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RACER Trust

PFAS Groundwater Sampling Summary

Pontiac North Campus

Original Submittal: January 19, 2024
Re-Submittal: April 24, 2024
Re-Submittal: June 27, 2024
Re-Submittal: July 12, 2024

PFAS Groundwater Sampling Summary

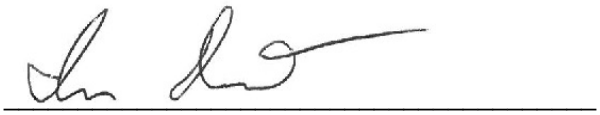
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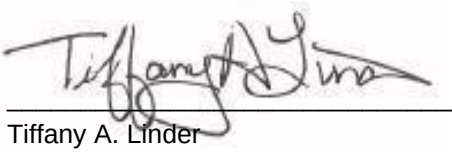
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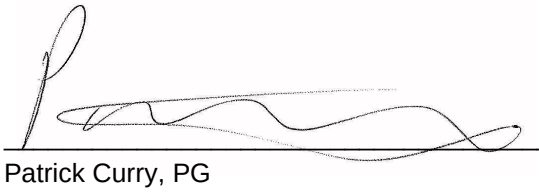
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Acronyms and Abbreviations

AOI	area of interest
bgs	below ground surface
COC	contaminant of concern
CSM	conceptual site model
DW	drinking water
EGLE	Michigan Department of Environment, Great Lakes, and Energy
EIS	extracted internal standard
FTS (6:2)	fluorotelomer sulfonic acid 6:2
GSI	groundwater surface water interface
HDPE	high density polyethylene
J/UJ	estimated result
LC-MS/MS	liquid chromatography-tandem mass
LOQ	limit of quantitation
MS/MSD	matrix spike and matrix spike duplicate
ng/L	nanograms per liter
NMFD	Northern Metal Fabrication Division
PCBs	polychloride biphenyls
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutanoic acid
PFHxA	perfluoroheanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PFPeS	perfluoropentanesulfonic acid
RACER	Revitalizing Auto Communities Environmental Response Trust
RPD	relative percent difference
RFI	Resource Conservation and Recovery Act Facilities Investigation
SMFD	Southern Metal Fabrication Division
SVOC	semi-volatile organic compounds

TGI	Technical Guidance Instruction
USEPA	United States Environmental Protection Agency
USPS	United States Postal Service
VOC	volatile organic compounds
WCA	Water Resources Comission

1 Introduction

This report summarizes the results of the initial and supplemental per- and polyfluoroalkyl substances (PFAS) groundwater sampling events completed at the Revitalizing Auto Communities Environmental Response Trust (RACER) Pontiac North Campus Site (Site) located in Pontiac, Michigan. Sampling activities consisted of gauging and sampling of existing monitoring well locations across the Site during two sampling events. The Site is divided into three main sections including the Northern Metal Fabrication Division (NMFD), Southern Metal Fabrication Division (SMFD), and Former Fiero Properties. The monitoring locations included in the sampling event are shown on **Figure 1**.

The purpose of this report is to describe the results of the PFAS sampling events detailed in the *Initial PFAS Sampling Plan* (Arcadis 2023a) submitted to the United States Environmental Protection Agency (USEPA) on April 18, 2023, and the supplemental event described in the *Initial Sampling Summary and Proposed 2023 Supplemental PFAS Sampling Plan* (Arcadis 2023b) submitted to the USEPA on September 29, 2023 and re-submitted on December 8, 2023 after addressing USEPA comments provided. The following sections summarize the results of the sampling performed, a brief description of the relevant exposure pathways, proposed next steps and includes revisions based on USEPA's email comments dated February 27, 2024, on the January 19, 2024 Draft PFAS Summary and subsequent discussions between USEPA and RACER.

2 Monitoring Well Sampling

Two sampling events were completed utilizing the existing monitoring well network at the Site to determine the general distribution of PFAS-impacts at the Site. For the initial event, 27 monitoring well locations were selected across the Site in areas of interest (AOIs) most likely to be impacted by PFAS used during former operations. Historical operations targeted for sampling included wastewater treatment, metal plating and fabrication, and waste storage. Based on the results of the initial event, the supplemental event included sampling 39 on-site and off-site monitoring wells, some of which were sampled during the initial event. Locations of monitoring wells sampled during the two events are shown on **Figure 1**. A summary of each monitoring event follows:

- Initial Sampling Event: On April 24th, 2023, Arcadis began monitoring activities by gauging Site monitoring wells. Following the gauging event, monitoring wells were sampled for PFAS over a 5-day period from April 25 to May 2, 2023. All groundwater samples were submitted to Pace Analytical (Pace) and analyzed for 28 PFAS compounds in accordance with modified USEPA Method 537M. The analytical reports from Pace are provided as **Appendix A**. The results of the gauging and sampling are provided **Table 1** and **Table 2**, respectively. The initial sampling event was to include monitoring well MWM16-40, but upon inspection the well was damaged and could not be sampled.
- Supplemental Sampling Event: On September 11th, 2023, Arcadis began monitoring activities by gauging Site monitoring wells. Following the gauging event, monitoring wells were sampled for PFAS over a 13-day period from September 12 through 25, 2023. All groundwater samples were submitted to Pace and analyzed for the same 28 PFAS compounds in accordance with modified USEPA Method 537M. The analytical reports from Pace are provided as **Appendix A**. The results of the gauging and sampling are provided **Table 1** and **Table 2**, respectively.

2.1 Field Methods

Sampling for PFAS presents unique challenges to typical field sampling protocols, as PFAS can be found in many materials such as Teflon tape, pump bladders, and water and oil resistant gear. While most of these materials will not present a large source of contamination of PFAS, they should be considered. Sampling was conducted in accordance with the Arcadis PFAS Sampling Technical Guidance Instruction (TGI) to help ensure the chance of cross-contamination is minimized. The PFAS Sampling TGI was provided to the field staff and is included as **Appendix B**. In general, the following methods were utilized during each event during sample collection:

- Monitoring wells were gauged for depth to water and total depth prior to sampling. Gauging was used to verify monitoring well construction and condition (e.g., free of obstructions and/or excessive sediment accumulation). Gauging data was not used to generate groundwater elevation contour maps. A more complete dataset used to construct contour maps is collected during the Site annual groundwater sampling event.
- Groundwater samples were collected from each monitoring well using a submersible pump.
- Low-flow sampling procedures were used to collect the samples. Groundwater sampling logs from each event are provided in **Appendix C**.
- Equipment was decontaminated between samples in accordance with the PFAS Sampling TGI (**Appendix B**).
- Samples were collected near the surface of the water column in the well once low-flow purging was completed.
- Unfiltered samples were collected in laboratory supplied high density polyethylene (HDPE) plastic containers.
- Samples were stored in a cooler with ice for transport to the laboratory.
- Samples were submitted to the laboratory utilizing laboratory provided chain of custody forms.

2.2 Laboratory Methods and Data Validation

Groundwater samples were analyzed by Pace in West Columbia, South Carolina. A summary of the laboratory methods and procedures is provided below:

- Samples were analyzed by liquid chromatography-tandem mass spectrometry (LC-MS/MS) with isotope dilution by modified USEPA Method 537M. The modified method includes analysis of 28 PFAS, including perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) and all other PFAS for which the Michigan Department of Environment, Great Lakes, and Energy (EGLE) has a Part 201 Drinking Water Criteria and USEPA has proposed a Maximum Contaminant Level.

A Tier II validation was performed on the 12 data packages. The validation checked chain of custodies (COC), holding times, blank contamination, extracted internal standards (EIS), matrix spike/matrix spike duplicate recoveries and relative percent difference (RPDs), laboratory duplicate RPDs and field duplicate RPDs. A summary of the data validation is provided below:

- Several samples exhibited EIS above the upper control limit or below the lower control limit, but greater than twenty percent. The associated PFAS compounds in the associated field samples were qualified as estimated (J/UJ).

- The EIS for 13C4_PFBA was less than twenty percent in samples MWM30-01_GW, TW-01-03_GW and TW-10-01_GW. The compound perfluorobutanoic acid (PFBA) was qualified as rejected (R) for these samples and the results are not useable.
- The laboratory duplicate performed on sample TW-10-01_GW exhibited RPDs above the control limit for 6:2 FTS (fluorotelomer sulfonic acid 6:2), PFPeS (perfluoropentanesulfonic acid), PFHxS (perflourohexanesulfonic acid), PFHxA (perfluorohexanoic acid), PFOA and PFOS. This sample was qualified as estimated (J) for these compounds.
- Samples from monitoring wells MWM32-01 and MWM2-22 collected on May 1, 2023, were diluted by the lab due to the foamy nature of the sample matrix. As a result, the limit of quantitation (LOQ) was elevated to reflect the dilution.

Laboratory analytical reports are provided in **Appendix A** and data validation reports are included in **Appendix D**.

3 Conceptual Site Model

Based on investigations and characterization completed across the Site, the following are key elements of the conceptual site model (CSM):

- The Site has been used as an industrial automotive manufacturing facility since the 1920s and operations included machining, assembly, and waste storage and disposal.
- The Site overburden geology consists of varying thicknesses of a fill unit underlain by an interbedded unit of clays, silts, sands, and gravel, followed by a fine-grained sand unit underlain by a laterally extensive basal clay unit.
- Depth to groundwater on-site is typically encountered between 15 and 20 feet below ground surface (bgs) but has been observed as shallow as 10 feet bgs in localized areas. Off-site, south of the Former Fiero properties, depth to groundwater typically ranges from 4 to 8 feet bgs. Off-site, west of the Former Fiero Properties, depth to groundwater typically ranges between 28 and 32 feet bgs.
- Groundwater flow is generally in a south – southwest flow direction based on the September 19, 2022, groundwater monitoring event, as shown on **Figure 1**.
- Other than PFAS, Site groundwater impacts include volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, and polychloride biphenyls (PCBs) and are typically found in the lower interbedded unit and fine-grained sand unit above the basal clay.
- Much of on-site soil and groundwater is restricted by Land and Resource Use Deed Restrictions. Off-site to the south there is a Well and Groundwater Use Restriction Ordinance, as shown on **Figure 2**.

Additional details about the CSM are discussed in the *Draft Corrective Action Summary Report* (Arcadis 2023c).

3.1 Initial Sampling Results

A total of 26 groundwater samples were collected from 26 monitoring wells and submitted for analysis of PFAS. In addition, laboratory quality assurance/quality control samples were collected including field duplicate and matrix spike/matrix spike duplicate (MS/MSD) samples. A summary of the monitoring wells sampled and exceedances of the EGLE Part 201 Drinking Water (DW) Criteria and Groundwater Surface Water Interface (GSI) Criteria for groundwater is shown on **Figure 1**. Complete analytical results are provided in **Table 2** and laboratory analytical

reports are provided in **Appendix A**. Groundwater sampling logs can be found in **Appendix C**. The following is based on the analytical results from the initial groundwater sampling:

- Of the 26 groundwater samples collected, 13 exceed the EGLE Part 201 DW Criteria and 9 exceed the GSI Criteria for one or more PFAS.
- Regulated PFAS that exceed Part 201 Criteria include PFOS, PFOA, PFNA (perfluorononanoic acid), and PFHxS.
- The range of PFAS concentrations were similar across the Site with PFOS detected at concentrations up to 140 nanograms per liter (ng/L) and PFOA detected at concentrations up to 78 ng/L. Detections of the remaining regulated compounds were sporadic with none exceeding 100 ng/L.
- Although PFAS impacts were widespread across the Site high concentrations (e.g., >500 parts per trillion total PFAS) indicative of source areas were not observed.
- Several monitoring well locations along the Site boundary exceed DW or GSI criteria suggesting the potential for off-site migration. West of the former Fiero property, one location, MWF16-26 exceeds the DW Criteria for PFAS and the off-site area west of MWF16-26 is not currently included in the Groundwater Use Restriction Ordinance (see **Figure 2**).

A summary of the regulated PFAS that exceed Part 201 Criteria is provided in the table below:

Location ID	Date Collected	PFHxS (ng/L)	PFNA (ng/L)	PFOS (ng/L)	PFOA (ng/L)
MW-02-17	4/25/2023	10	< 4.0	< 4.0	7.7
MWF12-02R	4/25/2023	5.9	< 3.8	4.0	11
MWF16-23	4/25/2023	26	< 3.5	< 3.5	63
MWM16-37	4/25/2023	5.8	< 3.5	4.4	2.5 J
MWM30-01	4/25/2023	8.3	< 4.0	< 4.0	45
MWM5-02	4/25/2023	< 3.5	< 3.5	1.3 J	1.0 J
MWW10-04	4/26/2023	6.9	12	18	78
MWW10-SEN01	4/26/2023	< 40	< 40	15 J	< 40
SEEPVAULT	4/26/2023	12 J	< 40	100	11 J
TW-01-03	4/26/2023	19 J	< 40	97	29 J
TW-MD-01	4/26/2023	5.6	< 3.6	1.3 J	4.6
MWF12-01R	4/27/2023	1.8 J	< 3.5	< 3.5	3.2 J
MWF16-05	4/27/2023	6.8	< 3.7	< 3.7	4.8
MWF16-06	4/27/2023	18	< 3.5	38	42
MWF16-18	4/27/2023	33	< 3.5	< 3.5	41
MWF8-01	4/27/2023	< 3.6	< 3.6	< 3.6	< 3.6
MWOS-05	4/27/2023	2.3 J	< 3.5	2.7 J	2.1 J
MWM16-30	5/1/2023	4.7	< 3.9	1.3 J	3.8 J
MWM2-22	5/1/2023	< 40	< 40	77	28 J
MWM2-28	5/1/2023	4.2	5.0	56	18
MWM32-01	5/1/2023	< 40	< 40	< 40	< 40
MWM4-05	5/1/2023	2.2 J	< 3.7	2.2 J	4.2
MW-03-17	5/2/2023	58	2.4 J	140	27
MWF16-26	5/2/2023	24	< 3.6	< 3.6	34
MWM32-09	5/2/2023	< 3.5	< 3.5	< 3.5	< 3.5
MWW1-04	5/2/2023	4.1	< 3.5	98	2.8 J

3.2 Supplemental Sampling Results

A total of 39 groundwater samples were collected from 39 monitoring wells and submitted for analysis of PFAS. In addition, laboratory quality assurance/quality control samples were collected including field duplicate and MS/MSD samples. A summary of the monitoring wells sampled and exceedances of the EGLE Part 201 Drinking Water Criteria and GSI Criteria for groundwater is shown on **Figure 1**. Complete analytical results are provided in **Table 2** and laboratory analytical reports are provided in **Appendix A**. Groundwater sampling logs can be found in **Appendix C**. The following is based on the analytical results from the supplemental groundwater sampling:

- Of the 40 groundwater samples collected, 28 samples exceed the EGLE Part 201 DW Criteria and 19 samples exceed the GSI Criteria.
- Regulated PFAS that exceed Part 201 Criteria include PFOS, PFOA, and PFNA.
- Concentrations were similar to the initial sampling event with PFOS detected at concentrations up to 150 ng/L and PFOA detected at concentrations up to 54 ng/L.
- PFAS concentrations indicative of active source areas were not identified during the supplemental event.
- Off-site sampling results indicate that groundwater exceeds the DW Criteria for PFAS to the southwest of the Former Fiero Properties and groundwater exceeds the DW Criteria and GSI Criteria to the southwest of the Former South Metal Fabrication Division (SMFD, currently the United States Postal Service [USPS] property). The Groundwater Use Restriction Ordinance currently includes the area south of the Former SMFD but does not include the area southwest of the Former Fiero Properties.

A summary of the regulated PFAS that exceed Part 201 Criteria is provided in the table below:

Location ID	Date Collected	PFNA (ng/L)	PFOS (ng/L)	PFOA (ng/L)
MW-02-17	9/12/2023	< 3.4	< 3.4	5.9
MW-05-18	9/12/2023	< 3.8	< 3.8	5.3
MWF12-02R	9/12/2023	< 3.4	9.0	9.6
MWF15-01	9/12/2023	< 4.0	17	11
MWF16-23	9/12/2023	< 4.6	< 4.6	19
MWF16-25	9/12/2023	< 4.0	< 4.0	20
MWF16-26	9/12/2023	< 4.0	2.0 J	34
MWF7-02	9/12/2023	< 4.2	12	50
MWOS-09R	9/12/2023	< 3.5	< 3.5	19
MWOS-10	9/12/2023	< 4.4	< 4.4	10
MWOS-01	9/13/2023	< 3.5	7.8	3.8
MWOS-02	9/13/2023	< 4.0	9.5	7.0
MWOS-03	9/13/2023	< 3.9	< 3.9	< 3.9
MWOS-04	9/13/2023	< 3.7	< 3.7	< 3.7
MWW1-06	9/13/2023	< 4.1	22	6.8
TW-ROW-01	9/13/2023	< 3.4	12	5.5
TW-ROW-03	9/13/2023	0.74 J	36	5.8
MWM30-01	9/14/2023	< 3.5	< 3.5	54
MWM5-03	9/14/2023	< 3.7	< 3.7	< 3.7

Location ID	Date Collected	PFNA (ng/L)	PFOS (ng/L)	PFOA (ng/L)
MWM5-03	9/14/2023	< 3.8	< 3.8	1.3 J
MWF16-06	9/15/2023	< 3.5	49	40
MWF16-18	9/15/2023	0.91 J	13	12
MWW10-03	9/15/2023	< 3.8	< 3.8	50
MWW10-04	9/15/2023	16	48	45
MWW1-04	9/15/2023	1.3 J	130	6.8
PZF17-05	9/15/2023	< 3.7	< 3.7	< 3.7
MW-01-17	9/18/2023	0.67 J	13	14
MWF16-12	9/18/2023	2.2 J	110	24
MWW10-SEN01	9/18/2023	< 3.9	18	8.7
TW-01-03	9/18/2023	1.1 J	150	21
TW10-01	9/18/2023	< 3.8	81	15
MWM16-52	9/19/2023	< 40	65	21 J
MWM30-02	9/19/2023	< 3.9	3.1 J	6.7
MWW1-02	9/19/2023	< 40	66	15 J
MW-03-17	9/21/2023	2.5 J	140	20
MWDP-02R	9/21/2023	< 3.5	4.2	2.2 J
SUMP	9/21/2023	0.71 J	120	12
MW-43-14R	9/25/2023	1.0 J	99	12
MWM2-22	9/25/2023	5.4	95	26
MWM2-28	9/25/2023	4.0	65	16

3.3 Subsurface Utilities Evaluation

The existing on-site subsurface utilities include water, natural gas, electrical, storm sewer, and sanitary sewer. Active water, electrical, and natural gas lines are installed above the water table. Functional sanitary sewer lines only serve the existing buildings found in the northern area of the Former Fiero Property and the USPS building found in the Former SMFD. Storm sewer lines found in the Former NMFD and Former SMFD were in contact with groundwater but have been bulkheaded at several locations to prevent off-site flow. The storm sewer lines are still functional over an area of the Former Fiero Properties. Storm sewer invert depths measured during the Resource Conservation and Recovery Act Facilities Investigation (RFI) Addendum No. 13 ranged from 2.7 to 4.6 feet bgs (ENCORE 2004). Depth to groundwater at the Former Fiero Properties has ranged from about 10 to 27.5 feet bgs. Based on the depths of the storm sewers and depth to groundwater on site, impacted groundwater does not encounter the on-site utilities. In addition, Outfall 002 at the Fiero Assembly (AOI-16) portion of the Site is believed to still be functioning and the on-site storm sewers flowing from the Fiero Assembly portion of the Site to the Fiero Powerhouse portion of the Site were bulkheaded in 2020 to prevent flow from the Fiero Assembly portion to the Fiero Powerhouse portion as the parcels have different owners. The remaining storm sewers from the other portions of the property are believed to be still functioning, including the two outfalls: Outfall 001 and Outfall 003. Outfalls 001 and 003 discharge to Harris Lake, south of the Site (see **Figure 1**). Outfall 002 discharges further to the west at Osmun Lake.

Off-site subsurface utilities are present including electrical, water, natural gas, storm sewer, and sanitary sewer. In general, subsurface electrical, water, and natural gas are shallow and are above the water table. Unfortunately, the depths of the sanitary sewers are not known but generally they are installed below storm sewers. The depth of the storm sewers near the Site are similar to the depth of the on-site storm sewers and are not in contact with groundwater, except for potentially south of the Site where the ground surface elevation decreases and groundwater is encountered at shallower depths eventually coming to surface at Harris Lake. There is potential for impacted groundwater to be in contact with storm sewers south of the Site, as shown on **Figure 1**.

4 Exposure Pathway Analysis

Arcadis has analyzed each of the exposure pathways to be considered for protection of human health with respect to PFAS in groundwater and relevant site-specific conditions applicable to each. When an exposure pathway is considered complete or potentially complete, media-specific, pathway-specific Generic Cleanup Criteria can be used to determine whether further evaluation is warranted. Site data can then be evaluated by comparison to applicable cleanup criteria to determine if additional site-specific activities are necessary. If a site is adequately characterized and site data are below pathway-specific criteria, then no further action is warranted to address that exposure pathway.

This exposure pathway analysis indicates which pathways and conditions are relevant, which criteria are applicable, and documents the reasons for those conclusions. Based on the results of the exposure pathway assessment, applicable cleanup criteria were identified for the Site.

Exposure can only occur when the potential exists for a receptor to contact PFAS or when there is a mechanism for PFAS to be transported to a receptor. An exposure pathway is defined by the following four elements:

1. A source and mechanism of constituent release to the environment.
2. An environmental transport medium for the released constituent.
3. A point of potential contact by the receptor with the medium containing the constituent (the exposure point).
4. A route of exposure to the receptor at the exposure point (i.e., ingestion, inhalation, or dermal contact).

PFAS may have been released to the environment during historical operations, and subsequently migrated to and within groundwater. Low-level PFAS impacts in groundwater are currently present at various areas of the Site and to the south of the Site. In addition, storm sewers from the Site outfall to Harris Lake to the south and Osmun Lake to the west. Certain storm sewers located off-site and downgradient may be in contact with groundwater.

Groundwater under much of the on-site property is restricted or can be restricted to prohibit potable use through current Land and Resource Use Deed Restrictions. In addition, a Groundwater Use Restriction Ordinance that prohibits potable use of groundwater is in place for much of the off-site area to the south, between the Site and Harris Lake and to the east of Harris Lake. However, the area south of AOI F-17 (the western Former Fiero Property) is not currently included in the Groundwater Use Restriction Ordinance. Based on October 2023 updated well survey (Arcadis 2023d) there are only two drinking water wells located downgradient or sidegradient within 1-mile of the Site, these include:

- A household well approximately 2,930 feet west of the Site, located at 370 Lakeside Drive, Wellogic Well – 63000041589 with a well screen installed from 38-42 feet bgs in a sand and gravel water bearing unit below a clay unit that extends from 5-35 feet bgs.

- An industrial well approximately 1,800 feet west of Site on Columbia Avenue, Wellogic Well – 63000019429, was drilled to 280 feet bgs. No well screen was installed, and this well is listed as a bedrock well. The well casing extends down to 100 feet bgs into a clay and gravel unit below a clay unit from 32-90 feet bgs.

Based on the distance from the Site and/or depth of these wells, the drinking water pathway is not complete.

Based on the pathway evaluation described above, the following Part 201 Generic Cleanup Criteria (EGLE 2023) are applicable:

- Residential DW Criteria may be technically applicable in areas that are not restricted by the on-site Land and Resource Use Deed Restrictions or the off-site Groundwater Use Restriction Ordinance; however, the Oakland County Water Resources Commissioner (WRC) operates the City of Pontiac's water system and provides drinking water to the area. Use of groundwater near the Site for potable purposes is not expected.
- GSI Criteria where storm sewer lines are in contact with impacted groundwater, or where impacted groundwater may reach Harris Lake.

Groundwater data have been compared to these applicable criteria in **Table 2** and locations with exceedances are shown on **Figure 1**.

5 Conclusions and Data Gaps

Based on the findings from the two sampling events, the following conclusions can be made:

- PFOA or PFOS is present in groundwater at similar and relatively low concentrations across the Former Fiero and SMFD properties with no apparent source areas or "hot spots" identified. The primary PFAS compounds detected above the DW and GSI criteria are PFOA and PFOS, with PFOA being more prevalent in the western portion of the Site (Former Fiero Properties) and PFOS more widespread in the east-southeast portion of the Former SMFD.
- DW Criteria is not applicable on-site due to Land and Resource Use Deed Restrictions, and the GSI Criteria is not applicable on-site due to the depth of on-site utilities and lack of utility contact with groundwater.
- The Groundwater Use Restriction Ordinance currently includes the area south of the Former SMFD and south of the Former Fiero Property.
- At the western boundary of the Former Fiero Property, MWF16-26 exceeds DW Criteria. The area west of the Former Fiero Property is not included within the Groundwater Use Restriction Ordinance. However, groundwater is not used and not expected to be used for drinking water in this area and the nearest water well located outside of the Groundwater Use Restriction Ordinance is 1,800 feet to the west on Columbia Avenue (Arcadis 2023d).
- To the southwest of the Former Fiero Property, within the area included as part of the Groundwater Use Restriction Ordinance, off-site monitoring wells MWOS-09R and MWOS-10 groundwater results exceed the DW Criteria for PFOA.
- At the southern boundary of the Former SMFD monitoring wells MWW1-04, MW-01-17, TW-ROW-03, MWW1-02, and TW-ROW-01, as well as the Montcalm Seep vault, exceed criteria for PFOS and/or PFOA. However, monitoring wells MW-OS4 located south of the southern boundary of the Former SMFD did not have any exceedances.
- To the southeast of the Former SMFD, off-site monitoring well MWW1-06 exceeds DW and GSI criteria for PFOS. Although this area is within the Groundwater Use restriction Ordinance area, the GSI exceedance is not delineated between the site and Harris Lake.

6 Recommendations

PFAS concentrations across the Pontiac North Campus are relatively low with no obvious source areas indicated by the distribution of groundwater impacts. Although there are DW Criteria exceedances at the Site perimeter, the majority of the potentially impacted off-site areas are included under the Groundwater Use Restriction Ordinance, except for the area west of former Fiero at monitoring well MWF16-26. The nearest water well to former Fiero is located 1,800 feet to the west. Drinking water for nearby residents is provided by the City of Pontiac and groundwater is not expected to be used for drinking water.

Most storm sewers on-site are located above the water table and Site groundwater impacts are not expected to infiltrate into those sewers. Certain storm sewers associated with Outfall 003 may potentially be in contact with Site-impacted groundwater and further evaluation is warranted. Due to the ubiquitous nature of PFAS in the environment, including non-point residential source areas (i.e., background concentrations), we do not recommend sampling on-site storm sewers that are above the water table, or off-site storm sewers that may be in contact with groundwater but are located outside of the known Site-impacted groundwater. Based on the results of PFAS monitoring events and the relevant exposure pathways discussed above, the following next steps are recommended.

A summary of the proposed additional work is included as **Figure 3**:

- Following additional PFAS groundwater sampling at existing monitoring wells (as outlined below), a review of the associated GSI risk and the site prioritization process currently underway for the RACER Trust Michigan sites, RACER will discuss with USEPA the potential need for a monitoring well at parcel 14-20-256-027 located south of the Site. The additional monitoring well would further characterize potential GSI Criteria exceedances in groundwater southwest of the Former SMFD, between monitoring well MWW1-06 and Harris Lake.
- Complete two additional PFAS sampling events from of the perimeter monitoring wells as shown on **Figure 3**. Samples will be collected during the second quarter 2024 and during the annual groundwater monitoring event that takes place during the fourth quarter 2024. Groundwater samples will be collected from the following:
  - MWF16-26, MWF16-25, MWOS-09R, MWOS-10, MWF12-02R, MWW1-06, MWW1-04, MW-01-17, MWW1-02, MWW10-03, Seep Vault, MWOS-02, and MWOS-04.
- Site reconnaissance has confirmed the location of Outfall 003 and the manhole immediately upstream (**Figure 3**); however, the storm drain was dry and does not appear to have historically contained flow. Additional reconnaissance will be completed to assess flow at Outfall 003 during a rain event, as well as locations and flow within other storm drains located to the east along East Montcalm Street and North Saginaw Street. If flow is observed at the manhole immediately upstream from Outfall 003, a sample will be collected for PFAS analysis. Additional stormwater sampling will be evaluated based on the result of the Outfall 003 result (if any), and sampling will be evaluated for other stormwater outfalls based on the results of the East Montcalm Street and North Saginaw Street reconnaissance.

7 References

Arcadis 2023a. Initial PFAS Sampling Plan, RACER Trust Pontiac North Campus, April 18.

Arcadis 2023b. Initial Sampling Summary and Proposed 2023 Supplemental PFAS Sampling Plan, RACER Trust Pontiac North Campus, original submittal September 29, revised submittal December 8.

Arcadis 2023c. Draft Correct Action Summary Report, RACER Trust Pontiac North Campus, July 25.

Arcadis 2023d. Revised DRAFT - RACER Pontiac North Campus Water Well Survey. October 20.

ENCORE. 2004. RCRA Facility Investigation Work Plan Addendum No. 13. September 24, 2004.

Tables

Figures

Appendix A

Laboratory Analytical Reports

Appendix B

Arcadis TGI for PFAS Sampling Procedures

Appendix C

Groundwater Sampling Logs

Appendix D

Laboratory Data Validation Summary

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Tables

Table 1
Groundwater Elevation Summary
RACER Trust Pontiac North Campus
Pontiac, Michigan

Well ID	Well Elevation [1]	Total Depth (ft)	Initial Sampling Event			Second Sampling Event		
			Date	Depth to Water (ft)	Groundwater Elevation	Date	Depth to Water (ft)	Groundwater Elevation
OFFSITE								
MWOS-01	943.79	12.95	--	--	--	9/11/2023	7.25	936.54
MWOS-02	943.46	15.89	--	--	--	9/11/2023	6.95	936.51
MWOS-03	944.35	18.72	--	--	--	9/11/2023	7.30	937.05
MWOS-04	942.52	12.85	--	--	--	9/11/2023	3.80	938.72
FIERO								
F-7								
MWF7-02	970.58	21.87	--	--	--	9/11/2023	18.60	951.98
F-8								
MWF8-01	972.94	27.20	4/24/2023	18.90	954.04	--	--	--
F-12								
MWF12-01R	967.99	23.25	4/24/2023	20.09	947.90	--	--	--
MWF12-02R	961.91	22.48	4/24/2023	13.17	948.74	9/11/2023	13.06	948.85
F-15								
MWF15-01	973.57	28.66	--	--	--	9/11/2023	18.12	955.45
F-16								
MWF16-05	973.68	22.75	4/24/2023	19.87	953.81	--	--	--
MWF16-06	973.77	28.65	4/24/2023	13.32	960.45	9/11/2023	11.72	962.05
MWF16-12	973.20	18.88	--	--	--	9/11/2023	12.76	960.44
MWF16-18	973.22	31.96	4/24/2023	21.02	952.20	9/11/2023	20.49	952.73
MWF16-23	973.39	30.50	4/24/2023	24.15	949.24	9/11/2023	23.72	949.67
MWF16-25	975.24	37.18	--	--	--	9/11/2023	25.86	949.38
MWF16-26	974.14	36.70	4/24/2023	24.80	949.34	9/11/2023	24.40	949.74
MW-02-17	972.52	29.70	4/24/2023	25.80	946.72	9/11/2023	25.66	946.86
MW-05-18	975.21	33.56	--	--	--	9/11/2023	27.02	948.19
Offsite								
MWOS-09R	976.42	32.18	--	--	--	9/11/2023	27.06	949.36
MWOS-10	976.55	32.72	--	--	--	9/11/2023	28.31	948.24
DEMOLITION AREA								
W-1								
MWW1-02	946.08	15.07	--	--	--	9/19/2023	5.17	940.91
MWW1-04	947.49	16.35	4/24/2023	6.85	940.64	9/11/2023	6.93	940.56
MWW1-06	943.63	14.15	--	--	--	9/11/2023	5.04	938.59
MW-01-17	949.40	10.73	--	--	--	9/11/2023	7.46	941.94
TW-01-03	969.06	23.10	4/24/2023	14.23	954.83	9/11/2023	14.11	954.95
MW-43-14R	969.90	33.50	--	--	--	9/25/2023	26.87	943.03
W-8								
TW-10-01	971.91	32.78	--	--	--	9/11/2023	19.05	952.86
W-10								
MWW10-03	958.20	11.92	--	--	--	9/11/2023	7.78	950.42
MWW10-04	961.49	17.92	4/24/2023	8.42	953.07	9/11/2023	8.49	953.00
MWW10-SEN01	967.31	22.45	4/24/2023	16.04	951.27	9/11/2023	16.48	950.83

See Notes on last page.

Table 1
Groundwater Elevation Summary
RACER Trust Pontiac North Campus
Pontiac, Michigan

Well ID	Well Elevation [1]	Total Depth (ft)	Date	Depth to Water (ft)	Groundwater Elevation	Date	Depth to Water (ft)	Groundwater Elevation
MFD								
M-2								
MWM2-22	970.82	24.24	4/24/2023	16.96	953.86	9/11/2023	16.52	954.30
MWM2-28	971.07	25.80	4/24/2023	16.68	954.39	9/11/2023	16.16	954.91
M-4								
MWM4-05	985.70	23.05	4/24/2023	6.50	979.20	--	--	--
M-5								
MWM5-02	977.07	27.32	4/24/2023	19.57	957.50	--	--	--
MWM5-03	978.78	33.70	--	--	--	9/11/2023	21.13	957.65
M-16								
MWM16-30	985.37	30.82	4/24/2023	27.46	957.91	--	--	--
MWM16-37	980.37	35.30	4/24/2023	23.23	957.14	--	--	--
MWM16-52	983.71	37.20	--	--	--	9/11/2023	26.94	956.77
M-30								
MWM30-01	979.76	34.63	4/24/2023	23.87	955.89	9/11/2023	23.57	956.19
MWM30-02	979.64	32.35	--	--	--	9/11/2023	20.21	959.43
M-31/M-32								
MWM32-01	983.64	35.10	4/24/2023	27.38	956.26	--	--	--
MWM32-09	982.10	26.00	4/24/2023	23.00	959.10	--	--	--
Montcalm								
MW-03-17	964.77	21.90	4/24/2023	8.29	956.48	9/11/2023	8.35	956.42
TW-MD-01	946.20	10.32	4/24/2023	5.19	941.01	--	--	--
Montcalm ROW								
TW-ROW-01	942.53	7.96	--	--	--	9/11/2023	1.85	940.68
TW-ROW-03	942.38	7.98	--	--	--	9/11/2023	1.93	940.45
Former Fiero Parking Lot								
PZF17-05	975.97	34.00	--	--	--	9/11/2023	26.03	949.94
Duck Pond								
MWOS-05	944.26	11.42	4/24/2023	1.85	942.41	--	--	--
MWDP-2R	947.90	14.41	--	--	--	9/11/2023	4.18	943.72

Notes:
1. All depth to waters measured from Top of Casing.

Abbreviations:

--	Not available
LNAPL	Light non-aqueous phase liquid

Footnotes:
[1] Top of Casing Elevation is in feet National Vertical Geodetic Datum (1988)

Table 2
Summary of PFAS Analytical Results
RACER Trust Pontiac North Campus
Pontiac, Michigan

Location ID: / Date Collected: / Sample Name:	MI Groundwater Surface Water Interface	MI Groundwater Residential Drinking Water	Units	MW-01-17 9/18/2023 MW-01-17_GW-091823	MW-02-17 4/25/2023 MW-02-17_GW-042523	MW-02-17 9/12/2023 MW-02-17_GW-091223	MW-03-17 5/2/2023 MW-03-17-GW-050223	MW-03-17 9/21/2023 MW-03-17_GW-092123	MW-05-18 9/12/2023 MW-05-18_GW-091223	MW-43-14R 9/25/2023 MW-43-14R_GW-092523	MWDP-02R 9/21/2023 MWDP-2R_GW-092123	MWF12-01R 4/27/2023 MWF12-01R_GW-042723	MWF12-02R 4/25/2023 MWF12-02R_GW-042523	MWF12-02R 9/12/2023 MWF12-02R_GW-091223
PFAS														
11Cl-PF3OUdS (F-53B Minor)	--	--	ng/L	< 7.3 U [< 7.4 U]	< 8.0 U	< 6.7 U	< 7.8 U [< 7.2 U]	< 7.3 U	< 7.5 U	< 7.1 U	< 7.0 U	< 7.0 UQ [< 7.2 U]	< 7.6 U	< 6.9 U
4:2 FTS	--	--	ng/L	< 7.3 UQ [< 7.4 UQ]	< 8.0 U	< 6.7 UQ	< 7.8 UQ [< 7.2 UQ]	< 7.3 UQ	< 7.5 UQ	< 7.1 UQ	< 7.0 UQ	< 7.0 UQ [< 7.2 UQ]	< 7.6 UQ	< 6.9 UQ
6:2FTS	--	--	ng/L	< 7.3 UQ [< 7.4 UQ]	< 8.0 U	< 6.7 UQ	8.8 Q [9.6 Q]	8.0 Q	< 7.5 U	< 7.1 UQ	< 7.0 UQ	< 7.0 UQ [< 7.2 U]	< 7.6 UQ	< 6.9 UQ
8:2FTS	--	--	ng/L	< 7.3 UQ [< 7.4 UQ]	< 8.0 U	< 6.7 U	< 7.8 UQ [< 7.2 UQ]	< 7.3 UQ	< 7.5 U	< 7.1 UQ	< 7.0 U	< 7.0 UQ [< 7.2 U]	< 7.6 U	< 6.9 U
9Cl-PF3ONS (F-53B Major)	--	--	ng/L	< 7.3 U [< 7.4 U]	< 8.0 U	< 6.7 U	< 7.8 U [< 7.2 U]	< 7.3 U	< 7.5 U	< 7.1 U	< 7.0 U	< 7.0 UQ [< 7.2 U]	< 7.6 U	< 6.9 U
ADONA	--	--	ng/L	< 7.3 U [< 7.4 U]	< 8.0 U	< 6.7 U	< 7.8 U [< 7.2 U]	< 7.3 U	< 7.5 U	< 7.1 U	< 7.0 U	< 7.0 UQ [< 7.2 U]	< 7.6 U	< 6.9 U
HFPO-DA (GenX)	--	370	ng/L	< 7.3 U [< 7.4 U]	< 8.0 U	< 6.7 U	< 7.8 U [< 7.2 U]	< 7.3 U	< 7.5 U	< 7.1 U	< 7.0 U	< 7.0 UQ [< 7.2 U]	< 7.6 U	< 6.9 U
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	--	--	ng/L	< 7.3 U [< 7.4 U]	< 8.0 U	< 6.7 U	< 7.8 U [< 7.2 U]	< 7.3 U	< 7.5 U	< 7.1 U	< 7.0 U	< 7.0 UQ [< 7.2 U]	< 7.6 U	< 6.9 U
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	--	--	ng/L	< 7.3 U [< 7.4 U]	< 8.0 U	< 6.7 U	< 7.8 U [< 7.2 U]	< 7.3 U	< 7.5 U	< 7.1 U	< 7.0 U	< 7.0 UQ [< 7.2 U]	< 7.6 U	< 6.9 U
Perfluorobutanesulfonic acid (PFBS)	**670,000**	420	ng/L	7.0 [4.9]	9.3	7.4	5.2 [4.0]	3.3 J	7.4	< 3.6 U	5.3	1.8 JQ [3.5 J]	3.7 J	3.9
Perfluorobutanoic acid (PFBA)	--	--	ng/L	18 Q [< 3.7 UQ]	12	16	18 Q [17 Q]	15	15	< 3.6 UQ	18	4.3 [9.0]	22	20
Perfluorodecanesulfonic acid (PFDS)	--	--	ng/L	< 3.7 U [< 3.7 U]	< 4.0 U	< 3.4 U	< 3.9 U [< 3.6 U]	< 3.6 U	< 3.8 U	< 3.6 U	< 3.5 U	< 3.5 UQ [< 3.6 U]	< 3.8 U	< 3.4 U
Perfluorodecanoic acid (PFDA)	--	--	ng/L	< 3.7 U [< 3.7 U]	< 4.0 U	< 3.4 U	< 3.9 U [< 3.6 U]	< 3.6 U	< 3.8 U	< 3.6 U	< 3.5 U	< 3.5 UQ [< 3.6 U]	< 3.8 U	< 3.4 U
Perfluoroheptanesulfonic Acid (PFHpS)	--	--	ng/L	< 3.7 U [< 3.7 U]	< 4.0 U	< 3.4 U	4.7 [5.1]	4.5	< 3.8 U	< 3.6 U	< 3.5 U	< 3.5 UQ [< 3.6 U]	< 3.8 U	< 3.4 U
Perfluoroheptanoic acid (PFHpA)	--	--	ng/L	5.7 [6.0]	6.4	4.9	9.1 [8.8]	8.6	5.7	4.9	1.1 J	0.90 JQ [1.6 J]	4.4	3.5
Perfluorohexanesulfonic acid (PFHxS)	**210**	51	ng/L	13 [13]	10	9.3	58 [57]	32	7.0	16	2.3 J	1.8 JQ [4.0]	5.9	4.6
Perfluorohexanoic acid (PFHxA)	--	400,000	ng/L	9.2 [9.6]	11	8.3	14 [15]	14	11	< 3.6 U	3.5	1.8 JQ [2.6 J]	12	8.9
Perfluorononanesulfonic acid (PFNS)	--	--	ng/L	< 3.7 U [< 3.7 U]	< 4.0 U	< 3.4 U	< 3.9 U [< 3.6 U]	< 3.6 U	< 3.8 U	< 3.6 U	< 3.5 U	< 3.5 UQ [< 3.6 U]	< 3.8 U	< 3.4 U
Perfluorononanoic acid (PFNA)	**30**	6	ng/L	0.67 J [0.72 J]	< 4.0 U	< 3.4 U	2.4 J [2.2 J]	2.5 J	< 3.8 U	1.0 J	< 3.5 U	< 3.5 UQ [< 3.6 U]	< 3.8 U	< 3.4 U
Perfluorooctane Sulfonamide (FOSA)	--	--	ng/L	< 3.7 U [< 3.7 U]	< 4.0 U	< 3.4 U	< 3.9 U [< 3.6 U]	1.4 J	< 3.8 U	< 3.6 U	< 3.5 U	< 3.5 UQ [< 3.6 U]	< 3.8 U	< 3.4 U
Perfluorooctane sulfonic acid (PFOS)	**12**	16	ng/L	**13 [14]**	< 4.0 U	< 3.4 U	**140 [140]**	**140**	< 3.8 U	**99**	4.2	< 3.5 UQ [0.90 J]	4.0	9.0
Perfluorooctanoic acid (PFOA)	**170**	8	ng/L	14 [13]	7.7	5.9	27 [27]	20	5.3	12	2.2 J	3.2 JQ [6.7]	11	9.6
Perfluoropentanesulfonic acid (PFPeS)	--	--	ng/L	3.4 J [< 3.7 U]	5.8	5.5	4.0 [3.8]	2.7 J	5.2	< 3.6 U	0.84 J	< 3.5 UQ [< 3.6 U]	1.6 J	< 3.4 U
Perfluoropentanoic acid (PFPeA)	--	--	ng/L	< 3.7 U [< 3.7 U]	7.2	7.7	16 [16]	15	9.3	< 3.6 U	3.5	1.9 JQ [2.7 J]	14	11
Perfluorotetradecanoic acid (PFTeA)	--	--	ng/L	< 3.7 U [< 3.7 U]	< 4.0 U	< 3.4 U	< 3.9 U [< 3.6 U]	< 3.6 U	< 3.8 U	< 3.6 U	< 3.5 U	< 3.5 UQ [< 3.6 U]	< 3.8 U	< 3.4 U
Perfluorotridecanoic Acid (PFTriA)	--	--	ng/L	< 3.7 U [< 3.7 U]	< 4.0 U	< 3.4 U	< 3.9 U [< 3.6 U]	< 3.6 U	< 3.8 U	< 3.6 U	< 3.5 U	< 3.5 UQ [< 3.6 U]	< 3.8 U	< 3.4 U
Perfluoroundecanoic acid (PFUnA)	--	--	ng/L	< 3.7 U [< 3.7 U]	< 4.0 U	< 3.4 U	< 3.9 U [< 3.6 U]	< 3.6 U	< 3.8 U	< 3.6 U	< 3.5 U	< 3.5 UQ [< 3.6 U]	< 3.8 U	< 3.4 U

Table 2
Summary of PFAS Analytical Results
RACER Trust Pontiac North Campus
Pontiac, Michigan

Location ID:	MI Groundwater Surface Water Interface	MI Groundwater Residential Drinking Water	Units	MWF15-01	MWF16-05	MWF16-06	MWF16-06	MWF16-12	MWF16-18	MWF16-18	MWF16-23	MWF16-23	MWF16-25	MWF16-26
Date Collected:				9/12/2023	4/27/2023	4/27/2023	9/15/2023	9/18/2023	4/27/2023	9/15/2023	4/25/2023	9/12/2023	9/12/2023	5/2/2023
Sample Name:				MWF15-01_GW-091223	MWF16-05_GW-042723	MWF16-06_GW-042723	MWF16-06_GW-091523	MWF16-12_GW-091823	MWF16-18_GW-042723	MWF16-18_GW-091523	MWF16-23_GW-042523	MWF16-23_GW-091223	MWF16-25_GW-091223	MWF16-26-GW-050223
PFAS														
11Cl-PF3OUdS (F-53B Minor)	--	--	ng/L	< 7.9 U	< 7.4 U	< 7.0 U	< 6.9 U	< 7.8 U	< 7.1 U	< 6.9 U	< 6.9 U	< 9.1 U	< 8.0 U	< 7.1 U
4:2 FTS	--	--	ng/L	< 7.9 UQ	< 7.4 UQ	< 7.0 UQ	< 6.9 UQ	< 7.8 UQ	< 7.1 UQ	< 6.9 UQ	< 6.9 U	< 9.1 UQ	< 8.0 UQ	< 7.1 U
6:2FTS	--	--	ng/L	4.7 JQ	< 7.4 UQ	< 7.0 U	< 6.9 UQ	< 7.8 UQ	< 7.1 UQ	< 6.9 UQ	< 6.9 U	7.8 J	< 8.0 UQ	< 7.1 U
8:2FTS	--	--	ng/L	< 7.9 U	< 7.4 U	< 7.0 U	< 6.9 U	< 7.8 U	< 7.1 U	< 6.9 U	< 6.9 U	< 9.1 U	< 8.0 U	< 7.1 U
9Cl-PF3ONS (F-53B Major)	--	--	ng/L	< 7.9 U	< 7.4 U	< 7.0 U	< 6.9 U	< 7.8 U	< 7.1 U	< 6.9 U	< 6.9 U	< 9.1 U	< 8.0 U	< 7.1 U
ADONA	--	--	ng/L	< 7.9 U	< 7.4 U	< 7.0 U	< 6.9 U	< 7.8 U	< 7.1 U	< 6.9 U	< 6.9 U	< 9.1 U	< 8.0 U	< 7.1 U
HFPO-DA (GenX)	--	370	ng/L	< 7.9 U	< 7.4 U	< 7.0 U	< 6.9 U	< 7.8 U	< 7.1 U	< 6.9 U	< 6.9 U	< 9.1 U	< 8.0 U	< 7.1 U
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	--	--	ng/L	< 7.9 U	< 7.4 U	< 7.0 U	< 6.9 U	1.4 J	< 7.1 U	< 6.9 U	< 6.9 U	< 9.1 U	< 8.0 U	< 7.1 U
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	--	--	ng/L	< 7.9 U	< 7.4 U	< 7.0 U	< 6.9 U	< 7.8 U	< 7.1 U	< 6.9 U	< 6.9 U	< 9.1 U	< 8.0 U	< 7.1 U
Perfluorobutanesulfonic acid (PFBS)	**670,000**	420	ng/L	5.9	3.3 J	3.4 J	4.2	< 3.9 U	10	< 3.5 U	6.7	4.8	12	15
Perfluorobutanoic acid (PFBA)	--	--	ng/L	10	8.8	9.1	9.6	3.7 J	14 Q	10	9.8	13	13	8.6
Perfluorodecanesulfonic acid (PFDS)	--	--	ng/L	< 4.0 U	< 3.7 U	< 3.5 U	< 3.5 U	< 3.9 U	< 3.5 U	< 3.5 U	< 3.5 U	< 4.6 U	< 4.0 U	< 3.6 U
Perfluorodecanoic acid (PFDA)	--	--	ng/L	< 4.0 U	< 3.7 U	< 3.5 U	< 3.5 U	0.91 J	< 3.5 U	< 3.5 U	< 3.5 U	< 4.6 U	< 4.0 U	< 3.6 U
Perfluoroheptanesulfonic Acid (PFHpS)	--	--	ng/L	0.96 J	< 3.7 U	5.7	5.1	1.8 J	1.3 J	< 3.5 U	1.3 J	< 4.6 U	< 4.0 U	< 3.6 U
Perfluoroheptanoic acid (PFHpA)	--	--	ng/L	5.2	2.8 J	7.5	7.7	6.0	20	3.5	23	5.5	8.0	7.3
Perfluorohexanesulfonic acid (PFHxS)	**210**	51	ng/L	13	6.8	18	17	3.4 J	33	2.2 J	26	8.0	22	24
Perfluorohexanoic acid (PFHxA)	--	400,000	ng/L	7.8	8.6	8.8	14	12	21	4.2	12	9.3	13	17
Perfluorononanesulfonic acid (PFNS)	--	--	ng/L	< 4.0 U	< 3.7 U	< 3.5 U	< 3.5 U	< 3.9 U	< 3.5 U	< 3.5 U	< 3.5 U	< 4.6 U	< 4.0 U	< 3.6 U
Perfluorononanoic acid (PFNA)	**30**	6	ng/L	< 4.0 U	< 3.7 U	< 3.5 U	< 3.5 U	2.2 J	< 3.5 U	0.91 J	< 3.5 U	< 4.6 U	< 4.0 U	< 3.6 U
Perfluorooctane Sulfonamide (FOSA)	--	--	ng/L	< 4.0 U	< 3.7 U	< 3.5 U	< 3.5 U	3.5 J	< 3.5 U	< 3.5 U	< 3.5 U	< 4.6 U	< 4.0 U	< 3.6 U
Perfluorooctane sulfonic acid (PFOS)	**12**	16	ng/L	**17**	< 3.7 U	**38**	**49**	**110**	< 3.5 U	**13**	< 3.5 U	< 4.6 U	< 4.0 U	< 3.6 U
Perfluorooctanoic acid (PFOA)	**170**	8	ng/L	11	4.8	42	40	24	41	12	63	19	20	34
Perfluoropentanesulfonic acid (PFPeS)	--	--	ng/L	5.8	2.8 J	5.1	4.8	< 3.9 U	13	< 3.5 U	6.1	2.5 J	10	14
Perfluoropentanoic acid (PFPeA)	--	--	ng/L	7.3	7.4	10	13	11	16	4.8	14	7.1	9.2	12
Perfluorotetradecanoic acid (PFTeA)	--	--	ng/L	< 4.0 U	< 3.7 U	< 3.5 U	< 3.5 U	< 3.9 U	< 3.5 U	< 3.5 U	< 3.5 U	< 4.6 U	< 4.0 U	< 3.6 U
Perfluorotridecanoic Acid (PFTriA)	--	--	ng/L	< 4.0 U	< 3.7 U	< 3.5 U	< 3.5 U	< 3.9 U	< 3.5 U	< 3.5 U	< 3.5 U	< 4.6 U	< 4.0 U	< 3.6 U
Perfluoroundecanoic acid (PFUnA)	--	--	ng/L	< 4.0 U	< 3.7 U	< 3.5 U	< 3.5 U	< 3.9 U	< 3.5 U	< 3.5 U	< 3.5 U	< 4.6 U	< 4.0 U	< 3.6 U

Table 2
Summary of PFAS Analytical Results
RACER Trust Pontiac North Campus
Pontiac, Michigan

Location ID: Date Collected: Sample Name:	MI Groundwater Surface Water Interface	MI Groundwater Residential Drinking Water	Units	MWF16-26 9/12/2023 MWF16-26_GW-091223	MWF7-02 9/12/2023 MWF7-02_GW-091223	MWF8-01 4/27/2023 MWF8-01_GW-042723	MWM16-30 5/1/2023 MWM16-30_GW-050123	MWM16-37 4/25/2023 MWM16-37_GW-042523	MWM16-52 9/19/2023 MWM16-52_GW-091923	MWM2-22 5/1/2023 MWM2-22_GW-050123	MWM2-22 9/25/2023 MWM2-22_GW-092523	MWM2-28 5/1/2023 MWM2-28_GW-050123	MWM2-28 9/25/2023 MWM2-28_GW-092523	MWM30-01 4/25/2023 MWM30-01_GW-042523
PFAS														
11Cl-PF3OUdS (F-53B Minor)	--	--	ng/L	< 8.0 U	< 8.4 U	< 7.1 U	< 7.7 U [< 7.4 U]	< 6.9 U	< 80 U	< 80 U	< 7.2 U	< 7.0 U	< 7.3 U	< 8.1 U
4:2 FTS	--	--	ng/L	< 8.0 U	< 8.4 UQ	< 7.1 U	< 7.7 UQ [< 7.4 UQ]	< 6.9 UQ	< 80 UQ	< 80 UQ	< 7.2 UQ	< 7.0 UQ	< 7.3 UQ	< 8.1 UQ
6:2FTS	--	--	ng/L	8.4	4.9 JQ	< 7.1 U	< 7.7 UQ [< 7.4 UQ]	< 6.9 U	28 JQ	< 80 UQ	< 80 U	3.9 JQ	3.4 JQ	34 Q
8:2FTS	--	--	ng/L	< 8.0 U	< 8.4 U	< 7.1 U	< 7.7 U [< 7.4 U]	< 6.9 U	< 80 UQ	< 80 UQ	< 80 U	2.3 JQ	2.0 JQ	< 8.1 UQ
9Cl-PF3ONS (F-53B Major)	--	--	ng/L	< 8.0 U	< 8.4 U	< 7.1 U	< 7.7 U [< 7.4 U]	< 6.9 U	< 80 U	< 80 U	< 7.2 U	< 7.0 U	< 7.3 U	< 8.1 U
ADONA	--	--	ng/L	< 8.0 U	< 8.4 U	< 7.1 U	< 7.7 U [< 7.4 U]	< 6.9 U	< 80 U	< 80 U	< 7.2 U	< 7.0 U	< 7.3 U	< 8.1 U
HFPO-DA (GenX)	--	370	ng/L	< 8.0 U	< 8.4 U	< 7.1 U	< 7.7 U [< 7.4 U]	< 6.9 U	< 80 U	< 80 U	< 7.2 U	< 7.0 U	< 7.3 U	< 8.1 U
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	--	--	ng/L	< 8.0 U	< 8.4 U	< 7.1 U	< 7.7 U [< 7.4 U]	< 6.9 U	< 80 U	< 80 U	2.0 J	< 7.0 U	< 7.3 U	< 8.1 U
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	--	--	ng/L	< 8.0 U	< 8.4 U	< 7.1 U	< 7.7 U [< 7.4 U]	< 6.9 U	< 80 U	< 80 U	< 7.2 U	< 7.0 U	< 7.3 U	< 8.1 U
Perfluorobutanesulfonic acid (PFBS)	**670,000**	420	ng/L	17	7.0	3.6	3.0 J [3.0 J]	1.4 J	< 40 U	< 40 U	7.4	3.7	< 3.6 U	4.6
Perfluorobutanoic acid (PFBA)	--	--	ng/L	11	15	1.6 J	12 Q [11 Q]	6.4	< 40 U	27 J	28	14 Q	16	24 Q
Perfluorodecanesulfonic acid (PFDS)	--	--	ng/L	< 4.0 U	< 4.2 U	< 3.6 U	< 3.9 U [< 3.7 U]	< 3.5 U	< 40 U	< 40 U	< 3.6 U	< 3.5 U	< 3.6 U	< 4.0 U
Perfluorodecanoic acid (PFDA)	--	--	ng/L	< 4.0 U	< 4.2 U	< 3.6 U	< 3.9 U [< 3.7 U]	< 3.5 U	< 40 U	< 40 U	1.9 J	2.2 J	2.2 J	< 4.0 U
Perfluoroheptanesulfonic Acid (PFHpS)	--	--	ng/L	0.98 J	1.6 J	< 3.6 U	< 3.9 U [< 3.7 U]	< 3.5 U	< 40 U	< 40 U	< 3.6 U	1.1 J	< 3.6 U	< 4.0 U
Perfluoroheptanoic acid (PFHpA)	--	--	ng/L	5.8	8.9	< 3.6 U	6.7 [6.5]	1.5 J	8.6 J	15 J	14	8.1	8.3	15
Perfluorohexanesulfonic acid (PFHxS)	**210**	51	ng/L	21	16	< 3.6 U	4.7 [4.6]	5.8	25 J	< 40 U	8.7	4.2	7.0	8.3
Perfluorohexanoic acid (PFHxA)	--	400,000	ng/L	22	16	< 3.6 U	7.7 [7.0]	1.9 J	12 J	28 J	28	16	18	20
Perfluorononanesulfonic acid (PFNS)	--	--	ng/L	< 4.0 U	< 4.2 U	< 3.6 U	< 3.9 U [< 3.7 U]	< 3.5 U	< 40 U	< 40 U	< 3.6 U	< 3.5 U	< 3.6 U	< 4.0 U
Perfluorononanoic acid (PFNA)	**30**	6	ng/L	< 4.0 U	< 4.2 U	< 3.6 U	< 3.9 U [< 3.7 U]	< 3.5 U	< 40 U	< 40 U	5.4	5.0	4.0	< 4.0 U
Perfluorooctane Sulfonamide (FOSA)	--	--	ng/L	< 4.0 U	< 4.2 U	< 3.6 U	< 3.9 U [< 3.7 U]	< 3.5 U	< 40 U	< 40 U	< 3.6 U	< 3.5 U	< 3.6 U	< 4.0 U
Perfluorooctane sulfonic acid (PFOS)	**12**	16	ng/L	2.0 J	**12**	< 3.6 U	1.3 J [1.2 J]	4.4	**65**	**77**	**95**	**56**	**65**	< 4.0 U
Perfluorooctanoic acid (PFOA)	**170**	8	ng/L	34	50	< 3.6 U	3.8 J [4.1]	2.5 J	21 J	28 J	26	18	16	45
Perfluoropentanesulfonic acid (PFPeS)	--	--	ng/L	11	6.0	< 3.6 U	1.0 J [< 3.7 U]	0.93 J	< 40 U	< 40 U	< 3.6 U	< 3.5 U	< 3.6 U	2.4 J
Perfluoropentanoic acid (PFPeA)	--	--	ng/L	24	9.6	< 3.6 U	11 [13]	2.0 J	< 40 U	26 J	27	14	17	18
Perfluorotetradecanoic acid (PFTeA)	--	--	ng/L	< 4.0 U	< 4.2 U	< 3.6 U	< 3.9 U [< 3.7 U]	< 3.5 U	< 40 U	< 40 U	< 3.6 U	< 3.5 U	< 3.6 U	< 4.0 U
Perfluorotridecanoic Acid (PFTriA)	--	--	ng/L	< 4.0 U	< 4.2 U	< 3.6 U	< 3.9 U [< 3.7 U]	< 3.5 U	< 40 U	< 40 U	< 3.6 U	< 3.5 U	< 3.6 U	< 4.0 U
Perfluoroundecanoic acid (PFUnA)	--	--	ng/L	< 4.0 U	< 4.2 U	< 3.6 U	< 3.9 U [< 3.7 U]	< 3.5 U	< 40 U	< 40 U	< 3.6 U	< 3.5 U	< 3.6 U	< 4.0 U

Table 2
Summary of PFAS Analytical Results
RACER Trust Pontiac North Campus
Pontiac, Michigan

Location ID: Date Collected: Sample Name:	MI Groundwater Surface Water Interface	MI Groundwater Residential Drinking Water	Units	MWM30-01 9/14/2023 MWM30-01_GW-091423	MWM30-02 9/19/2023 MWM30-02_GW-091923	MWM32-01 5/1/2023 MWM32-01_GW-050123	MWM32-09 5/2/2023 MWM32-09-GW-050223	MWM4-05 5/1/2023 MWM4-05_GW-050123	MWM5-02 4/25/2023 MWM5-02_GW-042523	MWM5-03 9/14/2023 MWM5-03_GW-091423	MWM5-03 9/14/2023 DUP-02_GW-091423	MWOS-01 9/13/2023 MWOS-01_GW-091323	MWOS-02 9/13/2023 MWOS-02_GW-091323	MWOS-03 9/13/2023 MWOS-03_GW-091323
PFAS														
11Cl-PF3OUdS (F-53B Minor)	--	--	ng/L	< 7.1 U	< 7.7 U	< 80 U	< 7.0 U	< 7.4 U	< 6.9 U	< 7.4 U	< 7.6 U	< 7.0 U	< 8.0 U	< 7.7 U
4:2 FTS	--	--	ng/L	< 7.1 UQ	< 7.7 UQ	< 80 UQ	< 7.0 U	< 7.4 UQ	< 6.9 UQ	< 7.4 UQ	< 7.6 UQ	< 7.0 UQ	< 8.0 UQ	< 7.7 UQ
6:2FTS	--	--	ng/L	37 Q	< 7.7 UQ	< 80 UQ	< 7.0 U	< 7.4 UQ	< 6.9 UQ	< 7.4 UQ	< 7.6 UQ	< 7.0 U	< 8.0 UQ	< 7.7 UQ
8:2FTS	--	--	ng/L	< 7.1 UQ	< 7.7 U	< 80 UQ	< 7.0 U	< 7.4 U	< 6.9 U	< 7.4 U	< 7.6 U	< 7.0 U	< 8.0 U	< 7.7 U
9Cl-PF3ONS (F-53B Major)	--	--	ng/L	< 7.1 U	< 7.7 U	< 80 U	< 7.0 U	< 7.4 U	< 6.9 U	< 7.4 U	< 7.6 U	< 7.0 U	< 8.0 U	< 7.7 U
ADONA	--	--	ng/L	< 7.1 U	< 7.7 U	< 80 U	< 7.0 U	< 7.4 U	< 6.9 U	< 7.4 U	< 7.6 U	< 7.0 U	< 8.0 U	< 7.7 U
HFPO-DA (GenX)	--	370	ng/L	< 7.1 U	< 7.7 U	< 80 U	< 7.0 U	< 7.4 U	< 6.9 U	< 7.4 U	< 7.6 U	< 7.0 U	< 8.0 U	< 7.7 U
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	--	--	ng/L	< 7.1 U	< 7.7 U	< 80 U	< 7.0 U	< 7.4 U	< 6.9 U	< 7.4 U	< 7.6 U	< 7.0 U	< 8.0 U	< 7.7 U
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	--	--	ng/L	< 7.1 U	< 7.7 U	< 80 U	< 7.0 U	< 7.4 U	< 6.9 U	< 7.4 U	< 7.6 U	< 7.0 U	< 8.0 U	< 7.7 U
Perfluorobutanesulfonic acid (PFBS)	**670,000**	420	ng/L	< 3.5 U	2.9 J	< 40 U	< 3.5 U	2.5 J	0.95 J	< 3.7 U	2.8 J	18	4.3	< 3.9 U
Perfluorobutanoic acid (PFBA)	--	--	ng/L	< 3.5 UQ	6.5	< 40 U	< 3.5 U	8.5	2.5 J	2.5 J	3.4 J	14	7.9	< 3.9 U
Perfluorodecanesulfonic acid (PFDS)	--	--	ng/L	< 3.5 U	< 3.9 U	< 40 U	< 3.5 U	< 3.7 U	< 3.5 U	< 3.7 U	< 3.8 U	< 3.5 U	< 4.0 U	< 3.9 U
Perfluorodecanoic acid (PFDA)	--	--	ng/L	< 3.5 U	< 3.9 U	< 40 U	< 3.5 U	< 3.7 U	< 3.5 U	< 3.7 U	< 3.8 U	< 3.5 U	< 4.0 U	< 3.9 U
Perfluoroheptanesulfonic Acid (PFHpS)	--	--	ng/L	< 3.5 U	< 3.9 U	< 40 U	< 3.5 U	< 3.7 U	< 3.5 U	< 3.7 U	< 3.8 U	< 3.5 U	< 4.0 U	< 3.9 U
Perfluoroheptanoic acid (PFHpA)	--	--	ng/L	16	3.3 J	< 40 U	< 3.5 U	2.6 J	< 3.5 U	0.57 J	0.70 J	1.8 J	1.5 J	< 3.9 U
Perfluorohexanesulfonic acid (PFHxS)	**210**	51	ng/L	12	3.3 J	< 40 U	< 3.5 U	2.2 J	< 3.5 U	1.8 J	1.5 J	2.2 J	6.8	< 3.9 U
Perfluorohexanoic acid (PFHxA)	--	400,000	ng/L	23	3.4 J	< 40 U	< 3.5 U	3.5 J	< 3.5 U	< 3.7 U	< 3.8 U	3.3 J	2.9 J	< 3.9 U
Perfluorononanesulfonic acid (PFNS)	--	--	ng/L	< 3.5 U	< 3.9 U	< 40 U	< 3.5 U	< 3.7 U	< 3.5 U	< 3.7 U	< 3.8 U	< 3.5 U	< 4.0 U	< 3.9 U
Perfluorononanoic acid (PFNA)	**30**	6	ng/L	< 3.5 U	< 3.9 U	< 40 U	< 3.5 U	< 3.7 U	< 3.5 U	< 3.7 U	< 3.8 U	< 3.5 U	< 4.0 U	< 3.9 U
Perfluorooctane Sulfonamide (FOSA)	--	--	ng/L	< 3.5 U	< 3.9 U	< 40 U	< 3.5 U	< 3.7 U	< 3.5 U	< 3.7 U	< 3.8 U	< 3.5 U	< 4.0 U	< 3.9 U
Perfluorooctane sulfonic acid (PFOS)	**12**	16	ng/L	< 3.5 U	3.1 J	< 40 U	< 3.5 U	2.2 J	1.3 J	< 3.7 U	< 3.8 U	7.8	9.5	< 3.9 U
Perfluorooctanoic acid (PFOA)	**170**	8	ng/L	54	6.7	< 40 U	< 3.5 U	4.2	1.0 J	< 3.7 U	1.3 J	3.8	7.0	< 3.9 U
Perfluoropentanesulfonic acid (PFPeS)	--	--	ng/L	2.6 J	< 3.9 U	< 40 U	< 3.5 U	< 3.7 U	< 3.5 U	< 3.7 U	< 3.8 U	< 3.5 U	1.6 J	< 3.9 U
Perfluoropentanoic acid (PFPeA)	--	--	ng/L	21	3.0 J	< 40 U	< 3.5 U	3.8	< 3.5 U	< 3.7 U	< 3.8 U	5.7	2.5 J	< 3.9 U
Perfluorotetradecanoic acid (PFTeA)	--	--	ng/L	< 3.5 U	< 3.9 U	< 40 U	< 3.5 U	< 3.7 U	< 3.5 U	< 3.7 U	< 3.8 U	< 3.5 U	< 4.0 U	< 3.9 U
Perfluorotridecanoic Acid (PFTriA)	--	--	ng/L	< 3.5 U	< 3.9 U	< 40 U	< 3.5 U	< 3.7 U	< 3.5 U	< 3.7 U	< 3.8 U	< 3.5 U	< 4.0 U	< 3.9 U
Perfluoroundecanoic acid (PFUnA)	--	--	ng/L	< 3.5 U	< 3.9 U	< 40 U	< 3.5 U	< 3.7 U	< 3.5 U	< 3.7 U	< 3.8 U	< 3.5 U	< 4.0 U	< 3.9 U

Table 2
Summary of PFAS Analytical Results
RACER Trust Pontiac North Campus
Pontiac, Michigan

Location ID: Date Collected: Sample Name:	MI Groundwater Surface Water Interface	MI Groundwater Residential Drinking Water	Units	MWOS-04 9/13/2023 MWOS-04_GW-091323	MWOS-05 4/27/2023 MW0S-05_GW-042723	MWOS-09R 9/12/2023 MWOS-09R_GW-091223	MWOS-10 9/12/2023 MWOS-10_GW-091223	MWW10-03 9/15/2023 MWW10-03_GW-091523	MWW10-04 4/26/2023 MWW10-04_GW-042623	MWW10-04 9/15/2023 MWW10-04_GW-091523	MWW1-02 9/19/2023 MWW1-02_GW-091923	MWW1-04 5/2/2023 MWW1-04-GW-050223	MWW1-04 9/15/2023 MWW1-04_GW-091523	MWW1-06 9/13/2023 MWW1-06_GW-091323
PFAS														
11Cl-PF3OUdS (F-53B Minor)	--	--	ng/L	< 7.4 U	< 6.9 U	< 7.0 U	< 8.8 U	< 7.5 U	< 7.3 U	< 7.7 U [< 7.5 U]	< 80 U	< 7.1 U	< 7.8 U	< 8.2 U
4:2 FTS	--	--	ng/L	< 7.4 UQ	< 6.9 UQ	< 7.0 UQ	< 8.8 UQ	< 7.5 UQ	< 7.3 UQ	< 7.7 UQ [< 7.5 UQ]	< 80 UQ	< 7.1 UQ	< 7.8 UQ	< 8.2 UQ
6:2FTS	--	--	ng/L	< 7.4 UQ	< 6.9 U	3.5 J	3.0 J	< 7.5 UQ	< 7.3 UQ	< 7.7 UQ [< 7.5 UQ]	< 80 U	< 7.1 UQ	< 7.8 UQ	16
8:2FTS	--	--	ng/L	< 7.4 U	< 6.9 U	< 7.0 U	< 8.8 U	< 7.5 UQ	< 7.3 UQ	< 7.7 UQ [< 7.5 UQ]	< 80 U	< 7.1 UQ	< 7.8 UQ	< 8.2 U
9Cl-PF3ONS (F-53B Major)	--	--	ng/L	< 7.4 U	< 6.9 U	< 7.0 U	< 8.8 U	< 7.5 U	< 7.3 U	< 7.7 U [< 7.5 U]	< 80 U	< 7.1 U	< 7.8 U	< 8.2 U
ADONA	--	--	ng/L	< 7.4 U	< 6.9 U	< 7.0 U	< 8.8 U	< 7.5 U	< 7.3 U	< 7.7 U [< 7.5 U]	< 80 U	< 7.1 U	< 7.8 U	< 8.2 U
HFPO-DA (GenX)	--	370	ng/L	< 7.4 U	< 6.9 U	< 7.0 U	< 8.8 U	< 7.5 U	< 7.3 U	< 7.7 U [< 7.5 U]	< 80 U	< 7.1 U	< 7.8 U	< 8.2 U
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	--	--	ng/L	< 7.4 U	< 6.9 U	< 7.0 U	< 8.8 U	< 7.5 U	< 7.3 U	< 7.7 U [< 7.5 U]	< 80 U	8.9	15	< 8.2 U
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	--	--	ng/L	< 7.4 U	< 6.9 U	< 7.0 U	< 8.8 U	< 7.5 U	< 7.3 U	< 7.7 U [< 7.5 U]	< 80 U	< 7.1 U	1.0 J	< 8.2 U
Perfluorobutanesulfonic acid (PFBS)	**670,000**	420	ng/L	< 3.7 U	2.9 J	6.3	7.5	12	< 3.7 U	< 3.9 U [< 3.8 U]	< 40 U	< 3.5 U	< 3.9 U	2.7 J
Perfluorobutanoic acid (PFBA)	--	--	ng/L	< 3.7 UQ	12	9.8	14	21	11 Q	8.3 J [< 40 U]	43	< 3.5 UQ	< 40 U	6.1
Perfluorodecanesulfonic acid (PFDS)	--	--	ng/L	< 3.7 U	< 3.5 U	< 3.5 U	< 4.4 U	< 3.8 U	< 3.7 U	< 3.9 U [< 3.8 U]	< 40 U	< 3.5 U	0.88 J	< 4.1 U
Perfluorodecanoic acid (PFDA)	--	--	ng/L	< 3.7 U	< 3.5 U	< 3.5 U	< 4.4 U	< 3.8 U	< 3.7 U	0.94 J [1.1 J]	< 40 U	< 3.5 U	0.87 J	< 4.1 U
Perfluoroheptanesulfonic Acid (PFHpS)	--	--	ng/L	< 3.7 U	< 3.5 U	< 3.5 U	< 4.4 U	1.6 J	1.2 J	< 3.9 U [< 3.8 U]	< 40 U	< 3.5 U	< 3.9 U	< 4.1 U
Perfluoroheptanoic acid (PFHpA)	--	--	ng/L	< 3.7 U	< 3.5 U	10	11	30	17	11 [14]	< 40 U	< 3.5 U	3.1 J	1.3 J
Perfluorohexanesulfonic acid (PFHxS)	**210**	51	ng/L	< 3.7 U	2.3 J	10	13	44	6.9	5.7 [5.0]	15 J	4.1	4.5	0.96 J
Perfluorohexanoic acid (PFHxA)	--	400,000	ng/L	< 3.7 U	< 3.5 U	11	15	29	19	18 [15]	< 40 U	< 3.5 U	< 3.9 U	1.3 J
Perfluorononanesulfonic acid (PFNS)	--	--	ng/L	< 3.7 U	< 3.5 U	< 3.5 U	< 4.4 U	< 3.8 U	< 3.7 U	< 3.9 U [< 3.8 U]	< 40 U	< 3.5 U	< 3.9 U	< 4.1 U
Perfluorononanoic acid (PFNA)	**30**	6	ng/L	< 3.7 U	< 3.5 U	< 3.5 U	< 4.4 U	< 3.8 U	12	16 [15]	< 40 U	< 3.5 U	1.3 J	< 4.1 U
Perfluorooctane Sulfonamide (FOSA)	--	--	ng/L	< 3.7 U	< 3.5 U	< 3.5 U	< 4.4 U	< 3.8 U	< 3.7 U	< 3.9 U [< 3.8 U]	< 40 U	1.2 J	1.7 J	< 4.1 U
Perfluorooctane sulfonic acid (PFOS)	**12**	16	ng/L	< 3.7 U	2.7 J	< 3.5 U	< 4.4 U	< 3.8 U	**18**	**48 [47]**	**66**	**98**	**130**	**22**
Perfluorooctanoic acid (PFOA)	**170**	8	ng/L	< 3.7 U	2.1 J	19	10	50	78	45 [45]	15 J	2.8 J	6.8	6.8
Perfluoropentanesulfonic acid (PFPeS)	--	--	ng/L	< 3.7 U	< 3.5 U	5.0	5.0	15	< 3.7 U	< 3.9 U [< 3.8 U]	< 40 U	< 3.5 U	< 3.9 U	< 4.1 U
Perfluoropentanoic acid (PFPeA)	--	--	ng/L	< 3.7 U	2.5 J	11	14	27	18	15 [15]	< 40 U	< 3.5 U	5.2	0.92 J
Perfluorotetradecanoic acid (PFTeA)	--	--	ng/L	< 3.7 U	< 3.5 U	< 3.5 U	< 4.4 U	< 3.8 U	< 3.7 U	< 3.9 U [< 3.8 U]	< 40 U	< 3.5 U	< 3.9 U	< 4.1 U
Perfluorotridecanoic Acid (PFTriA)	--	--	ng/L	< 3.7 U	< 3.5 U	< 3.5 U	< 4.4 U	< 3.8 U	< 3.7 U	< 3.9 U [< 3.8 U]	< 40 U	< 3.5 U	< 3.9 U	< 4.1 U
Perfluoroundecanoic acid (PFUnA)	--	--	ng/L	< 3.7 U	< 3.5 U	< 3.5 U	< 4.4 U	< 3.8 U	< 3.7 U	< 3.9 U [< 3.8 U]	< 40 U	< 3.5 U	< 3.9 U	< 4.1 U

Table 2
Summary of PFAS Analytical Results
RACER Trust Pontiac North Campus
Pontiac, Michigan

Location ID: Date Collected: Sample Name:	MI Groundwater Surface Water Interface	MI Groundwater Residential Drinking Water	Units	MWW10-SEN01 4/26/2023 MWW10-SEN01_GW-042623	MWW10-SEN01 9/18/2023 MWW10-SEN01-091823	PZF17-05 9/15/2023 PZF17-05_GW-091523	SEEPVAULT 4/26/2023 SEEPVAULT_GW-042623	SUMP 9/21/2023 SUMP_GW-092123	TW-01-03 4/26/2023 TW-01-03_GW-042623	TW-01-03 9/18/2023 TW-01-03_GW-091823	TW10-01 9/18/2023 TW-10-01_GW-091823	TW-MD-01 4/26/2023 TW-MD-01_GW-042623	TW-ROW-01 9/13/2023 TW-ROW-01_GW-091323	TW-ROW-03 9/13/2023 TW-ROW-03_GW-091323
PFAS														
11Cl-PF3OUdS (F-53B Minor)	--	--	ng/L	< 80 U	< 7.9 U	< 7.4 U	< 80 U	< 7.5 U	< 80 U	< 7.1 U	< 7.7 U	< 7.2 U	< 6.9 U	< 6.9 U
4:2 FTS	--	--	ng/L	< 80 UQ	< 7.9 UQ	< 7.4 U	< 80 UQ	< 7.5 UQ	< 80 UQ	< 7.1 UQ	< 7.7 UQ	< 7.2 UQ	< 6.9 UQ	< 6.9 UQ
6:2FTS	--	--	ng/L	< 80 UQ	< 7.9 UQ	< 7.4 U	< 80 UQ	< 7.5 UQ	< 80 UQ	< 7.1 UQ	24 Q	< 7.2 UQ	< 6.9 UQ	2.1 JQ
8:2FTS	--	--	ng/L	< 80 U	< 7.9 UQ	< 7.4 U	< 80 U	< 7.5 UQ	< 80 UQ	< 7.1 UQ	< 7.7 U	< 7.2 U	< 6.9 U	< 6.9 U
9Cl-PF3ONS (F-53B Major)	--	--	ng/L	< 80 U	< 7.9 U	< 7.4 U	< 80 U	< 7.5 U	< 80 U	< 7.1 U	< 7.7 U	< 7.2 U	< 6.9 U	< 6.9 U
ADONA	--	--	ng/L	< 80 U	< 7.9 U	< 7.4 U	< 80 U	< 7.5 U	< 80 U	< 7.1 U	< 7.7 U	< 7.2 U	< 6.9 U	< 6.9 U
HFPO-DA (GenX)	--	370	ng/L	< 80 U	< 7.9 U	< 7.4 U	< 80 U	< 7.5 U	< 80 U	< 7.1 U	< 7.7 U	< 7.2 U	< 6.9 U	< 6.9 U
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	--	--	ng/L	< 80 U	< 7.9 U	< 7.4 U	< 80 U	< 7.5 U	< 80 UQ	< 7.1 U	< 7.7 U	< 7.2 U	< 6.9 U	< 6.9 U
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	--	--	ng/L	< 80 U	< 7.9 U	< 7.4 U	< 80 U	< 7.5 U	< 80 UQ	< 7.1 U	< 7.7 U	< 7.2 U	< 6.9 U	< 6.9 U
Perfluorobutanesulfonic acid (PFBS)	**670,000**	420	ng/L	< 40 U	< 3.9 U	0.67 J	< 40 U	< 3.8 U	< 40 U	< 3.6 U	43	1.3 J	< 3.4 U	4.8
Perfluorobutanoic acid (PFBA)	--	--	ng/L	10 J	< 3.9 UQ	1.1 J	14 J	< 3.8 UQ	< 40 U	< 3.6 UQ	< 3.8 UQ	2.7 JQ	8.6	12
Perfluorodecanesulfonic acid (PFDS)	--	--	ng/L	< 40 U	< 3.9 U	< 3.7 U	< 40 U	< 3.8 U	< 40 U	< 3.6 U	< 3.8 U	< 3.6 U	< 3.4 U	< 3.5 U
Perfluorodecanoic acid (PFDA)	--	--	ng/L	< 40 U	< 3.9 U	< 3.7 U	< 40 U	< 3.8 U	< 40 U	< 3.6 U	< 3.8 U	< 3.6 U	< 3.4 U	< 3.5 U
Perfluoroheptanesulfonic Acid (PFHpS)	--	--	ng/L	< 40 U	< 3.9 U	< 3.7 U	< 40 U	2.1 J	< 40 U	3.1 J	3.1 J	< 3.6 U	0.88 J	0.95 J
Perfluoroheptanoic acid (PFHpA)	--	--	ng/L	< 40 U	3.4 J	< 3.7 U	< 40 U	4.4	< 40 U	< 3.6 U	7.0	< 3.6 U	2.1 J	1.7 J
Perfluorohexanesulfonic acid (PFHxS)	**210**	51	ng/L	< 40 U	2.9 J	< 3.7 U	12 J	11	19 J	19	47	5.6	3.5	6.3
Perfluorohexanoic acid (PFHxA)	--	400,000	ng/L	< 40 U	6.0	< 3.7 U	< 40 U	7.4	< 40 U	< 3.6 U	45	1.2 J	4.2	4.1
Perfluorononanesulfonic acid (PFNS)	--	--	ng/L	< 40 U	< 3.9 U	< 3.7 U	< 40 U	< 3.8 U	< 40 U	< 3.6 U	< 3.8 U	< 3.6 U	< 3.4 U	< 3.5 U
Perfluorononanoic acid (PFNA)	**30**	6	ng/L	< 40 U	< 3.9 U	< 3.7 U	< 40 U	0.71 J	< 40 U	1.1 J	< 3.8 U	< 3.6 U	< 3.4 U	0.74 J
Perfluorooctane Sulfonamide (FOSA)	--	--	ng/L	< 40 U	< 3.9 U	< 3.7 U	< 40 U	< 3.8 U	< 40 U	< 3.6 U	< 3.8 U	< 3.6 U	< 3.4 U	< 3.5 U
Perfluorooctane sulfonic acid (PFOS)	**12**	16	ng/L	**15 J**	**18**	< 3.7 U	**100**	**120**	**97**	**150**	**81**	1.3 J	**12**	**36**
Perfluorooctanoic acid (PFOA)	**170**	8	ng/L	< 40 U	8.7	< 3.7 U	11 J	12	29 J	21	15	4.6	5.5	5.8
Perfluoropentanesulfonic acid (PFPeS)	--	--	ng/L	< 40 U	< 3.9 U	< 3.7 U	< 40 U	< 3.8 U	< 40 U	< 3.6 U	13	0.97 J	< 3.4 U	1.3 J
Perfluoropentanoic acid (PFPeA)	--	--	ng/L	< 40 U	< 3.9 U	< 3.7 U	< 40 U	< 3.8 U	< 40 U	< 3.6 U	< 3.8 U	< 3.6 U	< 3.4 U	4.5
Perfluorotetradecanoic acid (PFTeA)	--	--	ng/L	< 40 U	< 3.9 U	< 3.7 U	< 40 U	< 3.8 U	< 40 U	< 3.6 U	< 3.8 U	< 3.6 U	< 3.4 U	< 3.5 U
Perfluorotridecanoic Acid (PFTriA)	--	--	ng/L	< 40 U	< 3.9 U	< 3.7 U	< 40 U	< 3.8 U	< 40 U	< 3.6 U	< 3.8 U	< 3.6 U	< 3.4 U	< 3.5 U
Perfluoroundecanoic acid (PFUnA)	--	--	ng/L	< 40 U	< 3.9 U	< 3.7 U	< 40 U	< 3.8 U	< 40 U	< 3.6 U	< 3.8 U	< 3.6 U	< 3.4 U	< 3.5 U

Table 2
Summary of PFAS Analytical Results
RACER Trust Pontiac North Campus
Pontiac, Michigan

Notes:

1) Criteria listed are from the State of Michigan's groundwater clean-up rules, Michigan Department of Environment Great Lakes and Energy (EGLE) updated on October 12, 2023
2) Bold values denote exceedance and/or equal to Michigan Groundwater Surface Water Interface criteria
3) Gray highlighted values denote exceedance and/or equal to Michigan Residential Drinking Water criteria
4) Samples were analyzed by LC-MS/MS with isotope dilution by modified USEPA Method 537M. The modified method includes analysis of 28 per- and polyfluoroalkyl substances (PFAS), including Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS) and all other PFAS for which EGLE has a Part 201 Drinking Water Criteria and USEPA has proposed a Maximum Contaminant Level.

