5	20.0-25.0'	5.0	NR		(22.0-40.0') CLAY, medium to high plasticity, no dilatancy; little to some silt; trace to little fine sand, subrounded; trace granules to large pebbles, subrounded; moist; medium stiff; dark grayish brown (10YR 4/2).			Borehole Backfilled with Bentonite
25	-25						NOTE: Sand seam, fine; wet from 23.2 to 23.5' bgs.			
		6	25.0-30.0'	5.0	NR		NOTE: Soft, increase in moisture from 25.0 to 27.0' bgs.			
30	-30									
		7	30.0-35.0'	5.0	NR					
35	-35									
		8	35.0-40.0'	5.0	NR					
40	-40							End of boring at 40.0' bgs.		

 <small>Design & Consultancy for natural and built assets</small>	Remarks: bgs = below ground surface NA = not applicable NR = not recorded Groundwater not encountered. No odor or staining observed. Temporary Monitoring Well screened from 18.5 to 23.5' bgs.
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Date Start: 04/29/19
Date Finish: 04/29/19
Drilling Company: Stock Drilling
Driller's Name: Jess Stromberger
Drilling Method: Geoprobe
Sampling Method: Dual Tube
Rig Type: NA
Water Level Start (ft. bgs.): NA
Water Level Finish (ft. btoc.): NA

Northing: NA
Easting: NA
Casing Elevation: NA

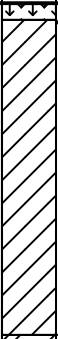

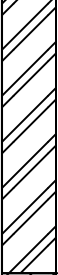
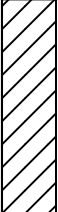
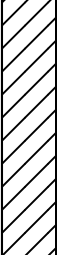

Borehole Depth (ft. bgs.): 40.0
Surface Elevation: NA

Descriptions By: A. Westhuis

Well/Boring ID: SB-P6-SG322
Client: RACER

Location: RACER Lansing Plant 6

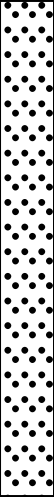



Weather Conditions: 40F, Cloudy, Rain


DEPTH (feet bgl.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
0	0							(0.0-0.3') GRASS and TOPSOIL		
0	0	1	0.0-5.0'	2.6	NR			(0.3-6.0') CLAY, some silt, low plasticity, no dilatancy; trace fine sand, subrounded; trace granules, subrounded; dry; stiff; brown (10YR 4/3).		
5	-5	2	5.0-10.0'	4.0	NR			(6.0-11.0') CLAY, medium to high plasticity, no dilatancy; little silt; little fine sand, subrounded; trace granules to medium pebbles, subrounded; moist; soft to medium stiff; light yellowish brown (10YR 6/4). NOTE: Soft from 6.0 to 7.0' bgs.		
10	-10	3	10.0-15.0'	5.0	NR			NOTE: Silt lens, little very fine sand; wet from 10.0 to 10.3' bgs.		
15	-15	4	15.0-20.0'	4.75	NR			(11.0-19.5') CLAY, trace to little silt, low plasticity, no dilatancy; trace fine sand, subrounded; trace granules, subrounded; moist; very soft to soft; light yellowish brown (10YR 6/4).		
20	-20							(19.5-30.0') SAND, very fine to fine, subrounded; trace granules, subrounded; trace to little silt; well sorted; dry to moist; yellowish brown (10YR 5/4).		

Remarks: bgs = below ground surface
 NA = not applicable
 NR = not recorded
 Groundwater encountered at 24.5' bgs.
 No odor or staining observed.
 Temporary Monitoring Wells screened from 10.0 to 15.0' and 25.0 to 30.0' bgs.



