ARCADIS Design & Consultancy for natural and built assets

Revitalizing Auto Communities
Environmental Response Trust

INTERIM MEASURES WORK PLAN: PLANTS 2 AND 3 STORM SEWER MODIFICATIONS

Lansing Industrial Land

Lansing, Michigan

July 2019

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Our Ref.:

30042872.03600

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July 2019

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ACRONYMS AND ABBREVIATIONS

bgs	Below Ground Surface
DW	Drinking Water
EGLE	Michigan Department of Environment, Great Lakes, and Energy
GPM	Gallons per Minute
HNV	Human Non-Cancer Screening Value
IM	Interim Measures
JSA	Job Safety Analysis
ng/L	Nanograms per Liter
PFAS	Poly- and Perfluoroalkyl Substances
PFOS	Perfluorooctanesulfonic acid
PVC	Polyvinyl chloride
QAPP	Quality Assurance Project Plan
RACER	Revitalizing Auto Communities Environmental Response
Rule 57 Criteria	MDEQ Rule 57 Human Non-Cancer Screening Value (HNV) for Surface Water from a Non-Drinking Water Source
TGI	Technical Guidance Instructions

1 INTRODUCTION

Arcadis of Michigan, LLC prepared this Interim Measures (IM) Workplan (Work Plan) on behalf of the Revitalizing Auto Communities Environmental Response (RACER) Trust Plants 2 and 3 at the RACER Lansing Industrial Land (Site) located in Lansing, Michigan (**Figure 1**). The purpose of this Work Plan is to provide information to support Michigan Department of Environment, Great Lakes, and Energy (EGLE) City of Lansing, and the Ingham County Drain Commission, as applicable, approval of the Plants 2 and 3 supplemental storm sewer modifications proposed for implementation at the Site to address per- and polyfluoroalkyl substances (PFAS) discharges to offsite sewers. It is noted that even though this Work Plan is being submitted as an interim measure while other matters related to the Site are being addressed, it is intended that this interim measure will be a part of the final corrective measure to address PFAS.

This IM Work Plan outlines proposed modifications to the Plants 2 and 3 storm sewer systems to mitigate the Site's PFAS-impacted storm water discharges to an offsite storm sewer owned by the City of Lansing and the Ingham County Drain Commission. This Work Plan has been updated to reflect comments and discussions in the June 28, 2019 meeting with RACER, EGLE, City of Lansing, and the Ingham County Drain Commission. The proposed scope of work includes: Inspection of the outfall pipe that runs from the Site to the City Main north of Plant 3, and further plugging of the East Main, West Main, and Outfall (manhole P3-MH-NE) at Plant 3; plugging two mains at Plant 2; and capping selected catch basins at Plant 2. This Work Plan also includes post-installation monitoring of the property boundary manholes to verify corrective action objectives are met.

1.1 Site Overview

The perched PFAS at Plant 3 originates in the former plating area in the north-central portion of Plant 3. After initially being detected during groundwater sampling in December 2016, Arcadis conducted field investigations throughout 2017 and 2018 to characterize and define the extent of contamination (Arcadis 2018b). In fall of 2017, it was confirmed that PFAS impacts were infiltrating into the storm sewer system on Plant 3. This storm sewer system was composed of catch basins, manholes, and sewer mains, and eventually drained into a municipally owned storm main. An initial scope of work to address these impacts was completed in 2018. Follow up inspections and sampling conducted in 2019 indicated that these efforts were successful at blocking 95 to 99% the base flow, but that the remaining flow exceeds the PFOS Rule 57 criteria at the manhole located at the property outfall P3-MH-NE.

Storm sewer outfalls on Plant 2 were sampled in December of 2018, and PFOS above the Rule 57 criteria was detected in the northern most outfall (P2-MH-NW). Follow-up sampling of select manholes and catch basins in January and March of 2019 demonstrated the highest concentrations are entering the sewers in the southeast corner of Plant 2. This workplan outlines steps to address the PFAS sewer impacts at both Plants 2 and 3.

1.2 Corrective Action Objectives

The corrective action objective of this IM Work Plan is to eliminate off-Site storm sewer discharges exceeding the Rule 57 criteria. The point of compliance for Plant 3 is outfall (manhole P3-MH-NE,

Figure 2). The points of compliance for Plant 2 are the northwest outfall (P2-MH-30, **Figure 4**) and the southwest outfall (P2-MH-W).

2 PLANT 3 STORM SEWER MODIFICATIONS

In the fall of 2018, storm sewer modifications were executed at Plant 3, in accordance with the approved *Interim Measures Work Plan: Plant 3 Storm Sewer Modifications* (Arcadis, 2018a). The scope of work included:

- Capping 155 catch basins to minimize surface water inflow to the sewers;
- Bulkheading two locations to prevent potential reversal of flow to the county drain; and,
- Installation of concrete monoliths in the two mains (referred to as the East Main and West Main) contributing to the Plant 3 Outfall (P3-MH-NE). The monoliths were installed downstream of manholes P3-MH-1-1 (West Main) and P3-MH-2-1N (East Main), and upstream of the property outfall.

Details of the implementation are documented in the *Plant 3 Storm Sewer Modifications Completion Report* (Arcadis, 2019a).

The storm sewer modifications completed in 2018 achieved a one to two order of magnitude decrease in discharge volume from the outfall. Estimated flow volume prior to the modifications was 20 to 100 gallons per minute (gpm), based on approximate depth of water in the pipe. Follow-up observations after the modifications indicates that a small trickle (approximately 1 gallon per minute or less) continues to discharge from the site. Based on visual observations, remaining flow appeared to originate from the East Main. Arcadis inspected the manholes upstream of the East and West Main monoliths. Significant back up of water in the manhole upstream of the West Main monolith was observed, indicating the monolith is successfully blocking flow along the West Main. Very little water back up was observed in the manhole upstream of the East Main monolith, a line of evidence that the East Main monolith was not blocking all flow in the line. In March 2019 Arcadis completed a video inspection of the East Main and confirmed a small leak in the first pipe joint downstream of the monolith that was allowing water to infiltrate into the pipe. Based on the observations, it appears that the water reaching the East Main monolith is migrating around the monolith and back into the sewer pipe through the compromised pipe joint. Sediment buildup prevented camera access to the West Main, which had several inches of standing water in it.

Arcadis used a telescoping stream sampler to collect discrete storm water samples from the influent pipes and effluent pipe of the Plant 3 outfall manhole to quantify the relative mass contributions of PFAS. The East Main and discharge returned PFOS concentrations above the surface water criteria of 12 ng/L (**Figure 3**). The West Main sample was also above the criterion, but it was difficult to confirm the sample was collected from the standing water in the West Main pipe and not from the water in the manhole. The pipe running from the former pump station / clarifier returned concentrations below criteria.

After blocking the storm sewers, it was expected that increased surface ponding could occur following rain events. In order to monitor storm water ponding and potential runoff, Arcadis personnel mobilized to the Site within 24 hours following four precipitation events of various intensity after completion of the bulkheading. No significant runoff was observed leaving the property. Some ponding was observed, but the ponding dissipated relatively quickly in most areas.

2.1 Proposed Modifications

The primary components of the Plant 3 modifications are as follows, listed in order of planned implementation:

1. Inspect the outfall pipe that runs from the Site to the City Main north of Plant 3
2. Fill the manhole upstream of the East and West monolith with concrete to mitigate leakage from the East Main and further isolate water in the West Main
3. Fill the outfall (manhole P3-MH-NE) with concrete to mitigate discharge from Plant 3
4. Repair 4 to 5 catch basin caps that were damaged by snowplows

All work will be completed per the requirements of the Arcadis Site-Specific Health and Safety Plan (Arcadis 2019b) and industry best practices.

The construction contractor will be required to submit details on materials to be used in the work for review, to minimize the potential that PFAS-containing materials are used. Contractor personnel handling materials will follow appropriate protocols to minimize PFAS contamination of materials. City of Lansing water will be used in the concrete mix to minimize risk of PFAS contamination.

2.1.1 Inspection of the Property Outfall Main

A closed-circuit video inspection of the outfall pipe that runs from the Site to the City Main north of Plant 3 will then be performed to confirm that there is no sediment in the pipe that could be considered an ongoing source to the City Main (Figure 2). A confined space is not expected for the video inspection. If it is required, all confined space entries will be performed in accordance with applicable subcontractor standards and will include continuous air monitoring. Should the video footage indicate sediment is present, additional measures will be considered (see Section 4). Plugging of the East Main, West Main, and Outfall Manhole**.**

Arcadis will plug the East and West Main upstream of the East and West monoliths to mitigate the remaining discharge and isolate water further upstream of the monoliths. In addition, the outfall manhole (P3-MH-NE) will be plugged to mitigate discharge from the Site to the City Main. The first manhole upstream of the monoliths, manhole P3-MH-2-1N and P3-MH-1-1, as well as the outfall manhole P3-MH-NE will be filled to ground surface with underwater concrete (**Figure 2**). Underwater concrete is a thick concrete mixture commonly used for bridge footings in soil with high water levels and offshore structures. Because it is a thick mixture, the underwater concrete will travel a short distance down the pipes to provide a seal around the inlet and outlet pipes (**Figure 6**).

Prior to filling the manhole, standing water and sediment will be vacuumed out to the extent practicable. The manhole structure will then be filled with underwater concrete mix to ground surface (**Figure 6**). Concrete placement will follow standard construction practices including but not limited to consolidation (i.e. vibrating) to eliminate air voids and ensure complete placement. The concrete will be allowed to cure for 2 to 3 days while Arcadis monitors for signs of cracking or settling. An expected quantity of 1,000 to 2,000 gallons of sewer water (per location) from dewatering will be pumped into dewatering boxes staged on-Site, characterized, and disposed of an appropriate off-Site disposal facility. Actual volume may vary based on field conditions. Following setting of the concrete, the manhole structure will be capped.

2.1.2 Catch Basin Caps

Approximately four of the catch basins capped in 2018 were damaged over the winter by snowplows. These caps will be removed and replaced with a flush-mount traffic-rated cover (**Figure 6**, Detail B) that will mitigate the risk of them being damaged in the future.

2.2 Performance Monitoring

The property outfall P3-MH-NE manhole will be inspected quarterly for the first year following the construction to evaluate remedy effectiveness. This will include quarterly inspection of the manhole for signs of cracking or settling.

As noted in the workplan (Arcadis, 2018a), there was the potential that the groundwater level (or potentiometric surface) in the area would rise following bulkheading activities. Perched wells in the vicinity of the monoliths were gauged quarterly to assess changes in groundwater conditions. Groundwater levels have remained within historical ranges since the completion of the sewer modifications in October 2018. Groundwater elevation and water chemistry in the area will continue to be monitored in accordance with the EGLE approved Interim Groundwater Monitoring Plan (Arcadis, 2017a).

3 PLANT 2 STORM SEWER MODIFICATIONS

Stormwater at Plant 2 drains through a storm sewer system consisting of catch basins and sewer mains (**Figure 4**). For the purposes of this Work Plan, a catch basin is defined as a stormwater collection structure with an open top and a sump. A manhole is an access point along a main with a solid lid and does not receive surface stormwater. Catch basins and manholes are differentiated on **Figure 4.** Prior to implementation, a Site inspection will be completed to confirm the location and condition of manholes and catch basins that require modification as part of this scope of work.

Stormwater from Plant 2 flows through the sewer mains to the outfall at the northwest corner of the property, P2-MH-30. This outfall drains beneath Saginaw Street and connects to the Ingham County storm drain at Plant 3, which ultimately connects to the City of Lansing sewers and discharges to the Grand River.

A systematic process for identifying, ranking, and addressing PFAS inputs to the storm water system will be utilized to eliminate off-Site storm sewer discharges exceeding the Rule 57 criteria of 12 ng/L for PFOS in the Plant 2 northwest outfall, P2-MH-30. The process is:

- Identify: Investigated storm sewers to identify distribution of PFAS and incorporate flow conditions to evaluate mass flux into the system.
- Rank: Prioritize inputs based on mass flux, taking into consideration impacted and non-impacted flow contributions, with highest priorities starting internal to the Site.
- Address: Complete storm sewer modifications that reduce mass flux to the outfall but maintain drainage in non-impacted sewers to the extent practicable.

Modifications to address PFAS will be completed in step wise process, repeating the identify → rank → address process, as needed, to reach the objective. The sections below detail the work that has been completed to identify and rank PFAS inputs into the Plant 2 storm sewers, as well as the proposed scope of work to address the highest priorities identified.

3.1 Identify - 2019 Storm Sewer Sampling Investigation

Storm sewer water samples collected from 20 manholes in January and March of 2019 were analyzed for 24 PFAS compounds, as well as 1,4-dioxane, during the March sampling event. Sampling was conducted in dry weather to ensure that base flow conditions were evaluated. Results at the outfalls indicated:

- No PFAS compounds exceed surface water criteria at the southwest outfall, P2-MH-W.
- PFOS concentrations exceed the MDEQ Rule 57 Human Non-Cancer Screening Value (HNV) for Surface Water from a Non-Drinking Water Source criteria (Rule 57 criteria) of 12 ng/L at the Plant 2 northwest outfall, P2-MH-30.
- No other PFAS compounds exceeded relevant surface water criteria at the Plant 2 northwest outfall, P2-MH-30
- There were no exceedances of 1,4-dioxane surface water criteria.

Internal to Plant 2, the highest concentration of PFOS in the storm sewer network was 1,160 ng/L at P2-MH-96 in the southeast portion.

Analytical results for the January and March 2019 sampling events are summarized on **Table 2** and **Figure 4**. The laboratory reports are included as **Appendix A**.

3.2 Rank

Addressing the PFAS impacts in the Plant 2 storm sewer system requires balancing the need to mitigate the flow of impacted water off Site, maintaining adequate site drainage, and addressing PFAS impacts as close to the highest mass flux areas in the sewers as possible to prevent impacted water from moving to other areas of the site. Based on sampling and field observations, the highest impacts with the most substantial flow rates are in the P2-MH-97 drainage basin in the southeast corner of Plant 2 (**Figure 4**). The two samples collected from P2-MH-97 indicate PFOS concentrations of 656 and 394 ng/L in January and March, respectively (**Figure 4**, **Table 2**). P2-MH-96 had low flow, but a concentration of 1,160 ng/L contributes to elevated concentrations along northern flow path toward the northern Plant 2 outfall. Drainage areas outside of the P2-MH-97 drainage area have low PFOS concentrations; samples downstream from P2-MH-97 indicate dilution as the water works its way to the outfall manhole (**Figure 4**).

3.3 Address – Proposed Modifications

Targeting the P2-MH-97 drainage area as a first step will help achieve the following goals:

1. Cut off the flow of the highest known PFAS-impacted water from reaching the property outfall.
2. Addressing the impacts as close to the highest impacted sewers as possible to prevent impacted water from moving to other areas of the site.
3. Maintain drainage and operation of the sewer system from areas with little or no PFAS detected.
4. Minimize the disruption to the Site surface water drainage network, with a focus on the boundary. The proposed work area lies far from the road along the western Site boundary, the rail corridor to the east is elevated several feet above the ground surface in the P2-MH-97 area, and the ground surface of the area appears able to accept the short-term ponding water and subsequent infiltration, so the modifications should not impact neighboring properties.

The proposed modifications to the Plant 2 storm sewers are as follows, listed in order of planned implementation:

1. Cap approximately 24 catch basins in the P2-MH-97 drainage area to minimize inflow after precipitation events to the portion of the storm system to be abandoned, to reduce build-up of hydraulic pressure and the possibility of impacted sewer water daylighting.
2. Fill manhole P2-MH-95, to eliminate alternate pathways for impacted storm water to discharge from the Site.
3. Fill manhole P2-MH-97 with underwater concrete to mitigate the flow of PFAS-impacted water to further downstream at Plant 2 and eventually to the outfall

3.3.1 Cap Catch Basins

All catch basins in the P2-MH-97 drainage area will be capped to minimize surface water inflow into the portion of the sewer system to be deactivated. Capping catch basins is considered a best practice to reduce the possibility of water from storm sewer lines daylighting to ground surface through open catch basins following large storm events. Prior to capping, Arcadis will perform a field survey to finalize quantity and locations of the catch basins to be capped. Approximately 24 catch basins will be capped by removing the existing grate, placing a polyvinyl chloride (PVC) liner with a silicone bead sealant over the opening, reinstalling the existing catch basin grate over the PVC liner, followed by placing a galvanized steel plate on top as shown by the detail on **Figure 6**. The steel plate will also be sealed with silicone and covered with gravel to prevent theft **(Figure 6**, Detail A**)**.

3.3.2 Fill P2-MH-95 and P2-MH-97 with Concrete

Manhole P2-MH-97 will be filled with underwater concrete (**Figure 5**) to mitigate flow of PFAS-impacted water to the property outfall. The proposed filling of manhole P2-MH-97 presents the possibility that impacted sewer water could back up and flow around the plugged manhole during storm events. Water bypassing through P2-MH-95 could continue toward the Plant 2 outfall via a line to the west. To mitigate this possibility, P2-MH-95 will also be filled with underwater concrete (**Figure 5**). The manhole structures will be filled with underwater concrete mix to ground surface. Concrete placement will follow standard construction practices including but not limited to consolidation (i.e. vibrating) to eliminate air voids and ensure complete placement.

The concrete will be allowed to cure for 2 to 3 days while Arcadis monitors for signs of cracking or settling. An anticipated volume of 1,000 to 2,000 gallons of sewer water from dewatering will be pumped into dewatering boxes staged on-Site, characterized, and disposed of at an appropriate off-Site disposal facility. Actual volume removed may vary based on field conditions. Following setting of the concrete, the manhole structure will be capped according to the procedure described in Section 3.3.1.

3.3.3 Monitoring and Assessment

After blocking the P2-MH-97, increased surface ponding may occur following rain events. This ponding is expected to dissipate relatively quickly, as has been observed at Plant 3. In order to monitor storm water ponding and potential runoff, personnel will mobilize to the Site within 24 hours following the first four precipitation events of various intensity after completion of the bulkheading. The Site will be generally inspected with more attention to locations that based on surface topography have the potential for runoff.

There is the potential that the groundwater level (or potentiometric surface) in the south east portion of Plant 2 will rise. Perched wells in the vicinity of P2-MH-97 (Monitoring Wells P2-MW-02, P2-SB-06, and P2-MW-04) will be gauged quarterly for the first year following the sewer modifications to assess groundwater levels.

Storm sewer water quality monitoring will be completed following the storm sewer modification activities to evaluate PFAS at the northern Plant 2 outfall. Confirmatory sampling for PFAS will be completed at manhole P3-MH-30 approximately three months following construction and quarterly thereafter for one year.

4 CONTINGENCY

Should the video inspection of the outfall pipe that runs from the Site to the City Main north of Plant 3 show sediment in the pipe that could be considered an ongoing source to the City Main, cleaning of the outfall pipe will be completed. Sediment and water will be removed from the outfall pipe by pressure washing and vacuuming. Pressure washing will be implemented using standard sewer cleaning practices such that the water will flush the sediment and debris out of the sewer pipe, but not damage the pipe joints. The sewer waste (likely a mix of sediment and water) will be containerized in dewatering boxes to facilitate waste stream segregation. Wastes will be properly characterized and disposed of an appropriate off-Site disposal facility. Cleaning of the outfall pipe will be completed prior to the filling of the outfall manhole (P3-MH-NE).

Should confirmatory water quality samples return PFAS exceedances discharging from the Plant 2 outfall (P2-MH-30), additional characterization, modifications, and/or corrective measures will be evaluated. Specifically, Additional sewer sampling may be completed to re-assess conditions following the modifications to identify, rank, and address the next highest priority location for potential sewer modification in the Plant 2 sewer network.

5 SCHEDULE

Implementation will be initiated after all necessary approvals of this Work Plan are obtained. At this time, the identified approvals needed are from MDEQ and the City of Lansing. The first step in implementing this Work is to procure a contractor, which could take up to two months after Work Plan approval. After contractor selection a schedule for field implementation will be determined. Field implementation is targeted to be initiated in summer to fall of 2019.

6 REFERENCES

Arcadis 2017a. Revised Interim Groundwater Monitoring Work Plan, RACER Trust Plants 2, 3, & 6, Lansing, Michigan. January 30.

Arcadis, 2017b. Poly- and Perfluorinated Alkyl Substance (PFAS) Field Sampling Guidance. April 27

Arcadis, 2018a. Interim Measures Work Plan: Plant 3 Storm Sewer Modifications. May 24.

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

Arcadis, 2019a. Plant 3 Storm Sewer Modifications Completion Report. January 25.

Arcadis, 2019b. Site Specific Health and Safety Plan. RACER Trust, Lansing Plants 2, 3, and 6. June

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TABLES

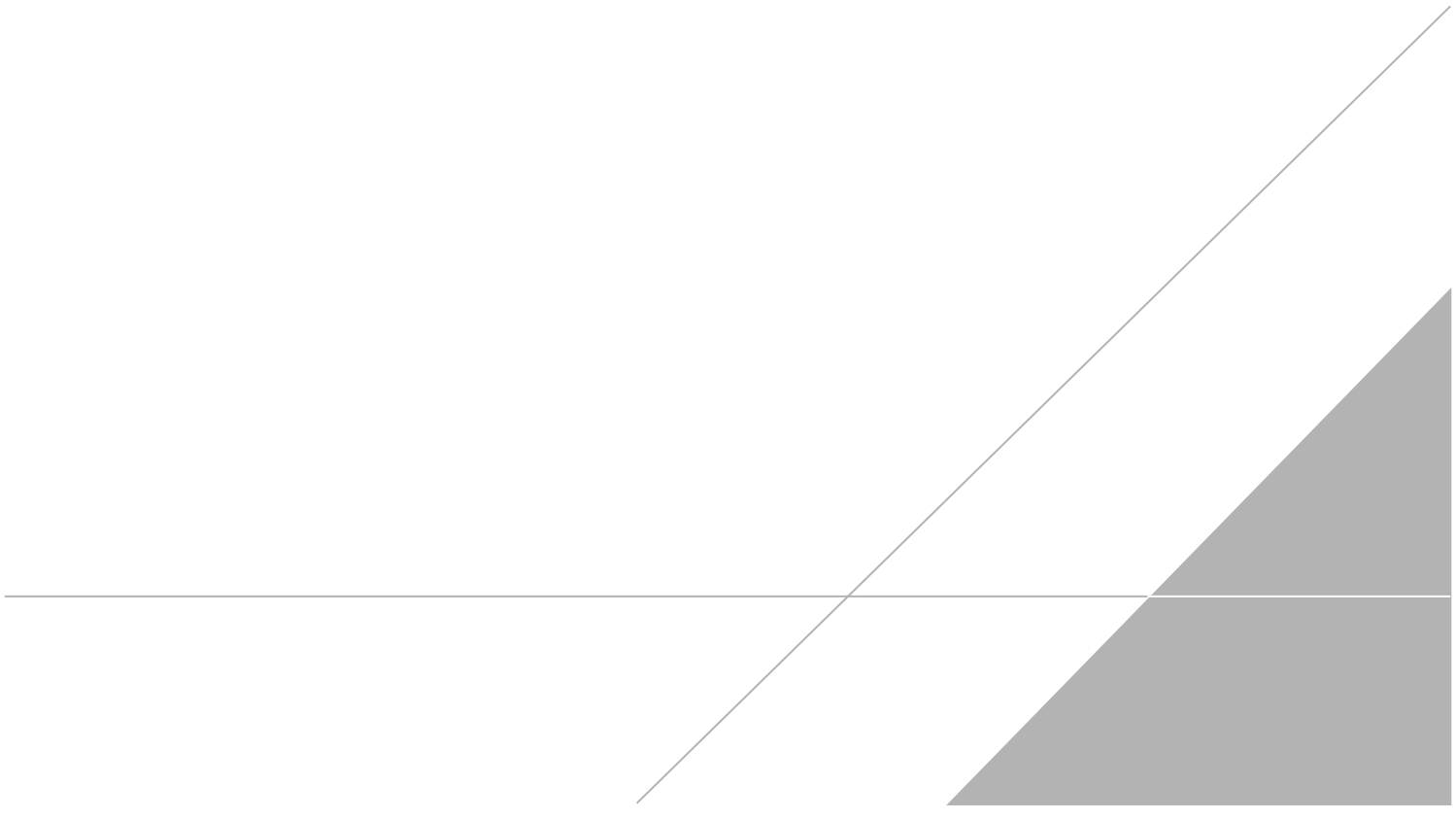

Table 1
Summary of Plant 3 Storm Sewer Sampling Results
Interim Measures Work Plan: Plants 2 and 3 Storm Sewer Modifications
RACER Trust - Plant 3 Industrial Land, Lansing, Michigan

ARCADIS Design & Consultancy for natural and built assets

Location ID: / Date Collected:	Units	MI Rule 57 SW (DEQ2017)	P3-MH-CLA 03/19/19	P3-MH-NW-E 03/19/19	P3-MH-NW-OUT 03/19/19	P3-MH-NW-W 03/19/19
Results						
Perfluorooctanesulfonic acid (PFOS)	ng/l	12	9.90	62.6	111	188
Perfluorooctanoic acid (PFOA)	ng/l	12000	1.44 J	4.82	5.88	7.23
Other PFAS	ng/l	NC	11.8	21.5	22.0	31.5

Notes:

Shaded Exceeds Rule 57 Human Non-Cancer Screening Value for Surface Water from a Non-Drinking Water Source for PFOS or PFOA

ng/L = Nanograms per liter.

NA = Not analyzed.

NC = No criteria

J = Indicates an estimated value below laboratory reporting limit

< = The compound was analyzed for but not detected. The associated value is the compound quantitation limit.

Table 2
Summary of Plant 2 Storm Sewer Sampling Results
Interim Measures Work Plan: Plants 2 and 3 Storm Sewer Modifications
RACER Trust - Plant 2 Industrial Land, Lansing, Michigan

ARCADIS Design & Consultancy for natural and built assets

Location ID: / Date Collected:	Units	MI Rule 57 SW (DEQ2017)	P2-MH-02 01/26/19	P2-MH-09 01/26/19	P2-MH-25 01/26/19	P2-MH-26 01/26/19	P2-MH-36 01/26/19
Results							
Perfluorooctanesulfonic acid (PFOS)	ng/L	12	161	26.6	207	104	2.42 J
Perfluorooctanoic acid (PFOA)	ng/L	12,000	29.2	15.8	50.1	27.5	2.54 J
1,4-Dioxane	µg/L	280	NA	NA	NA	NA	NA
Other PFAS	ng/L	NC	102	48.2	155	84.5	6.90

Notes:

Shaded — Exceeds Rule 57 Human Non-Cancer Screening Value for Surface Water from a Non-Drinking Water Source

NA = Not analyzed.

NC = No criteria

ng/L = Nanograms per liter.

µg/L = Micrograms per liter

PFAS = Per- and polyfluoroalkyl substances

[ ] Indicates duplicate sample

J = Indicates an estimated value below laboratory reporting limit

< = The compound was analyzed for but not detected.