Abbreviations

<	Not detected above the laboratory reporting limit
ng/L	Nanograms per liter
MI	Michigan
J	Estimated result less than limit of quantitation (LOQ) and greater than or equal to detection limit (DL)
U	Compound was analyzed for but not detected. The associated value is the compound quantitation limit.
Q	Surrogate failure

Figures

MWM4-05	
Analyte	5/1/2023
PFOA	4.2
PFOS	2.2 J
PFNA	< 3.7
PFHxS	2.2 J

MWM16-30	
Analyte	5/1/2023
PFOA	3.8 J
PFOS	1.3 J
PFNA	< 3.9
PFHxS	4.7

MWM5-02	
Analyte	4/25/2023
PFOA	1.0 J
PFOS	1.3 J
PFNA	< 3.5
PFHxS	< 3.5

MWM5-03	
Analyte	9/14/2023
PFOA	< 3.7
PFOS	< 3.7
PFNA	< 3.7
PFHxS	1.8 J

MWM16-37	
Analyte	4/25/2023
PFOA	2.5 J
PFOS	4.4
PFNA	< 3.5
PFHxS	5.8

MWM16-52	
Analyte	9/19/2023
PFOA	21 J
PFOS	85
PFNA	< 40
PFHxS	25 J

MWM32-01	
Analyte	5/1/2023
PFOA	< 40
PFOS	< 40
PFNA	< 40
PFHxS	< 40

MWM32-09	
Analyte	5/2/2023
PFOA	< 3.5
PFOS	< 3.5
PFNA	< 3.5
PFHxS	< 3.5

MWM30-02	
Analyte	9/13/2023
PFOA	6.7
PFOS	3.1 J
PFNA	< 3.9
PFHxS	3.3 J

MWM30-01	
Analyte	4/25/2023
PFOA	45
PFOS	< 4.0
PFNA	< 4.0
PFHxS	8.3
Analyte	9/14/2023
PFOA	54
PFOS	< 3.5
PFNA	< 3.5
PFHxS	12

MWF8-01	
Analyte	4/27/2023
PFOA	< 3.6
PFOS	< 3.6
PFNA	< 3.6
PFHxS	< 3.6

MWF16-05	
Analyte	4/27/2023
PFOA	4.8
PFOS	< 3.7
PFNA	< 3.7
PFHxS	6.8

MWF16-18	
Analyte	4/27/2023
PFOA	41
PFOS	< 3.5
PFNA	< 3.5
PFHxS	33
Analyte	9/15/2023
PFOA	12
PFOS	13
PFNA	0.91 J
PFHxS	2.2 J

MWF16-26	
Analyte	5/2/2023
PFOA	34
PFOS	< 3.6
PFNA	< 3.6
PFHxS	24
Analyte	9/12/2023
PFOA	34
PFOS	2.0 J
PFNA	< 4.0
PFHxS	21

PZF17-05	
Analyte	9/15/2023
PFOA	< 3.7
PFOS	< 3.7
PFNA	< 3.7
PFHxS	< 3.7

MWF16-23	
Analyte	4/25/2023
PFOA	63
PFOS	< 3.5
PFNA	< 3.5
PFHxS	26
Analyte	9/12/2023
PFOA	19
PFOS	< 4.6
PFNA	< 4.6
PFHxS	8

MWF16-25	
Analyte	9/12/2023
PFOA	20
PFOS	< 4.0
PFNA	< 4.0
PFHxS	22

MWOS-09R	
Analyte	9/12/2023
PFOA	19
PFOS	< 3.5
PFNA	< 3.5
PFHxS	10

MWOS-10	
Analyte	9/12/2023
PFOA	10
PFOS	< 4.4
PFNA	< 4.4
PFHxS	13

MW-05-18	
Analyte	9/12/2023
PFOA	5.3
PFOS	< 3.8
PFNA	< 3.8
PFHxS	7

MW-02-17	
Analyte	4/25/2023
PFOA	7.7
PFOS	< 4.0
PFNA	< 4.0
PFHxS	10
Analyte	9/12/2023
PFOA	5.9
PFOS	< 3.4
PFNA	< 3.4
PFHxS	9.3

MWF7-02	
Analyte	9/12/2023
PFOA	50
PFOS	12
PFNA	< 4.2
PFHxS	16

MWF15-01	
Analyte	9/12/2023
PFOA	11
PFOS	17
PFNA	< 4.0
PFHxS	13

MWW10-03	
Analyte	9/15/2023
PFOA	5.0
PFOS	< 3.8
PFNA	< 3.8
PFHxS	44

MWF12-01R	
Analyte	4/27/2023
PFOA	3.2 J
PFOS	< 3.5
PFNA	< 3.5
PFHxS	1.8 J

MWF12-02R	
Analyte	4/25/2023
PFOA	11
PFOS	4
PFNA	< 3.8
PFHxS	5.9
Analyte	9/12/2023
PFOA	9.6
PFOS	9
PFNA	< 3.4
PFHxS	4.6

MWW10-SEN01	
Analyte	4/26/2023
PFOA	< 40
PFOS	15 J
PFNA	< 40
PFHxS	< 40
Analyte	9/18/2023
PFOA	8.7
PFOS	18
PFNA	< 3.9
PFHxS	2.9 J

MWF16-12	
Analyte	9/18/2023
PFOA	24
PFOS	110
PFNA	2.2 J
PFHxS	3.4 J

MWF16-06	
Analyte	4/27/2023
PFOA	42
PFOS	38
PFNA	< 3.5
PFHxS	18
Analyte	9/15/2023
PFOA	40
PFOS	49
PFNA	< 3.5
PFHxS	17

MWW10-04	
Analyte	4/26/2023
PFOA	78
PFOS	18
PFNA	12
PFHxS	6.9
Analyte	9/15/2023
PFOA	45
PFOS	48
PFNA	16
PFHxS	5.7

MWM2-22	
Analyte	5/1/2023
PFOA	28 J
PFOS	77
PFNA	< 40
PFHxS	< 40
Analyte	9/25/2023
PFOA	26
PFOS	95
PFNA	5.4
PFHxS	8.7

MWM2-28	
Analyte	5/1/2023
PFOA	18
PFOS	56
PFNA	5
PFHxS	4.2
Analyte	9/25/2023
PFOA	16
PFOS	65
PFNA	4
PFHxS	7

MW-03-17	
Analyte	4/25/2023
PFOA	27
PFOS	140
PFNA	2.4 J
PFHxS	58
Analyte	9/12/2023
PFOA	20
PFOS	140
PFNA	2.5 J
PFHxS	32

TW-10-01	
Analyte	9/18/2023
PFOA	15
PFOS	81
PFNA	< 3.8
PFHxS	47

TW-01-03	
Analyte	4/26/2023
PFOA	29 J
PFOS	97
PFNA	< 40
PFHxS	19 J
Analyte	9/18/2023
PFOA	21
PFOS	150
PFNA	1.1 J
PFHxS	19

MW-43-14R	
Analyte	9/25/2023
PFOA	12
PFOS	99
PFNA	1.0 J
PFHxS	16

MWW1-02	
Analyte	9/13/2023
PFOA	15 J
PFOS	66
PFNA	< 40
PFHxS	15 J

TW-ROW-01	
Analyte	9/13/2023
PFOA	5.5
PFOS	12
PFNA	< 3.4
PFHxS	3.5

SEEPVAULT	
Analyte	4/26/2023
PFOA	11 J
PFOS	100
PFNA	< 40
PFHxS	12 J
Analyte	9/21/2023
PFOA	12
PFOS	120
PFNA	0.71 J
PFHxS	11

MWDP-02R	
Analyte	9/21/2023
PFOA	2.2 J
PFOS	4.2
PFNA	< 3.5
PFHxS	2.3 J

MWOS-05	
Analyte	4/27/2023
PFOA	2.1 J
PFOS	2.7 J
PFNA	< 3.5
PFHxS	2.3 J

TW-MD-01	
Analyte	4/26/2023
PFOA	4.6
PFOS	1.3 J
PFNA	< 3.6
PFHxS	5.6

TW-ROW-03	
Analyte	9/13/2023
PFOA	5.8
PFOS	36
PFNA	0.74 J
PFHxS	6.3

MWW1-04	
Analyte	5/2/2023
PFOA	2.8 J
PFOS	98
PFNA	< 3.5
PFHxS	4.1
Analyte	9/15/2023
PFOA	6.8
PFOS	130
PFNA	1.3 J
PFHxS	4.5

MWOS-01	
Analyte	9/13/2023
PFOA	3.8
PFOS	7.8
PFNA	< 3.5
PFHxS	2.2 J

MWOS-02	
Analyte	9/13/2023
PFOA	7
PFOS	9.5
PFNA	< 4.0
PFHxS	6.8

MWOS-03	
Analyte	9/13/2023
PFOA	< 3.9
PFOS	< 3.9
PFNA	< 3.9
PFHxS	< 3.9

MWW1-06	
Analyte	9/13/2023
PFOA	6.8
PFOS	22
PFNA	< 4.1
PFHxS	0.96 J

MW-01-17	
Analyte	9/18/2023
PFOA	14
PFOS	13
PFNA	0.67 J
PFHxS	13

MWOS-04	
Analyte	9/13/2023
PFOA	< 3.7
PFOS	< 3.7
PFNA	< 3.7
PFHxS	< 3.7

LEGEND

- BULKHEAD LOCATION
- EXISTING MONITORING WELLL
- EXISTING TEMPORARY MONITORING WELL
- SEEP VAULT
- EXCEEDS RESIDENTIAL DRINKING WATER CRITERIA FOR PFAS
- DOES NOT EXCEED RESIDENTIAL DRINKING WATER OR GSI CRITERIA FOR PFAS
- EXCEEDS RESIDENTIAL DRINKING WATER AND GSI CRITERIA FOR PFAS
- EXCEEDS GSI CRITERIA FOR PFAS
- OUTFALL LOCATION
- STORM AND SANITARY SEWER LINES POTENTIALLY IN CONTACT WITH GROUNDWATER
- APPROXIMATE LOCATION OF SANITARY SEWER LINES
- APPROXIMATE LOCATION OF STORM SEWER LINES
- GENERAL MOTORS, LLC PROPERTY BOUNDARY
- CURRENT OR FORMER RACER PROPERTY
- GROUNDWATER CONTOUR (2.0 FEET INTERVAL)
- INFERRED GROUNDWATER CONTOUR
- APPROXIMATE GROUNDWATER FLOW DIRECTION

ABBREVIATIONS:

< - NOT DETECTED ABOVE THE LABORATORY REPORTING LIMIT

ng/L - NANOGRAMS PER LITER

J - ESTIMATED RESULT LESS THAN LIMIT OF QUANTITATION (LOQ) AND GREATER THAN OR EQUAL TO DETECTION LIMIT (DL)

U - COMPOUND WAS ANALYZED FOR BUT NOT DETECTED. THE ASSOCIATED VALUE IS THE COMPOUND QUANTITATION LIMIT.

GSI - GROUNDWATER SURFACE WATER INTERFACE

PFAS - PER-AND POLYFLUOROALKYL SUBSTANCES

NOTES:
CRITERIA LISTED ARE FROM THE STATE OF MICHIGAN'S GROUNDWATER CLEAN-UP RULES, PART 201, MICHIGAN DEPARTMENT OF ENVIRONMENTAL GREAT LAKES AND ENERGY (EGLE) UPDATED ON FEBRUARY 15, 2022.

0 300 600
SCALE IN FEET

Analyte	P201 Residential Drinking Water	P201 Groundwater Surface Water Interface	Units
Perfluorooctane sulfonic acid (PFOS)	16	12	ng/L
Perfluorooctanoic acid (PFOA)	8	12,000	ng/L
Perfluorononanoic acid (PFNA)	6	30	ng/L
Perfluorohexanesulfonic acid (PFHxS)	51	210	ng/L

RACER TRUST
PONTIAC NORTH CAMPUS
PONTIAC, MICHIGAN

SEWER LAYOUT SHOWING PFAS ANALYTICAL DATA

ARCADIS

FIGURE 1

CITY: NOVI DIV: ENV DB: TRY PIC: S.INSALACO PM: T. LINDER TM: L. CRISP TR: PROJECT NUMBER: 30075936.0005 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet D:\GIS\Project Files\MotorsLiquidationCompany\PontiacNorthCampus\Documents\Former_Fiero_Property\SiteInvestigation_2023\MonitoringPlan_2024\MonitoringPlan_2024.aprx PLOTTED: 7/12/2024 12:02 PM BY: TYarbrough

Service Layer Credits: Google Earth Pro Aerial Dated March 19, 2021

SPO PARKING

RAIL PARCEL

FORMER BUILDING 25

SPO

CONSUMER'S SUBSTATION

FORMER BUILDING 15

FORMER PLANT 12

BUILDING 14

FORMER FIERO PARKING LOT

FORMER FIERO PLANT 17

RAIL PARCEL

FORMER PLANT 14S (PLANTS 5 AND 23)

GM POWERTRAIN

FORMER POWER HOUSE FACILITY

USPS REGIONAL DISTRIBUTION CENTER

FORMER STORMWATER DETENTION FACILITY

W Walton Blvd
E Walton Blvd
Alpine Ln
Bellmore Ln
Concord Ln
Deerfield Ln
Highwood
Highwood Blvd
Lehigh Ave
Laurel
Jaycee Park Rd
W Sheffield
E Sheffield
Hollywood
W Princeton
E Princeton
W Hopkins
E Hopkins
W Yale
E Yale
W Ypsilanti
E Ypsilanti
E Ann Arbor
Price
Peacock
Clara
W Columbia
E Columbia
W Longfellow
E Longfellow
W Strathmore
E Strathmore
W Fairmount
E Fairmount
W Rutgers
E Rutgers
W Cornell
E Cornell
Baldwin Ave
W Beverly Ave
E Beverly Ave
Beverly Ave
E Beverly Ave
Jostyn Ave
E Tennyson
W Tennyson
E Mansfield
4th St
3rd Ave
Ivy
2nd Ave
1st Ave
E Madison
Le Baron
Wesbrook
Lenox
Markle
Raskob
E Kennett Rd
Lowell
Saint Louis Ave
W Kennett Rd
Parkdale Ave
E Kennett Rd
N Merrimac St
S Merrimac
Owens St
Saint Clair St
Young
Wing
Portland
W Montcalm
E Montcalm
Hillside Dr
Burt
City Line Rd
Le Grande
Garner
Hudson
Riker
McNeil St
Hood
W Rundell
Tacoma Ct
Hamilton
Cadillac
Jefferson
Virginia
Kimball
Grandie
Home
Whitfield
Kemp
E Rundell
N Saginaw St
Edison
Wolfe
Marquette
N Glenwood
Glenwood Ave
Nelson
Hammond

LEGEND

- PROPERTY BOUNDARY
- WATER WELL RESTRICTION ORDINANCE AREA
- PROPERTY SOLD BY RACER
- GENERAL MOTORS, LLC (GM)
- CURRENT OR FORMER RACER PROPERTY

SPO – SERVICE PARTS OPERATION

USPS – UNITED STATES POSTAL SERVICE

WWTP – WASTEWATER TREATMENT PLANT

NOTE: ALL BOUNDARIES ARE APPROXIMATE

0 300 600

SCALE IN FEET

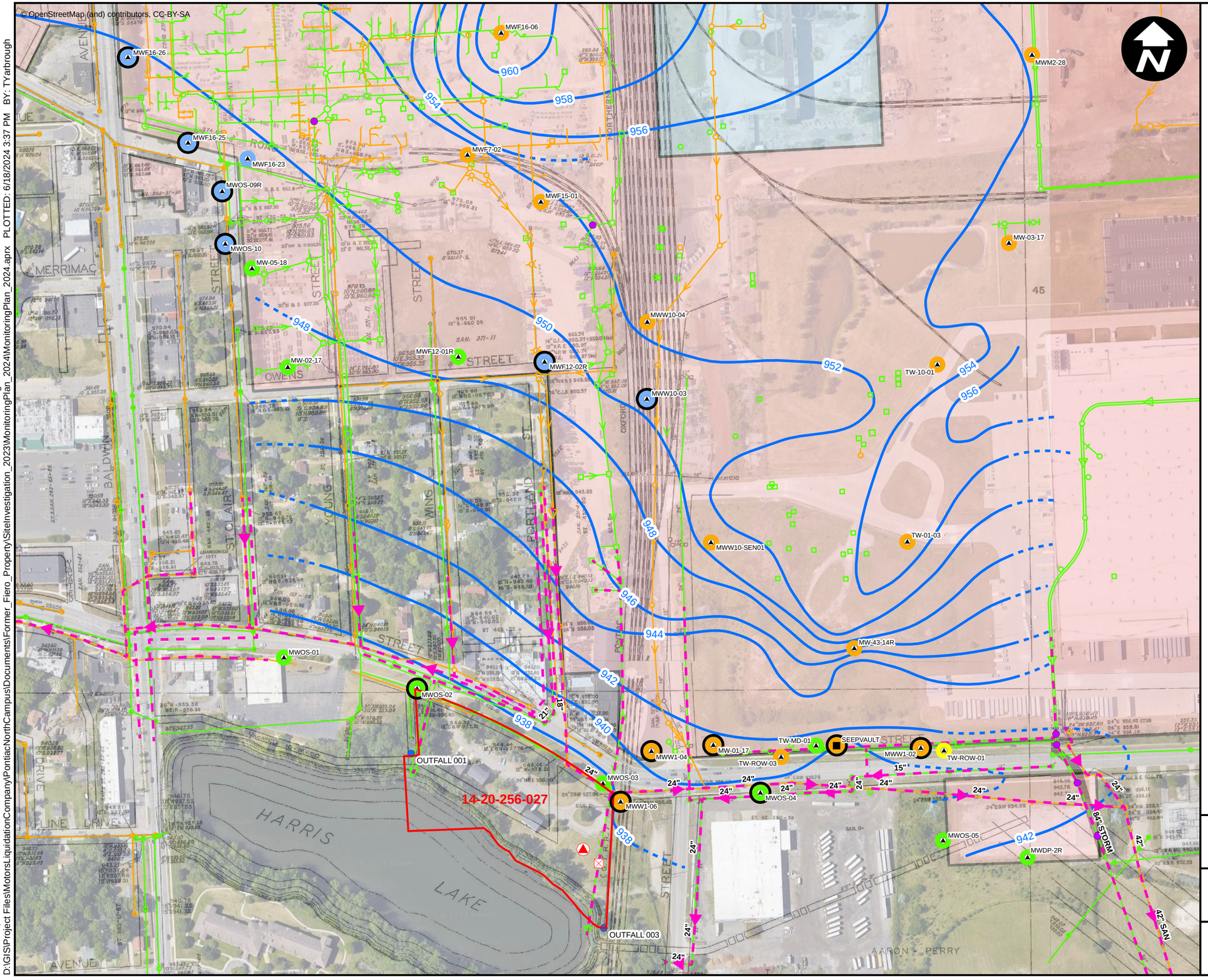
RACER TRUST
PONTIAC NORTH CAMPUS
PONTIAC, MICHIGAN

LAND AND RESOURCE USE RESTRICTIONS

ARCADIS

FIGURE 2

CITY: NOVI, MI DIV: ENV DB: TRY PIC: PM: B.SANDERS TM: TR: PROJECT NUMBER: 30006882
COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet
D:\GIS\Project Files\MotorsLiquidationCompany\PontiacNorthCampus\Documents\InspectionReport\2022_01\01_2022_InspectionReport_PropertyLayout.mxd PLOTTED: 8/17/2023 1:19:16 PM BY: TYarbrough



LEGEND

- POTENTIAL MONITORING WELL INSTALLATION PENDING 2024 RISK & PRIORITIZATION DISCUSSION
- PROPOSED SAMPLING POINT FOR OUTFALL 3 IF STORMWATER FLOW IS OBSERVED
- MONITORING WELLS PROPOSED FOR SEMI-ANNUAL SAMPLING (2Q AND 4Q 2024)
- BULKHEAD LOCATION
- EXISTING MONITORING WELLL
- EXISTING TEMPORARY MONITORING WELL
- SEEP VAULT
- EXCEEDS RESIDENTIAL DRINKING WATER CRITERIA FOR PFAS
- DOES NOT EXCEED RESIDENTIAL DRINKING WATER OR GSI CRITERIA FOR PFAS
- EXCEEDS RESIDENTIAL DRINKING WATER AND GSI CRITERIA FOR PFAS
- EXCEEDS GSI CRITERIA FOR PFAS
- OUTFALL LOCATION
- SEWER FLOW DIRECTION
- STORM AND SANITARY SEWER LINES POTENTIALLY IN CONTACT WITH GROUNDWATER
- APPROXIMATE LOCATION OF SANITARY SEWER LINES
- APPROXIMATE LOCATION OF STORM SEWER LINES
- GROUNDWATER CONTOUR (2.0 FEET INTERVAL)
- INFERRED GROUNDWATER CONTOUR
- APPROXIMATE GROUNDWATER FLOW DIRECTION
- GENERAL MOTORS, LLC PROPERTY BOUNDARY
- CURRENT OR FORMER RACER PROPERTY
- PARCEL BOUNDARY

0 250 500

SCALE IN FEET

RACER TRUST
PONTIAC NORTH CAMPUS
PONTIAC, MICHIGAN

PROPOSED ADDITIONAL WORK

ARCADIS

FIGURE
3

CITY: NOVI, MI DIV: ENV DB: TRY PIC: PM: TM: TR: PROJECT NUMBER: COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
D:\GIS\Project Files\Motors_LiquidationCompany\PontiacNorthCampus\Documents\Former_Fiero_Property\SiteInvestigation_2023\MonitoringPlan_2024\MonitoringPlan_2024.aprx PLOTTED: 6/18/2024 3:37 PM BY: TYarbrough

Appendix A

Laboratory Analytical Reports

Report of Analysis

Arcadis U.S., Inc.
630 Plaza Drive
Suite 600
Highlands Ranch, CO 80129
Attention: Tiffany Linder

Project Name: RACER PNC

Project Number: 30167840.00030

Lot Number:**YD27025**

Date Completed:06/07/2023

Kathy Smith

06/08/2023 9:03 AM
Approved and released by:
Project Manager II: **Kathy E. Smith**

The electronic signature above is the equivalent of a handwritten signature.
This report shall not be reproduced, except in its entirety, without the written approval of Pace Analytical Services, LLC.

Pace Analytical Services, LLC (*formerly Shealy Environmental Services, Inc.*)
106 Vantage Point Drive West Columbia, SC 29172
Tel: 803-791-9700 Fax: 803-791-9111 www.pacelabs.com

Case Narrative
Arcadis U.S., Inc.
Lot Number: YD27025

This Report of Analysis contains the analytical result(s) for the sample(s) listed on the Sample Summary following this Case Narrative. The sample receiving date is documented in the header information associated with each sample.

All results listed in this report relate only to the samples that are contained within this report.

Sample receipt, sample analysis, and data review have been performed in accordance with the Pace Quality Assurance Management Plan (QAMP), applicable Shealy standard operating procedures (SOPs), the 2003 NELAC standard, and Shealy policies. Additionally, the DoD QSM version 5.4 has been followed for these samples, and specifically Table B-15 was followed for all PFAS samples. Any exceptions to the QAMP, SOPs, NELAC standards, the DoD QSM, or policies are qualified on the results page or discussed below.

All QC associated with these samples were compliant with DOD QSM 5.4 table B-15 and our PFAS SOP.

Correction factors (CF) are used to calculate the original sample concentration. The CF is the inverse of the concentration factor (sample volume / extract final volume) times the dilution factor (DF). The CF is calculated as follows:

CF = DF * FV / Vo

FV is volume of extract (mL)
Vo is initial sample volume (mL)
DF is dilution factor. For undiluted analysis, DF = 1.

Sample concentration for aqueous samples:
Concentration (ng/L) = Cs*CF,

$$C_s = \frac{\left(\frac{(A_s x C_{is})}{A_{is}}\right) - B}{M1}$$

Where

C_s is on column concentration of target analyte in the sample (ng/L)
C_{is} is concentration of internal standard in the sample (ng/L)
A_s is peak response of target analyte in the sample
A_{is} is peak response of internal standard in the sample
M1 is the average RF from ICAL or the slope from linear regression ICAL
B is the y-intercept from the ICAL

Pace is a DoD/DOE accredited laboratory; however, the following analyses are currently not listed on our DoD/DOE scope of accreditation: Drinking Water: pH EPA 150.1, Turbidity EPA 180.1, Metals EPA 200.7 & 200.8, Mercury EPA 245.1, Anions EPA 300.0, Cyanide EPA 335.4, Nitrates EPA 353.2, Orthophosphate & Phosphorus EPA 365.1, EDB/DBCP EPA 504.1, HPC SIMPLATE, Color SM 2120 B-2011, Alkalinity SM 2320 B-2011, Specific Conductance SM 2510 B-2011, Residue-filterable (TDS) SM 2540 C, Calcium Hardness (CaCO2) SM 3500-Ca B-2011, TRC SM 4500 Cl G-2011, pH SM 4500 H=B-2011, E.Coli, Total Coliform. Non-Potable Water: Metals EPA 200.7, Strontium EPA 200.8, Chlorate EPA 300.0, Cyanide EPA 335.4, Phenolics EPA 420.4, 2-Methyl-4,6-Dinitrophenol EPA 625.1, Propane RSK-175, Specific Conductance SM 2510 B-2011, Salinity SM2520 B, Residue- total SM 2540 B, Sulfite SM 4500 SO32- B-2011, Amenable Cyanide SM 4500-CN- G-2011, BOD & CBOD SM 5210 B, MBAS SM 5540 C-2011, Boron & Titanium SW-846 6010D, Boron, Molybdenum, & Titanium SW-846 6020B, Alcohols & Glycols SW-846 8015C, Pentachlorophenol SW-846 8151A, Ethyl Acetate, Hexane, & n-Hexane SW-846 8260D, SVOC 1,4-Dioxane, 4-Dimethyl aminoazobenzene, 1,4-Naphthoquinone, 3,5-Dinitroaniline, PETN SW-846 8270E, Amenable Cyanide SW-846 9012B. Solid and Chemical Materials: Boron & Titanium SW-846 6010D, Molybdenum SW-846 6020B, Ethylene Glycol SW-846 8015B, Pentachlorophenol SW-846 8151A, Chloroprene SW-846 8260B, SVOC 1,4-Dioxane, 1,3,5-Trinitrobenzene, 1,4- Naphthoquinone, 1,4-Phenylenediamine, 2,4-Dinitrotoluene, 2,6-Dinitrotoluene, 3-Methylcholanthrene, 4-Aminobiphenyl, 4-Dimethyl aminoazobenzene, 4-Nitroquinoline-1-oxide, 7,12-Dimethylbenzo(a)anthracene, Chlorobenzilate, Diallate, Ethyl methanesulfonate, Isodrin, Isosafrole, Methyl methanesulfonate, n-Nitrosomethylethylamine, n-Nitrosomorpholine, n-Nitrosopiperidine, Piperonyl butoxide, Pronamide, Safrole, 3,5- Dinitroaniline, PETN SW-846 8270E, Oil & Grease SW-846 9071B.

Pace is a TNI accredited laboratory; however, the following analyses are currently not listed on our TNI scope of accreditation: Drinking Water: VOC (excluding BTEX, MTBE, Naphthalene, & 1,2-dichloroethane) EPA 524.2, E. coli and Total coliforms SM 9223 B-2004, Solid Chemical Material: TOC Walkley-Black, Biological Tissue: All, Non-Potable Water: SGT-HEM EPA 1664B, Silica EPA 200.7, Boron, Calcium, Silicon, Strontium EPA 200.8, Bicarbonate, Carbonate, and Hydroxide Alkalinity SM 2320 B-2011, SM 9221 C E-2006 & SM 9222D-2006, Strontium SW-846 6010D, VOC SM 6200 B-2011, Fecal Coliform Colilert-18.

If you have any questions regarding this report, please contact the Pace Project Manager listed on the cover page.

PFAS
The following samples were diluted due to the nature of the sample matrix: YD27025-003, YD27025-004, YD27025-005. The LOQ has been elevated to reflect the dilution. Samples were diluted due to samples being foamy.

Surrogate recovery for the following sample was outside control limits: YD27025-001. DUP was performed with concurring results. The data has been reported.

Surrogate recovery for the following samples was outside the upper control limit: YD27025-003, YD27025-004, YD27025-005. These samples did not contain any target analytes; therefore, re-extraction and/or re-analysis was not performed.

Surrogate recovery for the following sample was outside control limits: YD27025-006. Re-extraction and/or re-analysis was performed outside of holding time with concurring results. All data has been reported.

Manual Integration Summary

Arcadis U.S., Inc.

Lot Number: YD27025

Project Name: RACER PNC

Project Number: 30167840.00030

Where applicable, analytes for which manual integration occurred have been flagged with the following:

Qualifier	Technical Justification	Qualifier	Technical Justification	Qualifier	Technical Justification
M-01	Split peak	M-07	Low fit	M-13	Error
M-02	Peak tailing	M-08	Peak not found	M-14	Baseline
M-03	Incorrect auto integration	M-09	Analyte not Identified by the Data System	M-15	Other
M-04	Poor chromatography	M-10	Analyte misidentified by the Data System	M-16	Retention time shift
M-05	Manually assigned peak	M-11	Invalid integration	M-17	Shouldering
M-06	Wrong isomer	M-12	Wrong peak		

A summary of instances where manual integration occurred is included below:

Method	Sample	Run Number	Parameter	Qualifier
PFAS by ID SOP	YD27025-001	1	Perfluoro-1-butanesulfonic acid (PFBS)	M-03
PFAS by ID SOP	YD27025-001	1	Perfluoro-1-pentanesulfonic acid	M-03
PFAS by ID SOP	YD27025-001	1	Perfluorohexanesulfonic acid (PFHxS)	M-03
PFAS by ID SOP	YD27025-001	1	Perfluoro-n-butanoic acid (PFBA)	M-03
PFAS by ID SOP	YD27025-001	1	Perfluoro-n-hexanoic acid (PFHxA)	M-03
PFAS by ID SOP	YD27025-001	1	Perfluoro-n-octanoic acid (PFOA)	M-03
PFAS by ID SOP	YD27025-001	1	Perfluorooctanesulfonic acid (PFOS)	M-03
PFAS by ID SOP	YD27025-003	1	Perfluorohexanesulfonic acid (PFHxS)	M-03
PFAS by ID SOP	YD27025-003	1	Perfluoro-n-butanoic acid (PFBA)	M-03
PFAS by ID SOP	YD27025-003	1	Perfluoro-n-octanoic acid (PFOA)	M-03
PFAS by ID SOP	YD27025-003	1	Perfluorooctanesulfonic acid (PFOS)	M-03
PFAS by ID SOP	YD27025-004	1	Perfluoro-n-butanoic acid (PFBA)	M-03
PFAS by ID SOP	YD27025-004	1	Perfluoro-n-octanoic acid (PFOA)	M-03
PFAS by ID SOP	YD27025-004	1	Perfluorooctanesulfonic acid (PFOS)	M-03
PFAS by ID SOP	YD27025-005	1	Perfluorohexanesulfonic acid (PFHxS)	M-03
PFAS by ID SOP	YD27025-005	1	Perfluoro-n-octanoic acid (PFOA)	M-03
PFAS by ID SOP	YD27025-005	1	Perfluorooctanesulfonic acid (PFOS)	M-03
PFAS by ID SOP	YD27025-006	1	Perfluoro-1-heptanesulfonic acid	M-03
PFAS by ID SOP	YD27025-006	1	Perfluorohexanesulfonic acid (PFHxS)	M-03
PFAS by ID SOP	YD27025-006	1	Perfluoro-n-butanoic acid (PFBA)	M-03
PFAS by ID SOP	YD27025-006	1	Perfluoro-n-octanoic acid (PFOA)	M-03
PFAS by ID SOP	YD27025-006	1	Perfluoro-n-pentanoic acid (PFPeA)	M-03
PFAS by ID SOP	YD27025-006	1	Perfluorooctanesulfonic acid (PFOS)	M-03
PFAS by ID SOP	YD27025-006	2	Perfluorohexanesulfonic acid (PFHxS)	M-03
PFAS by ID SOP	YD27025-006	2	Perfluoro-n-butanoic acid (PFBA)	M-03
PFAS by ID SOP	YD27025-006	2	Perfluoro-n-heptanoic acid (PFHpA)	M-03
PFAS by ID SOP	YD27025-006	2	Perfluoro-n-hexanoic acid (PFHxA)	M-03
PFAS by ID SOP	YD27025-006	2	Perfluoro-n-octanoic acid (PFOA)	M-03
PFAS by ID SOP	YD27025-006	2	Perfluoro-n-pentanoic acid (PFPeA)	M-03
PFAS by ID SOP	YD27025-006	2	Perfluorooctanesulfonic acid (PFOS)	M-03
PFAS by ID SOP	YD27025-006	2	13C8_PFOS	M-03
PFAS by ID SOP	YQ75308-002	1	N-methylperfluoro-1-	M-03
PFAS by ID SOP	YQ75308-003	1	N-methylperfluoro-1-	M-03
PFAS by ID SOP	YD27025-001DU	1	Perfluoro-1-butanesulfonic acid (PFBS)	M-03
PFAS by ID SOP	YD27025-001DU	1	Perfluoro-1-pentanesulfonic acid	M-03
PFAS by ID SOP	YD27025-001DU	1	Perfluoro-n-butanoic acid (PFBA)	M-03
PFAS by ID SOP	YD27025-001DU	1	Perfluoro-n-heptanoic acid (PFHpA)	M-03

Manual Integration Summary

Arcadis U.S., Inc.

Lot Number: YD27025

Project Name: RACER PNC

Project Number: 30167840.00030

Where applicable, analytes for which manual integration occurred have been flagged with the following:

Qualifier	Technical Justification	Qualifier	Technical Justification	Qualifier	Technical Justification
M-01	Split peak	M-07	Low fit	M-13	Error
M-02	Peak tailing	M-08	Peak not found	M-14	Baseline
M-03	Incorrect auto integration	M-09	Analyte not Identified by the Data System	M-15	Other
M-04	Poor chromatography	M-10	Analyte misidentified by the Data System	M-16	Retention time shift
M-05	Manually assigned peak	M-11	Invalid integration	M-17	Shouldering
M-06	Wrong isomer	M-12	Wrong peak		

A summary of instances where manual integration occurred is included below:

Method	Sample	Run Number	Parameter	Qualifier
PFAS by ID SOP	YQ75308-002	1	Perfluoro-n-nonanoic acid (PFNA)	M-03
PFAS by ID SOP	YD27025-001DU	1	Perfluoro-n-octanoic acid (PFOA)	M-03
PFAS by ID SOP	YQ75308-003	1	Perfluorooctanesulfonic acid (PFOS)	M-03
PFAS by ID SOP	YD27025-001DU	1	Perfluorooctanesulfonic acid (PFOS)	M-03
PFAS by ID SOP	YQ76891-002	1	1H, 1H, 2H, 2H-perfluorodecane	M-03
PFAS by ID SOP	YQ76891-002	1	N-methylperfluoro-1-	M-03
PFAS by ID SOP	YQ76891-002	1	Perfluorooctanesulfonic acid (PFOS)	M-03

If you have any questions regarding this report, please contact the Pace Project Manager listed on the cover page.

Sample Summary

Arcadis U.S., Inc.

Lot Number: YD27025

Project Name: RACER PNC

Project Number: 30167840.00030

Sample Number	Sample ID	Matrix	Date Sampled	Date Received
001	TW-MD-01_GW-042623	Aqueous	04/26/2023 1000	04/27/2023
002	EB-02_042623	Aqueous	04/26/2023 1010	04/27/2023
003	SEEPVAULT_GW-042623	Aqueous	04/26/2023 1030	04/27/2023
004	MWW10-SEN01_GW-042623	Aqueous	04/26/2023 1255	04/27/2023
005	TW-01-03_GW-042623	Aqueous	04/26/2023 1515	04/27/2023
006	MWW10-04_GW-042623	Aqueous	04/26/2023 1650	04/27/2023
007	Trip Blank	Aqueous	04/26/2023 1710	04/27/2023

(7 samples)

Detection Summary

Arcadis U.S., Inc.

Lot Number: YD27025

Project Name: RACER PNC

Project Number: 30167840.00030

Sample	Sample ID	Matrix	Parameter	Method	Result	Q	Units	Page
001	TW-MD-01_GW-042623	Aqueous	PFBS	PFAS by ID	1.3	JM-03	ng/L	8
001	TW-MD-01_GW-042623	Aqueous	PFPeS	PFAS by ID	0.97	JM-03	ng/L	8
001	TW-MD-01_GW-042623	Aqueous	PFHxS	PFAS by ID	5.6	M-03	ng/L	8
001	TW-MD-01_GW-042623	Aqueous	PFBA	PFAS by ID	2.7	JQM-03	ng/L	8
001	TW-MD-01_GW-042623	Aqueous	PFHxA	PFAS by ID	1.2	JM-03	ng/L	8
001	TW-MD-01_GW-042623	Aqueous	PFOA	PFAS by ID	4.6	M-03	ng/L	8
001	TW-MD-01_GW-042623	Aqueous	PFOS	PFAS by ID	1.3	JM-03	ng/L	8
003	SEEPVAULT_GW-042623	Aqueous	PFHxS	PFAS by ID	12	JM-03	ng/L	12
003	SEEPVAULT_GW-042623	Aqueous	PFBA	PFAS by ID	14	JM-03	ng/L	12
003	SEEPVAULT_GW-042623	Aqueous	PFOA	PFAS by ID	11	JM-03	ng/L	12
003	SEEPVAULT_GW-042623	Aqueous	PFOS	PFAS by ID	100	M-03	ng/L	12
004	MWW10-SEN01_GW-042623	Aqueous	PFBA	PFAS by ID	10	JM-03	ng/L	14
004	MWW10-SEN01_GW-042623	Aqueous	PFOS	PFAS by ID	15	JM-03	ng/L	14
005	TW-01-03_GW-042623	Aqueous	PFHxS	PFAS by ID	19	JM-03	ng/L	16
005	TW-01-03_GW-042623	Aqueous	PFOA	PFAS by ID	29	JM-03	ng/L	16
005	TW-01-03_GW-042623	Aqueous	PFOS	PFAS by ID	97	M-03	ng/L	16
006	MWW10-04_GW-042623	Aqueous	PFHpS	PFAS by ID	1.2	JM-03	ng/L	18
006	MWW10-04_GW-042623	Aqueous	PFHxS	PFAS by ID	6.9	M-03	ng/L	18
006	MWW10-04_GW-042623	Aqueous	PFBA	PFAS by ID	11	QM-03	ng/L	18
006	MWW10-04_GW-042623	Aqueous	PFHpA	PFAS by ID	17		ng/L	18
006	MWW10-04_GW-042623	Aqueous	PFHxA	PFAS by ID	19		ng/L	18
006	MWW10-04_GW-042623	Aqueous	PFNA	PFAS by ID	12		ng/L	18
006	MWW10-04_GW-042623	Aqueous	PFOA	PFAS by ID	78	M-03	ng/L	18
006	MWW10-04_GW-042623	Aqueous	PFPeA	PFAS by ID	18	M-03	ng/L	18
006	MWW10-04_GW-042623	Aqueous	PFOS	PFAS by ID	18	M-03	ng/L	18

(25 detections)

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-001**

Description: **TW-MD-01_GW-042623** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1000** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/30/2023 2008	ARC2	05/15/2023 1720	75308

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.2	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.2	1.8	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**1.3**	**JM-03**	**3.6**	**0.90**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.90	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.6	0.90	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.90	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	0.90	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**0.97**	**JM-03**	**3.6**	**0.90**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**5.6**	**M-03**	**3.6**	**0.90**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**2.7**	**JQM-03**	**3.6**	**0.90**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	0.90	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.90	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.6	0.90	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**1.2**	**JM-03**	**3.6**	**0.90**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.6	0.90	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**4.6**	**M-03**	**3.6**	**0.90**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.6	0.90	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.90	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.90	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.90	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**1.3**	**JM-03**	**3.6**	**0.90**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	259	50-150
13C2_6:2FTS	N	187	50-150
13C2_8:2FTS		130	50-150
13C2_PFDoA		102	50-150
13C2_PFTeDA		101	50-150
13C3_PFBS		85	50-150
13C3_PFHxS		99	50-150
13C3-HFPO-DA		90	50-150
13C4_PFBA	N	40	50-150
13C4_PFHpA		108	50-150
13C5_PFHxA		98	50-150
13C5_PFPeA		73	50-150
13C6_PFDA		112	50-150
13C7_PFUdA		106	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-001**

Description: **TW-MD-01_GW-042623** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1000** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		112	50-150
13C8_PFOS		109	50-150
13C8_PFOSA		117	50-150
13C9_PFNA		112	50-150
d5-EtFOSAA		111	50-150
d3-MeFOSAA		110	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-002**

Description: **EB-02_042623** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1010** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/30/2023 2033	ARC2	05/15/2023 1720	75308

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		8.2	2.1	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		8.2	2.1	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		8.2	2.1	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		8.2	2.1	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		8.2	2.1	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		8.2	2.1	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		8.2	2.1	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		8.2	2.1	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		8.2	2.1	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		4.1	1.0	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		89	50-150
13C2_6:2FTS		90	50-150
13C2_8:2FTS		96	50-150
13C2_PFDoA		92	50-150
13C2_PFTeDA		93	50-150
13C3_PFBS		84	50-150
13C3_PFHxS		91	50-150
13C3-HFPO-DA		87	50-150
13C4_PFBA		89	50-150
13C4_PFHpA		91	50-150
13C5_PFHxA		93	50-150
13C5_PFPeA		88	50-150
13C6_PFDA		89	50-150
13C7_PFUdA		93	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-002**

Description: **EB-02_042623** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1010** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		92	50-150
13C8_PFOS		91	50-150
13C8_PFOSA		100	50-150
13C9_PFNA		91	50-150
d5-EtFOSAA		95	50-150
d3-MeFOSAA		95	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-003**

Description: **SEEPVAULT_GW-042623** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1030** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/30/2023 2046	ARC2	05/15/2023 1720	75308

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		80	20	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		80	20	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		80	20	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	80	20	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	80	20	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		80	20	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		80	20	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		80	20	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		80	20	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**12**	**JM-03**	**40**	**10**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**14**	**JM-03**	**40**	**10**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**11**	**JM-03**	**40**	**10**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**100**	**M-03**	**40**	**10**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	215	50-150
13C2_6:2FTS	N	173	50-150
13C2_8:2FTS		150	50-150
13C2_PFDoA		105	50-150
13C2_PFTeDA		109	50-150
13C3_PFBS		106	50-150
13C3_PFHxS		105	50-150
13C3-HFPO-DA		104	50-150
13C4_PFBA		79	50-150
13C4_PFHpA		118	50-150
13C5_PFHxA		117	50-150
13C5_PFPeA		96	50-150
13C6_PFDA		120	50-150
13C7_PFUdA		120	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
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S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-003**

Description: **SEEPVAULT_GW-042623** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1030** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		119	50-150
13C8_PFOS		116	50-150
13C8_PFOSA		126	50-150
13C9_PFNA		119	50-150
d5-EtFOSAA		124	50-150
d3-MeFOSAA		127	50-150

LOQ = Limit of Quantitation	B = Detected in the method blank	E = Quantitation of compound exceeded the calibration range	DL = Detection Limit	Q = Surrogate failure
ND = Not detected at or above the DL	N = Recovery is out of criteria	P = The RPD between two GC columns exceeds 40%	J = Estimated result < LOQ and ≥ DL	L = LCS/LCSD failure
H = Out of holding time	W = Reported on wet weight basis			S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-004**

Description: **MWW10-SEN01_GW-042623** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1255** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/30/2023 2059	ARC2	05/15/2023 1720	75308

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		80	20	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		80	20	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		80	20	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	80	20	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	80	20	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		80	20	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		80	20	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		80	20	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		80	20	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**10**	**JM-03**	**40**	**10**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND	M-03	40	10	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**15**	**JM-03**	**40**	**10**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	202	50-150
13C2_6:2FTS	N	170	50-150
13C2_8:2FTS		134	50-150
13C2_PFDoA		101	50-150
13C2_PFTeDA		113	50-150
13C3_PFBS		109	50-150
13C3_PFHxS		111	50-150
13C3-HFPO-DA		105	50-150
13C4_PFBA		87	50-150
13C4_PFHpA		115	50-150
13C5_PFHxA		119	50-150
13C5_PFPeA		101	50-150
13C6_PFDA		117	50-150
13C7_PFUdA		117	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-004**

Description: **MWW10-SEN01_GW-042623** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1255** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		124	50-150
13C8_PFOS		115	50-150
13C8_PFOSA		127	50-150
13C9_PFNA		114	50-150
d5-EtFOSAA		120	50-150
d3-MeFOSAA		124	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-005**

Description: **TW-01-03_GW-042623** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1515** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/31/2023 1617	ARC2	05/15/2023 1720	75308

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		80	20	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		80	20	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	80	20	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	80	20	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	80	20	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		80	20	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		80	20	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND	Q	80	20	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND	Q	80	20	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**19**	**JM-03**	**40**	**10**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**29**	**JM-03**	**40**	**10**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**97**	**M-03**	**40**	**10**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	385	50-150
13C2_6:2FTS	N	327	50-150
13C2_8:2FTS	N	344	50-150
13C2_PFDoA		134	50-150
13C2_PFTeDA		118	50-150
13C3_PFBS		113	50-150
13C3_PFHxS		125	50-150
13C3-HFPO-DA		107	50-150
13C4_PFBA		84	50-150
13C4_PFHpA		115	50-150
13C5_PFHxA		115	50-150
13C5_PFPeA		102	50-150
13C6_PFDA		131	50-150
13C7_PFUdA		144	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-005**

Description: **TW-01-03_GW-042623** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1515** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		117	50-150
13C8_PFOS		125	50-150
13C8_PFOSA		128	50-150
13C9_PFNA		126	50-150
d5-EtFOSAA	N	183	50-150
d3-MeFOSAA	N	162	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-006**

Description: **MWW10-04_GW-042623** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1650** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/31/2023 1630	ARC2	05/15/2023 1720	75308
2	SOP SPE	PFAS by ID SOP QSM B-15	1	06/06/2023 2308	ARC2	06/05/2023 1453	76891

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.3	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.3	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.3	1.8	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**1.2**	**JM-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**6.9**	**M-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**11**	**QM-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**17**		**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**19**		**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**12**		**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**78**	**M-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**18**	**M-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**18**	**M-03**	**3.7**	**0.92**	**ng/L**	**1**

Surrogate	Run 1 Q	Run 1 % Recovery	Run 1 Acceptance Limits	Run 2 Q	Run 2 % Recovery	Run 2 Acceptance Limits
13C2_4:2FTS	N	292	50-150	HN	280	50-150
13C2_6:2FTS	N	299	50-150	HN	304	50-150
13C2_8:2FTS	N	277	50-150	HN	321	50-150
13C2_PFDoA		119	50-150	H	91	50-150
13C2_PFTeDA		104	50-150	H	73	50-150
13C3_PFBS		90	50-150	H	61	50-150
13C3_PFHxS		107	50-150	H	68	50-150
13C3-HFPO-DA		80	50-150	HN	41	50-150
13C4_PFBA	N	33	50-150	HN	18	50-150
13C4_PFHpA		91	50-150	HN	44	50-150
13C5_PFHxA		82	50-150	HN	44	50-150
13C5_PFPeA		61	50-150	HN	28	50-150
13C6_PFDA		108	50-150	H	82	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-006**

Description: **MWW10-04_GW-042623** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1650** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits	Q	Run 2 % Recovery	Acceptance Limits
13C7_PFUdA		124	50-150	H	93	50-150
13C8_PFOA		91	50-150	H	60	50-150
13C8_PFOS		115	50-150	HM-03	82	50-150
13C8_PFOSA		111	50-150	H	69	50-150
13C9_PFNA		108	50-150	H	77	50-150
d5-EtFOSAA		145	50-150	H	105	50-150
d3-MeFOSAA		126	50-150	H	98	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-006**

Description: **MWW10-04_GW-042623** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1650** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/31/2023 1630	ARC2	05/15/2023 1720	75308
2	SOP SPE	PFAS by ID SOP QSM B-15	1	06/06/2023 2308	ARC2	06/05/2023 1453	76891

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND	H	7.1	1.8	ng/L	2
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND	H	7.1	1.8	ng/L	2
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	HQ	7.1	1.8	ng/L	2
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	HQ	7.1	1.8	ng/L	2
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	HQ	7.1	1.8	ng/L	2
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND	HQ	7.1	1.8	ng/L	2
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND	H	7.1	1.8	ng/L	2
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND	H	7.1	1.8	ng/L	2
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND	H	7.1	1.8	ng/L	2
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND	H	3.6	0.89	ng/L	2
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND	H	3.6	0.89	ng/L	2
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND	H	3.6	0.89	ng/L	2
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND	H	3.6	0.89	ng/L	2
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND	H	3.6	0.89	ng/L	2
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND	H	3.6	0.89	ng/L	2
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**6.8**	**HM-03**	**3.6**	**0.89**	**ng/L**	**2**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**9.1**	**HQM-03**	**3.6**	**0.89**	**ng/L**	**2**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND	H	3.6	0.89	ng/L	2
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND	H	3.6	0.89	ng/L	2
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**19**	**HQM-03**	**3.6**	**0.89**	**ng/L**	**2**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**25**	**HQM-03**	**3.6**	**0.89**	**ng/L**	**2**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**11**	**H**	**3.6**	**0.89**	**ng/L**	**2**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**79**	**HM-03**	**3.6**	**0.89**	**ng/L**	**2**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**21**	**HQM-03**	**3.6**	**0.89**	**ng/L**	**2**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND	H	3.6	0.89	ng/L	2
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND	H	3.6	0.89	ng/L	2
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND	H	3.6	0.89	ng/L	2
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**21**	**HM-03**	**3.6**	**0.89**	**ng/L**	**2**

Surrogate	Run 1 Q	Run 1 % Recovery	Run 1 Acceptance Limits	Run 2 Q	Run 2 % Recovery	Run 2 Acceptance Limits
13C2_4:2FTS	N	292	50-150	HN	280	50-150
13C2_6:2FTS	N	299	50-150	HN	304	50-150
13C2_8:2FTS	N	277	50-150	HN	321	50-150
13C2_PFDoA		119	50-150	H	91	50-150
13C2_PFTeDA		104	50-150	H	73	50-150
13C3_PFBS		90	50-150	H	61	50-150
13C3_PFHxS		107	50-150	H	68	50-150
13C3-HFPO-DA		80	50-150	HN	41	50-150
13C4_PFBA	N	33	50-150	HN	18	50-150
13C4_PFHpA		91	50-150	HN	44	50-150
13C5_PFHxA		82	50-150	HN	44	50-150
13C5_PFPeA		61	50-150	HN	28	50-150
13C6_PFDA		108	50-150	H	82	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-006**

Description: **MWW10-04_GW-042623** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1650** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits	Q	Run 2 % Recovery	Acceptance Limits
13C7_PFUdA		124	50-150	H	93	50-150
13C8_PFOA		91	50-150	H	60	50-150
13C8_PFOS		115	50-150	HM-03	82	50-150
13C8_PFOSA		111	50-150	H	69	50-150
13C9_PFNA		108	50-150	H	77	50-150
d5-EtFOSAA		145	50-150	H	105	50-150
d3-MeFOSAA		126	50-150	H	98	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-007**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1710** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/31/2023 1643	ARC2	05/15/2023 1720	75308

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		8.4	2.1	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		8.4	2.1	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		8.4	2.1	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		8.4	2.1	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		8.4	2.1	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		8.4	2.1	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		8.4	2.1	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		8.4	2.1	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		8.4	2.1	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		4.2	1.1	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		129	50-150
13C2_6:2FTS		108	50-150
13C2_8:2FTS		110	50-150
13C2_PFDoA		114	50-150
13C2_PFTeDA		115	50-150
13C3_PFBS		113	50-150
13C3_PFHxS		114	50-150
13C3-HFPO-DA		117	50-150
13C4_PFBA		114	50-150
13C4_PFHpA		118	50-150
13C5_PFHxA		122	50-150
13C5_PFPeA		109	50-150
13C6_PFDA		110	50-150
13C7_PFUdA		112	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-007**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1710** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		116	50-150
13C8_PFOS		117	50-150
13C8_PFOSA		119	50-150
13C9_PFNA		114	50-150
d5-EtFOSAA		120	50-150
d3-MeFOSAA		113	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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QC Summary

PFAS by LC/MS/MS - MB

Sample ID: YQ75308-001
Batch: 75308
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/15/2023 1720

Parameter	Result	Q	Dil	LOQ	DL	Units	Analysis Date
9Cl-PF3ONS	ND		1	8.0	2.0	ng/L	05/30/2023 1723
11Cl-PF3OUdS	ND		1	8.0	2.0	ng/L	05/30/2023 1723
8:2 FTS	ND		1	8.0	2.0	ng/L	05/30/2023 1723
6:2 FTS	ND		1	8.0	2.0	ng/L	05/30/2023 1723
4:2 FTS	ND		1	8.0	2.0	ng/L	05/30/2023 1723
GenX	ND		1	8.0	2.0	ng/L	05/30/2023 1723
ADONA	ND		1	8.0	2.0	ng/L	05/30/2023 1723
EtFOSAA	ND		1	8.0	2.0	ng/L	05/30/2023 1723
MeFOSAA	ND		1	8.0	2.0	ng/L	05/30/2023 1723
PFBS	ND		1	4.0	1.0	ng/L	05/30/2023 1723
PFDS	ND		1	4.0	1.0	ng/L	05/30/2023 1723
PFHpS	ND		1	4.0	1.0	ng/L	05/30/2023 1723
PFNS	ND		1	4.0	1.0	ng/L	05/30/2023 1723
PFOSA	ND		1	4.0	1.0	ng/L	05/30/2023 1723
PFPeS	ND		1	4.0	1.0	ng/L	05/30/2023 1723
PFHxS	ND		1	4.0	1.0	ng/L	05/30/2023 1723
PFBA	ND		1	4.0	1.0	ng/L	05/30/2023 1723
PFDA	ND		1	4.0	1.0	ng/L	05/30/2023 1723
PFDoA	ND		1	4.0	1.0	ng/L	05/30/2023 1723
PFHpA	ND		1	4.0	1.0	ng/L	05/30/2023 1723
PFHxA	ND		1	4.0	1.0	ng/L	05/30/2023 1723
PFNA	ND		1	4.0	1.0	ng/L	05/30/2023 1723
PFOA	ND		1	4.0	1.0	ng/L	05/30/2023 1723
PFPeA	ND		1	4.0	1.0	ng/L	05/30/2023 1723
PFTeDA	ND		1	4.0	1.0	ng/L	05/30/2023 1723
PFTrDA	ND		1	4.0	1.0	ng/L	05/30/2023 1723
PFUdA	ND		1	4.0	1.0	ng/L	05/30/2023 1723
PFOS	ND		1	4.0	1.0	ng/L	05/30/2023 1723

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		107	50-150
13C2_6:2FTS		105	50-150
13C2_8:2FTS		101	50-150
13C2_PFDoA		95	50-150
13C2_PFTeDA		100	50-150
13C3_PFBS		97	50-150
13C3_PFHxS		96	50-150
13C3-HFPO-DA		99	50-150
13C4_PFBA		100	50-150
13C4_PFHpA		102	50-150
13C5_PFHxA		106	50-150
13C5_PFPeA		102	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: YQ75308-001
Batch: 75308
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/15/2023 1720

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		102	50-150
13C7_PFUdA		104	50-150
13C8_PFOA		107	50-150
13C8_PFOS		100	50-150
13C8_PFOSA		115	50-150
13C9_PFNA		100	50-150
d5-EtFOSAA		108	50-150
d3-MeFOSAA		102	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ75308-002
Batch: 75308
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/15/2023 1720

Parameter	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	%Rec Limit	Analysis Date
9Cl-PF3ONS	15	14		1	95	50-150	05/30/2023 1736
11Cl-PF3OUdS	15	15		1	97	50-150	05/30/2023 1736
8:2 FTS	15	13		1	87	67-138	05/30/2023 1736
6:2 FTS	15	14		1	95	64-140	05/30/2023 1736
4:2 FTS	15	16		1	104	63-143	05/30/2023 1736
GenX	32	31		1	97	50-150	05/30/2023 1736
ADONA	15	15		1	99	50-150	05/30/2023 1736
EtFOSAA	16	15		1	91	61-135	05/30/2023 1736
MeFOSAA	16	16	M-03	1	99	65-136	05/30/2023 1736
PFBS	14	14		1	100	72-130	05/30/2023 1736
PFDS	15	15		1	95	53-142	05/30/2023 1736
PFHpS	15	15		1	99	69-134	05/30/2023 1736
PFNS	15	14		1	90	69-127	05/30/2023 1736
PFOSA	16	15		1	94	67-137	05/30/2023 1736
PFPeS	15	14		1	93	71-127	05/30/2023 1736
PFHxS	15	15		1	101	68-131	05/30/2023 1736
PFBA	16	15		1	96	73-129	05/30/2023 1736
PFDA	16	15		1	95	71-129	05/30/2023 1736
PFDoA	16	17		1	106	72-134	05/30/2023 1736
PFHpA	16	16		1	102	72-130	05/30/2023 1736
PFHxA	16	15		1	94	72-129	05/30/2023 1736
PFNA	16	16	M-03	1	103	69-130	05/30/2023 1736
PFOA	16	16		1	100	71-133	05/30/2023 1736
PFPeA	16	15		1	94	72-129	05/30/2023 1736
PFTeDA	16	16		1	101	71-132	05/30/2023 1736
PFTrDA	16	16		1	99	65-144	05/30/2023 1736
PFUdA	16	16		1	99	69-133	05/30/2023 1736
PFOS	15	14		1	93	65-140	05/30/2023 1736

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		106	50-150
13C2_6:2FTS		104	50-150
13C2_8:2FTS		100	50-150
13C2_PFDoA		96	50-150
13C2_PFTeDA		106	50-150
13C3_PFBS		99	50-150
13C3_PFHxS		99	50-150
13C3-HFPO-DA		102	50-150
13C4_PFBA		100	50-150
13C4_PFHpA		105	50-150
13C5_PFHxA		107	50-150
13C5_PFPeA		101	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ75308-002
Batch: 75308
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/15/2023 1720

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		104	50-150
13C7_PFUdA		104	50-150
13C8_PFOA		104	50-150
13C8_PFOS		103	50-150
13C8_PFOSA		113	50-150
13C9_PFNA		105	50-150
d5-EtFOSAA		108	50-150
d3-MeFOSAA		105	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCSD

Sample ID: YQ75308-003
Batch: 75308
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/15/2023 1720

Parameter	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	% RPD	%Rec Limit	% RPD Limit	Analysis Date
9Cl-PF3ONS	15	16		1	106	11	50-150	30	05/30/2023 1748
11Cl-PF3OUdS	15	15		1	99	2.8	50-150	30	05/30/2023 1748
8:2 FTS	15	16		1	101	15	67-138	30	05/30/2023 1748
6:2 FTS	15	16		1	106	11	64-140	30	05/30/2023 1748
4:2 FTS	15	15		1	103	0.57	63-143	30	05/30/2023 1748
GenX	32	33		1	102	4.8	50-150	30	05/30/2023 1748
ADONA	15	15		1	101	2.1	50-150	30	05/30/2023 1748
EtFOSAA	16	16		1	102	11	61-135	30	05/30/2023 1748
MeFOSAA	16	17	M-03	1	107	6.9	65-136	30	05/30/2023 1748
PFBS	14	14		1	101	1.8	72-130	30	05/30/2023 1748
PFDS	15	16		1	103	7.4	53-142	30	05/30/2023 1748
PFHpS	15	15		1	99	0.30	69-134	30	05/30/2023 1748
PFNS	15	16		1	104	15	69-127	30	05/30/2023 1748
PFOSA	16	15		1	92	2.5	67-137	30	05/30/2023 1748
PFPeS	15	16		1	104	10	71-127	30	05/30/2023 1748
PFHxS	15	15		1	105	3.5	68-131	30	05/30/2023 1748
PFBA	16	16		1	98	1.5	73-129	30	05/30/2023 1748
PFDA	16	17		1	105	9.9	71-129	30	05/30/2023 1748
PFDoA	16	17		1	105	1.5	72-134	30	05/30/2023 1748
PFHpA	16	16		1	103	0.63	72-130	30	05/30/2023 1748
PFHxA	16	17		1	104	10	72-129	30	05/30/2023 1748
PFNA	16	18		1	115	11	69-130	30	05/30/2023 1748
PFOA	16	17		1	105	4.9	71-133	30	05/30/2023 1748
PFPeA	16	16		1	98	4.7	72-129	30	05/30/2023 1748
PFTeDA	16	17		1	105	3.4	71-132	30	05/30/2023 1748
PFTrDA	16	17		1	104	4.7	65-144	30	05/30/2023 1748
PFUdA	16	16		1	103	3.9	69-133	30	05/30/2023 1748
PFOS	15	15	M-03	1	100	7.6	65-140	30	05/30/2023 1748

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		99	50-150
13C2_6:2FTS		96	50-150
13C2_8:2FTS		103	50-150
13C2_PFDoA		93	50-150
13C2_PFTeDA		97	50-150
13C3_PFBS		94	50-150
13C3_PFHxS		96	50-150
13C3-HFPO-DA		97	50-150
13C4_PFBA		101	50-150
13C4_PFHpA		106	50-150
13C5_PFHxA		103	50-150
13C5_PFPeA		99	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCSD

Sample ID: YQ75308-003
Batch: 75308
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/15/2023 1720

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		102	50-150
13C7_PFUdA		100	50-150
13C8_PFOA		105	50-150
13C8_PFOS		95	50-150
13C8_PFOSA		112	50-150
13C9_PFNA		98	50-150
d5-EtFOSAA		103	50-150
d3-MeFOSAA		101	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - Duplicate

Sample ID: YD27025-001DU
Batch: 75308
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/15/2023 1720

Parameter	Sample Amount (ng/L)	Result (ng/L)	Q	Dil	% RPD	%RPD Limit	Analysis Date
9Cl-PF3ONS	ND	ND		1	0.00	20	05/30/2023 2021
11Cl-PF3OUdS	ND	ND		1	0.00	20	05/30/2023 2021
8:2 FTS	ND	ND		1	0.00	20	05/30/2023 2021
6:2 FTS	ND	ND		1	0.00	20	05/30/2023 2021
4:2 FTS	ND	ND		1	0.00	20	05/30/2023 2021
GenX	ND	ND		1	0.00	20	05/30/2023 2021
ADONA	ND	ND		1	0.00	20	05/30/2023 2021
EtFOSAA	ND	ND		1	0.00	20	05/30/2023 2021
MeFOSAA	ND	ND		1	0.00	20	05/30/2023 2021
PFBS	1.3	1.8	JM-03,+	1	28	20	05/30/2023 2021
PFDS	ND	ND		1	0.00	20	05/30/2023 2021
PFHpS	ND	ND		1	0.00	20	05/30/2023 2021
PFNS	ND	ND		1	0.00	20	05/30/2023 2021
PFOSA	ND	ND		1	0.00	20	05/30/2023 2021
PFPeS	0.97	1.1	JM-03	1	13	20	05/30/2023 2021
PFHxS	5.6	6.1		1	8.0	20	05/30/2023 2021
PFBA	2.7	2.8	JM-03	1	4.2	20	05/30/2023 2021
PFDA	ND	ND		1	0.00	20	05/30/2023 2021
PFDoA	ND	ND		1	0.00	20	05/30/2023 2021
PFHpA	ND	0.98	JM-03	1	19	20	05/30/2023 2021
PFHxA	1.2	0.95	J,+	1	24	20	05/30/2023 2021
PFNA	ND	ND		1	0.00	20	05/30/2023 2021
PFOA	4.6	4.9	M-03	1	6.2	20	05/30/2023 2021
PFPeA	ND	ND		1	0.00	20	05/30/2023 2021
PFTeDA	ND	ND		1	0.00	20	05/30/2023 2021
PFTrDA	ND	ND		1	0.00	20	05/30/2023 2021
PFUdA	ND	ND		1	0.00	20	05/30/2023 2021
PFOS	1.3	1.4	JM-03	1	11	20	05/30/2023 2021

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS	N	266	50-150
13C2_6:2FTS	N	200	50-150
13C2_8:2FTS		130	50-150
13C2_PFDoA		101	50-150
13C2_PFTeDA		104	50-150
13C3_PFBS		89	50-150
13C3_PFHxS		104	50-150
13C3-HFPO-DA		92	50-150
13C4_PFBA	N	39	50-150
13C4_PFHpA		110	50-150
13C5_PFHxA		101	50-150
13C5_PFPeA		78	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - Duplicate

Sample ID: YD27025-001DU
Batch: 75308
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/15/2023 1720

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		114	50-150
13C7_PFUdA		115	50-150
13C8_PFOA		118	50-150
13C8_PFOS		109	50-150
13C8_PFOSA		124	50-150
13C9_PFNA		115	50-150
d5-EtFOSAA		115	50-150
d3-MeFOSAA		120	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: YQ76891-001
Batch: 76891
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 06/05/2023 1453

Parameter	Result	Q	Dil	LOQ	DL	Units	Analysis Date
9Cl-PF3ONS	ND		1	8.0	2.0	ng/L	06/06/2023 2023
11Cl-PF3OUdS	ND		1	8.0	2.0	ng/L	06/06/2023 2023
8:2 FTS	ND		1	8.0	2.0	ng/L	06/06/2023 2023
6:2 FTS	ND		1	8.0	2.0	ng/L	06/06/2023 2023
4:2 FTS	ND		1	8.0	2.0	ng/L	06/06/2023 2023
GenX	ND		1	8.0	2.0	ng/L	06/06/2023 2023
ADONA	ND		1	8.0	2.0	ng/L	06/06/2023 2023
EtFOSAA	ND		1	8.0	2.0	ng/L	06/06/2023 2023
MeFOSAA	ND		1	8.0	2.0	ng/L	06/06/2023 2023
PFBS	ND		1	4.0	1.0	ng/L	06/06/2023 2023
PFDS	ND		1	4.0	1.0	ng/L	06/06/2023 2023
PFHpS	ND		1	4.0	1.0	ng/L	06/06/2023 2023
PFNS	ND		1	4.0	1.0	ng/L	06/06/2023 2023
PFOSA	ND		1	4.0	1.0	ng/L	06/06/2023 2023
PFPeS	ND		1	4.0	1.0	ng/L	06/06/2023 2023
PFHxS	ND		1	4.0	1.0	ng/L	06/06/2023 2023
PFBA	ND		1	4.0	1.0	ng/L	06/06/2023 2023
PFDA	ND		1	4.0	1.0	ng/L	06/06/2023 2023
PFDoA	ND		1	4.0	1.0	ng/L	06/06/2023 2023
PFHpA	ND		1	4.0	1.0	ng/L	06/06/2023 2023
PFHxA	ND		1	4.0	1.0	ng/L	06/06/2023 2023
PFNA	ND		1	4.0	1.0	ng/L	06/06/2023 2023
PFOA	ND		1	4.0	1.0	ng/L	06/06/2023 2023
PFPeA	ND		1	4.0	1.0	ng/L	06/06/2023 2023
PFTeDA	ND		1	4.0	1.0	ng/L	06/06/2023 2023
PFTrDA	ND		1	4.0	1.0	ng/L	06/06/2023 2023
PFUdA	ND		1	4.0	1.0	ng/L	06/06/2023 2023
PFOS	ND		1	4.0	1.0	ng/L	06/06/2023 2023

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		114	50-150
13C2_6:2FTS		99	50-150
13C2_8:2FTS		103	50-150
13C2_PFDoA		100	50-150
13C2_PFTeDA		95	50-150
13C3_PFBS		112	50-150
13C3_PFHxS		101	50-150
13C3-HFPO-DA		101	50-150
13C4_PFBA		107	50-150
13C4_PFHpA		110	50-150
13C5_PFHxA		110	50-150
13C5_PFPeA		105	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: YQ76891-001
Batch: 76891
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 06/05/2023 1453

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		94	50-150
13C7_PFUdA		100	50-150
13C8_PFOA		110	50-150
13C8_PFOS		103	50-150
13C8_PFOSA		103	50-150
13C9_PFNA		107	50-150
d5-EtFOSAA		103	50-150
d3-MeFOSAA		103	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ76891-002
Batch: 76891
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 06/05/2023 1453

Parameter	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	%Rec Limit	Analysis Date
9Cl-PF3ONS	15	17		1	112	50-150	06/06/2023 2034
11Cl-PF3OUdS	15	17		1	110	50-150	06/06/2023 2034
8:2 FTS	15	16	M-03	1	104	67-138	06/06/2023 2034
6:2 FTS	15	18		1	116	64-140	06/06/2023 2034
4:2 FTS	15	16		1	108	63-143	06/06/2023 2034
GenX	32	37		1	116	50-150	06/06/2023 2034
ADONA	15	17		1	114	50-150	06/06/2023 2034
EtFOSAA	16	17		1	109	61-135	06/06/2023 2034
MeFOSAA	16	17	M-03	1	106	65-136	06/06/2023 2034
PFBS	14	14		1	102	72-130	06/06/2023 2034
PFDS	15	18		1	114	53-142	06/06/2023 2034
PFHpS	15	18		1	118	69-134	06/06/2023 2034
PFNS	15	16		1	107	69-127	06/06/2023 2034
PFOSA	16	16		1	103	67-137	06/06/2023 2034
PFPeS	15	15		1	103	71-127	06/06/2023 2034
PFHxS	15	16		1	110	68-131	06/06/2023 2034
PFBA	16	18		1	111	73-129	06/06/2023 2034
PFDA	16	17		1	103	71-129	06/06/2023 2034
PFDoA	16	19		1	117	72-134	06/06/2023 2034
PFHpA	16	18		1	114	72-130	06/06/2023 2034
PFHxA	16	17		1	106	72-129	06/06/2023 2034
PFNA	16	16		1	102	69-130	06/06/2023 2034
PFOA	16	18		1	114	71-133	06/06/2023 2034
PFPeA	16	18		1	110	72-129	06/06/2023 2034
PFTeDA	16	19		1	116	71-132	06/06/2023 2034
PFTrDA	16	18		1	113	65-144	06/06/2023 2034
PFUdA	16	18		1	112	69-133	06/06/2023 2034
PFOS	15	15	M-03	1	101	65-140	06/06/2023 2034

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		96	50-150
13C2_6:2FTS		85	50-150
13C2_8:2FTS		89	50-150
13C2_PFDoA		88	50-150
13C2_PFTeDA		87	50-150
13C3_PFBS		96	50-150
13C3_PFHxS		85	50-150
13C3-HFPO-DA		89	50-150
13C4_PFBA		92	50-150
13C4_PFHpA		90	50-150
13C5_PFHxA		98	50-150
13C5_PFPeA		90	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ76891-002
Batch: 76891
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 06/05/2023 1453

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		89	50-150
13C7_PFUdA		92	50-150
13C8_PFOA		93	50-150
13C8_PFOS		94	50-150
13C8_PFOSA		94	50-150
13C9_PFNA		96	50-150
d5-EtFOSAA		94	50-150
d3-MeFOSAA		91	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Chain of Custody
and
Miscellaneous Documents

PACE ANALYTICAL SERVICES, LLC
106 Vantage Point Drive • West Columbia, SC 29172
Telephone No. 803-791-9700 Fax No. 803-791-9111
www.pacelabs.com

Number 146504

Client: Arcadis	Report to Contact: Tiffany. Linder Alexis Crisp	Telephone No / E-mail: Alexis.Crisp@arcadis.com tiffany.linder@arcadis.com	Quote No.
Address: 28555 Cabot Dr #500	Sampler's Signature: x Sommer Guy	Analysis (Attach list if more space is needed): Report EGLE 28 Compounds	Page 1 of
City: Novi / State: MI / Zip Code: 48377	Printed Name: Sommer Guy		YD27025
Project Name: Racer PNC			RES2
Project No.: 30167840.00030	P.O. No.:		

Sample ID / Description (Containers for each sample may be combined on one line)	Collection Date(s)	Collection Time (Military)	Grab G / Composite C	Matrix: Aqueous	Soil	Non-Aqueous	No of Containers by Preservative Type: Unpres.	HCl	HNO3	H2SO4	NaOH	Na2S2O3	Field Filtered	PFAS Method 537 mod. with isotope dilution (533 Table 4)	Remarks / Cooler I.D.
TW-MD-01_GW-042623	4/26/23	1000	G	2			2							X	
EB-02_042623	4/26/23	1010	G	2			2							X	Equipment Blank
SEEPVAULT_GW-042623	4/26/23	1030	G	2			2							X	
MWM10-SEN01_GW-042623	4/26/23	1255	G	2			2							X	
TW-01-03_GW-042623	4/26/23	1515	G	2			2							X	
MWM10-04_GW-042623	4/26/23	1650	G	2			2							X	
tripblank	4/26/23	1710	G	1			1							X	tripblank

Turn Around Time Required (Prior lab approval required for expedited TAT): ☒ Standard ☐ Rush (Specify)

Sample Disposal: ☐ Return to Client ☒ Disposal by Lab

Possible Hazard Identification: ☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: Sommer Guy	4/26/23	1750	1. Received by: FedEx	4/26/23	1750
2. Relinquished by	Date	Time	2. Received by	Date	Time
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by: FedEx	4.27.23	1010	4. Laboratory received by: Kayem Reams	4.27.23	1010

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY: Received on Ice (Circle) (Yes) No Ice Pack — Receipt Temp 2.8 °C — Temp Blank ☒ Y ☐ N

DISTRIBUTION: WHITE & YELLOW-Return to laboratory with Sample(s); PINK-Field/Client Copy

Document Number: ME003N2-01

PACE ANALYTICAL SERVICES, LLC

DC#_Title: ENV-FRM-WCOL-0286 v02_Samples Receipt Checklist (SRC)
Effective Date: 8/2/2022

Sample Receipt Checklist (SRC)

Client: ARCADIS Cooler Inspected by/date: KDRW / 04/27/2023 Lot #: YD27025

Means of receipt: ☐ Pace ☐ Client ☐ UPS ☑ FedEx ☐ Other: _____

☑ Yes	☐ No		1. Were custody seals present on the cooler?
☑ Yes	☐ No	☐ NA	2. If custody seals were present, were they intact and unbroken?

pH Strip ID: NA Chlorine Strip ID: NA Tested by: NA

Original temperature upon receipt / Derived (Corrected) temperature upon receipt %Solid Snap-Cup ID: NA

2.8 / 2.8 °C NA / NA °C NA / NA °C NA / NA °C

Method: ☑ Temperature Blank ☐ Against Bottles IR Gun ID: 8 IR Gun Correction Factor: 0 °C

Method of coolant: ☑ Wet Ice ☐ Ice Packs ☐ Dry Ice ☐ None

☑ Yes	☐ No	☐ NA	3. Were all coolers received at or below 6.0°C? If no, was Project Manager notified? PM was Notified by: phone / email / face-to-face (circle one).
☑ Yes	☐ No	☐ NA	4. Is the commercial courier's packing slip attached to this form?
☑ Yes	☐ No		5. Were proper custody procedures (relinquished/received) followed?
☑ Yes	☐ No		6. Were sample IDs listed on the COC and all sample containers?
☑ Yes	☐ No		7. Was collection date & time listed on the COC and all sample containers?
☑ Yes	☐ No		8. Did all container label information (ID, date, time) agree with the COC?
☑ Yes	☐ No		9. Were tests to be performed listed on the COC?
☑ Yes	☐ No		10. Did all samples arrive in the proper containers for each test and/or in good condition (unbroken, lids on, etc.)? _____
☑ Yes	☐ No		11. Was adequate sample volume available?
☑ Yes	☐ No		12. Were all samples received within ½ the holding time or 48 hours, whichever comes first?
☑ Yes	☐ No		13. Were all samples containers accounted for? (No missing/excess)
☐ Yes	☐ No	☑ NA	14. Were VOA, 8015C and RSK-175 samples free of bubbles >"pea-size" (¼"or 6mm in diameter) in any of the VOA vials?
☐ Yes	☐ No	☑ NA	15. Were all DRO/metals/nutrient samples received at a pH of < 2?
☐ Yes	☐ No	☑ NA	16. Were all cyanide samples received at a pH > 12 and sulfide samples received at a pH > 9?
☐ Yes	☐ No	☑ NA	17. Were all applicable NH_3/TKN/cyanide/phenol/625.1/608.3 (< 0.5mg/L) samples free of residual chlorine?
☐ Yes	☑ No	☐ NA	18. Was the quote number listed on the container label? If yes, Quote # _____

Sample Preservation (Must be completed for any sample(s) incorrectly preserved or with headspace.)

Sample(s) NA were received incorrectly preserved and were adjusted accordingly in sample receiving with NA mL of circle one: H_2SO_4, HNO_3, HCl, NaOH using SR # NA. Time of preservation NA. If more than one preservative is needed, please note in the comments below.

Sample(s) NA were received with bubbles >6 mm in diameter.

Samples(s) NA were received with TRC > 0.5 mg/L (If #19 is *no*) and were adjusted accordingly in sample receiving with sodium thiosulfate ($Na_2S_2O_3$) with Unique ID: NA.

Comments:

Report of Analysis

Arcadis U.S., Inc.
630 Plaza Drive
Suite 600
Highlands Ranch, CO 80129
Attention: Tiffany Linder

Project Name: Racer PNC

Project Number: 30171056.0370B

Lot Number:**YD28005**

Date Completed:05/26/2023

Project Manager:**Kathy E. Smith**

05/26/2023 10:10 AM
Approved and released by:
Project Manager II: **Edward Barnett**

The electronic signature above is the equivalent of a handwritten signature.
This report shall not be reproduced, except in its entirety, without the written approval of Pace Analytical Services, LLC.

Case Narrative
Arcadis U.S., Inc.
Lot Number: YD28005

This Report of Analysis contains the analytical result(s) for the sample(s) listed on the Sample Summary following this Case Narrative. The sample receiving date is documented in the header information associated with each sample.

All results listed in this report relate only to the samples that are contained within this report. Where sampling is conducted by the client, results relate to the accuracy of the information provided, and as the samples are received.

Sample receipt, sample analysis, and data review have been performed in accordance with the most current approved The NELAC Institute (TNI) standards, the Pace Analytical Services, LLC ("Pace") Laboratory Quality Manual, standard operating procedures (SOPs), and Pace policies. Additionally, the DoD QSM version 5.4 has been followed for these samples, and specifically Table B-15 was followed for all PFAS samples. Any exceptions to the TNI standards, the Laboratory Quality Manual, SOPs, the DoD QSM, or policies are qualified on the results page or discussed below.

Pace is a DoD/DOE accredited laboratory; however, the following analyses are currently not listed on our DoD/DOE scope of accreditation: Drinking Water: pH EPA 150.1, Turbidity EPA 180.1, Metals EPA 200.7 & 200.8, Mercury EPA 245.1, Anions EPA 300.0, Cyanide EPA 335.4, Nitrates EPA 353.2, Orthophosphate & Phosphorus EPA 365.1, EDB/DBCP EPA 504.1, HPC SIMPLATE, Color SM 2120 B-2011, Alkalinity SM 2320 B-2011, Specific Conductance SM 2510 B-2011, Residue-filterable (TDS) SM 2540 C, Calcium Hardness (CaCO2) SM 3500-Ca B-2011, TRC SM 4500 Cl G-2011, pH SM 4500 H=B-2011, E.Coli, Total Coliform. Non-Potable Water: Metals EPA 200.7, Strontium EPA 200.8, Chlorate EPA 300.0, Cyanide EPA 335.4, Phenolics EPA 420.4, 2-Methyl-4,6-Dinitrophenol EPA 625.1, Propane RSK-175, Specific Conductance SM 2510 B-2011, Salinity SM2520 B, Residue- total SM 2540 B, Sulfite SM 4500 SO32- B-2011, Amenable Cyanide SM 4500-CN- G-2011, BOD & CBOD SM 5210 B, MBAS SM 5540 C-2011, Boron & Titanium SW-846 6010D, Boron, Molybdenum, & Titanium SW-846 6020B, Alcohols & Glycols SW-846 8015C, Pentachlorophenol SW-846 8151A, Ethyl Acetate, Hexane, & n-Hexane SW-846 8260D, SVOC 1,4-Dioxane, 4-Dimethyl aminoazobenzene, 1,4-Naphthoquinone, 3,5-Dinitroaniline, PETN SW-846 8270E, Amenable Cyanide SW-846 9012B. Solid and Chemical Materials: Boron & Titanium SW-846 6010D, Molybdenum SW-846 6020B, Ethylene Glycol SW-846 8015B, Pentachlorophenol SW-846 8151A, Chloroprene SW-846 8260B, SVOC 1,4-Dioxane, 1,3,5-Trinitrobenzene, 1,4- Naphthoquinone, 1,4-Phenylenediamine, 2,4-Dinitrotoluene, 2,6-Dinitrotoluene, 3-Methylcholanthrene, 4-Aminobiphenyl, 4-Dimethyl aminoazobenzene, 4-Nitroquinoline-1-oxide, 7,12-Dimethylbenzo(a)anthracene, Chlorobenzilate, Diallate, Ethyl methanesulfonate, Isodrin, Isosafrole, Methyl methanesulfonate, n-Nitrosomethylethylamine, n-Nitrosomorpholine, n-Nitrosopiperidine, Piperonyl butoxide, Pronamide, Safrole, 3,5- Dinitroaniline, PETN SW-846 8270E, Oil & Grease SW-846 9071B.

Pace is a TNI accredited laboratory; however, the following analyses are currently not listed on our TNI scope of accreditation: Drinking Water: VOC (excluding BTEX, MTBE, Naphthalene, & 1,2-dichloroethane) EPA 524.2, E. coli and Total coliforms SM 9223 B-2004, Solid Chemical Material: TOC Walkley-Black, Biological Tissue: All, Non-Potable Water: SGT-HEM EPA 1664B, Silica EPA 200.7, Boron, Calcium, Silicon, Strontium EPA 200.8, Bicarbonate, Carbonate, and Hydroxide Alkalinity SM 2320 B-2011, SM 9221 C E-2006 & SM 9222D-2006, Strontium SW-846 6010D, VOC SM 6200 B-2011, Fecal Coliform Colilert-18.

If you have any questions regarding this report, please contact the Pace Project Manager listed on the cover page.

PFAS

Surrogate recovery for the following sample was outside the upper control limit: YD28005-001. This sample did not contain any target analytes; therefore, re-extraction and/or re-analysis was not performed.

Surrogate recovery for the following sample was outside control limits: YD28005-005. DUP was performed with concurring results. The original analysis has been reported.

Surrogate recovery for the following sample was outside control limits: YD28005-003. Re-extraction and/or re-analysis was performed with concurring results. The original analysis has been reported.

Surrogate recovery for the following samples was outside the upper control limit: YD28005-004, YD28005-006, YD28005-007. The samples did not contain any target analytes; therefore, re-extraction and/or re-analysis was not performed.

Manual Integration Summary

Arcadis U.S., Inc.

Lot Number: YD28005

Project Name: Racer PNC

Project Number: 30171056.0370B

Where applicable, analytes for which manual integration occurred have been flagged with the following:

Qualifier	Technical Justification	Qualifier	Technical Justification	Qualifier	Technical Justification
M-01	Split peak	M-07	Low fit	M-13	Error
M-02	Peak tailing	M-08	Peak not found	M-14	Baseline
M-03	Incorrect auto integration	M-09	Analyte not Identified by the Data System	M-15	Other
M-04	Poor chromatography	M-10	Analyte misidentified by the Data System	M-16	Retention time shift
M-05	Manually assigned peak	M-11	Invalid integration	M-17	Shouldering
M-06	Wrong isomer	M-12	Wrong peak		

A summary of instances where manual integration occurred is included below:

Method	Sample	Run Number	Parameter	Qualifier
PFAS by ID SOP	YD28005-001	1	Perfluoro-1-butanesulfonic acid (PFBS)	M-03
PFAS by ID SOP	YD28005-001	1	Perfluoro-1-pentanesulfonic acid	M-03
PFAS by ID SOP	YD28005-001	1	Perfluorohexanesulfonic acid (PFHxS)	M-03
PFAS by ID SOP	YD28005-001	1	Perfluoro-n-heptanoic acid (PFHpA)	M-03
PFAS by ID SOP	YD28005-001	1	Perfluoro-n-hexanoic acid (PFHxA)	M-03
PFAS by ID SOP	YD28005-001	1	Perfluoro-n-octanoic acid (PFOA)	M-03
PFAS by ID SOP	YD28005-001	1	Perfluoro-n-pentanoic acid (PFPeA)	M-03
PFAS by ID SOP	YD28005-002	1	Perfluoro-n-butanoic acid (PFBA)	M-03
PFAS by ID SOP	YD28005-002	1	d3-MeFOSAA	M-03
PFAS by ID SOP	YD28005-003	1	Perfluoro-1-butanesulfonic acid (PFBS)	M-03
PFAS by ID SOP	YD28005-003	1	Perfluorohexanesulfonic acid (PFHxS)	M-03
PFAS by ID SOP	YD28005-003	1	Perfluoro-n-butanoic acid (PFBA)	M-03
PFAS by ID SOP	YD28005-003	1	Perfluoro-n-heptanoic acid (PFHpA)	M-03
PFAS by ID SOP	YD28005-003	1	Perfluoro-n-hexanoic acid (PFHxA)	M-03
PFAS by ID SOP	YD28005-003	1	Perfluoro-n-pentanoic acid (PFPeA)	M-03
PFAS by ID SOP	YD28005-004	2	Perfluorohexanesulfonic acid (PFHxS)	M-03
PFAS by ID SOP	YD28005-004	2	Perfluoro-n-hexanoic acid (PFHxA)	M-03
PFAS by ID SOP	YD28005-004	2	Perfluoro-n-octanoic acid (PFOA)	M-03
PFAS by ID SOP	YD28005-004	2	Perfluoro-n-pentanoic acid (PFPeA)	M-03
PFAS by ID SOP	YD28005-004	2	Perfluorooctanesulfonic acid (PFOS)	M-03
PFAS by ID SOP	YD28005-005	1	Perfluoro-1-butanesulfonic acid (PFBS)	M-03
PFAS by ID SOP	YD28005-005	1	Perfluorohexanesulfonic acid (PFHxS)	M-03
PFAS by ID SOP	YD28005-005	1	Perfluoro-n-heptanoic acid (PFHpA)	M-03
PFAS by ID SOP	YD28005-005	1	Perfluoro-n-hexanoic acid (PFHxA)	M-03
PFAS by ID SOP	YD28005-005	1	Perfluoro-n-pentanoic acid (PFPeA)	M-03
PFAS by ID SOP	YD28005-005	1	d5-EtFOSAA	M-03
PFAS by ID SOP	YD28005-006	2	Perfluoro-1-butanesulfonic acid (PFBS)	M-03
PFAS by ID SOP	YD28005-006	2	Perfluorohexanesulfonic acid (PFHxS)	M-03
PFAS by ID SOP	YD28005-006	2	Perfluoro-n-octanoic acid (PFOA)	M-03
PFAS by ID SOP	YD28005-006	2	Perfluorooctanesulfonic acid (PFOS)	M-03
PFAS by ID SOP	YD28005-007	2	Perfluorohexanesulfonic acid (PFHxS)	M-03
PFAS by ID SOP	YD28005-007	2	Perfluoro-n-heptanoic acid (PFHpA)	M-03
PFAS by ID SOP	YD28005-008	1	13C8_PFOA	M-03
PFAS by ID SOP	YD28005-008	1	d3-MeFOSAA	M-03
PFAS by ID SOP	YQ75586-002	1	11-chloroeicosafluoro-3-oxaundecane-	M-03
PFAS by ID SOP	YQ75586-002	1	1H, 1H, 2H, 2H-perfluorodecane	M-03
PFAS by ID SOP	YD28005-001MS	1	1H, 1H, 2H, 2H-perfluorodecane	M-03

Manual Integration Summary

Arcadis U.S., Inc.

Lot Number: YD28005

Project Name: Racer PNC

Project Number: 30171056.0370B

Where applicable, analytes for which manual integration occurred have been flagged with the following:

Qualifier	Technical Justification	Qualifier	Technical Justification	Qualifier	Technical Justification
M-01	Split peak	M-07	Low fit	M-13	Error
M-02	Peak tailing	M-08	Peak not found	M-14	Baseline
M-03	Incorrect auto integration	M-09	Analyte not Identified by the Data System	M-15	Other
M-04	Poor chromatography	M-10	Analyte misidentified by the Data System	M-16	Retention time shift
M-05	Manually assigned peak	M-11	Invalid integration	M-17	Shouldering
M-06	Wrong isomer	M-12	Wrong peak		

A summary of instances where manual integration occurred is included below:

Method	Sample	Run Number	Parameter	Qualifier
PFAS by ID SOP	YQ75586-002	1	1H, 1H, 2H, 2H-perfluorooctane sulfonic	M-03
PFAS by ID SOP	YD28005-001MS	1	1H, 1H, 2H, 2H-perfluorooctane sulfonic	M-03
PFAS by ID SOP	YQ75586-002	1	N-ethylperfluoro-1-	M-03
PFAS by ID SOP	YD28005-001MS	1	N-ethylperfluoro-1-	M-03
PFAS by ID SOP	YQ75586-002	1	N-methylperfluoro-1-	M-03
PFAS by ID SOP	YD28005-001MS	1	Perfluoro-1-nonanesulfonic acid (PFNS)	M-03
PFAS by ID SOP	YD28005-001MS	1	Perfluoro-1-octanesulfonamide (PFOSA)	M-03
PFAS by ID SOP	YD28005-001MS	1	Perfluoro-1-pentanesulfonic acid	M-03
PFAS by ID SOP	YD28005-001MS	1	Perfluorohexanesulfonic acid (PFHxS)	M-03
PFAS by ID SOP	YD28005-005DU	1	Perfluorohexanesulfonic acid (PFHxS)	M-03
PFAS by ID SOP	YD28005-001MS	1	Perfluoro-n-butanoic acid (PFBA)	M-03
PFAS by ID SOP	YQ75586-002	1	Perfluoro-n-dodecanoic acid (PFDoA)	M-03
PFAS by ID SOP	YD28005-001MS	1	Perfluoro-n-heptanoic acid (PFHpA)	M-03
PFAS by ID SOP	YD28005-005DU	1	Perfluoro-n-heptanoic acid (PFHpA)	M-03
PFAS by ID SOP	YD28005-005DU	1	Perfluoro-n-hexanoic acid (PFHxA)	M-03
PFAS by ID SOP	YD28005-001MS	1	Perfluoro-n-octanoic acid (PFOA)	M-03
PFAS by ID SOP	YD28005-001MS	1	Perfluoro-n-pentanoic acid (PFPeA)	M-03
PFAS by ID SOP	YD28005-005DU	1	Perfluoro-n-pentanoic acid (PFPeA)	M-03
PFAS by ID SOP	YD28005-001MS	1	Perfluoro-n-tridecanoic acid (PFTrDA)	M-03
PFAS by ID SOP	YD28005-001MS	1	Perfluorooctanesulfonic acid (PFOS)	M-03
PFAS by ID SOP	YD28005-005DU	1	13C2_8:2FTS	M-03
PFAS by ID SOP	YD28005-005DU	1	13C7_PFUdA	M-03
PFAS by ID SOP	YQ75586-001	1	d5-EtFOSAA	M-03
PFAS by ID SOP	YQ75963-002	1	13C8_PFOSA	M-03
PFAS by ID SOP	YQ75963-002	1	1H, 1H, 2H, 2H-perfluorodecane	M-03
PFAS by ID SOP	YQ75963-002	1	1H, 1H, 2H, 2H-perfluorooctane sulfonic	M-03
PFAS by ID SOP	YQ75963-002	1	N-ethylperfluoro-1-	M-03
PFAS by ID SOP	YQ75963-002	1	N-methylperfluoro-1-	M-03
PFAS by ID SOP	YQ75963-002	1	Perfluoro-1-heptanesulfonic acid	M-03
PFAS by ID SOP	YQ75963-002	1	Perfluoro-1-octanesulfonamide (PFOSA)	M-03
PFAS by ID SOP	YQ75963-002	1	Perfluorohexanesulfonic acid (PFHxS)	M-03
PFAS by ID SOP	YQ75963-002	1	Perfluoro-n-decanoic acid (PFDA)	M-03
PFAS by ID SOP	YQ75963-002	1	Perfluoro-n-octanoic acid (PFOA)	M-03
PFAS by ID SOP	YQ75963-002	1	Perfluoro-n-tetradecanoic acid	M-03
PFAS by ID SOP	YQ75963-002	1	Perfluorooctanesulfonic acid (PFOS)	M-03

Manual Integration Summary

Arcadis U.S., Inc.