Date Start: 04/29/19 Date Finish: 04/29/19 Drilling Company: Stock Drilling Driller's Name: Jess Stromberger Drilling Method: Geoprobe Sampling Method: Dual Tube Rig Type: NA Water Level Start (ft. bgs.): NA Water Level Finish (ft. btoc.): NA	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: A. Westhuis	Well/Boring ID: SB-P6-SG322 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 40F, Cloudy, Rain
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DEPTH (feet bgl.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
25	-25	5	20.0-25.0'	3.0	NR			NOTE: Wet at 24.5' bgs.		
30	-30	6	25.0-30.0'	2.5	NR					
35	-35	7	30.0-35.0'	0.5	NR			(30.0-40.0') CLAY, some silt, low plasticity, no dilatancy; little fine sand, subrounded; trace to little granules to medium pebbles, subrounded; dry to moist; very stiff, grayish brown (10YR 5/2).		
40	-40	8	35.0-40.0'	5.0	NR			NOTE: Poor recovery from 30.0 to 35.0' bgs. due to jammed sample liner. Unable to remove the jammed liner. Likely encountered expanding clay.		
								End of boring at 40.0' bgs.		

 <small>Design & Consultancy for natural and built assets</small>	Remarks: bgs = below ground surface NA = not applicable NR = not recorded Groundwater encountered at 24.5' bgs. No odor or staining observed. Temporary Monitoring Wells screened from 10.0 to 15.0' and 25.0 to 30.0' bgs.
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Date Start: 05/01/19
Date Finish: 05/01/19
Drilling Company: Stock Drilling
Driller's Name: Jess Stromberger
Drilling Method: Geoprobe
Sampling Method: Dual Tube
Rig Type: NA
Water Level Start (ft. bgs.): 6.3
Water Level Finish (ft. btoc.): NA

Northing: NA
Easting: NA
Casing Elevation: NA
Borehole Depth (ft. bgs.): 20.0
Surface Elevation: NA
Descriptions By: M. Weaver

Well/Boring ID: SB-P6-TA228
Client: RACER
Location: RACER Lansing Plant 6
Weather Conditions: 55F, Cloudy

DEPTH (feet bgl.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
0	0							(0.0-0.2') TOPSOIL.		
		1	0.0-5.0'	2.8	NR		(0.2-1.3') SAND, fine to coarse; some clay; little silt; dark gray. NOTE: Wood debris at 1.0' bgs. (1.3-6.3') CLAY, moist to dry; gray with pale brown streaks.			
5	-5	2	5.0-10.0'	4.6	NR		(6.3-7.8') CLAY and SAND, wet; yellowish brown. (7.8-15.0') CLAY, little silt, low plasticity; stiff; smooth.	6.3		Borehole Backfilled with Bentonite
10	-10	3	10.0-15.0'	5.0	NR		(15.0-17.0') CLAY, stiff.			
15	-15	4	15.0-20.0'	5.0	NR		(17.0-18.0') CLAY and SILT; moist. (18.0-20.0') SAND, very fine; dry.			
							NOTE: Silty sand from 19.9 to 20.0' bgs.			
20	-20						End of boring at 20.0' bgs.			

Remarks: bgs = below ground surface
 NA = not applicable
 NR = not recorded
 Groundwater encountered at 6.3' bgs.
 No odor or staining observed.
 Temporary Monitoring Well screened from 5.0 to 10.0' bgs.



Date Start: 05/01/19
Date Finish: 05/01/19
Drilling Company: Stock Drilling
Driller's Name: Jess Stromberger
Drilling Method: Geoprobe
Sampling Method: Dual Tube
Rig Type: NA
Water Level Start (ft. bgs.): 1.5
Water Level Finish (ft. btoc.): NA

Northing: NA
Easting: NA
Casing Elevation: NA
Borehole Depth (ft. bgs.): 40.0
Surface Elevation: NA
Descriptions By: A. Westhuis

Well/Boring ID: SB-P6-TA242
Client: RACER
Location: RACER Lansing Plant 3
Weather Conditions: 55F, Cloudy