The associated value is the compound quantitation limit

Table 2
Summary of Plant 2 Storm Sewer Sampling Results
Interim Measures Work Plan: Plants 2 and 3 Storm Sewer Modifications
RACER Trust - Plant 2 Industrial Land, Lansing, Michigan

ARCADIS Design & Consultancy for natural and built assets

Location ID: / Date Collected:	Units	P2-MH-79 01/26/19	[P2-MH-79] 01/26/19	P2-MH-97 01/26/19	P2-CB-32 03/26/19	P2-MH-10 03/26/19	P2-MH-14 03/26/19	P2-MH-16 03/26/19
Results								
Perfluorooctanesulfonic acid (PFOS)	ng/L	147	135	656	6.05	14.2	25.1	486
Perfluorooctanoic acid (PFOA)	ng/L	37.0	32.8	84.7	2.94 J	12.2	13.5	46.2
1,4-Dioxane	µg/L	NA	NA	NA	<1	<1	<1	<1
Other PFAS	ng/L	121	107	268	22.7	39.7	40.2	211

Notes:

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Table 2
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Interim Measures Work Plan: Plants 2 and 3 Storm Sewer Modifications
RACER Trust - Plant 2 Industrial Land, Lansing, Michigan

ARCADIS Design & Consultancy for natural and built assets

Location ID: / Date Collected:	Units	P2-MH-25 03/26/19	P2-MH-26 03/26/19	P2-MH-30 03/26/19	P2-MH-32 03/26/19	P2-MH-36 03/26/19	P2-MH-58 03/27/19	P2-MH-73 03/27/19
Results								
Perfluorooctanesulfonic acid (PFOS)	ng/L	600	111	126	<4.0	2.23 J	13.5	9.28
Perfluorooctanoic acid (PFOA)	ng/L	77.2	27.5	23.6	2.42 J	1.95 J	9.79	7.17
1,4-Dioxane	µg/L	1	16	8	<1	<1	<1	<1
Other PFAS	ng/L	307	89.1	83.6	26.2	9	19.8	17.6

Notes:

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Interim Measures Work Plan: Plants 2 and 3 Storm Sewer Modifications
RACER Trust - Plant 2 Industrial Land, Lansing, Michigan

ARCADIS Design & Consultancy for natural and built assets

Location ID: / Date Collected:	Units	P2-MH-79 03/26/19	[P2-MH-86] 03/27/19	P2-MH-86 03/27/19	P2-MH-96 03/27/19	P2-MH-97 03/26/19	P2-MH-114 03/27/19	P2-MH-NW 03/26/19
Results								
Perfluorooctanesulfonic acid (PFOS)	ng/L	35.1	86.0	97.7	1160	394	185	131
Perfluorooctanoic acid (PFOA)	ng/L	29.3	30.2	30.9	77.9	56.7	29.9	26.5
1,4-Dioxane	µg/L	47	11	11	11	2	<1	10
Other PFAS	ng/L	65.7	126	121	480	203	205	93.7

Notes:

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Table 2
Summary of Plant 2 Storm Sewer Sampling Results
Interim Measures Work Plan: Plants 2 and 3 Storm Sewer Modifications
RACER Trust - Plant 2 Industrial Land, Lansing, Michigan

Location ID: / Date Collected:	Units	P2-MH-W 03/27/19
Results		
Perfluorooctanesulfonic acid (PFOS)	ng/L	9.43
Perfluorooctanoic acid (PFOA)	ng/L	25.8
1,4-Dioxane	µg/L	<1
Other PFAS	ng/L	53.7

Notes:

Shaded — Exceeds Rule 57 Human Non-Cancer Screening Value for Surface Water from a Non-Drinking Water Source

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FIGURES

PLANT BOUNDARIES

- PLANT 2
- PLANT 3
- PLANT 6

0 1,500 3,000

SCALE IN FEET

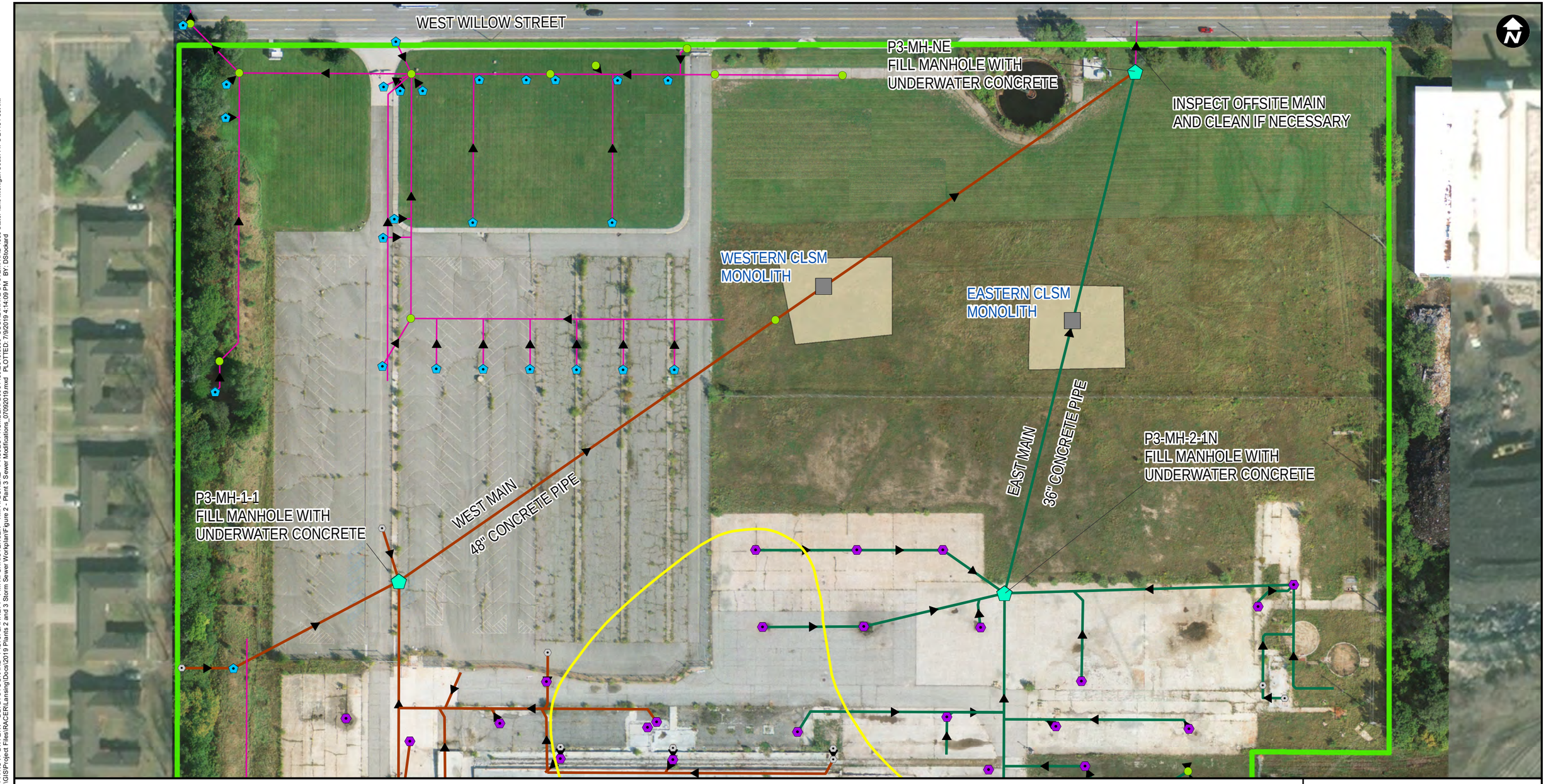
RACER TRUST
PLANTS 2, 3 & 6
LANSING, MICHIGAN

SITE LOCATION

ARCADIS Design & Consultancy for natural and built assets

FIGURE 1

CITY: Novi DIV: ENV PIC: J. BARRETT PM: R. CHRISTENSEN TM: A. LORENZ TR: J. SALING PROJECT NUMBER: B0064479.2019.03500 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
G:\GIS\Project Files\RACER\Lansing\Docs\2019 Plants 2 and 3 Storm Sewer Workplan\Figure 1 - Site Location.mxd PLOTTED: 6/18/2019 7:58:31 AM BY: DStockard



DRAINAGE NETWORKS
- OTHER
- EAST MAIN
- WEST MAIN
- PFOS 12 ng/L CONTOUR
- PLANT 3

STRUCTURE TYPE
- MANHOLE
- CATCH BASIN BURIED OR NOT LOCATED
- ACTIVE CATCH BASIN
- CAPPED CATCH BASIN
- 2018 CLSM MONOLITH
- TO BE FILLED WITH UNDERWATER CONCRETE
- APPROXIMATE EXCAVATION BOUNDARIES

NOTES:
-ALL PIPE AND STRUCTURE LOCATIONS ARE APPROXIMATE
-DRAINAGE NETWORKS DISPLAY PRIMARY
-LATERALS AND ALL INTERCEPTORS
-ARROWS DENOTE FLOW DIRECTION
-NAVY TEXT DENOTES WORK CONDUCTED IN 2018
CLSM: CONTROLLED LOW STRENGTH MATERIAL (FLOWABLE FILL)
ng/L: NANOGRAMS PER LITER

DRAFT

0 150 300
SCALE IN FEET

RACER TRUST
LANSING, MICHIGAN

2019 PLANT 3 STORM SEWER MODIFICATIONS PLAN LAYOUT

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FIGURE
2

CITY: NOVI DIV: ENV DB: D. STOCKARD PIC: J. BARRETT PM: R. CHRISTENSEN TM: A. LORENZ PROJECT NUMBER: B0064480.2019.3500 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
G:\GIS\Project Files\RACER\Lansing\Docs\2019 Plants 2 and 3 Storm Sewer Workplan\Figure 2 - Plant 3 Sewer Modifications_07092019.mxd PLOTTED: 7/9/2019 4:14:09 PM BY: DStockard

= Above Criteria

= Below Criteria

Notes:
Sample taken on 3/19/2019
All concentrations are expressed in ng/L or ppt
*No applicable criteria

PFOS = Perfluorooctanesulfonic Acid
PFOA = Perfluorooctanoic Acid
PFAS = Poly- and Perfluoroalkyl Substances
ng/L = Nanograms per liter
ppt = Parts per trillion

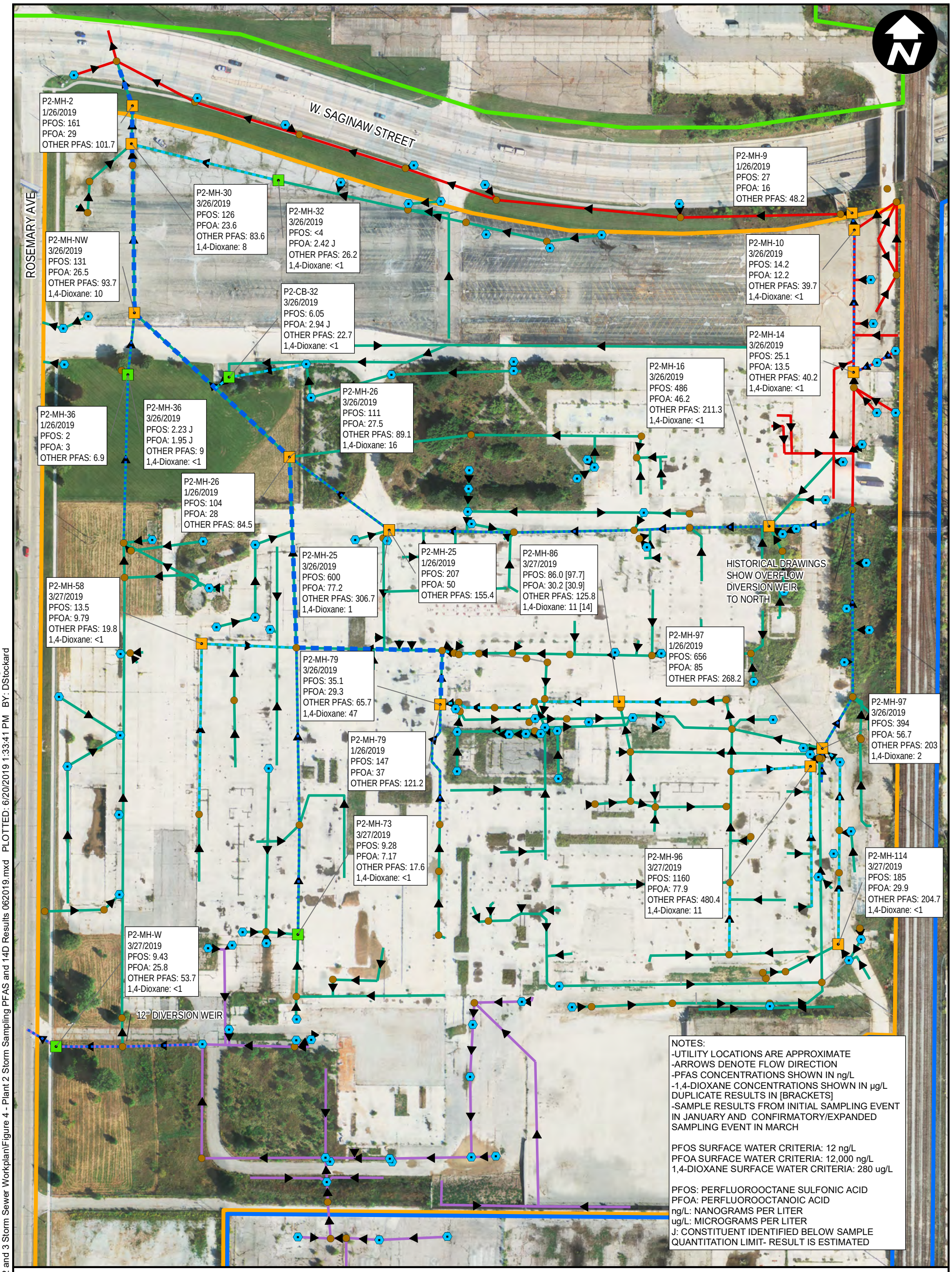
2016 PFOS Proposed MDEQ Rule 57 Human Non-Cancer Value for Surface Water from a Non-Drinking Water Source: 12 ng/L
2016 PFOA MDEQ Rule 57 Human Non-Cancer Screening Value for Surface Water from a Non-Drinking Water Source: 12,000 ng/L

RACER TRUST
LANSING, MICHIGAN

MARCH 2019 P3 OUTFALL INVERT SAMPLING

ARCADIS Design & Consultancy for natural and built assets

FIGURE
3



CITY: Novi DIV: ENV PIC: J. BARRETT PM: R. CHRISTENSEN TM: A. LORENZ TR: J. SALING PROJECT NUMBER: B0064479.2019.03500 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
G:\GIS\Project Files\RACER\Lansing\Docs\2019 Plants 2 and 3 Storm Sewer Workplan\Figure 4 - Plant 2 Storm Sampling PFAS and 14D Results 062019.mxd PLOTTED: 6/20/2019 1:33:41 PM BY: DStockard

RACER TRUST
PLANTS 2, 3 & 6
LANSING, MICHIGAN

PLANT 2 SEWER SAMPLING PFAS AND 1,4-DIOXANE ANALYTICAL RESULTS

ARCADIS Design & Consultancy for natural and built assets

FIGURE
4

P2-MH-97
3/26/2019
PFOS: 394
PFOA: 56.7
OTHER PFAS: 203
1,4-Dioxane: 2

P2-MH-97
1/26/2019
PFOS: 656
PFOA: 85
OTHER PFAS: 268.2

P2-MH-97
FILL MANHOLE WITH
UNDERWATER CONCRETE

P2-MH-95:
FILL MANHOLE WITH
UNDERWATER CONCRETE

P2-MH-96
3/27/2019
PFOS: 1160
PFOA: 77.9
OTHER PFAS: 480.4
1,4-Dioxane: 11

P2-MH-114
3/27/2019
PFOS: 185
PFOA: 29.9
OTHER PFAS: 204.7
1,4-Dioxane: <1

NOTES:
-UTILITY LOCATIONS ARE APPROXIMATE
-ARROWS DENOTE FLOW DIRECTION
-PFAS CONCENTRATIONS SHOWN IN ng/L
-1,4-DIOXANE CONCENTRATIONS SHOWN IN µg/L

PFOS SURFACE WATER CRITERIA: 12 ng/L
PFOA SURFACE WATER CRITERIA: 12,000 ng/L
1,4-DIOXANE SURFACE WATER CRITERIA: 280 ug/L

PFOS: PERFLUOROOCTANE SULFONIC ACID
PFOA: PERFLUOROOCTANOIC ACID
ng/L: NANOGRAMS PER LITER
ug/L: MICROGRAMS PER LITER
J: CONSTITUENT IDENTIFIED BELOW SAMPLE QUANTITATION LIMIT- RESULT IS ESTIMATED

ADJUSTMENT TYPE
- FLOW TO BE BLOCKED
- STRUCTURE TO BE CAPPED

STRUCTURES & SAMPLE POINTS
- MANHOLE
- CATCH BASIN TO REMAIN OPEN
- EXCEEDS PFOS RULE 57 SURFACE WATER CRITERIA FOR A NON-DRINKING WATER SOURCE

PLANT 2 DRAINAGE NETWORKS
- CENTRAL
- ABANDONED

OBSERVED FLOW
- TRICKLE
- LITTLE

PLANT BOUNDARIES
- PLANT 2
- PLANT 6

0 75 150
SCALE IN FEET

DRAFT

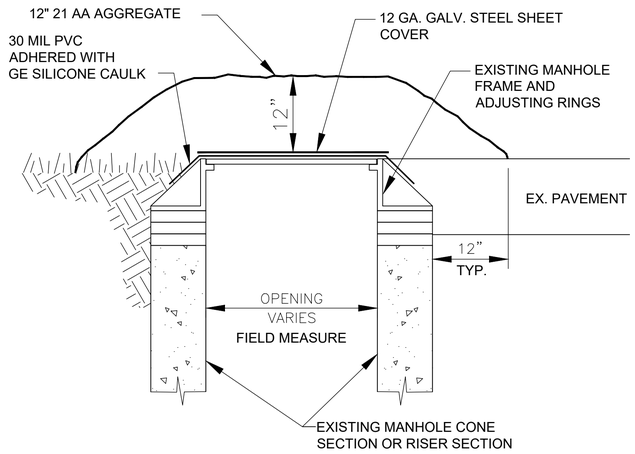
RACER TRUST
PLANTS 2, 3 & 6
LANSING, MICHIGAN

2019 PLANT 2 STORM SEWER MODIFICATIONS PLAN LAYOUT

ARCADIS Design & Consultancy for natural and built assets

FIGURE
5

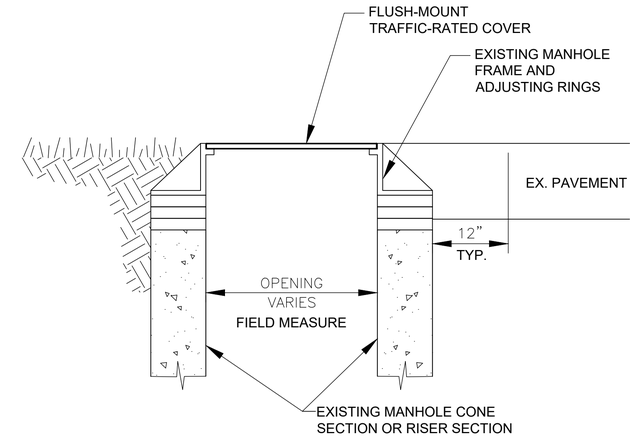
CITY: Novi DIV: ENV PIC: J. BARRETT PM: R. CHRISTENSEN TM: A. LORENZ TR: J. SALING PROJECT NUMBER: B00644479.2019.03500 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
G:\GIS\Project Files\RACER\Lansing\Docs\2019 Plants 2 and 3 Storm Sewer Workplan\Figure 5 - Proposed Plant 2 Storm Sewer Modifications 062019.mxd PLOTTED: 6/20/2019 2:04:19 PM BY: DStockard



PROPOSED

CATCH BASIN CAP DETAIL "A"

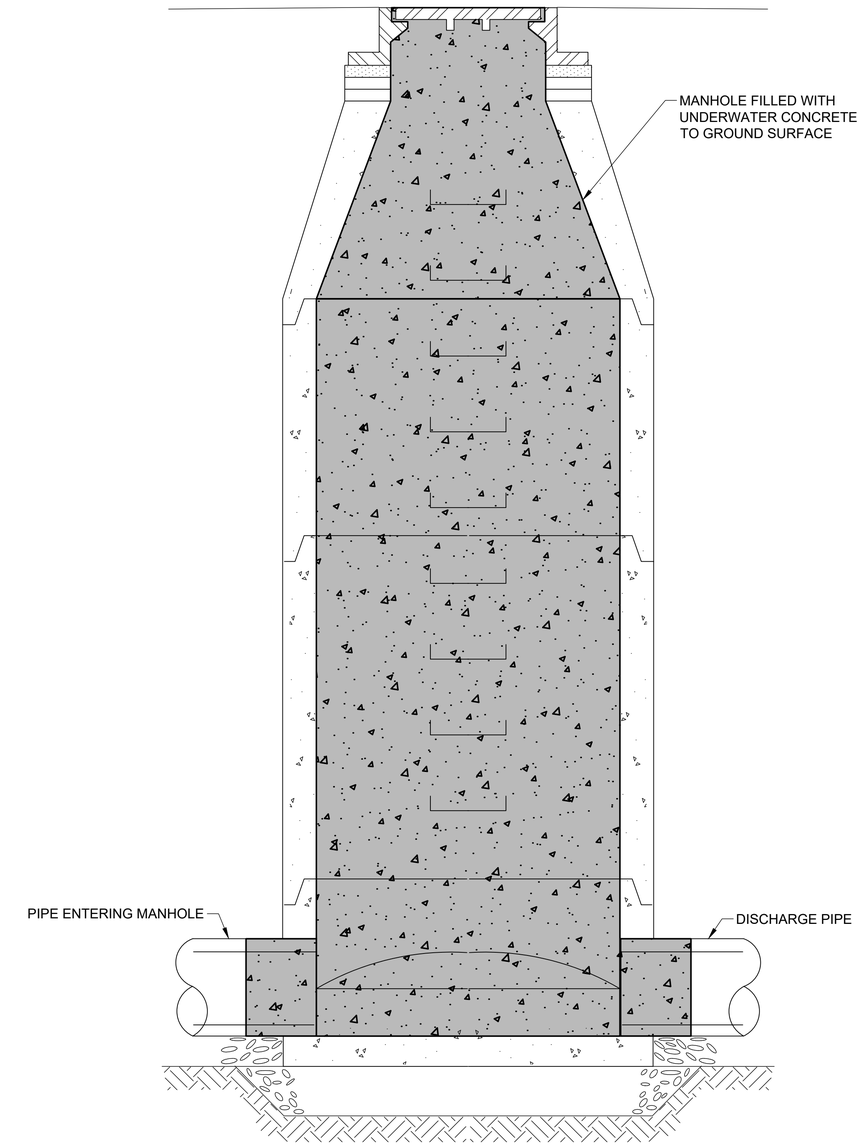
1" = 1'–0"



PROPOSED

CATCH BASIN CAP DETAIL "B"

1" = 1'–0"



PROPOSED

TYPICAL MANHOLE FILLED WITH UNDERWATER CONCRETE

1" = 1'–0"

CITY: DIV/GROUP: DB: A.SANCHEZ LD: PIC: PM: R.CHRISTENSEN TM: LYR:ON=*;OFF=*REF*
C:\BIM\OneDrive - ARCADIS\BIM 360 Docs\RACER TRUST\RACER LANSING PLANTS 2,3,&6\PFAS IM WORK PLAN\2019\B0064479.2019\01-DWG\RC-LP236-PFASIMWP-CATCH BASIN CAP DETAILS.dwg LAYOUT: 6 SAVED: 6/17/2019 2:50 PM ACADVER: 23.0S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ---- PLOTTED: 6/20/2019 9:57 AM BY: SANCHEZ, ADRIAN
PROJECTNAME: ----
IMAGES:
XREFS:
X-RC-LP236-PFASIMWP-BDR-C-LD

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING:

USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd

Professional Engineer's Name		
Professional Engineer's No.		
State: MI	Date Signed:	Project Mgr.: R.CHRISTENSEN
Designed by: R.CHRISTENSEN	Drawn by: A.SANCHEZ	Checked by:

ARCADIS Design & Consultancy for natural and built assets

ARCADIS OF MICHIGAN, LLC.

RACER TRUST • INDUSTRIAL LAND, LANSING, MICHIGAN

FILLING OF UTILITY MANHOLE WITH UNDERWATER CONCRETE AND CATCH BASIN CAP DETAILS

ARCADIS Project No.
B0064479.2019.03500

Date
JUNE 2019

ARCADIS
28550 CABOT DRIVE
SUITE 500
NOVI, MICHIGAN 48377
TEL. 248.994.2240

APPENDIX A

Plant 2 Storm Sewer Sampling Laboratory Results

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

e-Hardcopy 2.0
Automated Report

Technical Report for

Arcadis

Racer Lansing PFAS Delineation; Lansing, MI

B0064479.2018

SGS Job Number: FA61190

Sampling Date: 01/26/19

Report to:

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

Total number of pages in report: 51

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

Table of Contents

SGS North America Inc.