Lot Number: YD28005

Project Name: Racer PNC

Project Number: 30171056.0370B

Where applicable, analytes for which manual integration occurred have been flagged with the following:

Qualifier	Technical Justification	Qualifier	Technical Justification	Qualifier	Technical Justification
M-01	Split peak	M-07	Low fit	M-13	Error
M-02	Peak tailing	M-08	Peak not found	M-14	Baseline
M-03	Incorrect auto integration	M-09	Analyte not Identified by the Data System	M-15	Other
M-04	Poor chromatography	M-10	Analyte misidentified by the Data System	M-16	Retention time shift
M-05	Manually assigned peak	M-11	Invalid integration	M-17	Shouldering
M-06	Wrong isomer	M-12	Wrong peak		

A summary of instances where manual integration occurred is included below:

Method	Sample	Run Number	Parameter	Qualifier

If you have any questions regarding this report, please contact the Pace Project Manager listed on the cover page.

Sample Summary

Arcadis U.S., Inc.

Lot Number: YD28005

Project Name: Racer PNC

Project Number: 30171056.0370B

Sample Number	Sample ID	Matrix	Date Sampled	Date Received
001	MWF16-05_GW-042723	Aqueous	04/27/2023 0940	04/28/2023
002	MWF8-01_GW-042723	Aqueous	04/27/2023 1035	04/28/2023
003	MWF16-18_GW-042723	Aqueous	04/27/2023 1125	04/28/2023
004	MWF16-06_GW-042723	Aqueous	04/27/2023 1220	04/28/2023
005	MWF12-01R_GW-042723	Aqueous	04/27/2023 1342	04/28/2023
006	MW0S-05_GW-042723	Aqueous	04/27/2023 1453	04/28/2023
007	DUP-01_GW-042723	Aqueous	04/27/2023	04/28/2023
008	Trip Blank	Aqueous	04/27/2023 1410	04/28/2023

(8 samples)

Detection Summary

Arcadis U.S., Inc.

Lot Number: YD28005

Project Name: Racer PNC

Project Number: 30171056.0370B

Sample	Sample ID	Matrix	Parameter	Method	Result	Q	Units	Page
001	MWF16-05_GW-042723	Aqueous	PFBS	PFAS by ID	3.3	JM-03	ng/L	11
001	MWF16-05_GW-042723	Aqueous	PFPeS	PFAS by ID	2.8	JM-03	ng/L	11
001	MWF16-05_GW-042723	Aqueous	PFHxS	PFAS by ID	6.8	M-03	ng/L	11
001	MWF16-05_GW-042723	Aqueous	PFBA	PFAS by ID	8.8		ng/L	11
001	MWF16-05_GW-042723	Aqueous	PFHpA	PFAS by ID	2.8	JM-03	ng/L	11
001	MWF16-05_GW-042723	Aqueous	PFHxA	PFAS by ID	8.6	M-03	ng/L	11
001	MWF16-05_GW-042723	Aqueous	PFOA	PFAS by ID	4.8	M-03	ng/L	11
001	MWF16-05_GW-042723	Aqueous	PFPeA	PFAS by ID	7.4	M-03	ng/L	11
002	MWF8-01_GW-042723	Aqueous	PFBS	PFAS by ID	3.6		ng/L	13
002	MWF8-01_GW-042723	Aqueous	PFBA	PFAS by ID	1.6	JM-03	ng/L	13
003	MWF16-18_GW-042723	Aqueous	PFBS	PFAS by ID	10	M-03	ng/L	15
003	MWF16-18_GW-042723	Aqueous	PFHpS	PFAS by ID	1.3	J	ng/L	15
003	MWF16-18_GW-042723	Aqueous	PFPeS	PFAS by ID	13		ng/L	15
003	MWF16-18_GW-042723	Aqueous	PFHxS	PFAS by ID	33	M-03	ng/L	15
003	MWF16-18_GW-042723	Aqueous	PFBA	PFAS by ID	14	QM-03	ng/L	15
003	MWF16-18_GW-042723	Aqueous	PFHpA	PFAS by ID	20	M-03	ng/L	15
003	MWF16-18_GW-042723	Aqueous	PFHxA	PFAS by ID	21	M-03	ng/L	15
003	MWF16-18_GW-042723	Aqueous	PFOA	PFAS by ID	41		ng/L	15
003	MWF16-18_GW-042723	Aqueous	PFPeA	PFAS by ID	16	M-03	ng/L	15
004	MWF16-06_GW-042723	Aqueous	PFBS	PFAS by ID	3.4	J	ng/L	17
004	MWF16-06_GW-042723	Aqueous	PFHpS	PFAS by ID	5.7		ng/L	17
004	MWF16-06_GW-042723	Aqueous	PFPeS	PFAS by ID	5.1		ng/L	17
004	MWF16-06_GW-042723	Aqueous	PFHxS	PFAS by ID	18	M-03	ng/L	17
004	MWF16-06_GW-042723	Aqueous	PFBA	PFAS by ID	9.1		ng/L	17
004	MWF16-06_GW-042723	Aqueous	PFHpA	PFAS by ID	7.5		ng/L	17
004	MWF16-06_GW-042723	Aqueous	PFHxA	PFAS by ID	8.8	M-03	ng/L	17
004	MWF16-06_GW-042723	Aqueous	PFOA	PFAS by ID	42	M-03	ng/L	17
004	MWF16-06_GW-042723	Aqueous	PFPeA	PFAS by ID	10	M-03	ng/L	17
004	MWF16-06_GW-042723	Aqueous	PFOS	PFAS by ID	38	M-03	ng/L	17
005	MWF12-01R_GW-042723	Aqueous	PFBS	PFAS by ID	1.8	JQM-03	ng/L	19
005	MWF12-01R_GW-042723	Aqueous	PFHxS	PFAS by ID	1.8	JQM-03	ng/L	19
005	MWF12-01R_GW-042723	Aqueous	PFBA	PFAS by ID	4.3		ng/L	19
005	MWF12-01R_GW-042723	Aqueous	PFHpA	PFAS by ID	0.90	JQM-03	ng/L	19
005	MWF12-01R_GW-042723	Aqueous	PFHxA	PFAS by ID	1.8	JQM-03	ng/L	19
005	MWF12-01R_GW-042723	Aqueous	PFOA	PFAS by ID	3.2	JQ	ng/L	19
005	MWF12-01R_GW-042723	Aqueous	PFPeA	PFAS by ID	1.9	JQM-03	ng/L	19
006	MW0S-05_GW-042723	Aqueous	PFBS	PFAS by ID	2.9	JM-03	ng/L	21
006	MW0S-05_GW-042723	Aqueous	PFHxS	PFAS by ID	2.3	JM-03	ng/L	21
006	MW0S-05_GW-042723	Aqueous	PFBA	PFAS by ID	12		ng/L	21
006	MW0S-05_GW-042723	Aqueous	PFOA	PFAS by ID	2.1	JM-03	ng/L	21
006	MW0S-05_GW-042723	Aqueous	PFPeA	PFAS by ID	2.5	J	ng/L	21
006	MW0S-05_GW-042723	Aqueous	PFOS	PFAS by ID	2.7	JM-03	ng/L	21
007	DUP-01_GW-042723	Aqueous	PFBS	PFAS by ID	3.5	J	ng/L	23

Detection Summary (Continued)

Lot Number: YD28005

Sample	Sample ID	Matrix	Parameter	Method	Result	Q	Units	Page
007	DUP-01_GW-042723	Aqueous	PFHxS	PFAS by ID	4.0	M-03	ng/L	23
007	DUP-01_GW-042723	Aqueous	PFBA	PFAS by ID	9.0		ng/L	23
007	DUP-01_GW-042723	Aqueous	PFHpA	PFAS by ID	1.6	JM-03	ng/L	23
007	DUP-01_GW-042723	Aqueous	PFHxA	PFAS by ID	2.6	J	ng/L	23
007	DUP-01_GW-042723	Aqueous	PFOA	PFAS by ID	6.7		ng/L	23
007	DUP-01_GW-042723	Aqueous	PFPeA	PFAS by ID	2.7	J	ng/L	23
007	DUP-01_GW-042723	Aqueous	PFOS	PFAS by ID	0.90	J	ng/L	23

(50 detections)

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-001**

Description: **MWF16-05_GW-042723** Matrix: **Aqueous**

Date Sampled: **04/27/2023 0940** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/18/2023 1856	ALM	05/17/2023 1903	75586

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.4	1.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.4	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.4	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.4	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.4	1.8	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.4	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.4	1.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.4	1.8	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.4	1.8	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**3.3**	**JM-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**2.8**	**JM-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**6.8**	**M-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**8.8**		**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**2.8**	**JM-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**8.6**	**M-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**4.8**	**M-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**7.4**	**M-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.7	0.92	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	243	50-150
13C2_6:2FTS	N	151	50-150
13C2_8:2FTS		104	50-150
13C2_PFDoA		89	50-150
13C2_PFTeDA		84	50-150
13C3_PFBS		100	50-150
13C3_PFHxS		103	50-150
13C3-HFPO-DA		82	50-150
13C4_PFBA		63	50-150
13C4_PFHpA		90	50-150
13C5_PFHxA		98	50-150
13C5_PFPeA		82	50-150
13C6_PFDA		96	50-150
13C7_PFUdA		86	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-001**

Description: **MWF16-05_GW-042723** Matrix: **Aqueous**

Date Sampled: **04/27/2023 0940** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		110	50-150
13C8_PFOS		95	50-150
13C8_PFOSA		97	50-150
13C9_PFNA		97	50-150
d5-EtFOSAA		94	50-150
d3-MeFOSAA		85	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-002**

Description: **MWF8-01_GW-042723** Matrix: **Aqueous**

Date Sampled: **04/27/2023 1035** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/18/2023 1917	ALM	05/17/2023 1903	75586

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**3.6**		**3.6**	**0.89**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**1.6**	**JM-03**	**3.6**	**0.89**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.6	0.89	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		111	50-150
13C2_6:2FTS		98	50-150
13C2_8:2FTS		89	50-150
13C2_PFDoA		81	50-150
13C2_PFTeDA		81	50-150
13C3_PFBS		105	50-150
13C3_PFHxS		91	50-150
13C3-HFPO-DA		86	50-150
13C4_PFBA		86	50-150
13C4_PFHpA		95	50-150
13C5_PFHxA		87	50-150
13C5_PFPeA		94	50-150
13C6_PFDA		86	50-150
13C7_PFUdA		86	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-002**

Description: **MWF8-01_GW-042723** Matrix: **Aqueous**

Date Sampled: **04/27/2023 1035** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		104	50-150
13C8_PFOS		88	50-150
13C8_PFOSA		95	50-150
13C9_PFNA		94	50-150
d5-EtFOSAA		92	50-150
d3-MeFOSAA	M-03	84	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-003**

Description: **MWF16-18_GW-042723** Matrix: **Aqueous**

Date Sampled: **04/27/2023 1125** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/18/2023 1928	ALM	05/17/2023 1903	75586

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.1	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.1	1.8	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**10**	**M-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**1.3**	**J**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**13**		**3.5**	**0.88**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**33**	**M-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**14**	**QM-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**20**	**M-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**21**	**M-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**41**		**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**16**	**M-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	249	50-150
13C2_6:2FTS	N	294	50-150
13C2_8:2FTS		128	50-150
13C2_PFDoA		85	50-150
13C2_PFTeDA		86	50-150
13C3_PFBS		88	50-150
13C3_PFHxS		88	50-150
13C3-HFPO-DA		65	50-150
13C4_PFBA	N	40	50-150
13C4_PFHpA		64	50-150
13C5_PFHxA		72	50-150
13C5_PFPeA		58	50-150
13C6_PFDA		99	50-150
13C7_PFUdA		87	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-003**

Description: **MWF16-18_GW-042723** Matrix: **Aqueous**

Date Sampled: **04/27/2023 1125** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		109	50-150
13C8_PFOS		97	50-150
13C8_PFOSA		93	50-150
13C9_PFNA		105	50-150
d5-EtFOSAA		90	50-150
d3-MeFOSAA		95	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-004**

Description: **MWF16-06_GW-042723** Matrix: **Aqueous**

Date Sampled: **04/27/2023 1220** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
2	SOP SPE	PFAS by ID SOP QSM B-15	1	05/24/2023 1510	ALM	05/23/2023 1402	75963

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.0	1.7	ng/L	2
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.0	1.7	ng/L	2
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.0	1.7	ng/L	2
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.0	1.7	ng/L	2
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.0	1.7	ng/L	2
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.0	1.7	ng/L	2
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.0	1.7	ng/L	2
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.0	1.7	ng/L	2
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.0	1.7	ng/L	2
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**3.4**	**J**	**3.5**	**0.87**	**ng/L**	**2**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.87	ng/L	2
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**5.7**		**3.5**	**0.87**	**ng/L**	**2**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.87	ng/L	2
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.87	ng/L	2
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**5.1**		**3.5**	**0.87**	**ng/L**	**2**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**18**	**M-03**	**3.5**	**0.87**	**ng/L**	**2**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**9.1**		**3.5**	**0.87**	**ng/L**	**2**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.87	ng/L	2
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.87	ng/L	2
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**7.5**		**3.5**	**0.87**	**ng/L**	**2**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**8.8**	**M-03**	**3.5**	**0.87**	**ng/L**	**2**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	0.87	ng/L	2
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**42**	**M-03**	**3.5**	**0.87**	**ng/L**	**2**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**10**	**M-03**	**3.5**	**0.87**	**ng/L**	**2**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.87	ng/L	2
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.87	ng/L	2
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.87	ng/L	2
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**38**	**M-03**	**3.5**	**0.87**	**ng/L**	**2**

Surrogate	Q	Run 2 % Recovery	Acceptance Limits
13C2_4:2FTS	N	207	50-150
13C2_6:2FTS		132	50-150
13C2_8:2FTS		89	50-150
13C2_PFDoA		93	50-150
13C2_PFTeDA		90	50-150
13C3_PFBS		97	50-150
13C3_PFHxS		93	50-150
13C3-HFPO-DA		93	50-150
13C4_PFBA		70	50-150
13C4_PFHpA		93	50-150
13C5_PFHxA		108	50-150
13C5_PFPeA		96	50-150
13C6_PFDA		98	50-150
13C7_PFUdA		91	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
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H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-004**

Description: **MWF16-06_GW-042723** Matrix: **Aqueous**

Date Sampled: **04/27/2023 1220** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Surrogate	Q	Run 2 % Recovery	Acceptance Limits
13C8_PFOA		119	50-150
13C8_PFOS		97	50-150
13C8_PFOSA		92	50-150
13C9_PFNA		104	50-150
d5-EtFOSAA		93	50-150
d3-MeFOSAA		89	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-005**

Description: **MWF12-01R_GW-042723** Matrix: **Aqueous**

Date Sampled: **04/27/2023 1342** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/18/2023 1949	ALM	05/17/2023 1903	75586

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND	Q	7.0	1.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND	Q	7.0	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.0	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.0	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.0	1.8	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND	Q	7.0	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND	Q	7.0	1.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND	Q	7.0	1.8	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND	Q	7.0	1.8	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**1.8**	**JQM-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND	Q	3.5	0.88	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND	Q	3.5	0.88	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND	Q	3.5	0.88	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND	Q	3.5	0.88	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND	Q	3.5	0.88	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**1.8**	**JQM-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**4.3**		**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND	Q	3.5	0.88	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND	Q	3.5	0.88	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**0.90**	**JQM-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**1.8**	**JQM-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND	Q	3.5	0.88	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**3.2**	**JQ**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**1.9**	**JQM-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND	Q	3.5	0.88	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND	Q	3.5	0.88	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND	Q	3.5	0.88	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND	Q	3.5	0.88	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	397	50-150
13C2_6:2FTS	N	222	50-150
13C2_8:2FTS	N	182	50-150
13C2_PFDoA	N	157	50-150
13C2_PFTeDA	N	161	50-150
13C3_PFBS	N	192	50-150
13C3_PFHxS	N	178	50-150
13C3-HFPO-DA	N	162	50-150
13C4_PFBA		120	50-150
13C4_PFHpA	N	179	50-150
13C5_PFHxA	N	181	50-150
13C5_PFPeA	N	159	50-150
13C6_PFDA	N	180	50-150
13C7_PFUdA	N	159	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-005**

Description: **MWF12-01R_GW-042723** Matrix: **Aqueous**

Date Sampled: **04/27/2023 1342** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA	N	212	50-150
13C8_PFOS	N	173	50-150
13C8_PFOSA	N	174	50-150
13C9_PFNA	N	186	50-150
d5-EtFOSAA	M-03N	165	50-150
d3-MeFOSAA	N	171	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-006**

Description: **MW0S-05_GW-042723** Matrix: **Aqueous**

Date Sampled: **04/27/2023 1453** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
2	SOP SPE	PFAS by ID SOP QSM B-15	1	05/24/2023 1521	ALM	05/23/2023 1402	75963

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		6.9	1.7	ng/L	2
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		6.9	1.7	ng/L	2
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		6.9	1.7	ng/L	2
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		6.9	1.7	ng/L	2
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	6.9	1.7	ng/L	2
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		6.9	1.7	ng/L	2
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		6.9	1.7	ng/L	2
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		6.9	1.7	ng/L	2
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		6.9	1.7	ng/L	2
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**2.9**	**JM-03**	**3.5**	**0.86**	**ng/L**	**2**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.86	ng/L	2
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.5	0.86	ng/L	2
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.86	ng/L	2
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.86	ng/L	2
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.5	0.86	ng/L	2
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**2.3**	**JM-03**	**3.5**	**0.86**	**ng/L**	**2**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**12**		**3.5**	**0.86**	**ng/L**	**2**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.86	ng/L	2
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.86	ng/L	2
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.5	0.86	ng/L	2
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.5	0.86	ng/L	2
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	0.86	ng/L	2
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**2.1**	**JM-03**	**3.5**	**0.86**	**ng/L**	**2**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**2.5**	**J**	**3.5**	**0.86**	**ng/L**	**2**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.86	ng/L	2
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.86	ng/L	2
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.86	ng/L	2
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**2.7**	**JM-03**	**3.5**	**0.86**	**ng/L**	**2**

Surrogate	Q	Run 2 % Recovery	Acceptance Limits
13C2_4:2FTS	N	207	50-150
13C2_6:2FTS		150	50-150
13C2_8:2FTS		84	50-150
13C2_PFDoA		89	50-150
13C2_PFTeDA		85	50-150
13C3_PFBS		91	50-150
13C3_PFHxS		93	50-150
13C3-HFPO-DA		85	50-150
13C4_PFBA		54	50-150
13C4_PFHpA		93	50-150
13C5_PFHxA		99	50-150
13C5_PFPeA		91	50-150
13C6_PFDA		98	50-150
13C7_PFUdA		93	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-006**

Description: **MW0S-05_GW-042723** Matrix: **Aqueous**

Date Sampled: **04/27/2023 1453** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Surrogate	Q	Run 2 % Recovery	Acceptance Limits
13C8_PFOA		115	50-150
13C8_PFOS		95	50-150
13C8_PFOSA		85	50-150
13C9_PFNA		105	50-150
d5-EtFOSAA		101	50-150
d3-MeFOSAA		89	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-007**

Description: **DUP-01_GW-042723** Matrix: **Aqueous**

Date Sampled: **04/27/2023** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
2	SOP SPE	PFAS by ID SOP QSM B-15	1	05/24/2023 1531	ALM	05/23/2023 1402	75963

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.2	1.8	ng/L	2
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.2	1.8	ng/L	2
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.2	1.8	ng/L	2
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.2	1.8	ng/L	2
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.2	1.8	ng/L	2
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.2	1.8	ng/L	2
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.2	1.8	ng/L	2
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.2	1.8	ng/L	2
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.2	1.8	ng/L	2
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**3.5**	**J**	**3.6**	**0.90**	**ng/L**	**2**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.90	ng/L	2
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.6	0.90	ng/L	2
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.90	ng/L	2
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	0.90	ng/L	2
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.6	0.90	ng/L	2
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**4.0**	**M-03**	**3.6**	**0.90**	**ng/L**	**2**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**9.0**		**3.6**	**0.90**	**ng/L**	**2**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	0.90	ng/L	2
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.90	ng/L	2
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**1.6**	**JM-03**	**3.6**	**0.90**	**ng/L**	**2**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**2.6**	**J**	**3.6**	**0.90**	**ng/L**	**2**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.6	0.90	ng/L	2
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**6.7**		**3.6**	**0.90**	**ng/L**	**2**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**2.7**	**J**	**3.6**	**0.90**	**ng/L**	**2**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.90	ng/L	2
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.90	ng/L	2
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.90	ng/L	2
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**0.90**	**J**	**3.6**	**0.90**	**ng/L**	**2**

Surrogate	Q	Run 2 % Recovery	Acceptance Limits
13C2_4:2FTS	N	191	50-150
13C2_6:2FTS		111	50-150
13C2_8:2FTS		85	50-150
13C2_PFDoA		90	50-150
13C2_PFTeDA		93	50-150
13C3_PFBS		95	50-150
13C3_PFHxS		93	50-150
13C3-HFPO-DA		82	50-150
13C4_PFBA		57	50-150
13C4_PFHpA		99	50-150
13C5_PFHxA		93	50-150
13C5_PFPeA		89	50-150
13C6_PFDA		91	50-150
13C7_PFUdA		86	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-007**

Description: **DUP-01_GW-042723** Matrix: **Aqueous**

Date Sampled: **04/27/2023** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Surrogate	Q	Run 2 % Recovery	Acceptance Limits
13C8_PFOA		103	50-150
13C8_PFOS		90	50-150
13C8_PFOSA		88	50-150
13C9_PFNA		94	50-150
d5-EtFOSAA		93	50-150
d3-MeFOSAA		85	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-008**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **04/27/2023 1410** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/18/2023 2032	ALM	05/17/2023 1903	75586

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		6.8	1.7	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		6.8	1.7	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		6.8	1.7	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		6.8	1.7	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		6.8	1.7	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		6.8	1.7	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		6.8	1.7	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		6.8	1.7	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		6.8	1.7	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.4	0.85	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		80	50-150
13C2_6:2FTS		75	50-150
13C2_8:2FTS		78	50-150
13C2_PFDoA		76	50-150
13C2_PFTeDA		60	50-150
13C3_PFBS		94	50-150
13C3_PFHxS		87	50-150
13C3-HFPO-DA		86	50-150
13C4_PFBA		86	50-150
13C4_PFHpA		84	50-150
13C5_PFHxA		86	50-150
13C5_PFPeA		80	50-150
13C6_PFDA		78	50-150
13C7_PFUdA		74	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-008**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **04/27/2023 1410** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA	M-03	93	50-150
13C8_PFOS		79	50-150
13C8_PFOSA		83	50-150
13C9_PFNA		87	50-150
d5-EtFOSAA		83	50-150
d3-MeFOSAA	M-03	82	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
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QC Summary

PFAS by LC/MS/MS - MB

Sample ID: YQ75586-001
Batch: 75586
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/17/2023 1903

Parameter	Result	Q	Dil	LOQ	DL	Units	Analysis Date
9Cl-PF3ONS	ND		1	8.0	2.0	ng/L	05/19/2023 2020
11Cl-PF3OUdS	ND		1	8.0	2.0	ng/L	05/19/2023 2020
8:2 FTS	ND		1	8.0	2.0	ng/L	05/19/2023 2020
6:2 FTS	ND		1	8.0	2.0	ng/L	05/19/2023 2020
4:2 FTS	ND		1	8.0	2.0	ng/L	05/19/2023 2020
GenX	ND		1	8.0	2.0	ng/L	05/19/2023 2020
ADONA	ND		1	8.0	2.0	ng/L	05/19/2023 2020
EtFOSAA	ND		1	8.0	2.0	ng/L	05/19/2023 2020
MeFOSAA	ND		1	8.0	2.0	ng/L	05/19/2023 2020
PFBS	ND		1	4.0	1.0	ng/L	05/19/2023 2020
PFDS	ND		1	4.0	1.0	ng/L	05/19/2023 2020
PFHpS	ND		1	4.0	1.0	ng/L	05/19/2023 2020
PFNS	ND		1	4.0	1.0	ng/L	05/19/2023 2020
PFOSA	ND		1	4.0	1.0	ng/L	05/19/2023 2020
PFPeS	ND		1	4.0	1.0	ng/L	05/19/2023 2020
PFHxS	ND		1	4.0	1.0	ng/L	05/19/2023 2020
PFBA	ND		1	4.0	1.0	ng/L	05/19/2023 2020
PFDA	ND		1	4.0	1.0	ng/L	05/19/2023 2020
PFDoA	ND		1	4.0	1.0	ng/L	05/19/2023 2020
PFHpA	ND		1	4.0	1.0	ng/L	05/19/2023 2020
PFHxA	ND		1	4.0	1.0	ng/L	05/19/2023 2020
PFNA	ND		1	4.0	1.0	ng/L	05/19/2023 2020
PFOA	ND		1	4.0	1.0	ng/L	05/19/2023 2020
PFPeA	ND		1	4.0	1.0	ng/L	05/19/2023 2020
PFTeDA	ND		1	4.0	1.0	ng/L	05/19/2023 2020
PFTrDA	ND		1	4.0	1.0	ng/L	05/19/2023 2020
PFUdA	ND		1	4.0	1.0	ng/L	05/19/2023 2020
PFOS	ND		1	4.0	1.0	ng/L	05/19/2023 2020

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		84	50-150
13C2_6:2FTS		90	50-150
13C2_8:2FTS		79	50-150
13C2_PFDoA		89	50-150
13C2_PFTeDA		74	50-150
13C3_PFBS		93	50-150
13C3_PFHxS		92	50-150
13C3-HFPO-DA		89	50-150
13C4_PFBA		92	50-150
13C4_PFHpA		90	50-150
13C5_PFHxA		89	50-150
13C5_PFPeA		98	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: YQ75586-001
Batch: 75586
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/17/2023 1903

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		83	50-150
13C7_PFUdA		76	50-150
13C8_PFOA		95	50-150
13C8_PFOS		101	50-150
13C8_PFOSA		83	50-150
13C9_PFNA		87	50-150
d5-EtFOSAA	M-03	90	50-150
d3-MeFOSAA		98	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ75586-002
Batch: 75586
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/17/2023 1903

Parameter	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	%Rec Limit	Analysis Date
9Cl-PF3ONS	15	12		1	84	50-150	05/19/2023 2031
11Cl-PF3OUdS	15	13	M-03	1	88	50-150	05/19/2023 2031
8:2 FTS	15	14	M-03	1	88	67-138	05/19/2023 2031
6:2 FTS	15	14	M-03	1	95	64-140	05/19/2023 2031
4:2 FTS	15	15		1	100	63-143	05/19/2023 2031
GenX	32	29		1	91	50-150	05/19/2023 2031
ADONA	15	14		1	94	50-150	05/19/2023 2031
EtFOSAA	16	16	M-03	1	98	61-135	05/19/2023 2031
MeFOSAA	16	15	M-03	1	93	65-136	05/19/2023 2031
PFBS	14	14		1	98	72-130	05/19/2023 2031
PFDS	15	13		1	84	53-142	05/19/2023 2031
PFHpS	15	14		1	91	69-134	05/19/2023 2031
PFNS	15	13		1	84	69-127	05/19/2023 2031
PFOSA	16	16		1	98	67-137	05/19/2023 2031
PFPeS	15	14		1	91	71-127	05/19/2023 2031
PFHxS	15	14		1	94	68-131	05/19/2023 2031
PFBA	16	15		1	93	73-129	05/19/2023 2031
PFDA	16	15		1	95	71-129	05/19/2023 2031
PFDoA	16	14	M-03	1	89	72-134	05/19/2023 2031
PFHpA	16	17		1	103	72-130	05/19/2023 2031
PFHxA	16	15		1	95	72-129	05/19/2023 2031
PFNA	16	14		1	90	69-130	05/19/2023 2031
PFOA	16	15		1	92	71-133	05/19/2023 2031
PFPeA	16	15		1	96	72-129	05/19/2023 2031
PFTeDA	16	16		1	97	71-132	05/19/2023 2031
PFTrDA	16	14		1	87	65-144	05/19/2023 2031
PFUdA	16	16		1	99	69-133	05/19/2023 2031
PFOS	15	12		1	81	65-140	05/19/2023 2031

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		91	50-150
13C2_6:2FTS		87	50-150
13C2_8:2FTS		96	50-150
13C2_PFDoA		91	50-150
13C2_PFTeDA		85	50-150
13C3_PFBS		94	50-150
13C3_PFHxS		97	50-150
13C3-HFPO-DA		98	50-150
13C4_PFBA		95	50-150
13C4_PFHpA		94	50-150
13C5_PFHxA		86	50-150
13C5_PFPeA		94	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ75586-002
Batch: 75586
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/17/2023 1903

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		98	50-150
13C7_PFUdA		84	50-150
13C8_PFOA		100	50-150
13C8_PFOS		109	50-150
13C8_PFOSA		84	50-150
13C9_PFNA		87	50-150
d5-EtFOSAA		101	50-150
d3-MeFOSAA		96	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MS

Sample ID: YD28005-001MS
Batch: 75586
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/17/2023 1903

Parameter	Sample Amount (ng/L)	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	%Rec Limit	Analysis Date
9Cl-PF3ONS	ND	14	12		1	88	50-150	05/18/2023 1907
11Cl-PF3OUdS	ND	14	12		1	86	50-150	05/18/2023 1907
8:2 FTS	ND	15	18	M-03	1	121	67-138	05/18/2023 1907
6:2 FTS	ND	14	15	M-03	1	107	64-140	05/18/2023 1907
4:2 FTS	ND	14	16		1	110	63-143	05/18/2023 1907
GenX	ND	30	31		1	101	50-150	05/18/2023 1907
ADONA	ND	14	15		1	103	50-150	05/18/2023 1907
EtFOSAA	ND	15	15	M-03	1	99	61-135	05/18/2023 1907
MeFOSAA	ND	15	14		1	89	65-136	05/18/2023 1907
PFBS	3.3	13	15		1	88	72-130	05/18/2023 1907
PFDS	ND	15	12		1	80	53-142	05/18/2023 1907
PFHpS	ND	14	16		1	110	69-134	05/18/2023 1907
PFNS	ND	15	14	M-03	1	95	69-127	05/18/2023 1907
PFOSA	ND	15	15	M-03	1	100	67-137	05/18/2023 1907
PFPeS	2.8	14	16	M-03	1	96	71-127	05/18/2023 1907
PFHxS	6.8	14	21	M-03	1	101	68-131	05/18/2023 1907
PFBA	8.8	15	25	M-03	1	104	73-129	05/18/2023 1907
PFDA	ND	15	17		1	109	71-129	05/18/2023 1907
PFDoA	ND	15	15		1	99	72-134	05/18/2023 1907
PFHpA	2.8	15	19	M-03	1	109	72-130	05/18/2023 1907
PFHxA	8.6	15	23		1	94	72-129	05/18/2023 1907
PFNA	ND	15	16		1	105	69-130	05/18/2023 1907
PFOA	4.8	15	21	M-03	1	109	71-133	05/18/2023 1907
PFPeA	7.4	15	21	M-03	1	90	72-129	05/18/2023 1907
PFTeDA	ND	15	15		1	99	71-132	05/18/2023 1907
PFTrDA	ND	15	13	M-03	1	87	65-144	05/18/2023 1907
PFUdA	ND	15	15		1	101	69-133	05/18/2023 1907
PFOS	ND	14	15	M-03	1	104	65-140	05/18/2023 1907

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS	N	227	50-150
13C2_6:2FTS		129	50-150
13C2_8:2FTS		97	50-150
13C2_PFDoA		85	50-150
13C2_PFTeDA		84	50-150
13C3_PFBS		99	50-150
13C3_PFHxS		89	50-150
13C3-HFPO-DA		80	50-150
13C4_PFBA		61	50-150
13C4_PFHpA		88	50-150
13C5_PFHxA		95	50-150
13C5_PFPeA		82	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MS

Sample ID: YD28005-001MS
Batch: 75586
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/17/2023 1903

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		89	50-150
13C7_PFUdA		79	50-150
13C8_PFOA		110	50-150
13C8_PFOS		93	50-150
13C8_PFOSA		96	50-150
13C9_PFNA		93	50-150
d5-EtFOSAA		86	50-150
d3-MeFOSAA		91	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - Duplicate

Sample ID: YD28005-005DU
Batch: 75586
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/17/2023 1903

Parameter	Sample Amount (ng/L)	Result (ng/L)	Q	Dil	% RPD	%RPD Limit	Analysis Date
9Cl-PF3ONS	ND	ND		1	0.00	20	05/18/2023 2000
11Cl-PF3OUdS	ND	ND		1	0.00	20	05/18/2023 2000
8:2 FTS	ND	ND		1	0.00	20	05/18/2023 2000
6:2 FTS	ND	ND		1	0.00	20	05/18/2023 2000
4:2 FTS	ND	ND		1	0.00	20	05/18/2023 2000
GenX	ND	ND		1	0.00	20	05/18/2023 2000
ADONA	ND	ND		1	0.00	20	05/18/2023 2000
EtFOSAA	ND	ND		1	0.00	20	05/18/2023 2000
MeFOSAA	ND	ND		1	0.00	20	05/18/2023 2000
PFBS	1.8	1.9	J	1	3.7	20	05/18/2023 2000
PFDS	ND	ND		1	0.00	20	05/18/2023 2000
PFHpS	ND	ND		1	0.00	20	05/18/2023 2000
PFNS	ND	ND		1	0.00	20	05/18/2023 2000
PFOSA	ND	ND		1	0.00	20	05/18/2023 2000
PFPeS	ND	ND		1	0.00	20	05/18/2023 2000
PFHxS	1.8	1.7	JM-03	1	5.6	20	05/18/2023 2000
PFBA	4.3	4.3		1	0.72	20	05/18/2023 2000
PFDA	ND	ND		1	0.00	20	05/18/2023 2000
PFDoA	ND	ND		1	0.00	20	05/18/2023 2000
PFHpA	0.90	1.1	JM-03	1	19	20	05/18/2023 2000
PFHxA	1.8	1.4	JM-03,+	1	28	20	05/18/2023 2000
PFNA	ND	ND		1	0.00	20	05/18/2023 2000
PFOA	3.2	2.7	J	1	17	20	05/18/2023 2000
PFPeA	1.9	1.5	JM-03,+	1	23	20	05/18/2023 2000
PFTeDA	ND	ND		1	0.00	20	05/18/2023 2000
PFTrDA	ND	ND		1	0.00	20	05/18/2023 2000
PFUdA	ND	ND		1	0.00	20	05/18/2023 2000
PFOS	ND	ND		1	0.00	20	05/18/2023 2000

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS	N	352	50-150
13C2_6:2FTS	N	205	50-150
13C2_8:2FTS	M-03N	174	50-150
13C2_PFDoA	N	161	50-150
13C2_PFTeDA	N	171	50-150
13C3_PFBS	N	188	50-150
13C3_PFHxS	N	179	50-150
13C3-HFPO-DA	N	167	50-150
13C4_PFBA		121	50-150
13C4_PFHpA	N	177	50-150
13C5_PFHxA	N	184	50-150
13C5_PFPeA	N	160	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - Duplicate

Sample ID: YD28005-005DU
Batch: 75586
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/17/2023 1903

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA	N	171	50-150
13C7_PFUdA	M-03N	155	50-150
13C8_PFOA	N	215	50-150
13C8_PFOS	N	172	50-150
13C8_PFOSA	N	186	50-150
13C9_PFNA	N	190	50-150
d5-EtFOSAA	N	166	50-150
d3-MeFOSAA	N	180	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: YQ75963-001
Batch: 75963
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/23/2023 1402

Parameter	Result	Q	Dil	LOQ	DL	Units	Analysis Date
9Cl-PF3ONS	ND		1	8.0	2.0	ng/L	05/24/2023 1356
11Cl-PF3OUdS	ND		1	8.0	2.0	ng/L	05/24/2023 1356
8:2 FTS	ND		1	8.0	2.0	ng/L	05/24/2023 1356
6:2 FTS	ND		1	8.0	2.0	ng/L	05/24/2023 1356
4:2 FTS	ND		1	8.0	2.0	ng/L	05/24/2023 1356
GenX	ND		1	8.0	2.0	ng/L	05/24/2023 1356
ADONA	ND		1	8.0	2.0	ng/L	05/24/2023 1356
EtFOSAA	ND		1	8.0	2.0	ng/L	05/24/2023 1356
MeFOSAA	ND		1	8.0	2.0	ng/L	05/24/2023 1356
PFBS	ND		1	4.0	1.0	ng/L	05/24/2023 1356
PFDS	ND		1	4.0	1.0	ng/L	05/24/2023 1356
PFHpS	ND		1	4.0	1.0	ng/L	05/24/2023 1356
PFNS	ND		1	4.0	1.0	ng/L	05/24/2023 1356
PFOSA	ND		1	4.0	1.0	ng/L	05/24/2023 1356
PFPeS	ND		1	4.0	1.0	ng/L	05/24/2023 1356
PFHxS	ND		1	4.0	1.0	ng/L	05/24/2023 1356
PFBA	ND		1	4.0	1.0	ng/L	05/24/2023 1356
PFDA	ND		1	4.0	1.0	ng/L	05/24/2023 1356
PFDoA	ND		1	4.0	1.0	ng/L	05/24/2023 1356
PFHpA	ND		1	4.0	1.0	ng/L	05/24/2023 1356
PFHxA	ND		1	4.0	1.0	ng/L	05/24/2023 1356
PFNA	ND		1	4.0	1.0	ng/L	05/24/2023 1356
PFOA	ND		1	4.0	1.0	ng/L	05/24/2023 1356
PFPeA	ND		1	4.0	1.0	ng/L	05/24/2023 1356
PFTeDA	ND		1	4.0	1.0	ng/L	05/24/2023 1356
PFTrDA	ND		1	4.0	1.0	ng/L	05/24/2023 1356
PFUdA	ND		1	4.0	1.0	ng/L	05/24/2023 1356
PFOS	ND		1	4.0	1.0	ng/L	05/24/2023 1356

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		98	50-150
13C2_6:2FTS		117	50-150
13C2_8:2FTS		88	50-150
13C2_PFDoA		95	50-150
13C2_PFTeDA		95	50-150
13C3_PFBS		101	50-150
13C3_PFHxS		97	50-150
13C3-HFPO-DA		103	50-150
13C4_PFBA		91	50-150
13C4_PFHpA		103	50-150
13C5_PFHxA		101	50-150
13C5_PFPeA		100	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: YQ75963-001
Batch: 75963
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/23/2023 1402

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		96	50-150
13C7_PFUdA		91	50-150
13C8_PFOA		111	50-150
13C8_PFOS		90	50-150
13C8_PFOSA		83	50-150
13C9_PFNA		98	50-150
d5-EtFOSAA		93	50-150
d3-MeFOSAA		91	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ75963-002
Batch: 75963
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/23/2023 1402

Parameter	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	%Rec Limit	Analysis Date
9Cl-PF3ONS	15	15		1	98	50-150	05/25/2023 1208
11Cl-PF3OUdS	15	13		1	89	50-150	05/25/2023 1208
8:2 FTS	15	15	M-03	1	100	67-138	05/25/2023 1208
6:2 FTS	15	13	M-03	1	87	64-140	05/25/2023 1208
4:2 FTS	15	16		1	106	63-143	05/25/2023 1208
GenX	32	35		1	108	50-150	05/25/2023 1208
ADONA	15	16		1	104	50-150	05/25/2023 1208
EtFOSAA	16	18	M-03	1	111	61-135	05/25/2023 1208
MeFOSAA	16	17	M-03	1	105	65-136	05/25/2023 1208
PFBS	14	13		1	94	72-130	05/25/2023 1208
PFDS	15	14		1	88	53-142	05/25/2023 1208
PFHpS	15	17	M-03	1	114	69-134	05/25/2023 1208
PFNS	15	13		1	86	69-127	05/25/2023 1208
PFOSA	16	16	M-03	1	100	67-137	05/25/2023 1208
PFPeS	15	14		1	96	71-127	05/25/2023 1208
PFHxS	15	15	M-03	1	101	68-131	05/25/2023 1208
PFBA	16	17		1	108	73-129	05/25/2023 1208
PFDA	16	16	M-03	1	98	71-129	05/25/2023 1208
PFDoA	16	16		1	101	72-134	05/25/2023 1208
PFHpA	16	18		1	110	72-130	05/25/2023 1208
PFHxA	16	16		1	102	72-129	05/25/2023 1208
PFNA	16	16		1	98	69-130	05/25/2023 1208
PFOA	16	16	M-03	1	101	71-133	05/25/2023 1208
PFPeA	16	16		1	102	72-129	05/25/2023 1208
PFTeDA	16	16	M-03	1	101	71-132	05/25/2023 1208
PFTrDA	16	20		1	123	65-144	05/25/2023 1208
PFUdA	16	17		1	103	69-133	05/25/2023 1208
PFOS	15	15	M-03	1	103	65-140	05/25/2023 1208

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		97	50-150
13C2_6:2FTS		108	50-150
13C2_8:2FTS		104	50-150
13C2_PFDoA		94	50-150
13C2_PFTeDA		97	50-150
13C3_PFBS		105	50-150
13C3_PFHxS		98	50-150
13C3-HFPO-DA		94	50-150
13C4_PFBA		98	50-150
13C4_PFHpA		93	50-150
13C5_PFHxA		96	50-150
13C5_PFPeA		95	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ75963-002
Batch: 75963
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/23/2023 1402

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		97	50-150
13C7_PFUdA		90	50-150
13C8_PFOA		101	50-150
13C8_PFOS		99	50-150
13C8_PFOSA	M-03	94	50-150
13C9_PFNA		101	50-150
d5-EtFOSAA		86	50-150
d3-MeFOSAA		88	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Chain of Custody
and
Miscellaneous Documents

Pace Analytical®

PACE ANALYTICAL SERVICES, LLC
106 Vantage Point Drive • West Columbia, SC 29172
Telephone No. 803-791-9700 Fax No. 803-791-9111
www.pacelabs.com

Number 146506

Client: Arcadis	Report to Contact: Tiffany Linder, Alexis Crisp	Telephone No. / E-mail: tiffany.linder@arcadis.com, Alexis.Crisp@arcadis.com	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: Jommel Guy	Analysis (Attach list if more space is needed): Repost EGLE 28 Compounds	Page 1 of 1
City: NOVI	State: MI	Zip Code: 48377	Printed Name: Jommel Guy
Project Name: Racer PNC			YD28005
Project No.: 30167840.00030	P.O. No.:		KESZ

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	G=Grab C=Composite	Matrix: Aqueous	Soil	Air/Gas	No. of Containers by Preservative Type: Unpres.	H2SO4	HNO3	HCl	NaOH	Na2S2O3	NaHSO4	PFAS Method 537.1mod. with isotope dilution PZ (Y/N)	Remarks / Cooler I.D.
MWF16-05_GW-042723	4/27/23	0940	G	2			2							X	
MWF18-01_GW-042723	4/27/23	1035	G	2			2							X	
MWF16-18_GW-042723	4/27/23	1125	G	2			2							X	
MWF16-06_GW-042723	4/27/23	1220	G	2			2							X	
MWF12-01R_GW-042723	4/27/23	1342	G	2			2							X	
MWOS-05_GW-042723	4/27/23	1453	G	2			2							X	
DUP-01_GW-042723	4/27/23	—	G	2			2							X	
tripblank	4/27/23	1410	G	1			1							X	tripblank

Turn Around Time Required (Prior lab approval required for expedited TAT.): ☒ Standard ☐ Rush (Specify)

Sample Disposal: ☐ Return to Client ☒ Disposal by Lab

Possible Hazard Identification: ☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: Jommel Guy	4/27/23	1550	1. Received by: FedEx	4/27/23	1550
2. Relinquished by	Date	Time	2. Received by	Date	Time
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by: Fedex	4-28-23	930	4. Laboratory received by: [signature]	4-28-23	930

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY — Received on Ice (Circle): (Yes) No Ice Pack — Receipt Temp. 1.5 °C — Temp Blank: ☒ Y ☐ N

DISTRIBUTION: WHITE & YELLOW-Return to laboratory with Sample(s); PINK-Field/Client Copy

Document Number: ME003N2-01

PACE ANALYTICAL SERVICES, LLC

DC#_Title: ENV-FRM-WCOL-0286 v02_Samples Receipt Checklist (SRC)
Effective Date: 8/2/2022

Sample Receipt Checklist (SRC)

Client: ARCADIS Cooler Inspected by/date: KDRW / 04/28/2023 Lot #: YD28005

Means of receipt: ☐ Pace ☐ Client ☐ UPS ☑ FedEx ☐ Other: _____

☑ Yes	☐ No		1. Were custody seals present on the cooler?
☑ Yes	☐ No	☐ NA	2. If custody seals were present, were they intact and unbroken?

pH Strip ID: NA Chlorine Strip ID: NA Tested by: NA
Original temperature upon receipt / Derived (Corrected) temperature upon receipt %Solid Snap-Cup ID: NA
1.5 / 1.5 °C NA / NA °C NA / NA °C NA / NA °C
Method: ☑ Temperature Blank ☐ Against Bottles IR Gun ID: 8 IR Gun Correction Factor: 0 °C
Method of coolant: ☑ Wet Ice ☐ Ice Packs ☐ Dry Ice ☐ None

☑ Yes	☐ No	☐ NA	3. Were all coolers received at or below 6.0°C? If no, was Project Manager notified? PM was Notified by: phone / email / face-to-face (circle one).
☑ Yes	☐ No	☐ NA	4. Is the commercial courier's packing slip attached to this form?
☑ Yes	☐ No		5. Were proper custody procedures (relinquished/received) followed?
☑ Yes	☐ No		6. Were sample IDs listed on the COC and all sample containers?
☑ Yes	☐ No		7. Was collection date & time listed on the COC and all sample containers?
☑ Yes	☐ No		8. Did all container label information (ID, date, time) agree with the COC?
☑ Yes	☐ No		9. Were tests to be performed listed on the COC?
☑ Yes	☐ No		10. Did all samples arrive in the proper containers for each test and/or in good condition (unbroken, lids on, etc.)? _____
☑ Yes	☐ No		11. Was adequate sample volume available?
☑ Yes	☐ No		12. Were all samples received within ½ the holding time or 48 hours, whichever comes first?
☑ Yes	☐ No		13. Were all samples containers accounted for? (No missing/excess)
☐ Yes	☐ No	☑ NA	14. Were VOA, 8015C and RSK-175 samples free of bubbles >"pea-size" (¼" or 6mm in diameter) in any of the VOA vials?
☐ Yes	☐ No	☑ NA	15. Were all DRO/metals/nutrient samples received at a pH of < 2?
☐ Yes	☐ No	☑ NA	16. Were all cyanide samples received at a pH > 12 and sulfide samples received at a pH > 9?
☐ Yes	☐ No	☑ NA	17. Were all applicable NH_3/TKN/cyanide/phenol/625.1/608.3 (< 0.5mg/L) samples free of residual chlorine?
☑ Yes	☐ No	☐ NA	18. Was the quote number listed on the container label? If yes, Quote # 25015

Sample Preservation (Must be completed for any sample(s) incorrectly preserved or with headspace.)

Sample(s) _____ were received incorrectly preserved and were adjusted accordingly in sample receiving with _____ mL of circle one: H_2SO_4, HNO_3, HCl, NaOH using SR # _____. ☐
Time of preservation _____. If more than one preservative is needed, please note in the comments below.

Sample(s) _____ were received with bubbles >6 mm in diameter.

Samples(s) NA _____ were received with TRC > 0.5 mg/L (If #19 is *no*) and were adjusted accordingly in sample receiving with sodium thiosulfate ($Na_2S_2O_3$) with Unique ID: NA _____.

Comments:

Qualtrax ID: 56360 Pace® Analytical Services, LLC Page 1 of 1

Report of Analysis

Arcadis U.S., Inc.
630 Plaza Drive
Suite 600
Highlands Ranch, CO 80129
Attention: Tiffany Linder

Project Name: Racer PNC

Project Number: 30167840.00030

Lot Number:**YE02015**

Date Completed:06/05/2023

Kathy Smith

06/05/2023 10:23 AM
Approved and released by:
Project Manager II: **Kathy E. Smith**

The electronic signature above is the equivalent of a handwritten signature.
This report shall not be reproduced, except in its entirety, without the written approval of Pace Analytical Services, LLC.

Pace Analytical Services, LLC (*formerly Shealy Environmental Services, Inc.*)
106 Vantage Point Drive West Columbia, SC 29172
Tel: 803-791-9700 Fax: 803-791-9111 www.pacelabs.com

Case Narrative
Arcadis U.S., Inc.
Lot Number: YE02015

This Report of Analysis contains the analytical result(s) for the sample(s) listed on the Sample Summary following this Case Narrative. The sample receiving date is documented in the header information associated with each sample.

All results listed in this report relate only to the samples that are contained within this report.

Sample receipt, sample analysis, and data review have been performed in accordance with the Pace Quality Assurance Management Plan (QAMP), applicable Shealy standard operating procedures (SOPs), the 2003 NELAC standard, and Shealy policies. Additionally, the DoD QSM version 5.4 has been followed for these samples, and specifically Table B-15 was followed for all PFAS samples. Any exceptions to the QAMP, SOPs, NELAC standards, the DoD QSM, or policies are qualified on the results page or discussed below.

All QC associated with these samples were compliant with DOD QSM 5.4 table B-15 and our PFAS SOP.

Correction factors (CF) are used to calculate the original sample concentration. The CF is the inverse of the concentration factor (sample volume / extract final volume) times the dilution factor (DF). The CF is calculated as follows:

CF = DF * FV / Vo

FV is volume of extract (mL)
Vo is initial sample volume (mL)
DF is dilution factor. For undiluted analysis, DF = 1.

Sample concentration for aqueous samples:
Concentration (ng/L) = Cs*CF,

$$C_s = \frac{\left(\frac{(A_s x C_{is})}{A_{is}}\right) - B}{M1}$$

Where

C_s is on column concentration of target analyte in the sample (ng/L)
C_{is} is concentration of internal standard in the sample (ng/L)
A_s is peak response of target analyte in the sample
A_{is} is peak response of internal standard in the sample
M1 is the average RF from ICAL or the slope from linear regression ICAL
B is the y-intercept from the ICAL

Pace is a DoD/DOE accredited laboratory; however, the following analyses are currently not listed on our DoD/DOE scope of accreditation: Drinking Water: pH EPA 150.1, Turbidity EPA 180.1, Metals EPA 200.7 & 200.8, Mercury EPA 245.1, Anions EPA 300.0, Cyanide EPA 335.4, Nitrates EPA 353.2, Orthophosphate & Phosphorus EPA 365.1, EDB/DBCP EPA 504.1, HPC SIMPLATE, Color SM 2120 B-2011, Alkalinity SM 2320 B-2011, Specific Conductance SM 2510 B-2011, Residue-filterable (TDS) SM 2540 C, Calcium Hardness (CaCO2) SM 3500-Ca B-2011, TRC SM 4500 Cl G-2011, pH SM 4500 H=B-2011, E.Coli, Total Coliform. Non-Potable Water: Metals EPA 200.7, Strontium EPA 200.8, Chlorate EPA 300.0, Cyanide EPA 335.4, Phenolics EPA 420.4, 2-Methyl-4,6-Dinitrophenol EPA 625.1, Propane RSK-175, Specific Conductance SM 2510 B-2011, Salinity SM2520 B, Residue- total SM 2540 B, Sulfite SM 4500 SO32- B-2011, Amenable Cyanide SM 4500-CN- G-2011, BOD & CBOD SM 5210 B, MBAS SM 5540 C-2011, Boron & Titanium SW-846 6010D, Boron, Molybdenum, & Titanium SW-846 6020B, Alcohols & Glycols SW-846 8015C, Pentachlorophenol SW-846 8151A, Ethyl Acetate, Hexane, & n-Hexane SW-846 8260D, SVOC 1,4-Dioxane, 4-Dimethyl aminoazobenzene, 1,4-Naphthoquinone, 3,5-Dinitroaniline, PETN SW-846 8270E, Amenable Cyanide SW-846 9012B. Solid and Chemical Materials: Boron & Titanium SW-846 6010D, Molybdenum SW-846 6020B, Ethylene Glycol SW-846 8015B, Pentachlorophenol SW-846 8151A, Chloroprene SW-846 8260B, SVOC 1,4-Dioxane, 1,3,5-Trinitrobenzene, 1,4- Naphthoquinone, 1,4-Phenylenediamine, 2,4-Dinitrotoluene, 2,6-Dinitrotoluene, 3-Methylcholanthrene, 4-Aminobiphenyl, 4-Dimethyl aminoazobenzene, 4-Nitroquinoline-1-oxide, 7,12-Dimethylbenzo(a)anthracene, Chlorobenzilate, Diallate, Ethyl methanesulfonate, Isodrin, Isosafrole, Methyl methanesulfonate, n-Nitrosomethylethylamine, n-Nitrosomorpholine, n-Nitrosopiperidine, Piperonyl butoxide, Pronamide, Safrole, 3,5- Dinitroaniline, PETN SW-846 8270E, Oil & Grease SW-846 9071B.

Pace is a TNI accredited laboratory; however, the following analyses are currently not listed on our TNI scope of accreditation: Drinking Water: VOC (excluding BTEX, MTBE, Naphthalene, & 1,2-dichloroethane) EPA 524.2, E. coli and Total coliforms SM 9223 B-2004, Solid Chemical Material: TOC Walkley-Black, Biological Tissue: All, Non-Potable Water: SGT-HEM EPA 1664B, Silica EPA 200.7, Boron, Calcium, Silicon, Strontium EPA 200.8, Bicarbonate, Carbonate, and Hydroxide Alkalinity SM 2320 B-2011, SM 9221 C E-2006 & SM 9222D-2006, Strontium SW-846 6010D, VOC SM 6200 B-2011, Fecal Coliform Colilert-18.

PFAS
Sample YE02015-004 required centrifugation prior to extraction, due to excessive solids present in the samples. Centrifugation was performed following the PFAS Aqueous Centrifuge Protocol; samples were spiked with Surrogate (SUR; Extracted Internal Standard/EIS) and shaken vigorously before being poured into a conical bottle and centrifuged. The centrifuged aqueous sample was decanted back into the original sample bottle, off of the condensed solids remaining in the centrifuge bottle. Original sample bottle was rinsed as normal and centrifuge bottle was rinsed with 4mL of MeOH. Centrifuge bottle rinsate was added to the elution. Samples concentrated to <5mL and reconstituted to 5mL using MeOH by transfer pipet.

The following samples were diluted due to the nature of the sample matrix: YE02015-003, YE02015-005. The LOQ has been elevated to reflect the dilution. Samples were dilued due to samples being foamy.

Surrogate recovery for the following samples was outside control limits: YE02015-001, YE02015-004, YE02015-006. Re-extraction and/or re-analysis was performed with concurring results. The original analysis has been reported.

Surrogate recovery for the following samples was outside the upper control limit: YE02015-002, YE02015-003, YE02015-005. These samples did not contain any target analytes; therefore, re-extraction and/or re-analysis was not performed.

Manual Integration Summary

Arcadis U.S., Inc.

Lot Number: YE02015

Project Name: Racer PNC

Project Number: 30167840.00030

Where applicable, analytes for which manual integration occurred have been flagged with the following:

Qualifier	Technical Justification	Qualifier	Technical Justification	Qualifier	Technical Justification
M-01	Split peak	M-07	Low fit	M-13	Error
M-02	Peak tailing	M-08	Peak not found	M-14	Baseline
M-03	Incorrect auto integration	M-09	Analyte not Identified by the Data System	M-15	Other
M-04	Poor chromatography	M-10	Analyte misidentified by the Data System	M-16	Retention time shift
M-05	Manually assigned peak	M-11	Invalid integration	M-17	Shouldering
M-06	Wrong isomer	M-12	Wrong peak		

A summary of instances where manual integration occurred is included below:

Method	Sample	Run Number	Parameter	Qualifier
PFAS by ID SOP	YE02015-001	1	Perfluoro-1-butanesulfonic acid (PFBS)	M-03
PFAS by ID SOP	YE02015-001	1	Perfluoro-1-pentanesulfonic acid	M-03
PFAS by ID SOP	YE02015-001	1	Perfluorohexanesulfonic acid (PFHxS)	M-03
PFAS by ID SOP	YE02015-001	1	Perfluoro-n-butanoic acid (PFBA)	M-03
PFAS by ID SOP	YE02015-001	1	Perfluoro-n-hexanoic acid (PFHxA)	M-03
PFAS by ID SOP	YE02015-001	1	Perfluoro-n-octanoic acid (PFOA)	M-03
PFAS by ID SOP	YE02015-001	1	Perfluorooctanesulfonic acid (PFOS)	M-03
PFAS by ID SOP	YE02015-001	2	13C8_PFOS	M-03
PFAS by ID SOP	YE02015-002	1	1H, 1H, 2H, 2H-perfluorooctane sulfonic	M-03
PFAS by ID SOP	YE02015-002	1	Perfluoro-1-butanesulfonic acid (PFBS)	M-03
PFAS by ID SOP	YE02015-002	1	Perfluorohexanesulfonic acid (PFHxS)	M-03
PFAS by ID SOP	YE02015-002	1	Perfluoro-n-butanoic acid (PFBA)	M-03
PFAS by ID SOP	YE02015-002	1	Perfluoro-n-heptanoic acid (PFHpA)	M-03
PFAS by ID SOP	YE02015-002	1	Perfluoro-n-hexanoic acid (PFHxA)	M-03
PFAS by ID SOP	YE02015-002	1	Perfluoro-n-octanoic acid (PFOA)	M-03
PFAS by ID SOP	YE02015-002	1	Perfluorooctanesulfonic acid (PFOS)	M-03
PFAS by ID SOP	YE02015-004	1	1H, 1H, 2H, 2H-perfluorodecane	M-03
PFAS by ID SOP	YE02015-004	1	1H, 1H, 2H, 2H-perfluorooctane sulfonic	M-03
PFAS by ID SOP	YE02015-004	1	Perfluoro-1-butanesulfonic acid (PFBS)	M-03
PFAS by ID SOP	YE02015-004	1	Perfluoro-1-heptanesulfonic acid	M-03
PFAS by ID SOP	YE02015-004	1	Perfluorohexanesulfonic acid (PFHxS)	M-03
PFAS by ID SOP	YE02015-004	1	Perfluoro-n-butanoic acid (PFBA)	M-03
PFAS by ID SOP	YE02015-004	1	Perfluoro-n-decanoic acid (PFDA)	M-03
PFAS by ID SOP	YE02015-004	1	Perfluoro-n-heptanoic acid (PFHpA)	M-03
PFAS by ID SOP	YE02015-004	1	Perfluoro-n-hexanoic acid (PFHxA)	M-03
PFAS by ID SOP	YE02015-004	1	Perfluoro-n-pentanoic acid (PFPeA)	M-03
PFAS by ID SOP	YE02015-004	1	Perfluorooctanesulfonic acid (PFOS)	M-03
PFAS by ID SOP	YE02015-004	2	13C2_8:2FTS	M-03
PFAS by ID SOP	YE02015-004	2	d3-MeFOSAA	M-03
PFAS by ID SOP	YE02015-005	1	Perfluoro-n-butanoic acid (PFBA)	M-03
PFAS by ID SOP	YE02015-005	1	Perfluoro-n-heptanoic acid (PFHpA)	M-03
PFAS by ID SOP	YE02015-005	1	Perfluoro-n-hexanoic acid (PFHxA)	M-03
PFAS by ID SOP	YE02015-005	1	Perfluoro-n-octanoic acid (PFOA)	M-03
PFAS by ID SOP	YE02015-005	1	Perfluoro-n-pentanoic acid (PFPeA)	M-03
PFAS by ID SOP	YE02015-005	1	Perfluorooctanesulfonic acid (PFOS)	M-03
PFAS by ID SOP	YE02015-006	1	Perfluoro-1-butanesulfonic acid (PFBS)	M-03
PFAS by ID SOP	YE02015-006	1	Perfluoro-1-pentanesulfonic acid	M-03

Manual Integration Summary

Arcadis U.S., Inc.

Lot Number: YE02015

Project Name: Racer PNC

Project Number: 30167840.00030

Where applicable, analytes for which manual integration occurred have been flagged with the following:

Qualifier	Technical Justification	Qualifier	Technical Justification	Qualifier	Technical Justification
M-01	Split peak	M-07	Low fit	M-13	Error
M-02	Peak tailing	M-08	Peak not found	M-14	Baseline
M-03	Incorrect auto integration	M-09	Analyte not Identified by the Data System	M-15	Other
M-04	Poor chromatography	M-10	Analyte misidentified by the Data System	M-16	Retention time shift
M-05	Manually assigned peak	M-11	Invalid integration	M-17	Shouldering
M-06	Wrong isomer	M-12	Wrong peak		

A summary of instances where manual integration occurred is included below:

Method	Sample	Run Number	Parameter	Qualifier
PFAS by ID SOP	YE02015-006	1	Perfluorohexanesulfonic acid (PFHxS)	M-03
PFAS by ID SOP	YE02015-006	1	Perfluoro-n-octanoic acid (PFOA)	M-03
PFAS by ID SOP	YE02015-006	1	Perfluoro-n-pentanoic acid (PFPeA)	M-03
PFAS by ID SOP	YE02015-006	1	Perfluorooctanesulfonic acid (PFOS)	M-03
PFAS by ID SOP	YE02015-006	2	13C2_4:2FTS	M-03
PFAS by ID SOP	YE02015-006	2	13C2_8:2FTS	M-03
PFAS by ID SOP	YE02015-006	2	13C3_PFBS	M-03
PFAS by ID SOP	YE02015-006	2	13C6_PFDA	M-03
PFAS by ID SOP	YE02015-006	2	d5-EtFOSAA	M-03
PFAS by ID SOP	YE02015-007	1	4,8-dioxa-3H-perfluorononanoic acid	M-03
PFAS by ID SOP	YQ75726-002	1	N-ethylperfluoro-1-	M-03
PFAS by ID SOP	YQ75726-002	1	N-methylperfluoro-1-	M-03
PFAS by ID SOP	YQ75726-002	1	Perfluoro-1-octanesulfonamide (PFOSA)	M-03
PFAS by ID SOP	YQ75726-002	1	Perfluoro-n-undecanoic acid (PFUdA)	M-03
PFAS by ID SOP	YQ75750-002	1	1H, 1H, 2H, 2H-perfluorodecane	M-03
PFAS by ID SOP	YQ75750-002	1	N-methylperfluoro-1-	M-03
PFAS by ID SOP	YQ75750-002	1	Perfluorooctanesulfonic acid (PFOS)	M-03

If you have any questions regarding this report, please contact the Pace Project Manager listed on the cover page.

Sample Summary

Arcadis U.S., Inc.

Lot Number: YE02015

Project Name: Racer PNC

Project Number: 30167840.00030

Sample Number	Sample ID	Matrix	Date Sampled	Date Received
001	MWM16-30_GW-050123	Aqueous	05/01/2023 0838	05/02/2023
002	MWM4-05_GW-050123	Aqueous	05/01/2023 1132	05/02/2023
003	MWM32-01_GW-050123	Aqueous	05/01/2023 1250	05/02/2023
004	MWM2-28_GW-050123	Aqueous	05/01/2023 1413	05/02/2023
005	MWM2-22_GW-050123	Aqueous	05/01/2023 1505	05/02/2023
006	DUP-02_GW-050123	Aqueous	05/01/2023	05/02/2023
007	Trip Blank	Aqueous	05/01/2023 1540	05/02/2023

(7 samples)

Detection Summary

Arcadis U.S., Inc.

Lot Number: YE02015

Project Name: Racer PNC

Project Number: 30167840.00030

Sample	Sample ID	Matrix	Parameter	Method	Result	Q	Units	Page
001	MWM16-30_GW-050123	Aqueous	PFBS	PFAS by ID	3.0	JM-03	ng/L	9
001	MWM16-30_GW-050123	Aqueous	PFPeS	PFAS by ID	1.0	JM-03	ng/L	9
001	MWM16-30_GW-050123	Aqueous	PFHxS	PFAS by ID	4.7	M-03	ng/L	9
001	MWM16-30_GW-050123	Aqueous	PFBA	PFAS by ID	12	QM-03	ng/L	9
001	MWM16-30_GW-050123	Aqueous	PFHpA	PFAS by ID	6.7		ng/L	9
001	MWM16-30_GW-050123	Aqueous	PFHxA	PFAS by ID	7.7	M-03	ng/L	9
001	MWM16-30_GW-050123	Aqueous	PFOA	PFAS by ID	3.8	JM-03	ng/L	9
001	MWM16-30_GW-050123	Aqueous	PFPeA	PFAS by ID	11		ng/L	9
001	MWM16-30_GW-050123	Aqueous	PFOS	PFAS by ID	1.3	JM-03	ng/L	9
002	MWM4-05_GW-050123	Aqueous	PFBS	PFAS by ID	2.5	JM-03	ng/L	11
002	MWM4-05_GW-050123	Aqueous	PFHxS	PFAS by ID	2.2	JM-03	ng/L	11
002	MWM4-05_GW-050123	Aqueous	PFBA	PFAS by ID	8.5	M-03	ng/L	11
002	MWM4-05_GW-050123	Aqueous	PFHpA	PFAS by ID	2.6	JM-03	ng/L	11
002	MWM4-05_GW-050123	Aqueous	PFHxA	PFAS by ID	3.5	JM-03	ng/L	11
002	MWM4-05_GW-050123	Aqueous	PFOA	PFAS by ID	4.2	M-03	ng/L	11
002	MWM4-05_GW-050123	Aqueous	PFPeA	PFAS by ID	3.8		ng/L	11
002	MWM4-05_GW-050123	Aqueous	PFOS	PFAS by ID	2.2	JM-03	ng/L	11
004	MWM2-28_GW-050123	Aqueous	8:2 FTS	PFAS by ID	2.3	JQM-03	ng/L	15
004	MWM2-28_GW-050123	Aqueous	6:2 FTS	PFAS by ID	3.9	JQM-03	ng/L	15
004	MWM2-28_GW-050123	Aqueous	PFBS	PFAS by ID	3.7	M-03	ng/L	15
004	MWM2-28_GW-050123	Aqueous	PFHpS	PFAS by ID	1.1	JM-03	ng/L	15
004	MWM2-28_GW-050123	Aqueous	PFHxS	PFAS by ID	4.2	M-03	ng/L	15
004	MWM2-28_GW-050123	Aqueous	PFBA	PFAS by ID	14	QM-03	ng/L	15
004	MWM2-28_GW-050123	Aqueous	PFDA	PFAS by ID	2.2	JM-03	ng/L	15
004	MWM2-28_GW-050123	Aqueous	PFHpA	PFAS by ID	8.1	M-03	ng/L	15
004	MWM2-28_GW-050123	Aqueous	PFHxA	PFAS by ID	16	M-03	ng/L	15
004	MWM2-28_GW-050123	Aqueous	PFNA	PFAS by ID	5.0		ng/L	15
004	MWM2-28_GW-050123	Aqueous	PFOA	PFAS by ID	18		ng/L	15
004	MWM2-28_GW-050123	Aqueous	PFPeA	PFAS by ID	14	M-03	ng/L	15
004	MWM2-28_GW-050123	Aqueous	PFOS	PFAS by ID	56	M-03	ng/L	15
005	MWM2-22_GW-050123	Aqueous	PFBA	PFAS by ID	27	JM-03	ng/L	17
005	MWM2-22_GW-050123	Aqueous	PFHpA	PFAS by ID	15	JM-03	ng/L	17
005	MWM2-22_GW-050123	Aqueous	PFHxA	PFAS by ID	28	JM-03	ng/L	17
005	MWM2-22_GW-050123	Aqueous	PFOA	PFAS by ID	28	JM-03	ng/L	17
005	MWM2-22_GW-050123	Aqueous	PFPeA	PFAS by ID	26	JM-03	ng/L	17
005	MWM2-22_GW-050123	Aqueous	PFOS	PFAS by ID	77	M-03	ng/L	17
006	DUP-02_GW-050123	Aqueous	PFBS	PFAS by ID	3.0	JM-03	ng/L	19
006	DUP-02_GW-050123	Aqueous	PFHxS	PFAS by ID	4.6	M-03	ng/L	19
006	DUP-02_GW-050123	Aqueous	PFBA	PFAS by ID	11	Q	ng/L	19
006	DUP-02_GW-050123	Aqueous	PFHpA	PFAS by ID	6.5		ng/L	19
006	DUP-02_GW-050123	Aqueous	PFHxA	PFAS by ID	7.0		ng/L	19
006	DUP-02_GW-050123	Aqueous	PFOA	PFAS by ID	4.1	M-03	ng/L	19
006	DUP-02_GW-050123	Aqueous	PFPeA	PFAS by ID	13	M-03	ng/L	19

Detection Summary (Continued)

Lot Number: YE02015

Sample	Sample ID	Matrix	Parameter	Method	Result	Q	Units	Page
006	DUP-02_GW-050123	Aqueous	PFOS	PFAS by ID	1.2	JM-03	ng/L	19

(44 detections)

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE02015-001**

Description: **MWM16-30_GW-050123** Matrix: **Aqueous**

Date Sampled: **05/01/2023 0838** Project Name: **Racer PNC**

Date Received: **05/02/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/24/2023 0211	ARC2	05/19/2023 1219	75726

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.7	1.9	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.7	1.9	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.7	1.9	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.7	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.7	1.9	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.7	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.7	1.9	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.7	1.9	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.7	1.9	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**3.0**	**JM-03**	**3.9**	**0.96**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.9	0.96	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.9	0.96	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.9	0.96	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.9	0.96	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**1.0**	**JM-03**	**3.9**	**0.96**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**4.7**	**M-03**	**3.9**	**0.96**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**12**	**QM-03**	**3.9**	**0.96**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.9	0.96	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.9	0.96	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**6.7**		**3.9**	**0.96**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**7.7**	**M-03**	**3.9**	**0.96**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.9	0.96	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**3.8**	**JM-03**	**3.9**	**0.96**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**11**		**3.9**	**0.96**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.9	0.96	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.9	0.96	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.9	0.96	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**1.3**	**JM-03**	**3.9**	**0.96**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	295	50-150
13C2_6:2FTS	N	166	50-150
13C2_8:2FTS		110	50-150
13C2_PFDoA		88	50-150
13C2_PFTeDA		92	50-150
13C3_PFBS		95	50-150
13C3_PFHxS		101	50-150
13C3-HFPO-DA		88	50-150
13C4_PFBA	N	31	50-150
13C4_PFHpA		105	50-150
13C5_PFHxA		93	50-150
13C5_PFPeA		67	50-150
13C6_PFDA		99	50-150
13C7_PFUdA		93	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE02015-001**

Description: **MWM16-30_GW-050123** Matrix: **Aqueous**

Date Sampled: **05/01/2023 0838** Project Name: **Racer PNC**

Date Received: **05/02/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		105	50-150
13C8_PFOS		97	50-150
13C8_PFOSA		98	50-150
13C9_PFNA		109	50-150
d5-EtFOSAA		95	50-150
d3-MeFOSAA		103	50-150

LOQ = Limit of Quantitation	B = Detected in the method blank	E = Quantitation of compound exceeded the calibration range	DL = Detection Limit	Q = Surrogate failure
ND = Not detected at or above the DL	N = Recovery is out of criteria	P = The RPD between two GC columns exceeds 40%	J = Estimated result < LOQ and ≥ DL	L = LCS/LCSD failure
H = Out of holding time	W = Reported on wet weight basis			S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE02015-002**

Description: **MWM4-05_GW-050123** Matrix: **Aqueous**

Date Sampled: **05/01/2023 1132** Project Name: **Racer PNC**

Date Received: **05/02/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/24/2023 0223	ARC2	05/19/2023 1219	75726

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.4	1.9	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.4	1.9	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.4	1.9	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	QM-03	7.4	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.4	1.9	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.4	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.4	1.9	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.4	1.9	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.4	1.9	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**2.5**	**JM-03**	**3.7**	**0.93**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	0.93	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.7	0.93	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	0.93	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	0.93	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.7	0.93	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**2.2**	**JM-03**	**3.7**	**0.93**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**8.5**	**M-03**	**3.7**	**0.93**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	0.93	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	0.93	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**2.6**	**JM-03**	**3.7**	**0.93**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**3.5**	**JM-03**	**3.7**	**0.93**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.7	0.93	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**4.2**	**M-03**	**3.7**	**0.93**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**3.8**		**3.7**	**0.93**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	0.93	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	0.93	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	0.93	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**2.2**	**JM-03**	**3.7**	**0.93**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	251	50-150
13C2_6:2FTS	N	169	50-150
13C2_8:2FTS		119	50-150
13C2_PFDoA		88	50-150
13C2_PFTeDA		93	50-150
13C3_PFBS		99	50-150
13C3_PFHxS		102	50-150
13C3-HFPO-DA		92	50-150
13C4_PFBA		55	50-150
13C4_PFHpA		105	50-150
13C5_PFHxA		102	50-150
13C5_PFPeA		85	50-150
13C6_PFDA		105	50-150
13C7_PFUdA		95	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE02015-002**

Description: **MWM4-05_GW-050123** Matrix: **Aqueous**

Date Sampled: **05/01/2023 1132** Project Name: **Racer PNC**

Date Received: **05/02/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		105	50-150
13C8_PFOS		95	50-150
13C8_PFOSA		99	50-150
13C9_PFNA		107	50-150
d5-EtFOSAA		96	50-150
d3-MeFOSAA		107	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE02015-003**

Description: **MWM32-01_GW-050123** Matrix: **Aqueous**

Date Sampled: **05/01/2023 1250** Project Name: **Racer PNC**

Date Received: **05/02/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/24/2023 0236	ARC2	05/19/2023 1219	75726

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		80	20	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		80	20	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	80	20	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	80	20	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	80	20	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		80	20	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		80	20	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		80	20	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		80	20	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		40	10	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	234	50-150
13C2_6:2FTS	N	214	50-150
13C2_8:2FTS	N	186	50-150
13C2_PFDoA		106	50-150
13C2_PFTeDA		103	50-150
13C3_PFBS		104	50-150
13C3_PFHxS		106	50-150
13C3-HFPO-DA		98	50-150
13C4_PFBA		86	50-150
13C4_PFHpA		110	50-150
13C5_PFHxA		110	50-150
13C5_PFPeA		97	50-150
13C6_PFDA		112	50-150
13C7_PFUdA		113	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE02015-003**

Description: **MWM32-01_GW-050123** Matrix: **Aqueous**

Date Sampled: **05/01/2023 1250** Project Name: **Racer PNC**

Date Received: **05/02/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		108	50-150
13C8_PFOS		99	50-150
13C8_PFOSA		105	50-150
13C9_PFNA		111	50-150
d5-EtFOSAA		124	50-150
d3-MeFOSAA		134	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE02015-004**

Description: **MWM2-28_GW-050123** Matrix: **Aqueous**

Date Sampled: **05/01/2023 1413** Project Name: **Racer PNC**

Date Received: **05/02/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/24/2023 0249	ARC2	05/19/2023 1219	75726

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	**39108-34-4**	**PFAS by ID SOP**	**2.3**	**JQM-03**	**7.0**	**1.8**	**ng/L**	**1**
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**3.9**	**JQM-03**	**7.0**	**1.8**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.0	1.8	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**3.7**	**M-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**1.1**	**JM-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**4.2**	**M-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**14**	**QM-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	**335-76-2**	**PFAS by ID SOP**	**2.2**	**JM-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**8.1**	**M-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**16**	**M-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**5.0**		**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**18**		**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**14**	**M-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**56**	**M-03**	**3.5**	**0.88**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	331	50-150
13C2_6:2FTS	N	312	50-150
13C2_8:2FTS	N	359	50-150
13C2_PFDoA		103	50-150
13C2_PFTeDA		104	50-150
13C3_PFBS		89	50-150
13C3_PFHxS		92	50-150
13C3-HFPO-DA		74	50-150
13C4_PFBA	N	29	50-150
13C4_PFHpA		82	50-150
13C5_PFHxA		77	50-150
13C5_PFPeA		57	50-150
13C6_PFDA		93	50-150
13C7_PFUdA		105	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE02015-004**

Description: **MWM2-28_GW-050123** Matrix: **Aqueous**

Date Sampled: **05/01/2023 1413** Project Name: **Racer PNC**

Date Received: **05/02/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		82	50-150
13C8_PFOS		93	50-150
13C8_PFOSA		80	50-150
13C9_PFNA		93	50-150
d5-EtFOSAA		131	50-150
d3-MeFOSAA		119	50-150

LOQ = Limit of Quantitation	B = Detected in the method blank	E = Quantitation of compound exceeded the calibration range	DL = Detection Limit	Q = Surrogate failure
ND = Not detected at or above the DL	N = Recovery is out of criteria	P = The RPD between two GC columns exceeds 40%	J = Estimated result < LOQ and ≥ DL	L = LCS/LCSD failure
H = Out of holding time	W = Reported on wet weight basis			S = MS/MSD failure

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Client: **Arcadis U.S., Inc.** Laboratory ID: **YE02015-005**

Description: **MWM2-22_GW-050123** Matrix: **Aqueous**

Date Sampled: **05/01/2023 1505** Project Name: **Racer PNC**

Date Received: **05/02/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/24/2023 0302	ARC2	05/19/2023 1219	75726

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		80	20	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		80	20	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	80	20	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	80	20	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	80	20	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		80	20	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		80	20	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		80	20	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		80	20	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**27**	**JM-03**	**40**	**10**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**15**	**JM-03**	**40**	**10**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**28**	**JM-03**	**40**	**10**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**28**	**JM-03**	**40**	**10**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**26**	**JM-03**	**40**	**10**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**77**	**M-03**	**40**	**10**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	221	50-150
13C2_6:2FTS	N	183	50-150
13C2_8:2FTS	N	171	50-150
13C2_PFDoA		108	50-150
13C2_PFTeDA		105	50-150
13C3_PFBS		105	50-150
13C3_PFHxS		110	50-150
13C3-HFPO-DA		99	50-150
13C4_PFBA		81	50-150
13C4_PFHpA		111	50-150
13C5_PFHxA		109	50-150
13C5_PFPeA		95	50-150
13C6_PFDA		113	50-150
13C7_PFUdA		113	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE02015-005**

Description: **MWM2-22_GW-050123** Matrix: **Aqueous**

Date Sampled: **05/01/2023 1505** Project Name: **Racer PNC**

Date Received: **05/02/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		107	50-150
13C8_PFOS		102	50-150
13C8_PFOSA		108	50-150
13C9_PFNA		113	50-150
d5-EtFOSAA		128	50-150
d3-MeFOSAA		136	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE02015-006**

Description: **DUP-02_GW-050123** Matrix: **Aqueous**

Date Sampled: **05/01/2023** Project Name: **Racer PNC**

Date Received: **05/02/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/24/2023 0314	ARC2	05/19/2023 1219	75726

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.4	1.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.4	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.4	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.4	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.4	1.8	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.4	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.4	1.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.4	1.8	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.4	1.8	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**3.0**	**JM-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND	M-03	3.7	0.92	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**4.6**	**M-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**11**	**Q**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**6.5**		**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**7.0**		**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**4.1**	**M-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**13**	**M-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**1.2**	**JM-03**	**3.7**	**0.92**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	292	50-150
13C2_6:2FTS	N	167	50-150
13C2_8:2FTS		110	50-150
13C2_PFDoA		88	50-150
13C2_PFTeDA		91	50-150
13C3_PFBS		97	50-150
13C3_PFHxS		102	50-150
13C3-HFPO-DA		86	50-150
13C4_PFBA	N	31	50-150
13C4_PFHpA		105	50-150
13C5_PFHxA		92	50-150
13C5_PFPeA		66	50-150
13C6_PFDA		103	50-150
13C7_PFUdA		92	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE02015-006**

Description: **DUP-02_GW-050123** Matrix: **Aqueous**

Date Sampled: **05/01/2023** Project Name: **Racer PNC**

Date Received: **05/02/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		105	50-150
13C8_PFOS		98	50-150
13C8_PFOSA		99	50-150
13C9_PFNA		109	50-150
d5-EtFOSAA		93	50-150
d3-MeFOSAA		106	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE02015-007**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **05/01/2023 1540** Project Name: **Racer PNC**

Date Received: **05/02/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	06/01/2023 2338	ARC2	05/19/2023 1238	75750

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND	M-03	6.9	1.7	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.4	0.86	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		92	50-150
13C2_6:2FTS		86	50-150
13C2_8:2FTS		96	50-150
13C2_PFDoA		93	50-150
13C2_PFTeDA		79	50-150
13C3_PFBS		95	50-150
13C3_PFHxS		91	50-150
13C3-HFPO-DA		95	50-150
13C4_PFBA		94	50-150
13C4_PFHpA		95	50-150
13C5_PFHxA		89	50-150
13C5_PFPeA		96	50-150
13C6_PFDA		94	50-150
13C7_PFUdA		95	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE02015-007**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **05/01/2023 1540** Project Name: **Racer PNC**

Date Received: **05/02/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		95	50-150
13C8_PFOS		89	50-150
13C8_PFOSA		91	50-150
13C9_PFNA		87	50-150
d5-EtFOSAA		83	50-150
d3-MeFOSAA		89	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
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Q = Surrogate failure
L = LCS/LCSD failure
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QC Summary

PFAS by LC/MS/MS - MB

Sample ID: YQ75726-001
Batch: 75726
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/19/2023 1219

Parameter	Result	Q	Dil	LOQ	DL	Units	Analysis Date
9Cl-PF3ONS	ND		1	8.0	2.0	ng/L	05/24/2023 0054
11Cl-PF3OUdS	ND		1	8.0	2.0	ng/L	05/24/2023 0054
8:2 FTS	ND		1	8.0	2.0	ng/L	05/24/2023 0054
6:2 FTS	ND		1	8.0	2.0	ng/L	05/24/2023 0054
4:2 FTS	ND		1	8.0	2.0	ng/L	05/24/2023 0054
GenX	ND		1	8.0	2.0	ng/L	05/24/2023 0054
ADONA	ND		1	8.0	2.0	ng/L	05/24/2023 0054
EtFOSAA	ND		1	8.0	2.0	ng/L	05/24/2023 0054
MeFOSAA	ND		1	8.0	2.0	ng/L	05/24/2023 0054
PFBS	ND		1	4.0	1.0	ng/L	05/24/2023 0054
PFDS	ND		1	4.0	1.0	ng/L	05/24/2023 0054
PFHpS	ND		1	4.0	1.0	ng/L	05/24/2023 0054
PFNS	ND		1	4.0	1.0	ng/L	05/24/2023 0054
PFOSA	ND		1	4.0	1.0	ng/L	05/24/2023 0054
PFPeS	ND		1	4.0	1.0	ng/L	05/24/2023 0054
PFHxS	ND		1	4.0	1.0	ng/L	05/24/2023 0054
PFBA	ND		1	4.0	1.0	ng/L	05/24/2023 0054
PFDA	ND		1	4.0	1.0	ng/L	05/24/2023 0054
PFDoA	ND		1	4.0	1.0	ng/L	05/24/2023 0054
PFHpA	ND		1	4.0	1.0	ng/L	05/24/2023 0054
PFHxA	ND		1	4.0	1.0	ng/L	05/24/2023 0054
PFNA	ND		1	4.0	1.0	ng/L	05/24/2023 0054
PFOA	ND		1	4.0	1.0	ng/L	05/24/2023 0054
PFPeA	ND		1	4.0	1.0	ng/L	05/24/2023 0054
PFTeDA	ND		1	4.0	1.0	ng/L	05/24/2023 0054
PFTrDA	ND		1	4.0	1.0	ng/L	05/24/2023 0054
PFUdA	ND		1	4.0	1.0	ng/L	05/24/2023 0054
PFOS	ND		1	4.0	1.0	ng/L	05/24/2023 0054

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		99	50-150
13C2_6:2FTS		101	50-150
13C2_8:2FTS		100	50-150
13C2_PFDoA		90	50-150
13C2_PFTeDA		94	50-150
13C3_PFBS		103	50-150
13C3_PFHxS		101	50-150
13C3-HFPO-DA		100	50-150
13C4_PFBA		101	50-150
13C4_PFHpA		104	50-150
13C5_PFHxA		103	50-150
13C5_PFPeA		99	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: YQ75726-001
Batch: 75726
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/19/2023 1219

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		97	50-150
13C7_PFUdA		98	50-150
13C8_PFOA		103	50-150
13C8_PFOS		95	50-150
13C8_PFOSA		97	50-150
13C9_PFNA		102	50-150
d5-EtFOSAA		98	50-150
d3-MeFOSAA		111	50-150

LOQ = Limit of Quantitation
DL = Detection Limit

ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria

N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ75726-002
Batch: 75726
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/19/2023 1219

Parameter	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	%Rec Limit	Analysis Date
9Cl-PF3ONS	15	15		1	103	50-150	05/24/2023 0107
11Cl-PF3OUdS	15	14		1	95	50-150	05/24/2023 0107
8:2 FTS	15	16		1	104	67-138	05/24/2023 0107
6:2 FTS	15	16		1	103	64-140	05/24/2023 0107
4:2 FTS	15	16		1	104	63-143	05/24/2023 0107
GenX	32	33		1	104	50-150	05/24/2023 0107
ADONA	15	15		1	102	50-150	05/24/2023 0107
EtFOSAA	16	16	M-03	1	100	61-135	05/24/2023 0107
MeFOSAA	16	16	M-03	1	101	65-136	05/24/2023 0107
PFBS	14	14		1	102	72-130	05/24/2023 0107
PFDS	15	15		1	97	53-142	05/24/2023 0107
PFHpS	15	15		1	97	69-134	05/24/2023 0107
PFNS	15	15		1	99	69-127	05/24/2023 0107
PFOSA	16	16	M-03	1	103	67-137	05/24/2023 0107
PFPeS	15	15		1	101	71-127	05/24/2023 0107
PFHxS	15	14		1	98	68-131	05/24/2023 0107
PFBA	16	16		1	101	73-129	05/24/2023 0107
PFDA	16	17		1	106	71-129	05/24/2023 0107
PFDoA	16	17		1	108	72-134	05/24/2023 0107
PFHpA	16	17		1	103	72-130	05/24/2023 0107
PFHxA	16	16		1	101	72-129	05/24/2023 0107
PFNA	16	16		1	100	69-130	05/24/2023 0107
PFOA	16	16		1	102	71-133	05/24/2023 0107
PFPeA	16	16		1	103	72-129	05/24/2023 0107
PFTeDA	16	16		1	100	71-132	05/24/2023 0107
PFTrDA	16	15		1	91	65-144	05/24/2023 0107
PFUdA	16	18	M-03	1	110	69-133	05/24/2023 0107
PFOS	15	15		1	98	65-140	05/24/2023 0107

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		96	50-150
13C2_6:2FTS		95	50-150
13C2_8:2FTS		94	50-150
13C2_PFDoA		85	50-150
13C2_PFTeDA		72	50-150
13C3_PFBS		96	50-150
13C3_PFHxS		97	50-150
13C3-HFPO-DA		94	50-150
13C4_PFBA		98	50-150
13C4_PFHpA		96	50-150
13C5_PFHxA		100	50-150
13C5_PFPeA		97	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ75726-002
Batch: 75726
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/19/2023 1219

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		94	50-150
13C7_PFUdA		88	50-150
13C8_PFOA		100	50-150
13C8_PFOS		92	50-150
13C8_PFOSA		94	50-150
13C9_PFNA		99	50-150
d5-EtFOSAA		95	50-150
d3-MeFOSAA		102	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: YQ75750-001
Batch: 75750
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/19/2023 1238

Parameter	Result	Q	Dil	LOQ	DL	Units	Analysis Date
9Cl-PF3ONS	ND		1	8.0	2.0	ng/L	06/01/2023 2053
11Cl-PF3OUdS	ND		1	8.0	2.0	ng/L	06/01/2023 2053
8:2 FTS	ND		1	8.0	2.0	ng/L	06/01/2023 2053
6:2 FTS	ND		1	8.0	2.0	ng/L	06/01/2023 2053
4:2 FTS	ND		1	8.0	2.0	ng/L	06/01/2023 2053
GenX	ND		1	8.0	2.0	ng/L	06/01/2023 2053
ADONA	ND		1	8.0	2.0	ng/L	06/01/2023 2053
EtFOSAA	ND		1	8.0	2.0	ng/L	06/01/2023 2053
MeFOSAA	ND		1	8.0	2.0	ng/L	06/01/2023 2053
PFBS	ND		1	4.0	1.0	ng/L	06/01/2023 2053
PFDS	ND		1	4.0	1.0	ng/L	06/01/2023 2053
PFHpS	ND		1	4.0	1.0	ng/L	06/01/2023 2053
PFNS	ND		1	4.0	1.0	ng/L	06/01/2023 2053
PFOSA	ND		1	4.0	1.0	ng/L	06/01/2023 2053
PFPeS	ND		1	4.0	1.0	ng/L	06/01/2023 2053
PFHxS	ND		1	4.0	1.0	ng/L	06/01/2023 2053
PFBA	ND		1	4.0	1.0	ng/L	06/01/2023 2053
PFDA	ND		1	4.0	1.0	ng/L	06/01/2023 2053
PFDoA	ND		1	4.0	1.0	ng/L	06/01/2023 2053
PFHpA	ND		1	4.0	1.0	ng/L	06/01/2023 2053
PFHxA	ND		1	4.0	1.0	ng/L	06/01/2023 2053
PFNA	ND		1	4.0	1.0	ng/L	06/01/2023 2053
PFOA	ND		1	4.0	1.0	ng/L	06/01/2023 2053
PFPeA	ND		1	4.0	1.0	ng/L	06/01/2023 2053
PFTeDA	ND		1	4.0	1.0	ng/L	06/01/2023 2053
PFTrDA	ND		1	4.0	1.0	ng/L	06/01/2023 2053
PFUdA	ND		1	4.0	1.0	ng/L	06/01/2023 2053
PFOS	ND		1	4.0	1.0	ng/L	06/01/2023 2053

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		99	50-150
13C2_6:2FTS		100	50-150
13C2_8:2FTS		105	50-150
13C2_PFDoA		97	50-150
13C2_PFTeDA		69	50-150
13C3_PFBS		105	50-150
13C3_PFHxS		96	50-150
13C3-HFPO-DA		104	50-150
13C4_PFBA		103	50-150
13C4_PFHpA		104	50-150
13C5_PFHxA		97	50-150
13C5_PFPeA		103	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: YQ75750-001
Batch: 75750
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/19/2023 1238

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		98	50-150
13C7_PFUdA		105	50-150
13C8_PFOA		103	50-150
13C8_PFOS		95	50-150
13C8_PFOSA		99	50-150
13C9_PFNA		92	50-150
d5-EtFOSAA		98	50-150
d3-MeFOSAA		98	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ75750-002
Batch: 75750
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/19/2023 1238

Parameter	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	%Rec Limit	Analysis Date
9Cl-PF3ONS	15	15		1	102	50-150	06/01/2023 2106
11Cl-PF3OUdS	15	14		1	93	50-150	06/01/2023 2106
8:2 FTS	15	16	M-03	1	108	67-138	06/01/2023 2106
6:2 FTS	15	15		1	98	64-140	06/01/2023 2106
4:2 FTS	15	16		1	105	63-143	06/01/2023 2106
GenX	32	33		1	102	50-150	06/01/2023 2106
ADONA	15	15		1	102	50-150	06/01/2023 2106
EtFOSAA	16	17		1	108	61-135	06/01/2023 2106
MeFOSAA	16	16	M-03	1	99	65-136	06/01/2023 2106
PFBS	14	13		1	95	72-130	06/01/2023 2106
PFDS	15	14		1	93	53-142	06/01/2023 2106
PFHpS	15	15		1	95	69-134	06/01/2023 2106
PFNS	15	16		1	102	69-127	06/01/2023 2106
PFOSA	16	16		1	103	67-137	06/01/2023 2106
PFPeS	15	15		1	99	71-127	06/01/2023 2106
PFHxS	15	15		1	102	68-131	06/01/2023 2106
PFBA	16	16		1	103	73-129	06/01/2023 2106
PFDA	16	16		1	99	71-129	06/01/2023 2106
PFDoA	16	17		1	108	72-134	06/01/2023 2106
PFHpA	16	16		1	98	72-130	06/01/2023 2106
PFHxA	16	17		1	103	72-129	06/01/2023 2106
PFNA	16	16		1	98	69-130	06/01/2023 2106
PFOA	16	16		1	97	71-133	06/01/2023 2106
PFPeA	16	16		1	99	72-129	06/01/2023 2106
PFTeDA	16	18		1	111	71-132	06/01/2023 2106
PFTrDA	16	13		1	80	65-144	06/01/2023 2106
PFUdA	16	15		1	95	69-133	06/01/2023 2106
PFOS	15	16	M-03	1	105	65-140	06/01/2023 2106

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		100	50-150
13C2_6:2FTS		94	50-150
13C2_8:2FTS		99	50-150
13C2_PFDoA		86	50-150
13C2_PFTeDA		51	50-150
13C3_PFBS		103	50-150
13C3_PFHxS		94	50-150
13C3-HFPO-DA		99	50-150
13C4_PFBA		97	50-150
13C4_PFHpA		107	50-150
13C5_PFHxA		97	50-150
13C5_PFPeA		98	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ75750-002
Batch: 75750
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/19/2023 1238

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		97	50-150
13C7_PFUdA		101	50-150
13C8_PFOA		101	50-150
13C8_PFOS		86	50-150
13C8_PFOSA		93	50-150
13C9_PFNA		97	50-150
d5-EtFOSAA		88	50-150
d3-MeFOSAA		94	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Chain of Custody
and
Miscellaneous Documents

Pace Analytical®

PACE ANALYTICAL SERVICES, LLC
106 Vantage Point Drive • West Columbia, SC 29172
Telephone No. 803-791-9700 Fax No. 803-791-9111
www.pacelabs.com

Number 146505

Client: ArCadis	Report to Contact: Tiffany Linder, Alexis Crisp	Telephone No. / E-mail: Alexis.Crisp@arcadis.com, tiffany.linder@arcadis.com	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: x Sommer Guy	Analysis (Attach list if more space is needed): Report EGLE 28 compounds	Page: of
City: Novi / State: MI / Zip Code: 48377	Printed Name: Sommer Guy		YE02015
Project Name: River PNC			
Project No.: 30167840.00030	P.O. No.		