DEPTH (feet bgl.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
0	0							(0.0-0.1') GRASS and TOPSOIL.		
		1	0.0-5.0'	3.1	NR		(0.1-10.0') SAND, fine to coarse, subangular; little granules to large pebbles, subrounded; little silt; poorly sorted; moist to wet; yellowish brown (10YR 5/4). NOTE: CLAY, high plasticity, brown (10YR 5/3) from 0.7 to 0.9' bgs.			
5	-5	2	5.0-10.0'	1.5	NR					
10	-10	3	10.0-15.0'	5.0	NR		(10.0-31.5') CLAY, medium to high plasticity, no dilatancy; little silt; trace to little fine sand, subrounded; trace granules to medium pebbles, subrounded; moist; medium stiff to stiff; gray (10YR 5/1). NOTE: SAND seam, very fine, wet at 12.5' bgs NOTE: Small cobbles from 13.5 to 14.0' bgs.			Borehole Backfilled with Bentonite
15	-15	4	15.0-20.0'	5.0	NR					
20	-20									

Remarks: bgs = below ground surface
 NA = not applicable
 NR = not recorded
 Groundwater encountered at 12.5' bgs.
 No odor or staining observed.
 Temporary Monitoring Well screened from 8.0 to 13.0' bgs.



Date Start: 05/01/19
Date Finish: 05/01/19
Drilling Company: Stock Drilling
Driller's Name: Jess Stromberger
Drilling Method: Geoprobe
Sampling Method: Dual Tube
Rig Type: NA
Water Level Start (ft. bgs.): 1.5
Water Level Finish (ft. btoc.): NA

Northing: NA
Easting: NA
Casing Elevation: NA
Borehole Depth (ft. bgs.): 40.0
Surface Elevation: NA
Descriptions By: A. Westhuis

Well/Boring ID: SB-P6-TA242
Client: RACER
Location: RACER Lansing Plant 3
Weather Conditions: 55F, Cloudy

DEPTH (feet bgl.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
25	-25	5	20.0-25.0'	5.0	NR					
30	-30	6	25.0-30.0'	5.0	NR					
35	-35	7	30.0-35.0'	5.0	NR			(31.5-40.0') CLAY, some silt, non-plastic to low plasticity, no dilatancy; trace to little fine sand, subrounded; trace granules to large pebbles, subrounded; moist; stiff to very stiff; gray (10YR 5/1).		Borehole Backfilled with Bentonite
40	-40	8	35.0-40.0'	5.0	NR					
								End of boring at 40.0' bgs.		

Remarks: bgs = below ground surface
 NA = not applicable
 NR = not recorded
 Groundwater encountered at 12.5' bgs.
 No odor or staining observed.
 Temporary Monitoring Well screened from 8.0 to 13.0' bgs.



Date Start: 05/01/19
Date Finish: 05/01/19
Drilling Company: Stock Drilling
Driller's Name: Jess Stromberger
Drilling Method: Geoprobe
Sampling Method: Dual Tube
Rig Type: NA
Water Level Start (ft. bgs.): 0.5
Water Level Finish (ft. btoc.): NA

Northing: NA
Easting: NA
Casing Elevation: NA

Borehole Depth (ft. bgs.): 40.0
Surface Elevation: NA

Descriptions By: A. Westhuis

Well/Boring ID: SB-P6-TA258
Client: RACER

Location: RACER Lansing Plant 6

Weather Conditions: 45F, Cloudy

DEPTH (feet bgl.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
0	0							(0.0-0.3') GRASS and TOPSOIL.		
0.5	-0.5	1	0.0-5.0'	2.0	NR		(0.3-0.5') CLAY, medium plasticity, no dilatancy; little silt; little to some fine sand, subrounded; trace granules, subrounded; moist; medium stiff; grayish brown (10YR 5/2). (0.5-9.8') SAND, fine to coarse, subangular; little granules to large pebbles, subrounded; little silt; poorly sorted; wet; yellowish brown (10YR 5/4). NOTE: Wet at 0.5' bgs.		Borehole Backfilled with Bentonite	
5	-5	2	5.0-10.0'	3.0	NR					
10	-10	3	10.0-15.0'	5.0	NR		(9.8-24.9') CLAY, high plasticity, no dilatancy; trace to little silt; trace very fine sand; trace granules to small pebbles, subrounded; moist; medium stiff to stiff; gray (10YR 5/1).			
15	-15	4	15.0-20.0'	5.0	NR					
20	-20									

Remarks: bgs = below ground surface
 NA = not applicable
 NR = not recorded
 Groundwater encountered at 28.5' bgs.
 No odor or staining observed.
 Temporary Monitoring Well screened from 5.0 to 10.0' bgs.