Sample Summary

Arcadis

Job No: FA61190

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

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
FA61190-1	01/26/19	10:15	DSMS	01/29/19	AQ	Ground Water	P3-MH-NW_012619
FA61190-2	01/26/19	11:00	DSMS	01/29/19	AQ	Ground Water	P2-MH-2_012619
FA61190-3	01/26/19	11:20	DSMS	01/29/19	AQ	Ground Water	P2-MH-37_012619
FA61190-4	01/26/19	11:35	DSMS	01/29/19	AQ	Ground Water	P2-MH-26_012619
FA61190-5	01/26/19	12:10	DSMS	01/29/19	AQ	Ground Water	P2-MH-25_012619
FA61190-6	01/26/19	13:35	DSMS	01/29/19	AQ	Ground Water	P2-MH-79_012619
FA61190-7	01/26/19	14:25	DSMS	01/29/19	AQ	Ground Water	P2-MH-9_012619
FA61190-8	01/26/19	14:45	DSMS	01/29/19	AQ	Ground Water	P2-MH-97_012619
FA61190-9	01/26/19	15:35	DSMS	01/29/19	AQ	Ground Water	P6-MH-13_012619
FA61190-10	01/26/19	15:50	DSMS	01/29/19	AQ	Ground Water	P6-MH-14_012619
FA61190-11	01/26/19	16:10	DSMS	01/29/19	AQ	Ground Water	P6-MH-11_012619
FA61190-12	01/26/19	00:00	DSMS	01/29/19	AQ	Ground Water	DUP-01

Summary of Hits

Job Number: FA61190
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 01/26/19

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
FA61190-1	**P3-MH-NW_012619**					
Perfluorobutanoic acid		0.0120	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.00156 J	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.00149 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.00139 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.00261 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00195 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.00133 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.0347	0.0040	0.0015	ug/l	EPA 537M BY ID
FA61190-2	**P2-MH-2_012619**					
Perfluorobutanoic acid		0.0142	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0151	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		0.0139	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0292	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00317 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00340 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.0131	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid		0.00237 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.0193	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.00217 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.161	0.0040	0.0015	ug/l	EPA 537M BY ID
FA61190-3	**P2-MH-37_012619**					
Perfluorobutanoic acid		0.00445 J	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.00133 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.00254 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00114 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.00242 J	0.0040	0.0015	ug/l	EPA 537M BY ID
FA61190-4	**P2-MH-26_012619**					
Perfluorobutanoic acid		0.0130	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0136	0.0038	0.0014	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0139	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0126	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0275	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00268 J	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00253 J	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00272 J	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid		0.00346 J	0.0038	0.00096	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA61190
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 01/26/19

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
Perfluorohexanesulfonic acid		0.0176	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.00241 J	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.104	0.0038	0.0014	ug/l	EPA 537M BY ID
FA61190-5	**P2-MH-25_012619**					
Perfluorobutanoic acid		0.0207	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0260	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0269	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0256	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0501	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00474	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00321 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00639	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid		0.00353 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.0320	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.00305 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.207	0.0040	0.0015	ug/l	EPA 537M BY ID
6:2 Fluorotelomer sulfonate		0.00326 J	0.0080	0.0020	ug/l	EPA 537M BY ID
FA61190-6	**P2-MH-79_012619**					
Perfluorobutanoic acid		0.0161	0.0083	0.0021	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0173	0.0042	0.0016	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0175	0.0042	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0166	0.0042	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0370	0.0042	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00392 J	0.0042	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00431	0.0042	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.0124	0.0042	0.0010	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid		0.00460	0.0042	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.0250	0.0042	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.00348 J	0.0042	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.147	0.0042	0.0016	ug/l	EPA 537M BY ID
FA61190-7	**P2-MH-9_012619**					
Perfluorobutanoic acid		0.0142	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0121	0.0038	0.0014	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.00952	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.00753	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0158	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00109 J	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00133 J	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00252 J	0.0038	0.00096	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA61190
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 01/26/19

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
Perfluorooctanesulfonic acid		0.0266	0.0038	0.0014	ug/l	EPA 537M BY ID
FA61190-8	**P2-MH-97_012619**					
Perfluorobutanoic acid		0.0275	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0394	0.0038	0.0014	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0413	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0412	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0847	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00977	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.0140	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00730	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid		0.00685	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.0596	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.00647	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.656	0.0077	0.0029	ug/l	EPA 537M BY ID
PFOSA		0.00208 J	0.0038	0.00096	ug/l	EPA 537M BY ID
6:2 Fluorotelomer sulfonate		0.00820	0.0077	0.0019	ug/l	EPA 537M BY ID
8:2 Fluorotelomer sulfonate		0.00437 J	0.0077	0.0019	ug/l	EPA 537M BY ID
FA61190-9	**P6-MH-13_012619**					
Perfluorobutanoic acid		0.0197	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0244	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0242	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0232	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0480	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00637	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00746	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00260 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid		0.00115 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00193 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.0253	0.0040	0.0015	ug/l	EPA 537M BY ID
PFOSA		0.00278 J	0.0040	0.0010	ug/l	EPA 537M BY ID
FA61190-10	**P6-MH-14_012619**					
Perfluorobutanoic acid		0.0246	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0420	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0432	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0308	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0649	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00842	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00726	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00215 J	0.0040	0.0010	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA61190
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 01/26/19

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
Perfluoropentanesulfonic acid		0.00119 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00197 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.00198 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.0225	0.0040	0.0015	ug/l	EPA 537M BY ID
FA61190-11	**P6-MH-11_012619**					
Perfluorobutanoic acid		0.0215	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0202	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0208	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0204	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0497	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00580	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00512	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00181 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00169 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.0353	0.0040	0.0015	ug/l	EPA 537M BY ID
PFOSA		0.00312 J	0.0040	0.0010	ug/l	EPA 537M BY ID
FA61190-12	**DUP-01**					
Perfluorobutanoic acid		0.0140	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0147	0.0038	0.0014	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0158	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0144	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0328	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00336 J	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00408	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.0114	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid		0.00461	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.0224	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.00240 J	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.135	0.0038	0.0014	ug/l	EPA 537M BY ID

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID:	P3-MH-NW_012619		
Lab Sample ID:	FA61190-1	**Date Sampled:**	01/26/19
Matrix:	AQ - Ground Water	**Date Received:**	01/29/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q27034.D	1	02/06/19 12:51	NG	02/05/19 09:30	OP73679	S2Q424
Run #2							

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0120	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.00156	0.0040	0.0015	ug/l	J
307-24-4	Perfluorohexanoic acid	0.00149	0.0040	0.0010	ug/l	J
375-85-9	Perfluoroheptanoic acid	0.00139	0.0040	0.0010	ug/l	J
335-67-1	Perfluorooctanoic acid	0.00261	0.0040	0.0010	ug/l	J
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00195	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	0.00133	0.0040	0.0010	ug/l	J
1763-23-1	Perfluorooctanesulfonic acid	0.0347	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	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC 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:	P3-MH-NW_012619		
Lab Sample ID:	FA61190-1	**Date Sampled:**	01/26/19
Matrix:	AQ - Ground Water	**Date Received:**	01/29/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

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

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	107%		30-140%
	13C5-PFPeA	107%		40-140%
	13C5-PFHxA	106%		50-150%
	13C4-PFHpA	108%		50-150%
	13C8-PFOA	118%		50-150%
	13C9-PFNA	111%		50-150%
	13C6-PFDA	104%		50-150%
	13C7-PFUnDA	94%		50-150%
	13C2-PFDoDA	85%		50-150%
	13C2-PFTeDA	82%		40-150%
	13C3-PFBS	102%		50-150%
	13C3-PFHxS	99%		50-150%
	13C8-PFOS	87%		50-150%
	13C8-FOSA	95%		30-140%
	d3-MeFOSAA	94%		50-150%
	13C2-4:2FTS	104%		50-150%
	13C2-6:2FTS	116%		50-150%
	13C2-8:2FTS	98%		50-150%

ND = Not detected MDL = Method Detection Limit
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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:	P2-MH-2_012619		
Lab Sample ID:	FA61190-2	**Date Sampled:**	01/26/19
Matrix:	AQ - Ground Water	**Date Received:**	01/29/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q27035.D	1	02/06/19 13:07	NG	02/05/19 09:30	OP73679	S2Q424
Run #2							

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0142	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0151	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0149	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0139	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0292	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00317	0.0040	0.0010	ug/l	J
335-76-2	Perfluorodecanoic acid	0.00340	0.0040	0.0010	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.0131	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	0.00237	0.0040	0.0010	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	0.0193	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.00217	0.0040	0.0010	ug/l	J
1763-23-1	Perfluorooctanesulfonic acid	0.161	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	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC 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:	P2-MH-2_012619		
Lab Sample ID:	FA61190-2	**Date Sampled:**	01/26/19
Matrix:	AQ - Ground Water	**Date Received:**	01/29/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

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

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	95%		30-140%
	13C5-PFPeA	96%		40-140%
	13C5-PFHxA	94%		50-150%
	13C4-PFHpA	96%		50-150%
	13C8-PFOA	106%		50-150%
	13C9-PFNA	108%		50-150%
	13C6-PFDA	111%		50-150%
	13C7-PFUnDA	116%		50-150%
	13C2-PFDoDA	103%		50-150%
	13C2-PFTeDA	92%		40-150%
	13C3-PFBS	92%		50-150%
	13C3-PFHxS	91%		50-150%
	13C8-PFOS	84%		50-150%
	13C8-FOSA	75%		30-140%
	d3-MeFOSAA	116%		50-150%
	13C2-4:2FTS	99%		50-150%
	13C2-6:2FTS	117%		50-150%
	13C2-8:2FTS	120%		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:	P2-MH-37_012619		
Lab Sample ID:	FA61190-3	**Date Sampled:**	01/26/19
Matrix:	AQ - Ground Water	**Date Received:**	01/29/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q27095.D	1	02/11/19 13:28	NAF	02/08/19 11:00	OP73738	S2Q426
Run #2							

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.00445	0.0080	0.0020	ug/l	J
2706-90-3	Perfluoropentanoic acid	ND	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.00133	0.0040	0.0010	ug/l	J
375-85-9	Perfluoroheptanoic acid	ND	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.00254	0.0040	0.0010	ug/l	J
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00114	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	0.00242	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	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC 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:	P2-MH-37_012619		
Lab Sample ID:	FA61190-3	**Date Sampled:**	01/26/19
Matrix:	AQ - Ground Water	**Date Received:**	01/29/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

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

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	79%		30-140%
	13C5-PFPeA	82%		40-140%
	13C5-PFHxA	84%		50-150%
	13C4-PFHpA	85%		50-150%
	13C8-PFOA	90%		50-150%
	13C9-PFNA	86%		50-150%
	13C6-PFDA	82%		50-150%
	13C7-PFUnDA	67%		50-150%
	13C2-PFDoDA	59%		50-150%
	13C2-PFTeDA	51%		40-150%
	13C3-PFBS	79%		50-150%
	13C3-PFHxS	73%		50-150%
	13C8-PFOS	61%		50-150%
	13C8-FOSA	71%		30-140%
	d3-MeFOSAA	81%		50-150%
	13C2-4:2FTS	84%		50-150%
	13C2-6:2FTS	94%		50-150%
	13C2-8:2FTS	78%		50-150%

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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:	P2-MH-26_012619		
Lab Sample ID:	FA61190-4	**Date Sampled:**	01/26/19
Matrix:	AQ - Ground Water	**Date Received:**	01/29/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q27037.D	1	02/06/19 13:38	NG	02/05/19 09:30	OP73679	S2Q424
Run #2							

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0130	0.0077	0.0019	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0136	0.0038	0.0014	ug/l	
307-24-4	Perfluorohexanoic acid	0.0139	0.0038	0.00096	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0126	0.0038	0.00096	ug/l	
335-67-1	Perfluorooctanoic acid	0.0275	0.0038	0.00096	ug/l	
375-95-1	Perfluorononanoic acid	0.00268	0.0038	0.00096	ug/l	J
335-76-2	Perfluorodecanoic acid	0.00253	0.0038	0.00096	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.0038	0.00096	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0038	0.0014	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0038	0.00096	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0038	0.00096	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00272	0.0038	0.00096	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	0.00346	0.0038	0.00096	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	0.0176	0.0038	0.00096	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.00241	0.0038	0.00096	ug/l	J
1763-23-1	Perfluorooctanesulfonic acid	0.104	0.0038	0.0014	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0038	0.00096	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0038	0.00096	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0038	0.00096	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.019	0.0038	ug/l	
2991-50-6	EtFOSAA	ND	0.019	0.0038	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	

ND = Not detected MDL = Method Detection Limit
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:	P2-MH-26_012619		
Lab Sample ID:	FA61190-4	**Date Sampled:**	01/26/19
Matrix:	AQ - Ground Water	**Date Received:**	01/29/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	98%		30-140%
	13C5-PFPeA	96%		40-140%
	13C5-PFHxA	94%		50-150%
	13C4-PFHpA	94%		50-150%
	13C8-PFOA	105%		50-150%
	13C9-PFNA	105%		50-150%
	13C6-PFDA	102%		50-150%
	13C7-PFUnDA	107%		50-150%
	13C2-PFDoDA	104%		50-150%
	13C2-PFTeDA	90%		40-150%
	13C3-PFBS	94%		50-150%
	13C3-PFHxS	91%		50-150%
	13C8-PFOS	81%		50-150%
	13C8-FOSA	57%		30-140%
	d3-MeFOSAA	113%		50-150%
	13C2-4:2FTS	101%		50-150%
	13C2-6:2FTS	120%		50-150%
	13C2-8:2FTS	119%		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:	P2-MH-25_012619		
Lab Sample ID:	FA61190-5	**Date Sampled:**	01/26/19
Matrix:	AQ - Ground Water	**Date Received:**	01/29/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q27038.D	1	02/06/19 13:54	NG	02/05/19 09:30	OP73679	S2Q424
Run #2							

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0207	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0260	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0269	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0256	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0501	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00474	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	0.00321	0.0040	0.0010	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00639	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	0.00353	0.0040	0.0010	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	0.0320	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.00305	0.0040	0.0010	ug/l	J
1763-23-1	Perfluorooctanesulfonic acid	0.207	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	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC 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	0.00326	0.0080	0.0020	ug/l	J

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:	P2-MH-25_012619		
Lab Sample ID:	FA61190-5	**Date Sampled:**	01/26/19
Matrix:	AQ - Ground Water	**Date Received:**	01/29/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

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

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	103%		30-140%
	13C5-PFPeA	103%		40-140%
	13C5-PFHxA	102%		50-150%
	13C4-PFHpA	101%		50-150%
	13C8-PFOA	115%		50-150%
	13C9-PFNA	116%		50-150%
	13C6-PFDA	116%		50-150%
	13C7-PFUnDA	109%		50-150%
	13C2-PFDoDA	97%		50-150%
	13C2-PFTeDA	86%		40-150%
	13C3-PFBS	98%		50-150%
	13C3-PFHxS	96%		50-150%
	13C8-PFOS	91%		50-150%
	13C8-FOSA	91%		30-140%
	d3-MeFOSAA	117%		50-150%
	13C2-4:2FTS	104%		50-150%
	13C2-6:2FTS	125%		50-150%
	13C2-8:2FTS	122%		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:	P2-MH-79_012619		
Lab Sample ID:	FA61190-6	**Date Sampled:**	01/26/19
Matrix:	AQ - Ground Water	**Date Received:**	01/29/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q27039.D	1	02/06/19 14:10	NG	02/05/19 09:30	OP73679	S2Q424
Run #2							

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0161	0.0083	0.0021	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0173	0.0042	0.0016	ug/l	
307-24-4	Perfluorohexanoic acid	0.0175	0.0042	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0166	0.0042	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0370	0.0042	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00392	0.0042	0.0010	ug/l	J
335-76-2	Perfluorodecanoic acid	0.00431	0.0042	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0042	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0042	0.0016	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0042	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0042	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.0124	0.0042	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	0.00460	0.0042	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.0250	0.0042	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.00348	0.0042	0.0010	ug/l	J
1763-23-1	Perfluorooctanesulfonic acid	0.147	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	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0042	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC 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
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:	P2-MH-79_012619		
Lab Sample ID:	FA61190-6	**Date Sampled:**	01/26/19
Matrix:	AQ - Ground Water	**Date Received:**	01/29/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

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

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	89%		30-140%
	13C5-PFPeA	89%		40-140%
	13C5-PFHxA	86%		50-150%
	13C4-PFHpA	86%		50-150%
	13C8-PFOA	96%		50-150%
	13C9-PFNA	95%		50-150%
	13C6-PFDA	97%		50-150%
	13C7-PFUnDA	103%		50-150%
	13C2-PFDoDA	98%		50-150%
	13C2-PFTeDA	82%		40-150%
	13C3-PFBS	87%		50-150%
	13C3-PFHxS	84%		50-150%
	13C8-PFOS	80%		50-150%
	13C8-FOSA	46%		30-140%
	d3-MeFOSAA	110%		50-150%
	13C2-4:2FTS	94%		50-150%
	13C2-6:2FTS	113%		50-150%
	13C2-8:2FTS	120%		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:	P2-MH-9_012619		
Lab Sample ID:	FA61190-7	**Date Sampled:**	01/26/19
Matrix:	AQ - Ground Water	**Date Received:**	01/29/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q27040.D	1	02/06/19 14:26	NG	02/05/19 09:30	OP73679	S2Q424
Run #2							

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0142	0.0077	0.0019	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0121	0.0038	0.0014	ug/l	
307-24-4	Perfluorohexanoic acid	0.00952	0.0038	0.00096	ug/l	
375-85-9	Perfluoroheptanoic acid	0.00753	0.0038	0.00096	ug/l	
335-67-1	Perfluorooctanoic acid	0.0158	0.0038	0.00096	ug/l	
375-95-1	Perfluorononanoic acid	0.00109	0.0038	0.00096	ug/l	J
335-76-2	Perfluorodecanoic acid	ND	0.0038	0.00096	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0038	0.00096	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0038	0.0014	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0038	0.00096	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0038	0.00096	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00133	0.0038	0.00096	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0038	0.00096	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00252	0.0038	0.00096	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0038	0.00096	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0266	0.0038	0.0014	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0038	0.00096	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0038	0.00096	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0038	0.00096	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.019	0.0038	ug/l	
2991-50-6	EtFOSAA	ND	0.019	0.0038	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	

ND = Not detected MDL = Method Detection Limit
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:	P2-MH-9_012619		
Lab Sample ID:	FA61190-7	**Date Sampled:**	01/26/19
Matrix:	AQ - Ground Water	**Date Received:**	01/29/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	109%		30-140%
	13C5-PFPeA	110%		40-140%
	13C5-PFHxA	111%		50-150%
	13C4-PFHpA	112%		50-150%
	13C8-PFOA	123%		50-150%
	13C9-PFNA	122%		50-150%
	13C6-PFDA	116%		50-150%
	13C7-PFUnDA	106%		50-150%
	13C2-PFDoDA	97%		50-150%
	13C2-PFTeDA	90%		40-150%
	13C3-PFBS	103%		50-150%
	13C3-PFHxS	105%		50-150%
	13C8-PFOS	99%		50-150%
	13C8-FOSA	104%		30-140%
	d3-MeFOSAA	99%		50-150%
	13C2-4:2FTS	108%		50-150%
	13C2-6:2FTS	122%		50-150%
	13C2-8:2FTS	105%		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:	P2-MH-97_012619		
Lab Sample ID:	FA61190-8	**Date Sampled:**	01/26/19
Matrix:	AQ - Ground Water	**Date Received:**	01/29/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q27041.D	1	02/06/19 14:41	NG	02/05/19 09:30	OP73679	S2Q424
Run #2	2Q27075.D	2	02/07/19 13:31	NAF	02/05/19 09:30	OP73679	S2Q425

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0275	0.0077	0.0019	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0394	0.0038	0.0014	ug/l	
307-24-4	Perfluorohexanoic acid	0.0413	0.0038	0.00096	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0412	0.0038	0.00096	ug/l	
335-67-1	Perfluorooctanoic acid	0.0847	0.0038	0.00096	ug/l	
375-95-1	Perfluorononanoic acid	0.00977	0.0038	0.00096	ug/l	
335-76-2	Perfluorodecanoic acid	0.0140	0.0038	0.00096	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0038	0.00096	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0038	0.0014	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0038	0.00096	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0038	0.00096	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00730	0.0038	0.00096	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	0.00685	0.0038	0.00096	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.0596	0.0038	0.00096	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.00647	0.0038	0.00096	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.656 [a]	0.0077	0.0029	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0038	0.00096	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0038	0.00096	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	0.00208	0.0038	0.00096	ug/l	J
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.019	0.0038	ug/l	
2991-50-6	EtFOSAA	ND	0.019	0.0038	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	0.00820	0.0077	0.0019	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:	P2-MH-97_012619		
Lab Sample ID:	FA61190-8	**Date Sampled:**	01/26/19
Matrix:	AQ - Ground Water	**Date Received:**	01/29/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	0.00437	0.0077	0.0019	ug/l	J

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	104%	97%	30-140%
	13C5-PFPeA	104%	97%	40-140%
	13C5-PFHxA	101%	95%	50-150%
	13C4-PFHpA	101%	95%	50-150%
	13C8-PFOA	114%	103%	50-150%
	13C9-PFNA	112%	102%	50-150%
	13C6-PFDA	115%	99%	50-150%
	13C7-PFUnDA	107%	93%	50-150%
	13C2-PFDoDA	100%	78%	50-150%
	13C2-PFTeDA	90%	62%	40-150%
	13C3-PFBS	99%	94%	50-150%
	13C3-PFHxS	96%	91%	50-150%
	13C8-PFOS	87%	85%	50-150%
	13C8-FOSA	69%	70%	30-140%
	d3-MeFOSAA	119%	103%	50-150%
	13C2-4:2FTS	104%	94%	50-150%
	13C2-6:2FTS	125%	107%	50-150%
	13C2-8:2FTS	125%	104%	50-150%

(a) Result is from Run# 2

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

Report of Analysis

Client Sample ID:	P6-MH-13_012619		
Lab Sample ID:	FA61190-9	**Date Sampled:**	01/26/19
Matrix:	AQ - Ground Water	**Date Received:**	01/29/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q27044.D	1	02/06/19 15:29	NG	02/05/19 09:30	OP73679	S2Q424
Run #2							

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0197	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0244	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0242	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0232	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0480	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00637	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	0.00746	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00260	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	0.00115	0.0040	0.0010	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	0.00193	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0253	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	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	0.00278	0.0040	0.0010	ug/l	J
PERFLUOROOCTANESULFONAMIDOACETIC 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:	P6-MH-13_012619		
Lab Sample ID:	FA61190-9	**Date Sampled:**	01/26/19
Matrix:	AQ - Ground Water	**Date Received:**	01/29/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

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

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	86%		30-140%
	13C5-PFPeA	88%		40-140%
	13C5-PFHxA	89%		50-150%
	13C4-PFHpA	93%		50-150%
	13C8-PFOA	106%		50-150%
	13C9-PFNA	113%		50-150%
	13C6-PFDA	114%		50-150%
	13C7-PFUnDA	108%		50-150%
	13C2-PFDoDA	96%		50-150%
	13C2-PFTeDA	93%		40-150%
	13C3-PFBS	88%		50-150%
	13C3-PFHxS	90%		50-150%
	13C8-PFOS	91%		50-150%
	13C8-FOSA	57%		30-140%
	d3-MeFOSAA	112%		50-150%
	13C2-4:2FTS	94%		50-150%
	13C2-6:2FTS	115%		50-150%
	13C2-8:2FTS	120%		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:	P6-MH-14_012619		
Lab Sample ID:	FA61190-10	**Date Sampled:**	01/26/19
Matrix:	AQ - Ground Water	**Date Received:**	01/29/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q27045.D	1	02/06/19 15:44	NG	02/05/19 09:30	OP73679	S2Q424
Run #2							

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0246	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0420	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0432	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0308	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0649	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00842	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	0.00726	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00215	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	0.00119	0.0040	0.0010	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	0.00197	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	0.00198	0.0040	0.0010	ug/l	J
1763-23-1	Perfluorooctanesulfonic acid	0.0225	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	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC 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:	P6-MH-14_012619		
Lab Sample ID:	FA61190-10	**Date Sampled:**	01/26/19
Matrix:	AQ - Ground Water	**Date Received:**	01/29/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

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

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	99%		30-140%
	13C5-PFPeA	104%		40-140%
	13C5-PFHxA	105%		50-150%
	13C4-PFHpA	108%		50-150%
	13C8-PFOA	123%		50-150%
	13C9-PFNA	124%		50-150%
	13C6-PFDA	123%		50-150%
	13C7-PFUnDA	116%		50-150%
	13C2-PFDoDA	108%		50-150%
	13C2-PFTeDA	101%		40-150%
	13C3-PFBS	99%		50-150%
	13C3-PFHxS	100%		50-150%
	13C8-PFOS	98%		50-150%
	13C8-FOSA	97%		30-140%
	d3-MeFOSAA	108%		50-150%
	13C2-4:2FTS	106%		50-150%
	13C2-6:2FTS	129%		50-150%
	13C2-8:2FTS	123%		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:	P6-MH-11_012619		
Lab Sample ID:	FA61190-11	**Date Sampled:**	01/26/19
Matrix:	AQ - Ground Water	**Date Received:**	01/29/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q27046.D	1	02/06/19 16:00	NG	02/05/19 09:30	OP73679	S2Q424
Run #2							

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0215	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0202	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0208	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0204	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0497	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00580	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	0.00512	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00181	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00169	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0353	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	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	0.00312	0.0040	0.0010	ug/l	J
PERFLUOROOCTANESULFONAMIDOACETIC 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:	P6-MH-11_012619		
Lab Sample ID:	FA61190-11	**Date Sampled:**	01/26/19
Matrix:	AQ - Ground Water	**Date Received:**	01/29/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

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

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	92%		30-140%
	13C5-PFPeA	95%		40-140%
	13C5-PFHxA	94%		50-150%
	13C4-PFHpA	96%		50-150%
	13C8-PFOA	110%		50-150%
	13C9-PFNA	114%		50-150%
	13C6-PFDA	111%		50-150%
	13C7-PFUnDA	102%		50-150%
	13C2-PFDoDA	91%		50-150%
	13C2-PFTeDA	86%		40-150%
	13C3-PFBS	91%		50-150%
	13C3-PFHxS	89%		50-150%
	13C8-PFOS	85%		50-150%
	13C8-FOSA	68%		30-140%
	d3-MeFOSAA	112%		50-150%
	13C2-4:2FTS	96%		50-150%
	13C2-6:2FTS	119%		50-150%
	13C2-8:2FTS	119%		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:	DUP-01		
Lab Sample ID:	FA61190-12	**Date Sampled:**	01/26/19
Matrix:	AQ - Ground Water	**Date Received:**	01/29/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q27047.D	1	02/06/19 16:16	NG	02/05/19 09:30	OP73679	S2Q424
Run #2							

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0140	0.0077	0.0019	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0147	0.0038	0.0014	ug/l	
307-24-4	Perfluorohexanoic acid	0.0158	0.0038	0.00096	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0144	0.0038	0.00096	ug/l	
335-67-1	Perfluorooctanoic acid	0.0328	0.0038	0.00096	ug/l	
375-95-1	Perfluorononanoic acid	0.00336	0.0038	0.00096	ug/l	J
335-76-2	Perfluorodecanoic acid	0.00408	0.0038	0.00096	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0038	0.00096	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0038	0.0014	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0038	0.00096	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0038	0.00096	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.0114	0.0038	0.00096	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	0.00461	0.0038	0.00096	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.0224	0.0038	0.00096	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.00240	0.0038	0.00096	ug/l	J
1763-23-1	Perfluorooctanesulfonic acid	0.135	0.0038	0.0014	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0038	0.00096	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0038	0.00096	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0038	0.00096	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.019	0.0038	ug/l	
2991-50-6	EtFOSAA	ND	0.019	0.0038	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	

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

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

Report of Analysis

Client Sample ID:	DUP-01		
Lab Sample ID:	FA61190-12	**Date Sampled:**	01/26/19
Matrix:	AQ - Ground Water	**Date Received:**	01/29/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	95%		30-140%
	13C5-PFPeA	95%		40-140%
	13C5-PFHxA	92%		50-150%
	13C4-PFHpA	92%		50-150%
	13C8-PFOA	103%		50-150%
	13C9-PFNA	103%		50-150%
	13C6-PFDA	103%		50-150%
	13C7-PFUnDA	103%		50-150%
	13C2-PFDoDA	104%		50-150%
	13C2-PFTeDA	93%		40-150%
	13C3-PFBS	92%		50-150%
	13C3-PFHxS	90%		50-150%
	13C8-PFOS	84%		50-150%
	13C8-FOSA	52%		30-140%
	d3-MeFOSAA	113%		50-150%
	13C2-4:2FTS	99%		50-150%
	13C2-6:2FTS	120%		50-150%
	13C2-8:2FTS	129%		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 North America Inc - Orlando

Chain of Custody

FA61190

SGS - ORLANDO JOB # : PAGE 1 OF 1

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

SGS - ORLANDO Quote # | SKIFF #

Client / Reporting Information

Company Name: Arcadis
Address: 28550 Cabot Dr Ste 500
City: Novi State: MI Zip: 48377
Project Contact: Christine.Gregg@arcadis.com Email: Christine Gregg
Phone #:
Sampler(s) Name(s) (Printed)
Sampler 1: D. Stockard Sampler 2: M. Samp

Project Information

Project Name: RACER Lansing
Street
City State
Project # B006447.91.2018
Fax #
Client Purchase Order #

Analytical Information

LCID 537005FL

Matrix Codes

DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL- Sludge
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid

SGS Orlando Sample #	Field ID / Point of Collection	COLLECTION DATE	TIME	SAMPLED BY:	MATRIX	CONTAINER INFORMATION TOTAL # OF BOTTLES	OTHER	NONE	HCl	NaOH	HNO3	H2SO4	NAOH+ZNAC	DI WATER	MEOH	LAB USE ONLY
1	P3-MH-UW-012619	1/26/19	1015	DS/MS	WW	2		X								
2	P2-MH-2-012619		1100													
3	P2-MH-37-012619		1120													
4	P2-MH-26-012619		1135													
5	P2-MH-25-012619		1210													
6	P2-MH-79-012619		1335													
7	P2-MH-9-012619		1425													
8	P2-MH-97-012619		1445													
9	P6-MH-13-012619		1535													
10	P6-MH-14-012619		1550													
11	P6-MH-11-012619		1610													
12	Dup-01	1/26/19														

Turnaround Time (Business days)

10 Day (Business) Approved By: / Date:
7 Day
5 Day
3 Day *RUSH*
2 Day *RUSH*
1 Day *RUSH*
Other
Rush T/A Data Available VIA Email or Lablink

Data Deliverable Information

- [ ] COMMERCIAL "A" (RESULTS ONLY)
- [x] COMMERCIAL "B" (RESULTS PLUS QC)
- [ ] REDT1 (EPA LEVEL 3)
- [ ] FULLT1 (EPA LEVEL 4)
- [ ] EDD'S

Comments / Remarks

CC. Daniel Stockard on results: daniel.stockard@arcadis.com

Sample Custody must be documented below each time samples change possession, including courier delivery.