Sample ID / Description (Containers for each sample may be combined on one line)	Collection Date(s)	Collection Time (Military)	Grab / C-Composite	Matrix: Aqueous	Matrix: Soil	Matrix: Non-Aqueous	No. of Containers by Preservative Type: Unpres.	H2SO4	HNO3	HCl	NaOH	Other	Other Analysis	PFAS - Per/Poly Fluoroalkyl Substances by ASTM D7979-17 Modified	Remarks / Cooler I.D.
MWM16-30_GW-050123	5/1/23	0838	G	2			2							X	
MWM4-05_GW-050123	5/1/23	1132	G	2			2							X	
MWM32-01_GW-050123	5/1/23	1250	G	2			2							X	
MWM2-28_GW-050123	5/1/23	1413	G	2			2							X	
MWM2-22_GW-050123	5/1/23	1505	G	2			2							X	
DUP-02_GW-050123	5/1/23	—	G	2			2							X	
tripblank	5/1/23	1540	G	1			1							X	tripblank

Turn Around Time Required (Prior lab approval required for expedited TAT.): X Standard ☐ Rush (Specify)

Sample Disposal: ☐ Return to Client X Disposal by Lab

Possible Hazard Identification: X Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: Sommer Guy	5/1/23	1625	1. Received by: FedEx	5/1/23	1625
2. Relinquished by	Date	Time	2. Received by	Date	Time
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by: fedex	5-2-23	950	4. Laboratory received by: Keyanna Williams	5/2/23	950

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY — Received on Ice (Circle): Yes No Ice Pack — Receipt Temp: 3.6 °C — Temp Blank: ☐ Y ☐ N

DISTRIBUTION: WHITE & YELLOW-Return to Laboratory with Sample(s); PINK-Field/Client Copy

Document Number: ME009N2-01

PACE ANALYTICAL SERVICES, LLC

DC#_Title: ENV-FRM-WCOL-0286 v02_Samples Receipt Checklist (SRC)
Effective Date: 8/2/2022

Sample Receipt Checklist (SRC)

Client: ARCADIS Cooler Inspected by/date: KDRW / 05/02/2023 Lot #: YE02015

Means of receipt: ☐ Pace ☐ Client ☐ UPS ☑ FedEx ☐ Other:

☑ Yes	☐ No		1. Were custody seals present on the cooler?
☑ Yes	☐ No	☐ NA	2. If custody seals were present, were they intact and unbroken?

pH Strip ID: NA Chlorine Strip ID: NA Tested by: NA

Original temperature upon receipt / Derived (Corrected) temperature upon receipt %Solid Snap-Cup ID: NA

3.6 / 3.6 °C NA / NA °C NA / NA °C NA / NA °C

Method: ☑ Temperature Blank ☐ Against Bottles IR Gun ID: 8 IR Gun Correction Factor: 0 °C

Method of coolant: ☑ Wet Ice ☐ Ice Packs ☐ Dry Ice ☐ None

☑ Yes	☐ No	☐ NA	3. Were all coolers received at or below 6.0°C? If no, was Project Manager notified? PM was Notified by: phone / email / face-to-face (circle one).
☐ Yes	☐ No	☑ NA	4. Is the commercial courier's packing slip attached to this form?
☑ Yes	☐ No		5. Were proper custody procedures (relinquished/received) followed?
☑ Yes	☐ No		6. Were sample IDs listed on the COC and all sample containers?
☑ Yes	☐ No		7. Was collection date & time listed on the COC and all sample containers?
☑ Yes	☐ No		8. Did all container label information (ID, date, time) agree with the COC?
☑ Yes	☐ No		9. Were tests to be performed listed on the COC?
☑ Yes	☐ No		10. Did all samples arrive in the proper containers for each test and/or in good condition (unbroken, lids on, etc.)?
☑ Yes	☐ No		11. Was adequate sample volume available?
☑ Yes	☐ No		12. Were all samples received within ½ the holding time or 48 hours, whichever comes first?
☑ Yes	☐ No		13. Were all samples containers accounted for? (No missing/excess)
☐ Yes	☐ No	☑ NA	14. Were VOA, 8015C and RSK-175 samples free of bubbles >"pea-size" (¼" or 6mm in diameter) in any of the VOA vials?
☐ Yes	☐ No	☑ NA	15. Were all DRO/metals/nutrient samples received at a pH of < 2?
☐ Yes	☐ No	☑ NA	16. Were all cyanide samples received at a pH > 12 and sulfide samples received at a pH > 9?
☐ Yes	☐ No	☑ NA	17. Were all applicable NH_3/TKN/cyanide/phenol/625.1/608.3 (< 0.5mg/L) samples free of residual chlorine?
☑ Yes	☐ No	☐ NA	18. Was the quote number listed on the container label? If yes. Quote # 25015

Sample Preservation (Must be completed for any sample(s) incorrectly preserved or with headspace.)

Sample(s) NA were received incorrectly preserved and were adjusted accordingly in sample receiving with NA mL of circle one: H2SO4, HNO3, HCl, NaOH using SR # NA. ☐
Time of preservation NA. If more than one preservative is needed, please note in the comments below.

Sample(s) NA were received with bubbles >6 mm in diameter.

Samples(s) NA were received with TRC > 0.5 mg/L (If #19 is *no*) and were adjusted accordingly in sample receiving with sodium thiosulfate ($Na_2S_2O_3$) with Unique ID: NA.

Comments:

Qualtrax ID: 56360

Report of Analysis

Arcadis U.S., Inc.
630 Plaza Drive
Suite 600
Highlands Ranch, CO 80129
Attention: Tiffany Linder

Project Name: Racer PNC

Project Number: 30167840.00030

Lot Number:**YE03032**

Date Completed:06/08/2023

06/08/2023 11:00 AM
Approved and released by:
Project Manager II: **Kathy E. Smith**

The electronic signature above is the equivalent of a handwritten signature.
This report shall not be reproduced, except in its entirety, without the written approval of Pace Analytical Services, LLC.

Pace Analytical Services, LLC (*formerly Shealy Environmental Services, Inc.*)
106 Vantage Point Drive West Columbia, SC 29172
Tel: 803-791-9700 Fax: 803-791-9111 www.pacelabs.com

Case Narrative
Arcadis U.S., Inc.
Lot Number: YE03032

This Report of Analysis contains the analytical result(s) for the sample(s) listed on the Sample Summary following this Case Narrative. The sample receiving date is documented in the header information associated with each sample.

All results listed in this report relate only to the samples that are contained within this report.

Sample receipt, sample analysis, and data review have been performed in accordance with the Pace Quality Assurance Management Plan (QAMP), applicable Shealy standard operating procedures (SOPs), the 2003 NELAC standard, and Shealy policies. Additionally, the DoD QSM version 5.4 has been followed for these samples, and specifically Table B-15 was followed for all PFAS samples. Any exceptions to the QAMP, SOPs, NELAC standards, the DoD QSM, or policies are qualified on the results page or discussed below.

All QC associated with these samples were compliant with DOD QSM 5.4 table B-15 and our PFAS SOP.

Correction factors (CF) are used to calculate the original sample concentration. The CF is the inverse of the concentration factor (sample volume / extract final volume) times the dilution factor (DF). The CF is calculated as follows:

CF = DF * FV / Vo

FV is volume of extract (mL)
Vo is initial sample volume (mL)
DF is dilution factor. For undiluted analysis, DF = 1.

Sample concentration for aqueous samples:
Concentration (ng/L) = Cs*CF,

$$C_s = \frac{\left(\frac{(A_s x C_{is})}{A_{is}}\right) - B}{M1}$$

Where

C_s is on column concentration of target analyte in the sample (ng/L)
C_{is} is concentration of internal standard in the sample (ng/L)
A_s is peak response of target analyte in the sample
A_{is} is peak response of internal standard in the sample
M1 is the average RF from ICAL or the slope from linear regression ICAL
B is the y-intercept from the ICAL

Pace is a DoD/DOE accredited laboratory; however, the following analyses are currently not listed on our DoD/DOE scope of accreditation: Drinking Water: pH EPA 150.1, Turbidity EPA 180.1, Metals EPA 200.7 & 200.8, Mercury EPA 245.1, Anions EPA 300.0, Cyanide EPA 335.4, Nitrates EPA 353.2, Orthophosphate & Phosphorus EPA 365.1, EDB/DBCP EPA 504.1, HPC SIMPLATE, Color SM 2120 B-2011, Alkalinity SM 2320 B-2011, Specific Conductance SM 2510 B-2011, Residue-filterable (TDS) SM 2540 C, Calcium Hardness (CaCO2) SM 3500-Ca B-2011, TRC SM 4500 Cl G-2011, pH SM 4500 H=B-2011, E.Coli, Total Coliform. Non-Potable Water: Metals EPA 200.7, Strontium EPA 200.8, Chlorate EPA 300.0, Cyanide EPA 335.4, Phenolics EPA 420.4, 2-Methyl-4,6-Dinitrophenol EPA 625.1, Propane RSK-175, Specific Conductance SM 2510 B-2011, Salinity SM2520 B, Residue- total SM 2540 B, Sulfite SM 4500 SO32- B-2011, Amenable Cyanide SM 4500-CN- G-2011, BOD & CBOD SM 5210 B, MBAS SM 5540 C-2011, Boron & Titanium SW-846 6010D, Boron, Molybdenum, & Titanium SW-846 6020B, Alcohols & Glycols SW-846 8015C, Pentachlorophenol SW-846 8151A, Ethyl Acetate, Hexane, & n-Hexane SW-846 8260D, SVOC 1,4-Dioxane, 4-Dimethyl aminoazobenzene, 1,4-Naphthoquinone, 3,5-Dinitroaniline, PETN SW-846 8270E, Amenable Cyanide SW-846 9012B. Solid and Chemical Materials: Boron & Titanium SW-846 6010D, Molybdenum SW-846 6020B, Ethylene Glycol SW-846 8015B, Pentachlorophenol SW-846 8151A, Chloroprene SW-846 8260B, SVOC 1,4-Dioxane, 1,3,5-Trinitrobenzene, 1,4- Naphthoquinone, 1,4-Phenylenediamine, 2,4-Dinitrotoluene, 2,6-Dinitrotoluene, 3-Methylcholanthrene, 4-Aminobiphenyl, 4-Dimethyl aminoazobenzene, 4-Nitroquinoline-1-oxide, 7,12-Dimethylbenzo(a)anthracene, Chlorobenzilate, Diallate, Ethyl methanesulfonate, Isodrin, Isosafrole, Methyl methanesulfonate, n-Nitrosomethylethylamine, n-Nitrosomorpholine, n-Nitrosopiperidine, Piperonyl butoxide, Pronamide, Safrole, 3,5- Dinitroaniline, PETN SW-846 8270E, Oil & Grease SW-846 9071B.

Pace is a TNI accredited laboratory; however, the following analyses are currently not listed on our TNI scope of accreditation: Drinking Water: VOC (excluding BTEX, MTBE, Naphthalene, & 1,2-dichloroethane) EPA 524.2, E. coli and Total coliforms SM 9223 B-2004, Solid Chemical Material: TOC Walkley-Black, Biological Tissue: All, Non-Potable Water: SGT-HEM EPA 1664B, Silica EPA 200.7, Boron, Calcium, Silicon, Strontium EPA 200.8, Bicarbonate, Carbonate, and Hydroxide Alkalinity SM 2320 B-2011, SM 9221 C E-2006 & SM 9222D-2006, Strontium SW-846 6010D, VOC SM 6200 B-2011, Fecal Coliform Colilert-18.

If you have any questions regarding this report, please contact the Pace Project Manager listed on the cover page.

PFAS
Samples YE03032-001, YE03032-006 required centrifugation prior to extraction, due to excessive solids present in the samples. Centrifugation was performed following the PFAS Aqueous Centrifuge Protocol; samples were spiked with Surrogate (SUR; Extracted Internal Standard/EIS) and shaken vigorously before being poured into a conical bottle and centrifuged. The centrifuged aqueous sample was decanted back into the original sample bottle, off of the condensed solids remaining in the centrifuge bottle. Original sample bottle was rinsed as normal and centrifuge bottle was rinsed with 4mL of MeOH. Centrifuge bottle rinsate was added to the elution. Samples concentrated to <5mL and reconstituted to 5mL using MeOH by transfer pipet.

Surrogate recovery for the following samples was outside control limits: YE03032-001, YE03032-005, YE03032-006. Re-extraction and/or re-analysis was performed with concurring results. The original analysis has been reported.

Manual Integration Summary

Arcadis U.S., Inc.

Lot Number: YE03032

Project Name: Racer PNC

Project Number: 30167840.00030

Where applicable, analytes for which manual integration occurred have been flagged with the following:

Qualifier	Technical Justification	Qualifier	Technical Justification	Qualifier	Technical Justification
M-01	Split peak	M-07	Low fit	M-13	Error
M-02	Peak tailing	M-08	Peak not found	M-14	Baseline
M-03	Incorrect auto integration	M-09	Analyte not Identified by the Data System	M-15	Other
M-04	Poor chromatography	M-10	Analyte misidentified by the Data System	M-16	Retention time shift
M-05	Manually assigned peak	M-11	Invalid integration	M-17	Shouldering
M-06	Wrong isomer	M-12	Wrong peak		

A summary of instances where manual integration occurred is included below:

Method	Sample	Run Number	Parameter	Qualifier
PFAS by ID SOP	YE03032-001	1	Perfluoro-1-butanesulfonic acid (PFBS)	M-03
PFAS by ID SOP	YE03032-001	1	Perfluoro-1-pentanesulfonic acid	M-03
PFAS by ID SOP	YE03032-001	1	Perfluoro-n-butanoic acid (PFBA)	M-03
PFAS by ID SOP	YE03032-001	1	Perfluoro-n-hexanoic acid (PFHxA)	M-03
PFAS by ID SOP	YE03032-001	1	Perfluoro-n-nonanoic acid (PFNA)	M-03
PFAS by ID SOP	YE03032-001	1	Perfluoro-n-pentanoic acid (PFPeA)	M-03
PFAS by ID SOP	YE03032-001	1	Perfluorooctanesulfonic acid (PFOS)	M-03
PFAS by ID SOP	YE03032-001	2	13C8_PFOSA	M-03
PFAS by ID SOP	YE03032-004	1	Perfluoro-1-butanesulfonic acid (PFBS)	M-03
PFAS by ID SOP	YE03032-004	1	Perfluoro-n-hexanoic acid (PFHxA)	M-03
PFAS by ID SOP	YE03032-005	1	N-ethylperfluoro-1-	M-03
PFAS by ID SOP	YE03032-005	1	N-methylperfluoro-1-	M-03
PFAS by ID SOP	YE03032-005	1	Perfluoro-1-butanesulfonic acid (PFBS)	M-03
PFAS by ID SOP	YE03032-005	1	Perfluoro-1-octanesulfonamide (PFOSA)	M-03
PFAS by ID SOP	YE03032-005	1	Perfluorohexanesulfonic acid (PFHxS)	M-03
PFAS by ID SOP	YE03032-005	1	Perfluoro-n-nonanoic acid (PFNA)	M-03
PFAS by ID SOP	YE03032-005	1	Perfluoro-n-octanoic acid (PFOA)	M-03
PFAS by ID SOP	YE03032-006	1	Perfluoro-1-butanesulfonic acid (PFBS)	M-03
PFAS by ID SOP	YE03032-006	1	Perfluoro-1-pentanesulfonic acid	M-03
PFAS by ID SOP	YE03032-006	1	Perfluoro-n-butanoic acid (PFBA)	M-03
PFAS by ID SOP	YE03032-006	1	Perfluoro-n-pentanoic acid (PFPeA)	M-03
PFAS by ID SOP	YE03032-006	1	Perfluorooctanesulfonic acid (PFOS)	M-03
PFAS by ID SOP	YQ75967-002	1	1H, 1H, 2H, 2H-perfluorodecane	M-03
PFAS by ID SOP	YQ75967-002	1	N-ethylperfluoro-1-	M-03

If you have any questions regarding this report, please contact the Pace Project Manager listed on the cover page.

Sample Summary

Arcadis U.S., Inc.

Lot Number: YE03032

Project Name: Racer PNC

Project Number: 30167840.00030

Sample Number	Sample ID	Matrix	Date Sampled	Date Received
001	MW-03-17-GW-050223	Aqueous	05/02/2023 0918	05/03/2023
002	MWM32-09-GW-050223	Aqueous	05/02/2023 1053	05/03/2023
003	EB-01-050223	Aqueous	05/02/2023 1105	05/03/2023
004	MWF16-26-GW-050223	Aqueous	05/02/2023 1155	05/03/2023
005	MWW1-04-GW-050223	Aqueous	05/02/2023 1308	05/03/2023
006	DUP-03-GW-050223	Aqueous	05/02/2023	05/03/2023
007	TRIP BLANK	Aqueous	05/02/2023 1320	05/03/2023

(7 samples)

Detection Summary

Arcadis U.S., Inc.

Lot Number: YE03032

Project Name: Racer PNC

Project Number: 30167840.00030

Sample	Sample ID	Matrix	Parameter	Method	Result	Q	Units	Page
001	MW-03-17-GW-050223	Aqueous	6:2 FTS	PFAS by ID	8.8	Q	ng/L	7
001	MW-03-17-GW-050223	Aqueous	PFBS	PFAS by ID	5.2	M-03	ng/L	7
001	MW-03-17-GW-050223	Aqueous	PFHpS	PFAS by ID	4.7		ng/L	7
001	MW-03-17-GW-050223	Aqueous	PFPeS	PFAS by ID	4.0	M-03	ng/L	7
001	MW-03-17-GW-050223	Aqueous	PFHxS	PFAS by ID	58		ng/L	7
001	MW-03-17-GW-050223	Aqueous	PFBA	PFAS by ID	18	QM-03	ng/L	7
001	MW-03-17-GW-050223	Aqueous	PFHpA	PFAS by ID	9.1		ng/L	7
001	MW-03-17-GW-050223	Aqueous	PFHxA	PFAS by ID	14	M-03	ng/L	7
001	MW-03-17-GW-050223	Aqueous	PFNA	PFAS by ID	2.4	JM-03	ng/L	7
001	MW-03-17-GW-050223	Aqueous	PFOA	PFAS by ID	27		ng/L	7
001	MW-03-17-GW-050223	Aqueous	PFPeA	PFAS by ID	16	M-03	ng/L	7
001	MW-03-17-GW-050223	Aqueous	PFOS	PFAS by ID	140	M-03	ng/L	7
004	MWF16-26-GW-050223	Aqueous	PFBS	PFAS by ID	15	M-03	ng/L	13
004	MWF16-26-GW-050223	Aqueous	PFPeS	PFAS by ID	14		ng/L	13
004	MWF16-26-GW-050223	Aqueous	PFHxS	PFAS by ID	24		ng/L	13
004	MWF16-26-GW-050223	Aqueous	PFBA	PFAS by ID	8.6		ng/L	13
004	MWF16-26-GW-050223	Aqueous	PFHpA	PFAS by ID	7.3		ng/L	13
004	MWF16-26-GW-050223	Aqueous	PFHxA	PFAS by ID	17	M-03	ng/L	13
004	MWF16-26-GW-050223	Aqueous	PFOA	PFAS by ID	34		ng/L	13
004	MWF16-26-GW-050223	Aqueous	PFPeA	PFAS by ID	12		ng/L	13
005	MWW1-04-GW-050223	Aqueous	EtFOSAA	PFAS by ID	8.9	M-03	ng/L	15
005	MWW1-04-GW-050223	Aqueous	PFOSA	PFAS by ID	1.2	JM-03	ng/L	15
005	MWW1-04-GW-050223	Aqueous	PFHxS	PFAS by ID	4.1	M-03	ng/L	15
005	MWW1-04-GW-050223	Aqueous	PFOA	PFAS by ID	2.8	JM-03	ng/L	15
005	MWW1-04-GW-050223	Aqueous	PFOS	PFAS by ID	98		ng/L	15
006	DUP-03-GW-050223	Aqueous	6:2 FTS	PFAS by ID	9.6	Q	ng/L	17
006	DUP-03-GW-050223	Aqueous	PFBS	PFAS by ID	4.0	M-03	ng/L	17
006	DUP-03-GW-050223	Aqueous	PFHpS	PFAS by ID	5.1		ng/L	17
006	DUP-03-GW-050223	Aqueous	PFPeS	PFAS by ID	3.8	M-03	ng/L	17
006	DUP-03-GW-050223	Aqueous	PFHxS	PFAS by ID	57		ng/L	17
006	DUP-03-GW-050223	Aqueous	PFBA	PFAS by ID	17	QM-03	ng/L	17
006	DUP-03-GW-050223	Aqueous	PFHpA	PFAS by ID	8.8		ng/L	17
006	DUP-03-GW-050223	Aqueous	PFHxA	PFAS by ID	15		ng/L	17
006	DUP-03-GW-050223	Aqueous	PFNA	PFAS by ID	2.2	J	ng/L	17
006	DUP-03-GW-050223	Aqueous	PFOA	PFAS by ID	27		ng/L	17
006	DUP-03-GW-050223	Aqueous	PFPeA	PFAS by ID	16	M-03	ng/L	17
006	DUP-03-GW-050223	Aqueous	PFOS	PFAS by ID	140	M-03	ng/L	17

(37 detections)

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE03032-001**

Description: **MW-03-17-GW-050223** Matrix: **Aqueous**

Date Sampled: **05/02/2023 0918** Project Name: **Racer PNC**

Date Received: **05/03/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	06/01/2023 1303	ARC2	05/23/2023 1402	75967

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.8	2.0	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.8	2.0	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.8	2.0	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**8.8**	**Q**	**7.8**	**2.0**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.8	2.0	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.8	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.8	2.0	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.8	2.0	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.8	2.0	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**5.2**	**M-03**	**3.9**	**0.98**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.9	0.98	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**4.7**		**3.9**	**0.98**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.9	0.98	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.9	0.98	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**4.0**	**M-03**	**3.9**	**0.98**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**58**		**3.9**	**0.98**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**18**	**QM-03**	**3.9**	**0.98**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.9	0.98	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.9	0.98	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**9.1**		**3.9**	**0.98**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**14**	**M-03**	**3.9**	**0.98**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**2.4**	**JM-03**	**3.9**	**0.98**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**27**		**3.9**	**0.98**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**16**	**M-03**	**3.9**	**0.98**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.9	0.98	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.9	0.98	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.9	0.98	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**140**	**M-03**	**3.9**	**0.98**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	272	50-150
13C2_6:2FTS	N	261	50-150
13C2_8:2FTS	N	272	50-150
13C2_PFDoA		109	50-150
13C2_PFTeDA		90	50-150
13C3_PFBS		91	50-150
13C3_PFHxS		97	50-150
13C3-HFPO-DA		82	50-150
13C4_PFBA	N	34	50-150
13C4_PFHpA		92	50-150
13C5_PFHxA		80	50-150
13C5_PFPeA		63	50-150
13C6_PFDA		112	50-150
13C7_PFUdA		120	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE03032-001**

Description: **MW-03-17-GW-050223** Matrix: **Aqueous**

Date Sampled: **05/02/2023 0918** Project Name: **Racer PNC**

Date Received: **05/03/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		102	50-150
13C8_PFOS		95	50-150
13C8_PFOSA		99	50-150
13C9_PFNA		108	50-150
d5-EtFOSAA		127	50-150
d3-MeFOSAA		123	50-150

LOQ = Limit of Quantitation
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DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE03032-002**

Description: **MWM32-09-GW-050223** Matrix: **Aqueous**

Date Sampled: **05/02/2023 1053** Project Name: **Racer PNC**

Date Received: **05/03/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	06/01/2023 1316	ARC2	05/23/2023 1402	75967

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		130	50-150
13C2_6:2FTS		103	50-150
13C2_8:2FTS		111	50-150
13C2_PFDoA		90	50-150
13C2_PFTeDA		92	50-150
13C3_PFBS		106	50-150
13C3_PFHxS		96	50-150
13C3-HFPO-DA		100	50-150
13C4_PFBA		69	50-150
13C4_PFHpA		99	50-150
13C5_PFHxA		94	50-150
13C5_PFPeA		89	50-150
13C6_PFDA		97	50-150
13C7_PFUdA		94	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE03032-002**

Description: **MWM32-09-GW-050223** Matrix: **Aqueous**

Date Sampled: **05/02/2023 1053** Project Name: **Racer PNC**

Date Received: **05/03/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		99	50-150
13C8_PFOS		90	50-150
13C8_PFOSA		91	50-150
13C9_PFNA		92	50-150
d5-EtFOSAA		84	50-150
d3-MeFOSAA		92	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE03032-003**

Description: **EB-01-050223** Matrix: **Aqueous**

Date Sampled: **05/02/2023 1105** Project Name: **Racer PNC**

Date Received: **05/03/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	06/01/2023 1329	ARC2	05/23/2023 1402	75967

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.8	0.94	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		106	50-150
13C2_6:2FTS		101	50-150
13C2_8:2FTS		104	50-150
13C2_PFDoA		96	50-150
13C2_PFTeDA		92	50-150
13C3_PFBS		106	50-150
13C3_PFHxS		99	50-150
13C3-HFPO-DA		102	50-150
13C4_PFBA		96	50-150
13C4_PFHpA		101	50-150
13C5_PFHxA		98	50-150
13C5_PFPeA		96	50-150
13C6_PFDA		101	50-150
13C7_PFUdA		102	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.**		Laboratory ID: **YE03032-003**
Description: **EB-01-050223**		Matrix: **Aqueous**
Date Sampled: **05/02/2023 1105**	Project Name: **Racer PNC**	
Date Received: **05/03/2023**	Project Number: **30167840.00030**	

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		106	50-150
13C8_PFOS		99	50-150
13C8_PFOSA		92	50-150
13C9_PFNA		96	50-150
d5-EtFOSAA		94	50-150
d3-MeFOSAA		96	50-150

LOQ = Limit of Quantitation	B = Detected in the method blank	E = Quantitation of compound exceeded the calibration range	DL = Detection Limit	Q = Surrogate failure
ND = Not detected at or above the DL	N = Recovery is out of criteria	P = The RPD between two GC columns exceeds 40%	J = Estimated result < LOQ and ≥ DL	L = LCS/LCSD failure
H = Out of holding time	W = Reported on wet weight basis			S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE03032-004**

Description: **MWF16-26-GW-050223** Matrix: **Aqueous**

Date Sampled: **05/02/2023 1155** Project Name: **Racer PNC**

Date Received: **05/03/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	06/01/2023 1341	ARC2	05/23/2023 1402	75967

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**15**	**M-03**	**3.6**	**0.89**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**14**		**3.6**	**0.89**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**24**		**3.6**	**0.89**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**8.6**		**3.6**	**0.89**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**7.3**		**3.6**	**0.89**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**17**	**M-03**	**3.6**	**0.89**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**34**		**3.6**	**0.89**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**12**		**3.6**	**0.89**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.6	0.89	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		113	50-150
13C2_6:2FTS		96	50-150
13C2_8:2FTS		105	50-150
13C2_PFDoA		91	50-150
13C2_PFTeDA		96	50-150
13C3_PFBS		118	50-150
13C3_PFHxS		101	50-150
13C3-HFPO-DA		101	50-150
13C4_PFBA		79	50-150
13C4_PFHpA		101	50-150
13C5_PFHxA		97	50-150
13C5_PFPeA		95	50-150
13C6_PFDA		101	50-150
13C7_PFUdA		95	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE03032-004**

Description: **MWF16-26-GW-050223** Matrix: **Aqueous**

Date Sampled: **05/02/2023 1155** Project Name: **Racer PNC**

Date Received: **05/03/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		98	50-150
13C8_PFOS		98	50-150
13C8_PFOSA		99	50-150
13C9_PFNA		95	50-150
d5-EtFOSAA		92	50-150
d3-MeFOSAA		95	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE03032-005**

Description: **MWW1-04-GW-050223** Matrix: **Aqueous**

Date Sampled: **05/02/2023 1308** Project Name: **Racer PNC**

Date Received: **05/03/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	06/01/2023 1354	ARC2	05/23/2023 1402	75967

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.1	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.1	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.1	1.8	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	**2991-50-6**	**PFAS by ID SOP**	**8.9**	**M-03**	**7.1**	**1.8**	**ng/L**	**1**
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND	M-03	7.1	1.8	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND	M-03	3.5	0.88	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	**754-91-6**	**PFAS by ID SOP**	**1.2**	**JM-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**4.1**	**M-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND	Q	3.5	0.88	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND	M-03	3.5	0.88	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**2.8**	**JM-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**98**		**3.5**	**0.88**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	267	50-150
13C2_6:2FTS	N	277	50-150
13C2_8:2FTS	N	281	50-150
13C2_PFDoA		104	50-150
13C2_PFTeDA		83	50-150
13C3_PFBS		91	50-150
13C3_PFHxS		93	50-150
13C3-HFPO-DA		80	50-150
13C4_PFBA	N	13	50-150
13C4_PFHpA		91	50-150
13C5_PFHxA		78	50-150
13C5_PFPeA		65	50-150
13C6_PFDA		105	50-150
13C7_PFUdA		110	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE03032-005**

Description: **MWW1-04-GW-050223** Matrix: **Aqueous**

Date Sampled: **05/02/2023 1308** Project Name: **Racer PNC**

Date Received: **05/03/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		95	50-150
13C8_PFOS		93	50-150
13C8_PFOSA		93	50-150
13C9_PFNA		102	50-150
d5-EtFOSAA		116	50-150
d3-MeFOSAA		115	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE03032-006**

Description: **DUP-03-GW-050223** Matrix: **Aqueous**

Date Sampled: **05/02/2023** Project Name: **Racer PNC**

Date Received: **05/03/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	06/01/2023 1407	ARC2	05/23/2023 1402	75967

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.2	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**9.6**	**Q**	**7.2**	**1.8**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.2	1.8	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**4.0**	**M-03**	**3.6**	**0.91**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.91	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**5.1**		**3.6**	**0.91**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.91	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	0.91	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**3.8**	**M-03**	**3.6**	**0.91**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**57**		**3.6**	**0.91**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**17**	**QM-03**	**3.6**	**0.91**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	0.91	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.91	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**8.8**		**3.6**	**0.91**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**15**		**3.6**	**0.91**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**2.2**	**J**	**3.6**	**0.91**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**27**		**3.6**	**0.91**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**16**	**M-03**	**3.6**	**0.91**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.91	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.91	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.91	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**140**	**M-03**	**3.6**	**0.91**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	269	50-150
13C2_6:2FTS	N	263	50-150
13C2_8:2FTS	N	268	50-150
13C2_PFDoA		108	50-150
13C2_PFTeDA		87	50-150
13C3_PFBS		91	50-150
13C3_PFHxS		95	50-150
13C3-HFPO-DA		80	50-150
13C4_PFBA	N	33	50-150
13C4_PFHpA		95	50-150
13C5_PFHxA		78	50-150
13C5_PFPeA		61	50-150
13C6_PFDA		115	50-150
13C7_PFUdA		118	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE03032-006**

Description: **DUP-03-GW-050223** Matrix: **Aqueous**

Date Sampled: **05/02/2023** Project Name: **Racer PNC**

Date Received: **05/03/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		102	50-150
13C8_PFOS		97	50-150
13C8_PFOSA		97	50-150
13C9_PFNA		108	50-150
d5-EtFOSAA		123	50-150
d3-MeFOSAA		116	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE03032-007**

Description: **TRIP BLANK** Matrix: **Aqueous**

Date Sampled: **05/02/2023 1320** Project Name: **Racer PNC**

Date Received: **05/03/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	06/01/2023 1419	ARC2	05/23/2023 1402	75967

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		94	50-150
13C2_6:2FTS		93	50-150
13C2_8:2FTS		99	50-150
13C2_PFDoA		90	50-150
13C2_PFTeDA		89	50-150
13C3_PFBS		102	50-150
13C3_PFHxS		96	50-150
13C3-HFPO-DA		97	50-150
13C4_PFBA		92	50-150
13C4_PFHpA		100	50-150
13C5_PFHxA		92	50-150
13C5_PFPeA		92	50-150
13C6_PFDA		100	50-150
13C7_PFUdA		102	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE03032-007**

Description: **TRIP BLANK** Matrix: **Aqueous**

Date Sampled: **05/02/2023 1320** Project Name: **Racer PNC**

Date Received: **05/03/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		99	50-150
13C8_PFOS		91	50-150
13C8_PFOSA		93	50-150
13C9_PFNA		94	50-150
d5-EtFOSAA		92	50-150
d3-MeFOSAA		94	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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QC Summary

PFAS by LC/MS/MS - MB

Sample ID: YQ75967-001
Batch: 75967
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/23/2023 1402

Parameter	Result	Q	Dil	LOQ	DL	Units	Analysis Date
9Cl-PF3ONS	ND		1	8.0	2.0	ng/L	06/01/2023 1225
11Cl-PF3OUdS	ND		1	8.0	2.0	ng/L	06/01/2023 1225
8:2 FTS	ND		1	8.0	2.0	ng/L	06/01/2023 1225
6:2 FTS	ND		1	8.0	2.0	ng/L	06/01/2023 1225
4:2 FTS	ND		1	8.0	2.0	ng/L	06/01/2023 1225
GenX	ND		1	8.0	2.0	ng/L	06/01/2023 1225
ADONA	ND		1	8.0	2.0	ng/L	06/01/2023 1225
EtFOSAA	ND		1	8.0	2.0	ng/L	06/01/2023 1225
MeFOSAA	ND		1	8.0	2.0	ng/L	06/01/2023 1225
PFBS	ND		1	4.0	1.0	ng/L	06/01/2023 1225
PFDS	ND		1	4.0	1.0	ng/L	06/01/2023 1225
PFHpS	ND		1	4.0	1.0	ng/L	06/01/2023 1225
PFNS	ND		1	4.0	1.0	ng/L	06/01/2023 1225
PFOSA	ND		1	4.0	1.0	ng/L	06/01/2023 1225
PFPeS	ND		1	4.0	1.0	ng/L	06/01/2023 1225
PFHxS	ND		1	4.0	1.0	ng/L	06/01/2023 1225
PFBA	ND		1	4.0	1.0	ng/L	06/01/2023 1225
PFDA	ND		1	4.0	1.0	ng/L	06/01/2023 1225
PFDoA	ND		1	4.0	1.0	ng/L	06/01/2023 1225
PFHpA	ND		1	4.0	1.0	ng/L	06/01/2023 1225
PFHxA	ND		1	4.0	1.0	ng/L	06/01/2023 1225
PFNA	ND		1	4.0	1.0	ng/L	06/01/2023 1225
PFOA	ND		1	4.0	1.0	ng/L	06/01/2023 1225
PFPeA	ND		1	4.0	1.0	ng/L	06/01/2023 1225
PFTeDA	ND		1	4.0	1.0	ng/L	06/01/2023 1225
PFTrDA	ND		1	4.0	1.0	ng/L	06/01/2023 1225
PFUdA	ND		1	4.0	1.0	ng/L	06/01/2023 1225
PFOS	ND		1	4.0	1.0	ng/L	06/01/2023 1225

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		98	50-150
13C2_6:2FTS		98	50-150
13C2_8:2FTS		104	50-150
13C2_PFDoA		92	50-150
13C2_PFTeDA		85	50-150
13C3_PFBS		107	50-150
13C3_PFHxS		97	50-150
13C3-HFPO-DA		101	50-150
13C4_PFBA		97	50-150
13C4_PFHpA		102	50-150
13C5_PFHxA		94	50-150
13C5_PFPeA		99	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: YQ75967-001
Batch: 75967
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/23/2023 1402

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		96	50-150
13C7_PFUdA		100	50-150
13C8_PFOA		103	50-150
13C8_PFOS		90	50-150
13C8_PFOSA		91	50-150
13C9_PFNA		94	50-150
d5-EtFOSAA		93	50-150
d3-MeFOSAA		100	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ75967-002
Batch: 75967
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/23/2023 1402

Parameter	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	%Rec Limit	Analysis Date
9Cl-PF3ONS	15	17		1	112	50-150	06/01/2023 1238
11Cl-PF3OUdS	15	17		1	110	50-150	06/01/2023 1238
8:2 FTS	15	18	M-03	1	117	67-138	06/01/2023 1238
6:2 FTS	15	18		1	121	64-140	06/01/2023 1238
4:2 FTS	15	17		1	111	63-143	06/01/2023 1238
GenX	32	35		1	110	50-150	06/01/2023 1238
ADONA	15	17		1	111	50-150	06/01/2023 1238
EtFOSAA	16	19	M-03	1	116	61-135	06/01/2023 1238
MeFOSAA	16	17		1	108	65-136	06/01/2023 1238
PFBS	14	15		1	105	72-130	06/01/2023 1238
PFDS	15	17		1	112	53-142	06/01/2023 1238
PFHpS	15	16		1	108	69-134	06/01/2023 1238
PFNS	15	17		1	111	69-127	06/01/2023 1238
PFOSA	16	18		1	112	67-137	06/01/2023 1238
PFPeS	15	16		1	104	71-127	06/01/2023 1238
PFHxS	15	16		1	108	68-131	06/01/2023 1238
PFBA	16	17		1	105	73-129	06/01/2023 1238
PFDA	16	18		1	110	71-129	06/01/2023 1238
PFDoA	16	20		1	124	72-134	06/01/2023 1238
PFHpA	16	18		1	115	72-130	06/01/2023 1238
PFHxA	16	17		1	108	72-129	06/01/2023 1238
PFNA	16	19		1	116	69-130	06/01/2023 1238
PFOA	16	18		1	114	71-133	06/01/2023 1238
PFPeA	16	17		1	107	72-129	06/01/2023 1238
PFTeDA	16	17		1	108	71-132	06/01/2023 1238
PFTrDA	16	18		1	115	65-144	06/01/2023 1238
PFUdA	16	17		1	109	69-133	06/01/2023 1238
PFOS	15	16		1	111	65-140	06/01/2023 1238

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		91	50-150
13C2_6:2FTS		87	50-150
13C2_8:2FTS		91	50-150
13C2_PFDoA		87	50-150
13C2_PFTeDA		82	50-150
13C3_PFBS		98	50-150
13C3_PFHxS		87	50-150
13C3-HFPO-DA		93	50-150
13C4_PFBA		92	50-150
13C4_PFHpA		92	50-150
13C5_PFHxA		93	50-150
13C5_PFPeA		93	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ75967-002
Batch: 75967
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/23/2023 1402

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		88	50-150
13C7_PFUdA		95	50-150
13C8_PFOA		93	50-150
13C8_PFOS		81	50-150
13C8_PFOSA		86	50-150
13C9_PFNA		85	50-150
d5-EtFOSAA		85	50-150
d3-MeFOSAA		85	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Chain of Custody
and
Miscellaneous Documents

Pace Analytical®

PACE ANALYTICAL SERVICES, LLC
106 Vantage Point Drive • West Columbia, SC 29172
Telephone No. 803-791-9700 Fax No. 803-791-9111
www.pacelabs.com

Number 146506

Client: Arcadis	Report to Contact: Tiffany Linder, Alexis Cusp	Telephone No. / E-mail: Alexis.cusp@arcadis.com, tiffany.linder@arcadis.com	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: Sommer Guy	Analysis (Attach list if more space is needed): Report EGLE 28 compounds	Page 1 of 1
City: Novi; State: MI; Zip Code: 48377	Printed Name: Sommer Guy		Lot # Bar Code (lab use only): YE03032
Project Name: Racer PNC			
Project No.: 30167840.00030	P.O. No.		

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Sample Type: G=Grab C=Composite	Matrix: Aqueous	Soil/Solid	Oil	Biota/Animal	No. of Containers by Preservative Type: Unpres.	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other: Filtered (Y/N)	Analysis: Report EGLE 28 compounds per QSM 5.1	Lab ID
MW-03-17_GW-050223	5/2/23	0918	G	2				2								X	
MWM32-09_GW-050223	5/2/23	1053	G	2				2								X	
EB-01-050223	5/2/23	1105	G	2				2								X	
MWF16-26_GW-050223	5/2/23	1155	G	2				2								X	
MWW1-04_GW-050223	5/2/23	1308	G	2				2								X	
Dup-03_GW-050223	5/2/23	—	G	2				2								X	
tripblank	5/2/23	1320	G	1				1								X	tripblank

Turn Around Time Required (Prior lab approval required for expedited TAT.): [X] Standard [ ] Rush (Specify)

Sample Disposal: [ ] Return to Client [X] Disposal by Lab

Possible Hazard Identification: [X] Non-Hazard [ ] Flammable [ ] Skin Irritant [ ] Poison [ ] Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: Sommer Guy	5/2/23	1420	1. Received by: FedEx	5/2/23	1420
2. Relinquished by	Date	Time	2. Received by	Date	Time
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by: FedEx	5/3/23	0945	4. Laboratory received by: Jennifer N Parker	5/3/23	0945

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY — Received on ice (Circle): (Yes) No; Ice Pack:; Receipt Temp. 3.2 °C; Temp Blank: [ ] Y [X] N

DISTRIBUTION: WHITE & YELLOW-Return to laboratory with Sample(s); PINK-Field/Client Copy

Document Number: ME003N2-01

PACE ANALYTICAL SERVICES, LLC

DC#_Title: ENV-FRM-WCOL-0286 v02_Samples Receipt Checklist (SRC)
Effective Date: 8/2/2022

Sample Receipt Checklist (SRC)

Client: ARCADIS Cooler Inspected by/date: KNR / 5/03/23 Lot #: YE03032

Means of receipt: ☐ Pace ☐ Client ☐ UPS ☑ FedEx ☐ Other: ____

☑ Yes	☐ No		1. Were custody seals present on the cooler?
☑ Yes	☐ No	☐ NA	2. If custody seals were present, were they intact and unbroken?

pH Strip ID: NA Chlorine Strip ID: NA Tested by: NA

Original temperature upon receipt / Derived (Corrected) temperature upon receipt %Solid Snap-Cup ID: NA

3.2 / 3.2 °C NA / NA °C NA / NA °C NA / NA °C

Method: ☐ Temperature Blank ☑ Against Bottles IR Gun ID: 8 IR Gun Correction Factor: 0 °C

Method of coolant: ☑ Wet Ice ☐ Ice Packs ☐ Dry Ice ☐ None

☑ Yes	☐ No	☐ NA	3. Were all coolers received at or below 6.0°C? If no, was Project Manager notified? PM was Notified by: phone / email / face-to-face (circle one).
☐ Yes	☑ No	☐ NA	4. Is the commercial courier's packing slip attached to this form?
☑ Yes	☐ No		5. Were proper custody procedures (relinquished/received) followed?
☑ Yes	☐ No		6. Were sample IDs listed on the COC and all sample containers?
☑ Yes	☐ No		7. Was collection date & time listed on the COC and all sample containers?
☑ Yes	☐ No		8. Did all container label information (ID, date, time) agree with the COC?
☑ Yes	☐ No		9. Were tests to be performed listed on the COC?
☑ Yes	☐ No		10. Did all samples arrive in the proper containers for each test and/or in good condition (unbroken, lids on, etc.)? ____
☑ Yes	☐ No		11. Was adequate sample volume available?
☑ Yes	☐ No		12. Were all samples received within ½ the holding time or 48 hours, whichever comes first?
☑ Yes	☐ No		13. Were all samples containers accounted for? (No missing/excess)
☐ Yes	☐ No	☑ NA	14. Were VOA 8015C and RSK-175 samples free of bubbles >"pea-size" (¼" or 6mm in diameter) in any of the VOA vials?
☐ Yes	☐ No	☑ NA	15. Were all DRO/metals/nutrient samples received at a pH of < 2?
☐ Yes	☐ No	☑ NA	16. Were all cyanide samples received at a pH > 12 and sulfide samples received at a pH > 9?
☐ Yes	☐ No	☑ NA	17. Were all applicable NH_3/TKN/cyanide/phenol/625.1/608.3 (< 0.5mg/L) samples free of residual chlorine?
☐ Yes	☑ No	☐ NA	18. Was the quote number listed on the container label? If yes, Quote # ____

Sample Preservation (Must be completed for any sample(s) incorrectly preserved or with headspace.)

Sample(s) NA ____ were received incorrectly preserved and were adjusted accordingly in sample receiving with NA mL of circle one: H2SO4, HNO3, HCl, NaOH using SR # NA. ☐
Time of preservation NA. If more than one preservative is needed, please note in the comments below.

Sample(s) NA ____ were received with bubbles >6 mm in diameter.

Samples(s) NA ____ were received with TRC > 0.5 mg/L (If #19 is *no*) and were adjusted accordingly in sample receiving with sodium thiosulfate ($Na_2S_2O_3$) with Unique ID: NA.

Comments: Packing slip was not on cooler, must have come off on the truck

Qualtrax ID: 56360

Report of Analysis

Arcadis U.S., Inc.
630 Plaza Drive
Suite 600
Highlands Ranch, CO 80129
Attention: Tiffany Linder

Project Name: RACER PNC

Project Number: 30167840.00030

Lot Number:**YD26028**

Date Completed:05/12/2023

Kathy Smith

05/12/2023 5:23 PM
Approved and released by:
Project Manager II: **Kathy E. Smith**

The electronic signature above is the equivalent of a handwritten signature.
This report shall not be reproduced, except in its entirety, without the written approval of Pace Analytical Services, LLC.

Pace Analytical Services, LLC (*formerly Shealy Environmental Services, Inc.*)
106 Vantage Point Drive West Columbia, SC 29172
Tel: 803-791-9700 Fax: 803-791-9111 www.pacelabs.com

Case Narrative
Arcadis U.S., Inc.
Lot Number: YD26028

This Report of Analysis contains the analytical result(s) for the sample(s) listed on the Sample Summary following this Case Narrative. The sample receiving date is documented in the header information associated with each sample.

All results listed in this report relate only to the samples that are contained within this report.

Sample receipt, sample analysis, and data review have been performed in accordance with the Pace Quality Assurance Management Plan (QAMP), applicable Shealy standard operating procedures (SOPs), the 2003 NELAC standard, and Shealy policies. Additionally, the DoD QSM version 5.4 has been followed for these samples, and specifically Table B-15 was followed for all PFAS samples. Any exceptions to the QAMP, SOPs, NELAC standards, the DoD QSM, or policies are qualified on the results page or discussed below.

All QC associated with these samples were compliant with DOD QSM 5.4 table B-15 and our PFAS SOP.

Correction factors (CF) are used to calculate the original sample concentration. The CF is the inverse of the concentration factor (sample volume / extract final volume) times the dilution factor (DF). The CF is calculated as follows:

CF = DF * FV / Vo

FV is volume of extract (mL)
Vo is initial sample volume (mL)
DF is dilution factor. For undiluted analysis, DF = 1.

Sample concentration for aqueous samples:
Concentration (ng/L) = Cs*CF,

$$C_s = \frac{\left(\frac{(A_s x C_{is})}{A_{is}}\right) - B}{M1}$$

Where

C_s is on column concentration of target analyte in the sample (ng/L)
C_{is} is concentration of internal standard in the sample (ng/L)
A_s is peak response of target analyte in the sample
A_{is} is peak response of internal standard in the sample
M1 is the average RF from ICAL or the slope from linear regression ICAL
B is the y-intercept from the ICAL

Pace is a DoD/DOE accredited laboratory; however, the following analyses are currently not listed on our DoD/DOE scope of accreditation: Drinking Water: pH EPA 150.1, Turbidity EPA 180.1, Metals EPA 200.7 & 200.8, Mercury EPA 245.1, Anions EPA 300.0, Cyanide EPA 335.4, Nitrates EPA 353.2, Orthophosphate & Phosphorus EPA 365.1, EDB/DBCP EPA 504.1, HPC SIMPLATE, Color SM 2120 B-2011, Alkalinity SM 2320 B-2011, Specific Conductance SM 2510 B-2011, Residue-filterable (TDS) SM 2540 C, Calcium Hardness (CaCO2) SM 3500-Ca B-2011, TRC SM 4500 Cl G-2011, pH SM 4500 H=B-2011, E.Coli, Total Coliform. Non-Potable Water: Metals EPA 200.7, Strontium EPA 200.8, Chlorate EPA 300.0, Cyanide EPA 335.4, Phenolics EPA 420.4, 2-Methyl-4,6-Dinitrophenol EPA 625.1, Propane RSK-175, Specific Conductance SM 2510 B-2011, Salinity SM2520 B, Residue- total SM 2540 B, Sulfite SM 4500 SO32- B-2011, Amenable Cyanide SM 4500-CN- G-2011, BOD & CBOD SM 5210 B, MBAS SM 5540 C-2011, Boron & Titanium SW-846 6010D, Boron, Molybdenum, & Titanium SW-846 6020B, Alcohols & Glycols SW-846 8015C, Pentachlorophenol SW-846 8151A, Ethyl Acetate, Hexane, & n-Hexane SW-846 8260D, SVOC 1,4-Dioxane, 4-Dimethyl aminoazobenzene, 1,4-Naphthoquinone, 3,5-Dinitroaniline, PETN SW-846 8270E, Amenable Cyanide SW-846 9012B. Solid and Chemical Materials: Boron & Titanium SW-846 6010D, Molybdenum SW-846 6020B, Ethylene Glycol SW-846 8015B, Pentachlorophenol SW-846 8151A, Chloroprene SW-846 8260B, SVOC 1,4-Dioxane, 1,3,5-Trinitrobenzene, 1,4- Naphthoquinone, 1,4-Phenylenediamine, 2,4-Dinitrotoluene, 2,6-Dinitrotoluene, 3-Methylcholanthrene, 4-Aminobiphenyl, 4-Dimethyl aminoazobenzene, 4-Nitroquinoline-1-oxide, 7,12-Dimethylbenzo(a)anthracene, Chlorobenzilate, Diallate, Ethyl methanesulfonate, Isodrin, Isosafrole, Methyl methanesulfonate, n-Nitrosomethylethylamine, n-Nitrosomorpholine, n-Nitrosopiperidine, Piperonyl butoxide, Pronamide, Safrole, 3,5- Dinitroaniline, PETN SW-846 8270E, Oil & Grease SW-846 9071B.

Pace is a TNI accredited laboratory; however, the following analyses are currently not listed on our TNI scope of accreditation: Drinking Water: VOC (excluding BTEX, MTBE, Naphthalene, & 1,2-dichloroethane) EPA 524.2, E. coli and Total coliforms SM 9223 B-2004, Solid Chemical Material: TOC Walkley-Black, Biological Tissue: All, Non-Potable Water: SGT-HEM EPA 1664B, Silica EPA 200.7, Boron, Calcium, Silicon, Strontium EPA 200.8, Bicarbonate, Carbonate, and Hydroxide Alkalinity SM 2320 B-2011, SM 9221 C E-2006 & SM 9222D-2006, Strontium SW-846 6010D, VOC SM 6200 B-2011, Fecal Coliform Colilert-18.

If you have any questions regarding this report, please contact the Pace Project Manager listed on the cover page.

PFAS
Samples YD26028-001, YD26028-003, YD26028-005 had surrogates recovered above the acceptance limits. There were no detections for these compounds in the sample; therefore, there is no impact on data quality and no corrective action is required.

Sample YD26028-002 had surrogates recovered outside of the acceptance limits due to confirmed matrix interference.

Manual Integration Summary

Arcadis U.S., Inc.

Lot Number: YD26028

Project Name: RACER PNC

Project Number: 30167840.00030

Where applicable, analytes for which manual integration occurred have been flagged with the following:

Qualifier	Technical Justification	Qualifier	Technical Justification	Qualifier	Technical Justification
M-01	Split peak	M-07	Low fit	M-13	Error
M-02	Peak tailing	M-08	Peak not found	M-14	Baseline
M-03	Incorrect auto integration	M-09	Analyte not Identified by the Data System	M-15	Other
M-04	Poor chromatography	M-10	Analyte misidentified by the Data System	M-16	Retention time shift
M-05	Manually assigned peak	M-11	Invalid integration	M-17	Shouldering
M-06	Wrong isomer	M-12	Wrong peak		

A summary of instances where manual integration occurred is included below:

Method	Sample	Run Number	Parameter	Qualifier
PFAS by ID SOP	YD26028-001	1	Perfluoro-1-butanesulfonic acid (PFBS)	M-03
PFAS by ID SOP	YD26028-001	1	Perfluoro-1-pentanesulfonic acid	M-03
PFAS by ID SOP	YD26028-001	1	Perfluorohexanesulfonic acid (PFHxS)	M-03
PFAS by ID SOP	YD26028-001	1	Perfluoro-n-butanoic acid (PFBA)	M-03
PFAS by ID SOP	YD26028-001	1	Perfluoro-n-hexanoic acid (PFHxA)	M-03
PFAS by ID SOP	YD26028-001	1	Perfluoro-n-octanoic acid (PFOA)	M-03
PFAS by ID SOP	YD26028-001	1	Perfluorooctanesulfonic acid (PFOS)	M-03
PFAS by ID SOP	YD26028-002	1	Perfluoro-1-butanesulfonic acid (PFBS)	M-03
PFAS by ID SOP	YD26028-002	1	Perfluoro-1-pentanesulfonic acid	M-03
PFAS by ID SOP	YD26028-002	1	Perfluorohexanesulfonic acid (PFHxS)	M-03
PFAS by ID SOP	YD26028-002	1	Perfluoro-n-butanoic acid (PFBA)	M-03
PFAS by ID SOP	YD26028-002	1	Perfluoro-n-hexanoic acid (PFHxA)	M-03
PFAS by ID SOP	YD26028-002	1	Perfluoro-n-pentanoic acid (PFPeA)	M-03
PFAS by ID SOP	YD26028-003	1	Perfluoro-1-butanesulfonic acid (PFBS)	M-03
PFAS by ID SOP	YD26028-003	1	Perfluorohexanesulfonic acid (PFHxS)	M-03
PFAS by ID SOP	YD26028-003	1	Perfluoro-n-octanoic acid (PFOA)	M-03
PFAS by ID SOP	YD26028-003	1	Perfluorooctanesulfonic acid (PFOS)	M-03
PFAS by ID SOP	YD26028-004	1	Perfluoro-1-butanesulfonic acid (PFBS)	M-03
PFAS by ID SOP	YD26028-004	1	Perfluoro-1-heptanesulfonic acid	M-03
PFAS by ID SOP	YD26028-004	1	Perfluoro-1-pentanesulfonic acid	M-03
PFAS by ID SOP	YD26028-004	1	Perfluoro-n-butanoic acid (PFBA)	M-03
PFAS by ID SOP	YD26028-004	1	Perfluoro-n-octanoic acid (PFOA)	M-03
PFAS by ID SOP	YD26028-005	1	Perfluoro-1-butanesulfonic acid (PFBS)	M-03
PFAS by ID SOP	YD26028-005	1	Perfluoro-1-pentanesulfonic acid	M-03
PFAS by ID SOP	YD26028-005	1	Perfluorohexanesulfonic acid (PFHxS)	M-03
PFAS by ID SOP	YD26028-005	1	Perfluoro-n-butanoic acid (PFBA)	M-03
PFAS by ID SOP	YD26028-005	1	Perfluoro-n-heptanoic acid (PFHpA)	M-03
PFAS by ID SOP	YD26028-005	1	Perfluoro-n-octanoic acid (PFOA)	M-03
PFAS by ID SOP	YD26028-005	1	Perfluoro-n-pentanoic acid (PFPeA)	M-03
PFAS by ID SOP	YD26028-005	1	Perfluorooctanesulfonic acid (PFOS)	M-03
PFAS by ID SOP	YD26028-006	1	Perfluoro-1-butanesulfonic acid (PFBS)	M-03
PFAS by ID SOP	YD26028-006	1	Perfluoro-1-pentanesulfonic acid	M-03
PFAS by ID SOP	YD26028-006	1	Perfluoro-n-heptanoic acid (PFHpA)	M-03
PFAS by ID SOP	YD26028-006	1	Perfluoro-n-hexanoic acid (PFHxA)	M-03
PFAS by ID SOP	YD26028-006	1	Perfluoro-n-octanoic acid (PFOA)	M-03
PFAS by ID SOP	YD26028-005MS	1	1H, 1H, 2H, 2H-perfluorodecane	M-03
PFAS by ID SOP	YD26028-001MS	1	1H,1H,2H,2H-perfluorohexane sulfonic	M-03

Manual Integration Summary

Arcadis U.S., Inc.

Lot Number: YD26028

Project Name: RACER PNC

Project Number: 30167840.00030

Where applicable, analytes for which manual integration occurred have been flagged with the following:

Qualifier	Technical Justification	Qualifier	Technical Justification	Qualifier	Technical Justification
M-01	Split peak	M-07	Low fit	M-13	Error
M-02	Peak tailing	M-08	Peak not found	M-14	Baseline
M-03	Incorrect auto integration	M-09	Analyte not Identified by the Data System	M-15	Other
M-04	Poor chromatography	M-10	Analyte misidentified by the Data System	M-16	Retention time shift
M-05	Manually assigned peak	M-11	Invalid integration	M-17	Shouldering
M-06	Wrong isomer	M-12	Wrong peak		

A summary of instances where manual integration occurred is included below:

Method	Sample	Run Number	Parameter	Qualifier
PFAS by ID SOP	YD26028-001MD	1	1H,1H,2H,2H-perfluorohexane sulfonic	M-03
PFAS by ID SOP	YD26028-005MS	1	1H,1H,2H,2H-perfluorohexane sulfonic	M-03
PFAS by ID SOP	YD26028-005MD	1	1H,1H,2H,2H-perfluorohexane sulfonic	M-03
PFAS by ID SOP	YQ74943-002	1	N-ethylperfluoro-1-	M-03
PFAS by ID SOP	YD26028-001MS	1	N-ethylperfluoro-1-	M-03
PFAS by ID SOP	YD26028-001MS	1	N-methylperfluoro-1-	M-03
PFAS by ID SOP	YD26028-001MD	1	N-methylperfluoro-1-	M-03
PFAS by ID SOP	YD26028-005MS	1	N-methylperfluoro-1-	M-03
PFAS by ID SOP	YD26028-005MD	1	N-methylperfluoro-1-	M-03
PFAS by ID SOP	YD26028-005MD	1	Perfluoro-1-butanesulfonic acid (PFBS)	M-03
PFAS by ID SOP	YD26028-001MS	1	Perfluoro-1-octanesulfonamide (PFOSA)	M-03
PFAS by ID SOP	YD26028-001MS	1	Perfluoro-n-butanoic acid (PFBA)	M-03
PFAS by ID SOP	YD26028-001MD	1	Perfluoro-n-butanoic acid (PFBA)	M-03
PFAS by ID SOP	YD26028-005MS	1	Perfluoro-n-butanoic acid (PFBA)	M-03
PFAS by ID SOP	YD26028-005MD	1	Perfluoro-n-butanoic acid (PFBA)	M-03
PFAS by ID SOP	YD26028-005MD	1	Perfluoro-n-decanoic acid (PFDA)	M-03
PFAS by ID SOP	YD26028-001MS	1	Perfluoro-n-octanoic acid (PFOA)	M-03
PFAS by ID SOP	YD26028-001MD	1	Perfluoro-n-octanoic acid (PFOA)	M-03
PFAS by ID SOP	YD26028-005MD	1	Perfluoro-n-pentanoic acid (PFPeA)	M-03
PFAS by ID SOP	YQ74943-002	1	Perfluorooctanesulfonic acid (PFOS)	M-03
PFAS by ID SOP	YD26028-001MS	1	Perfluorooctanesulfonic acid (PFOS)	M-03
PFAS by ID SOP	YD26028-001MD	1	Perfluorooctanesulfonic acid (PFOS)	M-03
PFAS by ID SOP	YD26028-005MS	1	Perfluorooctanesulfonic acid (PFOS)	M-03
PFAS by ID SOP	YD26028-005MD	1	Perfluorooctanesulfonic acid (PFOS)	M-03
PFAS by ID SOP	YQ74943-001	1	13C2_8:2FTS	M-03

If you have any questions regarding this report, please contact the Pace Project Manager listed on the cover page.

Sample Summary

Arcadis U.S., Inc.

Lot Number: YD26028

Project Name: RACER PNC

Project Number: 30167840.00030

Sample Number	Sample ID	Matrix	Date Sampled	Date Received
001	MWM16-37_GW-042523	Aqueous	04/25/2023 1028	04/26/2023
002	MWM30-01_GW-042523	Aqueous	04/25/2023 1040	04/26/2023
003	MWM5-02_GW-042523	Aqueous	04/25/2023 1210	04/26/2023
004	MWF16-23_GW-042523	Aqueous	04/25/2023 1307	04/26/2023
005	MWF12-02R_GW-042523	Aqueous	04/25/2023 1425	04/26/2023
006	MW-02-17_GW-042523	Aqueous	04/25/2023 1420	04/26/2023
007	Trip Blank	Aqueous	04/25/2023 1730	04/26/2023

(7 samples)

Detection Summary

Arcadis U.S., Inc.

Lot Number: YD26028

Project Name: RACER PNC

Project Number: 30167840.00030

Sample	Sample ID	Matrix	Parameter	Method	Result	Q	Units	Page
001	MWM16-37_GW-042523	Aqueous	PFBS	PFAS by ID	1.4	JM-03	ng/L	8
001	MWM16-37_GW-042523	Aqueous	PFPeS	PFAS by ID	0.93	JM-03	ng/L	8
001	MWM16-37_GW-042523	Aqueous	PFHxS	PFAS by ID	5.8	M-03	ng/L	8
001	MWM16-37_GW-042523	Aqueous	PFBA	PFAS by ID	6.4	M-03	ng/L	8
001	MWM16-37_GW-042523	Aqueous	PFHpA	PFAS by ID	1.5	J	ng/L	8
001	MWM16-37_GW-042523	Aqueous	PFHxA	PFAS by ID	1.9	JM-03	ng/L	8
001	MWM16-37_GW-042523	Aqueous	PFOA	PFAS by ID	2.5	JM-03	ng/L	8
001	MWM16-37_GW-042523	Aqueous	PFPeA	PFAS by ID	2.0	J	ng/L	8
001	MWM16-37_GW-042523	Aqueous	PFOS	PFAS by ID	4.4	M-03	ng/L	8
002	MWM30-01_GW-042523	Aqueous	6:2 FTS	PFAS by ID	34	Q	ng/L	10
002	MWM30-01_GW-042523	Aqueous	PFBS	PFAS by ID	4.6	M-03	ng/L	10
002	MWM30-01_GW-042523	Aqueous	PFPeS	PFAS by ID	2.4	JM-03	ng/L	10
002	MWM30-01_GW-042523	Aqueous	PFHxS	PFAS by ID	8.3	M-03	ng/L	10
002	MWM30-01_GW-042523	Aqueous	PFBA	PFAS by ID	24	QM-03	ng/L	10
002	MWM30-01_GW-042523	Aqueous	PFHpA	PFAS by ID	15		ng/L	10
002	MWM30-01_GW-042523	Aqueous	PFHxA	PFAS by ID	20	M-03	ng/L	10
002	MWM30-01_GW-042523	Aqueous	PFOA	PFAS by ID	45		ng/L	10
002	MWM30-01_GW-042523	Aqueous	PFPeA	PFAS by ID	18	M-03	ng/L	10
003	MWM5-02_GW-042523	Aqueous	PFBS	PFAS by ID	0.95	JM-03	ng/L	12
003	MWM5-02_GW-042523	Aqueous	PFBA	PFAS by ID	2.5	J	ng/L	12
003	MWM5-02_GW-042523	Aqueous	PFOA	PFAS by ID	1.0	JM-03	ng/L	12
003	MWM5-02_GW-042523	Aqueous	PFOS	PFAS by ID	1.3	JM-03	ng/L	12
004	MWF16-23_GW-042523	Aqueous	PFBS	PFAS by ID	6.7	M-03	ng/L	14
004	MWF16-23_GW-042523	Aqueous	PFHpS	PFAS by ID	1.3	JM-03	ng/L	14
004	MWF16-23_GW-042523	Aqueous	PFPeS	PFAS by ID	6.1	M-03	ng/L	14
004	MWF16-23_GW-042523	Aqueous	PFHxS	PFAS by ID	26		ng/L	14
004	MWF16-23_GW-042523	Aqueous	PFBA	PFAS by ID	9.8	M-03	ng/L	14
004	MWF16-23_GW-042523	Aqueous	PFHpA	PFAS by ID	23		ng/L	14
004	MWF16-23_GW-042523	Aqueous	PFHxA	PFAS by ID	12		ng/L	14
004	MWF16-23_GW-042523	Aqueous	PFOA	PFAS by ID	63	M-03	ng/L	14
004	MWF16-23_GW-042523	Aqueous	PFPeA	PFAS by ID	14		ng/L	14
005	MWF12-02R_GW-042523	Aqueous	PFBS	PFAS by ID	3.7	JM-03	ng/L	16
005	MWF12-02R_GW-042523	Aqueous	PFPeS	PFAS by ID	1.6	JM-03	ng/L	16
005	MWF12-02R_GW-042523	Aqueous	PFHxS	PFAS by ID	5.9	M-03	ng/L	16
005	MWF12-02R_GW-042523	Aqueous	PFBA	PFAS by ID	22	M-03	ng/L	16
005	MWF12-02R_GW-042523	Aqueous	PFHpA	PFAS by ID	4.4	M-03	ng/L	16
005	MWF12-02R_GW-042523	Aqueous	PFHxA	PFAS by ID	12		ng/L	16
005	MWF12-02R_GW-042523	Aqueous	PFOA	PFAS by ID	11	M-03	ng/L	16
005	MWF12-02R_GW-042523	Aqueous	PFPeA	PFAS by ID	14	M-03	ng/L	16
005	MWF12-02R_GW-042523	Aqueous	PFOS	PFAS by ID	4.0	M-03	ng/L	16
006	MW-02-17_GW-042523	Aqueous	PFBS	PFAS by ID	9.3	M-03	ng/L	18
006	MW-02-17_GW-042523	Aqueous	PFPeS	PFAS by ID	5.8	M-03	ng/L	18
006	MW-02-17_GW-042523	Aqueous	PFHxS	PFAS by ID	10		ng/L	18

Detection Summary (Continued)

Lot Number: YD26028

Sample	Sample ID	Matrix	Parameter	Method	Result	Q	Units	Page
006	MW-02-17_GW-042523	Aqueous	PFBA	PFAS by ID	12		ng/L	18
006	MW-02-17_GW-042523	Aqueous	PFHpA	PFAS by ID	6.4	M-03	ng/L	18
006	MW-02-17_GW-042523	Aqueous	PFHxA	PFAS by ID	11	M-03	ng/L	18
006	MW-02-17_GW-042523	Aqueous	PFOA	PFAS by ID	7.7	M-03	ng/L	18
006	MW-02-17_GW-042523	Aqueous	PFPeA	PFAS by ID	7.2		ng/L	18

(48 detections)

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD26028-001**

Description: **MWM16-37_GW-042523** Matrix: **Aqueous**

Date Sampled: **04/25/2023 1028** Project Name: **RACER PNC**

Date Received: **04/26/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/12/2023 0448	OMNS	05/10/2023 1430	74943

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	6.9	1.7	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**1.4**	**JM-03**	**3.5**	**0.86**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**0.93**	**JM-03**	**3.5**	**0.86**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**5.8**	**M-03**	**3.5**	**0.86**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**6.4**	**M-03**	**3.5**	**0.86**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**1.5**	**J**	**3.5**	**0.86**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**1.9**	**JM-03**	**3.5**	**0.86**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**2.5**	**JM-03**	**3.5**	**0.86**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**2.0**	**J**	**3.5**	**0.86**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**4.4**	**M-03**	**3.5**	**0.86**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	174	50-150
13C2_6:2FTS		128	50-150
13C2_8:2FTS		108	50-150
13C2_PFDoA		81	50-150
13C2_PFTeDA		93	50-150
13C3_PFBS		111	50-150
13C3_PFHxS		116	50-150
13C3-HFPO-DA		101	50-150
13C4_PFBA		84	50-150
13C4_PFHpA		116	50-150
13C5_PFHxA		106	50-150
13C5_PFPeA		99	50-150
13C6_PFDA		101	50-150
13C7_PFUdA		92	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD26028-001**

Description: **MWM16-37_GW-042523** Matrix: **Aqueous**

Date Sampled: **04/25/2023 1028** Project Name: **RACER PNC**

Date Received: **04/26/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		111	50-150
13C8_PFOS		106	50-150
13C8_PFOSA		90	50-150
13C9_PFNA		115	50-150
d5-EtFOSAA		96	50-150
d3-MeFOSAA		100	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
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S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD26028-002**

Description: **MWM30-01_GW-042523** Matrix: **Aqueous**

Date Sampled: **04/25/2023 1040** Project Name: **RACER PNC**

Date Received: **04/26/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/12/2023 0319	ARC2	05/10/2023 1430	74943

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		8.1	2.0	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		8.1	2.0	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	8.1	2.0	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**34**	**Q**	**8.1**	**2.0**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	8.1	2.0	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		8.1	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		8.1	2.0	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		8.1	2.0	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		8.1	2.0	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**4.6**	**M-03**	**4.0**	**1.0**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**2.4**	**JM-03**	**4.0**	**1.0**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**8.3**	**M-03**	**4.0**	**1.0**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**24**	**QM-03**	**4.0**	**1.0**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**15**		**4.0**	**1.0**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**20**	**M-03**	**4.0**	**1.0**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**45**		**4.0**	**1.0**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**18**	**M-03**	**4.0**	**1.0**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		4.0	1.0	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	223	50-150
13C2_6:2FTS	N	243	50-150
13C2_8:2FTS	N	193	50-150
13C2_PFDoA		90	50-150
13C2_PFTeDA		95	50-150
13C3_PFBS		77	50-150
13C3_PFHxS		99	50-150
13C3-HFPO-DA		74	50-150
13C4_PFBA	N	26	50-150
13C4_PFHpA		90	50-150
13C5_PFHxA		74	50-150
13C5_PFPeA		55	50-150
13C6_PFDA		108	50-150
13C7_PFUdA		101	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
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W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD26028-002**

Description: **MWM30-01_GW-042523** Matrix: **Aqueous**

Date Sampled: **04/25/2023 1040** Project Name: **RACER PNC**

Date Received: **04/26/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		98	50-150
13C8_PFOS		106	50-150
13C8_PFOSA		103	50-150
13C9_PFNA		113	50-150
d5-EtFOSAA		118	50-150
d3-MeFOSAA		114	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD26028-003**

Description: **MWM5-02_GW-042523** Matrix: **Aqueous**

Date Sampled: **04/25/2023 1210** Project Name: **RACER PNC**

Date Received: **04/26/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/12/2023 0332	ARC2	05/10/2023 1430	74943

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	6.9	1.7	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	6.9	1.7	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**0.95**	**JM-03**	**3.5**	**0.86**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND	M-03	3.5	0.86	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**2.5**	**J**	**3.5**	**0.86**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**1.0**	**JM-03**	**3.5**	**0.86**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**1.3**	**JM-03**	**3.5**	**0.86**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	196	50-150
13C2_6:2FTS	N	158	50-150
13C2_8:2FTS		125	50-150
13C2_PFDoA		105	50-150
13C2_PFTeDA		104	50-150
13C3_PFBS		117	50-150
13C3_PFHxS		116	50-150
13C3-HFPO-DA		111	50-150
13C4_PFBA		83	50-150
13C4_PFHpA		117	50-150
13C5_PFHxA		118	50-150
13C5_PFPeA		110	50-150
13C6_PFDA		109	50-150
13C7_PFUdA		99	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD26028-003**

Description: **MWM5-02_GW-042523** Matrix: **Aqueous**

Date Sampled: **04/25/2023 1210** Project Name: **RACER PNC**

Date Received: **04/26/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		119	50-150
13C8_PFOS		114	50-150
13C8_PFOSA		102	50-150
13C9_PFNA		119	50-150
d5-EtFOSAA		112	50-150
d3-MeFOSAA		112	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD26028-004**

Description: **MWF16-23_GW-042523** Matrix: **Aqueous**

Date Sampled: **04/25/2023 1307** Project Name: **RACER PNC**

Date Received: **04/26/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/12/2023 0526	OMNS	05/10/2023 1430	74943

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**6.7**	**M-03**	**3.5**	**0.87**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.87	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**1.3**	**JM-03**	**3.5**	**0.87**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.87	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.87	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**6.1**	**M-03**	**3.5**	**0.87**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**26**		**3.5**	**0.87**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**9.8**	**M-03**	**3.5**	**0.87**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.87	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.87	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**23**		**3.5**	**0.87**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**12**		**3.5**	**0.87**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	0.87	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**63**	**M-03**	**3.5**	**0.87**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**14**		**3.5**	**0.87**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.87	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.87	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.87	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.5	0.87	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		145	50-150
13C2_6:2FTS		97	50-150
13C2_8:2FTS		87	50-150
13C2_PFDoA		65	50-150
13C2_PFTeDA		71	50-150
13C3_PFBS		97	50-150
13C3_PFHxS		98	50-150
13C3-HFPO-DA		90	50-150
13C4_PFBA		65	50-150
13C4_PFHpA		96	50-150
13C5_PFHxA		95	50-150
13C5_PFPeA		93	50-150
13C6_PFDA		92	50-150
13C7_PFUdA		80	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
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L = LCS/LCSD failure
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD26028-004**

Description: **MWF16-23_GW-042523** Matrix: **Aqueous**

Date Sampled: **04/25/2023 1307** Project Name: **RACER PNC**

Date Received: **04/26/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		101	50-150
13C8_PFOS		89	50-150
13C8_PFOSA		85	50-150
13C9_PFNA		97	50-150
d5-EtFOSAA		73	50-150
d3-MeFOSAA		80	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD26028-005**

Description: **MWF12-02R_GW-042523** Matrix: **Aqueous**

Date Sampled: **04/25/2023 1425** Project Name: **RACER PNC**

Date Received: **04/26/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/12/2023 0539	OMNS	05/10/2023 1430	74943

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.6	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.6	1.9	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**3.7**	**JM-03**	**3.8**	**0.95**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.8	0.95	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.8	0.95	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.8	0.95	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.8	0.95	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**1.6**	**JM-03**	**3.8**	**0.95**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**5.9**	**M-03**	**3.8**	**0.95**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**22**	**M-03**	**3.8**	**0.95**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.8	0.95	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.8	0.95	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**4.4**	**M-03**	**3.8**	**0.95**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**12**		**3.8**	**0.95**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.8	0.95	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**11**	**M-03**	**3.8**	**0.95**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**14**	**M-03**	**3.8**	**0.95**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.8	0.95	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.8	0.95	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.8	0.95	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**4.0**	**M-03**	**3.8**	**0.95**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	239	50-150
13C2_6:2FTS	N	155	50-150
13C2_8:2FTS		112	50-150
13C2_PFDoA		83	50-150
13C2_PFTeDA		94	50-150
13C3_PFBS		103	50-150
13C3_PFHxS		108	50-150
13C3-HFPO-DA		97	50-150
13C4_PFBA		56	50-150
13C4_PFHpA		102	50-150
13C5_PFHxA		100	50-150
13C5_PFPeA		88	50-150
13C6_PFDA		101	50-150
13C7_PFUdA		97	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD26028-005**

Description: **MWF12-02R_GW-042523** Matrix: **Aqueous**

Date Sampled: **04/25/2023 1425** Project Name: **RACER PNC**

Date Received: **04/26/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		114	50-150
13C8_PFOS		105	50-150
13C8_PFOSA		94	50-150
13C9_PFNA		115	50-150
d5-EtFOSAA		94	50-150
d3-MeFOSAA		103	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD26028-006**

Description: **MW-02-17_GW-042523** Matrix: **Aqueous**

Date Sampled: **04/25/2023 1420** Project Name: **RACER PNC**

Date Received: **04/26/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/12/2023 0617	OMNS	05/10/2023 1430	74943

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		8.0	2.0	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		8.0	2.0	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		8.0	2.0	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		8.0	2.0	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		8.0	2.0	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		8.0	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		8.0	2.0	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		8.0	2.0	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		8.0	2.0	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**9.3**	**M-03**	**4.0**	**1.0**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**5.8**	**M-03**	**4.0**	**1.0**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**10**		**4.0**	**1.0**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**12**		**4.0**	**1.0**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**6.4**	**M-03**	**4.0**	**1.0**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**11**	**M-03**	**4.0**	**1.0**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**7.7**	**M-03**	**4.0**	**1.0**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**7.2**		**4.0**	**1.0**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		4.0	1.0	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		111	50-150
13C2_6:2FTS		87	50-150
13C2_8:2FTS		89	50-150
13C2_PFDoA		75	50-150
13C2_PFTeDA		83	50-150
13C3_PFBS		94	50-150
13C3_PFHxS		94	50-150
13C3-HFPO-DA		88	50-150
13C4_PFBA		70	50-150
13C4_PFHpA		90	50-150
13C5_PFHxA		90	50-150
13C5_PFPeA		90	50-150
13C6_PFDA		84	50-150
13C7_PFUdA		84	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD26028-006**

Description: **MW-02-17_GW-042523** Matrix: **Aqueous**

Date Sampled: **04/25/2023 1420** Project Name: **RACER PNC**

Date Received: **04/26/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		92	50-150
13C8_PFOS		89	50-150
13C8_PFOSA		78	50-150
13C9_PFNA		94	50-150
d5-EtFOSAA		77	50-150
d3-MeFOSAA		84	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD26028-007**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **04/25/2023 1730** Project Name: **RACER PNC**

Date Received: **04/26/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/12/2023 0630	OMNS	05/10/2023 1430	74943

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.7	0.92	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		100	50-150
13C2_6:2FTS		92	50-150
13C2_8:2FTS		99	50-150
13C2_PFDoA		86	50-150
13C2_PFTeDA		98	50-150
13C3_PFBS		97	50-150
13C3_PFHxS		105	50-150
13C3-HFPO-DA		98	50-150
13C4_PFBA		101	50-150
13C4_PFHpA		102	50-150
13C5_PFHxA		101	50-150
13C5_PFPeA		103	50-150
13C6_PFDA		99	50-150
13C7_PFUdA		96	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
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H = Out of holding time
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S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD26028-007**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **04/25/2023 1730** Project Name: **RACER PNC**

Date Received: **04/26/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		99	50-150
13C8_PFOS		97	50-150
13C8_PFOSA		88	50-150
13C9_PFNA		106	50-150
d5-EtFOSAA		92	50-150
d3-MeFOSAA		98	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
Q = Surrogate failure
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QC Summary

PFAS by LC/MS/MS - MB

Sample ID: YQ74943-001
Batch: 74943
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/10/2023 1430