Date Start: 05/01/19
Date Finish: 05/01/19
Drilling Company: Stock Drilling
Driller's Name: Jess Stromberger
Drilling Method: Geoprobe
Sampling Method: Dual Tube
Rig Type: NA
Water Level Start (ft. bgs.): 0.5
Water Level Finish (ft. btoc.): NA

Northing: NA
Easting: NA
Casing Elevation: NA
Borehole Depth (ft. bgs.): 40.0
Surface Elevation: NA
Descriptions By: A. Westhuis

Well/Boring ID: SB-P6-TA258
Client: RACER
Location: RACER Lansing Plant 6
Weather Conditions: 45F, Cloudy

DEPTH (feet bgl.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
		5	20.0-25.0'	5.0	NR					
25	-25							(24.9-27.5') CLAY, some silt, non-plastic to low plasticity, no dilatancy; little very fine to fine sand, subrounded; trace granules to small pebbles, subrounded; dry to moist; stiff; grayish brown (10YR 5/2).		
		6	25.0-30.0'	4.0	NR			(27.5-28.0') SAND, very fine; and SILT; well sorted; wet; light brownish gray (10YR 6/2).		
								(28.0-28.5') CLAY, some silt, non-plastic to low plasticity, no dilatancy; little very fine to fine sand, subrounded; dry to moist; stiff; grayish brown (10YR 5/2).		
								(28.5-28.9') SAND, fine to coarse, subrounded; little silt; poorly sorted; wet; light brownish gray (10YR 6/2).		
30	-30							(28.9-40.0') CLAY, some silt, low plasticity, no dilatancy; trace to little very fine to fine sand, subrounded, trace granules, subrounded; dry to moist; stiff; grayish brown (10YR 5/2).		
		7	30.0-35.0'	5.0	NR			NOTE: SAND, very fine, wet from 29.5 to 29.7' bgs.		
35	-35									
		8	35.0-40.0'	5.0	NR					
40	-40							End of boring at 40.0' bgs.		

Remarks: bgs = below ground surface
 NA = not applicable
 NR = not recorded
 Groundwater encountered at 28.5' bgs.
 No odor or staining observed.
 Temporary Monitoring Well screened from 5.0 to 10.0' bgs.



Date Start: 04/30/19 Date Finish: 04/30/19 Drilling Company: Stock Drilling Driller's Name: Jess Stromberger Drilling Method: Hand Auger / Geoprobe Sampling Method: Dual Tube Rig Type: NA Water Level Start (ft. bgs.): 15.0 Water Level Finish (ft. btoc.): 15.5	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth (ft. bgs.): 40.0 Surface Elevation: NA Descriptions By: J. Lust	Well/Boring ID: SB-P6-TA272 Client: RACER Location: RACER Lansing Plant 6 Weather Conditions: 40F, Cloudy
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DEPTH (feet bgl.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
0	0	1	0.0-5.0'	2.0	NR			(0.0-0.3') GRASS and TOPSOIL (0.3-1.0') SAND, fine to coarse, trace small to large pebbles, subangular; well sorted; wet; brown (10YR 4/3). (1.0-5.6') SILT; some sand, subangular; moist; dark staining; very dark brown (10YR 2/2).		
5	-5	2	5.0-10.0'	3.0	NR			(5.6-15.5') SILT and CLAY, medium plasticity, slow dilatancy; trace small to large pebbles, subangular; moist to dry; stiff to medium stiff; yellowish brown (10YR 5/6).		
10	-10	3	10.0-15.0'	5.0	NR			NOTE: Concrete caught in dual tube from 0.0 to 10.0' bgs sample interval, poor recovery.		 Borehole Backfilled with Bentonite
15	-15	4	15.0-20.0'	5.0	NR			NOTE: Wet from 15.0 to 15.5' bgs.	15.5	
20	-20							(15.5-22.0') CLAY, some silt, medium plasticity, no dilatancy; trace small pebbles, subangular; gray (10YR 5/1).		