	Relinquished by Sampler/Affiliation	Date Time:	Received By/Affiliation
1	Arcadis	1/28/19 1230	2
3			
4		11/29/19	930
5	Relinquished by/Affiliation	Date Time:	Received By/Affiliation 6
7	Relinquished By/Affiliation	Date Time:	Received By/Affiliation 8

Lab Use Only : Cooler Temperature (s) Celsius (corrected): 4.2

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

ORLD-SMT-0001-03-FORM-COC (4).xls Rev 031318

FA61190: Chain of Custody
Page 1 of 2

SGS Sample Receipt Summary

Job Number: FA61190 **Client:** ARCADIS **Project:** RACER LANSING

Date / Time Received: 1/29/2019 9:30:00 AM **Delivery Method:** FX **Airbill #'s:** 1002239914210003281100813939291555

Therm ID: IR 1; **Therm CF:** -0.2; **# of Coolers:** 1

Cooler Temps (Raw Measured) °C: Cooler 1: (4.4);

Cooler Temps (Corrected) °C: Cooler 1: (4.2);

Cooler Information	Y	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	N	N/A
1. Trip Blank present / cooler	☐	☐	☑
2. Trip Blank listed on COC	☐	☐	☑

	W	S	N/A
3. Type Of TB Received	☐	☐	☑

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

Misc. Information

Number of Encores: 25-Gram _____ 5-Gram _____ Number of 5035 Field Kits: _____ Number of Lab Filtered Metals: _____

Test Strip Lot #s: pH 0-3 230315 pH 10-12 219813A Other: (Specify) _____ _____

Residual Chlorine Test Strip Lot #: _____

Comments

SM001
Rev. Date 05/24/17

Technician: PETERH Date: 1/29/2019 9:30:00 AM Reviewer: _____ Date: _____

FA61190: Chain of Custody
Page 2 of 2

MS Semi-volatiles

QC Data Summaries

Includes the following where applicable:

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

Method Blank Summary

Job Number: FA61190
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73679-MB	2Q27033.D	1	02/06/19	NG	02/05/19	OP73679	S2Q424

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA61190-1, FA61190-2, FA61190-4, FA61190-5, FA61190-6, FA61190-7, FA61190-8, FA61190-9, FA61190-10, FA61190-11, FA61190-12

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.0077	0.0019	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0038	0.0014	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0038	0.00096	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0038	0.00096	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0038	0.00096	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0038	0.00096	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0038	0.00096	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0038	0.00096	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0038	0.0014	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0038	0.00096	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0038	0.00096	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0038	0.00096	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0038	0.00096	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0038	0.00096	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0038	0.00096	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0038	0.0014	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0038	0.00096	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0038	0.00096	ug/l	
754-91-6	PFOSA	ND	0.0038	0.00096	ug/l	
2355-31-9	MeFOSAA	ND	0.019	0.0038	ug/l	
2991-50-6	EtFOSAA	ND	0.019	0.0038	ug/l	
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	

CAS No.	ID Standard Recoveries		Limits
	13C4-PFBA	114%	30-140%
	13C5-PFPeA	110%	40-140%
	13C5-PFHxA	110%	50-150%
	13C4-PFHpA	110%	50-150%
	13C8-PFOA	116%	50-150%
	13C9-PFNA	114%	50-150%
	13C6-PFDA	112%	50-150%
	13C7-PFUnDA	98%	50-150%

Method Blank Summary

Job Number: FA61190
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73679-MB	2Q27033.D	1	02/06/19	NG	02/05/19	OP73679	S2Q424

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA61190-1, FA61190-2, FA61190-4, FA61190-5, FA61190-6, FA61190-7, FA61190-8, FA61190-9, FA61190-10, FA61190-11, FA61190-12

CAS No.	ID Standard Recoveries		Limits
	13C2-PFDoDA	87%	50-150%
	13C2-PFTeDA	85%	40-150%
	13C3-PFBS	106%	50-150%
	13C3-PFHxS	103%	50-150%
	13C8-PFOS	106%	50-150%
	13C8-FOSA	98%	30-140%
	d3-MeFOSAA	99%	50-150%
	13C2-4:2FTS	105%	50-150%
	13C2-6:2FTS	111%	50-150%
	13C2-8:2FTS	100%	50-150%

Method Blank Summary

Job Number: FA61190
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73738-MB	2Q27094.D	1	02/11/19	NAF	02/08/19	OP73738	S2Q426

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA61190-3

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.0077	0.0019	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0038	0.0014	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0038	0.00096	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0038	0.00096	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0038	0.00096	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0038	0.00096	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0038	0.00096	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0038	0.00096	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0038	0.0014	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0038	0.00096	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0038	0.00096	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0038	0.00096	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0038	0.00096	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0038	0.00096	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0038	0.00096	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0038	0.0014	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0038	0.00096	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0038	0.00096	ug/l	
754-91-6	PFOSA	ND	0.0038	0.00096	ug/l	
2355-31-9	MeFOSAA	ND	0.019	0.0038	ug/l	
2991-50-6	EtFOSAA	ND	0.019	0.0038	ug/l	
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	

CAS No.	ID Standard Recoveries		Limits
	13C4-PFBA	96%	30-140%
	13C5-PFPeA	95%	40-140%
	13C5-PFHxA	97%	50-150%
	13C4-PFHpA	96%	50-150%
	13C8-PFOA	98%	50-150%
	13C9-PFNA	95%	50-150%
	13C6-PFDA	92%	50-150%
	13C7-PFUnDA	83%	50-150%

Method Blank Summary

Job Number: FA61190
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73738-MB	2Q27094.D	1	02/11/19	NAF	02/08/19	OP73738	S2Q426

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA61190-3

CAS No.	ID Standard Recoveries		Limits
	13C2-PFDoDA	71%	50-150%
	13C2-PFTeDA	56%	40-150%
	13C3-PFBS	91%	50-150%
	13C3-PFHxS	89%	50-150%
	13C8-PFOS	78%	50-150%
	13C8-FOSA	87%	30-140%
	d3-MeFOSAA	94%	50-150%
	13C2-4:2FTS	90%	50-150%
	13C2-6:2FTS	89%	50-150%
	13C2-8:2FTS	84%	50-150%

Instrument Blank

Job Number: FA61190
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q424-IBLK	2Q27024.D	1	02/06/19	NG	n/a	n/a	S2Q424

The QC reported here applies to the following samples: **Method:** EPA 537M QSM5.1 B-15

FA61190-1, FA61190-2, FA61190-4, FA61190-5, FA61190-6, FA61190-7, FA61190-8, FA61190-9, FA61190-10, FA61190-11, FA61190-12

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

CAS No.	ID Standard Recoveries		Limits
	13C4-PFBA	108%	50-150%
	13C5-PFPeA	108%	50-150%
	13C5-PFHxA	106%	50-150%
	13C4-PFHpA	107%	50-150%
	13C8-PFOA	108%	50-150%
	13C9-PFNA	109%	50-150%
	13C6-PFDA	110%	50-150%
	13C7-PFUnDA	110%	50-150%

Instrument Blank

Job Number: FA61190
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q424-IBLK	2Q27024.D	1	02/06/19	NG	n/a	n/a	S2Q424

The QC reported here applies to the following samples: **Method:** EPA 537M QSM5.1 B-15

FA61190-1, FA61190-2, FA61190-4, FA61190-5, FA61190-6, FA61190-7, FA61190-8, FA61190-9, FA61190-10, FA61190-11, FA61190-12

CAS No.	ID Standard Recoveries		Limits
	13C2-PFDoDA	105%	50-150%
	13C2-PFTeDA	102%	50-150%
	13C3-PFBS	105%	50-150%
	13C3-PFHxS	107%	50-150%
	13C8-PFOS	103%	50-150%
	13C8-FOSA	112%	50-150%
	d3-MeFOSAA	107%	50-150%
	13C2-4:2FTS	99%	50-150%
	13C2-6:2FTS	98%	50-150%
	13C2-8:2FTS	96%	50-150%

Instrument Blank

Job Number: FA61190
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q425-IBLK	2Q27070.D	1	02/07/19	NAF	n/a	n/a	S2Q425

The QC reported here applies to the following samples: **Method:** EPA 537M QSM5.1 B-15

FA61190-8

CAS No.	Compound	Result	RL	MDL	Units	Q
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	

CAS No.	ID Standard Recoveries		Limits
	13C4-PFBA	97%	50-150%
	13C5-PFPeA	97%	50-150%
	13C5-PFHxA	99%	50-150%
	13C4-PFHpA	99%	50-150%
	13C8-PFOA	101%	50-150%
	13C9-PFNA	100%	50-150%
	13C6-PFDA	102%	50-150%
	13C7-PFUnDA	100%	50-150%
	13C2-PFDoDA	98%	50-150%
	13C2-PFTeDA	88%	50-150%
	13C3-PFBS	96%	50-150%
	13C3-PFHxS	97%	50-150%
	13C8-PFOS	97%	50-150%
	13C8-FOSA	104%	50-150%
	d3-MeFOSAA	100%	50-150%
	13C2-4:2FTS	93%	50-150%
	13C2-6:2FTS	96%	50-150%
	13C2-8:2FTS	91%	50-150%

Instrument Blank

Job Number: FA61190
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q426-IBLK	2Q27089.D	1	02/11/19	NAF	n/a	n/a	S2Q426

The QC reported here applies to the following samples: **Method:** EPA 537M QSM5.1 B-15

FA61190-3

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

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

Instrument Blank

Job Number: FA61190
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q426-IBLK	2Q27089.D	1	02/11/19	NAF	n/a	n/a	S2Q426

The QC reported here applies to the following samples: **Method:** EPA 537M QSM5.1 B-15

FA61190-3

CAS No.	ID Standard Recoveries		Limits
	13C2-PFDoDA	91%	50-150%
	13C2-PFTeDA	77%	50-150%
	13C3-PFBS	93%	50-150%
	13C3-PFHxS	93%	50-150%
	13C8-PFOS	92%	50-150%
	13C8-FOSA	96%	50-150%
	d3-MeFOSAA	99%	50-150%
	13C2-4:2FTS	91%	50-150%
	13C2-6:2FTS	87%	50-150%
	13C2-8:2FTS	85%	50-150%

Blank Spike Summary

Job Number: FA61190
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73679-BS	2Q27032.D	1	02/06/19	NG	02/05/19	OP73679	S2Q424

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA61190-1, FA61190-2, FA61190-4, FA61190-5, FA61190-6, FA61190-7, FA61190-8, FA61190-9, FA61190-10, FA61190-11, FA61190-12

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
375-22-4	Perfluorobutanoic acid	0.0769	0.0744	97	70-130
2706-90-3	Perfluoropentanoic acid	0.0769	0.0771	100	70-130
307-24-4	Perfluorohexanoic acid	0.0769	0.0734	95	70-130
375-85-9	Perfluoroheptanoic acid	0.0769	0.0729	95	71-130
335-67-1	Perfluorooctanoic acid	0.0769	0.0742	96	74-130
375-95-1	Perfluorononanoic acid	0.0769	0.0749	97	76-130
335-76-2	Perfluorodecanoic acid	0.0769	0.0743	97	70-130
2058-94-8	Perfluoroundecanoic acid	0.0769	0.0746	97	70-130
307-55-1	Perfluorododecanoic acid	0.0769	0.0757	98	70-130
72629-94-8	Perfluorotridecanoic acid	0.0769	0.0745	97	70-139
376-06-7	Perfluorotetradecanoic acid	0.0769	0.0729	95	70-130
375-73-5	Perfluorobutanesulfonic acid	0.0769	0.0766	100	73-130
2706-91-4	Perfluoropentanesulfonic acid	0.0769	0.0856	111	70-130
355-46-4	Perfluorohexanesulfonic acid	0.0769	0.0752	98	74-130
375-92-8	Perfluoroheptanesulfonic acid	0.0769	0.0864	112	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.0769	0.0745	97	70-130
68259-12-1	Perfluorononanesulfonic acid	0.0769	0.0684	89	70-130
335-77-3	Perfluorodecanesulfonic acid	0.0769	0.0647	84	70-130
754-91-6	PFOSA	0.0769	0.0744	97	70-131
2355-31-9	MeFOSAA	0.0769	0.0768	100	70-130
2991-50-6	EtFOSAA	0.0769	0.0715	93	70-130
757124-72-4	4:2 Fluorotelomer sulfonate	0.0769	0.0786	102	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	0.0769	0.0793	103	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	0.0769	0.0769	100	70-130

CAS No.	ID Standard Recoveries	BSP	Limits
	13C4-PFBA	114%	30-140%
	13C5-PFPeA	112%	40-140%
	13C5-PFHxA	110%	50-150%
	13C4-PFHpA	110%	50-150%
	13C8-PFOA	114%	50-150%
	13C9-PFNA	112%	50-150%
	13C6-PFDA	111%	50-150%
	13C7-PFUnDA	108%	50-150%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA61190
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73679-BS	2Q27032.D	1	02/06/19	NG	02/05/19	OP73679	S2Q424

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA61190-1, FA61190-2, FA61190-4, FA61190-5, FA61190-6, FA61190-7, FA61190-8, FA61190-9, FA61190-10, FA61190-11, FA61190-12

CAS No.	ID Standard Recoveries	BSP	Limits
	13C2-PFDoDA	103%	50-150%
	13C2-PFTeDA	99%	40-150%
	13C3-PFBS	106%	50-150%
	13C3-PFHxS	95%	50-150%
	13C8-PFOS	107%	50-150%
	13C8-FOSA	109%	30-140%
	d3-MeFOSAA	108%	50-150%
	13C2-4:2FTS	113%	50-150%
	13C2-6:2FTS	115%	50-150%
	13C2-8:2FTS	108%	50-150%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA61190
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73738-BS [a]	2Q27093.D	1	02/11/19	NAF	02/08/19	OP73738	S2Q426

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA61190-3

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
375-22-4	Perfluorobutanoic acid	0.0769	0.0787	102	70-130
2706-90-3	Perfluoropentanoic acid	0.0769	0.0784	102	70-130
307-24-4	Perfluorohexanoic acid	0.0769	0.0785	102	70-130
375-85-9	Perfluoroheptanoic acid	0.0769	0.0734	95	71-130
335-67-1	Perfluorooctanoic acid	0.0769	0.0778	101	74-130
375-95-1	Perfluorononanoic acid	0.0769	0.0751	98	76-130
335-76-2	Perfluorodecanoic acid	0.0769	0.0770	100	70-130
2058-94-8	Perfluoroundecanoic acid	0.0769	0.0767	100	70-130
307-55-1	Perfluorododecanoic acid	0.0769	0.0769	100	70-130
72629-94-8	Perfluorotridecanoic acid	0.0769	0.0709	92	70-139
376-06-7	Perfluorotetradecanoic acid	0.0769	0.0778	101	70-130
375-73-5	Perfluorobutanesulfonic acid	0.0769	0.0787	102	73-130
2706-91-4	Perfluoropentanesulfonic acid	0.0769	0.0875	114	70-130
355-46-4	Perfluorohexanesulfonic acid	0.0769	0.0769	100	74-130
375-92-8	Perfluoroheptanesulfonic acid	0.0769	0.0749	97	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.0769	0.0749	97	70-130
68259-12-1	Perfluorononanesulfonic acid	0.0769	0.0616	80	70-130
335-77-3	Perfluorodecanesulfonic acid	0.0769	0.0576	75	70-130
754-91-6	PFOSA	0.0769	0.0770	100	70-131
2355-31-9	MeFOSAA	0.0769	0.0764	99	70-130
2991-50-6	EtFOSAA	0.0769	0.0695	90	70-130
757124-72-4	4:2 Fluorotelomer sulfonate	0.0769	0.0799	104	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	0.0769	0.0833	108	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	0.0769	0.0777	101	70-130

CAS No.	ID Standard Recoveries	BSP	Limits
	13C4-PFBA	88%	30-140%
	13C5-PFPeA	90%	40-140%
	13C5-PFHxA	91%	50-150%
	13C4-PFHpA	91%	50-150%
	13C8-PFOA	90%	50-150%
	13C9-PFNA	87%	50-150%
	13C6-PFDA	80%	50-150%
	13C7-PFUnDA	69%	50-150%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA61190
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73738-BS [a]	2Q27093.D	1	02/11/19	NAF	02/08/19	OP73738	S2Q426

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA61190-3

CAS No.	ID Standard Recoveries	BSP	Limits
	13C2-PFDoDA	61%	50-150%
	13C2-PFTeDA	54%	40-150%
	13C3-PFBS	87%	50-150%
	13C3-PFHxS	83%	50-150%
	13C8-PFOS	67%	50-150%
	13C8-FOSA	76%	30-140%
	d3-MeFOSAA	78%	50-150%
	13C2-4:2FTS	89%	50-150%
	13C2-6:2FTS	87%	50-150%
	13C2-8:2FTS	79%	50-150%

(a) Insufficient sample for MS/MSD.

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA61190
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73679-MS	2Q27052.D	1	02/06/19	NG	02/05/19	OP73679	S2Q424
OP73679-MSD	2Q27053.D	1	02/06/19	NG	02/05/19	OP73679	S2Q424
FA61222-4	2Q27051.D	1	02/06/19	NG	02/05/19	OP73679	S2Q424

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA61190-1, FA61190-2, FA61190-4, FA61190-5, FA61190-6, FA61190-7, FA61190-8, FA61190-9, FA61190-10, FA61190-11, FA61190-12

CAS No.	Compound	FA61222-4 ug/l	Q	Spike ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
375-22-4	Perfluorobutanoic acid	ND		0.0769	0.0751	98	0.0769	0.0710	92	6	70-130/30
2706-90-3	Perfluoropentanoic acid	ND		0.0769	0.0754	98	0.0769	0.0718	93	5	70-130/30
307-24-4	Perfluorohexanoic acid	0.00291	J	0.0769	0.0753	94	0.0769	0.0711	89	6	70-130/30
375-85-9	Perfluoroheptanoic acid	0.00191	J	0.0769	0.0730	92	0.0769	0.0693	88	5	71-130/30
335-67-1	Perfluorooctanoic acid	0.0114		0.0769	0.0839	94	0.0769	0.0789	88	6	74-130/30
375-95-1	Perfluorononanoic acid	ND		0.0769	0.0720	94	0.0769	0.0678	88	6	76-130/30
335-76-2	Perfluorodecanoic acid	ND		0.0769	0.0731	95	0.0769	0.0691	90	6	70-130/30
2058-94-8	Perfluoroundecanoic acid	ND		0.0769	0.0746	97	0.0769	0.0692	90	8	70-130/30
307-55-1	Perfluorododecanoic acid	ND		0.0769	0.0754	98	0.0769	0.0700	91	7	70-130/30
72629-94-8	Perfluorotridecanoic acid	ND		0.0769	0.0766	100	0.0769	0.0735	96	4	70-139/30
376-06-7	Perfluorotetradecanoic acid	ND		0.0769	0.0722	94	0.0769	0.0666	87	8	70-130/30
375-73-5	Perfluorobutanesulfonic acid	0.0140		0.0769	0.0875	96	0.0769	0.0850	92	3	73-130/30
2706-91-4	Perfluoropentanesulfonic acid	0.00307	J	0.0769	0.0890	112	0.0769	0.0854	107	4	70-130/30
355-46-4	Perfluorohexanesulfonic acid	0.0539		0.0769	0.122	89	0.0769	0.114	78	7	74-130/30
375-92-8	Perfluoroheptanesulfonic acid	ND		0.0769	0.0767	100	0.0769	0.0704	92	9	74-130/30
1763-23-1	Perfluorooctanesulfonic acid	0.0480		0.0769	0.112	83	0.0769	0.109	79	3	70-130/30
68259-12-1	Perfluorononanesulfonic acid	ND		0.0769	0.0630	82	0.0769	0.0581	76	8	70-130/30
335-77-3	Perfluorodecanesulfonic acid	ND		0.0769	0.0606	79	0.0769	0.0530	69*	13	70-130/30
754-91-6	PFOSA	ND		0.0769	0.0747	97	0.0769	0.0692	90	8	70-131/30
2355-31-9	MeFOSAA	ND		0.0769	0.0741	96	0.0769	0.0690	90	7	70-130/30
2991-50-6	EtFOSAA	ND		0.0769	0.0701	91	0.0769	0.0645	84	8	70-130/30
757124-72-4	4:2 Fluorotelomer sulfonate	ND		0.0769	0.0781	102	0.0769	0.0746	97	5	70-130/30
27619-97-2	6:2 Fluorotelomer sulfonate	ND		0.0769	0.0804	105	0.0769	0.0757	98	6	70-133/30
39108-34-4	8:2 Fluorotelomer sulfonate	ND		0.0769	0.0753	98	0.0769	0.0704	92	7	70-130/30

CAS No.	ID Standard Recoveries	MS	MSD	FA61222-4	Limits
	13C4-PFBA	97%	96%	97%	30-140%
	13C5-PFPeA	104%	101%	103%	40-140%
	13C5-PFHxA	107%	104%	108%	50-150%
	13C4-PFHpA	111%	107%	112%	50-150%
	13C8-PFOA	122%	117%	125%	50-150%
	13C9-PFNA	119%	112%	118%	50-150%
	13C6-PFDA	117%	107%	114%	50-150%
	13C7-PFUnDA	108%	100%	107%	50-150%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA61190
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73679-MS	2Q27052.D	1	02/06/19	NG	02/05/19	OP73679	S2Q424
OP73679-MSD	2Q27053.D	1	02/06/19	NG	02/05/19	OP73679	S2Q424
FA61222-4	2Q27051.D	1	02/06/19	NG	02/05/19	OP73679	S2Q424

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA61190-1, FA61190-2, FA61190-4, FA61190-5, FA61190-6, FA61190-7, FA61190-8, FA61190-9, FA61190-10, FA61190-11, FA61190-12

CAS No.	ID Standard Recoveries	MS	MSD	FA61222-4	Limits
	13C2-PFDoDA	97%	88%	94%	50-150%
	13C2-PFTeDA	89%	79%	92%	40-150%
	13C3-PFBS	98%	94%	98%	50-150%
	13C3-PFHxS	104%	98%	102%	50-150%
	13C8-PFOS	102%	93%	98%	50-150%
	13C8-FOSA	84%	88%	102%	30-140%
	d3-MeFOSAA	97%	89%	95%	50-150%
	13C2-4:2FTS	108%	104%	102%	50-150%
	13C2-6:2FTS	122%	116%	120%	50-150%
	13C2-8:2FTS	114%	105%	107%	50-150%

* = Outside of Control Limits.

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: FA62551

Sampling Date: 03/19/19

Report to:

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Total number of pages in report: 33

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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SGS North America Inc.

Sample Summary

Arcadis

Job No: FA62551

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

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
FA62551-1	03/19/19	14:15	AV	03/21/19	AQ	Ground Water	P3-MH-NW-CLA_031919
FA62551-2	03/19/19	14:20	AV	03/21/19	AQ	Ground Water	P3-MH-NW-W_031919
FA62551-3	03/19/19	14:27	AV	03/21/19	AQ	Ground Water	P3-MH-NW-E_031919
FA62551-4	03/19/19	14:40	AV	03/21/19	AQ	Ground Water	P3-MH-NW-OUT_031919

Summary of Hits

Job Number: FA62551
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 03/19/19

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
FA62551-1	**P3-MH-NW-CLA_031919**					
Perfluorobutanoic acid		0.0106	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.00144 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00123 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.00990	0.0040	0.0015	ug/l	EPA 537M BY ID
FA62551-2	**P3-MH-NW-W_031919**					
Perfluorobutanoic acid		0.0126	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.00359 J	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.00446	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.00317 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.00723	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00200 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00565	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.00322 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.188	0.0040	0.0015	ug/l	EPA 537M BY ID
FA62551-3	**P3-MH-NW-E_031919**					
Perfluorobutanoic acid		0.00894	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.00266 J	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.00302 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.00216 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.00482	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00178 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00291 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.0626	0.0040	0.0015	ug/l	EPA 537M BY ID
FA62551-4	**P3-MH-NW-OUT_031919**					
Perfluorobutanoic acid		0.00939	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.00289 J	0.0038	0.0014	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.00318 J	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.00260 J	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.00588	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00105 J	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00393	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.00213 J	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.111	0.0038	0.0014	ug/l	EPA 537M BY ID

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID:	P3-MH-NW-CLA_031919		
Lab Sample ID:	FA62551-1	**Date Sampled:**	03/19/19
Matrix:	AQ - Ground Water	**Date Received:**	03/21/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q28007.D	1	03/23/19 03:37	NAF	03/22/19 07:00	OP74262	S2Q446
Run #2							

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0106	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.00144	0.0040	0.0010	ug/l	J
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid [a]	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid [a]	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00123	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	0.00990	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	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC 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:	P3-MH-NW-CLA_031919		
Lab Sample ID:	FA62551-1	**Date Sampled:**	03/19/19
Matrix:	AQ - Ground Water	**Date Received:**	03/21/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

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

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	114%		30-140%
	13C5-PFPeA	113%		40-140%
	13C5-PFHxA	114%		50-150%
	13C4-PFHpA	113%		50-150%
	13C8-PFOA	133%		50-150%
	13C9-PFNA	110%		50-150%
	13C6-PFDA	96%		50-150%
	13C7-PFUnDA	127%		50-150%
	13C2-PFDoDA	101%		50-150%
	13C2-PFTeDA	26% [b]		40-150%
	13C3-PFBS	104%		50-150%
	13C3-PFHxS	100%		50-150%
	13C8-PFOS	85%		50-150%
	13C8-FOSA	54%		30-140%
	d3-MeFOSAA	80%		50-150%
	13C2-4:2FTS	113%		50-150%
	13C2-6:2FTS	140%		50-150%
	13C2-8:2FTS	90%		50-150%

(a) Associated ID Standard outside control limits due to matrix interference. Insufficient sample for re-extraction.
(b) Outside control limits. Insufficient sample for re-extraction.