Parameter	Result	Q	Dil	LOQ	DL	Units	Analysis Date
9Cl-PF3ONS	ND		1	8.0	2.0	ng/L	05/12/2023 0125
11Cl-PF3OUdS	ND		1	8.0	2.0	ng/L	05/12/2023 0125
8:2 FTS	ND		1	8.0	2.0	ng/L	05/12/2023 0125
6:2 FTS	ND		1	8.0	2.0	ng/L	05/12/2023 0125
4:2 FTS	ND		1	8.0	2.0	ng/L	05/12/2023 0125
GenX	ND		1	8.0	2.0	ng/L	05/12/2023 0125
ADONA	ND		1	8.0	2.0	ng/L	05/12/2023 0125
EtFOSAA	ND		1	8.0	2.0	ng/L	05/12/2023 0125
MeFOSAA	ND		1	8.0	2.0	ng/L	05/12/2023 0125
PFBS	ND		1	4.0	1.0	ng/L	05/12/2023 0125
PFDS	ND		1	4.0	1.0	ng/L	05/12/2023 0125
PFHpS	ND		1	4.0	1.0	ng/L	05/12/2023 0125
PFNS	ND		1	4.0	1.0	ng/L	05/12/2023 0125
PFOSA	ND		1	4.0	1.0	ng/L	05/12/2023 0125
PFPeS	ND		1	4.0	1.0	ng/L	05/12/2023 0125
PFHxS	ND		1	4.0	1.0	ng/L	05/12/2023 0125
PFBA	ND		1	4.0	1.0	ng/L	05/12/2023 0125
PFDA	ND		1	4.0	1.0	ng/L	05/12/2023 0125
PFDoA	ND		1	4.0	1.0	ng/L	05/12/2023 0125
PFHpA	ND		1	4.0	1.0	ng/L	05/12/2023 0125
PFHxA	ND		1	4.0	1.0	ng/L	05/12/2023 0125
PFNA	ND		1	4.0	1.0	ng/L	05/12/2023 0125
PFOA	ND		1	4.0	1.0	ng/L	05/12/2023 0125
PFPeA	ND		1	4.0	1.0	ng/L	05/12/2023 0125
PFTeDA	ND		1	4.0	1.0	ng/L	05/12/2023 0125
PFTrDA	ND		1	4.0	1.0	ng/L	05/12/2023 0125
PFUdA	ND		1	4.0	1.0	ng/L	05/12/2023 0125
PFOS	ND		1	4.0	1.0	ng/L	05/12/2023 0125

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		114	50-150
13C2_6:2FTS		106	50-150
13C2_8:2FTS	M-03	121	50-150
13C2_PFDoA		112	50-150
13C2_PFTeDA		108	50-150
13C3_PFBS		112	50-150
13C3_PFHxS		114	50-150
13C3-HFPO-DA		114	50-150
13C4_PFBA		115	50-150
13C4_PFHpA		110	50-150
13C5_PFHxA		117	50-150
13C5_PFPeA		121	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: YQ74943-001
Batch: 74943
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/10/2023 1430

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		109	50-150
13C7_PFUdA		108	50-150
13C8_PFOA		112	50-150
13C8_PFOS		123	50-150
13C8_PFOSA		104	50-150
13C9_PFNA		114	50-150
d5-EtFOSAA		113	50-150
d3-MeFOSAA		112	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ74943-002
Batch: 74943
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/10/2023 1430

Parameter	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	%Rec Limit	Analysis Date
9Cl-PF3ONS	15	14		1	95	50-150	05/12/2023 0138
11Cl-PF3OUdS	15	15		1	97	50-150	05/12/2023 0138
8:2 FTS	15	15		1	101	67-138	05/12/2023 0138
6:2 FTS	15	15		1	102	64-140	05/12/2023 0138
4:2 FTS	15	15		1	98	63-143	05/12/2023 0138
GenX	32	32		1	99	50-150	05/12/2023 0138
ADONA	15	15		1	101	50-150	05/12/2023 0138
EtFOSAA	16	16	M-03	1	98	61-135	05/12/2023 0138
MeFOSAA	16	16		1	101	65-136	05/12/2023 0138
PFBS	14	13		1	94	72-130	05/12/2023 0138
PFDS	15	15		1	100	53-142	05/12/2023 0138
PFHpS	15	15		1	96	69-134	05/12/2023 0138
PFNS	15	15		1	97	69-127	05/12/2023 0138
PFOSA	16	15		1	94	67-137	05/12/2023 0138
PFPeS	15	14		1	95	71-127	05/12/2023 0138
PFHxS	15	14		1	99	68-131	05/12/2023 0138
PFBA	16	15		1	95	73-129	05/12/2023 0138
PFDA	16	15		1	97	71-129	05/12/2023 0138
PFDoA	16	17		1	105	72-134	05/12/2023 0138
PFHpA	16	16		1	101	72-130	05/12/2023 0138
PFHxA	16	16		1	102	72-129	05/12/2023 0138
PFNA	16	16		1	101	69-130	05/12/2023 0138
PFOA	16	16		1	98	71-133	05/12/2023 0138
PFPeA	16	15		1	94	72-129	05/12/2023 0138
PFTeDA	16	14		1	91	71-132	05/12/2023 0138
PFTrDA	16	17		1	106	65-144	05/12/2023 0138
PFUdA	16	16		1	100	69-133	05/12/2023 0138
PFOS	15	14	M-03	1	94	65-140	05/12/2023 0138

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		108	50-150
13C2_6:2FTS		101	50-150
13C2_8:2FTS		110	50-150
13C2_PFDoA		109	50-150
13C2_PFTeDA		109	50-150
13C3_PFBS		113	50-150
13C3_PFHxS		112	50-150
13C3-HFPO-DA		112	50-150
13C4_PFBA		113	50-150
13C4_PFHpA		113	50-150
13C5_PFHxA		114	50-150
13C5_PFPeA		118	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ74943-002
Batch: 74943
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/10/2023 1430

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		107	50-150
13C7_PFUdA		103	50-150
13C8_PFOA		116	50-150
13C8_PFOS		115	50-150
13C8_PFOSA		109	50-150
13C9_PFNA		114	50-150
d5-EtFOSAA		113	50-150
d3-MeFOSAA		113	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MS

Sample ID: YD26028-001MS
Batch: 74943
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/10/2023 1430

Parameter	Sample Amount (ng/L)	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	%Rec Limit	Analysis Date
9Cl-PF3ONS	ND	13	13		1	98	50-150	05/12/2023 0501
11Cl-PF3OUdS	ND	13	12		1	95	50-150	05/12/2023 0501
8:2 FTS	ND	13	15		1	117	67-138	05/12/2023 0501
6:2 FTS	ND	13	14		1	109	64-140	05/12/2023 0501
4:2 FTS	ND	13	13	M-03	1	104	63-143	05/12/2023 0501
GenX	ND	28	28		1	103	50-150	05/12/2023 0501
ADONA	ND	13	13		1	100	50-150	05/12/2023 0501
EtFOSAA	ND	14	15	M-03	1	110	61-135	05/12/2023 0501
MeFOSAA	ND	14	15	M-03	1	106	65-136	05/12/2023 0501
PFBS	1.4	12	14		1	102	72-130	05/12/2023 0501
PFDS	ND	13	13		1	94	53-142	05/12/2023 0501
PFHpS	ND	13	14		1	104	69-134	05/12/2023 0501
PFNS	ND	13	13		1	96	69-127	05/12/2023 0501
PFOSA	ND	14	17	M-03	1	120	67-137	05/12/2023 0501
PFPeS	0.93	13	15		1	116	71-127	05/12/2023 0501
PFHxS	5.8	13	19		1	104	68-131	05/12/2023 0501
PFBA	6.4	14	22	M-03	1	109	73-129	05/12/2023 0501
PFDA	ND	14	14		1	105	71-129	05/12/2023 0501
PFDoA	ND	14	15		1	111	72-134	05/12/2023 0501
PFHpA	1.5	14	15		1	100	72-130	05/12/2023 0501
PFHxA	1.9	14	17		1	106	72-129	05/12/2023 0501
PFNA	ND	14	15		1	111	69-130	05/12/2023 0501
PFOA	2.5	14	17	M-03	1	108	71-133	05/12/2023 0501
PFPeA	2.0	14	15		1	95	72-129	05/12/2023 0501
PFTeDA	ND	14	14		1	101	71-132	05/12/2023 0501
PFTrDA	ND	14	15		1	111	65-144	05/12/2023 0501
PFUdA	ND	14	15		1	108	69-133	05/12/2023 0501
PFOS	4.4	13	17	M-03	1	102	65-140	05/12/2023 0501

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS	N	163	50-150
13C2_6:2FTS		132	50-150
13C2_8:2FTS		104	50-150
13C2_PFDoA		86	50-150
13C2_PFTeDA		88	50-150
13C3_PFBS		100	50-150
13C3_PFHxS		109	50-150
13C3-HFPO-DA		101	50-150
13C4_PFBA		78	50-150
13C4_PFHpA		104	50-150
13C5_PFHxA		102	50-150
13C5_PFPeA		102	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MS

Sample ID: YD26028-001MS
Batch: 74943
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/10/2023 1430

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		98	50-150
13C7_PFUdA		92	50-150
13C8_PFOA		105	50-150
13C8_PFOS		99	50-150
13C8_PFOSA		87	50-150
13C9_PFNA		108	50-150
d5-EtFOSAA		87	50-150
d3-MeFOSAA		98	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MSD

Sample ID: YD26028-001MD
Batch: 74943
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/10/2023 1430

Parameter	Sample Amount (ng/L)	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	% RPD	%Rec Limit	% RPD Limit	Analysis Date
9Cl-PF3ONS	ND	13	12		1	96	3.1	50-150	30	05/12/2023 0514
11Cl-PF3OUdS	ND	13	12		1	96	0.67	50-150	30	05/12/2023 0514
8:2 FTS	ND	13	14		1	104	12	67-138	30	05/12/2023 0514
6:2 FTS	ND	13	14		1	111	1.5	64-140	30	05/12/2023 0514
4:2 FTS	ND	13	14	M-03	1	107	2.2	63-143	30	05/12/2023 0514
GenX	ND	28	28		1	103	0.035	50-150	30	05/12/2023 0514
ADONA	ND	13	13		1	100	0.83	50-150	30	05/12/2023 0514
EtFOSAA	ND	14	15		1	109	1.4	61-135	30	05/12/2023 0514
MeFOSAA	ND	14	16	M-03	1	114	6.3	65-136	30	05/12/2023 0514
PFBS	1.4	12	14		1	100	1.7	72-130	30	05/12/2023 0514
PFDS	ND	13	12		1	93	2.0	53-142	30	05/12/2023 0514
PFHpS	ND	13	13		1	102	1.9	69-134	30	05/12/2023 0514
PFNS	ND	13	12		1	93	3.9	69-127	30	05/12/2023 0514
PFOSA	ND	14	16		1	118	2.7	67-137	30	05/12/2023 0514
PFPeS	0.93	13	14		1	106	8.8	71-127	30	05/12/2023 0514
PFHxS	5.8	13	19		1	105	0.17	68-131	30	05/12/2023 0514
PFBA	6.4	14	22	M-03	1	110	0.048	73-129	30	05/12/2023 0514
PFDA	ND	14	14		1	100	4.5	71-129	30	05/12/2023 0514
PFDoA	ND	14	15		1	110	1.0	72-134	30	05/12/2023 0514
PFHpA	1.5	14	15		1	97	4.0	72-130	30	05/12/2023 0514
PFHxA	1.9	14	16		1	101	5.3	72-129	30	05/12/2023 0514
PFNA	ND	14	15		1	105	5.7	69-130	30	05/12/2023 0514
PFOA	2.5	14	17	M-03	1	103	5.0	71-133	30	05/12/2023 0514
PFPeA	2.0	14	15		1	97	0.75	72-129	30	05/12/2023 0514
PFTeDA	ND	14	13		1	98	3.8	71-132	30	05/12/2023 0514
PFTrDA	ND	14	15		1	109	2.1	65-144	30	05/12/2023 0514
PFUdA	ND	14	14		1	101	7.2	69-133	30	05/12/2023 0514
PFOS	4.4	13	16	M-03	1	92	7.8	65-140	30	05/12/2023 0514

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS	N	170	50-150
13C2_6:2FTS		125	50-150
13C2_8:2FTS		108	50-150
13C2_PFDoA		88	50-150
13C2_PFTeDA		94	50-150
13C3_PFBS		108	50-150
13C3_PFHxS		108	50-150
13C3-HFPO-DA		100	50-150
13C4_PFBA		80	50-150
13C4_PFHpA		112	50-150
13C5_PFHxA		108	50-150
13C5_PFPeA		101	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MSD

Sample ID: YD26028-001MD
Batch: 74943
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/10/2023 1430

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		104	50-150
13C7_PFUdA		103	50-150
13C8_PFOA		112	50-150
13C8_PFOS		103	50-150
13C8_PFOSA		90	50-150
13C9_PFNA		114	50-150
d5-EtFOSAA		95	50-150
d3-MeFOSAA		100	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MS

Sample ID: YD26028-005MS
Batch: 74943
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/10/2023 1430

Parameter	Sample Amount (ng/L)	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	%Rec Limit	Analysis Date
9Cl-PF3ONS	ND	14	12		1	90	50-150	05/12/2023 0552
11Cl-PF3OUdS	ND	14	12		1	85	50-150	05/12/2023 0552
8:2 FTS	ND	14	13	M-03	1	91	67-138	05/12/2023 0552
6:2 FTS	ND	14	14		1	100	64-140	05/12/2023 0552
4:2 FTS	ND	14	12	M-03	1	90	63-143	05/12/2023 0552
GenX	ND	29	28		1	98	50-150	05/12/2023 0552
ADONA	ND	14	13		1	95	50-150	05/12/2023 0552
EtFOSAA	ND	15	15		1	104	61-135	05/12/2023 0552
MeFOSAA	ND	15	15	M-03	1	101	65-136	05/12/2023 0552
PFBS	3.7	13	15		1	91	72-130	05/12/2023 0552
PFDS	ND	14	12		1	89	53-142	05/12/2023 0552
PFHpS	ND	14	14		1	105	69-134	05/12/2023 0552
PFNS	ND	14	12		1	88	69-127	05/12/2023 0552
PFOSA	ND	15	15		1	102	67-137	05/12/2023 0552
PFPeS	1.6	14	15		1	96	71-127	05/12/2023 0552
PFHxS	5.9	13	18		1	93	68-131	05/12/2023 0552
PFBA	22	15	37	M-03	1	102	73-129	05/12/2023 0552
PFDA	ND	15	16		1	108	71-129	05/12/2023 0552
PFDoA	ND	15	15		1	102	72-134	05/12/2023 0552
PFHpA	4.4	15	18		1	97	72-130	05/12/2023 0552
PFHxA	12	15	24		1	88	72-129	05/12/2023 0552
PFNA	ND	15	15		1	103	69-130	05/12/2023 0552
PFOA	11	15	25		1	103	71-133	05/12/2023 0552
PFPeA	14	15	30		1	106	72-129	05/12/2023 0552
PFTeDA	ND	15	15		1	100	71-132	05/12/2023 0552
PFTrDA	ND	15	16		1	111	65-144	05/12/2023 0552
PFUdA	ND	15	15		1	105	69-133	05/12/2023 0552
PFOS	4.0	13	17	M-03	1	98	65-140	05/12/2023 0552

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS	N	250	50-150
13C2_6:2FTS	N	170	50-150
13C2_8:2FTS		125	50-150
13C2_PFDoA		83	50-150
13C2_PFTeDA		94	50-150
13C3_PFBS		104	50-150
13C3_PFHxS		111	50-150
13C3-HFPO-DA		98	50-150
13C4_PFBA		55	50-150
13C4_PFHpA		107	50-150
13C5_PFHxA		103	50-150
13C5_PFPeA		88	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MS

Sample ID: YD26028-005MS
Batch: 74943
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/10/2023 1430

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		97	50-150
13C7_PFUdA		96	50-150
13C8_PFOA		110	50-150
13C8_PFOS		107	50-150
13C8_PFOSA		95	50-150
13C9_PFNA		108	50-150
d5-EtFOSAA		95	50-150
d3-MeFOSAA		104	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MSD

Sample ID: YD26028-005MD
Batch: 74943
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/10/2023 1430

Parameter	Sample Amount (ng/L)	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	% RPD	%Rec Limit	% RPD Limit	Analysis Date
9Cl-PF3ONS	ND	13	13		1	97	5.1	50-150	30	05/12/2023 0604
11Cl-PF3OUdS	ND	13	12		1	90	2.9	50-150	30	05/12/2023 0604
8:2 FTS	ND	14	14		1	102	8.0	67-138	30	05/12/2023 0604
6:2 FTS	ND	13	14		1	107	3.3	64-140	30	05/12/2023 0604
4:2 FTS	ND	13	14	M-03	1	104	12	63-143	30	05/12/2023 0604
GenX	ND	28	29		1	103	2.4	50-150	30	05/12/2023 0604
ADONA	ND	13	13		1	100	2.9	50-150	30	05/12/2023 0604
EtFOSAA	ND	14	15		1	107	0.26	61-135	30	05/12/2023 0604
MeFOSAA	ND	14	15	M-03	1	108	3.3	65-136	30	05/12/2023 0604
PFBS	3.7	12	15	M-03	1	91	2.1	72-130	30	05/12/2023 0604
PFDS	ND	14	13		1	93	1.9	53-142	30	05/12/2023 0604
PFHpS	ND	13	14		1	105	2.6	69-134	30	05/12/2023 0604
PFNS	ND	14	12		1	89	0.98	69-127	30	05/12/2023 0604
PFOSA	ND	14	15		1	107	1.8	67-137	30	05/12/2023 0604
PFPeS	1.6	13	16		1	109	8.5	71-127	30	05/12/2023 0604
PFHxS	5.9	13	19		1	105	6.2	68-131	30	05/12/2023 0604
PFBA	22	14	36	M-03	1	102	1.4	73-129	30	05/12/2023 0604
PFDA	ND	14	14	M-03	1	101	8.9	71-129	30	05/12/2023 0604
PFDoA	ND	14	15		1	108	3.0	72-134	30	05/12/2023 0604
PFHpA	4.4	14	18		1	98	1.2	72-130	30	05/12/2023 0604
PFHxA	12	14	26		1	98	4.6	72-129	30	05/12/2023 0604
PFNA	ND	14	14		1	97	8.7	69-130	30	05/12/2023 0604
PFOA	11	14	25		1	103	1.3	71-133	30	05/12/2023 0604
PFPeA	14	14	29	M-03	1	108	0.37	72-129	30	05/12/2023 0604
PFTeDA	ND	14	14		1	98	4.5	71-132	30	05/12/2023 0604
PFTrDA	ND	14	16		1	114	0.44	65-144	30	05/12/2023 0604
PFUdA	ND	14	14		1	97	10	69-133	30	05/12/2023 0604
PFOS	4.0	13	17	M-03	1	98	1.6	65-140	30	05/12/2023 0604

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS	N	242	50-150
13C2_6:2FTS	N	164	50-150
13C2_8:2FTS		115	50-150
13C2_PFDoA		86	50-150
13C2_PFTeDA		99	50-150
13C3_PFBS		97	50-150
13C3_PFHxS		107	50-150
13C3-HFPO-DA		95	50-150
13C4_PFBA		53	50-150
13C4_PFHpA		109	50-150
13C5_PFHxA		97	50-150
13C5_PFPeA		84	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MSD

Sample ID: YD26028-005MD
Batch: 74943
Analytical Method: PFAS by ID SOP QSM B-15

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 05/10/2023 1430

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		103	50-150
13C7_PFUdA		99	50-150
13C8_PFOA		108	50-150
13C8_PFOS		103	50-150
13C8_PFOSA		93	50-150
13C9_PFNA		118	50-150
d5-EtFOSAA		94	50-150
d3-MeFOSAA		95	50-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Chain of Custody
and
Miscellaneous Documents

Pace Analytical

PACE ANALYTICAL SERVICES, LLC
108 Vantage Point Drive • West Columbia, SC 29172
Telephone No. 803-791-9700 Fax No. 803-791-9111
www.pacelabs.com

Number 146507

Client: Arcadis	Report to Contact: Tiffany Linder, Alexis Crisp	Telephone No. / E-mail: Tiffany.Linder@arcadis.com, Alexis.Crisp@arcadis.com	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: x Sommer Guy	Analysis (Attach list if more space is needed): Report EGLE 24 Compounds	Page 1 of 1
City: Novi / State: MI / Zip Code: 48377	Printed Name: Sommer Guy Lotte Jay		YD26028
Project Name: RacerPNC			KES2
Project No.: 30167840.00030	P.O. No.		

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Grab (G) / Composite (C)	Matrix: Aqueous	Soil	Non-Aqueous	No of Containers by Preservative Type: Unpres.	H2SO4	HNO3	HCl	NaOH	NaS2O3	Methanol	Filtered (Y/N)	Remarks / Cooler I.D.
MWM16-37_GW-042523	4/25/23	1028	G	6			6							X	Run MS/MSD
MWM30-01_GW-042523	4/25/23	1040	G	2			2							X	
MWM5-02_GW-042523	4/25/23	1210	G	2			2							X	
MWF16-23_GW-042523	4/25/23	1307	G	2			2							X	
MWF12-02R_GW-042523	4/25/23	1425	G	6			6							X	Run MS/MSD
MW-02-17_GW-042523	4/25/23	1420	G	2			2							X	
trip blank	4/25/23	1730	G	1			1							X	

Turn Around Time Required (Prior lab approval required for expedited TAT.): X Standard ☐ Rush (Specify)

Sample Disposal: ☐ Return to Client X Dispose by Lab

Possible Hazard Identification: X Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: Sommer Guy	4/25/23	1750	1. Received by: FedEx	4/25/23	1750
2. Relinquished by	Date	Time	2. Received by	Date	Time
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by: FedEx	4/26/23	1025	4. Laboratory received by	4/26/23	1025

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY: Received on ice (Circle) (Yes) No Ice Pack; Receipt Temp. 1.7 °C; Temp Blank ☐ Y ☐ N

DISTRIBUTION: WHITE & YELLOW-Return to laboratory with Sample(s); PINK-Field/Client Copy

Document Number: (illegible)

PACE ANALYTICAL SERVICES, LLC

DC#_Title: ENV-FRM-WCOL-0286 v02_Samples Receipt Checklist (SRC)
Effective Date: 8/2/2022

Sample Receipt Checklist (SRC)

Client: ARCADIS Cooler Inspected by/date: CDR / 04/26/2023 Lot #: YD26028

Means of receipt: ☐ Pace ☐ Client ☐ UPS ☑ FedEx ☐ Other: _____

☑ Yes	☐ No		1. Were custody seals present on the cooler?
☑ Yes	☐ No	☐ NA	2. If custody seals were present, were they intact and unbroken?

pH Strip ID: NA Chlorine Strip ID: NA Tested by: NA
Original temperature upon receipt / Derived (Corrected) temperature upon receipt %Solid Snap-Cup ID: NA
1.6 / 1.6 °C NA / NA °C NA / NA °C NA / NA °C
Method: ☑ Temperature Blank ☐ Against Bottles IR Gun ID: 8 IR Gun Correction Factor: 0 °C
Method of coolant: ☑ Wet Ice ☐ Ice Packs ☐ Dry Ice ☐ None

☑ Yes	☐ No	☐ NA	3. Were all coolers received at or below 6.0°C? If no, was Project Manager notified? PM was Notified by: phone / email / face-to-face (circle one).
☑ Yes	☐ No	☐ NA	4. Is the commercial courier's packing slip attached to this form?
☑ Yes	☐ No		5. Were proper custody procedures (relinquished/received) followed?
☑ Yes	☐ No		6. Were sample IDs listed on the COC and all sample containers?
☑ Yes	☐ No		7. Was collection date & time listed on the COC and all sample containers?
☑ Yes	☐ No		8. Did all container label information (ID, date, time) agree with the COC?
☑ Yes	☐ No		9. Were tests to be performed listed on the COC?
☑ Yes	☐ No		10. Did all samples arrive in the proper containers for each test and/or in good condition (unbroken, lids on, etc.)? _____
☑ Yes	☐ No		11. Was adequate sample volume available?
☑ Yes	☐ No		12. Were all samples received within ½ the holding time or 48 hours, whichever comes first?
☑ Yes	☐ No		13. Were all samples containers accounted for? (No missing/excess)
☐ Yes	☐ No	☑ NA	14. Were VOA, 8015C and RSK-175 samples free of bubbles >"pea-size" (¼" or 6mm in diameter) in any of the VOA vials?
☐ Yes	☐ No	☑ NA	15. Were all DRO/metals/nutrient samples received at a pH of < 2?
☐ Yes	☐ No	☑ NA	16. Were all cyanide samples received at a pH > 12 and sulfide samples received at a pH > 9?
☐ Yes	☐ No	☑ NA	17. Were all applicable NH_3/TKN/cyanide/phenol/625.1/608.3 (< 0.5mg/L) samples free of residual chlorine?
☑ Yes	☐ No	☐ NA	18. Was the quote number listed on the container label? If yes, Quote # 25015

Sample Preservation (Must be completed for any sample(s) incorrectly preserved or with headspace.)

Sample(s) NA were received incorrectly preserved and were adjusted accordingly in sample receiving with NA mL of circle one: H_2SO_4, HNO_3, HCl, NaOH using SR # NA. ☐
Time of preservation NA. If more than one preservative is needed, please note in the comments below.

Sample(s) NA were received with bubbles >6 mm in diameter.

Samples(s) NA were received with TRC > 0.5 mg/L (If #19 is *no*) and were adjusted accordingly in sample receiving with sodium thiosulfate ($Na_2S_2O_3$) with Unique ID: NA.

Comments:

Report of Analysis

Arcadis U.S., Inc.
630 Plaza Drive
Suite 600
Highlands Ranch, CO 80129
Attention: Tiffany Linder

Project Name: RACER PNC

Project Number: 30167840.00031

Lot Number:**YI26004**

Date Completed:10/20/2023

Project Manager:**Kathy E. Smith**

10/20/2023 12:46 PM
Approved and released by:
Account Executive: **Teresa A. Brailsford**

The electronic signature above is the equivalent of a handwritten signature.
This report shall not be reproduced, except in its entirety, without the written approval of Pace Analytical Services, LLC.

Case Narrative
Arcadis U.S., Inc.
Lot Number: YI26004

This Report of Analysis contains the analytical result(s) for the sample(s) listed on the Sample Summary following this Case Narrative. The sample receiving date is documented in the header information associated with each sample.

All results listed in this report relate only to the samples that are contained within this report. Where sampling is conducted by the client, results relate to the accuracy of the information provided, and as the samples are received.

Sample receipt, sample analysis, and data review have been performed in accordance with the most current approved The NELAC Institute (TNI) standards, the Pace Analytical Services, LLC ("Pace") Laboratory Quality Manual, standard operating procedures (SOPs), and Pace policies. Any exceptions to the TNI standards, the Laboratory Quality Manual, SOPs or policies are qualified on the results page or discussed below.

Pace is a TNI accredited laboratory; however, the following analyses are currently not listed on our TNI scope of accreditation: Drinking Water: VOC (excluding BTEX, MTBE, Naphthalene, & 1,2-dichloroethane) EPA 524.2, E. coli and Total coliforms SM 9223 B-2004, Solid Chemical Material: TOC Walkley-Black, Biological Tissue: All, Non-Potable Water: SGT-HEM EPA 1664B, Silica EPA 200.7, Boron, Calcium, Silicon, Strontium EPA 200.8, Bicarbonate, Carbonate, and Hydroxide Alkalinity SM 2320 B-2011, SM 9221 C E-2006 & SM 9222D-2006, Strontium SW-846 6010D, VOC SM 6200 B-2011, Fecal Coliform Colilert-18, PFAS by Isotope Dilution SOP.

If you have any questions regarding this report, please contact the Pace Project Manager listed on the cover page.

PFAS - MI 28

Sample YI26004-005 (MW-43-14R_GW-092523) required centrifugation prior to extraction, due to excessive solids present in the samples. Centrifugation was performed following the PFAS Aqueous Centrifuge Protocol; samples were spiked with Surrogate (SUR; Extracted Internal Standard/EIS) and shaken vigorously before being poured into a conical bottle and centrifuged. The centrifuged aqueous sample was decanted back into the original sample bottle, off of the condensed solids remaining in the centrifuge bottle. The original sample bottle was rinsed as normal and centrifuge bottle was rinsed with 4mL of MeOH. Centrifuge bottle rinsate was added to the elution. Samples concentrated to <5mL and reconstituted to 5mL using MeOH by transfer pipet.

The continuing calibration verification (CCV) associated with sample YI26004-001 (MWM2-28_GW-092523) was outside of criteria for the following EIS: PFOSA. The data has been reported. EIS failed high, target analyte passed. Data will be reported.

Surrogate recovery for sample YI26004-001 (MWM2-28_GW-092523) was outside the upper control limit. This sample did not contain any target analytes > 1/2 LOQ; therefore, re-extraction and/or re-analysis was not performed. Data has been flagged with a “Q” qualifier.

Surrogate recovery for sample YI26004-005 (MW-43-14R_GW-092523) was outside control limits. Evidence of matrix interference is present; therefore, re-extraction and/or re-analysis was not performed. Data has been flagged with a “Q” qualifier.

Surrogate recovery for the sample YI26004-004 (MWM2-22_GW-092523) was outside the upper control limit. This sample did not contain any target analytes; therefore, re-extraction and/or re-analysis was not performed. Data has been flagged with a “Q” qualifier.

Sample (YI26004-004 (MWM2-22_GW-092523) was diluted due to the nature of the sample matrix (samples were foamy). The LOQ has been elevated to reflect the dilution.

Sample Summary

Arcadis U.S., Inc.

Lot Number: YI26004

Project Name: RACER PNC

Project Number: 30167840.00031

Sample Number	Sample ID	Matrix	Date Sampled	Date Received
001	MWM2-28_GW-092523	Aqueous	09/25/2023 1020	09/26/2023
002	EB-08_092523	Aqueous	09/25/2023 1025	09/26/2023
003	Trip Blank	Aqueous	09/25/2023 0925	09/26/2023
004	MWM2-22_GW-092523	Aqueous	09/25/2023 1115	09/26/2023
005	MW-43-14R_GW-092523	Aqueous	09/25/2023 1220	09/26/2023

(5 samples)

Detection Summary

Arcadis U.S., Inc.

Lot Number: YI26004

Project Name: RACER PNC

Project Number: 30167840.00031

Sample	Sample ID	Matrix	Parameter	Method	Result	Q	Units	Page
001	MWM2-28_GW-092523	Aqueous	8:2 FTS	PFAS by ID	2.0	JQ	ng/L	6
001	MWM2-28_GW-092523	Aqueous	6:2 FTS	PFAS by ID	3.4	JQ	ng/L	6
001	MWM2-28_GW-092523	Aqueous	PFHxS	PFAS by ID	7.0		ng/L	6
001	MWM2-28_GW-092523	Aqueous	PFBA	PFAS by ID	16		ng/L	6
001	MWM2-28_GW-092523	Aqueous	PFDA	PFAS by ID	2.2	J	ng/L	6
001	MWM2-28_GW-092523	Aqueous	PFHpA	PFAS by ID	8.3		ng/L	6
001	MWM2-28_GW-092523	Aqueous	PFHxA	PFAS by ID	18		ng/L	6
001	MWM2-28_GW-092523	Aqueous	PFNA	PFAS by ID	4.0		ng/L	6
001	MWM2-28_GW-092523	Aqueous	PFOA	PFAS by ID	16		ng/L	6
001	MWM2-28_GW-092523	Aqueous	PFPeA	PFAS by ID	17		ng/L	6
001	MWM2-28_GW-092523	Aqueous	PFOS	PFAS by ID	65		ng/L	6
004	MWM2-22_GW-092523	Aqueous	EtFOSAA	PFAS by ID	2.0	J	ng/L	12
004	MWM2-22_GW-092523	Aqueous	PFBS	PFAS by ID	7.4		ng/L	12
004	MWM2-22_GW-092523	Aqueous	PFHxS	PFAS by ID	8.7		ng/L	12
004	MWM2-22_GW-092523	Aqueous	PFBA	PFAS by ID	28		ng/L	12
004	MWM2-22_GW-092523	Aqueous	PFDA	PFAS by ID	1.9	J	ng/L	12
004	MWM2-22_GW-092523	Aqueous	PFHpA	PFAS by ID	14		ng/L	12
004	MWM2-22_GW-092523	Aqueous	PFHxA	PFAS by ID	28		ng/L	12
004	MWM2-22_GW-092523	Aqueous	PFNA	PFAS by ID	5.4		ng/L	12
004	MWM2-22_GW-092523	Aqueous	PFOA	PFAS by ID	26		ng/L	12
004	MWM2-22_GW-092523	Aqueous	PFPeA	PFAS by ID	27		ng/L	12
004	MWM2-22_GW-092523	Aqueous	PFOS	PFAS by ID	95		ng/L	12
005	MW-43-14R_GW-092523	Aqueous	PFHxS	PFAS by ID	16		ng/L	14
005	MW-43-14R_GW-092523	Aqueous	PFHpA	PFAS by ID	4.9		ng/L	14
005	MW-43-14R_GW-092523	Aqueous	PFNA	PFAS by ID	1.0	J	ng/L	14
005	MW-43-14R_GW-092523	Aqueous	PFOA	PFAS by ID	12		ng/L	14
005	MW-43-14R_GW-092523	Aqueous	PFOS	PFAS by ID	99		ng/L	14

(27 detections)

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI26004-001**

Description: **MWM2-28_GW-092523** Matrix: **Aqueous**

Date Sampled: **09/25/2023 1020** Project Name: **RACER PNC**

Date Received: **09/26/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	10/12/2023 0137	ELC2	10/10/2023 2002	87060

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.3	0.44	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.3	0.60	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	**39108-34-4**	**PFAS by ID SOP**	**2.0**	**JQ**	**7.3**	**1.5**	**ng/L**	**1**
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**3.4**	**JQ**	**7.3**	**1.8**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.3	0.80	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.3	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.3	0.44	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.3	0.68	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.3	0.85	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.6	0.38	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.71	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.6	0.45	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.65	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	0.56	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.6	0.54	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**7.0**		**3.6**	**0.50**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**16**		**3.6**	**0.55**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	**335-76-2**	**PFAS by ID SOP**	**2.2**	**J**	**3.6**	**0.48**	**ng/L**	**1**
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.43	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**8.3**		**3.6**	**0.41**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**18**		**3.6**	**0.63**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**4.0**		**3.6**	**0.42**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**16**		**3.6**	**0.76**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**17**		**3.6**	**0.50**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.55	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.48	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.57	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**65**		**3.6**	**1.8**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	308	25-150
13C2_6:2FTS	N	341	25-150
13C2_8:2FTS	N	361	25-150
13C2_PFDoA		110	25-150
13C2_PFTeDA		111	25-150
13C3_PFBS		89	25-150
13C3_PFHxS		96	25-150
13C3-HFPO-DA		69	25-150
13C4_PFBA		37	25-150
13C4_PFHpA		77	25-150
13C5_PFHxA		72	25-150
13C5_PFPeA		56	25-150
13C6_PFDA		107	25-150
13C7_PFUdA		110	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI26004-001**

Description: **MWM2-28_GW-092523** Matrix: **Aqueous**

Date Sampled: **09/25/2023 1020** Project Name: **RACER PNC**

Date Received: **09/26/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		99	25-150
13C8_PFOS		108	25-150
13C8_PFOSA		93	10-150
13C9_PFNA		104	25-150
d5-EtFOSAA		118	25-150
d3-MeFOSAA		128	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI26004-002**

Description: **EB-08_092523** Matrix: **Aqueous**

Date Sampled: **09/25/2023 1025** Project Name: **RACER PNC**

Date Received: **09/26/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	10/12/2023 1517	ELC2	10/10/2023 2002	87060

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.3	0.44	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.3	0.60	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.3	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.3	0.79	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.3	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.3	0.44	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.3	0.68	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.3	0.85	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.6	0.38	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.71	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.6	0.45	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.65	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	0.56	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.6	0.54	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.6	0.50	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.6	0.55	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	0.48	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.43	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.6	0.41	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.6	0.63	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.6	0.42	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.6	0.75	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.6	0.49	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.55	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.48	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.57	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.6	1.8	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		115	25-150
13C2_6:2FTS		122	25-150
13C2_8:2FTS		100	25-150
13C2_PFDoA		101	25-150
13C2_PFTeDA		103	25-150
13C3_PFBS		107	25-150
13C3_PFHxS		110	25-150
13C3-HFPO-DA		96	25-150
13C4_PFBA		107	25-150
13C4_PFHpA		100	25-150
13C5_PFHxA		102	25-150
13C5_PFPeA		105	25-150
13C6_PFDA		108	25-150
13C7_PFUdA		105	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
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L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI26004-002**

Description: **EB-08_092523** Matrix: **Aqueous**

Date Sampled: **09/25/2023 1025** Project Name: **RACER PNC**

Date Received: **09/26/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		113	25-150
13C8_PFOS		105	25-150
13C8_PFOSA		101	10-150
13C9_PFNA		102	25-150
d5-EtFOSAA		100	25-150
d3-MeFOSAA		97	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI26004-003**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **09/25/2023 0925** Project Name: **RACER PNC**

Date Received: **09/26/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	10/12/2023 1528	ELC2	10/10/2023 2002	87060

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		6.9	0.42	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		6.9	0.57	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		6.9	1.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		6.9	0.76	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		6.9	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		6.9	0.42	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		6.9	0.65	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		6.9	0.81	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.5	0.36	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.67	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.5	0.43	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.62	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.53	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.5	0.52	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.5	0.48	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.5	0.52	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.46	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.41	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.5	0.39	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.5	0.60	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	0.40	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.5	0.72	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.5	0.47	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.52	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.46	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.54	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.5	1.7	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		114	25-150
13C2_6:2FTS		118	25-150
13C2_8:2FTS		88	25-150
13C2_PFDoA		92	25-150
13C2_PFTeDA		88	25-150
13C3_PFBS		101	25-150
13C3_PFHxS		104	25-150
13C3-HFPO-DA		94	25-150
13C4_PFBA		105	25-150
13C4_PFHpA		96	25-150
13C5_PFHxA		102	25-150
13C5_PFPeA		104	25-150
13C6_PFDA		98	25-150
13C7_PFUdA		95	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
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H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI26004-003**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **09/25/2023 0925** Project Name: **RACER PNC**

Date Received: **09/26/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		99	25-150
13C8_PFOS		99	25-150
13C8_PFOSA		94	10-150
13C9_PFNA		93	25-150
d5-EtFOSAA		93	25-150
d3-MeFOSAA		98	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI26004-004**

Description: **MWM2-22_GW-092523** Matrix: **Aqueous**

Date Sampled: **09/25/2023 1115** Project Name: **RACER PNC**

Date Received: **09/26/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	10/12/2023 1539	ELC2	10/10/2023 2002	87060
2	SOP SPE	PFAS by ID SOP	1	10/18/2023 1905	BWS	10/17/2023 1806	87673

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.2	0.43	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.2	0.59	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		80	16	ng/L	2
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		80	20	ng/L	2
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.2	0.78	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.2	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.2	0.43	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	**2991-50-6**	**PFAS by ID SOP**	**2.0**	**J**	**7.2**	**0.67**	**ng/L**	**1**
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.2	0.83	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**7.4**		**3.6**	**0.37**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.70	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.6	0.45	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.64	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	0.55	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.6	0.53	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**8.7**		**3.6**	**0.49**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**28**		**3.6**	**0.54**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	**335-76-2**	**PFAS by ID SOP**	**1.9**	**J**	**3.6**	**0.47**	**ng/L**	**1**
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.42	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**14**		**3.6**	**0.40**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**28**		**3.6**	**0.62**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**5.4**		**3.6**	**0.41**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**26**		**3.6**	**0.74**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**27**		**3.6**	**0.49**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.54	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.47	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.56	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**95**		**3.6**	**1.8**	**ng/L**	**1**

Surrogate	Run 1 Q	Run 1 % Recovery	Run 1 Acceptance Limits	Run 2 Q	Run 2 % Recovery	Run 2 Acceptance Limits
13C2_4:2FTS	N	273	25-150	N	194	25-150
13C2_6:2FTS	N	253	25-150		145	25-150
13C2_8:2FTS	N	274	25-150		95	25-150
13C2_PFDoA		104	25-150		108	25-150
13C2_PFTeDA		96	25-150		106	25-150
13C3_PFBS		78	25-150		100	25-150
13C3_PFHxS		93	25-150		103	25-150
13C3-HFPO-DA		56	25-150		92	25-150
13C4_PFBA		29	25-150		79	25-150
13C4_PFHpA		60	25-150		106	25-150
13C5_PFHxA		59	25-150		111	25-150
13C5_PFPeA		42	25-150		93	25-150
13C6_PFDA		97	25-150		98	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
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DL = Detection Limit
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI26004-004**

Description: **MWM2-22_GW-092523** Matrix: **Aqueous**

Date Sampled: **09/25/2023 1115** Project Name: **RACER PNC**

Date Received: **09/26/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits	Q	Run 2 % Recovery	Acceptance Limits
13C7_PFUdA		109	25-150		110	25-150
13C8_PFOA		74	25-150		101	25-150
13C8_PFOS		99	25-150		104	25-150
13C8_PFOSA		77	10-150		97	10-150
13C9_PFNA		85	25-150		104	25-150
d5-EtFOSAA		117	25-150		116	25-150
d3-MeFOSAA		113	25-150		111	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
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W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI26004-005**

Description: **MW-43-14R_GW-092523** Matrix: **Aqueous**

Date Sampled: **09/25/2023 1220** Project Name: **RACER PNC**

Date Received: **09/26/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	10/12/2023 1550	ELC2	10/10/2023 2002	87060

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.1	0.43	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.1	0.59	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.1	1.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.1	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.1	0.78	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.1	0.43	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.1	0.67	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.1	0.83	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.6	0.37	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.69	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.6	0.44	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.63	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	0.55	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.6	0.53	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**16**		**3.6**	**0.49**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND	Q	3.6	0.53	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	0.47	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.42	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**4.9**		**3.6**	**0.40**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.6	0.61	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**1.0**	**J**	**3.6**	**0.41**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**12**		**3.6**	**0.74**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.6	0.48	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.53	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.47	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.56	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**99**		**3.6**	**1.8**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	308	25-150
13C2_6:2FTS	N	229	25-150
13C2_8:2FTS	N	287	25-150
13C2_PFDoA		96	25-150
13C2_PFTeDA		72	25-150
13C3_PFBS		77	25-150
13C3_PFHxS		85	25-150
13C3-HFPO-DA		49	25-150
13C4_PFBA	N	20	25-150
13C4_PFHpA		54	25-150
13C5_PFHxA		54	25-150
13C5_PFPeA		35	25-150
13C6_PFDA		99	25-150
13C7_PFUdA		100	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI26004-005**

Description: **MW-43-14R_GW-092523** Matrix: **Aqueous**

Date Sampled: **09/25/2023 1220** Project Name: **RACER PNC**

Date Received: **09/26/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		69	25-150
13C8_PFOS		98	25-150
13C8_PFOSA		80	10-150
13C9_PFNA		88	25-150
d5-EtFOSAA		115	25-150
d3-MeFOSAA		110	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
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QC Summary

PFAS by LC/MS/MS - MB

Sample ID: YQ87060-001
Batch: 87060
Analytical Method: PFAS by ID SOP
Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 10/10/2023 2002

Parameter	Result	Q	Dil	LOQ	DL	Units	Analysis Date
9Cl-PF3ONS	ND		1	8.0	0.48	ng/L	10/11/2023 2314
11Cl-PF3OUdS	ND		1	8.0	0.66	ng/L	10/11/2023 2314
8:2 FTS	ND		1	8.0	1.6	ng/L	10/11/2023 2314
6:2 FTS	ND		1	8.0	2.0	ng/L	10/11/2023 2314
4:2 FTS	ND		1	8.0	0.87	ng/L	10/11/2023 2314
GenX	ND		1	8.0	2.1	ng/L	10/11/2023 2314
ADONA	ND		1	8.0	0.48	ng/L	10/11/2023 2314
EtFOSAA	ND		1	8.0	0.75	ng/L	10/11/2023 2314
MeFOSAA	ND		1	8.0	0.93	ng/L	10/11/2023 2314
PFBS	ND		1	4.0	0.41	ng/L	10/11/2023 2314
PFDS	ND		1	4.0	0.78	ng/L	10/11/2023 2314
PFHpS	ND		1	4.0	0.50	ng/L	10/11/2023 2314
PFNS	ND		1	4.0	0.71	ng/L	10/11/2023 2314
PFOSA	ND		1	4.0	0.61	ng/L	10/11/2023 2314
PFPeS	ND		1	4.0	0.59	ng/L	10/11/2023 2314
PFHxS	ND		1	4.0	0.55	ng/L	10/11/2023 2314
PFBA	ND		1	4.0	0.60	ng/L	10/11/2023 2314
PFDA	ND		1	4.0	0.52	ng/L	10/11/2023 2314
PFDoA	ND		1	4.0	0.47	ng/L	10/11/2023 2314
PFHpA	ND		1	4.0	0.45	ng/L	10/11/2023 2314
PFHxA	ND		1	4.0	0.69	ng/L	10/11/2023 2314
PFNA	ND		1	4.0	0.46	ng/L	10/11/2023 2314
PFOA	ND		1	4.0	0.83	ng/L	10/11/2023 2314
PFPeA	ND		1	4.0	0.54	ng/L	10/11/2023 2314
PFTeDA	ND		1	4.0	0.60	ng/L	10/11/2023 2314
PFTrDA	ND		1	4.0	0.53	ng/L	10/11/2023 2314
PFUdA	ND		1	4.0	0.63	ng/L	10/11/2023 2314
PFOS	ND		1	4.0	2.0	ng/L	10/11/2023 2314

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		97	25-150
13C2_6:2FTS		115	25-150
13C2_8:2FTS		92	25-150
13C2_PFDoA		107	25-150
13C2_PFTeDA		103	25-150
13C3_PFBS		108	25-150
13C3_PFHxS		112	25-150
13C3-HFPO-DA		114	25-150
13C4_PFBA		108	25-150
13C4_PFHpA		110	25-150
13C5_PFHxA		103	25-150
13C5_PFPeA		106	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: YQ87060-001
Batch: 87060
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 10/10/2023 2002

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		106	25-150
13C7_PFUdA		100	25-150
13C8_PFOA		119	25-150
13C8_PFOS		111	25-150
13C8_PFOSA		118	10-150
13C9_PFNA		111	25-150
d5-EtFOSAA		94	25-150
d3-MeFOSAA		112	25-150

LOQ = Limit of Quantitation
DL = Detection Limit

ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria

N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ87060-002
Batch: 87060
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 10/10/2023 2002

Parameter	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	%Rec Limit	Analysis Date
9Cl-PF3ONS	15	13		1	90	50-150	10/11/2023 2325
11Cl-PF3OUdS	15	15		1	98	50-150	10/11/2023 2325
8:2 FTS	15	17		1	112	50-150	10/11/2023 2325
6:2 FTS	15	18		1	116	50-150	10/11/2023 2325
4:2 FTS	15	14		1	93	50-150	10/11/2023 2325
GenX	32	33		1	104	50-150	10/11/2023 2325
ADONA	15	16		1	106	50-150	10/11/2023 2325
EtFOSAA	16	16		1	101	50-150	10/11/2023 2325
MeFOSAA	16	15		1	91	50-150	10/11/2023 2325
PFBS	14	14		1	97	50-150	10/11/2023 2325
PFDS	15	14		1	93	50-150	10/11/2023 2325
PFHpS	15	15		1	96	50-150	10/11/2023 2325
PFNS	15	16		1	103	50-150	10/11/2023 2325
PFOSA	16	16		1	97	50-150	10/11/2023 2325
PFPeS	15	15		1	97	50-150	10/11/2023 2325
PFHxS	15	14		1	97	50-150	10/11/2023 2325
PFBA	16	15		1	94	50-150	10/11/2023 2325
PFDA	16	16		1	97	50-150	10/11/2023 2325
PFDoA	16	15		1	95	50-150	10/11/2023 2325
PFHpA	16	15		1	96	50-150	10/11/2023 2325
PFHxA	16	16		1	99	50-150	10/11/2023 2325
PFNA	16	16		1	99	50-150	10/11/2023 2325
PFOA	16	15		1	95	50-150	10/11/2023 2325
PFPeA	16	16		1	103	50-150	10/11/2023 2325
PFTeDA	16	17		1	106	50-150	10/11/2023 2325
PFTrDA	16	15		1	92	50-150	10/11/2023 2325
PFUdA	16	16		1	100	50-150	10/11/2023 2325
PFOS	15	15		1	99	50-150	10/11/2023 2325

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		95	25-150
13C2_6:2FTS		121	25-150
13C2_8:2FTS		99	25-150
13C2_PFDoA		101	25-150
13C2_PFTeDA		101	25-150
13C3_PFBS		106	25-150
13C3_PFHxS		105	25-150
13C3-HFPO-DA		105	25-150
13C4_PFBA		105	25-150
13C4_PFHpA		107	25-150
13C5_PFHxA		104	25-150
13C5_PFPeA		101	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ87060-002
Batch: 87060
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 10/10/2023 2002

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		105	25-150
13C7_PFUdA		94	25-150
13C8_PFOA		116	25-150
13C8_PFOS		105	25-150
13C8_PFOSA		111	10-150
13C9_PFNA		103	25-150
d5-EtFOSAA		96	25-150
d3-MeFOSAA		107	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: YQ87673-001
Batch: 87673
Analytical Method: PFAS by ID SOP
Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 10/17/2023 1806

Parameter	Result	Q	Dil	LOQ	DL	Units	Analysis Date
8:2 FTS	ND		1	8.0	1.6	ng/L	10/18/2023 1827
6:2 FTS	ND		1	8.0	2.0	ng/L	10/18/2023 1827

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		91	25-150
13C2_6:2FTS		109	25-150
13C2_8:2FTS		65	25-150
13C2_PFDoA		104	25-150
13C2_PFTeDA		104	25-150
13C3_PFBS		102	25-150
13C3_PFHxS		104	25-150
13C3-HFPO-DA		96	25-150
13C4_PFBA		108	25-150
13C4_PFHpA		106	25-150
13C5_PFHxA		111	25-150
13C5_PFPeA		106	25-150
13C6_PFDA		95	25-150
13C7_PFUdA		102	25-150
13C8_PFOA		104	25-150
13C8_PFOS		104	25-150
13C8_PFOSA		94	10-150
13C9_PFNA		106	25-150
d5-EtFOSAA		97	25-150
d3-MeFOSAA		94	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ87673-002
Batch: 87673
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 10/17/2023 1806

Parameter	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	%Rec Limit	Analysis Date
8:2 FTS	15	17		1	111	50-150	10/18/2023 1839
6:2 FTS	15	14		1	94	50-150	10/18/2023 1839

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		91	25-150
13C2_6:2FTS		102	25-150
13C2_8:2FTS		61	25-150
13C2_PFDoA		99	25-150
13C2_PFTeDA		94	25-150
13C3_PFBS		98	25-150
13C3_PFHxS		97	25-150
13C3-HFPO-DA		92	25-150
13C4_PFBA		103	25-150
13C4_PFHpA		100	25-150
13C5_PFHxA		103	25-150
13C5_PFPeA		100	25-150
13C6_PFDA		91	25-150
13C7_PFUdA		99	25-150
13C8_PFOA		97	25-150
13C8_PFOS		98	25-150
13C8_PFOSA		89	10-150
13C9_PFNA		105	25-150
d5-EtFOSAA		92	25-150
d3-MeFOSAA		91	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Chain of Custody
and
Miscellaneous Documents

Pace Analytical

PACE ANALYTICAL SERVICES, LLC
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Number 150049

Client: Arcadis	Report to Contact: Alexis Crisp, Tiffany Linder	Telephone No. / E-mail: Alexis.Crisp@arcadis.com, sTiffany.linder@arcadis.com	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: x Sommer Guy	Analysis (Attach list if more space is needed): Report EbiE 28 compounds	Page 1 of 1
City: Novi	State: MI	Zip Code: 48377	Lot # Bar Code: YI26004
Project Name: Racer PNC	Printed Name: Sommer Guy		
Project No.: 30167840.00031	P.O. No.		

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	G=Grab C=Composite	Matrix: Aqueous	Solid	Wipe/Swab	No of Containers by Preservative Type: Unpres.	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Volatiles (EPA 624, plus 1,4-Dioxane, 1,2,3-TCP, Naphthalene, MTBE, TBA, DIPE, ETBE, TAME)	Lot # Bar Code / Remarks
MWM2-28_GW-092523	9/25/23	1020	G	X			2								X	
EB-08_092523	9/25/23	1025	G	X			1								X	equipment blank
triplank	9/25/23	0925	G	X			1								X	triplank
MWM2-22_GW-092523	9/25/23	1115	G	X			2								X	
MW-43-14R_GW-092523	9/25/23	1220	G	X			2								X	

Turn Around Time Required (Prior lab approval required for expedited TAT.): ☒ Standard ☐ Rush (Specify)

Sample Disposal: ☐ Return to Client ☒ Disposal by Lab

Possible Hazard Identification: ☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: Sommer Guy	9/25/23	1630	1. Received by: FedEx	9/25/23	1630
2. Relinquished by	Date	Time	2. Received by	Date	Time
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by: FedEx	9/26/23	1030	4. Laboratory received by	9/26/23	1036

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY — Received on ice (Circle): (Yes) No Ice Pack: Receipt Temp: 4.5 °C — Temp Blank: PRESENT

DISTRIBUTION: WHITE & YELLOW-Return to laboratory with Sample(s); PINK-Field/Client Copy

Document Number: ME003NA-01

PACE ANALYTICAL SERVICES, LLC

DC#_Title: ENV-FRM-WCOL-0286 v02_Samples Receipt Checklist (SRC)
Effective Date: 8/2/2022

Sample Receipt Checklist (SRC)

Client: ARCADIS Cooler Inspected by/date: CJH / 9/26/23 Lot #: YI26004

Means of receipt: ☐ Pace ☐ Client ☐ UPS ☑ FedEx ☐ Other: NA

☑ Yes	☐ No		1. Were custody seals present on the cooler?
☑ Yes	☐ No	☐ NA	2. If custody seals were present, were they intact and unbroken?

pH Strip ID: NA Chlorine Strip ID: NA Tested by: NA
Original temperature upon receipt / Derived (Corrected) temperature upon receipt %Solid Snap-Cup ID: NA
4.5 / 4.5 °C NA / NA °C NA / NA °C NA / NA °C
Method: ☑ Temperature Blank ☐ Against Bottles IR Gun ID: 8 IR Gun Correction Factor: 0 °C
Method of coolant: ☑ Wet Ice ☐ Ice Packs ☐ Dry Ice ☐ None

☑ Yes	☐ No	☐ NA	3. Were all coolers received at or below 6.0°C? If no, was Project Manager notified? PM was Notified by: phone / email / face-to-face (circle one).
☑ Yes	☐ No	☐ NA	4. Is the commercial courier's packing slip attached to this form?
☑ Yes	☐ No		5. Were proper custody procedures (relinquished/received) followed?
☑ Yes	☐ No		6. Were sample IDs listed on the COC and all sample containers?
☑ Yes	☐ No		7. Was collection date & time listed on the COC and all sample containers?
☑ Yes	☐ No		8. Did all container label information (ID, date, time) agree with the COC?
☑ Yes	☐ No		9. Were tests to be performed listed on the COC?
☑ Yes	☐ No		10. Did all samples arrive in the proper containers for each test and/or in good condition (unbroken, lids on, etc.)? NA
☑ Yes	☐ No		11. Was adequate sample volume available?
☑ Yes	☐ No		12. Were all samples received within ½ the holding time or 48 hours, whichever comes first?
☑ Yes	☐ No		13. Were all samples containers accounted for? (No missing/excess)
☐ Yes	☐ No	☑ NA	14. Were VOA, 8015C and RSK-175 samples free of bubbles >"pea-size" (¼"or 6mm in diameter) in any of the VOA vials?
☐ Yes	☐ No	☑ NA	15. Were all DRO/metals/nutrient samples received at a pH of < 2?
☐ Yes	☐ No	☑ NA	16. Were all cyanide samples received at a pH > 12 and sulfide samples received at a pH > 9?
☐ Yes	☐ No	☑ NA	17. Were all applicable NH_3/TKN/cyanide/phenol/625.1/608.3 (< 0.5mg/L) samples free of residual chlorine?
☐ Yes	☑ No	☐ NA	18. Was the quote number listed on the container label? If yes, Quote # NA

Sample Preservation (Must be completed for any sample(s) incorrectly preserved or with headspace.)

Sample(s) NA were received incorrectly preserved and were adjusted accordingly in sample receiving with NA mL of circle one: H2SO4, HNO3, HCl, NaOH using SR # NA. ☐
Time of preservation NA. If more than one preservative is needed, please note in the comments below.

Sample(s) NA were received with bubbles >6 mm in diameter.

Samples(s) NA were received with TRC > 0.5 mg/L (If #19 is *no*) and were adjusted accordingly in sample receiving with sodium thiosulfate ($Na_2S_2O_3$) with Unique ID: NA.

Comments:

Qualtrax ID: 56360 Pace® Analytical Services, LLC Page 1 of 1

Report of Analysis

Arcadis U.S., Inc.
630 Plaza Drive
Suite 600
Highlands Ranch, CO 80129
Attention: Tiffany Linder

Project Name: RACER PNC

Project Number: 30167840.00031

Lot Number:**YI13047**

Date Completed:09/29/2023

09/29/2023 5:19 PM
Approved and released by:
Project Manager II: **Kathy E. Smith**

The electronic signature above is the equivalent of a handwritten signature.
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Pace Analytical Services, LLC (*formerly Shealy Environmental Services, Inc.*)
106 Vantage Point Drive West Columbia, SC 29172
Tel: 803-791-9700 Fax: 803-791-9111 www.pacelabs.com

Case Narrative
Arcadis U.S., Inc.
Lot Number: YI13047

This Report of Analysis contains the analytical result(s) for the sample(s) listed on the Sample Summary following this Case Narrative. The sample receiving date is documented in the header information associated with each sample.

All results listed in this report relate only to the samples that are contained within this report.

Sample receipt, sample analysis, and data review have been performed in accordance with the Pace Quality Assurance Management Plan (QAMP), applicable Shealy standard operating procedures (SOPs), the 2003 NELAC standard, and Shealy policies. Additionally, the DoD QSM version 5.4 has been followed for these samples, and specifically Table B-15 was followed for all PFAS samples. Any exceptions to the QAMP, SOPs, NELAC standards, the DoD QSM, or policies are qualified on the results page or discussed below.

All QC associated with these samples were compliant with DOD QSM 5.4 table B-15 and our PFAS SOP.

Correction factors (CF) are used to calculate the original sample concentration. The CF is the inverse of the concentration factor (sample volume / extract final volume) times the dilution factor (DF). The CF is calculated as follows:

CF = DF * FV / Vo

FV is volume of extract (mL)
Vo is initial sample volume (mL)
DF is dilution factor. For undiluted analysis, DF = 1.

Sample concentration for aqueous samples:
Concentration (ng/L) = Cs*CF,

$$C_s = \frac{\left(\frac{(A_s x C_{is})}{A_{is}}\right) - B}{M1}$$

Where

C_s is on column concentration of target analyte in the sample (ng/L)
C_{is} is concentration of internal standard in the sample (ng/L)
A_s is peak response of target analyte in the sample
A_{is} is peak response of internal standard in the sample
M1 is the average RF from ICAL or the slope from linear regression ICAL
B is the y-intercept from the ICAL

Pace is a TNI accredited laboratory; however, the following analyses are currently not listed on our TNI scope of accreditation: Drinking Water: VOC (excluding BTEX, MTBE, Naphthalene, & 1,2-dichloroethane) EPA 524.2, E. coli and Total coliforms SM 9223 B-2004, Solid Chemical Material: TOC Walkley-Black, Biological Tissue: All, Non-Potable Water: SGT-HEM EPA 1664B, Silica EPA 200.7, Boron, Calcium, Silicon, Strontium EPA 200.8, Bicarbonate, Carbonate, and Hydroxide Alkalinity SM 2320 B-2011, SM 9221 C E-2006 & SM 9222D-2006, Strontium SW-846 6010D, VOC SM 6200 B-2011, Fecal Coliform Colilert-18, PFAS by Isotope Dilution SOP.

If you have any questions regarding this report, please contact the Pace Project Manager listed on the cover page.

PFAS
Samples YI13047-001, YI13047-003, YI13047-004, YI13047-005, YI13047-006, YI13047-008, YI13047-009 required centrifugation prior to extraction, due to excessive solids present in the samples. Centrifugation was performed following the PFAS Aqueous Centrifuge Protocol; samples were spiked with Surrogate (SUR; Extracted Internal Standard/EIS) and shaken vigorously before being poured into a conical bottle and centrifuged. The centrifuged aqueous sample was decanted back into the original sample bottle, off of the condensed solids remaining in the centrifuge bottle. Original sample bottle was rinsed as normal and centrifuge bottle was rinsed with 4mL of MeOH. Centrifuge bottle rinsate was added to the elution. Samples concentrated to <5mL and reconstituted to 5mL using MeOH by transfer pipet.

Surrogate recovery for the following samples was outside the upper control limit: YI13047-001, YI13047-004, YI13047-005, YI13047-006, YI13047-007, YI13047-010, YI13047-011. This sample did not contain any target analytes; therefore, re-extraction and/or re-analysis was not performed.

Surrogate recovery for the following sample was outside control limits: YI13047-008, YI13047-009. Evidence of matrix interference is present; therefore, re-extraction and/or re-analysis was not performed.

Sample Summary

Arcadis U.S., Inc.

Lot Number: YI13047

Project Name: RACER PNC

Project Number: 30167840.00031

Sample Number	Sample ID	Matrix	Date Sampled	Date Received
001	MWF16-25_GW-091223	Aqueous	09/12/2023 1417	09/13/2023
002	Trip Blank	Aqueous	09/12/2023 1400	09/13/2023
003	MWF16-26_GW-091223	Aqueous	09/12/2023 1525	09/13/2023
004	MW-05-18_GW-091223	Aqueous	09/12/2023 1642	09/13/2023
005	MW-02-17_GW-091223	Aqueous	09/12/2023 1110	09/13/2023
006	MWF12-02R_GW-091223	Aqueous	09/12/2023 1435	09/13/2023
007	MWOS-09R_GW-091223	Aqueous	09/12/2023 1635	09/13/2023
008	MWF7-02_GW-091223	Aqueous	09/12/2023 1125	09/13/2023
009	MWF15-01_GW-091223	Aqueous	09/12/2023 1330	09/13/2023
010	MWF16-23_GW-091223	Aqueous	09/12/2023 1505	09/13/2023
011	MWOS-10_GW-091223	Aqueous	09/12/2023 1700	09/13/2023
012	EB-03_091223	Aqueous	09/12/2023 1129	09/13/2023

(12 samples)

Detection Summary

Arcadis U.S., Inc.

Lot Number: YI13047

Project Name: RACER PNC

Project Number: 30167840.00031

Sample	Sample ID	Matrix	Parameter	Method	Result	Q	Units	Page
001	MWF16-25_GW-091223	Aqueous	PFBS	PFAS by ID	12		ng/L	9
001	MWF16-25_GW-091223	Aqueous	PFPeS	PFAS by ID	10		ng/L	9
001	MWF16-25_GW-091223	Aqueous	PFHxS	PFAS by ID	22		ng/L	9
001	MWF16-25_GW-091223	Aqueous	PFBA	PFAS by ID	13		ng/L	9
001	MWF16-25_GW-091223	Aqueous	PFHpA	PFAS by ID	8.0		ng/L	9
001	MWF16-25_GW-091223	Aqueous	PFHxA	PFAS by ID	13		ng/L	9
001	MWF16-25_GW-091223	Aqueous	PFOA	PFAS by ID	20		ng/L	9
001	MWF16-25_GW-091223	Aqueous	PFPeA	PFAS by ID	9.2		ng/L	9
003	MWF16-26_GW-091223	Aqueous	6:2 FTS	PFAS by ID	8.4		ng/L	13
003	MWF16-26_GW-091223	Aqueous	PFBS	PFAS by ID	17		ng/L	13
003	MWF16-26_GW-091223	Aqueous	PFHpS	PFAS by ID	0.98	J	ng/L	13
003	MWF16-26_GW-091223	Aqueous	PFPeS	PFAS by ID	11		ng/L	13
003	MWF16-26_GW-091223	Aqueous	PFHxS	PFAS by ID	21		ng/L	13
003	MWF16-26_GW-091223	Aqueous	PFBA	PFAS by ID	11		ng/L	13
003	MWF16-26_GW-091223	Aqueous	PFHpA	PFAS by ID	5.8		ng/L	13
003	MWF16-26_GW-091223	Aqueous	PFHxA	PFAS by ID	22		ng/L	13
003	MWF16-26_GW-091223	Aqueous	PFOA	PFAS by ID	34		ng/L	13
003	MWF16-26_GW-091223	Aqueous	PFPeA	PFAS by ID	24		ng/L	13
003	MWF16-26_GW-091223	Aqueous	PFOS	PFAS by ID	2.0	J	ng/L	13
004	MW-05-18_GW-091223	Aqueous	PFBS	PFAS by ID	7.4		ng/L	15
004	MW-05-18_GW-091223	Aqueous	PFPeS	PFAS by ID	5.2		ng/L	15
004	MW-05-18_GW-091223	Aqueous	PFHxS	PFAS by ID	7.0		ng/L	15
004	MW-05-18_GW-091223	Aqueous	PFBA	PFAS by ID	15		ng/L	15
004	MW-05-18_GW-091223	Aqueous	PFHpA	PFAS by ID	5.7		ng/L	15
004	MW-05-18_GW-091223	Aqueous	PFHxA	PFAS by ID	11		ng/L	15
004	MW-05-18_GW-091223	Aqueous	PFOA	PFAS by ID	5.3		ng/L	15
004	MW-05-18_GW-091223	Aqueous	PFPeA	PFAS by ID	9.3		ng/L	15
005	MW-02-17_GW-091223	Aqueous	PFBS	PFAS by ID	7.4		ng/L	17
005	MW-02-17_GW-091223	Aqueous	PFPeS	PFAS by ID	5.5		ng/L	17
005	MW-02-17_GW-091223	Aqueous	PFHxS	PFAS by ID	9.3		ng/L	17
005	MW-02-17_GW-091223	Aqueous	PFBA	PFAS by ID	16		ng/L	17
005	MW-02-17_GW-091223	Aqueous	PFHpA	PFAS by ID	4.9		ng/L	17
005	MW-02-17_GW-091223	Aqueous	PFHxA	PFAS by ID	8.3		ng/L	17
005	MW-02-17_GW-091223	Aqueous	PFOA	PFAS by ID	5.9		ng/L	17
005	MW-02-17_GW-091223	Aqueous	PFPeA	PFAS by ID	7.7		ng/L	17
006	MWF12-02R_GW-091223	Aqueous	PFBS	PFAS by ID	3.9		ng/L	19
006	MWF12-02R_GW-091223	Aqueous	PFHxS	PFAS by ID	4.6		ng/L	19
006	MWF12-02R_GW-091223	Aqueous	PFBA	PFAS by ID	20		ng/L	19
006	MWF12-02R_GW-091223	Aqueous	PFHpA	PFAS by ID	3.5		ng/L	19
006	MWF12-02R_GW-091223	Aqueous	PFHxA	PFAS by ID	8.9		ng/L	19
006	MWF12-02R_GW-091223	Aqueous	PFOA	PFAS by ID	9.6		ng/L	19
006	MWF12-02R_GW-091223	Aqueous	PFPeA	PFAS by ID	11		ng/L	19
006	MWF12-02R_GW-091223	Aqueous	PFOS	PFAS by ID	9.0		ng/L	19

Sample	Sample ID	Matrix	Parameter	Method	Result	Q	Units	Page
007	MWOS-09R_GW-091223	Aqueous	6:2 FTS	PFAS by ID	3.5	J	ng/L	21
007	MWOS-09R_GW-091223	Aqueous	PFBS	PFAS by ID	6.3		ng/L	21
007	MWOS-09R_GW-091223	Aqueous	PFPeS	PFAS by ID	5.0		ng/L	21
007	MWOS-09R_GW-091223	Aqueous	PFHxS	PFAS by ID	10		ng/L	21
007	MWOS-09R_GW-091223	Aqueous	PFBA	PFAS by ID	9.8		ng/L	21
007	MWOS-09R_GW-091223	Aqueous	PFHpA	PFAS by ID	10		ng/L	21
007	MWOS-09R_GW-091223	Aqueous	PFHxA	PFAS by ID	11		ng/L	21
007	MWOS-09R_GW-091223	Aqueous	PFOA	PFAS by ID	19		ng/L	21
007	MWOS-09R_GW-091223	Aqueous	PFPeA	PFAS by ID	11		ng/L	21
008	MWF7-02_GW-091223	Aqueous	6:2 FTS	PFAS by ID	4.9	JQ	ng/L	23
008	MWF7-02_GW-091223	Aqueous	PFBS	PFAS by ID	7.0		ng/L	23
008	MWF7-02_GW-091223	Aqueous	PFHpS	PFAS by ID	1.6	J	ng/L	23
008	MWF7-02_GW-091223	Aqueous	PFPeS	PFAS by ID	6.0		ng/L	23
008	MWF7-02_GW-091223	Aqueous	PFHxS	PFAS by ID	16		ng/L	23
008	MWF7-02_GW-091223	Aqueous	PFBA	PFAS by ID	15		ng/L	23
008	MWF7-02_GW-091223	Aqueous	PFHpA	PFAS by ID	8.9		ng/L	23
008	MWF7-02_GW-091223	Aqueous	PFHxA	PFAS by ID	16		ng/L	23
008	MWF7-02_GW-091223	Aqueous	PFOA	PFAS by ID	50		ng/L	23
008	MWF7-02_GW-091223	Aqueous	PFPeA	PFAS by ID	9.6		ng/L	23
008	MWF7-02_GW-091223	Aqueous	PFOS	PFAS by ID	12		ng/L	23
009	MWF15-01_GW-091223	Aqueous	6:2 FTS	PFAS by ID	4.7	JQ	ng/L	25
009	MWF15-01_GW-091223	Aqueous	PFBS	PFAS by ID	5.9		ng/L	25
009	MWF15-01_GW-091223	Aqueous	PFHpS	PFAS by ID	0.96	J	ng/L	25
009	MWF15-01_GW-091223	Aqueous	PFPeS	PFAS by ID	5.8		ng/L	25
009	MWF15-01_GW-091223	Aqueous	PFHxS	PFAS by ID	13		ng/L	25
009	MWF15-01_GW-091223	Aqueous	PFBA	PFAS by ID	10		ng/L	25
009	MWF15-01_GW-091223	Aqueous	PFHpA	PFAS by ID	5.2		ng/L	25
009	MWF15-01_GW-091223	Aqueous	PFHxA	PFAS by ID	7.8		ng/L	25
009	MWF15-01_GW-091223	Aqueous	PFOA	PFAS by ID	11		ng/L	25
009	MWF15-01_GW-091223	Aqueous	PFPeA	PFAS by ID	7.3		ng/L	25
009	MWF15-01_GW-091223	Aqueous	PFOS	PFAS by ID	17		ng/L	25
010	MWF16-23_GW-091223	Aqueous	6:2 FTS	PFAS by ID	7.8	J	ng/L	27
010	MWF16-23_GW-091223	Aqueous	PFBS	PFAS by ID	4.8		ng/L	27
010	MWF16-23_GW-091223	Aqueous	PFPeS	PFAS by ID	2.5	J	ng/L	27
010	MWF16-23_GW-091223	Aqueous	PFHxS	PFAS by ID	8.0		ng/L	27
010	MWF16-23_GW-091223	Aqueous	PFBA	PFAS by ID	13		ng/L	27
010	MWF16-23_GW-091223	Aqueous	PFHpA	PFAS by ID	5.5		ng/L	27
010	MWF16-23_GW-091223	Aqueous	PFHxA	PFAS by ID	9.3		ng/L	27
010	MWF16-23_GW-091223	Aqueous	PFOA	PFAS by ID	19		ng/L	27
010	MWF16-23_GW-091223	Aqueous	PFPeA	PFAS by ID	7.1		ng/L	27
011	MWOS-10_GW-091223	Aqueous	6:2 FTS	PFAS by ID	3.0	J	ng/L	29
011	MWOS-10_GW-091223	Aqueous	PFBS	PFAS by ID	7.5		ng/L	29
011	MWOS-10_GW-091223	Aqueous	PFPeS	PFAS by ID	5.0		ng/L	29
011	MWOS-10_GW-091223	Aqueous	PFHxS	PFAS by ID	13		ng/L	29
011	MWOS-10_GW-091223	Aqueous	PFBA	PFAS by ID	14		ng/L	29
011	MWOS-10_GW-091223	Aqueous	PFHpA	PFAS by ID	11		ng/L	29
011	MWOS-10_GW-091223	Aqueous	PFHxA	PFAS by ID	15		ng/L	29
011	MWOS-10_GW-091223	Aqueous	PFOA	PFAS by ID	10		ng/L	29

Detection Summary (Continued)

Lot Number: YI13047

Sample	Sample ID	Matrix	Parameter	Method	Result	Q	Units	Page
011	MWOS-10_GW-091223	Aqueous	PFPeA	PFAS by ID	14		ng/L	29

(92 detections)

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-001**

Description: **MWF16-25_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1417** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/28/2023 1643	ARC2	09/19/2023 1753	85183

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		8.0	0.48	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		8.0	0.66	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		8.0	1.6	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	8.0	2.0	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	8.0	0.87	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		8.0	2.1	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		8.0	0.48	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		8.0	0.75	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		8.0	0.93	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**12**		**4.0**	**0.41**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		4.0	0.78	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		4.0	0.50	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		4.0	0.71	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		4.0	0.61	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**10**		**4.0**	**0.59**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**22**		**4.0**	**0.55**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**13**		**4.0**	**0.60**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		4.0	0.52	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		4.0	0.47	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**8.0**		**4.0**	**0.45**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**13**		**4.0**	**0.69**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		4.0	0.46	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**20**		**4.0**	**0.83**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**9.2**		**4.0**	**0.54**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		4.0	0.60	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		4.0	0.53	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		4.0	0.63	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		4.0	2.0	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	203	25-150
13C2_6:2FTS	N	151	25-150
13C2_8:2FTS		98	25-150
13C2_PFDoA		88	25-150
13C2_PFTeDA		81	25-150
13C3_PFBS		115	25-150
13C3_PFHxS		112	25-150
13C3-HFPO-DA		105	25-150
13C4_PFBA		95	25-150
13C4_PFHpA		112	25-150
13C5_PFHxA		118	25-150
13C5_PFPeA		117	25-150
13C6_PFDA		111	25-150
13C7_PFUdA		100	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-001**

Description: **MWF16-25_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1417** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		136	25-150
13C8_PFOS		114	25-150
13C8_PFOSA		100	10-150
13C9_PFNA		106	25-150
d5-EtFOSAA		105	25-150
d3-MeFOSAA		109	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-002**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1400** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/28/2023 1654	ARC2	09/19/2023 1753	85183

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.4	0.45	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.4	0.61	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.4	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.4	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.4	0.81	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.4	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.4	0.45	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.4	0.70	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.4	0.86	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.7	0.38	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	0.72	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.7	0.46	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	0.66	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	0.57	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.7	0.55	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.7	0.51	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.7	0.56	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	0.49	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	0.44	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.7	0.41	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.7	0.64	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.7	0.43	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.7	0.77	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.7	0.50	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	0.56	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	0.49	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	0.58	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.7	1.9	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		98	25-150
13C2_6:2FTS		99	25-150
13C2_8:2FTS		85	25-150
13C2_PFDoA		85	25-150
13C2_PFTeDA		81	25-150
13C3_PFBS		92	25-150
13C3_PFHxS		95	25-150
13C3-HFPO-DA		91	25-150
13C4_PFBA		100	25-150
13C4_PFHpA		96	25-150
13C5_PFHxA		97	25-150
13C5_PFPeA		97	25-150
13C6_PFDA		84	25-150
13C7_PFUdA		81	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-002**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1400** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		105	25-150
13C8_PFOS		90	25-150
13C8_PFOSA		87	10-150
13C9_PFNA		88	25-150
d5-EtFOSAA		88	25-150
d3-MeFOSAA		96	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-003**

Description: **MWF16-26_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1525** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1700	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		8.0	0.48	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		8.0	0.67	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		8.0	1.6	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**8.4**		**8.0**	**2.0**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		8.0	0.88	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		8.0	2.1	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		8.0	0.49	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		8.0	0.75	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		8.0	0.94	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**17**		**4.0**	**0.42**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		4.0	0.78	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**0.98**	**J**	**4.0**	**0.50**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		4.0	0.71	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		4.0	0.62	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**11**		**4.0**	**0.60**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**21**		**4.0**	**0.55**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**11**		**4.0**	**0.60**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		4.0	0.53	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		4.0	0.47	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**5.8**		**4.0**	**0.45**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**22**		**4.0**	**0.69**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		4.0	0.46	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**34**		**4.0**	**0.83**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**24**		**4.0**	**0.55**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		4.0	0.60	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		4.0	0.53	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		4.0	0.63	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**2.0**	**J**	**4.0**	**2.0**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		149	25-150
13C2_6:2FTS		110	25-150
13C2_8:2FTS		92	25-150
13C2_PFDoA		76	25-150
13C2_PFTeDA		87	25-150
13C3_PFBS		97	25-150
13C3_PFHxS		88	25-150
13C3-HFPO-DA		87	25-150
13C4_PFBA		76	25-150
13C4_PFHpA		89	25-150
13C5_PFHxA		98	25-150
13C5_PFPeA		100	25-150
13C6_PFDA		93	25-150
13C7_PFUdA		85	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
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DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
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H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-003**

Description: **MWF16-26_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1525** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		91	25-150
13C8_PFOS		83	25-150
13C8_PFOSA		87	10-150
13C9_PFNA		94	25-150
d5-EtFOSAA		85	25-150
d3-MeFOSAA		83	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-004**

Description: **MW-05-18_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1642** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/28/2023 1715	ARC2	09/19/2023 1753	85183

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.5	0.45	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.5	0.62	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.5	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.5	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.5	0.82	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.5	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.5	0.46	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.5	0.71	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.5	0.88	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**7.4**		**3.8**	**0.39**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.8	0.73	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.8	0.47	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.8	0.67	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.8	0.58	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**5.2**		**3.8**	**0.56**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**7.0**		**3.8**	**0.52**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**15**		**3.8**	**0.57**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.8	0.49	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.8	0.44	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**5.7**		**3.8**	**0.42**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**11**		**3.8**	**0.65**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.8	0.44	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**5.3**		**3.8**	**0.78**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**9.3**		**3.8**	**0.51**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.8	0.56	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.8	0.59	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.8	1.9	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	219	25-150
13C2_6:2FTS		124	25-150
13C2_8:2FTS		83	25-150
13C2_PFDoA		87	25-150
13C2_PFTeDA		74	25-150
13C3_PFBS		87	25-150
13C3_PFHxS		94	25-150
13C3-HFPO-DA		75	25-150
13C4_PFBA		74	25-150
13C4_PFHpA		91	25-150
13C5_PFHxA		93	25-150
13C5_PFPeA		84	25-150
13C6_PFDA		79	25-150
13C7_PFUdA		82	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
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DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-004**

Description: **MW-05-18_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1642** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		95	25-150
13C8_PFOS		94	25-150
13C8_PFOSA		94	10-150
13C9_PFNA		98	25-150
d5-EtFOSAA		87	25-150
d3-MeFOSAA		87	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-005**

Description: **MW-02-17_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1110** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/28/2023 1726	ARC2	09/19/2023 1753	85183

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		6.7	0.40	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		6.7	0.56	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		6.7	1.3	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	6.7	1.7	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	6.7	0.73	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		6.7	1.7	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		6.7	0.41	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		6.7	0.63	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		6.7	0.78	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**7.4**		**3.4**	**0.35**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.4	0.65	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.4	0.42	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.4	0.60	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.4	0.51	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**5.5**		**3.4**	**0.50**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**9.3**		**3.4**	**0.46**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**16**		**3.4**	**0.50**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.4	0.44	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.4	0.40	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**4.9**		**3.4**	**0.37**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**8.3**		**3.4**	**0.58**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.4	0.39	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**5.9**		**3.4**	**0.69**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**7.7**		**3.4**	**0.46**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.4	0.50	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.4	0.44	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.4	0.52	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.4	1.7	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	262	25-150
13C2_6:2FTS	N	176	25-150
13C2_8:2FTS		99	25-150
13C2_PFDoA		82	25-150
13C2_PFTeDA		73	25-150
13C3_PFBS		96	25-150
13C3_PFHxS		98	25-150
13C3-HFPO-DA		82	25-150
13C4_PFBA		69	25-150
13C4_PFHpA		99	25-150
13C5_PFHxA		100	25-150
13C5_PFPeA		88	25-150
13C6_PFDA		97	25-150
13C7_PFUdA		81	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-005**

Description: **MW-02-17_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1110** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		113	25-150
13C8_PFOS		99	25-150
13C8_PFOSA		96	10-150
13C9_PFNA		108	25-150
d5-EtFOSAA		92	25-150
d3-MeFOSAA		91	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
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S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-006**

Description: **MWF12-02R_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1435** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/28/2023 1736	ARC2	09/19/2023 1753	85183

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		6.9	0.42	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		6.9	0.57	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		6.9	1.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	6.9	1.7	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	6.9	0.75	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		6.9	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		6.9	0.42	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		6.9	0.65	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		6.9	0.80	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**3.9**		**3.4**	**0.36**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.4	0.67	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.4	0.43	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.4	0.61	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.4	0.53	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.4	0.51	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**4.6**		**3.4**	**0.48**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**20**		**3.4**	**0.52**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.4	0.45	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.4	0.41	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**3.5**		**3.4**	**0.39**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**8.9**		**3.4**	**0.59**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.4	0.40	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**9.6**		**3.4**	**0.71**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**11**		**3.4**	**0.47**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.4	0.52	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.4	0.46	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.4	0.54	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**9.0**		**3.4**	**1.7**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	241	25-150
13C2_6:2FTS	N	194	25-150
13C2_8:2FTS		86	25-150
13C2_PFDoA		71	25-150
13C2_PFTeDA		61	25-150
13C3_PFBS		63	25-150
13C3_PFHxS		69	25-150
13C3-HFPO-DA		49	25-150
13C4_PFBA		35	25-150
13C4_PFHpA		57	25-150
13C5_PFHxA		62	25-150
13C5_PFPeA		51	25-150
13C6_PFDA		70	25-150
13C7_PFUdA		65	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-006**

Description: **MWF12-02R_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1435** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		73	25-150
13C8_PFOS		66	25-150
13C8_PFOSA		62	10-150
13C9_PFNA		79	25-150
d5-EtFOSAA		73	25-150
d3-MeFOSAA		75	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-007**

Description: **MWOS-09R_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1635** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1711	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.0	0.42	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.0	0.58	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.0	1.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**3.5**	**J**	**7.0**	**1.7**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.0	0.76	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.0	0.42	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.0	0.65	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.0	0.81	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**6.3**		**3.5**	**0.36**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.68	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.5	0.43	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.62	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.53	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**5.0**		**3.5**	**0.52**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**10**		**3.5**	**0.48**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**9.8**		**3.5**	**0.52**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.46	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.41	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**10**		**3.5**	**0.39**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**11**		**3.5**	**0.60**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	0.40	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**19**		**3.5**	**0.72**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**11**		**3.5**	**0.47**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.52	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.46	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.54	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.5	1.7	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	214	25-150
13C2_6:2FTS		130	25-150
13C2_8:2FTS		97	25-150
13C2_PFDoA		76	25-150
13C2_PFTeDA		83	25-150
13C3_PFBS		97	25-150
13C3_PFHxS		89	25-150
13C3-HFPO-DA		88	25-150
13C4_PFBA		63	25-150
13C4_PFHpA		82	25-150
13C5_PFHxA		97	25-150
13C5_PFPeA		91	25-150
13C6_PFDA		87	25-150
13C7_PFUdA		79	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-007**

Description: **MWOS-09R_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1635** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		98	25-150
13C8_PFOS		88	25-150
13C8_PFOSA		87	10-150
13C9_PFNA		93	25-150
d5-EtFOSAA		85	25-150
d3-MeFOSAA		86	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-008**

Description: **MWF7-02_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1125** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1721	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		8.4	0.51	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		8.4	0.70	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		8.4	1.7	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**4.9**	**JQ**	**8.4**	**2.1**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	8.4	0.92	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		8.4	2.2	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		8.4	0.51	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		8.4	0.79	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		8.4	0.98	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**7.0**		**4.2**	**0.44**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		4.2	0.82	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**1.6**	**J**	**4.2**	**0.53**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		4.2	0.75	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		4.2	0.65	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**6.0**		**4.2**	**0.63**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**16**		**4.2**	**0.58**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**15**		**4.2**	**0.63**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		4.2	0.55	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		4.2	0.50	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**8.9**		**4.2**	**0.47**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**16**		**4.2**	**0.73**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		4.2	0.49	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**50**		**4.2**	**0.87**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**9.6**		**4.2**	**0.57**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		4.2	0.63	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		4.2	0.56	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		4.2	0.66	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**12**		**4.2**	**2.1**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	261	25-150
13C2_6:2FTS	N	159	25-150
13C2_8:2FTS		101	25-150
13C2_PFDoA		77	25-150
13C2_PFTeDA		87	25-150
13C3_PFBS		89	25-150
13C3_PFHxS		87	25-150
13C3-HFPO-DA		71	25-150
13C4_PFBA		51	25-150
13C4_PFHpA		78	25-150
13C5_PFHxA		97	25-150
13C5_PFPeA		75	25-150
13C6_PFDA		91	25-150
13C7_PFUdA		86	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-008**

Description: **MWF7-02_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1125** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		99	25-150
13C8_PFOS		88	25-150
13C8_PFOSA		90	10-150
13C9_PFNA		95	25-150
d5-EtFOSAA		88	25-150
d3-MeFOSAA		86	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-009**

Description: **MWF15-01_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1330** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1732	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.9	0.48	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.9	0.66	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.9	1.6	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**4.7**	**JQ**	**7.9**	**2.0**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.9	0.86	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.9	2.1	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.9	0.48	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.9	0.74	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.9	0.92	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**5.9**		**4.0**	**0.41**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		4.0	0.77	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**0.96**	**J**	**4.0**	**0.49**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		4.0	0.70	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		4.0	0.61	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**5.8**		**4.0**	**0.59**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**13**		**4.0**	**0.55**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**10**		**4.0**	**0.59**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		4.0	0.52	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		4.0	0.47	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**5.2**		**4.0**	**0.44**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**7.8**		**4.0**	**0.68**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		4.0	0.46	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**11**		**4.0**	**0.82**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**7.3**		**4.0**	**0.54**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		4.0	0.59	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		4.0	0.52	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		4.0	0.62	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**17**		**4.0**	**2.0**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	269	25-150
13C2_6:2FTS	N	177	25-150
13C2_8:2FTS		93	25-150
13C2_PFDoA		73	25-150
13C2_PFTeDA		75	25-150
13C3_PFBS		94	25-150
13C3_PFHxS		93	25-150
13C3-HFPO-DA		77	25-150
13C4_PFBA		65	25-150
13C4_PFHpA		82	25-150
13C5_PFHxA		100	25-150
13C5_PFPeA		87	25-150
13C6_PFDA		91	25-150
13C7_PFUdA		86	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
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H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-009**

Description: **MWF15-01_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1330** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		103	25-150
13C8_PFOS		90	25-150
13C8_PFOSA		87	10-150
13C9_PFNA		100	25-150
d5-EtFOSAA		86	25-150
d3-MeFOSAA		86	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-010**

Description: **MWF16-23_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1505** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/28/2023 1705	ARC2	09/19/2023 1753	85183

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		9.1	0.55	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		9.1	0.76	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		9.1	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**7.8**	**J**	**9.1**	**2.3**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	9.1	1.0	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		9.1	2.4	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		9.1	0.55	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		9.1	0.86	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		9.1	1.1	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**4.8**		**4.6**	**0.47**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		4.6	0.89	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		4.6	0.57	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		4.6	0.81	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		4.6	0.70	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**2.5**	**J**	**4.6**	**0.68**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**8.0**		**4.6**	**0.63**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**13**		**4.6**	**0.68**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		4.6	0.60	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		4.6	0.54	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**5.5**		**4.6**	**0.51**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**9.3**		**4.6**	**0.79**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		4.6	0.53	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**19**		**4.6**	**0.95**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**7.1**		**4.6**	**0.62**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		4.6	0.68	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		4.6	0.60	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		4.6	0.71	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		4.6	2.3	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	247	25-150
13C2_6:2FTS		129	25-150
13C2_8:2FTS		89	25-150
13C2_PFDoA		84	25-150
13C2_PFTeDA		72	25-150
13C3_PFBS		85	25-150
13C3_PFHxS		93	25-150
13C3-HFPO-DA		77	25-150
13C4_PFBA		54	25-150
13C4_PFHpA		94	25-150
13C5_PFHxA		89	25-150
13C5_PFPeA		79	25-150
13C6_PFDA		86	25-150
13C7_PFUdA		86	25-150