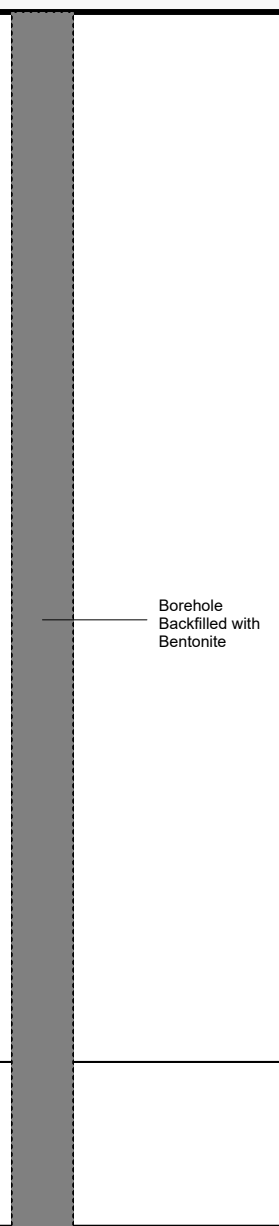
 ARCADIS Design & Consultancy for natural and built assets	Remarks: bgs = below ground surface NA = not applicable NR = not recorded Groundwater encountered at 15.0' bgs. No odor observed. Temporary Monitoring Well screened from 29.0 to 34.0' bgs.
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Date Start: 04/30/19
Date Finish: 04/30/19
Drilling Company: Stock Drilling
Driller's Name: Jess Stromberger
Drilling Method: Hand Auger / Geoprobe
Sampling Method: Dual Tube
Rig Type: NA
Water Level Start (ft. bgs.): 15.0
Water Level Finish (ft. btoc.): 15.5

Northing: NA
Easting: NA
Casing Elevation: NA
Borehole Depth (ft. bgs.): 40.0
Surface Elevation: NA
Descriptions By: J. Lust

Well/Boring ID: SB-P6-TA272
Client: RACER
Location: RACER Lansing Plant 6
Weather Conditions: 40F, Cloudy

DEPTH (feet bgl.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
25	-25	5	20.0-25.0'	5.0	NR			(22.0-23.0') SILT; some fine to medium sand, subangular; little clay, trace small pebbles, subangular; well sorted; moist; gray (10YR 5/1).		
								(23.0-29.0') CLAY, medium plasticity, no dilatancy; little silt; trace small pebbles, subangular; dry; stiff; gray (10YR 5/1).		
30	-30	6	25.0-30.0'	5.0	NR			(29.0-30.0') CLAY, some silt, medium plasticity, no dilatancy; trace small pebbles, subangular; dry; medium stiff; gray (10YR 5/1).		
								(30.0-37.0') SILT, some clay, medium plasticity, rapid dilatancy; little small pebbles, subangular; moist; soft; gray (10YR 5/1).		
		7	30.0-35.0'	4.0	NR			NOTE: Wet from 30.0 to 31.0' bgs; soft at 31.0' bgs.		
35	-35									
		8	35.0-40.0'	4.0	NR			(37.0-40.0') CLAY, some silt, low plasticity, no dilatancy; trace small to large pebbles, subangular; dry; stiff; gray (10YR 5/1).		
40	-40							End of boring at 40.0' bgs.		



Remarks: bgs = below ground surface
 NA = not applicable
 NR = not recorded
 Groundwater encountered at 15.0' bgs.
 No odor observed.
 Temporary Monitoring Well screened from 29.0 to 34.0' bgs.