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:	P3-MH-NW-W_031919		
Lab Sample ID:	FA62551-2	**Date Sampled:**	03/19/19
Matrix:	AQ - Ground Water	**Date Received:**	03/21/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q28009.D	1	03/23/19 04:08	NAF	03/22/19 07:00	OP74262	S2Q446
Run #2							

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0126	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.00359	0.0040	0.0015	ug/l	J
307-24-4	Perfluorohexanoic acid	0.00446	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.00317	0.0040	0.0010	ug/l	J
335-67-1	Perfluorooctanoic acid	0.00723	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00200	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00565	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.00322	0.0040	0.0010	ug/l	J
1763-23-1	Perfluorooctanesulfonic acid	0.188	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	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC 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:	P3-MH-NW-W_031919		
Lab Sample ID:	FA62551-2	**Date Sampled:**	03/19/19
Matrix:	AQ - Ground Water	**Date Received:**	03/21/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

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

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	109%		30-140%
	13C5-PFPeA	107%		40-140%
	13C5-PFHxA	108%		50-150%
	13C4-PFHpA	106%		50-150%
	13C8-PFOA	123%		50-150%
	13C9-PFNA	110%		50-150%
	13C6-PFDA	102%		50-150%
	13C7-PFUnDA	114%		50-150%
	13C2-PFDoDA	97%		50-150%
	13C2-PFTeDA	80%		40-150%
	13C3-PFBS	97%		50-150%
	13C3-PFHxS	93%		50-150%
	13C8-PFOS	87%		50-150%
	13C8-FOSA	104%		30-140%
	d3-MeFOSAA	84%		50-150%
	13C2-4:2FTS	111%		50-150%
	13C2-6:2FTS	124%		50-150%
	13C2-8:2FTS	103%		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:	P3-MH-NW-E_031919		
Lab Sample ID:	FA62551-3	**Date Sampled:**	03/19/19
Matrix:	AQ - Ground Water	**Date Received:**	03/21/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q28010.D	1	03/23/19 04:24	NAF	03/22/19 07:00	OP74262	S2Q446
Run #2							

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.00894	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.00266	0.0040	0.0015	ug/l	J
307-24-4	Perfluorohexanoic acid	0.00302	0.0040	0.0010	ug/l	J
375-85-9	Perfluoroheptanoic acid	0.00216	0.0040	0.0010	ug/l	J
335-67-1	Perfluorooctanoic acid	0.00482	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00178	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00291	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0626	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	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC 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:	P3-MH-NW-E_031919		
Lab Sample ID:	FA62551-3	**Date Sampled:**	03/19/19
Matrix:	AQ - Ground Water	**Date Received:**	03/21/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

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

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	111%		30-140%
	13C5-PFPeA	109%		40-140%
	13C5-PFHxA	111%		50-150%
	13C4-PFHpA	109%		50-150%
	13C8-PFOA	129%		50-150%
	13C9-PFNA	114%		50-150%
	13C6-PFDA	102%		50-150%
	13C7-PFUnDA	131%		50-150%
	13C2-PFDoDA	126%		50-150%
	13C2-PFTeDA	82%		40-150%
	13C3-PFBS	100%		50-150%
	13C3-PFHxS	97%		50-150%
	13C8-PFOS	87%		50-150%
	13C8-FOSA	104%		30-140%
	d3-MeFOSAA	85%		50-150%
	13C2-4:2FTS	112%		50-150%
	13C2-6:2FTS	132%		50-150%
	13C2-8:2FTS	98%		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:	P3-MH-NW-OUT_031919		
Lab Sample ID:	FA62551-4	**Date Sampled:**	03/19/19
Matrix:	AQ - Ground Water	**Date Received:**	03/21/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q28252.D	1	03/27/19 15:00	NG	03/25/19 13:30	OP74287	S2Q449
Run #2	2Q28012.D	1.32	03/23/19 04:56	NAF	03/22/19 07:00	OP74262	S2Q446

	Initial Volume	Final Volume
Run #1	260 ml	1.0 ml
Run #2	250 ml	1.0 ml

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.00939	0.0077	0.0019	ug/l	
2706-90-3	Perfluoropentanoic acid	0.00289	0.0038	0.0014	ug/l	J
307-24-4	Perfluorohexanoic acid	0.00318	0.0038	0.00096	ug/l	J
375-85-9	Perfluoroheptanoic acid	0.00260	0.0038	0.00096	ug/l	J
335-67-1	Perfluorooctanoic acid	0.00588	0.0038	0.00096	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0038	0.00096	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0038	0.00096	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0038	0.00096	ug/l	
307-55-1	Perfluorododecanoic acid	ND [a]	0.0053	0.0020	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND [a]	0.0053	0.0013	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND [a]	0.0053	0.0013	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00105	0.0038	0.00096	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0038	0.00096	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00393	0.0038	0.00096	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.00213	0.0038	0.00096	ug/l	J
1763-23-1	Perfluorooctanesulfonic acid	0.111	0.0038	0.0014	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0038	0.00096	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND [a]	0.0053	0.0013	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0038	0.00096	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.019	0.0038	ug/l	
2991-50-6	EtFOSAA	ND	0.019	0.0038	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	

ND = Not detected MDL = Method Detection Limit
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:	P3-MH-NW-OUT_031919		
Lab Sample ID:	FA62551-4	**Date Sampled:**	03/19/19
Matrix:	AQ - Ground Water	**Date Received:**	03/21/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	96%	150%	30-140%
	13C5-PFPeA	93%	148%	40-140%
	13C5-PFHxA	92%	148%	50-150%
	13C4-PFHpA	92%	144%	50-150%
	13C8-PFOA	102%	163%	50-150%
	13C9-PFNA	92%	145%	50-150%
	13C6-PFDA	94%	126%	50-150%
	13C7-PFUnDA	80%	153%	50-150%
	13C2-PFDoDA	45%	135%	50-150%
	13C2-PFTeDA	31%	101%	40-150%
	13C3-PFBS	92%	132%	50-150%
	13C3-PFHxS	88%	128%	50-150%
	13C8-PFOS	74%	113%	50-150%
	13C8-FOSA	84%	131%	30-140%
	d3-MeFOSAA	65%	106%	50-150%
	13C2-4:2FTS	94%	149%	50-150%
	13C2-6:2FTS	105%	168%	50-150%
	13C2-8:2FTS	107%	122%	50-150%

(a) Result is from Run# 2

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

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

SGS North America Inc - Orlando

Chain of Custody

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

FA62551

SGS - ORLANDO JOB # : PAGE 1 OF 1

SGS - ORLANDO Quote # | SKIFF #

Client / Reporting Information

Company Name: Arcadis
Address: 28550 Cabot Dr. Suite 500
City: Nov. State: MI Zip: 48377
Project Contact: Alex Villhauer Email: Alex.Villhauer@arcadis.com
Phone #: 616-780-3277
Sampler(s) Name(s) (Printed)
Sampler 1: Alex Villhauer Sampler 2:

Project Information

Project Name: RACER Lansing
Street
City Lansing State MI
Project # B006447 9.2019.03100
Fax #
Client Purchase Order #

Analytical Information

M1 24 PFAs - 537 mod

Matrix Codes

DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL- Sludge
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid

SGS Orlando Sample #	Field ID / Point of Collection	COLLECTION DATE	TIME	SAMPLED BY:	MATRIX	TOTAL # OF BOTTLES	CONTAINER INFORMATION: OTHER	NONE	HCl	NaOH	HNO3	H2SO4	NaOH+ZnAc	DI WATER	MeOH	LAB USE ONLY
1	P3-MH-NW-CLA_031919	3/19/19	14:15	AV	SW	2		2								
2	P3-MH-NW-W_031919	3/19/19	14:20	AV	SW	2		2								
3	P3-MH-NW-E_031919	3/19/19	14:27	AV	SW	2		2								
4	P3-MH-NW-OUT_031919	3/19/19	14:40	AV	SW	2		2								

Turnaround Time (Business days)

10 Day (Business)
7 Day
5 Day
3 Day *RUSH*
2 Day *RUSH*
1 Day *RUSH*
Other
Approved By: / Date:
Rush T/A Data Available VIA Email or Lablink

Data Deliverable Information

- [ ] COMMERCIAL "A" (RESULTS ONLY)
- [ ] COMMERCIAL "B" (RESULTS PLUS QC)
- [ ] REDT1 (EPA LEVEL 3)
- [ ] FULLT1 (EPA LEVEL 4)
- [x] EDD'S

Comments / Remarks

5 day TAT

Sample Custody must be documented below each time samples change possession, including courier delivery.

	Relinquished by Sampler/Affiliation	Date Time:	Received By/Affiliation	Relinquished By/Affiliation	Date Time:	Received By/Affiliation
1	Arcadis	3/20/19 18:32	FedEx	3 Fed Ex		4 03/21/19 945
5	Relinquished by/Affiliation	Date Time:	Received By/Affiliation 6	Relinquished By/Affiliation 7	Date Time:	Received By/Affiliation 8

Lab Use Only: Cooler Temperature (s) Celsius (corrected): 3.3

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

ORLD-SMT-0001-03-FORM-COC (4).xls Rev 031318

3.3

SGS Sample Receipt Summary

Job Number: FA62551 **Client:** ARCADIS **Project:** RACER LANSING

Date / Time Received: 3/21/2019 9:15:00 AM **Delivery Method:** FED EX **Airbill #'s:** 1002239523010003281100814667051543

Therm ID: IR 1; **Therm CF:** -0.2; **# of Coolers:** 1

Cooler Temps (Raw Measured) °C: Cooler 1: (3.5);

Cooler Temps (Corrected) °C: Cooler 1: (3.3);

Cooler Information	Y	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	N	N/A
1. Trip Blank present / cooler	☐	☐	☑
2. Trip Blank listed on COC	☐	☐	☑

	W	S	N/A
3. Type Of TB Received	☐	☐	☑

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

Misc. Information

Number of Encores: 25-Gram _____ 5-Gram _____ Number of 5035 Field Kits: _____ Number of Lab Filtered Metals: _____

Test Strip Lot #s: pH 0-3 230315 pH 10-12 219813A Other: (Specify) _____ _____

Residual Chlorine Test Strip Lot #: _____

Comments

SM001
Rev. Date 05/24/17

Technician: SHAYLAP Date: 3/21/2019 9:15:00 AM Reviewer: _____ Date: _____

FA62551: Chain of Custody
Page 2 of 2

MS Semi-volatiles

QC Data Summaries

Includes the following where applicable:

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

Method Blank Summary

Job Number: FA62551
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP74262-MB	2Q28006.D	1	03/23/19	NAF	03/22/19	OP74262	S2Q446

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA62551-1, FA62551-2, FA62551-3, FA62551-4

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

CAS No.	ID Standard Recoveries		Limits
	13C4-PFBA	121%	30-140%
	13C5-PFPeA	117%	40-140%
	13C5-PFHxA	118%	50-150%
	13C4-PFHpA	118%	50-150%
	13C8-PFOA	128%	50-150%
	13C9-PFNA	123%	50-150%
	13C6-PFDA	122%	50-150%
	13C7-PFUnDA	150%	50-150%

Method Blank Summary

Job Number: FA62551
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP74262-MB	2Q28006.D	1	03/23/19	NAF	03/22/19	OP74262	S2Q446

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA62551-1, FA62551-2, FA62551-3, FA62551-4

CAS No.	ID Standard Recoveries		Limits
	13C2-PFDoDA	121%	50-150%
	13C2-PFTeDA	86%	40-150%
	13C3-PFBS	111%	50-150%
	13C3-PFHxS	110%	50-150%
	13C8-PFOS	111%	50-150%
	13C8-FOSA	113%	30-140%
	d3-MeFOSAA	109%	50-150%
	13C2-4:2FTS	113%	50-150%
	13C2-6:2FTS	123%	50-150%
	13C2-8:2FTS	117%	50-150%

Method Blank Summary

Job Number: FA62551
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP74287-MB	2Q28251.D	1	03/27/19	NG	03/25/19	OP74287	S2Q449

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA62551-4

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	0.00362	0.0080	0.0020	ug/l	J
2706-90-3	Perfluoropentanoic acid	ND	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	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	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries		Limits
	13C4-PFBA	118%	30-140%
	13C5-PFPeA	112%	40-140%
	13C5-PFHxA	111%	50-150%
	13C4-PFHpA	112%	50-150%
	13C8-PFOA	119%	50-150%
	13C9-PFNA	113%	50-150%
	13C6-PFDA	117%	50-150%
	13C7-PFUnDA	139%	50-150%
	13C2-PFDoDA	97%	50-150%
	13C2-PFTeDA	86%	40-150%
	13C3-PFBS	111%	50-150%
	13C3-PFHxS	110%	50-150%

Method Blank Summary

Job Number: FA62551
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP74287-MB	2Q28251.D	1	03/27/19	NG	03/25/19	OP74287	S2Q449

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA62551-4

CAS No.	ID Standard Recoveries		Limits
	13C8-PFOS	112%	50-150%
	13C8-FOSA	111%	30-140%
	d3-MeFOSAA	107%	50-150%
	13C2-4:2FTS	110%	50-150%
	13C2-6:2FTS	115%	50-150%
	13C2-8:2FTS	108%	50-150%

Instrument Blank

Job Number: FA62551
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q446-IBLK	2Q27956.D	1	03/22/19	NAF	n/a	n/a	S2Q446

The QC reported here applies to the following samples: **Method:** EPA 537M QSM5.1 B-15

FA62551-1, FA62551-2, FA62551-3, FA62551-4

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

CAS No.	ID Standard Recoveries		Limits
	13C4-PFBA	95%	50-150%
	13C5-PFPeA	95%	50-150%
	13C5-PFHxA	96%	50-150%
	13C4-PFHpA	96%	50-150%
	13C8-PFOA	99%	50-150%
	13C9-PFNA	99%	50-150%
	13C6-PFDA	100%	50-150%
	13C7-PFUnDA	99%	50-150%

Instrument Blank

Job Number: FA62551
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q446-IBLK	2Q27956.D	1	03/22/19	NAF	n/a	n/a	S2Q446

The QC reported here applies to the following samples: **Method:** EPA 537M QSM5.1 B-15

FA62551-1, FA62551-2, FA62551-3, FA62551-4

CAS No.	ID Standard Recoveries		Limits
	13C2-PFDoDA	96%	50-150%
	13C2-PFTeDA	93%	50-150%
	13C3-PFBS	93%	50-150%
	13C3-PFHxS	93%	50-150%
	13C8-PFOS	94%	50-150%
	13C8-FOSA	100%	50-150%
	d3-MeFOSAA	97%	50-150%
	13C2-4:2FTS	89%	50-150%
	13C2-6:2FTS	92%	50-150%
	13C2-8:2FTS	93%	50-150%

Instrument Blank

Job Number: FA62551
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q449-IBLK	2Q28169.D	1	03/26/19	NG	n/a	n/a	S2Q449

The QC reported here applies to the following samples: **Method:** EPA 537M QSM5.1 B-15

FA62551-4

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	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries		Limits
	13C4-PFBA	93%	50-150%
	13C5-PFPeA	94%	50-150%
	13C5-PFHxA	94%	50-150%
	13C4-PFHpA	95%	50-150%
	13C8-PFOA	98%	50-150%
	13C9-PFNA	96%	50-150%
	13C6-PFDA	99%	50-150%
	13C7-PFUnDA	97%	50-150%
	13C2-PFDoDA	95%	50-150%
	13C2-PFTeDA	93%	50-150%
	13C3-PFBS	93%	50-150%
	13C3-PFHxS	95%	50-150%

Instrument Blank

Job Number: FA62551
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q449-IBLK	2Q28169.D	1	03/26/19	NG	n/a	n/a	S2Q449

The QC reported here applies to the following samples: **Method:** EPA 537M QSM5.1 B-15

FA62551-4

CAS No.	ID Standard Recoveries		Limits
	13C8-PFOS	97%	50-150%
	13C8-FOSA	99%	50-150%
	d3-MeFOSAA	96%	50-150%
	13C2-4:2FTS	88%	50-150%
	13C2-6:2FTS	92%	50-150%
	13C2-8:2FTS	90%	50-150%

Blank Spike Summary

Job Number: FA62551
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP74262-BS	2Q28005.D	1	03/23/19	NAF	03/22/19	OP74262	S2Q446

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA62551-1, FA62551-2, FA62551-3, FA62551-4

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
375-22-4	Perfluorobutanoic acid	0.08	0.0767	96	70-130
2706-90-3	Perfluoropentanoic acid	0.08	0.0733	92	70-130
307-24-4	Perfluorohexanoic acid	0.08	0.0747	93	70-130
375-85-9	Perfluoroheptanoic acid	0.08	0.0749	94	71-130
335-67-1	Perfluorooctanoic acid	0.08	0.0754	94	74-130
375-95-1	Perfluorononanoic acid	0.08	0.0730	91	76-130
335-76-2	Perfluorodecanoic acid	0.08	0.0754	94	70-130
2058-94-8	Perfluoroundecanoic acid	0.08	0.0753	94	70-130
307-55-1	Perfluorododecanoic acid	0.08	0.0777	97	70-130
72629-94-8	Perfluorotridecanoic acid	0.08	0.0812	102	70-139
376-06-7	Perfluorotetradecanoic acid	0.08	0.0763	95	70-130
375-73-5	Perfluorobutanesulfonic acid	0.08	0.0754	94	73-130
2706-91-4	Perfluoropentanesulfonic acid	0.08	0.0773	97	70-130
355-46-4	Perfluorohexanesulfonic acid	0.08	0.0762	95	74-130
375-92-8	Perfluoroheptanesulfonic acid	0.08	0.0784	98	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.08	0.0749	94	70-130
68259-12-1	Perfluorononanesulfonic acid	0.08	0.0717	90	70-130
335-77-3	Perfluorodecanesulfonic acid	0.08	0.0668	84	70-130
754-91-6	PFOSA	0.08	0.0778	97	70-131
2355-31-9	MeFOSAA	0.08	0.0768	96	70-130
2991-50-6	EtFOSAA	0.08	0.0753	94	70-130
757124-72-4	4:2 Fluorotelomer sulfonate	0.08	0.0755	94	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	0.08	0.0748	94	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	0.08	0.0744	93	70-130

CAS No.	ID Standard Recoveries	BSP	Limits
	13C4-PFBA	126%	30-140%
	13C5-PFPeA	121%	40-140%
	13C5-PFHxA	122%	50-150%
	13C4-PFHpA	121%	50-150%
	13C8-PFOA	125%	50-150%
	13C9-PFNA	125%	50-150%
	13C6-PFDA	119%	50-150%
	13C7-PFUnDA	155%* [a]	50-150%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA62551
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP74262-BS	2Q28005.D	1	03/23/19	NAF	03/22/19	OP74262	S2Q446

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA62551-1, FA62551-2, FA62551-3, FA62551-4

CAS No.	ID Standard Recoveries	BSP	Limits
	13C2-PFDoDA	130%	50-150%
	13C2-PFTeDA	90%	40-150%
	13C3-PFBS	116%	50-150%
	13C3-PFHxS	115%	50-150%
	13C8-PFOS	115%	50-150%
	13C8-FOSA	115%	30-140%
	d3-MeFOSAA	114%	50-150%
	13C2-4:2FTS	122%	50-150%
	13C2-6:2FTS	124%	50-150%
	13C2-8:2FTS	124%	50-150%

(a) Outside control limits.

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA62551
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP74287-BS [a]	2Q28250.D	1	03/27/19	NG	03/25/19	OP74287	S2Q449

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA62551-4

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
375-22-4	Perfluorobutanoic acid	0.08	0.0704	88	70-130
2706-90-3	Perfluoropentanoic acid	0.08	0.0724	91	70-130
307-24-4	Perfluorohexanoic acid	0.08	0.0708	89	70-130
375-85-9	Perfluoroheptanoic acid	0.08	0.0723	90	71-130
335-67-1	Perfluorooctanoic acid	0.08	0.0716	90	74-130
375-95-1	Perfluorononanoic acid	0.08	0.0719	90	76-130
335-76-2	Perfluorodecanoic acid	0.08	0.0713	89	70-130
2058-94-8	Perfluoroundecanoic acid	0.08	0.0701	88	70-130
375-73-5	Perfluorobutanesulfonic acid	0.08	0.0714	89	73-130
2706-91-4	Perfluoropentanesulfonic acid	0.08	0.0720	90	70-130
355-46-4	Perfluorohexanesulfonic acid	0.08	0.0712	89	74-130
375-92-8	Perfluoroheptanesulfonic acid	0.08	0.0720	90	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.08	0.0689	86	70-130
68259-12-1	Perfluorononanesulfonic acid	0.08	0.0628	79	70-130
754-91-6	PFOSA	0.08	0.0717	90	70-131
2355-31-9	MeFOSAA	0.08	0.0747	93	70-130
2991-50-6	EtFOSAA	0.08	0.0676	85	70-130
757124-72-4	4:2 Fluorotelomer sulfonate	0.08	0.0709	89	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	0.08	0.0706	88	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	0.08	0.0710	89	70-130

CAS No.	ID Standard Recoveries	BSP	Limits
	13C4-PFBA	117%	30-140%
	13C5-PFPeA	111%	40-140%
	13C5-PFHxA	110%	50-150%
	13C4-PFHpA	110%	50-150%
	13C8-PFOA	112%	50-150%
	13C9-PFNA	109%	50-150%
	13C6-PFDA	109%	50-150%
	13C7-PFUnDA	127%	50-150%
	13C2-PFDoDA	91%	50-150%
	13C2-PFTeDA	83%	40-150%
	13C3-PFBS	110%	50-150%
	13C3-PFHxS	109%	50-150%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA62551
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP74287-BS [a]	2Q28250.D	1	03/27/19	NG	03/25/19	OP74287	S2Q449

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA62551-4

CAS No.	ID Standard Recoveries	BSP	Limits
	13C8-PFOS	107%	50-150%
	13C8-FOSA	105%	30-140%
	d3-MeFOSAA	102%	50-150%
	13C2-4:2FTS	113%	50-150%
	13C2-6:2FTS	114%	50-150%
	13C2-8:2FTS	110%	50-150%

(a) Insufficient sample for MS/MSD.

* = Outside of Control Limits.

Matrix Spike Summary

Job Number: FA62551
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP74262-MS	2Q28008.D	1	03/23/19	NAF	03/22/19	OP74262	S2Q446
FA62551-1	2Q28007.D	1	03/23/19	NAF	03/22/19	OP74262	S2Q446

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA62551-1, FA62551-2, FA62551-3, FA62551-4

CAS No.	Compound	FA62551-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	Limits
375-22-4	Perfluorobutanoic acid	0.0106		0.08	0.0794	86	70-130
2706-90-3	Perfluoropentanoic acid	ND		0.08	0.0679	85	70-130
307-24-4	Perfluorohexanoic acid	ND		0.08	0.0690	86	70-130
375-85-9	Perfluoroheptanoic acid	ND		0.08	0.0693	87	71-130
335-67-1	Perfluorooctanoic acid	0.00144	J	0.08	0.0700	86	74-130
375-95-1	Perfluorononanoic acid	ND		0.08	0.0667	83	76-130
335-76-2	Perfluorodecanoic acid	ND		0.08	0.0694	87	70-130
2058-94-8	Perfluoroundecanoic acid	ND		0.08	0.0715	89	70-130
307-55-1	Perfluorododecanoic acid	ND		0.08	0.0729	91	70-130
72629-94-8	Perfluorotridecanoic acid	ND		0.08	0.0948	119	70-139
376-06-7	Perfluorotetradecanoic acid	ND		0.08	0.0714	89	70-130
375-73-5	Perfluorobutanesulfonic acid	0.00123	J	0.08	0.0702	86	73-130
2706-91-4	Perfluoropentanesulfonic acid	ND		0.08	0.0728	91	70-130
355-46-4	Perfluorohexanesulfonic acid	ND		0.08	0.0710	89	74-130
375-92-8	Perfluoroheptanesulfonic acid	ND		0.08	0.0706	88	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.00990		0.08	0.0772	84	70-130
68259-12-1	Perfluorononanesulfonic acid	ND		0.08	0.0632	79	70-130
335-77-3	Perfluorodecanesulfonic acid	ND		0.08	0.0595	74	70-130
754-91-6	PFOSA	ND		0.08	0.0720	90	70-131
2355-31-9	MeFOSAA	ND		0.08	0.0725	91	70-130
2991-50-6	EtFOSAA	ND		0.08	0.0714	89	70-130
757124-72-4	4:2 Fluorotelomer sulfonate	ND		0.08	0.0691	86	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	ND		0.08	0.0690	86	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	ND		0.08	0.0701	88	70-130

CAS No.	ID Standard Recoveries	MS	FA62551-1	Limits
	13C4-PFBA	130%	114%	30-140%
	13C5-PFPeA	129%	113%	40-140%
	13C5-PFHxA	130%	114%	50-150%
	13C4-PFHpA	130%	113%	50-150%
	13C8-PFOA	149%	133%	50-150%
	13C9-PFNA	130%	110%	50-150%
	13C6-PFDA	111%	96%	50-150%
	13C7-PFUnDA	148%	127%	50-150%

* = Outside of Control Limits.

Matrix Spike Summary

Job Number: FA62551
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP74262-MS	2Q28008.D	1	03/23/19	NAF	03/22/19	OP74262	S2Q446
FA62551-1	2Q28007.D	1	03/23/19	NAF	03/22/19	OP74262	S2Q446

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA62551-1, FA62551-2, FA62551-3, FA62551-4

CAS No.	ID Standard Recoveries	MS	FA62551-1	Limits
	13C2-PFDoDA	123%	101%	50-150%
	13C2-PFTeDA	55%	26%* [a]	40-150%
	13C3-PFBS	121%	104%	50-150%
	13C3-PFHxS	119%	100%	50-150%
	13C8-PFOS	102%	85%	50-150%
	13C8-FOSA	49%	54%	30-140%
	d3-MeFOSAA	97%	80%	50-150%
	13C2-4:2FTS	138%	113%	50-150%
	13C2-6:2FTS	168%* [b]	140%	50-150%
	13C2-8:2FTS	112%	90%	50-150%

(a) Outside control limits. Insufficient sample for re-extraction.
(b) Outside control limits.

* = Outside of Control Limits.

Duplicate Summary

Job Number: FA62551
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP74262-DUP	2Q28011.D	1.19	03/23/19	NAF	03/22/19	OP74262	S2Q446
FA62551-3	2Q28010.D	1	03/23/19	NAF	03/22/19	OP74262	S2Q446

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA62551-1, FA62551-2, FA62551-3, FA62551-4

CAS No.	Compound	FA62551-3 ug/l	Q	DUP ug/l	Q	RPD	Limits
375-22-4	Perfluorobutanoic acid	0.00894		0.00736	J	19	30
2706-90-3	Perfluoropentanoic acid	0.00266	J	0.00217	J	20	30
307-24-4	Perfluorohexanoic acid	0.00302	J	0.00235	J	25	30
375-85-9	Perfluoroheptanoic acid	0.00216	J	0.00169	J	24	30
335-67-1	Perfluorooctanoic acid	0.00482		0.00383	J	23	30
375-95-1	Perfluorononanoic acid	ND		ND		nc	30
335-76-2	Perfluorodecanoic acid	ND		ND		nc	30
2058-94-8	Perfluoroundecanoic acid	ND		ND		nc	30
307-55-1	Perfluorododecanoic acid	ND		ND		nc	30
72629-94-8	Perfluorotridecanoic acid	ND		ND		nc	30
376-06-7	Perfluorotetradecanoic acid	ND		ND		nc	30
375-73-5	Perfluorobutanesulfonic acid	0.00178	J	0.00132	J	30	30
2706-91-4	Perfluoropentanesulfonic acid	ND		ND		nc	30
355-46-4	Perfluorohexanesulfonic acid	0.00291	J	0.00223	J	26	30
375-92-8	Perfluoroheptanesulfonic acid	ND		ND		nc	30
1763-23-1	Perfluorooctanesulfonic acid	0.0626		0.0502		22	30
68259-12-1	Perfluorononanesulfonic acid	ND		ND		nc	30
335-77-3	Perfluorodecanesulfonic acid	ND		ND		nc	30
754-91-6	PFOSA	ND		ND		nc	30
2355-31-9	MeFOSAA	ND		ND		nc	30
2991-50-6	EtFOSAA	ND		ND		nc	30
757124-72-4	4:2 Fluorotelomer sulfonate	ND		ND		nc	30
27619-97-2	6:2 Fluorotelomer sulfonate	ND		ND		nc	30
39108-34-4	8:2 Fluorotelomer sulfonate	ND		ND		nc	30

CAS No.	ID Standard Recoveries	DUP	FA62551-3	Limits
	13C4-PFBA	128%	111%	30-140%
	13C5-PFPeA	127%	109%	40-140%
	13C5-PFHxA	129%	111%	50-150%
	13C4-PFHpA	128%	109%	50-150%
	13C8-PFOA	149%	129%	50-150%
	13C9-PFNA	136%	114%	50-150%
	13C6-PFDA	115%	102%	50-150%
	13C7-PFUnDA	121%	131%	50-150%

* = Outside of Control Limits.