LOQ = Limit of Quantitation
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DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-010**

Description: **MWF16-23_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1505** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		100	25-150
13C8_PFOS		93	25-150
13C8_PFOSA		85	10-150
13C9_PFNA		92	25-150
d5-EtFOSAA		94	25-150
d3-MeFOSAA		93	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-011**

Description: **MWOS-10_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1700** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1742	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		8.8	0.53	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		8.8	0.73	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		8.8	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**3.0**	**J**	**8.8**	**2.2**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	8.8	0.97	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		8.8	2.3	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		8.8	0.53	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		8.8	0.83	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		8.8	1.0	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**7.5**		**4.4**	**0.46**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		4.4	0.86	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		4.4	0.55	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		4.4	0.79	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		4.4	0.68	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**5.0**		**4.4**	**0.66**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**13**		**4.4**	**0.61**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**14**		**4.4**	**0.66**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		4.4	0.58	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		4.4	0.52	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**11**		**4.4**	**0.49**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**15**		**4.4**	**0.76**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		4.4	0.51	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**10**		**4.4**	**0.92**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**14**		**4.4**	**0.60**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		4.4	0.66	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		4.4	0.58	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		4.4	0.69	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		4.4	2.2	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	162	25-150
13C2_6:2FTS		113	25-150
13C2_8:2FTS		90	25-150
13C2_PFDoA		74	25-150
13C2_PFTeDA		86	25-150
13C3_PFBS		101	25-150
13C3_PFHxS		90	25-150
13C3-HFPO-DA		89	25-150
13C4_PFBA		68	25-150
13C4_PFHpA		83	25-150
13C5_PFHxA		96	25-150
13C5_PFPeA		97	25-150
13C6_PFDA		84	25-150
13C7_PFUdA		82	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-011**

Description: **MWOS-10_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1700** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		92	25-150
13C8_PFOS		88	25-150
13C8_PFOSA		86	10-150
13C9_PFNA		90	25-150
d5-EtFOSAA		81	25-150
d3-MeFOSAA		86	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-012**

Description: **EB-03_091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1129** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1753	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		8.1	0.49	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		8.1	0.67	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		8.1	1.6	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		8.1	2.0	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		8.1	0.89	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		8.1	2.1	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		8.1	0.49	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		8.1	0.76	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		8.1	0.95	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		4.1	0.42	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		4.1	0.79	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		4.1	0.51	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		4.1	0.72	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		4.1	0.62	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		4.1	0.60	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		4.1	0.56	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		4.1	0.61	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		4.1	0.53	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		4.1	0.48	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		4.1	0.45	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		4.1	0.70	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		4.1	0.47	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		4.1	0.84	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		4.1	0.55	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		4.1	0.61	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		4.1	0.54	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		4.1	0.64	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		4.1	2.0	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		93	25-150
13C2_6:2FTS		92	25-150
13C2_8:2FTS		81	25-150
13C2_PFDoA		72	25-150
13C2_PFTeDA		83	25-150
13C3_PFBS		88	25-150
13C3_PFHxS		84	25-150
13C3-HFPO-DA		79	25-150
13C4_PFBA		92	25-150
13C4_PFHpA		85	25-150
13C5_PFHxA		89	25-150
13C5_PFPeA		86	25-150
13C6_PFDA		87	25-150
13C7_PFUdA		86	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.**		Laboratory ID: **YI13047-012**
Description: **EB-03_091223**		Matrix: **Aqueous**
Date Sampled: **09/12/2023 1129**	Project Name: **RACER PNC**	
Date Received: **09/13/2023**	Project Number: **30167840.00031**	

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		88	25-150
13C8_PFOS		83	25-150
13C8_PFOSA		79	10-150
13C9_PFNA		82	25-150
d5-EtFOSAA		84	25-150
d3-MeFOSAA		80	25-150

LOQ = Limit of Quantitation	B = Detected in the method blank	E = Quantitation of compound exceeded the calibration range	DL = Detection Limit	Q = Surrogate failure
ND = Not detected at or above the DL	N = Recovery is out of criteria	P = The RPD between two GC columns exceeds 40%	J = Estimated result < LOQ and ≥ DL	L = LCS/LCSD failure
H = Out of holding time	W = Reported on wet weight basis			S = MS/MSD failure

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QC Summary

PFAS by LC/MS/MS - MB

Sample ID: YQ85183-001
Batch: 85183
Analytical Method: PFAS by ID SOP
Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/19/2023 1753

Parameter	Result	Q	Dil	LOQ	DL	Units	Analysis Date
9Cl-PF3ONS	ND		1	8.0	0.48	ng/L	09/28/2023 1540
11Cl-PF3OUdS	ND		1	8.0	0.66	ng/L	09/28/2023 1540
8:2 FTS	ND		1	8.0	1.6	ng/L	09/28/2023 1540
6:2 FTS	ND		1	8.0	2.0	ng/L	09/28/2023 1540
4:2 FTS	ND		1	8.0	0.87	ng/L	09/28/2023 1540
GenX	ND		1	8.0	2.1	ng/L	09/28/2023 1540
ADONA	ND		1	8.0	0.48	ng/L	09/28/2023 1540
EtFOSAA	ND		1	8.0	0.75	ng/L	09/28/2023 1540
MeFOSAA	ND		1	8.0	0.93	ng/L	09/28/2023 1540
PFBS	ND		1	4.0	0.41	ng/L	09/28/2023 1540
PFDS	ND		1	4.0	0.78	ng/L	09/28/2023 1540
PFHpS	ND		1	4.0	0.50	ng/L	09/28/2023 1540
PFNS	ND		1	4.0	0.71	ng/L	09/28/2023 1540
PFOSA	ND		1	4.0	0.61	ng/L	09/28/2023 1540
PFPeS	ND		1	4.0	0.59	ng/L	09/28/2023 1540
PFHxS	ND		1	4.0	0.55	ng/L	09/28/2023 1540
PFBA	ND		1	4.0	0.60	ng/L	09/28/2023 1540
PFDA	ND		1	4.0	0.52	ng/L	09/28/2023 1540
PFDoA	ND		1	4.0	0.47	ng/L	09/28/2023 1540
PFHpA	ND		1	4.0	0.45	ng/L	09/28/2023 1540
PFHxA	ND		1	4.0	0.69	ng/L	09/28/2023 1540
PFNA	ND		1	4.0	0.46	ng/L	09/28/2023 1540
PFOA	ND		1	4.0	0.83	ng/L	09/28/2023 1540
PFPeA	ND		1	4.0	0.54	ng/L	09/28/2023 1540
PFTeDA	ND		1	4.0	0.60	ng/L	09/28/2023 1540
PFTrDA	ND		1	4.0	0.53	ng/L	09/28/2023 1540
PFUdA	ND		1	4.0	0.63	ng/L	09/28/2023 1540
PFOS	ND		1	4.0	2.0	ng/L	09/28/2023 1540

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		102	25-150
13C2_6:2FTS		103	25-150
13C2_8:2FTS		88	25-150
13C2_PFDoA		94	25-150
13C2_PFTeDA		85	25-150
13C3_PFBS		96	25-150
13C3_PFHxS		101	25-150
13C3-HFPO-DA		102	25-150
13C4_PFBA		105	25-150
13C4_PFHpA		102	25-150
13C5_PFHxA		89	25-150
13C5_PFPeA		99	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: YQ85183-001
Batch: 85183
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/19/2023 1753

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		92	25-150
13C7_PFUdA		87	25-150
13C8_PFOA		102	25-150
13C8_PFOS		93	25-150
13C8_PFOSA		94	10-150
13C9_PFNA		92	25-150
d5-EtFOSAA		101	25-150
d3-MeFOSAA		107	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ85183-002
Batch: 85183
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/19/2023 1753

Parameter	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	%Rec Limit	Analysis Date
9Cl-PF3ONS	15	13		1	88	50-150	09/28/2023 1550
11Cl-PF3OUdS	15	14		1	93	50-150	09/28/2023 1550
8:2 FTS	15	19		1	122	50-150	09/28/2023 1550
6:2 FTS	15	17		1	111	50-150	09/28/2023 1550
4:2 FTS	15	14		1	91	50-150	09/28/2023 1550
GenX	32	30		1	93	50-150	09/28/2023 1550
ADONA	15	15		1	103	50-150	09/28/2023 1550
EtFOSAA	16	17		1	106	50-150	09/28/2023 1550
MeFOSAA	16	17		1	104	50-150	09/28/2023 1550
PFBS	14	15		1	104	50-150	09/28/2023 1550
PFDS	15	14		1	94	50-150	09/28/2023 1550
PFHpS	15	17		1	114	50-150	09/28/2023 1550
PFNS	15	15		1	97	50-150	09/28/2023 1550
PFOSA	16	16		1	100	50-150	09/28/2023 1550
PFPeS	15	14		1	95	50-150	09/28/2023 1550
PFHxS	15	14		1	93	50-150	09/28/2023 1550
PFBA	16	15		1	91	50-150	09/28/2023 1550
PFDA	16	16		1	102	50-150	09/28/2023 1550
PFDoA	16	16		1	101	50-150	09/28/2023 1550
PFHpA	16	15		1	93	50-150	09/28/2023 1550
PFHxA	16	17		1	106	50-150	09/28/2023 1550
PFNA	16	16		1	97	50-150	09/28/2023 1550
PFOA	16	16		1	100	50-150	09/28/2023 1550
PFPeA	16	15		1	96	50-150	09/28/2023 1550
PFTeDA	16	16		1	102	50-150	09/28/2023 1550
PFTrDA	16	15		1	93	50-150	09/28/2023 1550
PFUdA	16	15		1	95	50-150	09/28/2023 1550
PFOS	15	14		1	93	50-150	09/28/2023 1550

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		101	25-150
13C2_6:2FTS		93	25-150
13C2_8:2FTS		84	25-150
13C2_PFDoA		98	25-150
13C2_PFTeDA		90	25-150
13C3_PFBS		94	25-150
13C3_PFHxS		94	25-150
13C3-HFPO-DA		100	25-150
13C4_PFBA		105	25-150
13C4_PFHpA		100	25-150
13C5_PFHxA		88	25-150
13C5_PFPeA		107	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ85183-002
Batch: 85183
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/19/2023 1753

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		91	25-150
13C7_PFUdA		91	25-150
13C8_PFOA		104	25-150
13C8_PFOS		102	25-150
13C8_PFOSA		89	10-150
13C9_PFNA		96	25-150
d5-EtFOSAA		97	25-150
d3-MeFOSAA		97	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MS

Sample ID: YI13047-006MS
Batch: 85183
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/19/2023 1753

Parameter	Sample Amount (ng/L)	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	%Rec Limit	Analysis Date
9Cl-PF3ONS	ND	13	11		1	88	50-150	09/28/2023 1747
11Cl-PF3OUdS	ND	13	11		1	82	50-150	09/28/2023 1747
8:2 FTS	ND	13	12		1	91	50-150	09/28/2023 1747
6:2 FTS	ND	13	15		1	112	50-150	09/28/2023 1747
4:2 FTS	ND	13	13		1	98	50-150	09/28/2023 1747
GenX	ND	28	29		1	103	50-150	09/28/2023 1747
ADONA	ND	13	11		1	81	50-150	09/28/2023 1747
EtFOSAA	ND	14	13		1	95	50-150	09/28/2023 1747
MeFOSAA	ND	14	13		1	95	50-150	09/28/2023 1747
PFBS	3.9	12	14		1	83	50-150	09/28/2023 1747
PFDS	ND	13	13		1	98	50-150	09/28/2023 1747
PFHpS	ND	13	13		1	100	50-150	09/28/2023 1747
PFNS	ND	13	11		1	85	50-150	09/28/2023 1747
PFOSA	ND	14	13		1	97	50-150	09/28/2023 1747
PFPeS	ND	13	13		1	97	50-150	09/28/2023 1747
PFHxS	4.6	13	14		1	78	50-150	09/28/2023 1747
PFBA	20	14	32		1	90	50-150	09/28/2023 1747
PFDA	ND	14	13		1	94	50-150	09/28/2023 1747
PFDoA	ND	14	13		1	93	50-150	09/28/2023 1747
PFHpA	3.5	14	17		1	93	50-150	09/28/2023 1747
PFHxA	8.9	14	21		1	91	50-150	09/28/2023 1747
PFNA	ND	14	13		1	90	50-150	09/28/2023 1747
PFOA	9.6	14	21		1	86	50-150	09/28/2023 1747
PFPeA	11	14	24		1	94	50-150	09/28/2023 1747
PFTeDA	ND	14	13		1	95	50-150	09/28/2023 1747
PFTrDA	ND	14	13		1	91	50-150	09/28/2023 1747
PFUdA	ND	14	13		1	93	50-150	09/28/2023 1747
PFOS	9.0	13	18		1	74	50-150	09/28/2023 1747

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS	N	283	25-150
13C2_6:2FTS	N	233	25-150
13C2_8:2FTS		122	25-150
13C2_PFDoA		77	25-150
13C2_PFTeDA		68	25-150
13C3_PFBS		79	25-150
13C3_PFHxS		87	25-150
13C3-HFPO-DA		62	25-150
13C4_PFBA		40	25-150
13C4_PFHpA		73	25-150
13C5_PFHxA		73	25-150
13C5_PFPeA		58	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MS

Sample ID: YI13047-006MS
Batch: 85183
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/19/2023 1753

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		85	25-150
13C7_PFUdA		80	25-150
13C8_PFOA		94	25-150
13C8_PFOS		91	25-150
13C8_PFOSA		86	10-150
13C9_PFNA		97	25-150
d5-EtFOSAA		89	25-150
d3-MeFOSAA		100	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MSD

Sample ID: YI13047-006MD
Batch: 85183
Analytical Method: PFAS by ID SOP
Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/19/2023 1753

Parameter	Sample Amount (ng/L)	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	% RPD	%Rec Limit	% RPD Limit	Analysis Date
9Cl-PF3ONS	ND	13	11		1	90	1.3	50-150	30	09/28/2023 1757
11Cl-PF3OUdS	ND	13	11		1	85	2.8	50-150	30	09/28/2023 1757
8:2 FTS	ND	13	13		1	97	5.9	50-150	30	09/28/2023 1757
6:2 FTS	ND	13	17		1	133	16	50-150	30	09/28/2023 1757
4:2 FTS	ND	13	15		1	117	17	50-150	30	09/28/2023 1757
GenX	ND	27	29		1	107	2.7	50-150	30	09/28/2023 1757
ADONA	ND	13	12		1	90	9.8	50-150	30	09/28/2023 1757
EtFOSAA	ND	14	15		1	107	11	50-150	30	09/28/2023 1757
MeFOSAA	ND	14	14		1	99	3.2	50-150	30	09/28/2023 1757
PFBS	3.9	12	16		1	97	10	50-150	30	09/28/2023 1757
PFDS	ND	13	12		1	88	11	50-150	30	09/28/2023 1757
PFHpS	ND	13	16		1	119	16	50-150	30	09/28/2023 1757
PFNS	ND	13	12		1	88	2.6	50-150	30	09/28/2023 1757
PFOSA	ND	14	14		1	104	6.3	50-150	30	09/28/2023 1757
PFPeS	ND	13	15		1	114	16	50-150	30	09/28/2023 1757
PFHxS	4.6	12	17		1	96	14	50-150	30	09/28/2023 1757
PFBA	20	14	38		1	130	16	50-150	30	09/28/2023 1757
PFDA	ND	14	14		1	105	9.6	50-150	30	09/28/2023 1757
PFDoA	ND	14	15		1	106	12	50-150	30	09/28/2023 1757
PFHpA	3.5	14	18		1	105	8.1	50-150	30	09/28/2023 1757
PFHxA	8.9	14	23		1	101	5.8	50-150	30	09/28/2023 1757
PFNA	ND	14	14		1	102	11	50-150	30	09/28/2023 1757
PFOA	9.6	14	20		1	77	5.9	50-150	30	09/28/2023 1757
PFPeA	11	14	24		1	101	3.3	50-150	30	09/28/2023 1757
PFTeDA	ND	14	14		1	103	6.8	50-150	30	09/28/2023 1757
PFTrDA	ND	14	14		1	100	8.4	50-150	30	09/28/2023 1757
PFUdA	ND	14	14		1	98	5.2	50-150	30	09/28/2023 1757
PFOS	9.0	13	20		1	87	8.5	50-150	30	09/28/2023 1757

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS	N	245	25-150
13C2_6:2FTS	N	222	25-150
13C2_8:2FTS		109	25-150
13C2_PFDoA		78	25-150
13C2_PFTeDA		66	25-150
13C3_PFBS		73	25-150
13C3_PFHxS		80	25-150
13C3-HFPO-DA		60	25-150
13C4_PFBA		35	25-150
13C4_PFHpA		67	25-150
13C5_PFHxA		66	25-150
13C5_PFPeA		55	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MSD

Sample ID: YI13047-006MD
Batch: 85183
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/19/2023 1753

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		85	25-150
13C7_PFUdA		79	25-150
13C8_PFOA		94	25-150
13C8_PFOS		90	25-150
13C8_PFOSA		79	10-150
13C9_PFNA		92	25-150
d5-EtFOSAA		85	25-150
d3-MeFOSAA		92	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: YQ85388-001
Batch: 85388
Analytical Method: PFAS by ID SOP
Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/21/2023 1602

Parameter	Result	Q	Dil	LOQ	DL	Units	Analysis Date
9Cl-PF3ONS	ND		1	8.0	0.48	ng/L	09/22/2023 1546
11Cl-PF3OUdS	ND		1	8.0	0.66	ng/L	09/22/2023 1546
8:2 FTS	ND		1	8.0	1.6	ng/L	09/22/2023 1546
6:2 FTS	ND		1	8.0	2.0	ng/L	09/22/2023 1546
4:2 FTS	ND		1	8.0	0.87	ng/L	09/22/2023 1546
GenX	ND		1	8.0	2.1	ng/L	09/22/2023 1546
ADONA	ND		1	8.0	0.48	ng/L	09/22/2023 1546
EtFOSAA	ND		1	8.0	0.75	ng/L	09/22/2023 1546
MeFOSAA	ND		1	8.0	0.93	ng/L	09/22/2023 1546
PFBS	ND		1	4.0	0.41	ng/L	09/22/2023 1546
PFDS	ND		1	4.0	0.78	ng/L	09/22/2023 1546
PFHpS	ND		1	4.0	0.50	ng/L	09/22/2023 1546
PFNS	ND		1	4.0	0.71	ng/L	09/22/2023 1546
PFOSA	ND		1	4.0	0.61	ng/L	09/22/2023 1546
PFPeS	ND		1	4.0	0.59	ng/L	09/22/2023 1546
PFHxS	ND		1	4.0	0.55	ng/L	09/22/2023 1546
PFBA	ND		1	4.0	0.60	ng/L	09/22/2023 1546
PFDA	ND		1	4.0	0.52	ng/L	09/22/2023 1546
PFDoA	ND		1	4.0	0.47	ng/L	09/22/2023 1546
PFHpA	ND		1	4.0	0.45	ng/L	09/22/2023 1546
PFHxA	ND		1	4.0	0.69	ng/L	09/22/2023 1546
PFNA	ND		1	4.0	0.46	ng/L	09/22/2023 1546
PFOA	ND		1	4.0	0.83	ng/L	09/22/2023 1546
PFPeA	ND		1	4.0	0.54	ng/L	09/22/2023 1546
PFTeDA	ND		1	4.0	0.60	ng/L	09/22/2023 1546
PFTrDA	ND		1	4.0	0.53	ng/L	09/22/2023 1546
PFUdA	ND		1	4.0	0.63	ng/L	09/22/2023 1546
PFOS	ND		1	4.0	2.0	ng/L	09/22/2023 1546

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		100	25-150
13C2_6:2FTS		108	25-150
13C2_8:2FTS		93	25-150
13C2_PFDoA		90	25-150
13C2_PFTeDA		98	25-150
13C3_PFBS		92	25-150
13C3_PFHxS		83	25-150
13C3-HFPO-DA		90	25-150
13C4_PFBA		94	25-150
13C4_PFHpA		86	25-150
13C5_PFHxA		89	25-150
13C5_PFPeA		89	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: YQ85388-001
Batch: 85388
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/21/2023 1602

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		91	25-150
13C7_PFUdA		86	25-150
13C8_PFOA		88	25-150
13C8_PFOS		84	25-150
13C8_PFOSA		86	10-150
13C9_PFNA		94	25-150
d5-EtFOSAA		94	25-150
d3-MeFOSAA		87	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ85388-002
Batch: 85388
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/21/2023 1602

Parameter	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	%Rec Limit	Analysis Date
9Cl-PF3ONS	15	16		1	106	50-150	09/22/2023 1556
11Cl-PF3OUdS	15	15		1	102	50-150	09/22/2023 1556
8:2 FTS	15	16		1	105	50-150	09/22/2023 1556
6:2 FTS	15	16		1	103	50-150	09/22/2023 1556
4:2 FTS	15	16		1	107	50-150	09/22/2023 1556
GenX	32	32		1	101	50-150	09/22/2023 1556
ADONA	15	18		1	118	50-150	09/22/2023 1556
EtFOSAA	16	17		1	105	50-150	09/22/2023 1556
MeFOSAA	16	16		1	101	50-150	09/22/2023 1556
PFBS	14	15		1	108	50-150	09/22/2023 1556
PFDS	15	16		1	101	50-150	09/22/2023 1556
PFHpS	15	17		1	109	50-150	09/22/2023 1556
PFNS	15	16		1	107	50-150	09/22/2023 1556
PFOSA	16	14		1	89	50-150	09/22/2023 1556
PFPeS	15	16		1	108	50-150	09/22/2023 1556
PFHxS	15	16		1	112	50-150	09/22/2023 1556
PFBA	16	16		1	100	50-150	09/22/2023 1556
PFDA	16	17		1	107	50-150	09/22/2023 1556
PFDoA	16	16		1	100	50-150	09/22/2023 1556
PFHpA	16	17		1	108	50-150	09/22/2023 1556
PFHxA	16	17		1	108	50-150	09/22/2023 1556
PFNA	16	19		1	118	50-150	09/22/2023 1556
PFOA	16	20		1	123	50-150	09/22/2023 1556
PFPeA	16	16		1	102	50-150	09/22/2023 1556
PFTeDA	16	17		1	108	50-150	09/22/2023 1556
PFTrDA	16	18		1	113	50-150	09/22/2023 1556
PFUdA	16	18		1	113	50-150	09/22/2023 1556
PFOS	15	16		1	109	50-150	09/22/2023 1556

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		101	25-150
13C2_6:2FTS		102	25-150
13C2_8:2FTS		86	25-150
13C2_PFDoA		81	25-150
13C2_PFTeDA		92	25-150
13C3_PFBS		99	25-150
13C3_PFHxS		89	25-150
13C3-HFPO-DA		95	25-150
13C4_PFBA		93	25-150
13C4_PFHpA		85	25-150
13C5_PFHxA		95	25-150
13C5_PFPeA		99	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ85388-002
Batch: 85388
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/21/2023 1602

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		89	25-150
13C7_PFUdA		82	25-150
13C8_PFOA		92	25-150
13C8_PFOS		81	25-150
13C8_PFOSA		86	10-150
13C9_PFNA		83	25-150
d5-EtFOSAA		86	25-150
d3-MeFOSAA		81	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Chain of Custody
and
Miscellaneous Documents

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106 Vantage Point Drive • West Columbia, SC 29172
Telephone No. 803-791-9700 Fax No. 803-791-9111
www.pacelabs.com

Number 149979

Client: Arcadis	Report to Contact: Alexis.crisp@arcadis.com, tiffany.linder@arcadis.com	Telephone No. / E-mail: tiffany linder, Alexis Crisp	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: x Sommer Guy	Analysis (Attach list if more space is needed): Report EGLE 26 compounds	Page 1 of 3
City: Novi; State: MI; Zip Code: 48377	Printed Name: Sommer Guy		Lot # Bar Code: YI13047
Project Name: Racer PNC			

Project No. 30167840.00031	P.O. No.		Grab/Composite	Matrix: Aqueous, Solid, Non-Aqueous	No of Containers by Preservative Type: Unpres, H2SO4, HNO3, HCl, NaOH, ZnAc/NaOH, Na2S2O3, Other	Analysis: Method 537.1 mod. with isotope dilution per QSM 5.1	HES2
Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)					Remarks / Cooler I.D.
MWF16-25_GW-091223	9/12/23	1417	G	X — —	2	X	
tripblank	9/12/23	1400	G	X — —	1	X	tripblank
MWF16-26_GW-091223	9/12/23	1525	G	X — —	2	X	
MW-05-18_GW-091223	9/12/23	1642	G	X — —	2	X	

Turn Around Time Required (Prior lab approval required for expedited TAT.)	Sample Disposal	Possible Hazard Identification	QC Requirements (Specify)
☒ Standard ☐ Rush (Specify)	☐ Return to Client ☒ Disposal by Lab	☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown	

	Date	Time		Date	Time
1. Relinquished by: Sommer Guy	9/12/23	1800	1. Received by: FedEx	9/12/23	1806
2. Relinquished by	Date	Time	2. Received by	Date	Time
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by: FedEx	Date 9/13/23	Time 0650	4. Laboratory received by: CJH	Date 9/12/23	Time 0650

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY — Received on Ice (Circle): (Yes) No Ice Pack — Receipt Temp: 1.3 °C — Temp Blank: ☐ Y ☐N

DISTRIBUTION: WHITE & YELLOW-Return to laboratory with Sample(s); PINK-Field/Client Copy

FedEx CJH

Document Number: MEG03N2-01

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Number 149978

Client: Arcadis	Report to Contact: Tiffany Linder Mundt CHSP	Telephone No. / E-mail: tiffany.linder@arcadis.us Alexis.Crisp@arcadis.com	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: x Garrett Link	Analysis (Attach list if more space is needed): Report EGLE 28 Compounds	Page 2 of 3
City: Novi / State: MI / Zip Code: 48377	Printed Name:		
Project Name: Racer PNC			

Project No.	P.O. No.		Grab/Composite	Matrix				No of Containers by Preservative Type									
Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)		Aqueous	Solid	Wipe / Assay	Other	Unpres.	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Field Filtered	537 Mod. w/ Isotope dilution for PFOA & PFOS		Remarks / Cooler I.D.
30167840.00031																	YI13047
MW-02-17_GW-091223	9/12/23	11:40	G	X				X							X		
MWP12-02R_GW-091223	9/12/23	14:35	G	X				X							X		EGLE MS/MSD
MW05-09R_GW-091223	9/12/23	16:35	G	X				X							X		

Turn Around Time Required (Prior lab approval required for expedited TAT.): ☒ Standard ☐ Rush (Specify)

Sample Disposal: ☐ Return to Client ☒ Disposal by Lab

Possible Hazard Identification: ☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify):

	Date	Time		Date	Time
1. Relinquished by: Jennifer Hay	9/12/23	1800	1. Received by: FedEx	9/12/23	1800
2. Relinquished by	Date	Time	2. Received by	Date	Time
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by: FEDEX	Date: 9/13/23	Time: 0850	4. Laboratory received by: Ch Hy	Date: 9/14/23	Time: 0850

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY
Received on Ice (Circle): (Yes) No Ice Pack
Receipt Temp: 1.3 °C
Temp Blank: ☐ Y ☐ N

DISTRIBUTION: WHITE & YELLOW-Return to laboratory with Sample(s); PINK-Field/Client Copy

Document Number: MECC3N2-01

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Number 149976

ARCADIS

Client: 28550 Cabot Dr #500	Report to Contact: Tiffany Linder, Alexis Crisp	Telephone No. / E-mail: Alexis.crisp@arcadis.com, tiffany.linder@arcadis.com	Quote No.
Address: Arcadis	Sampler's Signature: x Lottie Jay	Analysis (Attach list if more space is needed): Report EGLE 28 Compounds	Page 3 of 3
City: Novi; State: MI; Zip Code: 48377	Printed Name:		
Project Name: Racer PNC			YI13047
Project No.: 30167840.00031	P.O. No.		KES2

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Matrix: Grab/Composite	Aqueous	Solid	Non-Aqueous	No of Containers by Preservative Type: Unpres.	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Method 537 mod. with isotope dilution per DSHS	Remarks / Cooler I.D.
MWF7-02_GW-091223	9/12/23	1125	G	2			2							X	
MWF15-01_GW-091223		1330	G	2			2							X	
MWF16-23_GW-091223		1505	G	2			2							X	
MW05-10-GW-091223		1700	G	2			2							X	
EB-03-GW-091223		1129	G	1			1							X	

Turn Around Time Required (Prior lab approval required for expedited TAT): ☒ Standard ☐ Rush (Specify)

Sample Disposal: ☐ Return to Client ☒ Disposal by Lab

Possible Hazard Identification: ☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: Lottie Jay	9/12/23	1800	1. Received by: FedEx	9/12/23	1800
2. Relinquished by	Date	Time	2. Received by	Date	Time
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by: FedEx	Date 9/13/23	Time 0850	4. Laboratory received by	Date 9/13/23	Time 0850

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY — Received on Ice (Circle) (Yes) No — Ice Pack — Receipt Temp. 1.3 °C — Temp Blank ☐ Yes ☐ No

DISTRIBUTION: WHITE & YELLOW-Return to laboratory with Sample(s); PINK-Field/Client Copy

Document Number: MF002N2-01

PACE ANALYTICAL SERVICES, LLC

DC#_Title: ENV-FRM-WCOL-0286 v02_Samples Receipt Checklist (SRC)
Effective Date: 8/2/2022

Sample Receipt Checklist (SRC)

Client: ARCADIS Cooler Inspected by/date: CJH / 09/13/23 Lot #: YI13047

Means of receipt: ☐ Pace ☐ Client ☐ UPS ☑ FedEx ☐ Other: _____

☐ Yes	☑ No		1. Were custody seals present on the cooler?
☐ Yes	☐ No	☑ NA	2. If custody seals were present, were they intact and unbroken?

pH Strip ID: NA Chlorine Strip ID: NA Tested by: NA
Original temperature upon receipt / Derived (Corrected) temperature upon receipt %Solid Snap-Cup ID: NA
1.3 / 1.3 °C NA / NA °C NA / NA °C NA / NA °C
Method: ☐ Temperature Blank ☑ Against Bottles IR Gun ID: 8 IR Gun Correction Factor: 0 °C
Method of coolant: ☑ Wet Ice ☐ Ice Packs ☐ Dry Ice ☐ None

☑ Yes	☐ No	☐ NA	3. Were all coolers received at or below 6.0°C? If no, was Project Manager notified? PM was Notified by: phone / email / face-to-face (circle one).
☑ Yes	☐ No	☐ NA	4. Is the commercial courier's packing slip attached to this form?
☑ Yes	☐ No		5. Were proper custody procedures (relinquished/received) followed?
☑ Yes	☐ No		6. Were sample IDs listed on the COC and all sample containers?
☑ Yes	☐ No		7. Was collection date & time listed on the COC and all sample containers?
☑ Yes	☐ No		8. Did all container label information (ID, date, time) agree with the COC?
☑ Yes	☐ No		9. Were tests to be performed listed on the COC?
☑ Yes	☐ No		10. Did all samples arrive in the proper containers for each test and/or in good condition (unbroken, lids on, etc.)? _____
☑ Yes	☐ No		11. Was adequate sample volume available?
☑ Yes	☐ No		12. Were all samples received within ½ the holding time or 48 hours, whichever comes first?
☑ Yes	☐ No		13. Were all samples containers accounted for? (No missing/excess)
☐ Yes	☐ No	☑ NA	14. Were VOA, 8015C and RSK-175 samples free of bubbles >"pea-size" (¼" or 6mm in diameter) in any of the VOA vials?
☐ Yes	☐ No	☑ NA	15. Were all DRO/metals/nutrient samples received at a pH of < 2?
☐ Yes	☐ No	☑ NA	16. Were all cyanide samples received at a pH > 12 and sulfide samples received at a pH > 9?
☐ Yes	☐ No	☑ NA	17. Were all applicable NH_3/TKN/cyanide/phenol/625.1/608.3 (< 0.5mg/L) samples free of residual chlorine?
☐ Yes	☑ No	☐ NA	18. Was the quote number listed on the container label? If yes, Quote # _____

Sample Preservation (Must be completed for any sample(s) incorrectly preserved or with headspace.)

Sample(s) NA were received incorrectly preserved and were adjusted accordingly in sample receiving with NA mL of circle one: H2SO4, HNO3, HCl, NaOH using SR # NA . ☐
Time of preservation NA . If more than one preservative is needed, please note in the comments below.

Sample(s) NA were received with bubbles >6 mm in diameter.

Samples(s) NA were received with TRC > 0.5 mg/L (If #19 is *no*) and were adjusted accordingly in sample receiving with sodium thiosulfate ($Na_2S_2O_3$) with Unique ID: NA

Comments:

Qualtrax ID: 56360 Pace® Analytical Services, LLC Page 1 of 1

Report of Analysis

Arcadis U.S., Inc.
630 Plaza Drive
Suite 600
Highlands Ranch, CO 80129
Attention: Tiffany Linder

Project Name: RACER PNC

Project Number: 30167840.00031

Lot Number:**YI14025**

Date Completed:09/26/2023

09/26/2023 1:31 PM
Approved and released by:
Project Manager II: **Kathy E. Smith**

The electronic signature above is the equivalent of a handwritten signature.
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Pace Analytical Services, LLC (*formerly Shealy Environmental Services, Inc.*)
106 Vantage Point Drive West Columbia, SC 29172
Tel: 803-791-9700 Fax: 803-791-9111 www.pacelabs.com

Case Narrative
Arcadis U.S., Inc.
Lot Number: YI14025

This Report of Analysis contains the analytical result(s) for the sample(s) listed on the Sample Summary following this Case Narrative. The sample receiving date is documented in the header information associated with each sample.

All results listed in this report relate only to the samples that are contained within this report.

Sample receipt, sample analysis, and data review have been performed in accordance with the Pace Quality Assurance Management Plan (QAMP), applicable Shealy standard operating procedures (SOPs), the 2003 NELAC standard, and Shealy policies. Additionally, the DoD QSM version 5.4 has been followed for these samples, and specifically Table B-15 was followed for all PFAS samples. Any exceptions to the QAMP, SOPs, NELAC standards, the DoD QSM, or policies are qualified on the results page or discussed below.

All QC associated with these samples were compliant with DOD QSM 5.4 table B-15 and our PFAS SOP.

Correction factors (CF) are used to calculate the original sample concentration. The CF is the inverse of the concentration factor (sample volume / extract final volume) times the dilution factor (DF). The CF is calculated as follows:

CF = DF * FV / Vo

FV is volume of extract (mL)
Vo is initial sample volume (mL)
DF is dilution factor. For undiluted analysis, DF = 1.

Sample concentration for aqueous samples:
Concentration (ng/L) = Cs*CF,

$$C_s = \frac{\left(\frac{(A_s x C_{is})}{A_{is}}\right) - B}{M1}$$

Where

C_s is on column concentration of target analyte in the sample (ng/L)
C_{is} is concentration of internal standard in the sample (ng/L)
A_s is peak response of target analyte in the sample
A_{is} is peak response of internal standard in the sample
M1 is the average RF from ICAL or the slope from linear regression ICAL
B is the y-intercept from the ICAL

Pace is a TNI accredited laboratory; however, the following analyses are currently not listed on our TNI scope of accreditation: Drinking Water: VOC (excluding BTEX, MTBE, Naphthalene, & 1,2-dichloroethane) EPA 524.2, E. coli and Total coliforms SM 9223 B-2004, Solid Chemical Material: TOC Walkley-Black, Biological Tissue: All, Non-Potable Water: SGT-HEM EPA 1664B, Silica EPA 200.7, Boron, Calcium, Silicon, Strontium EPA 200.8, Bicarbonate, Carbonate, and Hydroxide Alkalinity SM 2320 B-2011, SM 9221 C E-2006 & SM 9222D-2006, Strontium SW-846 6010D, VOC SM 6200 B-2011, Fecal Coliform Colilert-18, PFAS by Isotope Dilution SOP.

If you have any questions regarding this report, please contact the Pace Project Manager listed on the cover page.

PFAS
Samples YI14025-001, YI14025-004, YI14025-006, YI14025-007, YI14025-008 required centrifugation prior to extraction, due to excessive solids present in the samples. Centrifugation was performed following the PFAS Aqueous Centrifuge Protocol; samples were spiked with Surrogate (SUR; Extracted Internal Standard/EIS) and shaken vigorously before being poured into a conical bottle and centrifuged. The centrifuged aqueous sample was decanted back into the original sample bottle, off of the condensed solids remaining in the centrifuge bottle. Original sample bottle was rinsed as normal and centrifuge bottle was rinsed with 4mL of MeOH. Centrifuge bottle rinsate was added to the elution. Samples concentrated to <5mL and reconstituted to 5mL using MeOH by transfer pipet.

Surrogate recovery for the following samples was outside control limits: YI14025-001, YI14025-004, YI14025-006, YI14025-007. Evidence of matrix interference is present; therefore, re-extraction and/or re-analysis was not performed.

Surrogate recovery for the following samples was outside the upper control limit: YI14025-005, YI14025-008, YI14025-009. These samples did not contain any target analytes; therefore, re-extraction and/or re-analysis was not performed.

Sample Summary

Arcadis U.S., Inc.

Lot Number: YI14025

Project Name: RACER PNC

Project Number: 30167840.00031

Sample Number	Sample ID	Matrix	Date Sampled	Date Received
001	MWOS-03_GW-091323	Aqueous	09/13/2023 1043	09/14/2023
002	EB-01-091323	Aqueous	09/13/2023 1100	09/14/2023
003	trip blank	Aqueous	09/13/2023 1105	09/14/2023
004	MWOS-04_GW-091323	Aqueous	09/13/2023 1310	09/14/2023
005	MWOS-01_GW-091323	Aqueous	09/13/2023 1045	09/14/2023
006	MWOS-02_GW-091323	Aqueous	09/13/2023 1135	09/14/2023
007	TW-ROW-03_GW-091323	Aqueous	09/13/2023 1215	09/14/2023
008	TW-ROW-01_GW-091323	Aqueous	09/13/2023 1330	09/14/2023
009	MWW1-06_GW-091323	Aqueous	09/13/2023 1350	09/14/2023

(9 samples)

Detection Summary

Arcadis U.S., Inc.

Lot Number: YI14025

Project Name: RACER PNC

Project Number: 30167840.00031

Sample	Sample ID	Matrix	Parameter	Method	Result	Q	Units	Page
005	MWOS-01_GW-091323	Aqueous	PFBS	PFAS by ID	18		ng/L	15
005	MWOS-01_GW-091323	Aqueous	PFHxS	PFAS by ID	2.2	J	ng/L	15
005	MWOS-01_GW-091323	Aqueous	PFBA	PFAS by ID	14		ng/L	15
005	MWOS-01_GW-091323	Aqueous	PFHpA	PFAS by ID	1.8	J	ng/L	15
005	MWOS-01_GW-091323	Aqueous	PFHxA	PFAS by ID	3.3	J	ng/L	15
005	MWOS-01_GW-091323	Aqueous	PFOA	PFAS by ID	3.8		ng/L	15
005	MWOS-01_GW-091323	Aqueous	PFPeA	PFAS by ID	5.7		ng/L	15
005	MWOS-01_GW-091323	Aqueous	PFOS	PFAS by ID	7.8		ng/L	15
006	MWOS-02_GW-091323	Aqueous	PFBS	PFAS by ID	4.3		ng/L	17
006	MWOS-02_GW-091323	Aqueous	PFPeS	PFAS by ID	1.6	J	ng/L	17
006	MWOS-02_GW-091323	Aqueous	PFHxS	PFAS by ID	6.8		ng/L	17
006	MWOS-02_GW-091323	Aqueous	PFBA	PFAS by ID	7.9		ng/L	17
006	MWOS-02_GW-091323	Aqueous	PFHpA	PFAS by ID	1.5	J	ng/L	17
006	MWOS-02_GW-091323	Aqueous	PFHxA	PFAS by ID	2.9	J	ng/L	17
006	MWOS-02_GW-091323	Aqueous	PFOA	PFAS by ID	7.0		ng/L	17
006	MWOS-02_GW-091323	Aqueous	PFPeA	PFAS by ID	2.5	J	ng/L	17
006	MWOS-02_GW-091323	Aqueous	PFOS	PFAS by ID	9.5		ng/L	17
007	TW-ROW-03_GW-091323	Aqueous	6:2 FTS	PFAS by ID	2.1	JQ	ng/L	19
007	TW-ROW-03_GW-091323	Aqueous	PFBS	PFAS by ID	4.8		ng/L	19
007	TW-ROW-03_GW-091323	Aqueous	PFHpS	PFAS by ID	0.95	J	ng/L	19
007	TW-ROW-03_GW-091323	Aqueous	PFPeS	PFAS by ID	1.3	J	ng/L	19
007	TW-ROW-03_GW-091323	Aqueous	PFHxS	PFAS by ID	6.3		ng/L	19
007	TW-ROW-03_GW-091323	Aqueous	PFBA	PFAS by ID	12		ng/L	19
007	TW-ROW-03_GW-091323	Aqueous	PFHpA	PFAS by ID	1.7	J	ng/L	19
007	TW-ROW-03_GW-091323	Aqueous	PFHxA	PFAS by ID	4.1		ng/L	19
007	TW-ROW-03_GW-091323	Aqueous	PFNA	PFAS by ID	0.74	J	ng/L	19
007	TW-ROW-03_GW-091323	Aqueous	PFOA	PFAS by ID	5.8		ng/L	19
007	TW-ROW-03_GW-091323	Aqueous	PFPeA	PFAS by ID	4.5		ng/L	19
007	TW-ROW-03_GW-091323	Aqueous	PFOS	PFAS by ID	36		ng/L	19
008	TW-ROW-01_GW-091323	Aqueous	PFHpS	PFAS by ID	0.88	J	ng/L	21
008	TW-ROW-01_GW-091323	Aqueous	PFHxS	PFAS by ID	3.5		ng/L	21
008	TW-ROW-01_GW-091323	Aqueous	PFBA	PFAS by ID	8.6		ng/L	21
008	TW-ROW-01_GW-091323	Aqueous	PFHpA	PFAS by ID	2.1	J	ng/L	21
008	TW-ROW-01_GW-091323	Aqueous	PFHxA	PFAS by ID	4.2		ng/L	21
008	TW-ROW-01_GW-091323	Aqueous	PFOA	PFAS by ID	5.5		ng/L	21
008	TW-ROW-01_GW-091323	Aqueous	PFOS	PFAS by ID	12		ng/L	21
009	MWW1-06_GW-091323	Aqueous	6:2 FTS	PFAS by ID	16		ng/L	23
009	MWW1-06_GW-091323	Aqueous	PFBS	PFAS by ID	2.7	J	ng/L	23
009	MWW1-06_GW-091323	Aqueous	PFHxS	PFAS by ID	0.96	J	ng/L	23
009	MWW1-06_GW-091323	Aqueous	PFBA	PFAS by ID	6.1		ng/L	23
009	MWW1-06_GW-091323	Aqueous	PFHpA	PFAS by ID	1.3	J	ng/L	23
009	MWW1-06_GW-091323	Aqueous	PFHxA	PFAS by ID	1.3	J	ng/L	23
009	MWW1-06_GW-091323	Aqueous	PFOA	PFAS by ID	6.8		ng/L	23

Detection Summary (Continued)

Lot Number: YI14025

Sample	Sample ID	Matrix	Parameter	Method	Result	Q	Units	Page
009	MWW1-06_GW-091323	Aqueous	PFPeA	PFAS by ID	0.92	J	ng/L	23
009	MWW1-06_GW-091323	Aqueous	PFOS	PFAS by ID	22		ng/L	23

(45 detections)

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-001**

Description: **MWOS-03_GW-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1043** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1804	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.7	0.47	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.7	0.64	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.7	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.7	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.7	0.84	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.7	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.7	0.47	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.7	0.72	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.7	0.90	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.9	0.40	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.9	0.75	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.9	0.48	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.9	0.69	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.9	0.59	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.9	0.57	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.9	0.53	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.9	0.58	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.9	0.51	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.9	0.46	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.9	0.43	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.9	0.66	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.9	0.45	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.9	0.80	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.9	0.53	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.9	0.58	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.9	0.51	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.9	0.61	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.9	1.9	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	283	25-150
13C2_6:2FTS	N	217	25-150
13C2_8:2FTS		98	25-150
13C2_PFDoA		74	25-150
13C2_PFTeDA		73	25-150
13C3_PFBS		76	25-150
13C3_PFHxS		85	25-150
13C3-HFPO-DA		64	25-150
13C4_PFBA		26	25-150
13C4_PFHpA		80	25-150
13C5_PFHxA		74	25-150
13C5_PFPeA		54	25-150
13C6_PFDA		91	25-150
13C7_PFUdA		90	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-001**

Description: **MWOS-03_GW-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1043** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		104	25-150
13C8_PFOS		90	25-150
13C8_PFOSA		92	10-150
13C9_PFNA		101	25-150
d5-EtFOSAA		86	25-150
d3-MeFOSAA		85	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-002**

Description: **EB-01-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1100** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1814	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.2	0.43	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.2	0.60	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.2	1.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.2	0.79	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.2	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.2	0.44	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.2	0.68	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.2	0.84	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.6	0.37	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.70	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.6	0.45	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.64	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	0.55	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.6	0.53	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.6	0.50	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.6	0.54	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	0.47	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.42	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.6	0.40	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.6	0.62	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.6	0.42	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.6	0.75	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.6	0.49	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.54	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.48	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.56	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.6	1.8	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		105	25-150
13C2_6:2FTS		98	25-150
13C2_8:2FTS		88	25-150
13C2_PFDoA		72	25-150
13C2_PFTeDA		85	25-150
13C3_PFBS		94	25-150
13C3_PFHxS		87	25-150
13C3-HFPO-DA		82	25-150
13C4_PFBA		94	25-150
13C4_PFHpA		84	25-150
13C5_PFHxA		95	25-150
13C5_PFPeA		95	25-150
13C6_PFDA		86	25-150
13C7_PFUdA		85	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-002**

Description: **EB-01-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1100** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		97	25-150
13C8_PFOS		81	25-150
13C8_PFOSA		81	10-150
13C9_PFNA		85	25-150
d5-EtFOSAA		87	25-150
d3-MeFOSAA		80	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-003**

Description: **trip blank** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1105** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1825	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.8	0.47	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.8	0.65	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.8	1.6	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.8	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.8	0.85	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.8	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.8	0.47	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.8	0.73	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.8	0.91	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.9	0.40	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.9	0.76	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.9	0.49	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.9	0.69	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.9	0.60	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.9	0.58	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.9	0.54	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.9	0.58	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.9	0.51	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.9	0.46	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.9	0.44	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.9	0.67	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.9	0.45	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.9	0.81	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.9	0.53	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.9	0.58	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.9	0.52	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.9	0.61	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.9	2.0	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		94	25-150
13C2_6:2FTS		102	25-150
13C2_8:2FTS		82	25-150
13C2_PFDoA		75	25-150
13C2_PFTeDA		85	25-150
13C3_PFBS		93	25-150
13C3_PFHxS		90	25-150
13C3-HFPO-DA		90	25-150
13C4_PFBA		92	25-150
13C4_PFHpA		84	25-150
13C5_PFHxA		92	25-150
13C5_PFPeA		97	25-150
13C6_PFDA		90	25-150
13C7_PFUdA		87	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-003**

Description: **trip blank** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1105** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		95	25-150
13C8_PFOS		86	25-150
13C8_PFOSA		91	10-150
13C9_PFNA		93	25-150
d5-EtFOSAA		94	25-150
d3-MeFOSAA		82	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
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N = Recovery is out of criteria
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-004**

Description: **MWOS-04_GW-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1310** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1857	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.4	0.45	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.4	0.61	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.4	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.4	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.4	0.81	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.4	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.4	0.45	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.4	0.70	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.4	0.86	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.7	0.38	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	0.72	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.7	0.46	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	0.66	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	0.57	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.7	0.55	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.7	0.51	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND	Q	3.7	0.56	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	0.49	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	0.44	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.7	0.41	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.7	0.64	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.7	0.43	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.7	0.77	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.7	0.50	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	0.56	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	0.49	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	0.58	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.7	1.9	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	231	25-150
13C2_6:2FTS	N	224	25-150
13C2_8:2FTS		108	25-150
13C2_PFDoA		67	25-150
13C2_PFTeDA		73	25-150
13C3_PFBS		80	25-150
13C3_PFHxS		83	25-150
13C3-HFPO-DA		56	25-150
13C4_PFBA	N	21	25-150
13C4_PFHpA		60	25-150
13C5_PFHxA		55	25-150
13C5_PFPeA		40	25-150
13C6_PFDA		93	25-150
13C7_PFUdA		81	25-150

LOQ = Limit of Quantitation
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E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
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S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-004**

Description: **MWOS-04_GW-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1310** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		95	25-150
13C8_PFOS		80	25-150
13C8_PFOSA		84	10-150
13C9_PFNA		98	25-150
d5-EtFOSAA		80	25-150
d3-MeFOSAA		87	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-005**

Description: **MWOS-01_GW-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1045** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1907	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.0	0.42	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.0	0.58	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.0	1.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.0	1.7	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.0	0.76	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.0	0.42	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.0	0.66	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.0	0.81	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**18**		**3.5**	**0.36**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.68	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.5	0.44	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.62	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.54	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.5	0.52	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**2.2**	**J**	**3.5**	**0.48**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**14**		**3.5**	**0.52**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.46	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.41	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**1.8**	**J**	**3.5**	**0.39**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**3.3**	**J**	**3.5**	**0.60**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	0.40	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**3.8**		**3.5**	**0.72**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**5.7**		**3.5**	**0.48**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.52	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.46	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.55	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**7.8**		**3.5**	**1.7**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	224	25-150
13C2_6:2FTS		135	25-150
13C2_8:2FTS		91	25-150
13C2_PFDoA		75	25-150
13C2_PFTeDA		84	25-150
13C3_PFBS		87	25-150
13C3_PFHxS		81	25-150
13C3-HFPO-DA		75	25-150
13C4_PFBA		52	25-150
13C4_PFHpA		88	25-150
13C5_PFHxA		66	25-150
13C5_PFPeA		83	25-150
13C6_PFDA		88	25-150
13C7_PFUdA		88	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-005**

Description: **MWOS-01_GW-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1045** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		91	25-150
13C8_PFOS		74	25-150
13C8_PFOSA		87	10-150
13C9_PFNA		94	25-150
d5-EtFOSAA		85	25-150
d3-MeFOSAA		86	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-006**

Description: **MWOS-02_GW-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1135** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1918	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		8.0	0.48	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		8.0	0.66	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		8.0	1.6	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	8.0	2.0	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	8.0	0.88	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		8.0	2.1	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		8.0	0.48	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		8.0	0.75	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		8.0	0.93	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**4.3**		**4.0**	**0.42**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		4.0	0.78	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		4.0	0.50	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		4.0	0.71	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		4.0	0.61	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**1.6**	**J**	**4.0**	**0.60**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**6.8**		**4.0**	**0.55**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**7.9**		**4.0**	**0.60**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		4.0	0.53	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		4.0	0.47	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**1.5**	**J**	**4.0**	**0.45**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**2.9**	**J**	**4.0**	**0.69**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		4.0	0.46	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**7.0**		**4.0**	**0.83**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**2.5**	**J**	**4.0**	**0.55**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		4.0	0.60	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		4.0	0.53	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		4.0	0.63	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**9.5**		**4.0**	**2.0**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	276	25-150
13C2_6:2FTS	N	157	25-150
13C2_8:2FTS		92	25-150
13C2_PFDoA		69	25-150
13C2_PFTeDA		73	25-150
13C3_PFBS		94	25-150
13C3_PFHxS		85	25-150
13C3-HFPO-DA		69	25-150
13C4_PFBA		56	25-150
13C4_PFHpA		79	25-150
13C5_PFHxA		88	25-150
13C5_PFPeA		78	25-150
13C6_PFDA		89	25-150
13C7_PFUdA		83	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
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H = Out of holding time
W = Reported on wet weight basis
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-006**

Description: **MWOS-02_GW-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1135** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		96	25-150
13C8_PFOS		83	25-150
13C8_PFOSA		88	10-150
13C9_PFNA		97	25-150
d5-EtFOSAA		83	25-150
d3-MeFOSAA		80	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
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ND = Not detected at or above the DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-007**

Description: **TW-ROW-03_GW-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1215** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1928	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		6.9	0.42	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		6.9	0.57	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		6.9	1.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**2.1**	**JQ**	**6.9**	**1.7**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	6.9	0.76	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		6.9	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		6.9	0.42	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		6.9	0.65	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		6.9	0.81	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**4.8**		**3.5**	**0.36**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.67	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**0.95**	**J**	**3.5**	**0.43**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.62	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.53	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**1.3**	**J**	**3.5**	**0.51**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**6.3**		**3.5**	**0.48**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**12**		**3.5**	**0.52**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.46	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.41	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**1.7**	**J**	**3.5**	**0.39**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**4.1**		**3.5**	**0.60**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**0.74**	**J**	**3.5**	**0.40**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**5.8**		**3.5**	**0.72**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**4.5**		**3.5**	**0.47**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.52	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.46	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.54	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**36**		**3.5**	**1.7**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	266	25-150
13C2_6:2FTS	N	219	25-150
13C2_8:2FTS		130	25-150
13C2_PFDoA		72	25-150
13C2_PFTeDA		66	25-150
13C3_PFBS		84	25-150
13C3_PFHxS		82	25-150
13C3-HFPO-DA		58	25-150
13C4_PFBA		32	25-150
13C4_PFHpA		72	25-150
13C5_PFHxA		84	25-150
13C5_PFPeA		61	25-150
13C6_PFDA		93	25-150
13C7_PFUdA		85	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-007**

Description: **TW-ROW-03_GW-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1215** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		94	25-150
13C8_PFOS		80	25-150
13C8_PFOSA		82	10-150
13C9_PFNA		94	25-150
d5-EtFOSAA		91	25-150
d3-MeFOSAA		88	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-008**

Description: **TW-ROW-01_GW-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1330** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1939	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		6.9	0.41	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		6.9	0.57	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		6.9	1.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	6.9	1.7	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	6.9	0.75	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		6.9	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		6.9	0.41	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		6.9	0.64	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		6.9	0.80	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.4	0.36	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.4	0.67	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**0.88**	**J**	**3.4**	**0.43**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.4	0.61	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.4	0.53	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.4	0.51	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**3.5**		**3.4**	**0.47**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**8.6**		**3.4**	**0.51**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.4	0.45	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.4	0.40	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**2.1**	**J**	**3.4**	**0.38**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**4.2**		**3.4**	**0.59**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.4	0.40	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**5.5**		**3.4**	**0.71**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.4	0.47	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.4	0.51	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.4	0.45	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.4	0.54	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**12**		**3.4**	**1.7**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	328	25-150
13C2_6:2FTS	N	215	25-150
13C2_8:2FTS		105	25-150
13C2_PFDoA		65	25-150
13C2_PFTeDA		63	25-150
13C3_PFBS		81	25-150
13C3_PFHxS		80	25-150
13C3-HFPO-DA		57	25-150
13C4_PFBA		31	25-150
13C4_PFHpA		66	25-150
13C5_PFHxA		72	25-150
13C5_PFPeA		60	25-150
13C6_PFDA		83	25-150
13C7_PFUdA		77	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-008**

Description: **TW-ROW-01_GW-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1330** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		93	25-150
13C8_PFOS		72	25-150
13C8_PFOSA		80	10-150
13C9_PFNA		84	25-150
d5-EtFOSAA		74	25-150
d3-MeFOSAA		77	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-009**

Description: **MWW1-06_GW-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1350** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1950	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		8.2	0.50	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		8.2	0.68	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		8.2	1.7	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**16**		**8.2**	**2.1**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	8.2	0.90	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		8.2	2.1	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		8.2	0.50	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		8.2	0.77	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		8.2	0.96	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**2.7**	**J**	**4.1**	**0.43**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		4.1	0.80	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		4.1	0.51	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		4.1	0.73	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		4.1	0.63	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		4.1	0.61	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**0.96**	**J**	**4.1**	**0.57**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**6.1**		**4.1**	**0.62**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		4.1	0.54	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		4.1	0.49	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**1.3**	**J**	**4.1**	**0.46**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**1.3**	**J**	**4.1**	**0.71**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		4.1	0.48	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**6.8**		**4.1**	**0.85**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**0.92**	**J**	**4.1**	**0.56**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		4.1	0.62	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		4.1	0.54	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		4.1	0.64	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**22**		**4.1**	**2.1**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	205	25-150
13C2_6:2FTS		140	25-150
13C2_8:2FTS		104	25-150
13C2_PFDoA		70	25-150
13C2_PFTeDA		71	25-150
13C3_PFBS		101	25-150
13C3_PFHxS		89	25-150
13C3-HFPO-DA		79	25-150
13C4_PFBA		68	25-150
13C4_PFHpA		87	25-150
13C5_PFHxA		100	25-150
13C5_PFPeA		89	25-150
13C6_PFDA		89	25-150
13C7_PFUdA		85	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-009**

Description: **MWW1-06_GW-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1350** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		98	25-150
13C8_PFOS		84	25-150
13C8_PFOSA		87	10-150
13C9_PFNA		97	25-150
d5-EtFOSAA		82	25-150
d3-MeFOSAA		87	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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QC Summary

PFAS by LC/MS/MS - MB

Sample ID: YQ85388-001
Batch: 85388
Analytical Method: PFAS by ID SOP
Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/21/2023 1602

Parameter	Result	Q	Dil	LOQ	DL	Units	Analysis Date
9Cl-PF3ONS	ND		1	8.0	0.48	ng/L	09/22/2023 1546
11Cl-PF3OUdS	ND		1	8.0	0.66	ng/L	09/22/2023 1546
8:2 FTS	ND		1	8.0	1.6	ng/L	09/22/2023 1546
6:2 FTS	ND		1	8.0	2.0	ng/L	09/22/2023 1546
4:2 FTS	ND		1	8.0	0.87	ng/L	09/22/2023 1546
GenX	ND		1	8.0	2.1	ng/L	09/22/2023 1546
ADONA	ND		1	8.0	0.48	ng/L	09/22/2023 1546
EtFOSAA	ND		1	8.0	0.75	ng/L	09/22/2023 1546
MeFOSAA	ND		1	8.0	0.93	ng/L	09/22/2023 1546
PFBS	ND		1	4.0	0.41	ng/L	09/22/2023 1546
PFDS	ND		1	4.0	0.78	ng/L	09/22/2023 1546
PFHpS	ND		1	4.0	0.50	ng/L	09/22/2023 1546
PFNS	ND		1	4.0	0.71	ng/L	09/22/2023 1546
PFOSA	ND		1	4.0	0.61	ng/L	09/22/2023 1546
PFPeS	ND		1	4.0	0.59	ng/L	09/22/2023 1546
PFHxS	ND		1	4.0	0.55	ng/L	09/22/2023 1546
PFBA	ND		1	4.0	0.60	ng/L	09/22/2023 1546
PFDA	ND		1	4.0	0.52	ng/L	09/22/2023 1546
PFDoA	ND		1	4.0	0.47	ng/L	09/22/2023 1546
PFHpA	ND		1	4.0	0.45	ng/L	09/22/2023 1546
PFHxA	ND		1	4.0	0.69	ng/L	09/22/2023 1546
PFNA	ND		1	4.0	0.46	ng/L	09/22/2023 1546
PFOA	ND		1	4.0	0.83	ng/L	09/22/2023 1546
PFPeA	ND		1	4.0	0.54	ng/L	09/22/2023 1546
PFTeDA	ND		1	4.0	0.60	ng/L	09/22/2023 1546
PFTrDA	ND		1	4.0	0.53	ng/L	09/22/2023 1546
PFUdA	ND		1	4.0	0.63	ng/L	09/22/2023 1546
PFOS	ND		1	4.0	2.0	ng/L	09/22/2023 1546

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		100	25-150
13C2_6:2FTS		108	25-150
13C2_8:2FTS		93	25-150
13C2_PFDoA		90	25-150
13C2_PFTeDA		98	25-150
13C3_PFBS		92	25-150
13C3_PFHxS		83	25-150
13C3-HFPO-DA		90	25-150
13C4_PFBA		94	25-150
13C4_PFHpA		86	25-150
13C5_PFHxA		89	25-150
13C5_PFPeA		89	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: YQ85388-001
Batch: 85388
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/21/2023 1602

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		91	25-150
13C7_PFUdA		86	25-150
13C8_PFOA		88	25-150
13C8_PFOS		84	25-150
13C8_PFOSA		86	10-150
13C9_PFNA		94	25-150
d5-EtFOSAA		94	25-150
d3-MeFOSAA		87	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ85388-002
Batch: 85388
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/21/2023 1602

Parameter	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	%Rec Limit	Analysis Date
9Cl-PF3ONS	15	16		1	106	50-150	09/22/2023 1556
11Cl-PF3OUdS	15	15		1	102	50-150	09/22/2023 1556
8:2 FTS	15	16		1	105	50-150	09/22/2023 1556
6:2 FTS	15	16		1	103	50-150	09/22/2023 1556
4:2 FTS	15	16		1	107	50-150	09/22/2023 1556
GenX	32	32		1	101	50-150	09/22/2023 1556
ADONA	15	18		1	118	50-150	09/22/2023 1556
EtFOSAA	16	17		1	105	50-150	09/22/2023 1556
MeFOSAA	16	16		1	101	50-150	09/22/2023 1556
PFBS	14	15		1	108	50-150	09/22/2023 1556
PFDS	15	16		1	101	50-150	09/22/2023 1556
PFHpS	15	17		1	109	50-150	09/22/2023 1556
PFNS	15	16		1	107	50-150	09/22/2023 1556
PFOSA	16	14		1	89	50-150	09/22/2023 1556
PFPeS	15	16		1	108	50-150	09/22/2023 1556
PFHxS	15	16		1	112	50-150	09/22/2023 1556
PFBA	16	16		1	100	50-150	09/22/2023 1556
PFDA	16	17		1	107	50-150	09/22/2023 1556
PFDoA	16	16		1	100	50-150	09/22/2023 1556
PFHpA	16	17		1	108	50-150	09/22/2023 1556
PFHxA	16	17		1	108	50-150	09/22/2023 1556
PFNA	16	19		1	118	50-150	09/22/2023 1556
PFOA	16	20		1	123	50-150	09/22/2023 1556
PFPeA	16	16		1	102	50-150	09/22/2023 1556
PFTeDA	16	17		1	108	50-150	09/22/2023 1556
PFTrDA	16	18		1	113	50-150	09/22/2023 1556
PFUdA	16	18		1	113	50-150	09/22/2023 1556
PFOS	15	16		1	109	50-150	09/22/2023 1556

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		101	25-150
13C2_6:2FTS		102	25-150
13C2_8:2FTS		86	25-150
13C2_PFDoA		81	25-150
13C2_PFTeDA		92	25-150
13C3_PFBS		99	25-150
13C3_PFHxS		89	25-150
13C3-HFPO-DA		95	25-150
13C4_PFBA		93	25-150
13C4_PFHpA		85	25-150
13C5_PFHxA		95	25-150
13C5_PFPeA		99	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ85388-002
Batch: 85388
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/21/2023 1602

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		89	25-150
13C7_PFUdA		82	25-150
13C8_PFOA		92	25-150
13C8_PFOS		81	25-150
13C8_PFOSA		86	10-150
13C9_PFNA		83	25-150
d5-EtFOSAA		86	25-150
d3-MeFOSAA		81	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Chain of Custody
and
Miscellaneous Documents

Pace Analytical®

PACE ANALYTICAL SERVICES, LLC
106 Vantage Point Drive • West Columbia, SC 29172
Telephone No. 803-791-9700 Fax No. 803-791-9111
www.pacelabs.com

Number 149977

Client: Arcadis	Report to Contact: Tiffany Linder, Alexis Crisp	Telephone No. / E-mail: Alexis.crisp@arcadis.com, Tiffany.linder@arcadis.com	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: x Sommer Gray	Analysis (Attach list if more space is needed): Report EGLE 28 Compounds	Page 1 of 1
City: Novi	State: MI	Zip Code: 48377	Printed Name: Sommer Gray, Lothe Jay Garrett Link	Lot # Bar Code: YI14025
Project Name: Racer PNC				
Project No.: 30167840.00031	P.O. No.			

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Grab/Composite	Matrix: Aqueous	Solid	Non-Aqueous	No of Containers by Preservative Type: Unpres.	HNO3	H2SO4	HCl	NaOH	Na2S2O3	Field Filtered	Methanol MS with Tentative Compounds OSM 9.1	Remarks / Locker I.D.
MWOS-03_GW-091323	9/13/23	1043	G	X			2							X	
EB-01_091323	9/13/23	1100	G	X			1							X	equipment blank
tripblank	9/13/23	1105	G	X			1							X	tripblank
MWOS-04_GW-091323	9/13/23	1310	G	X			2							X	
MWOS-01_GW-091323	9/13/23	1045	G	X			2							X	
MWOS-02_GW-091323	9/13/23	1135	G	X			2							X	
TW-ROW-03_GW-091323	9/13/23	1215	G	X			2							X	
TW-ROW-01_GW-091323	9/13/23	1330	G	X			2							X	
MWW1-06_GW-091323	9/13/23	1350	G	X			2							X	

Turn Around Time Required (Prior lab approval required for expedited TAT.): ☒ Standard ☐ Rush (Specify)

Sample Disposal: ☐ Return to Client ☒ Dispose by Lab

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: Sommer Gray	9/13/23	1715	1. Received by: FedEx	9/13/23	1715
2. Relinquished by	Date	Time	2. Received by	Date	Time
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by: FedEx	9/14/23	1250	4. Laboratory Received by	9/14/23	1250

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY — Received on ice (Circle): (Yes) No Ice Pack — Receipt Temp: 1.0 °C — Temp Blank ☐ Y ☐ N

DISTRIBUTION: WHITE & YELLOW-Return to laboratory with Sample(s); PINK-Field/Client Copy

Document Number: ME00SIN2-01

PACE ANALYTICAL SERVICES, LLC

DC#_Title: ENV-FRM-WCOL-0286 v02_Samples Receipt Checklist (SRC)
Effective Date: 8/2/2022

Sample Receipt Checklist (SRC)

Client: ARCADIS Cooler Inspected by/date: CDR / 9/14/23 Lot #: YI14025

Means of receipt: ☐ Pace ☐ Client ☐ UPS ☑ FedEx ☐ Other: NA

☐ Yes	☑ No		1. Were custody seals present on the cooler?
☐ Yes	☐ No	☑ NA	2. If custody seals were present, were they intact and unbroken?

pH Strip ID: NA Chlorine Strip ID: NA Tested by: NA

Original temperature upon receipt / Derived (Corrected) temperature upon receipt %Solid Snap-Cup ID: NA

1.0 / 1.0 °C NA / NA °C NA / NA °C NA / NA °C

Method: ☐ Temperature Blank ☑ Against Bottles IR Gun ID: 8 IR Gun Correction Factor: 0 °C

Method of coolant: ☑ Wet Ice ☐ Ice Packs ☐ Dry Ice ☐ None

☑ Yes	☐ No	☐ NA	3. Were all coolers received at or below 6.0°C? If no, was Project Manager notified? PM was Notified by: phone / email / face-to-face (circle one).
☑ Yes	☐ No	☐ NA	4. Is the commercial courier's packing slip attached to this form?
☑ Yes	☐ No		5. Were proper custody procedures (relinquished/received) followed?
☑ Yes	☐ No		6. Were sample IDs listed on the COC and all sample containers?
☑ Yes	☐ No		7. Was collection date & time listed on the COC and all sample containers?
☑ Yes	☐ No		8. Did all container label information (ID, date, time) agree with the COC?
☑ Yes	☐ No		9. Were tests to be performed listed on the COC?
☑ Yes	☐ No		10. Did all samples arrive in the proper containers for each test and/or in good condition (unbroken, lids on, etc.)? NA
☑ Yes	☐ No		11. Was adequate sample volume available?
☑ Yes	☐ No		12. Were all samples received within ½ the holding time or 48 hours, whichever comes first?
☑ Yes	☐ No		13. Were all samples containers accounted for? (No missing/excess)
☐ Yes	☐ No	☑ NA	14. Were VOA, 8015C and RSK-175 samples free of bubbles >"pea-size" (¼"or 6mm in diameter) in any of the VOA vials?
☐ Yes	☐ No	☑ NA	15. Were all DRO/metals/nutrient samples received at a pH of < 2?
☐ Yes	☐ No	☑ NA	16. Were all cyanide samples received at a pH > 12 and sulfide samples received at a pH > 9?
☐ Yes	☐ No	☑ NA	17. Were all applicable NH_3/TKN/cyanide/phenol/625.1/608.3 (< 0.5mg/L) samples free of residual chlorine?
☐ Yes	☑ No	☐ NA	18. Was the quote number listed on the container label? If yes, Quote # NA

Sample Preservation (Must be completed for any sample(s) incorrectly preserved or with headspace.)

Sample(s) NA were received incorrectly preserved and were adjusted accordingly in sample receiving with NA mL of circle one: H2SO4, HNO3, HCl, NaOH using SR # NA. Time of preservation NA. If more than one preservative is needed, please note in the comments below.

Sample(s) NA were received with bubbles >6 mm in diameter.

Samples(s) NA were received with TRC > 0.5 mg/L (If #19 is ***no***) and were adjusted accordingly in sample receiving with sodium thiosulfate ($Na_2S_2O_3$) with Unique ID: NA.

Comments:

Qualtrax ID: 56360 Pace® Analytical Services, LLC Page 1 of 1

Report of Analysis

Arcadis U.S., Inc.
630 Plaza Drive
Suite 600
Highlands Ranch, CO 80129
Attention: Tiffany Linder

Project Name: RACER PNC

Project Number: 30167840.00031

Lot Number:**YI15017**

Date Completed:09/29/2023

09/29/2023 4:37 PM
Approved and released by:
Project Manager II: **Kathy E. Smith**

The electronic signature above is the equivalent of a handwritten signature.
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Case Narrative
Arcadis U.S., Inc.
Lot Number: YI15017

This Report of Analysis contains the analytical result(s) for the sample(s) listed on the Sample Summary following this Case Narrative. The sample receiving date is documented in the header information associated with each sample.

All results listed in this report relate only to the samples that are contained within this report.

Sample receipt, sample analysis, and data review have been performed in accordance with the Pace Quality Assurance Management Plan (QAMP), applicable Shealy standard operating procedures (SOPs), the 2003 NELAC standard, and Shealy policies. Additionally, the DoD QSM version 5.4 has been followed for these samples, and specifically Table B-15 was followed for all PFAS samples. Any exceptions to the QAMP, SOPs, NELAC standards, the DoD QSM, or policies are qualified on the results page or discussed below.

All QC associated with these samples were compliant with DOD QSM 5.4 table B-15 and our PFAS SOP.

Correction factors (CF) are used to calculate the original sample concentration. The CF is the inverse of the concentration factor (sample volume / extract final volume) times the dilution factor (DF). The CF is calculated as follows:

CF = DF * FV / Vo

FV is volume of extract (mL)
Vo is initial sample volume (mL)
DF is dilution factor. For undiluted analysis, DF = 1.

Sample concentration for aqueous samples:
Concentration (ng/L) = Cs*CF,

$$C_s = \frac{\left(\frac{(A_s x C_{is})}{A_{is}}\right) - B}{M1}$$

Where

C_s is on column concentration of target analyte in the sample (ng/L)
C_{is} is concentration of internal standard in the sample (ng/L)
A_s is peak response of target analyte in the sample
A_{is} is peak response of internal standard in the sample
M1 is the average RF from ICAL or the slope from linear regression ICAL
B is the y-intercept from the ICAL

Pace is a TNI accredited laboratory; however, the following analyses are currently not listed on our TNI scope of accreditation: Drinking Water: VOC (excluding BTEX, MTBE, Naphthalene, & 1,2-dichloroethane) EPA 524.2, E. coli and Total coliforms SM 9223 B-2004, Solid Chemical Material: TOC Walkley-Black, Biological Tissue: All, Non-Potable Water: SGT-HEM EPA 1664B, Silica EPA 200.7, Boron, Calcium, Silicon, Strontium EPA 200.8, Bicarbonate, Carbonate, and Hydroxide Alkalinity SM 2320 B-2011, SM 9221 C E-2006 & SM 9222D-2006, Strontium SW-846 6010D, VOC SM 6200 B-2011, Fecal Coliform Colilert-18, PFAS by Isotope Dilution SOP.

If you have any questions regarding this report, please contact the Pace Project Manager listed on the cover page.

PFAS
Samples YI15017-004, YI15017-005 required centrifugation prior to extraction, due to excessive solids present in the samples. Centrifugation was performed following the PFAS Aqueous Centrifuge Protocol; samples were spiked with Surrogate (SUR; Extracted Internal Standard/EIS) and shaken vigorously before being poured into a conical bottle and centrifuged. The centrifuged aqueous sample was decanted back into the original sample bottle, off of the condensed solids remaining in the centrifuge bottle. Original sample bottle was rinsed as normal and centrifuge bottle was rinsed with 4mL of MeOH. Centrifuge bottle rinsate was added to the elution. Samples concentrated to <5mL and reconstituted to 5mL using MeOH by transfer pipet.

Surrogate recovery for the following sample was outside control limits: YI15017-001. Re-extraction and/or re-analysis was performed with concurring results. The original analysis has been reported.

Surrogate recovery for the following samples was outside the upper control limit: YI15017-004, YI15017-005. These samples did not contain any target analytes; therefore, re-extraction and/or re-analysis was not performed.

Sample Summary

Arcadis U.S., Inc.

Lot Number: YI15017

Project Name: RACER PNC

Project Number: 30167840.00031

Sample Number	Sample ID	Matrix	Date Sampled	Date Received
001	MWM30-01_GW-091423	Aqueous	09/14/2023 1425	09/15/2023
002	EB-04_091423	Aqueous	09/14/2023 1450	09/15/2023
003	trip blank	Aqueous	09/14/2023 1455	09/15/2023
004	MWM5-03_GW-091423	Aqueous	09/14/2023 1435	09/15/2023
005	DUP-02_GW-091423	Aqueous	09/14/2023	09/15/2023

(5 samples)

Detection Summary

Arcadis U.S., Inc.

Lot Number: YI15017

Project Name: RACER PNC

Project Number: 30167840.00031

Sample	Sample ID	Matrix	Parameter	Method	Result	Q	Units	Page
001	MWM30-01_GW-091423	Aqueous	6:2 FTS	PFAS by ID	37	Q	ng/L	6
001	MWM30-01_GW-091423	Aqueous	PFPeS	PFAS by ID	2.6	J	ng/L	6
001	MWM30-01_GW-091423	Aqueous	PFHxS	PFAS by ID	12		ng/L	6
001	MWM30-01_GW-091423	Aqueous	PFHpA	PFAS by ID	16		ng/L	6
001	MWM30-01_GW-091423	Aqueous	PFHxA	PFAS by ID	23		ng/L	6
001	MWM30-01_GW-091423	Aqueous	PFOA	PFAS by ID	54		ng/L	6
001	MWM30-01_GW-091423	Aqueous	PFPeA	PFAS by ID	21		ng/L	6
004	MWM5-03_GW-091423	Aqueous	PFHxS	PFAS by ID	1.8	J	ng/L	12
004	MWM5-03_GW-091423	Aqueous	PFBA	PFAS by ID	2.5	J	ng/L	12
004	MWM5-03_GW-091423	Aqueous	PFHpA	PFAS by ID	0.57	J	ng/L	12
005	DUP-02_GW-091423	Aqueous	PFBS	PFAS by ID	2.8	J	ng/L	14
005	DUP-02_GW-091423	Aqueous	PFHxS	PFAS by ID	1.5	J	ng/L	14
005	DUP-02_GW-091423	Aqueous	PFBA	PFAS by ID	3.4	J	ng/L	14
005	DUP-02_GW-091423	Aqueous	PFHpA	PFAS by ID	0.70	J	ng/L	14
005	DUP-02_GW-091423	Aqueous	PFOA	PFAS by ID	1.3	J	ng/L	14

(15 detections)

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI15017-001**

Description: **MWM30-01_GW-091423** Matrix: **Aqueous**

Date Sampled: **09/14/2023 1425** Project Name: **RACER PNC**

Date Received: **09/15/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/21/2023 1842	ARC2	09/20/2023 2104	85336

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.1	0.43	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.1	0.59	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.1	1.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**37**	**Q**	**7.1**	**1.8**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.1	0.77	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.1	0.43	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.1	0.66	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.1	0.82	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.5	0.37	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.69	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.5	0.44	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.63	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.54	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**2.6**	**J**	**3.5**	**0.53**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**12**		**3.5**	**0.49**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND	Q	3.5	0.53	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.46	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.42	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**16**		**3.5**	**0.40**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**23**		**3.5**	**0.61**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	0.41	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**54**		**3.5**	**0.73**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**21**		**3.5**	**0.48**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.53	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.47	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.55	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.5	1.8	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	177	25-150
13C2_6:2FTS	N	300	25-150
13C2_8:2FTS	N	213	25-150
13C2_PFDoA		95	25-150
13C2_PFTeDA		92	25-150
13C3_PFBS		71	25-150
13C3_PFHxS		87	25-150
13C3-HFPO-DA		44	25-150
13C4_PFBA	N	19	25-150
13C4_PFHpA		55	25-150
13C5_PFHxA		43	25-150
13C5_PFPeA		32	25-150
13C6_PFDA		105	25-150
13C7_PFUdA		94	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI15017-001**

Description: **MWM30-01_GW-091423** Matrix: **Aqueous**

Date Sampled: **09/14/2023 1425** Project Name: **RACER PNC**

Date Received: **09/15/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		82	25-150
13C8_PFOS		88	25-150
13C8_PFOSA		83	10-150
13C9_PFNA		89	25-150
d5-EtFOSAA		111	25-150
d3-MeFOSAA		107	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI15017-002**

Description: **EB-04_091423** Matrix: **Aqueous**

Date Sampled: **09/14/2023 1450** Project Name: **RACER PNC**

Date Received: **09/15/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/21/2023 1853	ARC2	09/20/2023 2104	85336

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.8	0.47	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.8	0.65	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.8	1.6	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.8	2.0	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.8	0.85	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.8	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.8	0.47	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.8	0.73	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.8	0.91	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.9	0.41	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.9	0.76	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.9	0.49	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.9	0.70	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.9	0.60	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.9	0.58	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.9	0.54	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.9	0.59	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.9	0.51	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.9	0.46	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.9	0.44	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.9	0.67	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.9	0.45	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.9	0.81	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.9	0.53	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.9	0.59	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.9	0.52	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.9	0.61	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.9	2.0	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		99	25-150
13C2_6:2FTS		139	25-150
13C2_8:2FTS		94	25-150
13C2_PFDoA		99	25-150
13C2_PFTeDA		91	25-150
13C3_PFBS		111	25-150
13C3_PFHxS		100	25-150
13C3-HFPO-DA		101	25-150
13C4_PFBA		103	25-150
13C4_PFHpA		101	25-150
13C5_PFHxA		98	25-150
13C5_PFPeA		96	25-150
13C6_PFDA		99	25-150
13C7_PFUdA		91	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.**		Laboratory ID: **YI15017-002**
Description: **EB-04_091423**		Matrix: **Aqueous**
Date Sampled: **09/14/2023 1450**	Project Name: **RACER PNC**	
Date Received: **09/15/2023**	Project Number: **30167840.00031**	

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		106	25-150
13C8_PFOS		96	25-150
13C8_PFOSA		90	10-150
13C9_PFNA		98	25-150
d5-EtFOSAA		90	25-150
d3-MeFOSAA		88	25-150

LOQ = Limit of Quantitation	B = Detected in the method blank	E = Quantitation of compound exceeded the calibration range	DL = Detection Limit	Q = Surrogate failure
ND = Not detected at or above the DL	N = Recovery is out of criteria	P = The RPD between two GC columns exceeds 40%	J = Estimated result < LOQ and ≥ DL	L = LCS/LCSD failure
H = Out of holding time	W = Reported on wet weight basis			S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI15017-003**

Description: **trip blank** Matrix: **Aqueous**

Date Sampled: **09/14/2023 1455** Project Name: **RACER PNC**

Date Received: **09/15/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/21/2023 1903	ARC2	09/20/2023 2104	85336

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.6	0.46	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.6	0.63	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.6	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.6	0.83	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.6	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.6	0.46	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.6	0.71	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.6	0.88	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.8	0.39	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.8	0.74	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.8	0.47	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.8	0.67	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.8	0.58	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.8	0.56	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.8	0.52	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.8	0.57	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.8	0.45	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.8	0.42	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.8	0.65	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.8	0.44	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.8	0.79	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.8	0.52	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.8	0.57	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.8	0.59	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.8	1.9	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		96	25-150
13C2_6:2FTS		121	25-150
13C2_8:2FTS		93	25-150
13C2_PFDoA		97	25-150
13C2_PFTeDA		95	25-150
13C3_PFBS		104	25-150
13C3_PFHxS		102	25-150
13C3-HFPO-DA		94	25-150
13C4_PFBA		105	25-150
13C4_PFHpA		105	25-150
13C5_PFHxA		96	25-150
13C5_PFPeA		99	25-150
13C6_PFDA		99	25-150
13C7_PFUdA		102	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI15017-003**

Description: **trip blank** Matrix: **Aqueous**

Date Sampled: **09/14/2023 1455** Project Name: **RACER PNC**

Date Received: **09/15/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		109	25-150
13C8_PFOS		101	25-150
13C8_PFOSA		90	10-150
13C9_PFNA		104	25-150
d5-EtFOSAA		100	25-150
d3-MeFOSAA		95	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI15017-004**

Description: **MWM5-03_GW-091423** Matrix: **Aqueous**

Date Sampled: **09/14/2023 1435** Project Name: **RACER PNC**

Date Received: **09/15/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/21/2023 1935	ARC2	09/20/2023 2104	85336

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.4	0.45	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.4	0.62	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.4	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.4	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.4	0.81	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.4	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.4	0.45	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.4	0.70	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.4	0.87	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.7	0.39	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	0.72	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.7	0.46	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	0.66	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	0.57	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.7	0.55	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**1.8**	**J**	**3.7**	**0.51**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**2.5**	**J**	**3.7**	**0.56**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	0.49	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	0.44	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**0.57**	**J**	**3.7**	**0.42**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.7	0.64	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.7	0.43	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.7	0.77	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.7	0.51	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	0.56	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	0.49	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	0.58	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.7	1.9	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	291	25-150
13C2_6:2FTS	N	193	25-150
13C2_8:2FTS		91	25-150
13C2_PFDoA		81	25-150
13C2_PFTeDA		73	25-150
13C3_PFBS		93	25-150
13C3_PFHxS		94	25-150
13C3-HFPO-DA		63	25-150
13C4_PFBA		39	25-150
13C4_PFHpA		90	25-150
13C5_PFHxA		87	25-150
13C5_PFPeA		66	25-150
13C6_PFDA		97	25-150
13C7_PFUdA		90	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI15017-004**

Description: **MWM5-03_GW-091423** Matrix: **Aqueous**

Date Sampled: **09/14/2023 1435** Project Name: **RACER PNC**

Date Received: **09/15/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		114	25-150
13C8_PFOS		93	25-150
13C8_PFOSA		90	10-150
13C9_PFNA		100	25-150
d5-EtFOSAA		85	25-150
d3-MeFOSAA		85	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI15017-005**

Description: **DUP-02_GW-091423** Matrix: **Aqueous**

Date Sampled: **09/14/2023** Project Name: **RACER PNC**

Date Received: **09/15/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/21/2023 1946	ARC2	09/20/2023 2104	85336

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.6	0.46	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.6	0.63	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.6	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.6	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.6	0.83	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.6	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.6	0.46	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.6	0.71	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.6	0.89	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**2.8**	**J**	**3.8**	**0.39**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.8	0.74	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.8	0.47	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.8	0.68	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.8	0.58	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.8	0.56	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**1.5**	**J**	**3.8**	**0.52**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**3.4**	**J**	**3.8**	**0.57**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.8	0.45	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**0.70**	**J**	**3.8**	**0.43**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.8	0.65	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.8	0.44	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**1.3**	**J**	**3.8**	**0.79**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.8	0.52	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.8	0.57	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.8	0.60	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.8	1.9	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	280	25-150
13C2_6:2FTS	N	191	25-150
13C2_8:2FTS		96	25-150
13C2_PFDoA		79	25-150
13C2_PFTeDA		71	25-150
13C3_PFBS		96	25-150
13C3_PFHxS		101	25-150
13C3-HFPO-DA		68	25-150
13C4_PFBA		41	25-150
13C4_PFHpA		88	25-150
13C5_PFHxA		85	25-150
13C5_PFPeA		64	25-150
13C6_PFDA		92	25-150
13C7_PFUdA		86	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
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S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI15017-005**

Description: **DUP-02_GW-091423** Matrix: **Aqueous**

Date Sampled: **09/14/2023** Project Name: **RACER PNC**

Date Received: **09/15/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		114	25-150
13C8_PFOS		93	25-150
13C8_PFOSA		85	10-150
13C9_PFNA		100	25-150
d5-EtFOSAA		81	25-150
d3-MeFOSAA		86	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
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QC Summary

PFAS by LC/MS/MS - MB

Sample ID: YQ85336-001
Batch: 85336
Analytical Method: PFAS by ID SOP
Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/20/2023 2104

Parameter	Result	Q	Dil	LOQ	DL	Units	Analysis Date
9Cl-PF3ONS	ND		1	8.0	0.48	ng/L	09/21/2023 1656
11Cl-PF3OUdS	ND		1	8.0	0.66	ng/L	09/21/2023 1656
8:2 FTS	ND		1	8.0	1.6	ng/L	09/21/2023 1656
6:2 FTS	ND		1	8.0	2.0	ng/L	09/21/2023 1656
4:2 FTS	ND		1	8.0	0.87	ng/L	09/21/2023 1656
GenX	ND		1	8.0	2.1	ng/L	09/21/2023 1656
ADONA	ND		1	8.0	0.48	ng/L	09/21/2023 1656
EtFOSAA	ND		1	8.0	0.75	ng/L	09/21/2023 1656
MeFOSAA	ND		1	8.0	0.93	ng/L	09/21/2023 1656
PFBS	ND		1	4.0	0.41	ng/L	09/21/2023 1656
PFDS	ND		1	4.0	0.78	ng/L	09/21/2023 1656
PFHpS	ND		1	4.0	0.50	ng/L	09/21/2023 1656
PFNS	ND		1	4.0	0.71	ng/L	09/21/2023 1656
PFOSA	ND		1	4.0	0.61	ng/L	09/21/2023 1656
PFPeS	ND		1	4.0	0.59	ng/L	09/21/2023 1656
PFHxS	ND		1	4.0	0.55	ng/L	09/21/2023 1656
PFBA	ND		1	4.0	0.60	ng/L	09/21/2023 1656
PFDA	ND		1	4.0	0.52	ng/L	09/21/2023 1656
PFDoA	ND		1	4.0	0.47	ng/L	09/21/2023 1656
PFHpA	ND		1	4.0	0.45	ng/L	09/21/2023 1656
PFHxA	ND		1	4.0	0.69	ng/L	09/21/2023 1656
PFNA	ND		1	4.0	0.46	ng/L	09/21/2023 1656
PFOA	ND		1	4.0	0.83	ng/L	09/21/2023 1656
PFPeA	ND		1	4.0	0.54	ng/L	09/21/2023 1656
PFTeDA	ND		1	4.0	0.60	ng/L	09/21/2023 1656
PFTrDA	ND		1	4.0	0.53	ng/L	09/21/2023 1656
PFUdA	ND		1	4.0	0.63	ng/L	09/21/2023 1656
PFOS	ND		1	4.0	2.0	ng/L	09/21/2023 1656

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		100	25-150
13C2_6:2FTS		130	25-150
13C2_8:2FTS		102	25-150
13C2_PFDoA		94	25-150
13C2_PFTeDA		95	25-150
13C3_PFBS		106	25-150
13C3_PFHxS		109	25-150
13C3-HFPO-DA		90	25-150
13C4_PFBA		105	25-150
13C4_PFHpA		104	25-150
13C5_PFHxA		97	25-150
13C5_PFPeA		96	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: YQ85336-001
Batch: 85336
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/20/2023 2104

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		100	25-150
13C7_PFUdA		98	25-150
13C8_PFOA		113	25-150
13C8_PFOS		99	25-150
13C8_PFOSA		88	10-150
13C9_PFNA		102	25-150
d5-EtFOSAA		105	25-150
d3-MeFOSAA		95	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ85336-002
Batch: 85336
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/20/2023 2104

Parameter	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	%Rec Limit	Analysis Date
9Cl-PF3ONS	15	15		1	104	50-150	09/21/2023 1707
11Cl-PF3OUdS	15	15		1	97	50-150	09/21/2023 1707
8:2 FTS	15	13		1	85	50-150	09/21/2023 1707
6:2 FTS	15	15		1	100	50-150	09/21/2023 1707
4:2 FTS	15	14		1	97	50-150	09/21/2023 1707
GenX	32	30		1	93	50-150	09/21/2023 1707
ADONA	15	15		1	102	50-150	09/21/2023 1707
EtFOSAA	16	16		1	101	50-150	09/21/2023 1707
MeFOSAA	16	14		1	87	50-150	09/21/2023 1707
PFBS	14	14		1	96	50-150	09/21/2023 1707
PFDS	15	16		1	102	50-150	09/21/2023 1707
PFHpS	15	14		1	94	50-150	09/21/2023 1707
PFNS	15	15		1	99	50-150	09/21/2023 1707
PFOSA	16	15		1	93	50-150	09/21/2023 1707
PFPeS	15	15		1	98	50-150	09/21/2023 1707
PFHxS	15	15		1	101	50-150	09/21/2023 1707
PFBA	16	15		1	94	50-150	09/21/2023 1707
PFDA	16	15		1	91	50-150	09/21/2023 1707
PFDoA	16	15		1	94	50-150	09/21/2023 1707
PFHpA	16	16		1	100	50-150	09/21/2023 1707
PFHxA	16	15		1	92	50-150	09/21/2023 1707
PFNA	16	15		1	94	50-150	09/21/2023 1707
PFOA	16	16		1	101	50-150	09/21/2023 1707
PFPeA	16	16		1	101	50-150	09/21/2023 1707
PFTeDA	16	16		1	101	50-150	09/21/2023 1707
PFTrDA	16	15		1	93	50-150	09/21/2023 1707
PFUdA	16	15		1	95	50-150	09/21/2023 1707
PFOS	15	15		1	104	50-150	09/21/2023 1707

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		104	25-150
13C2_6:2FTS		137	25-150
13C2_8:2FTS		102	25-150
13C2_PFDoA		98	25-150
13C2_PFTeDA		104	25-150
13C3_PFBS		109	25-150
13C3_PFHxS		114	25-150
13C3-HFPO-DA		108	25-150
13C4_PFBA		105	25-150
13C4_PFHpA		107	25-150
13C5_PFHxA		104	25-150
13C5_PFPeA		102	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ85336-002
Batch: 85336
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/20/2023 2104

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		107	25-150
13C7_PFUdA		103	25-150
13C8_PFOA		110	25-150
13C8_PFOS		100	25-150
13C8_PFOSA		102	10-150
13C9_PFNA		103	25-150
d5-EtFOSAA		105	25-150
d3-MeFOSAA		105	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Chain of Custody
and
Miscellaneous Documents

Pace Analytical®

PACE ANALYTICAL SERVICES, LLC
108 Vantage Point Drive • West Columbia, SC 29172
Telephone No. 803-791-9700 Fax No. 803-791-9111
www.pacelabs.com

Number 150049

Client: Arcadis	Report to Contact: Tiffany Linder, Alexis Crisp	Telephone No. / E-mail: Alexis.crisp@arcadis.com, tiffany.linder@arcadis.com	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: x Sommer Guy	Analysis (Attach list if more space is needed): Report CoLE 28 Compounds	Page 1 of 2
City: Novi	State: MI Zip Code: 48377	Printed Name: Sommer Guy	
Project Name: Racer PNC			YI15017
Project No.: 30167840.00031	P.O. No.		KES2

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Grab (G) C-Composite	Matrix: Aqueous	Matrix: Solid	Matrix: Non-Aqueous	No. of Containers by Preservative Type: Unpres	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Methyl 537 mod. with Isotope dilution PFAS 533 PFAS	Remarks / Cooler I.D.
MWM30-01_GW-091423	9/14/23	1425	G	X			2							X	
EB-04_091423	9/14/23	1450	G	X			1							X	equipment blank
tripblank	9/14/23	1455	G	X			1							X	tripblank

Turn Around Time Required (Prior lab approval required for expedited TAT.): ☑ Standard ☐ Rush (Specify)	Sample Disposal: ☐ Return to Client ☒ Disposal by Lab	Possible Hazard Identification: ☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown		QC Requirements (Specify)	
1. Relinquished by: Sommer Guy	Date: 9/14/23	Time: 1700	1. Received by: FedEx	Date: 9/14/23	Time: 1700
2. Relinquished by	Date	Time	2. Received by	Date	Time
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by: FedEx	Date: 9.15.23	Time: 1030	4. Laboratory received by: Karen Weems	Date: 9.15.23	Time: 1030

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY
Received on Ice (Circle) (Yes) No Ice Pack
Receipt Temp: 4.0 °C
Temp Blank: Y ☐ N

PACE ANALYTICAL SERVICES, LLC

Pace Analytical®

ARCADIS US

PACE ANALYTICAL SERVICES, LLC
106 Vantage Point Drive • West Columbia, SC 29172
Telephone No. 803-791-9700 Fax No. 803-791-9111
www.pacelabs.com

Number 150049

Client: US ARCADIS	Report to Contact: Alexis Crisp	Telephone No. / E-mail: Alexis.crisp@arcadis.com	Quote No.
Address: US 28550 Cabot Dr #500 Novi	Sampler's Signature: x	Analysis (Attach list if more space is needed): Report Chlate 28 Compounds	Page 2 of 2
City: Novi / State: MI / Zip Code: 48377	Printed Name: Lottie Jay		
Project Name: Racer PNC			
Project No.: 30167840.00031.SG	P.O. No.		