Date Start: 05/02/19
Date Finish: 05/02/19
Drilling Company: Stock Drilling
Driller's Name: Jess Stromberger
Drilling Method: Hand Auger / Geoprobe
Sampling Method: Dual Tube
Rig Type: NA
Water Level Start (ft. bgs.): 22.0
Water Level Finish (ft. btoc.): NA

Northing: NA
Easting: NA
Casing Elevation: NA
Borehole Depth (ft. bgs.): 40.0
Surface Elevation: NA
Descriptions By: A. Westhuis

Well/Boring ID: SB-05-QR364
Client: RACER
Location: RACER Lansing Plant 6
Weather Conditions: 45F, Cloudy

DEPTH (feet bgl.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
0	0							(0.0-1.0') GRASS and TOPSOIL		
1	-1	1	0.0-6.5'	6.5	NR			(1.0-4.0') CLAY, medium to high plasticity, no dilatancy; little silt; trace fine sand, subrounded; trace granules to small pebbles, subrounded; moist; medium stiff; dark yellowish brown (10YR 4/6).		Borehole Backfilled with Bentonite
4	-4							(4.0-5.0') SAND, fine, subrounded; trace granules, subrounded; little silt; well sorted; moist; pale brown (10YR 6/3).		
5	-5	2	6.5-10.0'	2.4	NR			(5.0-10.0') CLAY, medium plasticity, no dilatancy; little silt; trace fine sand, subrounded; trace granules to small pebbles, subrounded; moist; medium stiff; yellowish brown (10YR 5/6).		
10	-10	3	10.0-15.0'	5.0	NR			(10.0-15.0') CLAY, some silt, high plasticity, no dilatancy; trace fine sand, subrounded; trace granules to medium pebbles, subrounded; moist; medium stiff; dark gray (10YR 4/1).		
15	-15	4	15.0-20.0'	5.0	NR			(15.0-17.5') SILT; some very fine sand; well sorted; moist to wet; grayish brown (10YR 5/2).		
20	-20							(17.5-23.5') SAND, very fine to fine, subrounded; little silt; well sorted; moist to wet; pale brown (10YR 6/3).		

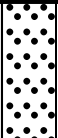
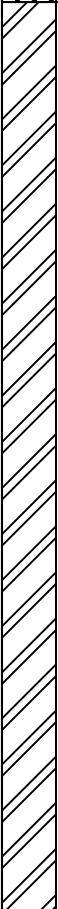
Remarks: bgs = below ground surface
 NA = not applicable
 NR = not recorded
 Groundwater encountered at 22.0' bgs.
 No odor or staining observed.
 Temporary Monitoring Wells screened from 22.5 to 27.5' bgs.



Date Start: 05/02/19
Date Finish: 05/02/19
Drilling Company: Stock Drilling
Driller's Name: Jess Stromberger
Drilling Method: Hand Auger / Geoprobe
Sampling Method: Dual Tube
Rig Type: NA
Water Level Start (ft. bgs.): 22.0
Water Level Finish (ft. btoc.): NA

Northing: NA
Easting: NA
Casing Elevation: NA
Borehole Depth (ft. bgs.): 40.0
Surface Elevation: NA
Descriptions By: A. Westhuis

Well/Boring ID: SB-05-QR364
Client: RACER
Location: RACER Lansing Plant 6
Weather Conditions: 45F, Cloudy

DEPTH (feet bgl.)	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Water Level (ft. bgs.)	Well/Boring Construction
		5	20.0-25.0'	5.0	NR			NOTE: Wet at 22.0' bgs; yellowish brown (10YR 5/6) from 22.5 to 23.5' bgs.	22.0	
25	-25							(23.5-40.0') CLAY, medium to high plasticity, no dilatancy; little to some silt; trace to little fine sand, subrounded; moist; medium stiff; dark grayish brown (10YR 5/2).		
		6	25.0-30.0'	5.0	NR			NOTE: Sand seam, fine; wet from 27.0 to 27.3' bgs.		
30	-30							NOTE: Soft from 31.0 to 32.0' bgs.		
		7	30.0-35.0'	5.0	NR					
35	-35									
		8	35.0-40.0'	5.0	NR					
40	40							End of boring at 40.0' bgs.		

Remarks: bgs = below ground surface
 NA = not applicable
 NR = not recorded
 Groundwater encountered at 22.0' bgs.
 No odor or staining observed.
 Temporary Monitoring Wells screened from 22.5 to 27.5' bgs.