Duplicate Summary

Job Number: FA62551
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP74262-DUP	2Q28011.D	1.19	03/23/19	NAF	03/22/19	OP74262	S2Q446
FA62551-3	2Q28010.D	1	03/23/19	NAF	03/22/19	OP74262	S2Q446

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA62551-1, FA62551-2, FA62551-3, FA62551-4

CAS No.	ID Standard Recoveries	DUP	FA62551-3	Limits
	13C2-PFDoDA	102%	126%	50-150%
	13C2-PFTeDA	87%	82%	40-150%
	13C3-PFBS	118%	100%	50-150%
	13C3-PFHxS	117%	97%	50-150%
	13C8-PFOS	103%	87%	50-150%
	13C8-FOSA	123%	104%	30-140%
	d3-MeFOSAA	93%	85%	50-150%
	13C2-4:2FTS	129%	112%	50-150%
	13C2-6:2FTS	156%* [a]	132%	50-150%
	13C2-8:2FTS	109%	98%	50-150%

(a) Outside control limits.

* = Outside of Control Limits.

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: FA62774

Sampling Dates: 03/26/19 - 03/27/19

Report to:

Arcadis
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Total number of pages in report: **66**

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

Sections: 1 2 3 4 5

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SGS North America Inc.

Sample Summary

Arcadis

Job No: FA62774

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

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
FA62774-1	03/26/19	09:55	DSEF	03/28/19	AQ	Water	P2-MH-30_032619
FA62774-2	03/26/19	10:10	DSEF	03/28/19	AQ	Water	P2-MH-32_032619
FA62774-3	03/26/19	10:30	DSEF	03/28/19	AQ	Water	P2-MH-10_032619
FA62774-4	03/26/19	11:00	DSEF	03/28/19	AQ	Water	P2-MH-NW_032619
FA62774-5	03/26/19	11:30	DSEF	03/28/19	AQ	Water	P2-MH-36_032619
FA62774-6	03/26/19	12:00	DSEF	03/28/19	AQ	Water	P2-MH-26_032619
FA62774-7	03/26/19	12:30	DSEF	03/28/19	AQ	Water	P2-CB-32_032619
FA62774-8	03/26/19	12:45	DSEF	03/28/19	AQ	Water	P2-MH-25_032619
FA62774-9	03/26/19	14:00	DSEF	03/28/19	AQ	Water	P2-MH-14_032619
FA62774-10	03/26/19	14:20	DSEF	03/28/19	AQ	Water	P2-MH-16_032619
FA62774-11	03/26/19	14:45	DSEF	03/28/19	AQ	Water	P2-MH-79_032619
FA62774-12	03/26/19	15:10	DSEF	03/28/19	AQ	Water	P2-MH-97_032619
FA62774-13	03/27/19	00:00	DSEF	03/28/19	AQ	Water	DUP 1

Sample Summary
(continued)

Arcadis

Job No: FA62774

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

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
FA62774-14	03/27/19	09:00	DSEF	03/28/19	AQ	Water	P2-MH-114_032719
FA62774-15	03/27/19	11:00	DSEF	03/28/19	AQ	Water	P2-MH-86_032719
FA62774-16	03/27/19	12:00	DSEF	03/28/19	AQ	Water	P2-MH-73_032719
FA62774-17	03/27/19	12:50	DSEF	03/28/19	AQ	Water	P2-MH-W_032719
FA62774-18	03/27/19	10:50	DSEF	03/28/19	AQ	Water	P2-MH-96_032719
FA62774-19	03/27/19	12:10	DSEF	03/28/19	AQ	Water	P2-MH-58_032719

Summary of Hits

Job Number: FA62774
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 03/26/19 thru 03/27/19

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
FA62774-1	**P2-MH-30_032619**					
Perfluorobutanoic acid		0.0123	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0123	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0127	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0123	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0236	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00284 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00311 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00886	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid		0.00183 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.0137	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.00124 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.126	0.0040	0.0015	ug/l	EPA 537M BY ID
6:2 Fluorotelomer sulfonate		0.00252 J	0.0080	0.0020	ug/l	EPA 537M BY ID
FA62774-2	**P2-MH-32_032619**					
Perfluorobutanoic acid		0.0146	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.00619	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.00338 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.00200 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.00242 J	0.0040	0.0010	ug/l	EPA 537M BY ID
FA62774-3	**P2-MH-10_032619**					
Perfluorobutanoic acid		0.0135	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.00861	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.00797	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.00590	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0122	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00144 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00230 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.0142	0.0040	0.0015	ug/l	EPA 537M BY ID
FA62774-4	**P2-MH-NW_032619**					
Perfluorobutanoic acid		0.0135	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0141	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0147	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0139	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0265	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00325 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00330 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00829	0.0040	0.0010	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA62774
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 03/26/19 thru 03/27/19

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
Perfluoropentanesulfonic acid		0.00231 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.0155	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.00194 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.131	0.0040	0.0015	ug/l	EPA 537M BY ID
6:2 Fluorotelomer sulfonate		0.00289 J	0.0080	0.0020	ug/l	EPA 537M BY ID
FA62774-5	**P2-MH-36_032619**					
Perfluorobutanoic acid		0.00501 J	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.00167 J	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.00118 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.00195 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00114 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.00223 J	0.0040	0.0015	ug/l	EPA 537M BY ID
FA62774-6	**P2-MH-26_032619**					
Perfluorobutanoic acid		0.0136	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0138	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0140	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0134	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0275	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00334 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00327 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00766	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid		0.00206 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.0139	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.00167 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.111	0.0040	0.0015	ug/l	EPA 537M BY ID
6:2 Fluorotelomer sulfonate		0.00228 J	0.0080	0.0020	ug/l	EPA 537M BY ID
FA62774-7	**P2-CB-32_032619**					
Perfluorobutanoic acid		0.0133	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.00310 J	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.00310 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.00201 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.00294 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00123 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.00605	0.0040	0.0015	ug/l	EPA 537M BY ID
FA62774-8	**P2-MH-25_032619**					
Perfluorobutanoic acid		0.0361	0.015	0.0038	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0465	0.0077	0.0029	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA62774
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 03/26/19 thru 03/27/19

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
Perfluorohexanoic acid		0.0470	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0455	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0772	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00951	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.0110	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.0140	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid		0.00650 J	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.0646	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.00721 J	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.600	0.0077	0.0029	ug/l	EPA 537M BY ID
6:2 Fluorotelomer sulfonate		0.0130 J	0.015	0.0038	ug/l	EPA 537M BY ID
8:2 Fluorotelomer sulfonate		0.00582 J	0.015	0.0038	ug/l	EPA 537M BY ID
FA62774-9	**P2-MH-14_032619**					
Perfluorobutanoic acid		0.0139	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.00877	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.00779	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.00581	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0135	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00139 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00247 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.0251	0.0040	0.0015	ug/l	EPA 537M BY ID
FA62774-10	**P2-MH-16_032619**					
Perfluorobutanoic acid		0.0224	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0330	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0320	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0305	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0462	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00604	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00642	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00719	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid		0.00419	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.0465	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.00445	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.486	0.0080	0.0030	ug/l	EPA 537M BY ID
PFOSA		0.00105 J	0.0040	0.0010	ug/l	EPA 537M BY ID
6:2 Fluorotelomer sulfonate		0.0114	0.0080	0.0020	ug/l	EPA 537M BY ID
8:2 Fluorotelomer sulfonate		0.00607 J	0.0080	0.0020	ug/l	EPA 537M BY ID
FA62774-11	**P2-MH-79_032619**					
Perfluorobutanoic acid		0.0126	0.0080	0.0020	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA62774
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 03/26/19 thru 03/27/19

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
Perfluoropentanoic acid		0.0119	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0128	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0114	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0293	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00245 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00299 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00691	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00464	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.0351	0.0040	0.0015	ug/l	EPA 537M BY ID
FA62774-12	**P2-MH-97_032619**					
Perfluorobutanoic acid		0.0223	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0312	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0320	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0319	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0567	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00817	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.0104	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00573	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid		0.00374 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.0391	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.00409	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.394	0.0040	0.0015	ug/l	EPA 537M BY ID
PFOSA		0.00138 J	0.0040	0.0010	ug/l	EPA 537M BY ID
6:2 Fluorotelomer sulfonate		0.00903	0.0080	0.0020	ug/l	EPA 537M BY ID
8:2 Fluorotelomer sulfonate		0.00399 J	0.0080	0.0020	ug/l	EPA 537M BY ID
FA62774-13	**DUP 1**					
Perfluorobutanoic acid		0.0131	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0143	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0152	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0157	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0309	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00359 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00349 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.0288	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid		0.00321 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.0209	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.00261 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.0977	0.0040	0.0015	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA62774
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 03/26/19 thru 03/27/19

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
FA62774-14	**P2-MH-114_032719**					
Perfluorobutanoic acid		0.0230	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0326	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0288	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0212	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0299	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00300 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00154 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00486	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid		0.00297 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.0363	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.00234 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.185	0.0040	0.0015	ug/l	EPA 537M BY ID
6:2 Fluorotelomer sulfonate		0.0272	0.0080	0.0020	ug/l	EPA 537M BY ID
8:2 Fluorotelomer sulfonate		0.0209	0.0080	0.0020	ug/l	EPA 537M BY ID
FA62774-15	**P2-MH-86_032719**					
Perfluorobutanoic acid		0.0124	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0145	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0151	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0155	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0302	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00324 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00270 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.0362	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid		0.00456	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.0199	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.00165 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.0860	0.0040	0.0015	ug/l	EPA 537M BY ID
FA62774-16	**P2-MH-73_032719**					
Perfluorobutanoic acid		0.00781 J	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.00200 J	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.00259 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.00224 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.00717	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00111 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00186 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.00928	0.0040	0.0015	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA62774
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 03/26/19 thru 03/27/19

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
FA62774-17	**P2-MH-W_032719**					
Perfluorobutanoic acid		0.0112	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.00792	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0119	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.00980	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0258	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00326 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00473	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00288 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00196 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.00943	0.0040	0.0015	ug/l	EPA 537M BY ID
FA62774-18	**P2-MH-96_032719**					
Perfluorobutanoic acid		0.0191	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0325	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0508	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0263	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0779	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00382 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00470	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.0306	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid		0.0251	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.252	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.0316	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		1.16	0.020	0.0075	ug/l	EPA 537M BY ID
6:2 Fluorotelomer sulfonate		0.00391 J	0.0080	0.0020	ug/l	EPA 537M BY ID
FA62774-19	**P2-MH-58_032719**					
Perfluorobutanoic acid		0.00893	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.00199 J	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.00282 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.00223 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.00979	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00106 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00154 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00127 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

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID:	P2-MH-30_032619		
Lab Sample ID:	FA62774-1	**Date Sampled:**	03/26/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3Q2732.D	1	04/10/19 18:23	NAF	04/05/19 08:30	OP74476	S3Q71
Run #2							

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

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0123	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0123	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0127	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0123	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0236	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00284	0.0040	0.0010	ug/l	J
335-76-2	Perfluorodecanoic acid	0.00311	0.0040	0.0010	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00886	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	0.00183	0.0040	0.0010	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	0.0137	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.00124	0.0040	0.0010	ug/l	J
1763-23-1	Perfluorooctanesulfonic acid	0.126	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid [a]	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC 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	0.00252	0.0080	0.0020	ug/l	J

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

Report of Analysis

Client Sample ID:	P2-MH-30_032619		
Lab Sample ID:	FA62774-1	**Date Sampled:**	03/26/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
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	91%		30-140%
	13C5-PFPeA	98%		40-140%
	13C5-PFHxA	96%		50-150%
	13C4-PFHpA	96%		50-150%
	13C8-PFOA	103%		50-150%
	13C9-PFNA	105%		50-150%
	13C6-PFDA	95%		50-150%
	13C7-PFUnDA	76%		50-150%
	13C2-PFDoDA	63%		50-150%
	13C2-PFTeDA	63%		40-150%
	13C3-PFBS	92%		50-150%
	13C3-PFHxS	85%		50-150%
	13C8-PFOS	75%		50-150%
	13C8-FOSA	79%		30-140%
	d3-MeFOSAA	80%		50-150%
	13C2-4:2FTS	101%		50-150%
	13C2-6:2FTS	117%		50-150%
	13C2-8:2FTS	107%		50-150%

(a) Associated BS recovery outside control limits.

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

Report of Analysis

Client Sample ID:	P2-MH-32_032619		
Lab Sample ID:	FA62774-2	**Date Sampled:**	03/26/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3Q2733.D	1	04/10/19 18:39	NAF	04/05/19 08:30	OP74476	S3Q71
Run #2							

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

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0146	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.00619	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.00338	0.0040	0.0010	ug/l	J
375-85-9	Perfluoroheptanoic acid	0.00200	0.0040	0.0010	ug/l	J
335-67-1	Perfluorooctanoic acid	0.00242	0.0040	0.0010	ug/l	J
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid [a]	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC 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:	P2-MH-32_032619		
Lab Sample ID:	FA62774-2	**Date Sampled:**	03/26/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
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	74%		30-140%
	13C5-PFPeA	82%		40-140%
	13C5-PFHxA	79%		50-150%
	13C4-PFHpA	82%		50-150%
	13C8-PFOA	89%		50-150%
	13C9-PFNA	94%		50-150%
	13C6-PFDA	88%		50-150%
	13C7-PFUnDA	85%		50-150%
	13C2-PFDoDA	67%		50-150%
	13C2-PFTeDA	46%		40-150%
	13C3-PFBS	77%		50-150%
	13C3-PFHxS	72%		50-150%
	13C8-PFOS	63%		50-150%
	13C8-FOSA	69%		30-140%
	d3-MeFOSAA	76%		50-150%
	13C2-4:2FTS	90%		50-150%
	13C2-6:2FTS	105%		50-150%
	13C2-8:2FTS	111%		50-150%

(a) Associated BS recovery outside control limits.

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

Report of Analysis

Client Sample ID:	P2-MH-10_032619		
Lab Sample ID:	FA62774-3	**Date Sampled:**	03/26/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3Q2734.D	1	04/10/19 18:54	NAF	04/05/19 08:30	OP74476	S3Q71
Run #2							

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

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0135	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.00861	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.00797	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.00590	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0122	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00144	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00230	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0142	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid [a]	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

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

Report of Analysis

Client Sample ID:	P2-MH-10_032619		
Lab Sample ID:	FA62774-3	**Date Sampled:**	03/26/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
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%		30-140%
	13C5-PFPeA	108%		40-140%
	13C5-PFHxA	109%		50-150%
	13C4-PFHpA	110%		50-150%
	13C8-PFOA	116%		50-150%
	13C9-PFNA	113%		50-150%
	13C6-PFDA	92%		50-150%
	13C7-PFUnDA	73%		50-150%
	13C2-PFDoDA	54%		50-150%
	13C2-PFTeDA	50%		40-150%
	13C3-PFBS	105%		50-150%
	13C3-PFHxS	98%		50-150%
	13C8-PFOS	73%		50-150%
	13C8-FOSA	96%		30-140%
	d3-MeFOSAA	70%		50-150%
	13C2-4:2FTS	110%		50-150%
	13C2-6:2FTS	122%		50-150%
	13C2-8:2FTS	97%		50-150%

(a) Associated BS recovery outside control limits.

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

Report of Analysis

Client Sample ID:	P2-MH-NW_032619		
Lab Sample ID:	FA62774-4	**Date Sampled:**	03/26/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3Q2735.D	1	04/10/19 19:10	NAF	04/05/19 08:30	OP74476	S3Q71
Run #2							

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

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0135	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0141	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0147	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0139	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0265	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00325	0.0040	0.0010	ug/l	J
335-76-2	Perfluorodecanoic acid	0.00330	0.0040	0.0010	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00829	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	0.00231	0.0040	0.0010	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	0.0155	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.00194	0.0040	0.0010	ug/l	J
1763-23-1	Perfluorooctanesulfonic acid	0.131	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid [a]	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC 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	0.00289	0.0080	0.0020	ug/l	J

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

Report of Analysis

Client Sample ID:	P2-MH-NW_032619		
Lab Sample ID:	FA62774-4	**Date Sampled:**	03/26/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
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	96%		30-140%
	13C5-PFPeA	102%		40-140%
	13C5-PFHxA	99%		50-150%
	13C4-PFHpA	100%		50-150%
	13C8-PFOA	108%		50-150%
	13C9-PFNA	108%		50-150%
	13C6-PFDA	101%		50-150%
	13C7-PFUnDA	83%		50-150%
	13C2-PFDoDA	68%		50-150%
	13C2-PFTeDA	69%		40-150%
	13C3-PFBS	97%		50-150%
	13C3-PFHxS	88%		50-150%
	13C8-PFOS	84%		50-150%
	13C8-FOSA	84%		30-140%
	d3-MeFOSAA	87%		50-150%
	13C2-4:2FTS	104%		50-150%
	13C2-6:2FTS	121%		50-150%
	13C2-8:2FTS	114%		50-150%

(a) Associated BS recovery outside control limits.

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

Report of Analysis

Client Sample ID: P2-MH-36_032619
Lab Sample ID: FA62774-5
Matrix: AQ - Water
Method: EPA 537M BY ID EPA 537 MOD
Project: Racer Lansing PFAS Delineation; Lansing, MI

Date Sampled: 03/26/19
Date Received: 03/28/19
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3Q2736.D	1	04/10/19 19:26	NAF	04/05/19 08:30	OP74476	S3Q71
Run #2 [a]	2Q29136.D	1	04/16/19 23:11	NG	04/16/19 07:30	OP74616	S2Q463

	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
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.00501	0.0080	0.0020	ug/l	J
2706-90-3	Perfluoropentanoic acid	0.00167	0.0040	0.0015	ug/l	J
307-24-4	Perfluorohexanoic acid	0.00118	0.0040	0.0010	ug/l	J
375-85-9	Perfluoroheptanoic acid	ND	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.00195	0.0040	0.0010	ug/l	J
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid [b]	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00114	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	0.00223	0.0040	0.0015	ug/l	J
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid [c]	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC 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:	P2-MH-36_032619		
Lab Sample ID:	FA62774-5	**Date Sampled:**	03/26/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
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	86%	77%	30-140%
	13C5-PFPeA	92%	83%	40-140%
	13C5-PFHxA	94%	82%	50-150%
	13C4-PFHpA	95%	79%	50-150%
	13C8-PFOA	103%	89%	50-150%
	13C9-PFNA	106%	86%	50-150%
	13C6-PFDA	88%	76%	50-150%
	13C7-PFUnDA	75%	54%	50-150%
	13C2-PFDoDA	49% [e]	37% [d]	50-150%
	13C2-PFTeDA	47%	12% [d]	40-150%
	13C3-PFBS	87%	78%	50-150%
	13C3-PFHxS	82%	78%	50-150%
	13C8-PFOS	63%	69%	50-150%
	13C8-FOSA	89%	30%	30-140%
	d3-MeFOSAA	65%	59%	50-150%
	13C2-4:2FTS	98%	83%	50-150%
	13C2-6:2FTS	114%	86%	50-150%
	13C2-8:2FTS	98%	75%	50-150%

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

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

Report of Analysis

Client Sample ID:	P2-MH-26_032619		
Lab Sample ID:	FA62774-6	**Date Sampled:**	03/26/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3Q2737.D	1	04/10/19 19:41	NAF	04/05/19 08:30	OP74476	S3Q71
Run #2							

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

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0136	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0138	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0140	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0134	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0275	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00334	0.0040	0.0010	ug/l	J
335-76-2	Perfluorodecanoic acid	0.00327	0.0040	0.0010	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00766	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	0.00206	0.0040	0.0010	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	0.0139	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.00167	0.0040	0.0010	ug/l	J
1763-23-1	Perfluorooctanesulfonic acid	0.111	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid [a]	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC 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	0.00228	0.0080	0.0020	ug/l	J

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

Report of Analysis

Client Sample ID:	P2-MH-26_032619		
Lab Sample ID:	FA62774-6	**Date Sampled:**	03/26/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
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	98%		30-140%
	13C5-PFPeA	104%		40-140%
	13C5-PFHxA	100%		50-150%
	13C4-PFHpA	101%		50-150%
	13C8-PFOA	106%		50-150%
	13C9-PFNA	106%		50-150%
	13C6-PFDA	94%		50-150%
	13C7-PFUnDA	74%		50-150%
	13C2-PFDoDA	64%		50-150%
	13C2-PFTeDA	70%		40-150%
	13C3-PFBS	99%		50-150%
	13C3-PFHxS	87%		50-150%
	13C8-PFOS	75%		50-150%
	13C8-FOSA	82%		30-140%
	d3-MeFOSAA	77%		50-150%
	13C2-4:2FTS	108%		50-150%
	13C2-6:2FTS	121%		50-150%
	13C2-8:2FTS	107%		50-150%

(a) Associated BS recovery outside control limits.

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

Report of Analysis

Client Sample ID:	P2-CB-32_032619		
Lab Sample ID:	FA62774-7	**Date Sampled:**	03/26/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3Q2739.D	1	04/10/19 20:12	NAF	04/05/19 08:30	OP74476	S3Q71
Run #2							

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

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0133	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.00310	0.0040	0.0015	ug/l	J
307-24-4	Perfluorohexanoic acid	0.00310	0.0040	0.0010	ug/l	J
375-85-9	Perfluoroheptanoic acid	0.00201	0.0040	0.0010	ug/l	J
335-67-1	Perfluorooctanoic acid	0.00294	0.0040	0.0010	ug/l	J
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00123	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	0.00605	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid [a]	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC 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:	P2-CB-32_032619		
Lab Sample ID:	FA62774-7	**Date Sampled:**	03/26/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
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	104%		30-140%
	13C5-PFPeA	108%		40-140%
	13C5-PFHxA	109%		50-150%
	13C4-PFHpA	111%		50-150%
	13C8-PFOA	123%		50-150%
	13C9-PFNA	129%		50-150%
	13C6-PFDA	109%		50-150%
	13C7-PFUnDA	86%		50-150%
	13C2-PFDoDA	60%		50-150%
	13C2-PFTeDA	49%		40-150%
	13C3-PFBS	104%		50-150%
	13C3-PFHxS	99%		50-150%
	13C8-PFOS	80%		50-150%
	13C8-FOSA	93%		30-140%
	d3-MeFOSAA	83%		50-150%
	13C2-4:2FTS	114%		50-150%
	13C2-6:2FTS	135%		50-150%
	13C2-8:2FTS	116%		50-150%

(a) Associated BS recovery outside control limits.

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

Report of Analysis

Client Sample ID: P2-MH-25_032619
Lab Sample ID: FA62774-8
Matrix: AQ - Water
Method: EPA 537M BY ID EPA 537 MOD
Project: Racer Lansing PFAS Delineation; Lansing, MI

Date Sampled: 03/26/19
Date Received: 03/28/19
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3Q2742.D	1	04/10/19 20:59	NAF	04/05/19 08:30	OP74476	S3Q71
Run #2							

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

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0361	0.015	0.0038	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0465	0.0077	0.0029	ug/l	
307-24-4	Perfluorohexanoic acid	0.0470	0.0077	0.0019	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0455	0.0077	0.0019	ug/l	
335-67-1	Perfluorooctanoic acid	0.0772	0.0077	0.0019	ug/l	
375-95-1	Perfluorononanoic acid	0.00951	0.0077	0.0019	ug/l	
335-76-2	Perfluorodecanoic acid	0.0110	0.0077	0.0019	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0077	0.0019	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0077	0.0029	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0077	0.0019	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0077	0.0019	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.0140	0.0077	0.0019	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	0.00650	0.0077	0.0019	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	0.0646	0.0077	0.0019	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.00721	0.0077	0.0019	ug/l	J
1763-23-1	Perfluorooctanesulfonic acid	0.600	0.0077	0.0029	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0077	0.0019	ug/l	
335-77-3	Perfluorodecanesulfonic acid [a]	ND	0.0077	0.0019	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0077	0.0019	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.038	0.0077	ug/l	
2991-50-6	EtFOSAA	ND	0.038	0.0077	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	0.0130	0.015	0.0038	ug/l	J

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

Report of Analysis

Client Sample ID:	P2-MH-25_032619		
Lab Sample ID:	FA62774-8	**Date Sampled:**	03/26/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	0.00582	0.015	0.0038	ug/l	J

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	102%		30-140%
	13C5-PFPeA	107%		40-140%
	13C5-PFHxA	106%		50-150%
	13C4-PFHpA	108%		50-150%
	13C8-PFOA	118%		50-150%
	13C9-PFNA	120%		50-150%
	13C6-PFDA	108%		50-150%
	13C7-PFUnDA	79%		50-150%
	13C2-PFDoDA	65%		50-150%
	13C2-PFTeDA	74%		40-150%
	13C3-PFBS	101%		50-150%
	13C3-PFHxS	97%		50-150%
	13C8-PFOS	83%		50-150%
	13C8-FOSA	99%		30-140%
	d3-MeFOSAA	80%		50-150%
	13C2-4:2FTS	112%		50-150%
	13C2-6:2FTS	134%		50-150%
	13C2-8:2FTS	117%		50-150%

(a) Associated BS recovery outside control limits.

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

Report of Analysis

Client Sample ID: P2-MH-14_032619
Lab Sample ID: FA62774-9
Matrix: AQ - Water
Method: EPA 537M BY ID EPA 537 MOD
Project: Racer Lansing PFAS Delineation; Lansing, MI

Date Sampled: 03/26/19
Date Received: 03/28/19
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3Q2743.D	1	04/10/19 21:15	NAF	04/05/19 08:30	OP74476	S3Q71
Run #2							

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

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0139	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.00877	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.00779	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.00581	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0135	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00139	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00247	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0251	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid [a]	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC 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:	P2-MH-14_032619		
Lab Sample ID:	FA62774-9	**Date Sampled:**	03/26/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
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%		30-140%
	13C5-PFPeA	107%		40-140%
	13C5-PFHxA	108%		50-150%
	13C4-PFHpA	109%		50-150%
	13C8-PFOA	120%		50-150%
	13C9-PFNA	122%		50-150%
	13C6-PFDA	108%		50-150%
	13C7-PFUnDA	85%		50-150%
	13C2-PFDoDA	75%		50-150%
	13C2-PFTeDA	72%		40-150%
	13C3-PFBS	102%		50-150%
	13C3-PFHxS	99%		50-150%
	13C8-PFOS	83%		50-150%
	13C8-FOSA	104%		30-140%
	d3-MeFOSAA	87%		50-150%
	13C2-4:2FTS	107%		50-150%
	13C2-6:2FTS	125%		50-150%
	13C2-8:2FTS	104%		50-150%

(a) Associated BS recovery outside control limits.

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

Report of Analysis

Client Sample ID: P2-MH-16_032619
Lab Sample ID: FA62774-10
Matrix: AQ - Water
Method: EPA 537M BY ID EPA 537 MOD
Project: Racer Lansing PFAS Delineation; Lansing, MI

Date Sampled: 03/26/19
Date Received: 03/28/19
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3Q2744.D	1	04/10/19 21:31	NAF	04/05/19 08:30	OP74476	S3Q71
Run #2	2Q28937.D	2	04/11/19 20:19	NG	04/05/19 08:30	OP74476	S2Q460

	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
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0224	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0330	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0320	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0305	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0462	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00604	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	0.00642	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00719	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	0.00419	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.0465	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.00445	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.486 [a]	0.0080	0.0030	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid [b]	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	0.00105	0.0040	0.0010	ug/l	J
PERFLUOROOCTANESULFONAMIDOACETIC 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	0.0114	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:	P2-MH-16_032619		
Lab Sample ID:	FA62774-10	**Date Sampled:**	03/26/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	0.00607	0.0080	0.0020	ug/l	J

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	102%	109%	30-140%
	13C5-PFPeA	107%	113%	40-140%
	13C5-PFHxA	107%	116%	50-150%
	13C4-PFHpA	109%	123%	50-150%
	13C8-PFOA	119%	137%	50-150%
	13C9-PFNA	116%	130%	50-150%
	13C6-PFDA	106%	118%	50-150%
	13C7-PFUnDA	83%	81%	50-150%
	13C2-PFDoDA	68%	75%	50-150%
	13C2-PFTeDA	72%	85%	40-150%
	13C3-PFBS	102%	104%	50-150%
	13C3-PFHxS	97%	108%	50-150%
	13C8-PFOS	82%	94%	50-150%
	13C8-FOSA	97%	101%	30-140%
	d3-MeFOSAA	83%	92%	50-150%
	13C2-4:2FTS	111%	94%	50-150%
	13C2-6:2FTS	132%	128%	50-150%
	13C2-8:2FTS	115%	125%	50-150%

(a) Result is from Run# 2
(b) Associated BS recovery outside control limits.