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Grab / Composite	Matrix: Aqueous	Matrix: Soil	Matrix: Non-Aqueous	No. of Containers by Preservative Type: Unpres.	HCl	HNO3	H2SO4	NaOH	Na2S2O3	Field Filtered	Method 537 mod. with isotope dilution per QSM 5.1	Remarks / Cooler I.D.
MWMS-03_GW-091423	9/14/23	1435	G	X			2							X	
DUP-02-GW-091423	"	—	G	X			2							X	

Y115017

KBS2

Turn Around Time Required (Prior lab approval required for expedited TAT.)	Sample Disposal	Possible Hazard Identification	QC Requirements (Specify)
☐ Standard ☐ Rush (Specify)	☐ Return to Client ☑ Disposal by Lab	☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown	

	Date	Time		Date	Time
1. Relinquished by: Lottie Jay/Lottie	9/14/23	1525	1. Received by: Jonnmen	9/14/23	1525
2. Relinquished by: Jonnmen	9/14/23	1700	2. Received by: FedEx	9/14/23	1700
3. Relinquished by:	Date	Time	3. Received by:	Date	Time
4. Relinquished by: Fedex	9.15.23	1030	4. Laboratory received by: Keyon Mercer	9.15.23	1030

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY
Received on Ice (Circle) (Yes) No Ice Pack Receipt Temp. 4.0 °C Temp Blank ☑ Y ☐ N

PACE ANALYTICAL SERVICES, LLC

DC#_Title: ENV-FRM-WCOL-0286 v02_Samples Receipt Checklist (SRC)
Effective Date: 8/2/2022

Sample Receipt Checklist (SRC)

Client: Arcadis Cooler Inspected by/date: KDRW / 09/15/203 Lot #: YT15017

Means of receipt: ☐ Pace ☐ Client ☐ UPS ☑ FedEx ☐ Other: _____

☑ Yes	☐ No		1. Were custody seals present on the cooler?
☑ Yes	☐ No	☐ NA	2. If custody seals were present, were they intact and unbroken?

pH Strip ID: NA Chlorine Strip ID: NA Tested by: NA

Original temperature upon receipt / Derived (Corrected) temperature upon receipt %Solid Snap-Cup ID: NA

4.0 / 4.0 °C NA / NA °C NA / NA °C NA / NA °C

Method: ☑ Temperature Blank ☐ Against Bottles IR Gun ID: 8 IR Gun Correction Factor: 0 °C

Method of coolant: ☑ Wet Ice ☐ Ice Packs ☐ Dry Ice ☐ None

☑ Yes	☐ No	☐ NA	3. Were all coolers received at or below 6.0°C? If no, was Project Manager notified? PM was Notified by: phone / email / face-to-face (circle one).
☑ Yes	☐ No	☐ NA	4. Is the commercial courier's packing slip attached to this form?
☑ Yes	☐ No		5. Were proper custody procedures (relinquished/received) followed?
☑ Yes	☐ No		6. Were sample IDs listed on the COC and all sample containers?
☑ Yes	☐ No		7. Was collection date & time listed on the COC and all sample containers?
☑ Yes	☐ No		8. Did all container label information (ID, date, time) agree with the COC?
☑ Yes	☐ No		9. Were tests to be performed listed on the COC?
☑ Yes	☐ No		10. Did all samples arrive in the proper containers for each test and/or in good condition (unbroken, lids on, etc.)? _____
☑ Yes	☐ No		11. Was adequate sample volume available?
☑ Yes	☐ No		12. Were all samples received within ½ the holding time or 48 hours, whichever comes first?
☑ Yes	☐ No		13. Were all samples containers accounted for? (No missing/excess)
☑ Yes	☐ No	☐ NA	14. Were VOA, 8015C and RSK-175 samples free of bubbles >"pea-size" (¼" or 6mm in diameter) in any of the VOA vials?
☐ Yes	☐ No	☑ NA	15. Were all DRO/metals/nutrient samples received at a pH of < 2?
☐ Yes	☐ No	☑ NA	16. Were all cyanide samples received at a pH > 12 and sulfide samples received at a pH > 9?
☐ Yes	☐ No	☑ NA	17. Were all applicable NH_3/TKN/cyanide/phenol/625.1/608.3 (< 0.5mg/L) samples free of residual chlorine?
☐ Yes	☑ No	☐ NA	18. Was the quote number listed on the container label? If yes, Quote # _____

Sample Preservation (Must be completed for any sample(s) incorrectly preserved or with headspace.)

Sample(s) NA _____ were received incorrectly preserved and were adjusted accordingly in sample receiving with NA _____ mL of circle one: H_2SO_4, HNO_3, HCl, NaOH using SR # NA _____. Time of preservation NA _____. If more than one preservative is needed, please note in the comments below.

Sample(s) NA _____ were received with bubbles >6 mm in diameter.

Samples(s) NA _____ were received with TRC > 0.5 mg/L (If #19 is *no*) and were adjusted accordingly in sample receiving with sodium thiosulfate ($Na_2S_2O_3$) with Unique ID: NA _____.

Comments:

Qualtrax ID: 56360 Pace® Analytical Services, LLC Page 1 of 1

Report of Analysis

Arcadis U.S., Inc.
630 Plaza Drive
Suite 600
Highlands Ranch, CO 80129
Attention: Alexis Crisp

Project Name: RACER PNC

Project Number: 30167840.00031

Lot Number:**YI19014**

Date Completed:10/12/2023

Kathy Smith

10/12/2023 9:15 AM
Approved and released by:
Project Manager II: **Kathy E. Smith**

The electronic signature above is the equivalent of a handwritten signature.
This report shall not be reproduced, except in its entirety, without the written approval of Pace Analytical Services, LLC.

Pace Analytical Services, LLC (*formerly Shealy Environmental Services, Inc.*)
106 Vantage Point Drive West Columbia, SC 29172
Tel: 803-791-9700 Fax: 803-791-9111 www.pacelabs.com

Case Narrative
Arcadis U.S., Inc.
Lot Number: YI19014

This Report of Analysis contains the analytical result(s) for the sample(s) listed on the Sample Summary following this Case Narrative. The sample receiving date is documented in the header information associated with each sample.

All results listed in this report relate only to the samples that are contained within this report.

Sample receipt, sample analysis, and data review have been performed in accordance with the Pace Quality Assurance Management Plan (QAMP), applicable Shealy standard operating procedures (SOPs), the 2003 NELAC standard, and Shealy policies. Additionally, the DoD QSM version 5.4 has been followed for these samples, and specifically Table B-15 was followed for all PFAS samples. Any exceptions to the QAMP, SOPs, NELAC standards, the DoD QSM, or policies are qualified on the results page or discussed below.

All QC associated with these samples were compliant with DOD QSM 5.4 table B-15 and our PFAS SOP.

Correction factors (CF) are used to calculate the original sample concentration. The CF is the inverse of the concentration factor (sample volume / extract final volume) times the dilution factor (DF). The CF is calculated as follows:

CF = DF * FV / Vo

FV is volume of extract (mL)
Vo is initial sample volume (mL)
DF is dilution factor. For undiluted analysis, DF = 1.

Sample concentration for aqueous samples:
Concentration (ng/L) = Cs*CF,

$$C_s = \frac{\left(\frac{(A_s x C_{is})}{A_{is}}\right) - B}{M1}$$

Where

C_s is on column concentration of target analyte in the sample (ng/L)
C_{is} is concentration of internal standard in the sample (ng/L)
A_s is peak response of target analyte in the sample
A_{is} is peak response of internal standard in the sample
M1 is the average RF from ICAL or the slope from linear regression ICAL
B is the y-intercept from the ICAL

Pace is a TNI accredited laboratory; however, the following analyses are currently not listed on our TNI scope of accreditation: Drinking Water: VOC (excluding BTEX, MTBE, Naphthalene, & 1,2-dichloroethane) EPA 524.2, E. coli and Total coliforms SM 9223 B-2004, Solid Chemical Material: TOC Walkley-Black, Biological Tissue: All, Non-Potable Water: SGT-HEM EPA 1664B, Silica EPA 200.7, Boron, Calcium, Silicon, Strontium EPA 200.8, Bicarbonate, Carbonate, and Hydroxide Alkalinity SM 2320 B-2011, SM 9221 C E-2006 & SM 9222D-2006, Strontium SW-846 6010D, VOC SM 6200 B-2011, Fecal Coliform Colilert-18, PFAS by Isotope Dilution SOP.

If you have any questions regarding this report, please contact the Pace Project Manager listed on the cover page.

PFAS
Samples YI19014-005, YI19014-006, YI19014-008, YI19014-009 required centrifugation prior to extraction, due to excessive solids present in the samples. Centrifugation was performed following the PFAS Aqueous Centrifuge Protocol; samples were spiked with Surrogate (SUR; Extracted Internal Standard/EIS) and shaken vigorously before being poured into a conical bottle and centrifuged. The centrifuged aqueous sample was decanted back into the original sample bottle, off of the condensed solids remaining in the centrifuge bottle. Original sample bottle was rinsed as normal and centrifuge bottle was rinsed with 4mL of MeOH. Centrifuge bottle rinsate was added to the elution. Samples concentrated to <5mL and reconstituted to 5mL using MeOH by transfer pipet.

Surrogate recovery for the following samples was outside the upper control limit: YI19014-004, YI19014-010, YI19014-011, YI19014-012, YI19014-013, YI19014-014, YI19014-015. These samples did not contain any target analytes; therefore, re-extraction and/or re-analysis was not performed.

Surrogate recovery for the following samples was outside control limits: YI19014-005, YI19014-006. Evidence of matrix interference is present; therefore, re-extraction and/or re-analysis was not performed.

Surrogate recovery for the following samples was outside control limits: YI19014-008, YI19014-009. Re-extraction and/or re-analysis was performed with concurring results. The original analysis has been reported.

Sample Summary

Arcadis U.S., Inc.

Lot Number: YI19014

Project Name: RACER PNC

Project Number: 30167840.00031

Sample Number	Sample ID	Matrix	Date Sampled	Date Received
001	PZF17-05_GW-091523	Aqueous	09/15/2023 1304	09/19/2023
002	EB-05_091523	Aqueous	09/15/2023 1610	09/19/2023
003	Trip Blank	Aqueous	09/16/2023 1000	09/19/2023
004	MWF16-12_GW-091823	Aqueous	09/18/2023 1100	09/19/2023
005	MWW10-SEN01-091823	Aqueous	09/18/2023 1340	09/19/2023
006	TW-01-03_GW-091823	Aqueous	09/18/2023 1125	09/19/2023
007	EB-02_091823	Aqueous	09/18/2023 1135	09/19/2023
008	MW-01-17_GW-091823	Aqueous	09/18/2023 1425	09/19/2023
009	DUP-03_GW-091823	Aqueous	09/18/2023	09/19/2023
010	MWF16-06_GW-091523	Aqueous	09/15/2023 1300	09/19/2023
011	MWF16-18_GW-091523	Aqueous	09/15/2023 1420	09/19/2023
012	MWW10-03_GW-091523	Aqueous	09/15/2023 1250	09/19/2023
013	MWW1-04_GW-091523	Aqueous	09/15/2023 1540	09/19/2023
014	MWW10-04_GW-091523	Aqueous	09/15/2023 1130	09/19/2023
015	DUP-01_GW-091523	Aqueous	09/15/2023	09/19/2023

(15 samples)

Detection Summary

Arcadis U.S., Inc.

Lot Number: YI19014

Project Name: RACER PNC

Project Number: 30167840.00031

Sample	Sample ID	Matrix	Parameter	Method	Result	Q	Units	Page
001	PZF17-05_GW-091523	Aqueous	PFBS	PFAS by ID	0.67	J	ng/L	9
001	PZF17-05_GW-091523	Aqueous	PFBA	PFAS by ID	1.1	J	ng/L	9
004	MWF16-12_GW-091823	Aqueous	EtFOSAA	PFAS by ID	1.4	J	ng/L	15
004	MWF16-12_GW-091823	Aqueous	PFHpS	PFAS by ID	1.8	J	ng/L	15
004	MWF16-12_GW-091823	Aqueous	PFOSA	PFAS by ID	3.5	J	ng/L	15
004	MWF16-12_GW-091823	Aqueous	PFHxS	PFAS by ID	3.4	J	ng/L	15
004	MWF16-12_GW-091823	Aqueous	PFBA	PFAS by ID	3.7	J	ng/L	15
004	MWF16-12_GW-091823	Aqueous	PFDA	PFAS by ID	0.91	J	ng/L	15
004	MWF16-12_GW-091823	Aqueous	PFHpA	PFAS by ID	6.0		ng/L	15
004	MWF16-12_GW-091823	Aqueous	PFHxA	PFAS by ID	12		ng/L	15
004	MWF16-12_GW-091823	Aqueous	PFNA	PFAS by ID	2.2	J	ng/L	15
004	MWF16-12_GW-091823	Aqueous	PFOA	PFAS by ID	24		ng/L	15
004	MWF16-12_GW-091823	Aqueous	PFPeA	PFAS by ID	11		ng/L	15
004	MWF16-12_GW-091823	Aqueous	PFOS	PFAS by ID	110		ng/L	15
005	MWW10-SEN01-091823	Aqueous	PFHxS	PFAS by ID	2.9	J	ng/L	17
005	MWW10-SEN01-091823	Aqueous	PFHpA	PFAS by ID	3.4	J	ng/L	17
005	MWW10-SEN01-091823	Aqueous	PFHxA	PFAS by ID	6.0		ng/L	17
005	MWW10-SEN01-091823	Aqueous	PFOA	PFAS by ID	8.7		ng/L	17
005	MWW10-SEN01-091823	Aqueous	PFOS	PFAS by ID	18		ng/L	17
006	TW-01-03_GW-091823	Aqueous	PFHpS	PFAS by ID	3.1	J	ng/L	19
006	TW-01-03_GW-091823	Aqueous	PFHxS	PFAS by ID	19		ng/L	19
006	TW-01-03_GW-091823	Aqueous	PFNA	PFAS by ID	1.1	J	ng/L	19
006	TW-01-03_GW-091823	Aqueous	PFOA	PFAS by ID	21		ng/L	19
006	TW-01-03_GW-091823	Aqueous	PFOS	PFAS by ID	150		ng/L	19
008	MW-01-17_GW-091823	Aqueous	PFBS	PFAS by ID	7.0		ng/L	23
008	MW-01-17_GW-091823	Aqueous	PFPeS	PFAS by ID	3.4	J	ng/L	23
008	MW-01-17_GW-091823	Aqueous	PFHxS	PFAS by ID	13		ng/L	23
008	MW-01-17_GW-091823	Aqueous	PFBA	PFAS by ID	18	Q	ng/L	23
008	MW-01-17_GW-091823	Aqueous	PFHpA	PFAS by ID	5.7		ng/L	23
008	MW-01-17_GW-091823	Aqueous	PFHxA	PFAS by ID	9.2		ng/L	23
008	MW-01-17_GW-091823	Aqueous	PFNA	PFAS by ID	0.67	J	ng/L	23
008	MW-01-17_GW-091823	Aqueous	PFOA	PFAS by ID	14		ng/L	23
008	MW-01-17_GW-091823	Aqueous	PFOS	PFAS by ID	13		ng/L	23
009	DUP-03_GW-091823	Aqueous	PFBS	PFAS by ID	4.9		ng/L	25
009	DUP-03_GW-091823	Aqueous	PFHxS	PFAS by ID	13		ng/L	25
009	DUP-03_GW-091823	Aqueous	PFHpA	PFAS by ID	6.0		ng/L	25
009	DUP-03_GW-091823	Aqueous	PFHxA	PFAS by ID	9.6		ng/L	25
009	DUP-03_GW-091823	Aqueous	PFNA	PFAS by ID	0.72	J	ng/L	25
009	DUP-03_GW-091823	Aqueous	PFOA	PFAS by ID	13		ng/L	25
009	DUP-03_GW-091823	Aqueous	PFOS	PFAS by ID	14		ng/L	25
010	MWF16-06_GW-091523	Aqueous	PFBS	PFAS by ID	4.2		ng/L	27
010	MWF16-06_GW-091523	Aqueous	PFHpS	PFAS by ID	5.1		ng/L	27
010	MWF16-06_GW-091523	Aqueous	PFPeS	PFAS by ID	4.8		ng/L	27

Detection Summary (Continued)

Lot Number: YI19014

Sample	Sample ID	Matrix	Parameter	Method	Result	Q	Units	Page
010	MWF16-06_GW-091523	Aqueous	PFHxS	PFAS by ID	17		ng/L	27
010	MWF16-06_GW-091523	Aqueous	PFBA	PFAS by ID	9.6		ng/L	27
010	MWF16-06_GW-091523	Aqueous	PFHpA	PFAS by ID	7.7		ng/L	27
010	MWF16-06_GW-091523	Aqueous	PFHxA	PFAS by ID	14		ng/L	27
010	MWF16-06_GW-091523	Aqueous	PFOA	PFAS by ID	40		ng/L	27
010	MWF16-06_GW-091523	Aqueous	PFPeA	PFAS by ID	13		ng/L	27
010	MWF16-06_GW-091523	Aqueous	PFOS	PFAS by ID	49		ng/L	27
011	MWF16-18_GW-091523	Aqueous	PFHxS	PFAS by ID	2.2	J	ng/L	29
011	MWF16-18_GW-091523	Aqueous	PFBA	PFAS by ID	10		ng/L	29
011	MWF16-18_GW-091523	Aqueous	PFHpA	PFAS by ID	3.5		ng/L	29
011	MWF16-18_GW-091523	Aqueous	PFHxA	PFAS by ID	4.2		ng/L	29
011	MWF16-18_GW-091523	Aqueous	PFNA	PFAS by ID	0.91	J	ng/L	29
011	MWF16-18_GW-091523	Aqueous	PFOA	PFAS by ID	12		ng/L	29
011	MWF16-18_GW-091523	Aqueous	PFPeA	PFAS by ID	4.8		ng/L	29
011	MWF16-18_GW-091523	Aqueous	PFOS	PFAS by ID	13		ng/L	29
012	MWW10-03_GW-091523	Aqueous	PFBS	PFAS by ID	12		ng/L	31
012	MWW10-03_GW-091523	Aqueous	PFHpS	PFAS by ID	1.6	J	ng/L	31
012	MWW10-03_GW-091523	Aqueous	PFPeS	PFAS by ID	15		ng/L	31
012	MWW10-03_GW-091523	Aqueous	PFHxS	PFAS by ID	44		ng/L	31
012	MWW10-03_GW-091523	Aqueous	PFBA	PFAS by ID	21		ng/L	31
012	MWW10-03_GW-091523	Aqueous	PFHpA	PFAS by ID	30		ng/L	31
012	MWW10-03_GW-091523	Aqueous	PFHxA	PFAS by ID	29		ng/L	31
012	MWW10-03_GW-091523	Aqueous	PFOA	PFAS by ID	50		ng/L	31
012	MWW10-03_GW-091523	Aqueous	PFPeA	PFAS by ID	27		ng/L	31
013	MWW1-04_GW-091523	Aqueous	EtFOSAA	PFAS by ID	15		ng/L	33
013	MWW1-04_GW-091523	Aqueous	MeFOSAA	PFAS by ID	1.0	J	ng/L	33
013	MWW1-04_GW-091523	Aqueous	PFDS	PFAS by ID	0.88	J	ng/L	33
013	MWW1-04_GW-091523	Aqueous	PFOSA	PFAS by ID	1.7	J	ng/L	33
013	MWW1-04_GW-091523	Aqueous	PFHxS	PFAS by ID	4.5		ng/L	33
013	MWW1-04_GW-091523	Aqueous	PFDA	PFAS by ID	0.87	J	ng/L	33
013	MWW1-04_GW-091523	Aqueous	PFHpA	PFAS by ID	3.1	J	ng/L	33
013	MWW1-04_GW-091523	Aqueous	PFNA	PFAS by ID	1.3	J	ng/L	33
013	MWW1-04_GW-091523	Aqueous	PFOA	PFAS by ID	6.8		ng/L	33
013	MWW1-04_GW-091523	Aqueous	PFPeA	PFAS by ID	5.2		ng/L	33
013	MWW1-04_GW-091523	Aqueous	PFOS	PFAS by ID	130		ng/L	33
014	MWW10-04_GW-091523	Aqueous	PFHxS	PFAS by ID	5.7		ng/L	35
014	MWW10-04_GW-091523	Aqueous	PFBA	PFAS by ID	8.3	J	ng/L	35
014	MWW10-04_GW-091523	Aqueous	PFDA	PFAS by ID	0.94	J	ng/L	35
014	MWW10-04_GW-091523	Aqueous	PFHpA	PFAS by ID	11		ng/L	35
014	MWW10-04_GW-091523	Aqueous	PFHxA	PFAS by ID	18		ng/L	35
014	MWW10-04_GW-091523	Aqueous	PFNA	PFAS by ID	16		ng/L	35
014	MWW10-04_GW-091523	Aqueous	PFOA	PFAS by ID	45		ng/L	35
014	MWW10-04_GW-091523	Aqueous	PFPeA	PFAS by ID	15		ng/L	35
014	MWW10-04_GW-091523	Aqueous	PFOS	PFAS by ID	48		ng/L	35
015	DUP-01_GW-091523	Aqueous	PFHxS	PFAS by ID	5.0		ng/L	37
015	DUP-01_GW-091523	Aqueous	PFDA	PFAS by ID	1.1	J	ng/L	37
015	DUP-01_GW-091523	Aqueous	PFHpA	PFAS by ID	14		ng/L	37
015	DUP-01_GW-091523	Aqueous	PFHxA	PFAS by ID	15		ng/L	37

Detection Summary (Continued)

Lot Number: YI19014

Sample	Sample ID	Matrix	Parameter	Method	Result	Q	Units	Page
015	DUP-01_GW-091523	Aqueous	PFNA	PFAS by ID	15		ng/L	37
015	DUP-01_GW-091523	Aqueous	PFOA	PFAS by ID	45		ng/L	37
015	DUP-01_GW-091523	Aqueous	PFPeA	PFAS by ID	15		ng/L	37
015	DUP-01_GW-091523	Aqueous	PFOS	PFAS by ID	47		ng/L	37

(95 detections)

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-001**

Description: **PZF17-05_GW-091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023 1304** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/29/2023 2329	ARC2	09/27/2023 1602	85922

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.4	0.45	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.4	0.62	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.4	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.4	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.4	0.81	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.4	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.4	0.45	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.4	0.70	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.4	0.87	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**0.67**	**J**	**3.7**	**0.39**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	0.72	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.7	0.46	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	0.66	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	0.57	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.7	0.55	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.7	0.51	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**1.1**	**J**	**3.7**	**0.56**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	0.49	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	0.44	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.7	0.42	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.7	0.64	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.7	0.43	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.7	0.77	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.7	0.51	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	0.56	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	0.49	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	0.58	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.7	1.9	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		116	25-150
13C2_6:2FTS		95	25-150
13C2_8:2FTS		81	25-150
13C2_PFDoA		73	25-150
13C2_PFTeDA		83	25-150
13C3_PFBS		93	25-150
13C3_PFHxS		84	25-150
13C3-HFPO-DA		92	25-150
13C4_PFBA		80	25-150
13C4_PFHpA		87	25-150
13C5_PFHxA		93	25-150
13C5_PFPeA		92	25-150
13C6_PFDA		80	25-150
13C7_PFUdA		82	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-001**

Description: **PZF17-05_GW-091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023 1304** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		89	25-150
13C8_PFOS		84	25-150
13C8_PFOSA		79	10-150
13C9_PFNA		90	25-150
d5-EtFOSAA		85	25-150
d3-MeFOSAA		83	25-150

LOQ = Limit of Quantitation
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E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
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P = The RPD between two GC columns exceeds 40%
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-002**

Description: **EB-05_091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023 1610** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/29/2023 2339	ARC2	09/27/2023 1602	85922

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.6	0.46	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.6	0.63	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.6	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.6	0.83	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.6	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.6	0.46	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.6	0.71	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.6	0.88	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.8	0.39	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.8	0.74	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.8	0.47	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.8	0.67	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.8	0.58	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.8	0.56	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.8	0.52	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.8	0.57	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.8	0.45	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.8	0.42	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.8	0.65	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.8	0.44	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.8	0.78	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.8	0.51	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.8	0.57	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.8	0.59	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.8	1.9	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		117	25-150
13C2_6:2FTS		139	25-150
13C2_8:2FTS		105	25-150
13C2_PFDoA		102	25-150
13C2_PFTeDA		105	25-150
13C3_PFBS		111	25-150
13C3_PFHxS		100	25-150
13C3-HFPO-DA		106	25-150
13C4_PFBA		108	25-150
13C4_PFHpA		110	25-150
13C5_PFHxA		112	25-150
13C5_PFPeA		112	25-150
13C6_PFDA		108	25-150
13C7_PFUdA		103	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-002**

Description: **EB-05_091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023 1610** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		116	25-150
13C8_PFOS		112	25-150
13C8_PFOSA		98	10-150
13C9_PFNA		114	25-150
d5-EtFOSAA		106	25-150
d3-MeFOSAA		107	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-003**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **09/16/2023 1000** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/29/2023 2350	ARC2	09/27/2023 1602	85922

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.2	0.43	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.2	0.59	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.2	1.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.2	0.78	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.2	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.2	0.43	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.2	0.67	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.2	0.83	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.6	0.37	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.70	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.6	0.45	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.64	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	0.55	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.6	0.53	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.6	0.49	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.6	0.54	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	0.47	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.42	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.6	0.40	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.6	0.61	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.6	0.41	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.6	0.74	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.6	0.49	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.54	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.47	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.56	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.6	1.8	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		88	25-150
13C2_6:2FTS		94	25-150
13C2_8:2FTS		83	25-150
13C2_PFDoA		78	25-150
13C2_PFTeDA		88	25-150
13C3_PFBS		91	25-150
13C3_PFHxS		85	25-150
13C3-HFPO-DA		93	25-150
13C4_PFBA		91	25-150
13C4_PFHpA		90	25-150
13C5_PFHxA		94	25-150
13C5_PFPeA		87	25-150
13C6_PFDA		90	25-150
13C7_PFUdA		91	25-150

LOQ = Limit of Quantitation
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DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
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W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-003**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **09/16/2023 1000** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		92	25-150
13C8_PFOS		85	25-150
13C8_PFOSA		81	10-150
13C9_PFNA		93	25-150
d5-EtFOSAA		90	25-150
d3-MeFOSAA		82	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-004**

Description: **MWF16-12_GW-091823** Matrix: **Aqueous**

Date Sampled: **09/18/2023 1100** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/30/2023 0032	ARC2	09/28/2023 2045	86111

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.8	0.47	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.8	0.64	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.8	1.6	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.8	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.8	0.85	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.8	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.8	0.47	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	**2991-50-6**	**PFAS by ID SOP**	**1.4**	**J**	**7.8**	**0.73**	**ng/L**	**1**
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.8	0.91	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.9	0.40	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.9	0.76	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**1.8**	**J**	**3.9**	**0.48**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.9	0.69	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	**754-91-6**	**PFAS by ID SOP**	**3.5**	**J**	**3.9**	**0.60**	**ng/L**	**1**
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.9	0.58	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**3.4**	**J**	**3.9**	**0.54**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**3.7**	**J**	**3.9**	**0.58**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	**335-76-2**	**PFAS by ID SOP**	**0.91**	**J**	**3.9**	**0.51**	**ng/L**	**1**
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.9	0.46	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**6.0**		**3.9**	**0.43**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**12**		**3.9**	**0.67**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**2.2**	**J**	**3.9**	**0.45**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**24**		**3.9**	**0.81**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**11**		**3.9**	**0.53**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.9	0.58	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.9	0.51	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.9	0.61	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**110**		**3.9**	**1.9**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	256	25-150
13C2_6:2FTS	N	168	25-150
13C2_8:2FTS		119	25-150
13C2_PFDoA		91	25-150
13C2_PFTeDA		92	25-150
13C3_PFBS		94	25-150
13C3_PFHxS		94	25-150
13C3-HFPO-DA		87	25-150
13C4_PFBA		55	25-150
13C4_PFHpA		88	25-150
13C5_PFHxA		99	25-150
13C5_PFPeA		92	25-150
13C6_PFDA		102	25-150
13C7_PFUdA		101	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-004**

Description: **MWF16-12_GW-091823** Matrix: **Aqueous**

Date Sampled: **09/18/2023 1100** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		105	25-150
13C8_PFOS		93	25-150
13C8_PFOSA		92	10-150
13C9_PFNA		107	25-150
d5-EtFOSAA		95	25-150
d3-MeFOSAA		106	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-005**

Description: **MWW10-SEN01-091823** Matrix: **Aqueous**

Date Sampled: **09/18/2023 1340** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/30/2023 0043	ARC2	09/28/2023 2045	86111

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.9	0.48	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.9	0.65	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.9	1.6	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.9	2.0	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.9	0.86	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.9	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.9	0.48	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.9	0.74	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.9	0.92	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.9	0.41	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.9	0.77	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.9	0.49	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.9	0.70	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.9	0.60	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.9	0.59	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**2.9**	**J**	**3.9**	**0.54**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND	Q	3.9	0.59	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.9	0.52	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.9	0.47	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**3.4**	**J**	**3.9**	**0.44**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**6.0**		**3.9**	**0.68**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.9	0.46	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**8.7**		**3.9**	**0.82**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.9	0.54	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.9	0.59	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.9	0.52	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.9	0.62	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**18**		**3.9**	**2.0**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	234	25-150
13C2_6:2FTS	N	298	25-150
13C2_8:2FTS	N	236	25-150
13C2_PFDoA		90	25-150
13C2_PFTeDA		86	25-150
13C3_PFBS		76	25-150
13C3_PFHxS		83	25-150
13C3-HFPO-DA		61	25-150
13C4_PFBA	N	24	25-150
13C4_PFHpA		56	25-150
13C5_PFHxA		56	25-150
13C5_PFPeA		43	25-150
13C6_PFDA		99	25-150
13C7_PFUdA		103	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-005**

Description: **MWW10-SEN01-091823** Matrix: **Aqueous**

Date Sampled: **09/18/2023 1340** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		83	25-150
13C8_PFOS		87	25-150
13C8_PFOSA		84	10-150
13C9_PFNA		94	25-150
d5-EtFOSAA		108	25-150
d3-MeFOSAA		112	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-006**

Description: **TW-01-03_GW-091823** Matrix: **Aqueous**

Date Sampled: **09/18/2023 1125** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/30/2023 0054	ARC2	09/28/2023 2045	86111

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.1	0.43	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.1	0.59	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.1	1.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.1	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.1	0.78	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.1	0.43	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.1	0.67	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.1	0.83	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.6	0.37	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.69	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**3.1**	**J**	**3.6**	**0.44**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.63	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	0.55	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.6	0.53	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**19**		**3.6**	**0.49**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND	Q	3.6	0.53	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	0.47	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.42	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.6	0.40	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.6	0.61	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**1.1**	**J**	**3.6**	**0.41**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**21**		**3.6**	**0.74**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.6	0.48	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.53	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.47	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.56	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**150**		**3.6**	**1.8**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	260	25-150
13C2_6:2FTS	N	246	25-150
13C2_8:2FTS	N	249	25-150
13C2_PFDoA		63	25-150
13C2_PFTeDA		44	25-150
13C3_PFBS		70	25-150
13C3_PFHxS		62	25-150
13C3-HFPO-DA		45	25-150
13C4_PFBA	N	17	25-150
13C4_PFHpA		28	25-150
13C5_PFHxA		33	25-150
13C5_PFPeA		29	25-150
13C6_PFDA		66	25-150
13C7_PFUdA		74	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-006**

Description: **TW-01-03_GW-091823** Matrix: **Aqueous**

Date Sampled: **09/18/2023 1125** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		55	25-150
13C8_PFOS		71	25-150
13C8_PFOSA		35	10-150
13C9_PFNA		66	25-150
d5-EtFOSAA		72	25-150
d3-MeFOSAA		69	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-007**

Description: **EB-02_091823** Matrix: **Aqueous**

Date Sampled: **09/18/2023 1135** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/30/2023 0104	ARC2	09/28/2023 2045	86111

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.2	0.44	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.2	0.60	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.2	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.2	0.79	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.2	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.2	0.44	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.2	0.68	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.2	0.84	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.6	0.38	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.70	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.6	0.45	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.64	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	0.56	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.6	0.54	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.6	0.50	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.6	0.54	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	0.48	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.43	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.6	0.41	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.6	0.62	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.6	0.42	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.6	0.75	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.6	0.49	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.54	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.48	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.57	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.6	1.8	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		93	25-150
13C2_6:2FTS		80	25-150
13C2_8:2FTS		74	25-150
13C2_PFDoA		81	25-150
13C2_PFTeDA		91	25-150
13C3_PFBS		87	25-150
13C3_PFHxS		86	25-150
13C3-HFPO-DA		86	25-150
13C4_PFBA		90	25-150
13C4_PFHpA		83	25-150
13C5_PFHxA		87	25-150
13C5_PFPeA		83	25-150
13C6_PFDA		87	25-150
13C7_PFUdA		87	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-007**

Description: **EB-02_091823** Matrix: **Aqueous**

Date Sampled: **09/18/2023 1135** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		92	25-150
13C8_PFOS		86	25-150
13C8_PFOSA		83	10-150
13C9_PFNA		86	25-150
d5-EtFOSAA		86	25-150
d3-MeFOSAA		82	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-008**

Description: **MW-01-17_GW-091823** Matrix: **Aqueous**

Date Sampled: **09/18/2023 1425** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/30/2023 0251	ARC2	09/28/2023 2045	86111

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.3	0.44	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.3	0.61	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.3	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.3	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.3	0.80	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.3	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.3	0.44	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.3	0.69	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.3	0.85	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**7.0**		**3.7**	**0.38**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	0.71	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.7	0.46	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	0.65	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	0.56	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**3.4**	**J**	**3.7**	**0.54**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**13**		**3.7**	**0.51**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**18**	**Q**	**3.7**	**0.55**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	0.48	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	0.43	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**5.7**		**3.7**	**0.41**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**9.2**		**3.7**	**0.63**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**0.67**	**J**	**3.7**	**0.42**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**14**		**3.7**	**0.76**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.7	0.50	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	0.55	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	0.48	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	0.57	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**13**		**3.7**	**1.8**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	220	25-150
13C2_6:2FTS	N	285	25-150
13C2_8:2FTS	N	249	25-150
13C2_PFDoA		104	25-150
13C2_PFTeDA		91	25-150
13C3_PFBS		76	25-150
13C3_PFHxS		95	25-150
13C3-HFPO-DA		59	25-150
13C4_PFBA	N	21	25-150
13C4_PFHpA		64	25-150
13C5_PFHxA		61	25-150
13C5_PFPeA		40	25-150
13C6_PFDA		112	25-150
13C7_PFUdA		119	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-008**

Description: **MW-01-17_GW-091823** Matrix: **Aqueous**

Date Sampled: **09/18/2023 1425** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		101	25-150
13C8_PFOS		107	25-150
13C8_PFOSA		90	10-150
13C9_PFNA		110	25-150
d5-EtFOSAA		125	25-150
d3-MeFOSAA		118	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
Q = Surrogate failure
L = LCS/LCSD failure
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-009**

Description: **DUP-03_GW-091823** Matrix: **Aqueous**

Date Sampled: **09/18/2023** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/30/2023 0301	ARC2	09/28/2023 2045	86111

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.4	0.45	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.4	0.62	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.4	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.4	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.4	0.81	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.4	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.4	0.45	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.4	0.70	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.4	0.87	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**4.9**		**3.7**	**0.39**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	0.72	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.7	0.46	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	0.66	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	0.57	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.7	0.55	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**13**		**3.7**	**0.51**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND	Q	3.7	0.56	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	0.49	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	0.44	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**6.0**		**3.7**	**0.42**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**9.6**		**3.7**	**0.64**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**0.72**	**J**	**3.7**	**0.43**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**13**		**3.7**	**0.77**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.7	0.51	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	0.56	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	0.49	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	0.58	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**14**		**3.7**	**1.9**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	247	25-150
13C2_6:2FTS	N	317	25-150
13C2_8:2FTS	N	214	25-150
13C2_PFDoA		101	25-150
13C2_PFTeDA		85	25-150
13C3_PFBS		82	25-150
13C3_PFHxS		90	25-150
13C3-HFPO-DA		59	25-150
13C4_PFBA	N	21	25-150
13C4_PFHpA		61	25-150
13C5_PFHxA		62	25-150
13C5_PFPeA		40	25-150
13C6_PFDA		111	25-150
13C7_PFUdA		113	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
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H = Out of holding time
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S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-009**

Description: **DUP-03_GW-091823** Matrix: **Aqueous**

Date Sampled: **09/18/2023** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		99	25-150
13C8_PFOS		89	25-150
13C8_PFOSA		96	10-150
13C9_PFNA		107	25-150
d5-EtFOSAA		125	25-150
d3-MeFOSAA		116	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-010**

Description: **MWF16-06_GW-091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023 1300** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/30/2023 0312	ARC2	09/28/2023 2045	86111

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		6.9	0.42	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		6.9	0.57	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		6.9	1.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	6.9	1.7	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	6.9	0.76	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		6.9	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		6.9	0.42	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		6.9	0.65	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		6.9	0.81	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**4.2**		**3.5**	**0.36**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.67	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**5.1**		**3.5**	**0.43**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.62	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.53	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**4.8**		**3.5**	**0.51**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**17**		**3.5**	**0.48**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**9.6**		**3.5**	**0.52**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.45	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.41	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**7.7**		**3.5**	**0.39**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**14**		**3.5**	**0.60**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	0.40	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**40**		**3.5**	**0.72**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**13**		**3.5**	**0.47**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.52	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.46	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.54	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**49**		**3.5**	**1.7**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	201	25-150
13C2_6:2FTS	N	171	25-150
13C2_8:2FTS		102	25-150
13C2_PFDoA		95	25-150
13C2_PFTeDA		89	25-150
13C3_PFBS		94	25-150
13C3_PFHxS		99	25-150
13C3-HFPO-DA		85	25-150
13C4_PFBA		73	25-150
13C4_PFHpA		90	25-150
13C5_PFHxA		104	25-150
13C5_PFPeA		90	25-150
13C6_PFDA		103	25-150
13C7_PFUdA		89	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-010**

Description: **MWF16-06_GW-091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023 1300** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		110	25-150
13C8_PFOS		100	25-150
13C8_PFOSA		91	10-150
13C9_PFNA		102	25-150
d5-EtFOSAA		89	25-150
d3-MeFOSAA		81	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-011**

Description: **MWF16-18_GW-091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023 1420** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/30/2023 0323	ARC2	09/28/2023 2045	86111

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		6.9	0.42	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		6.9	0.57	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		6.9	1.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	6.9	1.7	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	6.9	0.76	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		6.9	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		6.9	0.42	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		6.9	0.65	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		6.9	0.81	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.5	0.36	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.67	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.5	0.43	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.62	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.53	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.5	0.51	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**2.2**	**J**	**3.5**	**0.48**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**10**		**3.5**	**0.52**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.45	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.41	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**3.5**		**3.5**	**0.39**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**4.2**		**3.5**	**0.60**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**0.91**	**J**	**3.5**	**0.40**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**12**		**3.5**	**0.72**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**4.8**		**3.5**	**0.47**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.52	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.46	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.54	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**13**		**3.5**	**1.7**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	299	25-150
13C2_6:2FTS	N	231	25-150
13C2_8:2FTS		128	25-150
13C2_PFDoA		94	25-150
13C2_PFTeDA		87	25-150
13C3_PFBS		91	25-150
13C3_PFHxS		100	25-150
13C3-HFPO-DA		65	25-150
13C4_PFBA		46	25-150
13C4_PFHpA		84	25-150
13C5_PFHxA		95	25-150
13C5_PFPeA		73	25-150
13C6_PFDA		105	25-150
13C7_PFUdA		98	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-011**

Description: **MWF16-18_GW-091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023 1420** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		107	25-150
13C8_PFOS		99	25-150
13C8_PFOSA		94	10-150
13C9_PFNA		114	25-150
d5-EtFOSAA		100	25-150
d3-MeFOSAA		92	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-012**

Description: **MWW10-03_GW-091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023 1250** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/30/2023 0602	ARC2	09/28/2023 2045	86111

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.5	0.45	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.5	0.62	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.5	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.5	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.5	0.82	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.5	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.5	0.45	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.5	0.71	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.5	0.88	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**12**		**3.8**	**0.39**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.8	0.73	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**1.6**	**J**	**3.8**	**0.47**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.8	0.67	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.8	0.58	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**15**		**3.8**	**0.56**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**44**		**3.8**	**0.52**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**21**		**3.8**	**0.56**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.8	0.49	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.8	0.44	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**30**		**3.8**	**0.42**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**29**		**3.8**	**0.65**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.8	0.43	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**50**		**3.8**	**0.78**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**27**		**3.8**	**0.51**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.8	0.56	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.8	0.59	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.8	1.9	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	234	25-150
13C2_6:2FTS	N	304	25-150
13C2_8:2FTS	N	167	25-150
13C2_PFDoA		100	25-150
13C2_PFTeDA		94	25-150
13C3_PFBS		84	25-150
13C3_PFHxS		89	25-150
13C3-HFPO-DA		57	25-150
13C4_PFBA		27	25-150
13C4_PFHpA		59	25-150
13C5_PFHxA		64	25-150
13C5_PFPeA		45	25-150
13C6_PFDA		109	25-150
13C7_PFUdA		98	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
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S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-012**

Description: **MWW10-03_GW-091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023 1250** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		88	25-150
13C8_PFOS		97	25-150
13C8_PFOSA		95	10-150
13C9_PFNA		103	25-150
d5-EtFOSAA		105	25-150
d3-MeFOSAA		101	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-013**

Description: **MWW1-04_GW-091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023 1540** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/30/2023 0333	ARC2	09/28/2023 2045	86111
2	SOP SPE	PFAS by ID SOP	1	10/11/2023 0146	OMNS	10/03/2023 1731	86454

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.8	0.47	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.8	0.64	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.8	1.6	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.8	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.8	0.85	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.8	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.8	0.47	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	**2991-50-6**	**PFAS by ID SOP**	**15**		**7.8**	**0.73**	**ng/L**	**1**
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	**2355-31-9**	**PFAS by ID SOP**	**1.0**	**J**	**7.8**	**0.90**	**ng/L**	**1**
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.9	0.40	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	**335-77-3**	**PFAS by ID SOP**	**0.88**	**J**	**3.9**	**0.76**	**ng/L**	**1**
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.9	0.48	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.9	0.69	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	**754-91-6**	**PFAS by ID SOP**	**1.7**	**J**	**3.9**	**0.59**	**ng/L**	**1**
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.9	0.58	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**4.5**		**3.9**	**0.54**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		40	6.0	ng/L	2
Perfluoro-n-decanoic acid (PFDA)	**335-76-2**	**PFAS by ID SOP**	**0.87**	**J**	**3.9**	**0.51**	**ng/L**	**1**
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.9	0.46	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**3.1**	**J**	**3.9**	**0.43**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.9	0.67	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**1.3**	**J**	**3.9**	**0.45**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**6.8**		**3.9**	**0.80**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**5.2**		**3.9**	**0.53**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.9	0.58	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.9	0.51	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.9	0.61	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**130**		**3.9**	**1.9**	**ng/L**	**1**

Surrogate	Run 1 Q	Run 1 % Recovery	Run 1 Acceptance Limits	Run 2 Q	Run 2 % Recovery	Run 2 Acceptance Limits
13C2_4:2FTS	N	275	25-150	N	268	25-150
13C2_6:2FTS	N	335	25-150	N	174	25-150
13C2_8:2FTS	N	293	25-150		108	25-150
13C2_PFDoA		106	25-150		93	25-150
13C2_PFTeDA		88	25-150		88	25-150
13C3_PFBS		89	25-150		97	25-150
13C3_PFHxS		88	25-150		96	25-150
13C3-HFPO-DA		58	25-150		75	25-150
13C4_PFBA	N	4.0	25-150		84	25-150
13C4_PFHpA		59	25-150		88	25-150
13C5_PFHxA		76	25-150		93	25-150
13C5_PFPeA		29	25-150		99	25-150
13C6_PFDA		102	25-150		88	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-013**

Description: **MWW1-04_GW-091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023 1540** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits	Q	Run 2 % Recovery	Acceptance Limits
13C7_PFUdA		108	25-150		101	25-150
13C8_PFOA		87	25-150		97	25-150
13C8_PFOS		95	25-150		98	25-150
13C8_PFOSA		87	10-150		95	10-150
13C9_PFNA		94	25-150		106	25-150
d5-EtFOSAA		127	25-150		94	25-150
d3-MeFOSAA		115	25-150		97	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-014**

Description: **MWW10-04_GW-091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023 1130** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/30/2023 0344	ARC2	09/28/2023 2045	86111
2	SOP SPE	PFAS by ID SOP	1	10/11/2023 0156	OMNS	10/03/2023 1731	86454

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.7	0.47	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.7	0.64	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.7	1.6	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.7	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.7	0.85	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.7	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.7	0.47	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.7	0.73	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.7	0.90	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.9	0.40	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.9	0.75	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.9	0.48	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.9	0.69	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.9	0.59	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.9	0.57	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**5.7**		**3.9**	**0.53**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**8.3**	**J**	**40**	**6.0**	**ng/L**	**2**
Perfluoro-n-decanoic acid (PFDA)	**335-76-2**	**PFAS by ID SOP**	**0.94**	**J**	**3.9**	**0.51**	**ng/L**	**1**
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.9	0.46	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**11**		**3.9**	**0.43**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**18**		**3.9**	**0.67**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**16**		**3.9**	**0.45**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**45**		**3.9**	**0.80**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**15**		**3.9**	**0.53**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.9	0.58	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.9	0.51	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.9	0.61	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**48**		**3.9**	**1.9**	**ng/L**	**1**

Surrogate	Run 1 Q	Run 1 % Recovery	Run 1 Acceptance Limits	Run 2 Q	Run 2 % Recovery	Run 2 Acceptance Limits
13C2_4:2FTS	N	236	25-150	N	251	25-150
13C2_6:2FTS	N	298	25-150	N	161	25-150
13C2_8:2FTS	N	241	25-150		106	25-150
13C2_PFDoA		100	25-150		84	25-150
13C2_PFTeDA		91	25-150		84	25-150
13C3_PFBS		73	25-150		93	25-150
13C3_PFHxS		83	25-150		90	25-150
13C3-HFPO-DA		47	25-150		70	25-150
13C4_PFBA	N	22	25-150		75	25-150
13C4_PFHpA		54	25-150		85	25-150
13C5_PFHxA		53	25-150		88	25-150
13C5_PFPeA		35	25-150		92	25-150
13C6_PFDA		97	25-150		90	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-014**

Description: **MWW10-04_GW-091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023 1130** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits	Q	Run 2 % Recovery	Acceptance Limits
13C7_PFUdA		107	25-150		96	25-150
13C8_PFOA		79	25-150		95	25-150
13C8_PFOS		88	25-150		99	25-150
13C8_PFOSA		73	10-150		90	10-150
13C9_PFNA		94	25-150		99	25-150
d5-EtFOSAA		110	25-150		87	25-150
d3-MeFOSAA		105	25-150		90	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-015**

Description: **DUP-01_GW-091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/30/2023 0354	ARC2	09/28/2023 2045	86111
2	SOP SPE	PFAS by ID SOP	1	10/11/2023 0207	OMNS	10/03/2023 1731	86454

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.5	0.45	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.5	0.62	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.5	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.5	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.5	0.82	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.5	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.5	0.46	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.5	0.71	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.5	0.88	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.8	0.39	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.8	0.73	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.8	0.47	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.8	0.67	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.8	0.58	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.8	0.56	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**5.0**		**3.8**	**0.52**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		40	6.0	ng/L	2
Perfluoro-n-decanoic acid (PFDA)	**335-76-2**	**PFAS by ID SOP**	**1.1**	**J**	**3.8**	**0.49**	**ng/L**	**1**
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.8	0.44	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**14**		**3.8**	**0.42**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**15**		**3.8**	**0.65**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**15**		**3.8**	**0.43**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**45**		**3.8**	**0.78**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**15**		**3.8**	**0.51**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.8	0.56	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.8	0.59	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**47**		**3.8**	**1.9**	**ng/L**	**1**

Surrogate	Run 1 Q	Run 1 % Recovery	Run 1 Acceptance Limits	Run 2 Q	Run 2 % Recovery	Run 2 Acceptance Limits
13C2_4:2FTS	N	232	25-150	N	278	25-150
13C2_6:2FTS	N	300	25-150	N	181	25-150
13C2_8:2FTS	N	236	25-150		103	25-150
13C2_PFDoA		98	25-150		84	25-150
13C2_PFTeDA		86	25-150		84	25-150
13C3_PFBS		74	25-150		89	25-150
13C3_PFHxS		86	25-150		94	25-150
13C3-HFPO-DA		54	25-150		82	25-150
13C4_PFBA	N	23	25-150		77	25-150
13C4_PFHpA		50	25-150		89	25-150
13C5_PFHxA		56	25-150		95	25-150
13C5_PFPeA		38	25-150		93	25-150
13C6_PFDA		101	25-150		96	25-150

LOQ = Limit of Quantitation
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-015**

Description: **DUP-01_GW-091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits	Q	Run 2 % Recovery	Acceptance Limits
13C7_PFUdA		97	25-150		96	25-150
13C8_PFOA		76	25-150		95	25-150
13C8_PFOS		88	25-150		96	25-150
13C8_PFOSA		74	10-150		86	10-150
13C9_PFNA		94	25-150		104	25-150
d5-EtFOSAA		110	25-150		84	25-150
d3-MeFOSAA		98	25-150		87	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
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S = MS/MSD failure

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QC Summary

PFAS by LC/MS/MS - MB

Sample ID: YQ85922-001
Batch: 85922
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/27/2023 1602

Parameter	Result	Q	Dil	LOQ	DL	Units	Analysis Date
9Cl-PF3ONS	ND		1	8.0	0.48	ng/L	09/29/2023 1903
11Cl-PF3OUdS	ND		1	8.0	0.66	ng/L	09/29/2023 1903
8:2 FTS	ND		1	8.0	1.6	ng/L	09/29/2023 1903
6:2 FTS	ND		1	8.0	2.0	ng/L	09/29/2023 1903
4:2 FTS	ND		1	8.0	0.87	ng/L	09/29/2023 1903
GenX	ND		1	8.0	2.1	ng/L	09/29/2023 1903
ADONA	ND		1	8.0	0.48	ng/L	09/29/2023 1903
EtFOSAA	ND		1	8.0	0.75	ng/L	09/29/2023 1903
MeFOSAA	ND		1	8.0	0.93	ng/L	09/29/2023 1903
PFBS	ND		1	4.0	0.41	ng/L	09/29/2023 1903
PFDS	ND		1	4.0	0.78	ng/L	09/29/2023 1903
PFHpS	ND		1	4.0	0.50	ng/L	09/29/2023 1903
PFNS	ND		1	4.0	0.71	ng/L	09/29/2023 1903
PFOSA	ND		1	4.0	0.61	ng/L	09/29/2023 1903
PFPeS	ND		1	4.0	0.59	ng/L	09/29/2023 1903
PFHxS	ND		1	4.0	0.55	ng/L	09/29/2023 1903
PFBA	ND		1	4.0	0.60	ng/L	09/29/2023 1903
PFDA	ND		1	4.0	0.52	ng/L	09/29/2023 1903
PFDoA	ND		1	4.0	0.47	ng/L	09/29/2023 1903
PFHpA	ND		1	4.0	0.45	ng/L	09/29/2023 1903
PFHxA	ND		1	4.0	0.69	ng/L	09/29/2023 1903
PFNA	ND		1	4.0	0.46	ng/L	09/29/2023 1903
PFOA	ND		1	4.0	0.83	ng/L	09/29/2023 1903
PFPeA	ND		1	4.0	0.54	ng/L	09/29/2023 1903
PFTeDA	ND		1	4.0	0.60	ng/L	09/29/2023 1903
PFTrDA	ND		1	4.0	0.53	ng/L	09/29/2023 1903
PFUdA	ND		1	4.0	0.63	ng/L	09/29/2023 1903
PFOS	ND		1	4.0	2.0	ng/L	09/29/2023 1903

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		88	25-150
13C2_6:2FTS		100	25-150
13C2_8:2FTS		82	25-150
13C2_PFDoA		81	25-150
13C2_PFTeDA		85	25-150
13C3_PFBS		91	25-150
13C3_PFHxS		87	25-150
13C3-HFPO-DA		93	25-150
13C4_PFBA		92	25-150
13C4_PFHpA		89	25-150
13C5_PFHxA		91	25-150
13C5_PFPeA		89	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: YQ85922-001
Batch: 85922
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/27/2023 1602

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		89	25-150
13C7_PFUdA		82	25-150
13C8_PFOA		98	25-150
13C8_PFOS		82	25-150
13C8_PFOSA		86	10-150
13C9_PFNA		91	25-150
d5-EtFOSAA		85	25-150
d3-MeFOSAA		84	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ85922-002
Batch: 85922
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/27/2023 1602

Parameter	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	%Rec Limit	Analysis Date
9Cl-PF3ONS	15	14		1	96	50-150	09/29/2023 1914
11Cl-PF3OUdS	15	14		1	96	50-150	09/29/2023 1914
8:2 FTS	15	19		1	124	50-150	09/29/2023 1914
6:2 FTS	15	15		1	99	50-150	09/29/2023 1914
4:2 FTS	15	14		1	95	50-150	09/29/2023 1914
GenX	32	31		1	98	50-150	09/29/2023 1914
ADONA	15	15		1	98	50-150	09/29/2023 1914
EtFOSAA	16	15		1	94	50-150	09/29/2023 1914
MeFOSAA	16	18		1	112	50-150	09/29/2023 1914
PFBS	14	15		1	103	50-150	09/29/2023 1914
PFDS	15	15		1	95	50-150	09/29/2023 1914
PFHpS	15	15		1	96	50-150	09/29/2023 1914
PFNS	15	17		1	109	50-150	09/29/2023 1914
PFOSA	16	16		1	98	50-150	09/29/2023 1914
PFPeS	15	15		1	103	50-150	09/29/2023 1914
PFHxS	15	16		1	109	50-150	09/29/2023 1914
PFBA	16	15		1	91	50-150	09/29/2023 1914
PFDA	16	17		1	104	50-150	09/29/2023 1914
PFDoA	16	16		1	98	50-150	09/29/2023 1914
PFHpA	16	16		1	98	50-150	09/29/2023 1914
PFHxA	16	16		1	98	50-150	09/29/2023 1914
PFNA	16	16		1	102	50-150	09/29/2023 1914
PFOA	16	15		1	95	50-150	09/29/2023 1914
PFPeA	16	16		1	101	50-150	09/29/2023 1914
PFTeDA	16	15		1	95	50-150	09/29/2023 1914
PFTrDA	16	15		1	95	50-150	09/29/2023 1914
PFUdA	16	16		1	101	50-150	09/29/2023 1914
PFOS	15	16		1	106	50-150	09/29/2023 1914

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		103	25-150
13C2_6:2FTS		96	25-150
13C2_8:2FTS		88	25-150
13C2_PFDoA		88	25-150
13C2_PFTeDA		95	25-150
13C3_PFBS		99	25-150
13C3_PFHxS		96	25-150
13C3-HFPO-DA		106	25-150
13C4_PFBA		102	25-150
13C4_PFHpA		101	25-150
13C5_PFHxA		107	25-150
13C5_PFPeA		97	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ85922-002
Batch: 85922
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/27/2023 1602

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		92	25-150
13C7_PFUdA		90	25-150
13C8_PFOA		102	25-150
13C8_PFOS		97	25-150
13C8_PFOSA		94	10-150
13C9_PFNA		104	25-150
d5-EtFOSAA		96	25-150
d3-MeFOSAA		90	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: YQ86111-001
Batch: 86111
Analytical Method: PFAS by ID SOP
Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/28/2023 2045

Parameter	Result	Q	Dil	LOQ	DL	Units	Analysis Date
9Cl-PF3ONS	ND		1	8.0	0.48	ng/L	09/30/2023 0001
11Cl-PF3OUdS	ND		1	8.0	0.66	ng/L	09/30/2023 0001
8:2 FTS	ND		1	8.0	1.6	ng/L	09/30/2023 0001
6:2 FTS	ND		1	8.0	2.0	ng/L	09/30/2023 0001
4:2 FTS	ND		1	8.0	0.87	ng/L	09/30/2023 0001
GenX	ND		1	8.0	2.1	ng/L	09/30/2023 0001
ADONA	ND		1	8.0	0.48	ng/L	09/30/2023 0001
EtFOSAA	ND		1	8.0	0.75	ng/L	09/30/2023 0001
MeFOSAA	ND		1	8.0	0.93	ng/L	09/30/2023 0001
PFBS	ND		1	4.0	0.41	ng/L	09/30/2023 0001
PFDS	ND		1	4.0	0.78	ng/L	09/30/2023 0001
PFHpS	ND		1	4.0	0.50	ng/L	09/30/2023 0001
PFNS	ND		1	4.0	0.71	ng/L	09/30/2023 0001
PFOSA	ND		1	4.0	0.61	ng/L	09/30/2023 0001
PFPeS	ND		1	4.0	0.59	ng/L	09/30/2023 0001
PFHxS	ND		1	4.0	0.55	ng/L	09/30/2023 0001
PFBA	ND		1	4.0	0.60	ng/L	09/30/2023 0001
PFDA	ND		1	4.0	0.52	ng/L	09/30/2023 0001
PFDoA	ND		1	4.0	0.47	ng/L	09/30/2023 0001
PFHpA	ND		1	4.0	0.45	ng/L	09/30/2023 0001
PFHxA	ND		1	4.0	0.69	ng/L	09/30/2023 0001
PFNA	ND		1	4.0	0.46	ng/L	09/30/2023 0001
PFOA	ND		1	4.0	0.83	ng/L	09/30/2023 0001
PFPeA	ND		1	4.0	0.54	ng/L	09/30/2023 0001
PFTeDA	ND		1	4.0	0.60	ng/L	09/30/2023 0001
PFTrDA	ND		1	4.0	0.53	ng/L	09/30/2023 0001
PFUdA	ND		1	4.0	0.63	ng/L	09/30/2023 0001
PFOS	ND		1	4.0	2.0	ng/L	09/30/2023 0001

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		90	25-150
13C2_6:2FTS		90	25-150
13C2_8:2FTS		80	25-150
13C2_PFDoA		86	25-150
13C2_PFTeDA		95	25-150
13C3_PFBS		92	25-150
13C3_PFHxS		88	25-150
13C3-HFPO-DA		86	25-150
13C4_PFBA		92	25-150
13C4_PFHpA		95	25-150
13C5_PFHxA		94	25-150
13C5_PFPeA		88	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: YQ86111-001
Batch: 86111
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/28/2023 2045

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		86	25-150
13C7_PFUdA		90	25-150
13C8_PFOA		101	25-150
13C8_PFOS		89	25-150
13C8_PFOSA		81	10-150
13C9_PFNA		97	25-150
d5-EtFOSAA		93	25-150
d3-MeFOSAA		86	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ86111-002
Batch: 86111
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/28/2023 2045

Parameter	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	%Rec Limit	Analysis Date
9Cl-PF3ONS	15	16		1	105	50-150	09/30/2023 0011
11Cl-PF3OUdS	15	15		1	99	50-150	09/30/2023 0011
8:2 FTS	15	13		1	84	50-150	09/30/2023 0011
6:2 FTS	15	17		1	115	50-150	09/30/2023 0011
4:2 FTS	15	14		1	95	50-150	09/30/2023 0011
GenX	32	36		1	114	50-150	09/30/2023 0011
ADONA	15	17		1	113	50-150	09/30/2023 0011
EtFOSAA	16	16		1	102	50-150	09/30/2023 0011
MeFOSAA	16	17		1	107	50-150	09/30/2023 0011
PFBS	14	14		1	99	50-150	09/30/2023 0011
PFDS	15	15		1	100	50-150	09/30/2023 0011
PFHpS	15	16		1	103	50-150	09/30/2023 0011
PFNS	15	17		1	112	50-150	09/30/2023 0011
PFOSA	16	18		1	110	50-150	09/30/2023 0011
PFPeS	15	16		1	107	50-150	09/30/2023 0011
PFHxS	15	15		1	105	50-150	09/30/2023 0011
PFBA	16	15		1	92	50-150	09/30/2023 0011
PFDA	16	18		1	111	50-150	09/30/2023 0011
PFDoA	16	16		1	99	50-150	09/30/2023 0011
PFHpA	16	17		1	104	50-150	09/30/2023 0011
PFHxA	16	16		1	102	50-150	09/30/2023 0011
PFNA	16	16		1	102	50-150	09/30/2023 0011
PFOA	16	17		1	108	50-150	09/30/2023 0011
PFPeA	16	18		1	110	50-150	09/30/2023 0011
PFTeDA	16	18		1	110	50-150	09/30/2023 0011
PFTrDA	16	16		1	97	50-150	09/30/2023 0011
PFUdA	16	16		1	102	50-150	09/30/2023 0011
PFOS	15	16		1	111	50-150	09/30/2023 0011

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		99	25-150
13C2_6:2FTS		99	25-150
13C2_8:2FTS		99	25-150
13C2_PFDoA		96	25-150
13C2_PFTeDA		101	25-150
13C3_PFBS		104	25-150
13C3_PFHxS		96	25-150
13C3-HFPO-DA		99	25-150
13C4_PFBA		102	25-150
13C4_PFHpA		100	25-150
13C5_PFHxA		101	25-150
13C5_PFPeA		100	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ86111-002
Batch: 86111
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/28/2023 2045

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		101	25-150
13C7_PFUdA		96	25-150
13C8_PFOA		104	25-150
13C8_PFOS		99	25-150
13C8_PFOSA		95	10-150
13C9_PFNA		100	25-150
d5-EtFOSAA		96	25-150
d3-MeFOSAA		99	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: YQ86454-001
Batch: 86454
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 10/03/2023 1731

Parameter	Result	Q	Dil	LOQ	DL	Units	Analysis Date
PFBA	ND		1	4.0	0.60	ng/L	10/11/2023 0103

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		97	25-150
13C2_6:2FTS		108	25-150
13C2_8:2FTS		93	25-150
13C2_PFDoA		101	25-150
13C2_PFTeDA		97	25-150
13C3_PFBS		103	25-150
13C3_PFHxS		109	25-150
13C3-HFPO-DA		103	25-150
13C4_PFBA		110	25-150
13C4_PFHpA		110	25-150
13C5_PFHxA		99	25-150
13C5_PFPeA		111	25-150
13C6_PFDA		98	25-150
13C7_PFUdA		103	25-150
13C8_PFOA		107	25-150
13C8_PFOS		109	25-150
13C8_PFOSA		98	10-150
13C9_PFNA		104	25-150
d5-EtFOSAA		96	25-150
d3-MeFOSAA		96	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ86454-002
Batch: 86454
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 10/03/2023 1731

Parameter	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	%Rec Limit	Analysis Date
PFBA	16	16		1	99	50-150	10/11/2023 0114

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		93	25-150
13C2_6:2FTS		107	25-150
13C2_8:2FTS		98	25-150
13C2_PFDoA		99	25-150
13C2_PFTeDA		94	25-150
13C3_PFBS		103	25-150
13C3_PFHxS		105	25-150
13C3-HFPO-DA		91	25-150
13C4_PFBA		101	25-150
13C4_PFHpA		108	25-150
13C5_PFHxA		94	25-150
13C5_PFPeA		105	25-150
13C6_PFDA		96	25-150
13C7_PFUdA		101	25-150
13C8_PFOA		103	25-150
13C8_PFOS		101	25-150
13C8_PFOSA		94	10-150
13C9_PFNA		102	25-150
d5-EtFOSAA		98	25-150
d3-MeFOSAA		93	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Chain of Custody
and
Miscellaneous Documents

Pace Analytical®

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Telephone No. 803-791-9700 Fax No. 803-791-9111
www.pacelabs.com

Number 150049

Client: Aradis	Report to Contact: Alexis Crisp	Telephone No. / E-mail: alexis.crisp@aradas.com Diana.linder@aradas.com	Quote No.
Address: 29550 Cabot Dr Suite #500	Sampler's Signature: Samantha Szpaichler	Analysis (Attach list if more space is needed): Full Report EGLE 28 compounds	Page 1 of 4
City: Novi	State: MI Zip Code: 48377		
Project Name: Ralph Pine	Printed Name: Samantha Szpaichler		
Project No.: 30167840.00031	P.O. No.: 30167840.00031		

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Sample Type (G=Grab C=Comp)	Matrix: Aqueous	Matrix: Solid	Matrix: Non-Aqueous	No of Containers by Preservative Type: Unpres.	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Field Filtered	PFAS Analysis Required by DOD Lab?	Remarks / Cooler I.D.
PZE17-05_GW-091523	9/15/23	1304	G	2			2						N	X	
EB-05_091523	9/15/23	1610	G	1			1						N	X	equipment blank
Trip Blank	9/16/23	1000	G	1			1						N	X	trip blank
MWF16-12_GW-091823	9/18/23	1100	G	2			2						N	X	
MWW10-SEN01_GW-091823	9/18/23	1340	G	2			2						N	X	
~~FB-10-01_GW-091823~~ SS	~~9/18/23~~		G	2			2						N	X	

Turn Around Time Required (Prior lab approval required for expedited TAT): ☑ Standard ☐ Rush (Specify)

Sample Disposal: ☐ Return to Client ☑ Disposal by Lab

Possible Hazard Identification: ☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: Samantha Szpaichler / Aradis	9/15/23	1510	1. Received by: Tammera Ely	9/15/23	1510
2. Relinquished by: Tammera Ely	9/18/23	1645	2. Received by: FedEx	9/18/23	1645
3. Relinquished by:	Date	Time	3. Received by:	Date	Time
4. Relinquished by: FedEx	9/18/23	1805	4. Laboratory received by:	9/19/23	0805

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY
Received on ice (Circle) (Yes) No Ice Pack: Receipt Temp: 1.7 °C
Temp Blank: ☑ Y ☐ N

YI19014

KES2

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Number 150049

Client: Arcadis	Report to Contact: Alexis Crisp, Tiffany Linder	Telephone No. / E-mail: Alexis.crisp@arcadis.com, Tiffany.Linder@arcadis.com	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: Jammer Guy	Analysis (Attach list if more space is needed): Report EGLE 28 Compounds	Page 2 of 4
City: Novi / State: MI / Zip Code: 48377	Printed Name: Jammer Guy		YI19014
Project Name: Racer PNC			
Project No.: 30167840.00031	P.O. No.		

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Grab / Composite	Matrix: Aqueous	Matrix: Solid	Matrix: Non-Aqueous	No. of Containers by Preservative Type: Unpres.	HCl	HNO3	H2SO4	NaOH	Na2S2O3	Field Filtered	Method 537.1 mod. with isotope dilution per WSP	Remarks / Cooler I.D.
TW-01-03_GW-091823	9/18/23	1125	G	X			2							X	
EB-02_091823	9/18/23	1135	G	X			1							X	equipment blank
MW-01-17_GW-091823	9/18/23	1425	G	X			2							X	
DUP-03_GW-091823	9/18/23	—	G	X			2							X	

Turn Around Time Required (Prior lab approval required for expedited TAT.): ☒ Standard ☐ Rush (Specify)

Sample Disposal: ☐ Return to Client ☒ Disposal by Lab

Possible Hazard Identification: ☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: Jammer Guy	9/18/23	1645	1. Received by: FedEx	9/18/23	1645
2. Relinquished by	Date	Time	2. Received by	Date	Time
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by: FedEx	9/19/23	1005	4. Laboratory received by	9/16/23	1005

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY — Received on Ice (Circle): Yes / No — Ice Pack — Receipt Temp. 1.7 °C — Temp Blank: ☒ Y ☐ N

PACE ANALYTICAL SERVICES, LLC

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106 Vantage Point Drive • West Columbia, SC 29172
Telephone No. 803-791-9700 Fax No. 803-791-9111
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Number 150049

Client: ARCADIS	Report to Contact: Alexis Crisp	Telephone No. / E-mail: tiffany.linder@arcadis.com; alexis.crisp@arcadis.com	Quote No.
Address: 28550 Cabot Dr. #500	Sampler's Signature: Garrett Link	Analysis (Attach list if more space is needed): Report EGLE 28 Compounds	Page 3 of 4
City: Nov. State: MI Zip Code: 48377	Printed Name: Garrett Link		YI19014
Project Name: Pontiac North Campus (RACER)			IKES2
Project No.: 30167840.00031	P.O. No.		

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Grab/Composite	Matrix: Aqueous	Matrix: Solid	Matrix: Non-aqueous	No. of Containers by Preservative Type: Unpres	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Field Filtered	(MS/MSD, 537 w/ isotope dilution per ASMS.1)	Remarks / Cooler I.D.
~~MWF16-12_GW-091523~~	~~9/15/23~~		G	X			X								
MWF16-06_GW-091523	9/15/23	13:00	G	2			2							X	
MWF16-18_GW-091523	9/15/23	14:20	G	2			2							X	

Turn Around Time Required (Prior lab approval required for expedited TAT.)	Sample Disposal	Possible Hazard Identification	QC Requirements (Specify)
☑ Standard ☐ Rush (Specify)	☐ Return to Client ☑ Disposal by Lab	☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown	

	Date	Time		Date	Time
1. Relinquished by: Garrett Link	9/15/23	15:00	1. Received by: Arcadis	9/15/23	1500
2. Relinquished by: Arcadis	9/18/23	1510	2. Received by: Jennifer Eby	9/18/23	1510
3. Relinquished by: Jennifer Eby	9/18/23	1645	3. Received by: FedEx	9/18/23	1645
4. Relinquished by: FedEx	9/19/23	1005	4. Laboratory received by:	9/19/23	1005

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY
Received on Ice (Circle) (Yes) No Ice Pack
Receipt Temp 1.7 °C
Temp Blank ☑ Y ☐ N

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Number 150049

Client: ARCADIS	Report to Contact: Lexi Crisp	Telephone No. / E-mail: tiffany.linder@arcadis.com; alexis.crisp@arcadis.com	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: x Lotte Jay	Analysis (Attach list if more space is needed): Report EGLE 28 (compound)	Page 4 of 4
City: NOVI	State: MI	Zip Code: 48377	
Project Name: Racer PNC	Printed Name: Lottie Jay		YI19014
Project No.: 30167840.00031	P.O. No.		KF52

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Grab / Composite	Matrix: Aqueous	Matrix: Solid	Matrix: Other	No. of Containers by Preservative Type: Unpres.	HNO3	H2SO4	HCl	NaOH	Na2S2O3	Field Filtered	Method 537 mod with isotope dilution per QSM 5.1	Remarks / Cooler I.D.
MWW10-03_GW-091523	9/15/23	1250	G	X			2							X	
MWW1-04_GW-091523		1540	G	X			2							X	
MWW10-04_GW-091523		1130	G	X			2							X	
DUP-01_GW-091523		—	G	X			2							X	

Turn Around Time Required (Prior lab approval required for expedited TAT.): ☒ Standard ☐ Rush (Specify)

Sample Disposal: ☐ Return to Client ☒ Disposal by Lab

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: Lottie Jay	9/15/23	1628	1. Received by: Arcadis	9/15/23	1628
2. Relinquished by: Arcadis	9/18/23	1510	2. Received by: Jammel Day	9/18/23	1510
3. Relinquished by: Jammel Day	9/19/23	1645	3. Received by: FedEx	9/19/23	1645
4. Relinquished by: FedEx	9/19/23	1685	4. Laboratory received by: [signature]	9/19/23	1685

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY — Received on Ice (Circle): (Yes) No Ice Pack — Receipt Temp. 1.7 °C — Temp Blank ☒ ☐ N

PACE ANALYTICAL SERVICES, LLC

DC#_Title: ENV-FRM-WCOL-0286 v02_Samples Receipt Checklist (SRC)
Effective Date: 8/2/2022

Sample Receipt Checklist (SRC)

Client: ARCADIS Cooler Inspected by/date: KSC / 09/19/2023 Lot #: YII90114

Means of receipt: ☐ Pace ☐ Client ☐ UPS ☑ FedEx ☐ Other:			
☐ Yes	☑ No		1. Were custody seals present on the cooler?
☐ Yes	☐ No	☑ NA	2. If custody seals were present, were they intact and unbroken?

pH Strip ID: NA Chlorine Strip ID: NA Tested by: NA

Original temperature upon receipt / Derived (Corrected) temperature upon receipt %Solid Snap-Cup ID: NA

1.7 /1.7 °C NA /NA °C NA /NA °C NA /NA °C

Method: ☑ Temperature Blank ☐ Against Bottles IR Gun ID: 8 IR Gun Correction Factor: 0 °C

Method of coolant: ☑ Wet Ice ☐ Ice Packs ☐ Dry Ice ☐ None

☑ Yes	☐ No	☐ NA	3. Were all coolers received at or below 6.0°C? If no, was Project Manager notified? PM was Notified by: phone / email / face-to-face (circle one).
☑ Yes	☐ No	☐ NA	4. Is the commercial courier's packing slip attached to this form?
☑ Yes	☐ No		5. Were proper custody procedures (relinquished/received) followed?
☑ Yes	☐ No		6. Were sample IDs listed on the COC and all sample containers?
☐ Yes	☑ No		7. Was collection date & time listed on the COC and all sample containers?
☐ Yes	☑ No		8. Did all container label information (ID, date, time) agree with the COC?
☐ Yes	☑ No		9. Were tests to be performed listed on the COC?
☑ Yes	☐ No		10. Did all samples arrive in the proper containers for each test and/or in good condition (unbroken, lids on, etc.)?
☑ Yes	☐ No		11. Was adequate sample volume available?
☐ Yes	☑ No		12. Were all samples received within ½ the holding time or 48 hours, whichever comes first?
☑ Yes	☐ No		13. Were all samples containers accounted for? (No missing/excess)
☐ Yes	☐ No	☑ NA	14. Were VOA, 8015C and RSK-175 samples free of bubbles >"pea-size" (¼"or 6mm in diameter) in any of the VOA vials?
☐ Yes	☐ No	☑ NA	15. Were all DRO/metals/nutrient samples received at a pH of < 2?
☐ Yes	☐ No	☑ NA	16. Were all cyanide samples received at a pH > 12 and sulfide samples received at a pH > 9?
☐ Yes	☐ No	☑ NA	17. Were all applicable NH_3/TKN/cyanide/phenol/625.1/608.3 (< 0.5mg/L) samples free of residual chlorine?
☐ Yes	☐ No	☑ NA	18. Was the quote number listed on the container label? If yes. Quote #

Sample Preservation (Must be completed for any sample(s) incorrectly preserved or with headspace.)

Sample(s) NA were received incorrectly preserved and were adjusted accordingly in sample receiving with NA mL of circle one: H2SO4, HNO3, HCl, NaOH using SR # NA. ☐
Time of preservation NA. If more than one preservative is needed, please note in the comments below.

Sample(s) NA were received with bubbles >6 mm in diameter.

Samples(s) NA were received with TRC > 0.5 mg/L (if #19 is *no*) and were adjusted accordingly in sample receiving with sodium thiosulfate ($Na_2S_2O_3$) with Unique ID: NA.

Comments:

Qualtrax ID: 56360 Pace® Analytical Services, LLC Page 1 of 1

Report of Analysis

Arcadis U.S., Inc.
630 Plaza Drive
Suite 600
Highlands Ranch, CO 80129
Attention: Tiffany Linder

Project Name: RACER PNC

Project Number: 30167840.00031

Lot Number:**YI20016**

Date Completed:10/03/2023

Kathy Smith

10/03/2023 10:56 AM
Approved and released by:
Project Manager II: **Kathy E. Smith**

The electronic signature above is the equivalent of a handwritten signature.
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Case Narrative
Arcadis U.S., Inc.
Lot Number: YI20016

This Report of Analysis contains the analytical result(s) for the sample(s) listed on the Sample Summary following this Case Narrative. The sample receiving date is documented in the header information associated with each sample.

All results listed in this report relate only to the samples that are contained within this report.

Sample receipt, sample analysis, and data review have been performed in accordance with the Pace Quality Assurance Management Plan (QAMP), applicable Shealy standard operating procedures (SOPs), the 2003 NELAC standard, and Shealy policies. Additionally, the DoD QSM version 5.4 has been followed for these samples, and specifically Table B-15 was followed for all PFAS samples. Any exceptions to the QAMP, SOPs, NELAC standards, the DoD QSM, or policies are qualified on the results page or discussed below.

All QC associated with these samples were compliant with DOD QSM 5.4 table B-15 and our PFAS SOP.

Correction factors (CF) are used to calculate the original sample concentration. The CF is the inverse of the concentration factor (sample volume / extract final volume) times the dilution factor (DF). The CF is calculated as follows:

CF = DF * FV / Vo

FV is volume of extract (mL)
Vo is initial sample volume (mL)
DF is dilution factor. For undiluted analysis, DF = 1.

Sample concentration for aqueous samples:
Concentration (ng/L) = Cs*CF,

$$C_s = \frac{\left(\frac{(A_s x C_{is})}{A_{is}}\right) - B}{M1}$$

Where

C_s is on column concentration of target analyte in the sample (ng/L)
C_{is} is concentration of internal standard in the sample (ng/L)
A_s is peak response of target analyte in the sample
A_{is} is peak response of internal standard in the sample
M1 is the average RF from ICAL or the slope from linear regression ICAL
B is the y-intercept from the ICAL

Pace is a TNI accredited laboratory; however, the following analyses are currently not listed on our TNI scope of accreditation: Drinking Water: VOC (excluding BTEX, MTBE, Naphthalene, & 1,2-dichloroethane) EPA 524.2, E. coli and Total coliforms SM 9223 B-2004, Solid Chemical Material: TOC Walkley-Black, Biological Tissue: All, Non-Potable Water: SGT-HEM EPA 1664B, Silica EPA 200.7, Boron, Calcium, Silicon, Strontium EPA 200.8, Bicarbonate, Carbonate, and Hydroxide Alkalinity SM 2320 B-2011, SM 9221 C E-2006 & SM 9222D-2006, Strontium SW-846 6010D, VOC SM 6200 B-2011, Fecal Coliform Colilert-18, PFAS by Isotope Dilution SOP.

If you have any questions regarding this report, please contact the Pace Project Manager listed on the cover page.

PFAS
Samples YI20016-003, YI20016-006 required centrifugation prior to extraction, due to excessive solids present in the samples. Centrifugation was performed following the PFAS Aqueous Centrifuge Protocol; samples were spiked with Surrogate (SUR; Extracted Internal Standard/EIS) and shaken vigorously before being poured into a conical bottle and centrifuged. The centrifuged aqueous sample was decanted back into the original sample bottle, off of the condensed solids remaining in the centrifuge bottle. Original sample bottle was rinsed as normal and centrifuge bottle was rinsed with 4mL of MeOH. Centrifuge bottle rinsate was added to the elution. Samples concentrated to <5mL and reconstituted to 5mL using MeOH by transfer pipet.

The following sample was diluted due to the nature of the sample matrix: YI20016-002/MS/MSD, YI20016-003. The LOQ has been elevated to reflect the dilution. Sample was diluted due to foaminess.

Surrogate recovery for the following sample was outside control limits: YI20016-002. MS/MSD was performed with concurring results. The data has been reported.

Surrogate recovery for the following samples was outside the upper control limit: YI20016-003, YI20016-005. These samples did not contain any target analytes; therefore, re-extraction and/or re-analysis was not performed.

Surrogate recovery for the following sample was outside control limits: YI20016-006. Evidence of matrix interference is present; therefore, re-extraction and/or re-analysis was not performed.

Sample YI20016-006 and its DUP have analyte concentrations that do not agree. Samples have similiar surrogate recoveries, matrix interference, and both bottles were consumed on the same day. No other sample in the PB or run appear to match either the parent sample or the DUP. There is insufficient sample to reextract and the data has been reported.

Sample Summary

Arcadis U.S., Inc.

Lot Number: YI20016

Project Name: RACER PNC

Project Number: 30167840.00031

Sample Number	Sample ID	Matrix	Date Sampled	Date Received
001	Trip Blank	Aqueous	09/18/2023 1500	09/20/2023
002	MWM16-52_GW-091923	Aqueous	09/19/2023 1115	09/20/2023
003	MWW1-02_GW-091923	Aqueous	09/19/2023 1322	09/20/2023
004	EB-06_091923	Aqueous	09/19/2023 1330	09/20/2023
005	MWM30-02_GW-091923	Aqueous	09/19/2023 1120	09/20/2023
006	TW-10-01_GW-091823	Aqueous	09/18/2023 1515	09/20/2023

(6 samples)

Detection Summary

Arcadis U.S., Inc.