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

Report of Analysis

Client Sample ID:	P2-MH-79_032619		
Lab Sample ID:	FA62774-11	**Date Sampled:**	03/26/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3Q2745.D	1	04/10/19 21:46	NAF	04/05/19 08:30	OP74476	S3Q71
Run #2							

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

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0126	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0119	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0128	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0114	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0293	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00245	0.0040	0.0010	ug/l	J
335-76-2	Perfluorodecanoic acid	0.00299	0.0040	0.0010	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00691	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00464	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0351	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid [a]	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC 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:	P2-MH-79_032619		
Lab Sample ID:	FA62774-11	**Date Sampled:**	03/26/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
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	84%		30-140%
	13C5-PFPeA	90%		40-140%
	13C5-PFHxA	87%		50-150%
	13C4-PFHpA	87%		50-150%
	13C8-PFOA	91%		50-150%
	13C9-PFNA	90%		50-150%
	13C6-PFDA	74%		50-150%
	13C7-PFUnDA	56%		50-150%
	13C2-PFDoDA	54%		50-150%
	13C2-PFTeDA	66%		40-150%
	13C3-PFBS	86%		50-150%
	13C3-PFHxS	78%		50-150%
	13C8-PFOS	62%		50-150%
	13C8-FOSA	54%		30-140%
	d3-MeFOSAA	66%		50-150%
	13C2-4:2FTS	93%		50-150%
	13C2-6:2FTS	105%		50-150%
	13C2-8:2FTS	90%		50-150%

(a) Associated BS recovery outside control limits.

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

Report of Analysis

Client Sample ID:	P2-MH-97_032619		
Lab Sample ID:	FA62774-12	**Date Sampled:**	03/26/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3Q2746.D	1	04/10/19 22:02	NAF	04/05/19 08:30	OP74476	S3Q71
Run #2							

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

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0223	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0312	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0320	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0319	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0567	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00817	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	0.0104	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00573	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	0.00374	0.0040	0.0010	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	0.0391	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.00409	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.394	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid [a]	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	0.00138	0.0040	0.0010	ug/l	J
PERFLUOROOCTANESULFONAMIDOACETIC 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	0.00903	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: P2-MH-97_032619
Lab Sample ID: FA62774-12
Matrix: AQ - Water
Method: EPA 537M BY ID EPA 537 MOD
Project: Racer Lansing PFAS Delineation; Lansing, MI

Date Sampled: 03/26/19
Date Received: 03/28/19
Percent Solids: n/a

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	0.00399	0.0080	0.0020	ug/l	J

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	100%		30-140%
	13C5-PFPeA	103%		40-140%
	13C5-PFHxA	104%		50-150%
	13C4-PFHpA	104%		50-150%
	13C8-PFOA	113%		50-150%
	13C9-PFNA	110%		50-150%
	13C6-PFDA	100%		50-150%
	13C7-PFUnDA	77%		50-150%
	13C2-PFDoDA	65%		50-150%
	13C2-PFTeDA	69%		40-150%
	13C3-PFBS	100%		50-150%
	13C3-PFHxS	94%		50-150%
	13C8-PFOS	80%		50-150%
	13C8-FOSA	77%		30-140%
	d3-MeFOSAA	78%		50-150%
	13C2-4:2FTS	108%		50-150%
	13C2-6:2FTS	126%		50-150%
	13C2-8:2FTS	111%		50-150%

(a) Associated BS recovery outside control limits.

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

Report of Analysis

Client Sample ID:	DUP 1		
Lab Sample ID:	FA62774-13	**Date Sampled:**	03/27/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3Q2747.D	1	04/10/19 22:17	NAF	04/05/19 08:30	OP74476	S3Q71
Run #2							

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

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0131	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0143	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0152	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0157	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0309	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00359	0.0040	0.0010	ug/l	J
335-76-2	Perfluorodecanoic acid	0.00349	0.0040	0.0010	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.0288	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	0.00321	0.0040	0.0010	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	0.0209	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.00261	0.0040	0.0010	ug/l	J
1763-23-1	Perfluorooctanesulfonic acid	0.0977	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid [a]	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

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

Report of Analysis

Client Sample ID:	DUP 1		
Lab Sample ID:	FA62774-13	**Date Sampled:**	03/27/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
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	97%		30-140%
	13C5-PFPeA	102%		40-140%
	13C5-PFHxA	97%		50-150%
	13C4-PFHpA	97%		50-150%
	13C8-PFOA	101%		50-150%
	13C9-PFNA	99%		50-150%
	13C6-PFDA	86%		50-150%
	13C7-PFUnDA	68%		50-150%
	13C2-PFDoDA	60%		50-150%
	13C2-PFTeDA	67%		40-150%
	13C3-PFBS	97%		50-150%
	13C3-PFHxS	86%		50-150%
	13C8-PFOS	70%		50-150%
	13C8-FOSA	60%		30-140%
	d3-MeFOSAA	75%		50-150%
	13C2-4:2FTS	106%		50-150%
	13C2-6:2FTS	117%		50-150%
	13C2-8:2FTS	99%		50-150%

(a) Associated BS recovery outside control limits.

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

Report of Analysis

Client Sample ID: P2-MH-114_032719
Lab Sample ID: FA62774-14
Matrix: AQ - Water
Method: EPA 537M BY ID EPA 537 MOD
Project: Racer Lansing PFAS Delineation; Lansing, MI

Date Sampled: 03/27/19
Date Received: 03/28/19
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3Q2749.D	1	04/10/19 22:49	NAF	04/05/19 08:30	OP74476	S3Q71
Run #2							

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

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0230	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0326	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0288	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0212	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0299	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00300	0.0040	0.0010	ug/l	J
335-76-2	Perfluorodecanoic acid	0.00154	0.0040	0.0010	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00486	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	0.00297	0.0040	0.0010	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	0.0363	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.00234	0.0040	0.0010	ug/l	J
1763-23-1	Perfluorooctanesulfonic acid	0.185	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid [a]	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC 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	0.0272	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: P2-MH-114_032719
Lab Sample ID: FA62774-14
Matrix: AQ - Water
Method: EPA 537M BY ID EPA 537 MOD
Project: Racer Lansing PFAS Delineation; Lansing, MI

Date Sampled: 03/27/19
Date Received: 03/28/19
Percent Solids: n/a

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	0.0209	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	103%		30-140%
	13C5-PFPeA	105%		40-140%
	13C5-PFHxA	105%		50-150%
	13C4-PFHpA	105%		50-150%
	13C8-PFOA	112%		50-150%
	13C9-PFNA	99%		50-150%
	13C6-PFDA	78%		50-150%
	13C7-PFUnDA	76%		50-150%
	13C2-PFDoDA	68%		50-150%
	13C2-PFTeDA	64%		40-150%
	13C3-PFBS	100%		50-150%
	13C3-PFHxS	85%		50-150%
	13C8-PFOS	64%		50-150%
	13C8-FOSA	77%		30-140%
	d3-MeFOSAA	59%		50-150%
	13C2-4:2FTS	105%		50-150%
	13C2-6:2FTS	124%		50-150%
	13C2-8:2FTS	80%		50-150%

(a) Associated BS recovery outside control limits.

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

Report of Analysis

Client Sample ID:	P2-MH-86_032719		
Lab Sample ID:	FA62774-15	**Date Sampled:**	03/27/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3Q2750.D	1	04/10/19 23:04	NAF	04/05/19 08:30	OP74476	S3Q71
Run #2							

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

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0124	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0145	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0151	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0155	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0302	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00324	0.0040	0.0010	ug/l	J
335-76-2	Perfluorodecanoic acid	0.00270	0.0040	0.0010	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.0362	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	0.00456	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.0199	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.00165	0.0040	0.0010	ug/l	J
1763-23-1	Perfluorooctanesulfonic acid	0.0860	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid [a]	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC 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:	P2-MH-86_032719		
Lab Sample ID:	FA62774-15	**Date Sampled:**	03/27/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
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	91%		30-140%
	13C5-PFPeA	96%		40-140%
	13C5-PFHxA	92%		50-150%
	13C4-PFHpA	93%		50-150%
	13C8-PFOA	96%		50-150%
	13C9-PFNA	97%		50-150%
	13C6-PFDA	86%		50-150%
	13C7-PFUnDA	66%		50-150%
	13C2-PFDoDA	55%		50-150%
	13C2-PFTeDA	59%		40-150%
	13C3-PFBS	92%		50-150%
	13C3-PFHxS	83%		50-150%
	13C8-PFOS	69%		50-150%
	13C8-FOSA	57%		30-140%
	d3-MeFOSAA	70%		50-150%
	13C2-4:2FTS	101%		50-150%
	13C2-6:2FTS	111%		50-150%
	13C2-8:2FTS	100%		50-150%

(a) Associated BS recovery outside control limits.

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

Report of Analysis

Client Sample ID:	P2-MH-73_032719		
Lab Sample ID:	FA62774-16	**Date Sampled:**	03/27/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3Q2751.D	1	04/10/19 23:20	NAF	04/05/19 08:30	OP74476	S3Q71
Run #2							

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

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.00781	0.0080	0.0020	ug/l	J
2706-90-3	Perfluoropentanoic acid	0.00200	0.0040	0.0015	ug/l	J
307-24-4	Perfluorohexanoic acid	0.00259	0.0040	0.0010	ug/l	J
375-85-9	Perfluoroheptanoic acid	0.00224	0.0040	0.0010	ug/l	J
335-67-1	Perfluorooctanoic acid	0.00717	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00111	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00186	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.00928	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid [a]	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

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

Report of Analysis

Client Sample ID:	P2-MH-73_032719		
Lab Sample ID:	FA62774-16	**Date Sampled:**	03/27/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
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	106%		30-140%
	13C5-PFPeA	107%		40-140%
	13C5-PFHxA	108%		50-150%
	13C4-PFHpA	110%		50-150%
	13C8-PFOA	119%		50-150%
	13C9-PFNA	116%		50-150%
	13C6-PFDA	89%		50-150%
	13C7-PFUnDA	75%		50-150%
	13C2-PFDoDA	51%		50-150%
	13C2-PFTeDA	46%		40-150%
	13C3-PFBS	104%		50-150%
	13C3-PFHxS	96%		50-150%
	13C8-PFOS	64%		50-150%
	13C8-FOSA	93%		30-140%
	d3-MeFOSAA	69%		50-150%
	13C2-4:2FTS	107%		50-150%
	13C2-6:2FTS	127%		50-150%
	13C2-8:2FTS	93%		50-150%

(a) Associated BS recovery outside control limits.

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

Report of Analysis

Client Sample ID:	P2-MH-W_032719		
Lab Sample ID:	FA62774-17	**Date Sampled:**	03/27/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3Q2755.D	1	04/11/19 00:22	NAF	04/05/19 08:30	OP74476	S3Q71
Run #2							

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

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0112	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.00792	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0119	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.00980	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0258	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00326	0.0040	0.0010	ug/l	J
335-76-2	Perfluorodecanoic acid	0.00473	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00288	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00196	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.00943	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid [a]	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC 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:	P2-MH-W_032719		
Lab Sample ID:	FA62774-17	**Date Sampled:**	03/27/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
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	103%		30-140%
	13C5-PFPeA	110%		40-140%
	13C5-PFHxA	111%		50-150%
	13C4-PFHpA	115%		50-150%
	13C8-PFOA	126%		50-150%
	13C9-PFNA	136%		50-150%
	13C6-PFDA	120%		50-150%
	13C7-PFUnDA	88%		50-150%
	13C2-PFDoDA	74%		50-150%
	13C2-PFTeDA	68%		40-150%
	13C3-PFBS	105%		50-150%
	13C3-PFHxS	103%		50-150%
	13C8-PFOS	96%		50-150%
	13C8-FOSA	112%		30-140%
	d3-MeFOSAA	91%		50-150%
	13C2-4:2FTS	116%		50-150%
	13C2-6:2FTS	140%		50-150%
	13C2-8:2FTS	122%		50-150%

(a) Associated BS recovery outside control limits.

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

Report of Analysis

Client Sample ID:	P2-MH-96_032719		
Lab Sample ID:	FA62774-18	**Date Sampled:**	03/27/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3Q2756.D	1	04/11/19 00:38	NAF	04/05/19 08:30	OP74476	S3Q71
Run #2	2Q28938.D	5	04/11/19 20:38	NG	04/05/19 08:30	OP74476	S2Q460
Run #3 [a]	2Q29137.D	1	04/16/19 23:26	NG	04/16/19 07:30	OP74616	S2Q463
Run #4 [a]	2Q29138.D	5	04/16/19 23:41	NG	04/16/19 07:30	OP74616	S2Q463

	Initial Volume	Final Volume
Run #1	250 ml	1.0 ml
Run #2	250 ml	1.0 ml
Run #3	250 ml	1.0 ml
Run #4	250 ml	1.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0191	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0325	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0508	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0263	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0779	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00382	0.0040	0.0010	ug/l	J
335-76-2	Perfluorodecanoic acid	0.00470	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid [b]	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid [b]	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid [b]	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.0306	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	0.0251	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.252	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.0316	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	1.16 [c]	0.020	0.0075	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid [d]	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	

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

Report of Analysis

Client Sample ID:	P2-MH-96_032719		
Lab Sample ID:	FA62774-18	**Date Sampled:**	03/27/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
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
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	0.00391	0.0080	0.0020	ug/l	J
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Run# 3	Limits
	13C4-PFBA	92%	108%	81%	30-140%
	13C5-PFPeA	96%	112%	83%	40-140%
	13C5-PFHxA	94%	113%	80%	50-150%
	13C4-PFHpA	94%	114%	76%	50-150%
	13C8-PFOA	101%	130%	80%	50-150%
	13C9-PFNA	97%	133%	80%	50-150%
	13C6-PFDA	85%	114%	80%	50-150%
	13C7-PFUnDA	60%	57%	59%	50-150%
	13C2-PFDoDA	41% [f]	38% [e]	33% [e]	50-150%
	13C2-PFTeDA	33% [f]	37% [e]	18% [e]	40-150%
	13C3-PFBS	92%	102%	80%	50-150%
	13C3-PFHxS	83%	106%	75%	50-150%
	13C8-PFOS	65%	91%	72%	50-150%
	13C8-FOSA	79%	90%	28% [e]	30-140%
	d3-MeFOSAA	62%	74%	56%	50-150%
	13C2-4:2FTS	100%	95%	83%	50-150%
	13C2-6:2FTS	114%	116%	84%	50-150%
	13C2-8:2FTS	96%	113%	81%	50-150%

(a) Confirmation run.
(b) Associated ID Standard outside control limits due to matrix interference.
(c) Result is from Run# 2
(d) Associated BS recovery outside control limits.
(e) Outside control limits.
(f) Outside control limits due to matrix interference. Confirmed by re-extraction and reanalysis.

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

Report of Analysis

Client Sample ID: P2-MH-58_032719
Lab Sample ID: FA62774-19
Matrix: AQ - Water
Method: EPA 537M BY ID EPA 537 MOD
Project: Racer Lansing PFAS Delineation; Lansing, MI

Date Sampled: 03/27/19
Date Received: 03/28/19
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3Q2757.D	1	04/11/19 00:53	NAF	04/05/19 08:30	OP74476	S3Q71
Run #2 [a]	2Q29139.D	1	04/16/19 23:55	NG	04/16/19 07:30	OP74616	S2Q463

	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
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.00893	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.00199	0.0040	0.0015	ug/l	J
307-24-4	Perfluorohexanoic acid	0.00282	0.0040	0.0010	ug/l	J
375-85-9	Perfluoroheptanoic acid	0.00223	0.0040	0.0010	ug/l	J
335-67-1	Perfluorooctanoic acid	0.00979	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00106	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 [b]	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid [b]	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00154	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00127	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 [c]	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC 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:	P2-MH-58_032719		
Lab Sample ID:	FA62774-19	**Date Sampled:**	03/27/19
Matrix:	AQ - Water	**Date Received:**	03/28/19
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	101%	84%	30-140%
	13C5-PFPeA	104%	89%	40-140%
	13C5-PFHxA	105%	88%	50-150%
	13C4-PFHpA	107%	85%	50-150%
	13C8-PFOA	117%	88%	50-150%
	13C9-PFNA	115%	87%	50-150%
	13C6-PFDA	90%	81%	50-150%
	13C7-PFUnDA	73%	66%	50-150%
	13C2-PFDoDA	50%	56%	50-150%
	13C2-PFTeDA	37% [e]	35% [d]	40-150%
	13C3-PFBS	101%	85%	50-150%
	13C3-PFHxS	94%	85%	50-150%
	13C8-PFOS	65%	79%	50-150%
	13C8-FOSA	90%	36%	30-140%
	d3-MeFOSAA	67%	66%	50-150%
	13C2-4:2FTS	106%	87%	50-150%
	13C2-6:2FTS	125%	85%	50-150%
	13C2-8:2FTS	99%	77%	50-150%

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

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

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

SGS North America Inc - Orlando
Chain of Custody

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

SGS - ORLANDO JOB # : FA62774 PAGE 1 OF 2

SGS - ORLANDO Quote # | SKIFF #

Client / Reporting Information

Company Name: Arcadis
Address: 28550 Cabot Dr. #500
City: Novi State: MI Zip: 48377
Project Contact: Daniel Stockard Email: daniel.stockard@arcadis.com
Phone #: 248-722-2945
Sampler(s) Name(s) (Printed) Sampler 1: Daniel Stockard Sampler 2: Eric Feenstra

Project Information

Project Name: RACER Lansing PFAS Delineation
Street 2801 Saginaw
City Lansing State MI
Project # B0064979.2019.03100
Fax #
Client Purchase Order #

Analytical Information

1 CADS37 DOD FL

Matrix Codes

DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL- Sludge
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid

SGS Orlando Sample #	Field ID / Point of Collection	COLLECTION DATE	COLLECTION TIME	SAMPLED BY:	MATRIX	TOTAL # OF BOTTLES	CONTAINER INFORMATION: OTHER	NONE	HCl	NaOH	HNO3	H2SO4	NAOH+ZNAC	DI WATER	MEOH		LAB USE ONLY
1	P2-MH-30_032619	3/26/19	9:55	Dms	WW	2		2								X	
2	P2-MH-32_032619	3/26/19	10:10														
3	P2-MH-10_032619		10:30														
4	P2-MH-NW_032619		11:00														
5	P2-MH-36_032619		11:30														
6	P2-MH-26_032619		12:00														
7	P2-CB-32_032619		12:30														
8	P2-MH-25_032619		12:45														
9	P2-MH-14_032619		14:00														
10	P2-MH-16_032619		14:20														
11	P2-MH-79_032619		14:45														
12	P2-MH-97_032619		15:10														

Turnaround Time (Business days)

10 Day (Business) Approved By: / Date:
7 Day
5 Day
3 Day *RUSH*
2 Day *RUSH*
1 Day *RUSH*
Other
Rush T/A Data Available VIA Email or Lablink

Data Deliverable Information

- [ ] COMMERCIAL "A" (RESULTS ONLY)
- [x] COMMERCIAL "B" (RESULTS PLUS QC)
- [ ] REDT1 (EPA LEVEL 3)
- [ ] FULLT1 (EPA LEVEL 4)
- [ ] EDD'S

Comments / Remarks

Michigan 24-compound PFAS list

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler/Affiliation	Date Time:	Received By/Affiliation	Relinquished By/Affiliation	Date Time:	Received By/Affiliation
Daniel Stockard Arcadis	3/27 15:00	2 Fed Ex	3 Fed Ex		4 03/28/19 945
Relinquished by/Affiliation	Date Time:	Received By/Affiliation	Relinquished By/Affiliation	Date Time:	Received By/Affiliation
5		6	7		8

Lab Use Only : Cooler Temperature (s) Celsius (corrected): 2.6, 2.1

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

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FA62774: Chain of Custody
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SGS North America Inc - Orlando

Chain of Custody

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

SGS - ORLANDO JOB # : FA62774 PAGE 2 OF 2

SGS - ORLANDO Quote # | SKIFF #

Client / Reporting Information

Company Name: Arcadis
Address: 28550 Cabot Dr
City: Novi State: MI Zip: 48377
Project Contact: D. Stockard Email:
Phone #:
Sampler(s) Name(s) (Printed) Sampler 1: Daniel Stockard Sampler 2: Eric Feenstra

Project Information

Project Name: RACER Lansing PFAS Delineation
Street
City Lansing State MI
Project # 30064479.2019.03100
Fax #
Client Purchase Order #

Analytical Information

LCID 537 DoD FL

Matrix Codes

DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL- Sludge
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid

SGS Orlando Sample #	Field ID / Point of Collection	COLLECTION DATE	TIME	SAMPLED BY:	MATRIX	TOTAL # OF BOTTLES	CONTAINER INFORMATION: OTHER	NONE	HCl	NaOH	HNO3	H2SO4	NaOH+ZnAc	DI WATER	MEOH	LAB USE ONLY
13	DUP1	3/27/19		DMS	WW	2		2								X
14	P2-MH-114-032719		9:00													
15	P2-MH-86-032719		11:00													
16	P2-MH-73-032719		12:00													
17	P2-MH-W-032719		12:50													
18	P2-MH-96-032719	3/27/19	10:50	DMS	WW	2		2								X

Turnaround Time (Business days)

Approved By: / Date:

- 10 Day (Business)
- 7 Day
- 5 Day
- 3 Day *RUSH*
- 2 Day *RUSH*
- 1 Day *RUSH*
- Other

Rush T/A Data Available VIA Email or Lablink

Data Deliverable Information

- [ ] COMMERCIAL "A" (RESULTS ONLY)
- [x] COMMERCIAL "B" (RESULTS PLUS QC)
- [ ] REDT1 (EPA LEVEL 3)
- [ ] FULLT1 (EPA LEVEL 4)
- [ ] EDD'S

Comments / Remarks

Analyze for MI 24-compound PFAS list

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by/Sampler/Affiliation	Date Time:	Received By/Affiliation	Relinquished By/Affiliation	Date Time:	Received By/Affiliation
Daniel Stockard Arcadis	3/27 15:00	Fed Ex	3 Fed Ex		4 03/28/19
Relinquished by/Affiliation	Date Time:	Received By/Affiliation	Relinquished By/Affiliation	Date Time:	Received By/Affiliation
5		6	7		8

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

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

ORLD-SMT-0001-03-FORM-COC (4).xls Rev 031318

2.6, 2.1

SGS Sample Receipt Summary

Job Number: FA62774 **Client:** ARCADIS **Project:** RACER LANSING PFAS DELINEATION

Date / Time Received: 3/28/2019 9:45:00 AM **Delivery Method:** FED EX **Airbill #'s:** 1001892124060003281100786289936890

Therm ID: IR 1; **Therm CF:** 0.4; **# of Coolers:** 2

Cooler Temps (Raw Measured) °C: Cooler 1: (2.2); Cooler 2: (1.7);

Cooler Temps (Corrected) °C: Cooler 1: (2.6); Cooler 2: (2.1);

Cooler Information	Y	or	N
1. Custody Seals Present	☑		☐
2. Custody Seals Intact	☑		☐
3. Temp criteria achieved	☑		☐
4. Cooler temp verification	IR Gun		
5. Cooler media	Ice (Bag)		

Trip Blank Information	Y	or	N	N/A
1. Trip Blank present / cooler	☐		☐	☑
2. Trip Blank listed on COC	☐		☐	☑

	W	or	S	N/A
3. Type Of TB Received	☐		☐	☑

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

Misc. Information

Number of Encores: 25-Gram _____ 5-Gram _____ Number of 5035 Field Kits: _____ Number of Lab Filtered Metals: _____

Test Strip Lot #s: pH 0-3 230315 pH 10-12 219813A Other: (Specify) _____ _____

Residual Chlorine Test Strip Lot #: _____

Comments EXTRA SAMPLE REC'D. ID LABEL READS "PZ-MH-58-032719" @1210. WILL BE SAMPLE #19.

SM001
Rev. Date 05/24/17

Technician: SHAYLAP Date: 3/28/2019 9:45:00 AM Reviewer: _____ Date: _____

Responded to by: Andrea Colby

Response Date: 3/28/19

Response:

Please analyze the extra sample received per Dan Stockard.

FA62774: 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: FA62774
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q460-IBLK	2Q28928.D	1	04/11/19	NG	n/a	n/a	S2Q460

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA62774-10, FA62774-18

CAS No.	Compound	Result	RL	MDL	Units	Q
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	

CAS No.	ID Standard Recoveries		Limits
	13C4-PFBA	102%	30-140%
	13C5-PFPeA	107%	40-140%
	13C5-PFHxA	110%	50-150%
	13C4-PFHpA	104%	50-150%
	13C8-PFOA	118%	50-150%
	13C9-PFNA	137%	50-150%
	13C6-PFDA	134%	50-150%
	13C7-PFUnDA	113%	50-150%
	13C2-PFDoDA	123%	50-150%
	13C2-PFTeDA	131%	40-150%
	13C3-PFBS	102%	50-150%
	13C3-PFHxS	100%	50-150%
	13C8-PFOS	113%	50-150%
	13C8-FOSA	111%	30-140%
	d3-MeFOSAA	121%	50-150%
	13C2-4:2FTS	95%	50-150%
	13C2-6:2FTS	104%	50-150%
	13C2-8:2FTS	146%	50-150%

Method Blank Summary

Job Number: FA62774
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP74476-MB	3Q2731.D	1	04/10/19	NAF	04/05/19	OP74476	S3Q71

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA62774-1, FA62774-2, FA62774-3, FA62774-4, FA62774-5, FA62774-6, FA62774-7, FA62774-8, FA62774-9, FA62774-10, FA62774-11, FA62774-12, FA62774-13, FA62774-14, FA62774-15, FA62774-16, FA62774-17, FA62774-18, FA62774-19

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.0077	0.0019	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0038	0.0014	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0038	0.00096	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0038	0.00096	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0038	0.00096	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0038	0.00096	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0038	0.00096	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0038	0.00096	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0038	0.0014	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0038	0.00096	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0038	0.00096	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0038	0.00096	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0038	0.00096	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0038	0.00096	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0038	0.00096	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0038	0.0014	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0038	0.00096	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0038	0.00096	ug/l	
754-91-6	PFOSA	ND	0.0038	0.00096	ug/l	
2355-31-9	MeFOSAA	ND	0.019	0.0038	ug/l	
2991-50-6	EtFOSAA	ND	0.019	0.0038	ug/l	
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	

CAS No.	ID Standard Recoveries		Limits
	13C4-PFBA	121%	30-140%
	13C5-PFPeA	117%	40-140%
	13C5-PFHxA	119%	50-150%
	13C4-PFHpA	120%	50-150%
	13C8-PFOA	135%	50-150%
	13C9-PFNA	134%	50-150%
	13C6-PFDA	113%	50-150%
	13C7-PFUnDA	90%	50-150%

Method Blank Summary

Job Number: FA62774
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP74476-MB	3Q2731.D	1	04/10/19	NAF	04/05/19	OP74476	S3Q71

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA62774-1, FA62774-2, FA62774-3, FA62774-4, FA62774-5, FA62774-6, FA62774-7, FA62774-8, FA62774-9, FA62774-10, FA62774-11, FA62774-12, FA62774-13, FA62774-14, FA62774-15, FA62774-16, FA62774-17, FA62774-18, FA62774-19

CAS No.	ID Standard Recoveries		Limits
	13C2-PFDoDA	76%	50-150%
	13C2-PFTeDA	71%	40-150%
	13C3-PFBS	115%	50-150%
	13C3-PFHxS	112%	50-150%
	13C8-PFOS	77%	50-150%
	13C8-FOSA	104%	30-140%
	d3-MeFOSAA	95%	50-150%
	13C2-4:2FTS	111%	50-150%
	13C2-6:2FTS	139%	50-150%
	13C2-8:2FTS	107%	50-150%

Instrument Blank

Job Number: FA62774
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S3Q71-IBLK	3Q2719.D	1	04/10/19	NAF	n/a	n/a	S3Q71

The QC reported here applies to the following samples: **Method:** EPA 537M QSM5.1 B-15

FA62774-1, FA62774-2, FA62774-3, FA62774-4, FA62774-5, FA62774-6, FA62774-7, FA62774-8, FA62774-9, FA62774-10, FA62774-11, FA62774-12, FA62774-13, FA62774-14, FA62774-15, FA62774-16, FA62774-17, FA62774-18, FA62774-19

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.015	0.0038	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0077	0.0029	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0077	0.0019	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0077	0.0019	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0077	0.0019	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0077	0.0019	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0077	0.0019	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0077	0.0019	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0077	0.0029	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0077	0.0019	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0077	0.0019	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0077	0.0019	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0077	0.0019	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0077	0.0019	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0077	0.0019	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0077	0.0029	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0077	0.0019	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0077	0.0019	ug/l	
754-91-6	PFOSA	ND	0.0077	0.0019	ug/l	
2355-31-9	MeFOSAA	ND	0.038	0.0077	ug/l	
2991-50-6	EtFOSAA	ND	0.038	0.0077	ug/l	
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	

CAS No.	ID Standard Recoveries		Limits
	13C4-PFBA	104%	50-150%
	13C5-PFPeA	104%	50-150%
	13C5-PFHxA	104%	50-150%
	13C4-PFHpA	104%	50-150%
	13C8-PFOA	107%	50-150%
	13C9-PFNA	107%	50-150%
	13C6-PFDA	110%	50-150%
	13C7-PFUnDA	107%	50-150%

Instrument Blank

Job Number: FA62774
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S3Q71-IBLK	3Q2719.D	1	04/10/19	NAF	n/a	n/a	S3Q71

The QC reported here applies to the following samples: **Method:** EPA 537M QSM5.1 B-15

FA62774-1, FA62774-2, FA62774-3, FA62774-4, FA62774-5, FA62774-6, FA62774-7, FA62774-8, FA62774-9, FA62774-10, FA62774-11, FA62774-12, FA62774-13, FA62774-14, FA62774-15, FA62774-16, FA62774-17, FA62774-18, FA62774-19

CAS No.	ID Standard Recoveries		Limits
	13C2-PFDoDA	107%	50-150%
	13C2-PFTeDA	103%	50-150%
	13C3-PFBS	103%	50-150%
	13C3-PFHxS	104%	50-150%
	13C8-PFOS	105%	50-150%
	13C8-FOSA	108%	50-150%
	d3-MeFOSAA	107%	50-150%
	13C2-4:2FTS	96%	50-150%
	13C2-6:2FTS	100%	50-150%
	13C2-8:2FTS	100%	50-150%

Blank Spike Summary

Job Number: FA62774
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP74476-BS	3Q2730.D	1	04/10/19	NAF	04/05/19	OP74476	S3Q71

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA62774-1, FA62774-2, FA62774-3, FA62774-4, FA62774-5, FA62774-6, FA62774-7, FA62774-8, FA62774-9, FA62774-10, FA62774-11, FA62774-12, FA62774-13, FA62774-14, FA62774-15, FA62774-16, FA62774-17, FA62774-18, FA62774-19

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
375-22-4	Perfluorobutanoic acid	0.0769	0.0710	92	70-130
2706-90-3	Perfluoropentanoic acid	0.0769	0.0667	87	70-130
307-24-4	Perfluorohexanoic acid	0.0769	0.0692	90	70-130
375-85-9	Perfluoroheptanoic acid	0.0769	0.0714	93	71-130
335-67-1	Perfluorooctanoic acid	0.0769	0.0706	92	74-130
375-95-1	Perfluorononanoic acid	0.0769	0.0694	90	76-130
335-76-2	Perfluorodecanoic acid	0.0769	0.0684	89	70-130
2058-94-8	Perfluoroundecanoic acid	0.0769	0.0706	92	70-130
307-55-1	Perfluorododecanoic acid	0.0769	0.0690	90	70-130
72629-94-8	Perfluorotridecanoic acid	0.0769	0.0712	93	70-139
376-06-7	Perfluorotetradecanoic acid	0.0769	0.0691	90	70-130
375-73-5	Perfluorobutanesulfonic acid	0.0769	0.0661	86	73-130
2706-91-4	Perfluoropentanesulfonic acid	0.0769	0.0655	85	70-130
355-46-4	Perfluorohexanesulfonic acid	0.0769	0.0702	91	74-130
375-92-8	Perfluoroheptanesulfonic acid	0.0769	0.0639	83	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.0769	0.0704	92	70-130
68259-12-1	Perfluorononanesulfonic acid	0.0769	0.0657	85	70-130
335-77-3	Perfluorodecanesulfonic acid	0.0769	0.0517	67* [a]	70-130
754-91-6	PFOSA	0.0769	0.0695	90	70-131
2355-31-9	MeFOSAA	0.0769	0.0710	92	70-130
2991-50-6	EtFOSAA	0.0769	0.0686	89	70-130
757124-72-4	4:2 Fluorotelomer sulfonate	0.0769	0.0760	99	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	0.0769	0.0733	95	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	0.0769	0.0732	95	70-130

CAS No.	ID Standard Recoveries	BSP	Limits
	13C4-PFBA	117%	30-140%
	13C5-PFPeA	114%	40-140%
	13C5-PFHxA	115%	50-150%
	13C4-PFHpA	116%	50-150%
	13C8-PFOA	127%	50-150%
	13C9-PFNA	125%	50-150%
	13C6-PFDA	108%	50-150%
	13C7-PFUnDA	91%	50-150%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA62774
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP74476-BS	3Q2730.D	1	04/10/19	NAF	04/05/19	OP74476	S3Q71

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA62774-1, FA62774-2, FA62774-3, FA62774-4, FA62774-5, FA62774-6, FA62774-7, FA62774-8, FA62774-9, FA62774-10, FA62774-11, FA62774-12, FA62774-13, FA62774-14, FA62774-15, FA62774-16, FA62774-17, FA62774-18, FA62774-19

CAS No.	ID Standard Recoveries	BSP	Limits
	13C2-PFDoDA	80%	50-150%
	13C2-PFTeDA	75%	40-150%
	13C3-PFBS	114%	50-150%
	13C3-PFHxS	110%	50-150%
	13C8-PFOS	76%	50-150%
	13C8-FOSA	105%	30-140%
	d3-MeFOSAA	95%	50-150%
	13C2-4:2FTS	115%	50-150%
	13C2-6:2FTS	135%	50-150%
	13C2-8:2FTS	109%	50-150%

(a) Sporadic marginal failure.

* = Outside of Control Limits.

Matrix Spike Summary

Job Number: FA62774
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP74476-MS	3Q2738.D	1	04/10/19	NAF	04/05/19	OP74476	S3Q71
FA62774-6	3Q2737.D	1	04/10/19	NAF	04/05/19	OP74476	S3Q71

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA62774-1, FA62774-2, FA62774-3, FA62774-4, FA62774-5, FA62774-6, FA62774-7, FA62774-8, FA62774-9, FA62774-10, FA62774-11, FA62774-12, FA62774-13, FA62774-14, FA62774-15, FA62774-16, FA62774-17, FA62774-18, FA62774-19

CAS No.	Compound	FA62774-6 ug/l	Q	Spike ug/l	MS ug/l	MS %	Limits
375-22-4	Perfluorobutanoic acid	0.0136		0.08	0.0842	88	70-130
2706-90-3	Perfluoropentanoic acid	0.0138		0.08	0.0777	80	70-130
307-24-4	Perfluorohexanoic acid	0.0140		0.08	0.0823	85	70-130
375-85-9	Perfluoroheptanoic acid	0.0134		0.08	0.0834	88	71-130
335-67-1	Perfluorooctanoic acid	0.0275		0.08	0.0955	85	74-130
375-95-1	Perfluorononanoic acid	0.00334	J	0.08	0.0727	87	76-130
335-76-2	Perfluorodecanoic acid	0.00327	J	0.08	0.0732	87	70-130
2058-94-8	Perfluoroundecanoic acid	ND		0.08	0.0711	89	70-130
307-55-1	Perfluorododecanoic acid	ND		0.08	0.0721	90	70-130
72629-94-8	Perfluorotridecanoic acid	ND		0.08	0.0702	88	70-139
376-06-7	Perfluorotetradecanoic acid	ND		0.08	0.0731	91	70-130
375-73-5	Perfluorobutanesulfonic acid	0.00766		0.08	0.0747	84	73-130
2706-91-4	Perfluoropentanesulfonic acid	0.00206	J	0.08	0.0664	80	70-130
355-46-4	Perfluorohexanesulfonic acid	0.0139		0.08	0.0830	86	74-130
375-92-8	Perfluoroheptanesulfonic acid	0.00167	J	0.08	0.0741	91	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.111		0.08	0.143	40*	70-130
68259-12-1	Perfluorononanesulfonic acid	ND		0.08	0.0594	74	70-130
335-77-3	Perfluorodecanesulfonic acid	ND		0.08	0.0496	62*	70-130
754-91-6	PFOSA	ND		0.08	0.0717	90	70-131
2355-31-9	MeFOSAA	ND		0.08	0.0743	93	70-130
2991-50-6	EtFOSAA	ND		0.08	0.0650	81	70-130
757124-72-4	4:2 Fluorotelomer sulfonate	ND		0.08	0.0763	95	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	0.00228	J	0.08	0.0755	92	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	ND		0.08	0.0748	94	70-130

CAS No.	ID Standard Recoveries	MS	FA62774-6	Limits
	13C4-PFBA	96%	98%	30-140%
	13C5-PFPeA	100%	104%	40-140%
	13C5-PFHxA	96%	100%	50-150%
	13C4-PFHpA	97%	101%	50-150%
	13C8-PFOA	102%	106%	50-150%
	13C9-PFNA	101%	106%	50-150%
	13C6-PFDA	89%	94%	50-150%
	13C7-PFUnDA	75%	74%	50-150%

* = Outside of Control Limits.

Matrix Spike Summary

Job Number: FA62774
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP74476-MS	3Q2738.D	1	04/10/19	NAF	04/05/19	OP74476	S3Q71
FA62774-6	3Q2737.D	1	04/10/19	NAF	04/05/19	OP74476	S3Q71

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA62774-1, FA62774-2, FA62774-3, FA62774-4, FA62774-5, FA62774-6, FA62774-7, FA62774-8, FA62774-9, FA62774-10, FA62774-11, FA62774-12, FA62774-13, FA62774-14, FA62774-15, FA62774-16, FA62774-17, FA62774-18, FA62774-19

CAS No.	ID Standard Recoveries	MS	FA62774-6	Limits
	13C2-PFDoDA	70%	64%	50-150%
	13C2-PFTeDA	71%	70%	40-150%
	13C3-PFBS	96%	99%	50-150%
	13C3-PFHxS	87%	87%	50-150%
	13C8-PFOS	77%	75%	50-150%
	13C8-FOSA	74%	82%	30-140%
	d3-MeFOSAA	80%	77%	50-150%
	13C2-4:2FTS	108%	108%	50-150%
	13C2-6:2FTS	121%	121%	50-150%
	13C2-8:2FTS	110%	107%	50-150%

* = Outside of Control Limits.

Duplicate Summary

Job Number: FA62774
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP74476-DUP	3Q2748.D	1	04/10/19	NAF	04/05/19	OP74476	S3Q71
FA62774-13	3Q2747.D	1	04/10/19	NAF	04/05/19	OP74476	S3Q71

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA62774-1, FA62774-2, FA62774-3, FA62774-4, FA62774-5, FA62774-6, FA62774-7, FA62774-8, FA62774-9, FA62774-10, FA62774-11, FA62774-12, FA62774-13, FA62774-14, FA62774-15, FA62774-16, FA62774-17, FA62774-18, FA62774-19

CAS No.	Compound	FA62774-13 ug/l	Q	DUP ug/l	Q	RPD	Limits
375-22-4	Perfluorobutanoic acid	0.0131		0.0121		8	30
2706-90-3	Perfluoropentanoic acid	0.0143		0.0150		5	30
307-24-4	Perfluorohexanoic acid	0.0152		0.0153		1	30
375-85-9	Perfluoroheptanoic acid	0.0157		0.0154		2	30
335-67-1	Perfluorooctanoic acid	0.0309		0.0301		3	30
375-95-1	Perfluorononanoic acid	0.00359	J	0.00335	J	7	30
335-76-2	Perfluorodecanoic acid	0.00349	J	0.00322	J	8	30
2058-94-8	Perfluoroundecanoic acid	ND		ND		nc	30
307-55-1	Perfluorododecanoic acid	ND		ND		nc	30
72629-94-8	Perfluorotridecanoic acid	ND		ND		nc	30
376-06-7	Perfluorotetradecanoic acid	ND		ND		nc	30
375-73-5	Perfluorobutanesulfonic acid	0.0288		0.0293		2	30
2706-91-4	Perfluoropentanesulfonic acid	0.00321	J	0.00430		29	30
355-46-4	Perfluorohexanesulfonic acid	0.0209		0.0195		7	30
375-92-8	Perfluoroheptanesulfonic acid	0.00261	J	0.00233	J	11	30
1763-23-1	Perfluorooctanesulfonic acid	0.0977		0.0937		4	30
68259-12-1	Perfluorononanesulfonic acid	ND		ND		nc	30
335-77-3	Perfluorodecanesulfonic acid	ND		ND		nc	30
754-91-6	PFOSA	ND		ND		nc	30
2355-31-9	MeFOSAA	ND		ND		nc	30
2991-50-6	EtFOSAA	ND		ND		nc	30
757124-72-4	4:2 Fluorotelomer sulfonate	ND		ND		nc	30
27619-97-2	6:2 Fluorotelomer sulfonate	ND		ND		nc	30
39108-34-4	8:2 Fluorotelomer sulfonate	ND		ND		nc	30

CAS No.	ID Standard Recoveries	DUP	FA62774-13	Limits
	13C4-PFBA	90%	97%	30-140%
	13C5-PFPeA	98%	102%	40-140%
	13C5-PFHxA	94%	97%	50-150%
	13C4-PFHpA	94%	97%	50-150%
	13C8-PFOA	99%	101%	50-150%
	13C9-PFNA	98%	99%	50-150%
	13C6-PFDA	84%	86%	50-150%
	13C7-PFUnDA	62%	68%	50-150%

* = Outside of Control Limits.

Duplicate Summary

Job Number: FA62774
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP74476-DUP	3Q2748.D	1	04/10/19	NAF	04/05/19	OP74476	S3Q71
FA62774-13	3Q2747.D	1	04/10/19	NAF	04/05/19	OP74476	S3Q71

The QC reported here applies to the following samples: **Method:** EPA 537M BY ID

FA62774-1, FA62774-2, FA62774-3, FA62774-4, FA62774-5, FA62774-6, FA62774-7, FA62774-8, FA62774-9, FA62774-10, FA62774-11, FA62774-12, FA62774-13, FA62774-14, FA62774-15, FA62774-16, FA62774-17, FA62774-18, FA62774-19

CAS No.	ID Standard Recoveries	DUP	FA62774-13	Limits
	13C2-PFDoDA	59%	60%	50-150%
	13C2-PFTeDA	69%	67%	40-150%
	13C3-PFBS	93%	97%	50-150%
	13C3-PFHxS	85%	86%	50-150%
	13C8-PFOS	67%	70%	50-150%
	13C8-FOSA	60%	60%	30-140%
	d3-MeFOSAA	70%	75%	50-150%
	13C2-4:2FTS	101%	106%	50-150%
	13C2-6:2FTS	113%	117%	50-150%
	13C2-8:2FTS	99%	99%	50-150%

* = Outside of Control Limits.

Analytical Laboratory Report

Report ID: S00286.01(01)
Generated on 03/29/2019

Report to

Attention: Daniel Stockard
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Phone: 248-722-2945 FAX: 248-994-2241
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Report Summary

Lab Sample ID(s): S00286.01-S00286.19
Project: B0064479.2019.03100 / RACER Lansing
Collected Date: 03/26/2019 - 03/27/2019
Submitted Date/Time: 03/27/2019 15:56
Sampled by: Daniel Stockard
P.O. #: B0064479.2019.03100

Table of Contents

Maya Murshak
Technical Director

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

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

Glossary of Abbreviations

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

Method Summary

Method	Version
N/A	Not Applicable
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Sample Summary (19 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S00286.01	P2-MH-30_032619	Wastewater	03/26/19 09:55
S00286.02	P2-MH-32_032619	Wastewater	03/26/19 10:10
S00286.03	P2-MH-10_032619	Wastewater	03/26/19 10:30
S00286.04	P2-MH-NW_032619	Wastewater	03/26/19 11:00
S00286.05	P2-MH-36_032619	Wastewater	03/26/19 11:30
S00286.06	P2-MH-26_032619	Wastewater	03/26/19 12:00
S00286.07	P2-CB-32_032619	Wastewater	03/26/19 12:30
S00286.08	P2-MH-25_032619	Wastewater	03/26/19 12:45
S00286.09	P2-MH-14_032619	Wastewater	03/26/19 14:06
S00286.10	P2-MH-16_032619	Wastewater	03/26/19 14:20
S00286.11	P2-MH-79_032619	Wastewater	03/26/19 14:45
S00286.12	P2-MH-97_032619	Wastewater	03/26/19 15:10
S00286.13	DUP1	Wastewater	03/27/19 00:01
S00286.14	P2-MH-114_032719	Wastewater	03/27/19 09:00
S00286.15	P2-MH-86_032719	Wastewater	03/27/19 11:00
S00286.16	P2-MH-73_032719	Wastewater	03/27/19 12:00
S00286.17	P2-MH-W_032719	Wastewater	03/27/19 12:50
S00286.18	P2-MH-96_032719	Wastewater	03/27/19 10:50
S00286.19	P2-MH-58_032719	Wastewater	03/27/19 12:10

Analytical Laboratory Report

Lab Sample ID: S00286.01
Sample Tag: P2-MH-30_032619
Collected Date/Time: 03/26/2019 09:55
Matrix: Wastewater
COC Reference: 121496

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.9	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	03/29/19 13:30	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 03/28/19 15:58, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	8	1		ug/L	1	123-91-1	

Analytical Laboratory Report

Lab Sample ID: S00286.02
Sample Tag: P2-MH-32_032619
Collected Date/Time: 03/26/2019 10:10
Matrix: Wastewater
COC Reference: 121496

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.9	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	03/29/19 13:30	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 03/28/19 16:19, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	

Lab Sample ID: S00286.03
Sample Tag: P2-MH-10_032619
Collected Date/Time: 03/26/2019 10:30
Matrix: Wastewater
COC Reference: 121496

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.9	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	03/29/19 13:30	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 03/28/19 16:41, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	

Analytical Laboratory Report

Lab Sample ID: S00286.04
Sample Tag: P2-MH-NW_032619
Collected Date/Time: 03/26/2019 11:00
Matrix: Wastewater
COC Reference: 121496

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.9	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	03/29/19 13:30	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 03/28/19 17:02, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	10	1		ug/L	1	123-91-1	

Lab Sample ID: S00286.05
Sample Tag: P2-MH-36_032619
Collected Date/Time: 03/26/2019 11:30
Matrix: Wastewater
COC Reference: 121496

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.9	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	03/29/19 13:30	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 03/28/19 17:24, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	

Analytical Laboratory Report

Lab Sample ID: S00286.06
Sample Tag: P2-MH-26_032619
Collected Date/Time: 03/26/2019 12:00
Matrix: Wastewater
COC Reference: 121496

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.9	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	03/29/19 13:30	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 03/28/19 17:46, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	16	1		ug/L	1	123-91-1	

Lab Sample ID: S00286.07
Sample Tag: P2-CB-32_032619
Collected Date/Time: 03/26/2019 12:30
Matrix: Wastewater
COC Reference: 121496

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.9	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	03/29/19 13:30	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 03/28/19 18:07, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	

Lab Sample ID: S00286.08
Sample Tag: P2-MH-25_032619
Collected Date/Time: 03/26/2019 12:45
Matrix: Wastewater
COC Reference: 121496

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.9	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	03/29/19 13:30	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 03/28/19 18:28, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	1	1		ug/L	1	123-91-1	

Lab Sample ID: S00286.09
Sample Tag: P2-MH-14_032619
Collected Date/Time: 03/26/2019 14:06
Matrix: Wastewater
COC Reference: 121496

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.9	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	03/29/19 13:30	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 03/28/19 18:49, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	

Analytical Laboratory Report

Lab Sample ID: S00286.10
Sample Tag: P2-MH-16_032619
Collected Date/Time: 03/26/2019 14:20
Matrix: Wastewater
COC Reference: 121496

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.9	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	03/29/19 13:30	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 03/28/19 19:11, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	

Lab Sample ID: S00286.11
Sample Tag: P2-MH-79_032619
Collected Date/Time: 03/26/2019 14:45
Matrix: Wastewater
COC Reference: 121496

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.9	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	03/29/19 13:30	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 03/28/19 19:32, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	47	1		ug/L	1	123-91-1	

Lab Sample ID: S00286.12
Sample Tag: P2-MH-97_032619
Collected Date/Time: 03/26/2019 15:10
Matrix: Wastewater
COC Reference: 121496

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.9	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	03/29/19 13:30	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 03/28/19 19:54, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	2	1		ug/L	1	123-91-1	

Lab Sample ID: S00286.13
Sample Tag: DUP1
Collected Date/Time: 03/27/2019 00:01
Matrix: Wastewater
COC Reference: 121498

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.9	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	03/29/19 13:30	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 03/28/19 20:15, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	14	1		ug/L	1	123-91-1	

Lab Sample ID: S00286.14
Sample Tag: P2-MH-114_032719
Collected Date/Time: 03/27/2019 09:00
Matrix: Wastewater
COC Reference: 121498

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.9	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	03/29/19 13:30	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 03/28/19 20:36, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	

Lab Sample ID: S00286.15
Sample Tag: P2-MH-86_032719
Collected Date/Time: 03/27/2019 11:00
Matrix: Wastewater
COC Reference: 121498

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.9	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	03/29/19 13:30	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 03/28/19 20:58, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	11	1		ug/L	1	123-91-1	

Analytical Laboratory Report

Lab Sample ID: S00286.16
Sample Tag: P2-MH-73_032719
Collected Date/Time: 03/27/2019 12:00
Matrix: Wastewater
COC Reference: 121498

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.9	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	03/29/19 13:30	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 03/28/19 21:19, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	

Lab Sample ID: S00286.17
Sample Tag: P2-MH-W_032719
Collected Date/Time: 03/27/2019 12:50
Matrix: Wastewater
COC Reference: 121498

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.9	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	03/29/19 13:30	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 03/28/19 21:41, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	

Lab Sample ID: S00286.18
Sample Tag: P2-MH-96_032719
Collected Date/Time: 03/27/2019 10:50
Matrix: Wastewater
COC Reference: 121498

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.9	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	03/29/19 13:30	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 03/28/19 22:02, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	11	1		ug/L	1	123-91-1	

Analytical Laboratory Report

Lab Sample ID: S00286.19
Sample Tag: P2-MH-58_032719
Collected Date/Time: 03/27/2019 12:10
Matrix: Wastewater
COC Reference: 121498

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	5.9	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	03/29/19 13:30	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 03/28/19 22:23, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,4-Dioxane*	Not detected	1		ug/L	1	123-91-1	

Merit Laboratories Login Checklist

Lab Set ID: S00286
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: B0064479.2019.03100 / RACER Lansing
Submitted: 03/27/2019 15:56 Login User: SRS

Attention: Daniel Stockard
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-722-2945 FAX: 248-994-2241
Email: Daniel.Stockard@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 5.9
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[X] No	[ ] N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # _____ OF _____ 121496

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Daniel Stockard
COMPANY: Arcadis
ADDRESS: 28550 Cabot Dr #500
CITY: Novi STATE: MI ZIP CODE: 48377
PHONE NO.: 248-722-2945 FAX NO.:
P.O. NO.: B0064479.2019.03100
E-MAIL ADDRESS: daniel.stockard@arcadis.com
QUOTE NO.:

INVOICE TO

CONTACT NAME: [X] SAME
COMPANY:
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: E-MAIL ADDRESS:

PROJECT NO./NAME: B0064479.2019.03100 RACER Lansing
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Daniel Stockard

TURNAROUND TIME REQUIRED ☐ 1 DAY ☐ 2 DAYS ☐ 3 DAYS [X] STANDARD ☐ OTHER _____

DELIVERABLES REQUIRED ☐ STD [X] LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER _____

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☐ Other _____

Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4-Dioxane 8260 SIMS
002860.01	3/26	9:55	P2-MH-30_032619	WW	3		3						X
.02		10:10	P2-MH-32_032619										
.03		10:30	P2-MH-10_032619										
.04		11:00	P2-MH-NW-032619										
.05		11:30	P2-MH-36_032619										
.06		12:00	P2-MH-26_032619										
.07		12:30	P2-OB-32_032619										
.08		12:45	P2-MH-25_032619										
.09		14:00	P2-MH-14_032619										
.10		14:20	P2-MH-16_032619										
.11		14:45	P2-MH-79_032619										
.12	↓	15:10	P2-MH-97_032619	↓	↓		↓						↓

		DATE	TIME
RELINQUISHED BY: SIGNATURE/ORGANIZATION	Daniel Stockard / Arcadis	3/27/19	15:56
RECEIVED BY: SIGNATURE/ORGANIZATION	M Chilcote	3/27/19	1556
RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME

		DATE	TIME
RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME

SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS

NOTES: TEMP. ON ARRIVAL 5.9

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12

Merit Laboratories, Inc.
2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # _____ OF _____ 121498

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME Daniel Stockard
COMPANY Arcadis
ADDRESS 28550 Cabot Dr. #500
CITY Novi STATE MI ZIP CODE 48377
PHONE NO. 248-722-2945 FAX NO.
P.O. NO. B006479.2019.03100
E-MAIL ADDRESS QUOTE NO.

INVOICE TO

CONTACT NAME X SAME
COMPANY
ADDRESS
CITY STATE ZIP CODE
PHONE NO. E-MAIL ADDRESS

PROJECT NO./NAME RACER Lansing
SAMPLER(S) - PLEASE PRINT/SIGN NAME

TURNAROUND TIME REQUIRED ☐ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☒ STANDARD ☐ OTHER _____

DELIVERABLES REQUIRED ☐ STD ☒ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER _____

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

1,4 Dioxane 8260 SIMS

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☐ Other _____

Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4 Dioxane 8260 SIMS
602886.13	3/27/19		DUP1	WW	3		3						X
.14		9:00	P2-MH-14_032719										
.15		11:00	P2-MH-86_032719										
.16		12:00	P2-MH-73_032719										
.17		12:50	P2-MH-W_032719										
.18	3/27	10:50	P2-MH-96_032719	WW	3		3						X
.19													

RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME
Daniel Stockard Arcadis (X Sampler)	3/27/19	15:56
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME
M Calcaterra	3/27/19	1556
RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME

RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME

SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS

NOTES: TEMP. ON ARRIVAL 5.9

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 5.18.12