Lot Number: YI20016

Project Name: RACER PNC

Project Number: 30167840.00031

Sample	Sample ID	Matrix	Parameter	Method	Result	Q	Units	Page
002	MWM16-52_GW-091923	Aqueous	6:2 FTS	PFAS by ID	28	JQ	ng/L	8
002	MWM16-52_GW-091923	Aqueous	PFHxS	PFAS by ID	25	J	ng/L	8
002	MWM16-52_GW-091923	Aqueous	PFHpA	PFAS by ID	8.6	J	ng/L	8
002	MWM16-52_GW-091923	Aqueous	PFHxA	PFAS by ID	12	J	ng/L	8
002	MWM16-52_GW-091923	Aqueous	PFOA	PFAS by ID	21	J	ng/L	8
002	MWM16-52_GW-091923	Aqueous	PFOS	PFAS by ID	65		ng/L	8
003	MWW1-02_GW-091923	Aqueous	PFHxS	PFAS by ID	15	J	ng/L	10
003	MWW1-02_GW-091923	Aqueous	PFBA	PFAS by ID	43		ng/L	10
003	MWW1-02_GW-091923	Aqueous	PFOA	PFAS by ID	15	J	ng/L	10
003	MWW1-02_GW-091923	Aqueous	PFOS	PFAS by ID	66		ng/L	10
005	MWM30-02_GW-091923	Aqueous	PFBS	PFAS by ID	2.9	J	ng/L	14
005	MWM30-02_GW-091923	Aqueous	PFHxS	PFAS by ID	3.3	J	ng/L	14
005	MWM30-02_GW-091923	Aqueous	PFBA	PFAS by ID	6.5		ng/L	14
005	MWM30-02_GW-091923	Aqueous	PFHpA	PFAS by ID	3.3	J	ng/L	14
005	MWM30-02_GW-091923	Aqueous	PFHxA	PFAS by ID	3.4	J	ng/L	14
005	MWM30-02_GW-091923	Aqueous	PFOA	PFAS by ID	6.7		ng/L	14
005	MWM30-02_GW-091923	Aqueous	PFPeA	PFAS by ID	3.0	J	ng/L	14
005	MWM30-02_GW-091923	Aqueous	PFOS	PFAS by ID	3.1	J	ng/L	14
006	TW-10-01_GW-091823	Aqueous	6:2 FTS	PFAS by ID	24	Q	ng/L	16
006	TW-10-01_GW-091823	Aqueous	PFBS	PFAS by ID	43		ng/L	16
006	TW-10-01_GW-091823	Aqueous	PFHpS	PFAS by ID	3.1	J	ng/L	16
006	TW-10-01_GW-091823	Aqueous	PFPeS	PFAS by ID	13		ng/L	16
006	TW-10-01_GW-091823	Aqueous	PFHxS	PFAS by ID	47		ng/L	16
006	TW-10-01_GW-091823	Aqueous	PFHpA	PFAS by ID	7.0		ng/L	16
006	TW-10-01_GW-091823	Aqueous	PFHxA	PFAS by ID	45		ng/L	16
006	TW-10-01_GW-091823	Aqueous	PFOA	PFAS by ID	15		ng/L	16
006	TW-10-01_GW-091823	Aqueous	PFOS	PFAS by ID	81		ng/L	16

(27 detections)

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI20016-001**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **09/18/2023 1500** Project Name: **RACER PNC**

Date Received: **09/20/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 2000	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.6	0.46	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.6	0.63	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.6	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.6	0.83	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.6	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.6	0.46	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.6	0.71	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.6	0.89	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.8	0.39	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.8	0.74	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.8	0.47	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.8	0.68	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.8	0.58	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.8	0.56	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.8	0.52	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.8	0.57	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.8	0.45	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.8	0.42	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.8	0.65	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.8	0.44	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.8	0.79	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.8	0.52	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.8	0.57	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.8	0.59	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.8	1.9	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		91	25-150
13C2_6:2FTS		123	25-150
13C2_8:2FTS		90	25-150
13C2_PFDoA		74	25-150
13C2_PFTeDA		84	25-150
13C3_PFBS		93	25-150
13C3_PFHxS		84	25-150
13C3-HFPO-DA		89	25-150
13C4_PFBA		94	25-150
13C4_PFHpA		85	25-150
13C5_PFHxA		99	25-150
13C5_PFPeA		92	25-150
13C6_PFDA		80	25-150
13C7_PFUdA		79	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI20016-001**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **09/18/2023 1500** Project Name: **RACER PNC**

Date Received: **09/20/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		91	25-150
13C8_PFOS		77	25-150
13C8_PFOSA		78	10-150
13C9_PFNA		85	25-150
d5-EtFOSAA		86	25-150
d3-MeFOSAA		77	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI20016-002**

Description: **MWM16-52_GW-091923** Matrix: **Aqueous**

Date Sampled: **09/19/2023 1115** Project Name: **RACER PNC**

Date Received: **09/20/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 2011	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		80	4.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		80	6.6	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	80	16	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**28**	**JQ**	**80**	**20**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	80	8.7	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		80	21	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		80	4.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		80	7.5	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		80	9.3	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		40	4.1	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		40	7.8	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		40	5.0	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		40	7.1	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		40	6.1	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		40	5.9	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**25**	**J**	**40**	**5.5**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		40	6.0	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		40	5.2	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		40	4.7	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**8.6**	**J**	**40**	**4.5**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**12**	**J**	**40**	**6.9**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		40	4.6	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**21**	**J**	**40**	**8.3**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		40	5.4	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		40	6.0	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		40	5.3	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		40	6.3	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**65**		**40**	**20**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	327	25-150
13C2_6:2FTS	N	246	25-150
13C2_8:2FTS	N	151	25-150
13C2_PFDoA		82	25-150
13C2_PFTeDA		82	25-150
13C3_PFBS		91	25-150
13C3_PFHxS		83	25-150
13C3-HFPO-DA		61	25-150
13C4_PFBA		72	25-150
13C4_PFHpA		72	25-150
13C5_PFHxA		90	25-150
13C5_PFPeA		80	25-150
13C6_PFDA		89	25-150
13C7_PFUdA		90	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI20016-002**

Description: **MWM16-52_GW-091923** Matrix: **Aqueous**

Date Sampled: **09/19/2023 1115** Project Name: **RACER PNC**

Date Received: **09/20/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		92	25-150
13C8_PFOS		78	25-150
13C8_PFOSA		87	10-150
13C9_PFNA		90	25-150
d5-EtFOSAA		97	25-150
d3-MeFOSAA		90	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI20016-003**

Description: **MWW1-02_GW-091923** Matrix: **Aqueous**

Date Sampled: **09/19/2023 1322** Project Name: **RACER PNC**

Date Received: **09/20/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/29/2023 1800	ARC2	09/21/2023 1924	85448

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		80	4.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		80	6.6	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		80	16	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		80	20	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	80	8.7	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		80	21	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		80	4.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		80	7.5	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		80	9.3	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		40	4.1	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		40	7.8	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		40	5.0	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		40	7.1	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		40	6.1	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		40	5.9	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**15**	**J**	**40**	**5.5**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**43**		**40**	**6.0**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		40	5.2	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		40	4.7	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		40	4.5	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		40	6.9	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		40	4.6	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**15**	**J**	**40**	**8.3**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		40	5.4	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		40	6.0	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		40	5.3	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		40	6.3	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**66**		**40**	**20**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	242	25-150
13C2_6:2FTS		137	25-150
13C2_8:2FTS		105	25-150
13C2_PFDoA		97	25-150
13C2_PFTeDA		97	25-150
13C3_PFBS		96	25-150
13C3_PFHxS		93	25-150
13C3-HFPO-DA		91	25-150
13C4_PFBA		78	25-150
13C4_PFHpA		94	25-150
13C5_PFHxA		114	25-150
13C5_PFPeA		93	25-150
13C6_PFDA		123	25-150
13C7_PFUdA		94	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI20016-003**

Description: **MWW1-02_GW-091923** Matrix: **Aqueous**

Date Sampled: **09/19/2023 1322** Project Name: **RACER PNC**

Date Received: **09/20/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		106	25-150
13C8_PFOS		93	25-150
13C8_PFOSA		98	10-150
13C9_PFNA		111	25-150
d5-EtFOSAA		96	25-150
d3-MeFOSAA		97	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI20016-004**

Description: **EB-06_091923** Matrix: **Aqueous**

Date Sampled: **09/19/2023 1330** Project Name: **RACER PNC**

Date Received: **09/20/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/29/2023 1811	ARC2	09/21/2023 1924	85448

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.6	0.46	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.6	0.63	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.6	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.6	0.83	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.6	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.6	0.46	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.6	0.71	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.6	0.88	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.8	0.39	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.8	0.74	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.8	0.47	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.8	0.67	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.8	0.58	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.8	0.56	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.8	0.52	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.8	0.57	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.8	0.45	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.8	0.42	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.8	0.65	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.8	0.44	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.8	0.79	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.8	0.52	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.8	0.57	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.8	0.59	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.8	1.9	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		104	25-150
13C2_6:2FTS		113	25-150
13C2_8:2FTS		105	25-150
13C2_PFDoA		98	25-150
13C2_PFTeDA		102	25-150
13C3_PFBS		103	25-150
13C3_PFHxS		102	25-150
13C3-HFPO-DA		104	25-150
13C4_PFBA		102	25-150
13C4_PFHpA		99	25-150
13C5_PFHxA		107	25-150
13C5_PFPeA		101	25-150
13C6_PFDA		105	25-150
13C7_PFUdA		98	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.**		Laboratory ID: **YI20016-004**
Description: **EB-06_091923**		Matrix: **Aqueous**
Date Sampled: **09/19/2023 1330**	Project Name: **RACER PNC**	
Date Received: **09/20/2023**	Project Number: **30167840.00031**	

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		107	25-150
13C8_PFOS		98	25-150
13C8_PFOSA		96	10-150
13C9_PFNA		112	25-150
d5-EtFOSAA		99	25-150
d3-MeFOSAA		103	25-150

LOQ = Limit of Quantitation	B = Detected in the method blank	E = Quantitation of compound exceeded the calibration range	DL = Detection Limit	Q = Surrogate failure
ND = Not detected at or above the DL	N = Recovery is out of criteria	P = The RPD between two GC columns exceeds 40%	J = Estimated result < LOQ and ≥ DL	L = LCS/LCSD failure
H = Out of holding time	W = Reported on wet weight basis			S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI20016-005**

Description: **MWM30-02_GW-091923** Matrix: **Aqueous**

Date Sampled: **09/19/2023 1120** Project Name: **RACER PNC**

Date Received: **09/20/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/29/2023 1821	ARC2	09/21/2023 1924	85448

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.7	0.46	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.7	0.64	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.7	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.7	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.7	0.84	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.7	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.7	0.47	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.7	0.72	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.7	0.90	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**2.9**	**J**	**3.9**	**0.40**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.9	0.75	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.9	0.48	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.9	0.69	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.9	0.59	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.9	0.57	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**3.3**	**J**	**3.9**	**0.53**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**6.5**		**3.9**	**0.58**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.9	0.51	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.9	0.45	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**3.3**	**J**	**3.9**	**0.43**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**3.4**	**J**	**3.9**	**0.66**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.9	0.44	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**6.7**		**3.9**	**0.80**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**3.0**	**J**	**3.9**	**0.52**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.9	0.58	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.9	0.51	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.9	0.60	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**3.1**	**J**	**3.9**	**1.9**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	206	25-150
13C2_6:2FTS	N	154	25-150
13C2_8:2FTS		103	25-150
13C2_PFDoA		96	25-150
13C2_PFTeDA		108	25-150
13C3_PFBS		105	25-150
13C3_PFHxS		94	25-150
13C3-HFPO-DA		102	25-150
13C4_PFBA		82	25-150
13C4_PFHpA		97	25-150
13C5_PFHxA		111	25-150
13C5_PFPeA		105	25-150
13C6_PFDA		103	25-150
13C7_PFUdA		104	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI20016-005**

Description: **MWM30-02_GW-091923** Matrix: **Aqueous**

Date Sampled: **09/19/2023 1120** Project Name: **RACER PNC**

Date Received: **09/20/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		109	25-150
13C8_PFOS		106	25-150
13C8_PFOSA		97	10-150
13C9_PFNA		112	25-150
d5-EtFOSAA		102	25-150
d3-MeFOSAA		101	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI20016-006**

Description: **TW-10-01_GW-091823** Matrix: **Aqueous**

Date Sampled: **09/18/2023 1515** Project Name: **RACER PNC**

Date Received: **09/20/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/29/2023 1842	ARC2	09/21/2023 1924	85448

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.7	0.46	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.7	0.64	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.7	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**24**	**Q**	**7.7**	**1.9**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.7	0.84	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.7	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.7	0.46	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.7	0.72	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.7	0.89	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**43**		**3.8**	**0.40**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.8	0.75	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**3.1**	**J**	**3.8**	**0.48**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.8	0.68	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.8	0.59	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**13**		**3.8**	**0.57**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**47**		**3.8**	**0.53**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND	Q	3.8	0.58	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.8	0.45	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**7.0**		**3.8**	**0.43**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**45**		**3.8**	**0.66**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.8	0.44	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**15**		**3.8**	**0.80**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.8	0.52	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.8	0.58	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.8	0.51	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.8	0.60	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**81**		**3.8**	**1.9**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	219	25-150
13C2_6:2FTS	N	223	25-150
13C2_8:2FTS		107	25-150
13C2_PFDoA		70	25-150
13C2_PFTeDA		60	25-150
13C3_PFBS		74	25-150
13C3_PFHxS		79	25-150
13C3-HFPO-DA		54	25-150
13C4_PFBA	N	16	25-150
13C4_PFHpA		56	25-150
13C5_PFHxA		44	25-150
13C5_PFPeA		32	25-150
13C6_PFDA		92	25-150
13C7_PFUdA		79	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI20016-006**

Description: **TW-10-01_GW-091823** Matrix: **Aqueous**

Date Sampled: **09/18/2023 1515** Project Name: **RACER PNC**

Date Received: **09/20/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		83	25-150
13C8_PFOS		84	25-150
13C8_PFOSA		88	10-150
13C9_PFNA		93	25-150
d5-EtFOSAA		80	25-150
d3-MeFOSAA		86	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
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L = LCS/LCSD failure
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QC Summary

PFAS by LC/MS/MS - MB

Sample ID: YQ85388-001
Batch: 85388
Analytical Method: PFAS by ID SOP
Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/21/2023 1602

Parameter	Result	Q	Dil	LOQ	DL	Units	Analysis Date
9Cl-PF3ONS	ND		1	8.0	0.48	ng/L	09/22/2023 1546
11Cl-PF3OUdS	ND		1	8.0	0.66	ng/L	09/22/2023 1546
8:2 FTS	ND		1	8.0	1.6	ng/L	09/22/2023 1546
6:2 FTS	ND		1	8.0	2.0	ng/L	09/22/2023 1546
4:2 FTS	ND		1	8.0	0.87	ng/L	09/22/2023 1546
GenX	ND		1	8.0	2.1	ng/L	09/22/2023 1546
ADONA	ND		1	8.0	0.48	ng/L	09/22/2023 1546
EtFOSAA	ND		1	8.0	0.75	ng/L	09/22/2023 1546
MeFOSAA	ND		1	8.0	0.93	ng/L	09/22/2023 1546
PFBS	ND		1	4.0	0.41	ng/L	09/22/2023 1546
PFDS	ND		1	4.0	0.78	ng/L	09/22/2023 1546
PFHpS	ND		1	4.0	0.50	ng/L	09/22/2023 1546
PFNS	ND		1	4.0	0.71	ng/L	09/22/2023 1546
PFOSA	ND		1	4.0	0.61	ng/L	09/22/2023 1546
PFPeS	ND		1	4.0	0.59	ng/L	09/22/2023 1546
PFHxS	ND		1	4.0	0.55	ng/L	09/22/2023 1546
PFBA	ND		1	4.0	0.60	ng/L	09/22/2023 1546
PFDA	ND		1	4.0	0.52	ng/L	09/22/2023 1546
PFDoA	ND		1	4.0	0.47	ng/L	09/22/2023 1546
PFHpA	ND		1	4.0	0.45	ng/L	09/22/2023 1546
PFHxA	ND		1	4.0	0.69	ng/L	09/22/2023 1546
PFNA	ND		1	4.0	0.46	ng/L	09/22/2023 1546
PFOA	ND		1	4.0	0.83	ng/L	09/22/2023 1546
PFPeA	ND		1	4.0	0.54	ng/L	09/22/2023 1546
PFTeDA	ND		1	4.0	0.60	ng/L	09/22/2023 1546
PFTrDA	ND		1	4.0	0.53	ng/L	09/22/2023 1546
PFUdA	ND		1	4.0	0.63	ng/L	09/22/2023 1546
PFOS	ND		1	4.0	2.0	ng/L	09/22/2023 1546

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		100	25-150
13C2_6:2FTS		108	25-150
13C2_8:2FTS		93	25-150
13C2_PFDoA		90	25-150
13C2_PFTeDA		98	25-150
13C3_PFBS		92	25-150
13C3_PFHxS		83	25-150
13C3-HFPO-DA		90	25-150
13C4_PFBA		94	25-150
13C4_PFHpA		86	25-150
13C5_PFHxA		89	25-150
13C5_PFPeA		89	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: YQ85388-001
Batch: 85388
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/21/2023 1602

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		91	25-150
13C7_PFUdA		86	25-150
13C8_PFOA		88	25-150
13C8_PFOS		84	25-150
13C8_PFOSA		86	10-150
13C9_PFNA		94	25-150
d5-EtFOSAA		94	25-150
d3-MeFOSAA		87	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ85388-002
Batch: 85388
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/21/2023 1602

Parameter	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	%Rec Limit	Analysis Date
9Cl-PF3ONS	15	16		1	106	50-150	09/22/2023 1556
11Cl-PF3OUdS	15	15		1	102	50-150	09/22/2023 1556
8:2 FTS	15	16		1	105	50-150	09/22/2023 1556
6:2 FTS	15	16		1	103	50-150	09/22/2023 1556
4:2 FTS	15	16		1	107	50-150	09/22/2023 1556
GenX	32	32		1	101	50-150	09/22/2023 1556
ADONA	15	18		1	118	50-150	09/22/2023 1556
EtFOSAA	16	17		1	105	50-150	09/22/2023 1556
MeFOSAA	16	16		1	101	50-150	09/22/2023 1556
PFBS	14	15		1	108	50-150	09/22/2023 1556
PFDS	15	16		1	101	50-150	09/22/2023 1556
PFHpS	15	17		1	109	50-150	09/22/2023 1556
PFNS	15	16		1	107	50-150	09/22/2023 1556
PFOSA	16	14		1	89	50-150	09/22/2023 1556
PFPeS	15	16		1	108	50-150	09/22/2023 1556
PFHxS	15	16		1	112	50-150	09/22/2023 1556
PFBA	16	16		1	100	50-150	09/22/2023 1556
PFDA	16	17		1	107	50-150	09/22/2023 1556
PFDoA	16	16		1	100	50-150	09/22/2023 1556
PFHpA	16	17		1	108	50-150	09/22/2023 1556
PFHxA	16	17		1	108	50-150	09/22/2023 1556
PFNA	16	19		1	118	50-150	09/22/2023 1556
PFOA	16	20		1	123	50-150	09/22/2023 1556
PFPeA	16	16		1	102	50-150	09/22/2023 1556
PFTeDA	16	17		1	108	50-150	09/22/2023 1556
PFTrDA	16	18		1	113	50-150	09/22/2023 1556
PFUdA	16	18		1	113	50-150	09/22/2023 1556
PFOS	15	16		1	109	50-150	09/22/2023 1556

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		101	25-150
13C2_6:2FTS		102	25-150
13C2_8:2FTS		86	25-150
13C2_PFDoA		81	25-150
13C2_PFTeDA		92	25-150
13C3_PFBS		99	25-150
13C3_PFHxS		89	25-150
13C3-HFPO-DA		95	25-150
13C4_PFBA		93	25-150
13C4_PFHpA		85	25-150
13C5_PFHxA		95	25-150
13C5_PFPeA		99	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ85388-002
Batch: 85388
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/21/2023 1602

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		89	25-150
13C7_PFUdA		82	25-150
13C8_PFOA		92	25-150
13C8_PFOS		81	25-150
13C8_PFOSA		86	10-150
13C9_PFNA		83	25-150
d5-EtFOSAA		86	25-150
d3-MeFOSAA		81	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MS

Sample ID: YI20016-002MS
Batch: 85388
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/21/2023 1602

Parameter	Sample Amount (ng/L)	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	%Rec Limit	Analysis Date
9Cl-PF3ONS	ND	150	150		1	99	50-150	09/22/2023 2021
11Cl-PF3OUdS	ND	150	160		1	103	50-150	09/22/2023 2021
8:2 FTS	ND	150	160		1	106	50-150	09/22/2023 2021
6:2 FTS	28	150	180		1	101	50-150	09/22/2023 2021
4:2 FTS	ND	150	170		1	111	50-150	09/22/2023 2021
GenX	ND	320	390		1	121	50-150	09/22/2023 2021
ADONA	ND	150	140		1	93	50-150	09/22/2023 2021
EtFOSAA	ND	160	170		1	109	50-150	09/22/2023 2021
MeFOSAA	ND	160	170		1	106	50-150	09/22/2023 2021
PFBS	ND	140	150		1	105	50-150	09/22/2023 2021
PFDS	ND	150	170		1	110	50-150	09/22/2023 2021
PFHpS	ND	150	170		1	109	50-150	09/22/2023 2021
PFNS	ND	150	150		1	101	50-150	09/22/2023 2021
PFOSA	ND	160	170		1	109	50-150	09/22/2023 2021
PFPeS	ND	150	150		1	100	50-150	09/22/2023 2021
PFHxS	25	150	180		1	107	50-150	09/22/2023 2021
PFBA	ND	160	150		1	97	50-150	09/22/2023 2021
PFDA	ND	160	180		1	115	50-150	09/22/2023 2021
PFDoA	ND	160	150		1	97	50-150	09/22/2023 2021
PFHpA	8.6	160	170		1	103	50-150	09/22/2023 2021
PFHxA	12	160	170		1	98	50-150	09/22/2023 2021
PFNA	ND	160	170		1	106	50-150	09/22/2023 2021
PFOA	21	160	190		1	105	50-150	09/22/2023 2021
PFPeA	ND	160	180		1	115	50-150	09/22/2023 2021
PFTeDA	ND	160	160		1	102	50-150	09/22/2023 2021
PFTrDA	ND	160	170		1	104	50-150	09/22/2023 2021
PFUdA	ND	160	200		1	128	50-150	09/22/2023 2021
PFOS	65	150	220		1	102	50-150	09/22/2023 2021

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS	N	326	25-150
13C2_6:2FTS	N	262	25-150
13C2_8:2FTS	N	173	25-150
13C2_PFDoA		92	25-150
13C2_PFTeDA		91	25-150
13C3_PFBS		97	25-150
13C3_PFHxS		86	25-150
13C3-HFPO-DA		67	25-150
13C4_PFBA		76	25-150
13C4_PFHpA		73	25-150
13C5_PFHxA		92	25-150
13C5_PFPeA		85	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MS

Sample ID: YI20016-002MS
Batch: 85388
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/21/2023 1602

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		95	25-150
13C7_PFUdA		99	25-150
13C8_PFOA		93	25-150
13C8_PFOS		87	25-150
13C8_PFOSA		88	10-150
13C9_PFNA		94	25-150
d5-EtFOSAA		108	25-150
d3-MeFOSAA		105	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MSD

Sample ID: YI20016-002MD
Batch: 85388
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/21/2023 1602

Parameter	Sample Amount (ng/L)	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	% RPD	%Rec Limit	% RPD Limit	Analysis Date
9Cl-PF3ONS	ND	150	160		1	109	10	50-150	30	09/22/2023 2032
11Cl-PF3OUdS	ND	150	160		1	106	2.9	50-150	30	09/22/2023 2032
8:2 FTS	ND	150	160		1	105	1.1	50-150	30	09/22/2023 2032
6:2 FTS	28	150	190		1	108	6.3	50-150	30	09/22/2023 2032
4:2 FTS	ND	150	140		1	97	14	50-150	30	09/22/2023 2032
GenX	ND	320	420		1	132	8.8	50-150	30	09/22/2023 2032
ADONA	ND	150	150		1	95	2.0	50-150	30	09/22/2023 2032
EtFOSAA	ND	160	170		1	104	4.3	50-150	30	09/22/2023 2032
MeFOSAA	ND	160	170		1	105	0.77	50-150	30	09/22/2023 2032
PFBS	ND	140	140		1	98	6.4	50-150	30	09/22/2023 2032
PFDS	ND	150	190		1	125	13	50-150	30	09/22/2023 2032
PFHpS	ND	150	150		1	97	11	50-150	30	09/22/2023 2032
PFNS	ND	150	180		1	116	14	50-150	30	09/22/2023 2032
PFOSA	ND	160	170		1	106	3.4	50-150	30	09/22/2023 2032
PFPeS	ND	150	160		1	105	4.7	50-150	30	09/22/2023 2032
PFHxS	25	150	160		1	94	11	50-150	30	09/22/2023 2032
PFBA	ND	160	150		1	95	1.7	50-150	30	09/22/2023 2032
PFDA	ND	160	170		1	109	5.3	50-150	30	09/22/2023 2032
PFDoA	ND	160	160		1	99	2.6	50-150	30	09/22/2023 2032
PFHpA	8.6	160	180		1	108	4.4	50-150	30	09/22/2023 2032
PFHxA	12	160	170		1	100	1.7	50-150	30	09/22/2023 2032
PFNA	ND	160	180		1	109	2.6	50-150	30	09/22/2023 2032
PFOA	21	160	180		1	100	4.4	50-150	30	09/22/2023 2032
PFPeA	ND	160	180		1	112	2.1	50-150	30	09/22/2023 2032
PFTeDA	ND	160	160		1	102	0.58	50-150	30	09/22/2023 2032
PFTrDA	ND	160	160		1	99	4.5	50-150	30	09/22/2023 2032
PFUdA	ND	160	170		1	105	20	50-150	30	09/22/2023 2032
PFOS	65	150	230		1	114	7.8	50-150	30	09/22/2023 2032

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS	N	342	25-150
13C2_6:2FTS	N	261	25-150
13C2_8:2FTS	N	153	25-150
13C2_PFDoA		83	25-150
13C2_PFTeDA		88	25-150
13C3_PFBS		93	25-150
13C3_PFHxS		84	25-150
13C3-HFPO-DA		61	25-150
13C4_PFBA		73	25-150
13C4_PFHpA		71	25-150
13C5_PFHxA		87	25-150
13C5_PFPeA		84	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MSD

Sample ID: YI20016-002MD
Batch: 85388
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/21/2023 1602

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		100	25-150
13C7_PFUdA		98	25-150
13C8_PFOA		88	25-150
13C8_PFOS		75	25-150
13C8_PFOSA		84	10-150
13C9_PFNA		86	25-150
d5-EtFOSAA		101	25-150
d3-MeFOSAA		98	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: YQ85448-001
Batch: 85448
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/21/2023 1924

Parameter	Result	Q	Dil	LOQ	DL	Units	Analysis Date
9Cl-PF3ONS	ND		1	8.0	0.48	ng/L	09/29/2023 1635
11Cl-PF3OUdS	ND		1	8.0	0.66	ng/L	09/29/2023 1635
8:2 FTS	ND		1	8.0	1.6	ng/L	09/29/2023 1635
6:2 FTS	ND		1	8.0	2.0	ng/L	09/29/2023 1635
4:2 FTS	ND		1	8.0	0.87	ng/L	09/29/2023 1635
GenX	ND		1	8.0	2.1	ng/L	09/29/2023 1635
ADONA	ND		1	8.0	0.48	ng/L	09/29/2023 1635
EtFOSAA	ND		1	8.0	0.75	ng/L	09/29/2023 1635
MeFOSAA	ND		1	8.0	0.93	ng/L	09/29/2023 1635
PFBS	ND		1	4.0	0.41	ng/L	09/29/2023 1635
PFDS	ND		1	4.0	0.78	ng/L	09/29/2023 1635
PFHpS	ND		1	4.0	0.50	ng/L	09/29/2023 1635
PFNS	ND		1	4.0	0.71	ng/L	09/29/2023 1635
PFOSA	ND		1	4.0	0.61	ng/L	09/29/2023 1635
PFPeS	ND		1	4.0	0.59	ng/L	09/29/2023 1635
PFHxS	ND		1	4.0	0.55	ng/L	09/29/2023 1635
PFBA	ND		1	4.0	0.60	ng/L	09/29/2023 1635
PFDA	ND		1	4.0	0.52	ng/L	09/29/2023 1635
PFDoA	ND		1	4.0	0.47	ng/L	09/29/2023 1635
PFHpA	ND		1	4.0	0.45	ng/L	09/29/2023 1635
PFHxA	ND		1	4.0	0.69	ng/L	09/29/2023 1635
PFNA	ND		1	4.0	0.46	ng/L	09/29/2023 1635
PFOA	ND		1	4.0	0.83	ng/L	09/29/2023 1635
PFPeA	ND		1	4.0	0.54	ng/L	09/29/2023 1635
PFTeDA	ND		1	4.0	0.60	ng/L	09/29/2023 1635
PFTrDA	ND		1	4.0	0.53	ng/L	09/29/2023 1635
PFUdA	ND		1	4.0	0.63	ng/L	09/29/2023 1635
PFOS	ND		1	4.0	2.0	ng/L	09/29/2023 1635

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		98	25-150
13C2_6:2FTS		87	25-150
13C2_8:2FTS		86	25-150
13C2_PFDoA		84	25-150
13C2_PFTeDA		90	25-150
13C3_PFBS		94	25-150
13C3_PFHxS		89	25-150
13C3-HFPO-DA		91	25-150
13C4_PFBA		92	25-150
13C4_PFHpA		89	25-150
13C5_PFHxA		97	25-150
13C5_PFPeA		92	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: YQ85448-001
Batch: 85448
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/21/2023 1924

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		98	25-150
13C7_PFUdA		95	25-150
13C8_PFOA		91	25-150
13C8_PFOS		94	25-150
13C8_PFOSA		87	10-150
13C9_PFNA		100	25-150
d5-EtFOSAA		90	25-150
d3-MeFOSAA		96	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ85448-002
Batch: 85448
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/21/2023 1924

Parameter	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	%Rec Limit	Analysis Date
9Cl-PF3ONS	15	15		1	100	50-150	09/29/2023 1646
11Cl-PF3OUdS	15	14		1	92	50-150	09/29/2023 1646
8:2 FTS	15	14		1	94	50-150	09/29/2023 1646
6:2 FTS	15	18		1	118	50-150	09/29/2023 1646
4:2 FTS	15	14		1	96	50-150	09/29/2023 1646
GenX	32	34		1	106	50-150	09/29/2023 1646
ADONA	15	16		1	109	50-150	09/29/2023 1646
EtFOSAA	16	16		1	102	50-150	09/29/2023 1646
MeFOSAA	16	18		1	114	50-150	09/29/2023 1646
PFBS	14	14		1	97	50-150	09/29/2023 1646
PFDS	15	15		1	98	50-150	09/29/2023 1646
PFHpS	15	17		1	114	50-150	09/29/2023 1646
PFNS	15	14		1	91	50-150	09/29/2023 1646
PFOSA	16	15		1	91	50-150	09/29/2023 1646
PFPeS	15	15		1	99	50-150	09/29/2023 1646
PFHxS	15	17		1	114	50-150	09/29/2023 1646
PFBA	16	15		1	94	50-150	09/29/2023 1646
PFDA	16	17		1	106	50-150	09/29/2023 1646
PFDoA	16	16		1	98	50-150	09/29/2023 1646
PFHpA	16	14		1	86	50-150	09/29/2023 1646
PFHxA	16	15		1	94	50-150	09/29/2023 1646
PFNA	16	15		1	92	50-150	09/29/2023 1646
PFOA	16	17		1	104	50-150	09/29/2023 1646
PFPeA	16	16		1	101	50-150	09/29/2023 1646
PFTeDA	16	16		1	100	50-150	09/29/2023 1646
PFTrDA	16	15		1	94	50-150	09/29/2023 1646
PFUdA	16	15		1	94	50-150	09/29/2023 1646
PFOS	15	15		1	103	50-150	09/29/2023 1646

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		101	25-150
13C2_6:2FTS		98	25-150
13C2_8:2FTS		89	25-150
13C2_PFDoA		93	25-150
13C2_PFTeDA		95	25-150
13C3_PFBS		101	25-150
13C3_PFHxS		89	25-150
13C3-HFPO-DA		101	25-150
13C4_PFBA		98	25-150
13C4_PFHpA		99	25-150
13C5_PFHxA		101	25-150
13C5_PFPeA		97	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ85448-002
Batch: 85448
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/21/2023 1924

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		98	25-150
13C7_PFUdA		102	25-150
13C8_PFOA		98	25-150
13C8_PFOS		97	25-150
13C8_PFOSA		95	10-150
13C9_PFNA		110	25-150
d5-EtFOSAA		95	25-150
d3-MeFOSAA		94	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MS

Sample ID: YI20016-005MS
Batch: 85448
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/21/2023 1924

Parameter	Sample Amount (ng/L)	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	%Rec Limit	Analysis Date
9Cl-PF3ONS	ND	15	15		1	100	50-150	09/29/2023 1832
11Cl-PF3OUdS	ND	16	14		1	92	50-150	09/29/2023 1832
8:2 FTS	ND	16	15		1	94	50-150	09/29/2023 1832
6:2 FTS	ND	16	17		1	106	50-150	09/29/2023 1832
4:2 FTS	ND	15	16		1	102	50-150	09/29/2023 1832
GenX	ND	33	36		1	110	50-150	09/29/2023 1832
ADONA	ND	16	16		1	104	50-150	09/29/2023 1832
EtFOSAA	ND	17	16		1	98	50-150	09/29/2023 1832
MeFOSAA	ND	17	15		1	93	50-150	09/29/2023 1832
PFBS	2.9	15	18		1	107	50-150	09/29/2023 1832
PFDS	ND	16	15		1	97	50-150	09/29/2023 1832
PFHpS	ND	16	16		1	101	50-150	09/29/2023 1832
PFNS	ND	16	15		1	95	50-150	09/29/2023 1832
PFOSA	ND	17	16		1	95	50-150	09/29/2023 1832
PFPeS	ND	15	16		1	103	50-150	09/29/2023 1832
PFHxS	3.3	15	19		1	105	50-150	09/29/2023 1832
PFBA	6.5	17	23		1	100	50-150	09/29/2023 1832
PFDA	ND	17	16		1	99	50-150	09/29/2023 1832
PFDoA	ND	17	17		1	101	50-150	09/29/2023 1832
PFHpA	3.3	17	21		1	105	50-150	09/29/2023 1832
PFHxA	3.4	17	21		1	110	50-150	09/29/2023 1832
PFNA	ND	17	17		1	103	50-150	09/29/2023 1832
PFOA	6.7	17	21		1	86	50-150	09/29/2023 1832
PFPeA	3.0	17	19		1	97	50-150	09/29/2023 1832
PFTeDA	ND	17	16		1	96	50-150	09/29/2023 1832
PFTrDA	ND	17	16		1	99	50-150	09/29/2023 1832
PFUdA	ND	17	16		1	97	50-150	09/29/2023 1832
PFOS	3.1	15	19		1	103	50-150	09/29/2023 1832

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS	N	158	25-150
13C2_6:2FTS		124	25-150
13C2_8:2FTS		94	25-150
13C2_PFDoA		81	25-150
13C2_PFTeDA		87	25-150
13C3_PFBS		84	25-150
13C3_PFHxS		85	25-150
13C3-HFPO-DA		83	25-150
13C4_PFBA		74	25-150
13C4_PFHpA		80	25-150
13C5_PFHxA		94	25-150
13C5_PFPeA		93	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MS

Sample ID: YI20016-005MS
Batch: 85448
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/21/2023 1924

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		93	25-150
13C7_PFUdA		84	25-150
13C8_PFOA		98	25-150
13C8_PFOS		88	25-150
13C8_PFOSA		92	10-150
13C9_PFNA		96	25-150
d5-EtFOSAA		88	25-150
d3-MeFOSAA		93	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - Duplicate

Sample ID: YI20016-006DU
Batch: 85448
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/21/2023 1924

Parameter	Sample Amount (ng/L)	Result (ng/L)	Q	Dil	% RPD	%RPD Limit	Analysis Date
9Cl-PF3ONS	ND	ND		1	0.00	20	09/29/2023 1853
11Cl-PF3OUdS	ND	ND		1	0.00	20	09/29/2023 1853
8:2 FTS	ND	ND		1	0.00	20	09/29/2023 1853
6:2 FTS	24	2.1	J,+	1	170	20	09/29/2023 1853
4:2 FTS	ND	ND		1	0.00	20	09/29/2023 1853
GenX	ND	ND		1	0.00	20	09/29/2023 1853
ADONA	ND	ND		1	0.00	20	09/29/2023 1853
EtFOSAA	ND	ND		1	0.00	20	09/29/2023 1853
MeFOSAA	ND	ND		1	0.00	20	09/29/2023 1853
PFBS	43	ND		1	0.00	20	09/29/2023 1853
PFDS	ND	ND		1	0.00	20	09/29/2023 1853
PFHpS	3.1	ND		1	0.00	20	09/29/2023 1853
PFNS	ND	ND		1	0.00	20	09/29/2023 1853
PFOSA	ND	ND		1	0.00	20	09/29/2023 1853
PFPeS	13	1.8	J,+	1	150	20	09/29/2023 1853
PFHxS	47	7.1	+	1	150	20	09/29/2023 1853
PFBA	ND	ND		1	0.00	20	09/29/2023 1853
PFDA	ND	ND		1	0.00	20	09/29/2023 1853
PFDoA	ND	ND		1	0.00	20	09/29/2023 1853
PFHpA	7.0	ND		1	0.00	20	09/29/2023 1853
PFHxA	45	17	+	1	91	20	09/29/2023 1853
PFNA	ND	ND		1	0.00	20	09/29/2023 1853
PFOA	15	3.5	J,+	1	120	20	09/29/2023 1853
PFPeA	ND	ND		1	0.00	20	09/29/2023 1853
PFTeDA	ND	ND		1	0.00	20	09/29/2023 1853
PFTrDA	ND	ND		1	0.00	20	09/29/2023 1853
PFUdA	ND	ND		1	0.00	20	09/29/2023 1853
PFOS	81	9.7	+	1	160	20	09/29/2023 1853

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS	N	196	25-150
13C2_6:2FTS	N	263	25-150
13C2_8:2FTS		104	25-150
13C2_PFDoA		73	25-150
13C2_PFTeDA		62	25-150
13C3_PFBS		80	25-150
13C3_PFHxS		85	25-150
13C3-HFPO-DA		55	25-150
13C4_PFBA	N	16	25-150
13C4_PFHpA		60	25-150
13C5_PFHxA		46	25-150
13C5_PFPeA		32	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

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PFAS by LC/MS/MS - Duplicate

Sample ID: YI20016-006DU
Batch: 85448
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 09/21/2023 1924

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		100	25-150
13C7_PFUdA		82	25-150
13C8_PFOA		85	25-150
13C8_PFOS		86	25-150
13C8_PFOSA		80	10-150
13C9_PFNA		92	25-150
d5-EtFOSAA		83	25-150
d3-MeFOSAA		86	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Chain of Custody
and
Miscellaneous Documents

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Telephone No. 803-791-9700 Fax No. 803-791-9111
www.pacelabs.com

Number 150049

Client: Arcadis	Report to Contact: Alexis Crisp, Tiffany Linder	Telephone No. / E-mail: Alexis.Crisp@arcadis.com, Tiffany.linder@arcadis.com	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: x Jammer Guy	Analysis (Attach list if more space is needed): Report EGLE 28 compounds	Page 1 of 3
City: Novi; State: MI; Zip Code: 48377	Printed Name: Jammer Guy		YI20016 KB52
Project Name: Racer PNC			
Project No.: 30167840.00031	P.O. No.		

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Grab / Composite	Matrix: Aqueous	Matrix: Solid	Matrix: Non-aqueous	No of Containers by Preservative Type: Unpres.	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Method 537 mod, with 150 ppb dilution per QSM 5.1	Remarks / Cooler I.D.
tripblank	9/18/23	1500	G	X			1						X		tripblank
MWM16-52_GW-091923	9/19/23	1115	G	X			6						X		Run MS/MSD
MWWI-02_GW-091923	9/19/23	1322	G	X			2						X		
EB-06_091923	9/19/23	1330	G	X			1						X		equipment blank

Turn Around Time Required (Prior lab approval required for expedited TAT.): ☒ Standard ☐ Rush (Specify)	Sample Disposal: ☐ Return to Client ☒ Disposal by Lab	Possible Hazard Identification: ☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown	QC Requirements (Specify)			
1. Relinquished by: Jammer Guy	Date: 9/19/23	Time: 1630	1. Received by: FedEx	Date: 9/19/23	Time: 1630	
2. Relinquished by	Date	Time	2. Received by	Date	Time	
3. Relinquished by	Date	Time	3. Received by	Date	Time	
4. Relinquished by: fedex	Date: 9.20.23	Time: 1010	4. Laboratory received by: Keegan Williams	Date: 9.20.23	Time: 1010	

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY — Received on ice (Circle): (Yes) No Ice Pack: Receipt Temp: 3.6 °C Temp Blank: ☐ Y ☒ N

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Number 150049

Client: ARCADIS	Report to Contact: Lexi Crisp	Telephone No. / E-mail: tiffany.linder@arcadis.com alexis.crisp@arcadis.com	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: X Lottie Jay	Analysis (Attach list if more space is needed): Report EGLE 28 Compounds	Page 2 of 3
City: NOVI	State: MI	Zip Code: 48377	Printed Name: Lottie Jay
Project Name: Racer PNC			
Project No.: ~~Racer PNC-LT~~ 30167840.00031	P.O. No.		

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Grab/Composite	Matrix: Aqueous	Matrix: Solid	Matrix: Non-Aqueous	No of Containers by Preservative Type: Unpres.	HCSO4	HNO3	HCl	NaOH	Soda Ash	Other Preserved	Method 624 + MS/MSD with Isotope dilution per USEPA SOW	Remarks / Cooler I.D.
MWM30-02-GW-091923	9/19/23	1120	G	X			2							X	

YI20016

KR32

Turn Around Time Required (Prior lab approval required for expedited TAT.)	Sample Disposal	Possible Hazard Identification	QC Requirements (Specify)
☒ Standard ☐ Rush (Specify)	☐ Return to Client ☒ Disposal by Lab	☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown	

	Date	Time		Date	Time
1. Relinquished by: Lottie Jay / ARCADIS	9/19/23	1500	1. Received by: Jennifer Kay	9/19/23	1500
2. Relinquished by: Jennifer Kay	9/19/23	1630	2. Received by: Fed Ex	9/19/23	1630
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by	9.20.2023	1010	4. Laboratory received by: Kelizeth Guerrero	9.20.23	10:10

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY
Received on Ice (Circle) (Yes) No Ice Pack | Receipt Temp. 3.1 °C | Temp Blank ☐ Y ☒N

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Number 150049

Client: Aradis	Report to Contact: Alexis Crisp	Telephone No. / E-mail: alexis.crisp@aradis.com; tiffany.binder@aradis.com	Quote No.
Address: 28550 Cabot Dr Suite #500	Sampler's Signature: X	Analysis (Attach list if more space is needed)	Page 3 of 3
City: Novi; State: MI; Zip Code: 48377	Printed Name: Samantha Szpaichler		
Project Name: Ruler PJC			
Project No.: 30167840.00031	P.O. No.: 30167840.00031		

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Sample Condition	Matrix: Aqueous	Matrix: Solid	Matrix: Non-aqueous	No of Containers by Preservation Type: Unpres.	HNO3	H2SO4	HCl	NaOH	Na2S2O3	Field Filtered	PFAS Method 537.1 / 533 Isotope Dilution Analysis List	Remarks / Cooler I.D.
IW-10-01_GW-091823	9/18/23	1515	G	X			2						N	X	

Turn Around Time Required (Prior lab approval required for expedited TAT.)
☑ Standard ☐ Rush (Specify)

Sample Disposal
☐ Return to Client ☑ Disposal by Lab

Possible Hazard Identification
☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: Samantha Szpaichler / Aradis	9/19/23	1520	1. Received by:	9/19/23	1520
2. Relinquished by:	9/19/23	1630	2. Received by: FedEx	9/19/23	1630
3. Relinquished by:	Date	Time	3. Received by:	Date	Time
4. Relinquished by: Fedex	9.20.23	1010	4. Laboratory received by:	9.20.23	1010

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY
Received on Ice (Circle) (Yes) No Ice Pack
Receipt Temp. 3.6 °C
Temp Blank ☐ Y ☑ N

YI20016

KES2

PACE ANALYTICAL SERVICES, LLC

DC#_Title: ENV-FRM-WCOL-0286 v02_Samples Receipt Checklist (SRC)
Effective Date: 8/2/2022

Sample Receipt Checklist (SRC)

Client: ARCADIS Cooler Inspected by/date: KDRW / 09/20/2023 Lot #: YI20016

Means of receipt: ☐ Pace ☐ Client ☐ UPS ☑ FedEx ☐ Other:

☐ Yes	☑ No		1. Were custody seals present on the cooler?
☐ Yes	☐ No	☑ NA	2. If custody seals were present, were they intact and unbroken?

pH Strip ID: NA Chlorine Strip ID: NA Tested by: NA

Original temperature upon receipt / Derived (Corrected) temperature upon receipt %Solid Snap-Cup ID: NA

3.6 / 3.6 °C NA / NA °C NA / NA °C NA / NA °C

Method: ☐ Temperature Blank ☑ Against Bottles IR Gun ID: 8 IR Gun Correction Factor: 0 °C

Method of coolant: ☑ Wet Ice ☐ Ice Packs ☐ Dry Ice ☐ None

☑ Yes	☐ No	☐ NA	3. Were all coolers received at or below 6.0°C? If no, was Project Manager notified? PM was Notified by: phone / email / face-to-face (circle one).
☑ Yes	☐ No	☐ NA	4. Is the commercial courier's packing slip attached to this form?
☑ Yes	☐ No		5. Were proper custody procedures (relinquished/received) followed?
☑ Yes	☐ No		6. Were sample IDs listed on the COC and all sample containers?
☑ Yes	☐ No		7. Was collection date & time listed on the COC and all sample containers?
☑ Yes	☐ No		8. Did all container label information (ID, date, time) agree with the COC?
☑ Yes	☐ No		9. Were tests to be performed listed on the COC?
☑ Yes	☐ No		10. Did all samples arrive in the proper containers for each test and/or in good condition (unbroken, lids on, etc.)?
☑ Yes	☐ No		11. Was adequate sample volume available?
☑ Yes	☐ No		12. Were all samples received within ½ the holding time or 48 hours, whichever comes first?
☑ Yes	☐ No		13. Were all samples containers accounted for? (No missing/excess)
☐ Yes	☐ No	☑ NA	14. Were VOA, 8015C and RSK-175 samples free of bubbles >"pea-size" (¼" or 6mm in diameter) in any of the VOA vials?
☑ Yes	☐ No	☐ NA	15. Were all DRO/metals/nutrient samples received at a pH of < 2?
☐ Yes	☐ No	☑ NA	16. Were all cyanide samples received at a pH > 12 and sulfide samples received at a pH > 9?
☐ Yes	☐ No	☑ NA	17. Were all applicable NH_3/TKN/cyanide/phenol/625.1/608.3 (< 0.5mg/L) samples free of residual chlorine?
☐ Yes	☐ No	☑ NA	18. Was the quote number listed on the container label? If yes, Quote #

Sample Preservation (Must be completed for any sample(s) incorrectly preserved or with headspace)

Sample(s) NA were received incorrectly preserved and were adjusted accordingly in sample receiving with NA mL of circle one: H_2SO_4, HNO_3, HCl, NaOH using SR # NA. Time of preservation NA. If more than one preservative is needed, please note in the comments below.

Sample(s) NA were received with bubbles >6 mm in diameter.

Samples(s) NA were received with TRC > 0.5 mg/L (If #19 is *no*) and were adjusted accordingly in sample receiving with sodium thiosulfate ($Na_2S_2O_3$) with Unique ID: NA.

Comments:

Qualtrax ID: 56360

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Page 1 of 1

Report of Analysis

Arcadis U.S., Inc.
630 Plaza Drive
Suite 600
Highlands Ranch, CO 80129
Attention: Tiffany Linder

Project Name: RACER PNC

Project Number: 30167840.00031

Lot Number:**YI22028**

Date Completed:10/05/2023

Kathy Smith

10/05/2023 9:51 AM
Approved and released by:
Project Manager II: **Kathy E. Smith**

The electronic signature above is the equivalent of a handwritten signature.
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Tel: 803-791-9700 Fax: 803-791-9111 www.pacelabs.com

Case Narrative
Arcadis U.S., Inc.
Lot Number: YI22028

This Report of Analysis contains the analytical result(s) for the sample(s) listed on the Sample Summary following this Case Narrative. The sample receiving date is documented in the header information associated with each sample.

All results listed in this report relate only to the samples that are contained within this report.

Sample receipt, sample analysis, and data review have been performed in accordance with the Pace Quality Assurance Management Plan (QAMP), applicable Shealy standard operating procedures (SOPs), the 2003 NELAC standard, and Shealy policies. Additionally, the DoD QSM version 5.4 has been followed for these samples, and specifically Table B-15 was followed for all PFAS samples. Any exceptions to the QAMP, SOPs, NELAC standards, the DoD QSM, or policies are qualified on the results page or discussed below.

All QC associated with these samples were compliant with DOD QSM 5.4 table B-15 and our PFAS SOP.

Correction factors (CF) are used to calculate the original sample concentration. The CF is the inverse of the concentration factor (sample volume / extract final volume) times the dilution factor (DF). The CF is calculated as follows:

CF = DF * FV / Vo

FV is volume of extract (mL)
Vo is initial sample volume (mL)
DF is dilution factor. For undiluted analysis, DF = 1.

Sample concentration for aqueous samples:
Concentration (ng/L) = Cs*CF,

$$C_s = \frac{\left(\frac{(A_s x C_{is})}{A_{is}}\right) - B}{M1}$$

Where

C_s is on column concentration of target analyte in the sample (ng/L)
C_{is} is concentration of internal standard in the sample (ng/L)
A_s is peak response of target analyte in the sample
A_{is} is peak response of internal standard in the sample
M1 is the average RF from ICAL or the slope from linear regression ICAL
B is the y-intercept from the ICAL

Pace is a TNI accredited laboratory; however, the following analyses are currently not listed on our TNI scope of accreditation: Drinking Water: VOC (excluding BTEX, MTBE, Naphthalene, & 1,2-dichloroethane) EPA 524.2, E. coli and Total coliforms SM 9223 B-2004, Solid Chemical Material: TOC Walkley-Black, Biological Tissue: All, Non-Potable Water: SGT-HEM EPA 1664B, Silica EPA 200.7, Boron, Calcium, Silicon, Strontium EPA 200.8, Bicarbonate, Carbonate, and Hydroxide Alkalinity SM 2320 B-2011, SM 9221 C E-2006 & SM 9222D-2006, Strontium SW-846 6010D, VOC SM 6200 B-2011, Fecal Coliform Colilert-18, PFAS by Isotope Dilution SOP.

If you have any questions regarding this report, please contact the Pace Project Manager listed on the cover page.

PFAS
Samples YI22028-002, YI22028-004, YI22028-005 required centrifugation prior to extraction, due to excessive solids present in the samples. Centrifugation was performed following the PFAS Aqueous Centrifuge Protocol; samples were spiked with Surrogate (SUR; Extracted Internal Standard/EIS) and shaken vigorously before being poured into a conical bottle and centrifuged. The centrifuged aqueous sample was decanted back into the original sample bottle, off of the condensed solids remaining in the centrifuge bottle. Original sample bottle was rinsed as normal and centrifuge bottle was rinsed with 4mL of MeOH. Centrifuge bottle rinsate was added to the elution. Samples concentrated to <5mL and reconstituted to 5mL using MeOH by transfer pipet.

Surrogate recovery for the following sample was outside the upper control limit: YI22028-002. This sample did not contain any target analytes; therefore, re-extraction and/or re-analysis was not performed.

Surrogate recovery for the following samples was outside control limits: YI22028-004, YI22028-005. Evidence of matrix interference is present; therefore, re-extraction and/or re-analysis was not performed.

Sample Summary

Arcadis U.S., Inc.

Lot Number: YI22028

Project Name: RACER PNC

Project Number: 30167840.00031

Sample Number	Sample ID	Matrix	Date Sampled	Date Received
001	Trip Blank	Aqueous	09/21/2023 0845	09/22/2023
002	MWDP-2R_GW-092123	Aqueous	09/21/2023 0923	09/22/2023
003	EB-07_092123	Aqueous	09/21/2023 0930	09/22/2023
004	SUMP_GW-092123	Aqueous	09/21/2023 1010	09/22/2023
005	MW-03-17_GW-092123	Aqueous	09/21/2023 1310	09/22/2023

(5 samples)

Detection Summary

Arcadis U.S., Inc.

Lot Number: YI22028

Project Name: RACER PNC

Project Number: 30167840.00031

Sample	Sample ID	Matrix	Parameter	Method	Result	Q	Units	Page
002	MWDP-2R_GW-092123	Aqueous	PFBS	PFAS by ID	5.3		ng/L	8
002	MWDP-2R_GW-092123	Aqueous	PFPeS	PFAS by ID	0.84	J	ng/L	8
002	MWDP-2R_GW-092123	Aqueous	PFHxS	PFAS by ID	2.3	J	ng/L	8
002	MWDP-2R_GW-092123	Aqueous	PFBA	PFAS by ID	18		ng/L	8
002	MWDP-2R_GW-092123	Aqueous	PFHpA	PFAS by ID	1.1	J	ng/L	8
002	MWDP-2R_GW-092123	Aqueous	PFHxA	PFAS by ID	3.5		ng/L	8
002	MWDP-2R_GW-092123	Aqueous	PFOA	PFAS by ID	2.2	J	ng/L	8
002	MWDP-2R_GW-092123	Aqueous	PFPeA	PFAS by ID	3.5		ng/L	8
002	MWDP-2R_GW-092123	Aqueous	PFOS	PFAS by ID	4.2		ng/L	8
004	SUMP_GW-092123	Aqueous	PFHpS	PFAS by ID	2.1	J	ng/L	12
004	SUMP_GW-092123	Aqueous	PFHxS	PFAS by ID	11		ng/L	12
004	SUMP_GW-092123	Aqueous	PFHpA	PFAS by ID	4.4		ng/L	12
004	SUMP_GW-092123	Aqueous	PFHxA	PFAS by ID	7.4		ng/L	12
004	SUMP_GW-092123	Aqueous	PFNA	PFAS by ID	0.71	J	ng/L	12
004	SUMP_GW-092123	Aqueous	PFOA	PFAS by ID	12		ng/L	12
004	SUMP_GW-092123	Aqueous	PFOS	PFAS by ID	120		ng/L	12
005	MW-03-17_GW-092123	Aqueous	6:2 FTS	PFAS by ID	8.0	Q	ng/L	14
005	MW-03-17_GW-092123	Aqueous	PFBS	PFAS by ID	3.3	J	ng/L	14
005	MW-03-17_GW-092123	Aqueous	PFHpS	PFAS by ID	4.5		ng/L	14
005	MW-03-17_GW-092123	Aqueous	PFOSA	PFAS by ID	1.4	J	ng/L	14
005	MW-03-17_GW-092123	Aqueous	PFPeS	PFAS by ID	2.7	J	ng/L	14
005	MW-03-17_GW-092123	Aqueous	PFHxS	PFAS by ID	32		ng/L	14
005	MW-03-17_GW-092123	Aqueous	PFBA	PFAS by ID	15		ng/L	14
005	MW-03-17_GW-092123	Aqueous	PFHpA	PFAS by ID	8.6		ng/L	14
005	MW-03-17_GW-092123	Aqueous	PFHxA	PFAS by ID	14		ng/L	14
005	MW-03-17_GW-092123	Aqueous	PFNA	PFAS by ID	2.5	J	ng/L	14
005	MW-03-17_GW-092123	Aqueous	PFOA	PFAS by ID	20		ng/L	14
005	MW-03-17_GW-092123	Aqueous	PFPeA	PFAS by ID	15		ng/L	14
005	MW-03-17_GW-092123	Aqueous	PFOS	PFAS by ID	140		ng/L	14

(29 detections)

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI22028-001**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **09/21/2023 0845** Project Name: **RACER PNC**

Date Received: **09/22/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	10/03/2023 1815	ARC2	10/01/2023 2059	86250

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.3	0.44	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.3	0.61	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.3	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.3	0.80	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.3	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.3	0.44	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.3	0.69	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.3	0.85	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.7	0.38	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	0.71	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.7	0.46	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	0.65	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	0.56	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.7	0.54	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.7	0.50	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.7	0.55	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	0.48	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	0.43	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.7	0.41	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.7	0.63	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.7	0.42	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.7	0.76	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.7	0.50	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	0.55	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	0.48	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	0.57	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.7	1.8	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		91	25-150
13C2_6:2FTS		106	25-150
13C2_8:2FTS		76	25-150
13C2_PFDoA		91	25-150
13C2_PFTeDA		85	25-150
13C3_PFBS		90	25-150
13C3_PFHxS		95	25-150
13C3-HFPO-DA		92	25-150
13C4_PFBA		99	25-150
13C4_PFHpA		104	25-150
13C5_PFHxA		94	25-150
13C5_PFPeA		90	25-150
13C6_PFDA		92	25-150
13C7_PFUdA		85	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI22028-001**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **09/21/2023 0845** Project Name: **RACER PNC**

Date Received: **09/22/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		97	25-150
13C8_PFOS		85	25-150
13C8_PFOSA		80	10-150
13C9_PFNA		91	25-150
d5-EtFOSAA		92	25-150
d3-MeFOSAA		80	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI22028-002**

Description: **MWDP-2R_GW-092123** Matrix: **Aqueous**

Date Sampled: **09/21/2023 0923** Project Name: **RACER PNC**

Date Received: **09/22/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	10/03/2023 1826	ARC2	10/01/2023 2059	86250

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.0	0.42	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.0	0.58	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.0	1.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.0	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.0	0.77	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.0	0.42	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.0	0.66	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.0	0.82	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**5.3**		**3.5**	**0.36**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.68	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.5	0.44	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.62	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.54	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**0.84**	**J**	**3.5**	**0.52**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**2.3**	**J**	**3.5**	**0.48**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**18**		**3.5**	**0.53**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.46	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.41	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**1.1**	**J**	**3.5**	**0.39**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**3.5**		**3.5**	**0.60**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	0.41	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**2.2**	**J**	**3.5**	**0.73**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**3.5**		**3.5**	**0.48**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.53	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.46	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.55	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**4.2**		**3.5**	**1.8**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	292	25-150
13C2_6:2FTS	N	180	25-150
13C2_8:2FTS		103	25-150
13C2_PFDoA		86	25-150
13C2_PFTeDA		81	25-150
13C3_PFBS		88	25-150
13C3_PFHxS		94	25-150
13C3-HFPO-DA		69	25-150
13C4_PFBA		50	25-150
13C4_PFHpA		97	25-150
13C5_PFHxA		88	25-150
13C5_PFPeA		74	25-150
13C6_PFDA		98	25-150
13C7_PFUdA		87	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
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H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI22028-002**

Description: **MWDP-2R_GW-092123** Matrix: **Aqueous**

Date Sampled: **09/21/2023 0923** Project Name: **RACER PNC**

Date Received: **09/22/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		108	25-150
13C8_PFOS		96	25-150
13C8_PFOSA		90	10-150
13C9_PFNA		100	25-150
d5-EtFOSAA		88	25-150
d3-MeFOSAA		89	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI22028-003**

Description: **EB-07_092123** Matrix: **Aqueous**

Date Sampled: **09/21/2023 0930** Project Name: **RACER PNC**

Date Received: **09/22/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	10/03/2023 1836	ARC2	10/01/2023 2059	86250

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.3	0.44	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.3	0.60	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.3	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.3	0.80	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.3	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.3	0.44	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.3	0.68	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.3	0.85	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.6	0.38	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.71	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.6	0.45	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.65	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	0.56	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.6	0.54	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.6	0.50	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.6	0.55	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	0.48	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.43	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.6	0.41	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.6	0.63	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.6	0.42	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.6	0.76	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.6	0.50	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.55	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.48	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.57	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.6	1.8	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		94	25-150
13C2_6:2FTS		90	25-150
13C2_8:2FTS		84	25-150
13C2_PFDoA		95	25-150
13C2_PFTeDA		93	25-150
13C3_PFBS		96	25-150
13C3_PFHxS		99	25-150
13C3-HFPO-DA		100	25-150
13C4_PFBA		104	25-150
13C4_PFHpA		110	25-150
13C5_PFHxA		100	25-150
13C5_PFPeA		93	25-150
13C6_PFDA		97	25-150
13C7_PFUdA		88	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI22028-003**

Description: **EB-07_092123** Matrix: **Aqueous**

Date Sampled: **09/21/2023 0930** Project Name: **RACER PNC**

Date Received: **09/22/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		99	25-150
13C8_PFOS		99	25-150
13C8_PFOSA		88	10-150
13C9_PFNA		88	25-150
d5-EtFOSAA		94	25-150
d3-MeFOSAA		89	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI22028-004**

Description: **SUMP_GW-092123** Matrix: **Aqueous**

Date Sampled: **09/21/2023 1010** Project Name: **RACER PNC**

Date Received: **09/22/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	10/03/2023 1847	ARC2	10/01/2023 2059	86250

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.5	0.45	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.5	0.62	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.5	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.5	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.5	0.82	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.5	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.5	0.45	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.5	0.71	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.5	0.88	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.8	0.39	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.8	0.73	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**2.1**	**J**	**3.8**	**0.47**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.8	0.67	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.8	0.58	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.8	0.56	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**11**		**3.8**	**0.52**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND	Q	3.8	0.56	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.8	0.49	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.8	0.44	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**4.4**		**3.8**	**0.42**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**7.4**		**3.8**	**0.65**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**0.71**	**J**	**3.8**	**0.43**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**12**		**3.8**	**0.78**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.8	0.51	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.8	0.56	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.8	0.59	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**120**		**3.8**	**1.9**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	268	25-150
13C2_6:2FTS	N	286	25-150
13C2_8:2FTS	N	288	25-150
13C2_PFDoA		110	25-150
13C2_PFTeDA		85	25-150
13C3_PFBS		79	25-150
13C3_PFHxS		84	25-150
13C3-HFPO-DA		57	25-150
13C4_PFBA	N	20	25-150
13C4_PFHpA		62	25-150
13C5_PFHxA		57	25-150
13C5_PFPeA		39	25-150
13C6_PFDA		101	25-150
13C7_PFUdA		112	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
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S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI22028-004**

Description: **SUMP_GW-092123** Matrix: **Aqueous**

Date Sampled: **09/21/2023 1010** Project Name: **RACER PNC**

Date Received: **09/22/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		86	25-150
13C8_PFOS		82	25-150
13C8_PFOSA		78	10-150
13C9_PFNA		94	25-150
d5-EtFOSAA		142	25-150
d3-MeFOSAA		117	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI22028-005**

Description: **MW-03-17_GW-092123** Matrix: **Aqueous**

Date Sampled: **09/21/2023 1310** Project Name: **RACER PNC**

Date Received: **09/22/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	10/03/2023 1858	ARC2	10/01/2023 2059	86250

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.3	0.44	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.3	0.60	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.3	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**8.0**	**Q**	**7.3**	**1.8**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.3	0.79	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.3	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.3	0.44	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.3	0.68	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.3	0.85	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**3.3**	**J**	**3.6**	**0.38**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.71	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**4.5**		**3.6**	**0.45**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.65	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	**754-91-6**	**PFAS by ID SOP**	**1.4**	**J**	**3.6**	**0.56**	**ng/L**	**1**
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**2.7**	**J**	**3.6**	**0.54**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**32**		**3.6**	**0.50**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**15**		**3.6**	**0.54**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	0.48	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.43	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**8.6**		**3.6**	**0.41**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**14**		**3.6**	**0.62**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**2.5**	**J**	**3.6**	**0.42**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**20**		**3.6**	**0.75**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**15**		**3.6**	**0.49**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.54	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.48	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.57	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**140**		**3.6**	**1.8**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	267	25-150
13C2_6:2FTS	N	249	25-150
13C2_8:2FTS	N	184	25-150
13C2_PFDoA		95	25-150
13C2_PFTeDA		77	25-150
13C3_PFBS		79	25-150
13C3_PFHxS		96	25-150
13C3-HFPO-DA		60	25-150
13C4_PFBA		33	25-150
13C4_PFHpA		79	25-150
13C5_PFHxA		73	25-150
13C5_PFPeA		54	25-150
13C6_PFDA		103	25-150
13C7_PFUdA		109	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI22028-005**

Description: **MW-03-17_GW-092123** Matrix: **Aqueous**

Date Sampled: **09/21/2023 1310** Project Name: **RACER PNC**

Date Received: **09/22/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		98	25-150
13C8_PFOS		87	25-150
13C8_PFOSA		85	10-150
13C9_PFNA		108	25-150
d5-EtFOSAA		112	25-150
d3-MeFOSAA		119	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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QC Summary

PFAS by LC/MS/MS - MB

Sample ID: YQ86250-001
Batch: 86250
Analytical Method: PFAS by ID SOP
Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 10/01/2023 2059

Parameter	Result	Q	Dil	LOQ	DL	Units	Analysis Date
9Cl-PF3ONS	ND		1	8.0	0.48	ng/L	10/03/2023 1412
11Cl-PF3OUdS	ND		1	8.0	0.66	ng/L	10/03/2023 1412
8:2 FTS	ND		1	8.0	1.6	ng/L	10/03/2023 1412
6:2 FTS	ND		1	8.0	2.0	ng/L	10/03/2023 1412
4:2 FTS	ND		1	8.0	0.87	ng/L	10/03/2023 1412
GenX	ND		1	8.0	2.1	ng/L	10/03/2023 1412
ADONA	ND		1	8.0	0.48	ng/L	10/03/2023 1412
EtFOSAA	ND		1	8.0	0.75	ng/L	10/03/2023 1412
MeFOSAA	ND		1	8.0	0.93	ng/L	10/03/2023 1412
PFBS	ND		1	4.0	0.41	ng/L	10/03/2023 1412
PFDS	ND		1	4.0	0.78	ng/L	10/03/2023 1412
PFHpS	ND		1	4.0	0.50	ng/L	10/03/2023 1412
PFNS	ND		1	4.0	0.71	ng/L	10/03/2023 1412
PFOSA	ND		1	4.0	0.61	ng/L	10/03/2023 1412
PFPeS	ND		1	4.0	0.59	ng/L	10/03/2023 1412
PFHxS	ND		1	4.0	0.55	ng/L	10/03/2023 1412
PFBA	ND		1	4.0	0.60	ng/L	10/03/2023 1412
PFDA	ND		1	4.0	0.52	ng/L	10/03/2023 1412
PFDoA	ND		1	4.0	0.47	ng/L	10/03/2023 1412
PFHpA	ND		1	4.0	0.45	ng/L	10/03/2023 1412
PFHxA	ND		1	4.0	0.69	ng/L	10/03/2023 1412
PFNA	ND		1	4.0	0.46	ng/L	10/03/2023 1412
PFOA	ND		1	4.0	0.83	ng/L	10/03/2023 1412
PFPeA	ND		1	4.0	0.54	ng/L	10/03/2023 1412
PFTeDA	ND		1	4.0	0.60	ng/L	10/03/2023 1412
PFTrDA	ND		1	4.0	0.53	ng/L	10/03/2023 1412
PFUdA	ND		1	4.0	0.63	ng/L	10/03/2023 1412
PFOS	ND		1	4.0	2.0	ng/L	10/03/2023 1412

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		93	25-150
13C2_6:2FTS		95	25-150
13C2_8:2FTS		94	25-150
13C2_PFDoA		98	25-150
13C2_PFTeDA		98	25-150
13C3_PFBS		98	25-150
13C3_PFHxS		100	25-150
13C3-HFPO-DA		105	25-150
13C4_PFBA		102	25-150
13C4_PFHpA		114	25-150
13C5_PFHxA		100	25-150
13C5_PFPeA		99	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - MB

Sample ID: YQ86250-001
Batch: 86250
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 10/01/2023 2059

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		100	25-150
13C7_PFUdA		93	25-150
13C8_PFOA		100	25-150
13C8_PFOS		101	25-150
13C8_PFOSA		91	10-150
13C9_PFNA		96	25-150
d5-EtFOSAA		96	25-150
d3-MeFOSAA		96	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ86250-002
Batch: 86250
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 10/01/2023 2059

Parameter	Spike Amount (ng/L)	Result (ng/L)	Q	Dil	% Rec	%Rec Limit	Analysis Date
9Cl-PF3ONS	15	16		1	105	50-150	10/03/2023 1422
11Cl-PF3OUdS	15	16		1	105	50-150	10/03/2023 1422
8:2 FTS	15	17		1	108	50-150	10/03/2023 1422
6:2 FTS	15	16		1	105	50-150	10/03/2023 1422
4:2 FTS	15	16		1	109	50-150	10/03/2023 1422
GenX	32	36		1	113	50-150	10/03/2023 1422
ADONA	15	14		1	94	50-150	10/03/2023 1422
EtFOSAA	16	17		1	109	50-150	10/03/2023 1422
MeFOSAA	16	16		1	98	50-150	10/03/2023 1422
PFBS	14	16		1	112	50-150	10/03/2023 1422
PFDS	15	17		1	108	50-150	10/03/2023 1422
PFHpS	15	13		1	85	50-150	10/03/2023 1422
PFNS	15	16		1	107	50-150	10/03/2023 1422
PFOSA	16	16		1	100	50-150	10/03/2023 1422
PFPeS	15	16		1	107	50-150	10/03/2023 1422
PFHxS	15	14		1	96	50-150	10/03/2023 1422
PFBA	16	17		1	108	50-150	10/03/2023 1422
PFDA	16	15		1	91	50-150	10/03/2023 1422
PFDoA	16	15		1	94	50-150	10/03/2023 1422
PFHpA	16	16		1	100	50-150	10/03/2023 1422
PFHxA	16	16		1	100	50-150	10/03/2023 1422
PFNA	16	15		1	95	50-150	10/03/2023 1422
PFOA	16	16		1	97	50-150	10/03/2023 1422
PFPeA	16	15		1	97	50-150	10/03/2023 1422
PFTeDA	16	15		1	95	50-150	10/03/2023 1422
PFTrDA	16	16		1	97	50-150	10/03/2023 1422
PFUdA	16	15		1	93	50-150	10/03/2023 1422
PFOS	15	17		1	113	50-150	10/03/2023 1422

Surrogate	Q	% Rec	Acceptance Limit
13C2_4:2FTS		92	25-150
13C2_6:2FTS		98	25-150
13C2_8:2FTS		85	25-150
13C2_PFDoA		104	25-150
13C2_PFTeDA		105	25-150
13C3_PFBS		95	25-150
13C3_PFHxS		106	25-150
13C3-HFPO-DA		90	25-150
13C4_PFBA		100	25-150
13C4_PFHpA		108	25-150
13C5_PFHxA		100	25-150
13C5_PFPeA		99	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

PFAS by LC/MS/MS - LCS

Sample ID: YQ86250-002
Batch: 86250
Analytical Method: PFAS by ID SOP

Matrix: Aqueous
Prep Method: SOP SPE
Prep Date: 10/01/2023 2059

Surrogate	Q	% Rec	Acceptance Limit
13C6_PFDA		105	25-150
13C7_PFUdA		92	25-150
13C8_PFOA		107	25-150
13C8_PFOS		89	25-150
13C8_PFOSA		97	10-150
13C9_PFNA		97	25-150
d5-EtFOSAA		98	25-150
d3-MeFOSAA		95	25-150

LOQ = Limit of Quantitation
DL = Detection Limit
ND = Not detected at or above the DL
J = Estimated result < LOQ and ≥ DL
* = RSD is out of criteria
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
+ = RPD is out of criteria

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Chain of Custody
and
Miscellaneous Documents

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Number 150049

Client: Arcadis	Report to Contact: Alexis Crisp, Tiffany Linder	Telephone No. / E-mail: Alexis.crisp@arcadis.com, tiffany.linder@arcadis.com	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: x Sommer Guy	Analysis (Attach list if more space is needed): Report EGLE 28 Compounds*	Page 1 of 2
City: Novi	State: MI	Zip Code: 48377	Printed Name: Sommer Guy
Project Name: Racer PNC			
Project No.: 3116784D.00031	P.O. No.		

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Grab G / Composite C	Matrix: Aqueous	Soil	Non-aqueous	No of Containers by Preservative Type: Unpres.	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Field Filtered	Method 537.1 and 533 PFAS Analysis	Remarks / Cooler I.D.
tripblank	9/21/23	0845	G	X			1							X	tripblank
MWDP-2R_GW-092123	9/21/23	0923	G	X			2							X	
EB-07_092123	9/21/23	0930	G	X			1							X	Equipment blank
SUMP_GW-092123	9/21/23	1010	G	X			2							X	

YI22028

HSSI

Turn Around Time Required (Prior lab approval required for expedited TAT.): ☒ Standard ☐ Rush (Specify)

Sample Disposal: ☐ Return to Client ☒ Disposal by Lab

Possible Hazard Identification: ☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: Sommer Guy	9/21/23	1700	1. Received by: FedEx	9/21/23	1700
2. Relinquished by	Date	Time	2. Received by	Date	Time
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by: FedEx	9/22/23	1000	4. Laboratory received by: Brooke Sapelka	9/22/23	1000

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY
Received on Ice (Circle) (Yes) No Ice Pack
Receipt Temp 1.9 °C
Temp Blank ☐ Y ☒ N

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Number 150049

Client: ARCADIS	Report to Contact: Lexi Crisp	Telephone No. / E-mail: tiffany.linder@arcadis.com; Alexis.crisp@arcadis.com	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: x Lottie Jay	Analysis (Attach list if more space is needed): Report Edit 28 Compounds	Page 2 of 2
City: Novi; State: MI; Zip Code: 48377	Printed Name: Lottie Jay		Lot # Bar Code: YI22028 KES2
Project Name: Racer PNC			
Project No.: 30112891.00031	P.O. No.		

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Grab/Composite	Matrix: Aqueous	Solid	Non-Aqueous	No of Containers by Preservative Type: Unpres.	HCl/504	NaOO	HCl	NaOH	ZnAc NB	Field Filtered	PFAS Analysis List of Analytes per QSM 5.1
MW-03-17_GW-092123	9/21/23	1310	G	X			2							X

Turn Around Time Required (Prior lab approval required for expedited TAT.)
X Standard ☐ Rush (Specify)

Sample Disposal
☐ Return to Client ☐ Disposal by Lab

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: Lottie Jay	9/21/23	1530	1. Received by: Lorraine Guy	9/21/23	1530
2. Relinquished by: Lorraine Guy	9/21/23	1700	2. Received by: Fed Ex	9/21/23	1700
3. Relinquished by:	Date	Time	3. Received by:	Date	Time
4. Relinquished by: FedEX	9/22/23	1000	4. Laboratory received by: Vincent Esperon	9/22/23	1000

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY
Received on Ice (Circle) (Yes) No Ice Pack — Receipt Temp. 0.9 °C — Temp Blank ☐ Y ☑ N

PACE ANALYTICAL SERVICES, LLC

DC#_Title: ENV-FRM-WCOL-0286 v02_Samples Receipt Checklist (SRC)
Effective Date: 8/2/2022

Sample Receipt Checklist (SRC)

Client: ARCADIS Cooler Inspected by/date: BRS2 / 09/22/23 Lot #: YI22028

Means of receipt: ☐ Pace ☐ Client ☐ UPS ☑ FedEx ☐ Other: _____

☐ Yes	☑ No		1. Were custody seals present on the cooler?
☐ Yes	☐ No	☑ NA	2. If custody seals were present, were they intact and unbroken?

pH Strip ID: NA Chlorine Strip ID: NA Tested by: NA

Original temperature upon receipt / Derived (Corrected) temperature upon receipt %Solid Snap-Cup ID: NA

1.9 / 1.9 °C NA / NA °C NA / NA °C NA / NA °C

Method: ☐ Temperature Blank ☑ Against Bottles IR Gun ID: 8 IR Gun Correction Factor: 0 °C

Method of coolant: ☑ Wet Ice ☐ Ice Packs ☐ Dry Ice ☐ None

☑ Yes	☐ No	☐ NA	3. Were all coolers received at or below 6.0°C? If no, was Project Manager notified? PM was Notified by: phone / email / face-to-face (circle one).
☑ Yes	☐ No	☐ NA	4. Is the commercial courier's packing slip attached to this form?
☑ Yes	☐ No		5. Were proper custody procedures (relinquished/received) followed?
☑ Yes	☐ No		6. Were sample IDs listed on the COC and all sample containers?
☑ Yes	☐ No		7. Was collection date & time listed on the COC and all sample containers?
☑ Yes	☐ No		8. Did all container label information (ID, date, time) agree with the COC?
☑ Yes	☐ No		9. Were tests to be performed listed on the COC?
☑ Yes	☐ No		10. Did all samples arrive in the proper containers for each test and/or in good condition (unbroken, lids on, etc.)? _____
☑ Yes	☐ No		11. Was adequate sample volume available?
☑ Yes	☐ No		12. Were all samples received within ½ the holding time or 48 hours, whichever comes first?
☑ Yes	☐ No		13. Were all samples containers accounted for? (No missing/excess)
☐ Yes	☐ No	☑ NA	14. Were VOA, 8015C and RSK-175 samples free of bubbles >"pea-size" (¼"or 6mm in diameter) in any of the VOA vials?
☐ Yes	☐ No	☑ NA	15. Were all DRO/metals/nutrient samples received at a pH of < 2?
☐ Yes	☐ No	☑ NA	16. Were all cyanide samples received at a pH > 12 and sulfide samples received at a pH > 9?
☐ Yes	☐ No	☑ NA	17. Were all applicable NH_3/TKN/cyanide/phenol/625.1/608.3 (< 0.5mg/L) samples free of residual chlorine?
☐ Yes	☑ No	☐ NA	18. Was the quote number listed on the container label? If yes, Quote # _____

Sample Preservation (Must be completed for any sample(s) incorrectly preserved or with headspace.)

Sample(s) NA _____ were received incorrectly preserved and were adjusted accordingly in sample receiving with NA mL of circle one: H2SO4, HNO3, HCl, NaOH using SR # NA. ☐
Time of preservation NA. If more than one preservative is needed, please note in the comments below.

Sample(s) NA _____ were received with bubbles >6 mm in diameter.

Samples(s) NA _____ were received with TRC > 0.5 mg/L (If #19 is *no*) and were adjusted accordingly in sample receiving with sodium thiosulfate ($Na_2S_2O_3$) with Unique ID: NA.

Comments:

Qualtrax ID: 56360 Pace® Analytical Services, LLC Page 1 of 1

Appendix B

Arcadis TGI for PFAS Sampling Procedures

ARCADIS Design & Consultancy for natural and built assets

PFAS SAMPLING PROCEDURES AND LOW-FLOW GROUNDWATER PURGING FOR MONITORING WELLS

Rev. # 0

Date 6/19/2018

PFAS SAMPLING PROCEDURES AND LOW-FLOW GROUNDWATER PURGING FOR MONITORING WELLS

REV. # 0

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1 SCOPE AND APPLICATION

The protocol presented in this methods and procedures document describes the procedures recommended to purge monitoring wells and collect groundwater samples for per- and polyfluoroalkyl substances (PFASs) using low flow sampling with a peristaltic pump. Samples will be analyzed for a specified list of PFASs using a modified version of United States (U.S.) Environmental Protection Agency (USEPA) method 537 following the U.S. Department of Defense and U.S. Department of Energy Quality Systems Manual 5.1 methods and procedures set forth in Table B-15.

This protocol has been developed in accordance with the USEPA Region I Low Stress (Low-Flow) Purging and Sampling Procedures for the Collection of Groundwater Samples from Monitoring Wells (EQASOP-GW4; September 19, 2017). PFAS sampling guidelines are incorporated from various guidance documents including the United States Army Corps of Engineers (2016), Department of Environment Regulation, Western Australia (2016), New Hampshire Department of Environmental Services (2016), and Massachusetts Department of Environmental Protection (2017). Staff should also review the Arcadis Technical Guidance Instruction (TGI) titled, Poly- and Perfluorinated Alkyl Substances (PFAS) Field Sampling Guidance (Arcadis 2018).

The project team should determine the last time the wells were developed and if additional development is necessary prior to sample collection. Groundwater samples should not be collected within one week following well development.

2 PERSONNEL QUALIFICATIONS

Arcadis personnel providing assistance to groundwater sample collection and associated activities should have a minimum of six months of related experience or an advanced degree in environmental sciences, engineering, hydrogeology, or geology. The supervisor of the groundwater sampling team should have at least one year of previous supervised groundwater sampling experience, preferably with PFAS related experience. Prior to mobilizing to the field, the groundwater sampling team should review and be thoroughly familiar with relevant site-specific documents including but not limited to the site work plan, field sampling plan, Health and Safety Plan (HASP), historical information, and site relevant documents. Additionally, the groundwater sampling team should review and be thoroughly familiar with documentation provided by equipment manufacturers for all equipment that will be used in the field prior to mobilization, in particular to confirm the sample materials that will be in contact with the water sample are compatibile with PFAS sample collection**.**

3 EQUIPMENT LIST

Specific to this activity, the following materials (or equivalent) should be available:

- Health and safety documents and equipment (as identified in the Programmatic Accident Prevention Plan and Site Safety and Health Plan)
- Site Plan, well construction records, prior groundwater sampling records (if available)

- Peristaltic pump (e.g., ISCO Model 150) or bladder pump (e.g., Geotech PFC-Free Portable Bladder Pumps)
- A power supply for the peristaltic pump; peristaltic pumps require electric power from either a generator or a deep cell battery.
- High Density Polyethylene (HDPE) tubing and/or silicon tubing of an appropriate size for the pump being used. When collecting samples for PFASs, Teflon® or polytetrafluoroethylene-containing or coated components or tubing are prohibited.
- HDPE bailers (if necessary)
- Water-level probe with fluorine-free materials (e.g., Geotech ET 3/8" with Delrin tip and Buna-N O-ring)
- Water-quality (temperature/pH/specific conductivity/oxidation reduction potential [ORP]/turbidity/dissolved oxygen [DO]) meter, flow-through measurement cell, and appropriate calibration standards. Several brands may be used, including:
    - YSI 6-Series Multi-Parameter Instrument
    - Horiba U-22 Multi-Parameter Instrument
    - Hydrolab Series 3 or Series 4a Multiprobe and Display
- Supplemental turbidity meter (e.g., Horiba U-10, Hach 2100P, LaMotte 2020). Turbidity measurements collected with multi-parameter meters have sometimes been shown to be unreliable due to fouling of the optic lens of the turbidity meter within the flow-through cell. A supplemental turbidity meter should be used to verify turbidity data during purging if such fouling is suspected. An in-line tee and valve should allow for collection of water for turbidity measurements before the pump discharge enters the flow-through cell. Note that industry improvements may eliminate the need for these supplemental measurements in the future.
- HDPE water sample containers (supplied by the laboratory) fitted with an unlined (no Teflon™), polypropylene screw cap. Sample bottles for standard groundwater sampling should not contain Trizma® preservative. If sample bottles with Trizma® are provided by the laboratory, request new sample bottles prior to sample collection.
- Appropriate blanks (field reagent blanks supplied by the laboratory)
- Fluorine-free cleaning equipment
- Groundwater sampling log
- Dedicated plastic sheeting (preferably HDPE) or other clean surface to prevent sample contact with the ground
- Clipboards, field binders, and field note pages that are not waterproof and are fluorine-free
- If high concentrations of PFAS related to class B firefighting foams are expected, bring 'shaker test' vials
- Ziploc® bags to hold ice and samples

- Appropriate blanks (field reagent blanks supplied by the laboratory)
- Appropriate transport containers (coolers) with ice and appropriate labeling, no blue ice should be used
- "PFAS-free" water provided by the laboratory for decontamination rinsing
- Alconox® or Liquinox®; note that Alconox® is known to contain trace levels of 1,4-dioxane
- Packing and shipping materials
- Chain-of-Custody (COC) Forms

Note the specific make/model of the equipment used during each sampling event on the groundwater sampling log. The maintenance requirements for the above equipment generally involve decontamination or periodic cleaning, battery charging, calibration, and proper storage, as specified by the manufacturer. For operational difficulties, the equipment should be serviced by a qualified technician.

4 CAUTIONS

- Do not perform field sampling when rain fall is persistent at a consistent rate that saturates the ground (i.e., formation of puddles) because rain gear is not permitted while sampling. Intermittent showers or fog are acceptable conditions to proceed. If rain showers occur; field gear must be removed from the monitoring well location until the rain subsides. If project timelines are tight, consider the use of a gazebo tent that can be erected over the top of the monitoring well to provide shelter from the rain. The canopy material is possibly a PFAS-treated surface and should be managed as such; therefore, wear gloves when moving the tent, change them immediately after moving the tent, and avoid further contact with the tent until all sampling activities have been finished and the team is ready to move on to the next sample location. Ensure that the canopy will not leak into the sampling area prior to use.
- Do not wear any outdoor performance wear that is water or stain resistant or appears to be. Performance wear such as Gore-Tex® or eVent™ are examples of clothing brands to avoid. Natural fabrics such as cotton are preferred. Synthetic fabrics may also be acceptable if there is no indication on the label that the fabric is water and stain resistant. Avoid contacting clothing with sampling equipment, bottles, and samples.
- Waterproof field books must not be used for field notes. Use loose paper on Masonite, plastic, or aluminum clip boards. Pens, pencils, and Sharpies may be used but should be kept away from sampling materials. One person should conduct the sampling while another records the field notes.
- To avoid potential food packaging-related PFAS contact, do not bring any food outside of the field vehicles onsite. Wash your hands after eating and remove any field garments or outer layers prior to eating.
- Safety footwear is often treated to provide a degree of waterproofing and increased durability and may represent a source of trace PFAS. For the health and safety of field personnel, footwear must be protected at all times to avoid potential PFAS contamination. To do this, do not touch your safety footwear in the immediate vicinity of the sampling location and do not allow gloves used for sampling to come in contact with safety footwear.

- Wear disposable nitrile gloves at all times.
    - Don a new pair of nitrile gloves before the following activities at each sample location:
        - Decontamination of re-usable sampling equipment;
        - Contact with sample bottles or “PFAS-free” water bottles;
        - Insertion of anything into the sample ports (e.g., HDPE tubing); and
        - Handling of any quality assurance/quality control samples including field blanks and equipment blanks.
    - Don a new pair of nitrile gloves after the following activities:
        - Handling of any non-dedicated sampling equipment;
        - Contact with contaminated surfaces; or
        - When judged necessary by field personnel.
- Shower at night. Do not use personal care products after showering such as lotions, makeup, and perfumes, UNLESS medically necessary.
- Use sunscreen and insect repellent ONLY if necessary for health and safety. If they are necessary, apply sunscreen and repellant prior to initiating field sampling. If sunscreen and/or repellant need to be reapplied, ensure a safe distance away from the sampling locations and equipment (i.e., more than 10 meters away). Wash hands after application. Don a new pair of gloves as noted above.
- Visitors are asked to remain at least 30 feet from sampling areas.

5 HEALTH AND SAFETY CONSIDERATIONS

Review all site-specific and procedural hazards as they are provided in the HASP, and review Job Safety Analysis (JSA) documents in the field each day prior to beginning work. The HASP and JSA documents should be present onsite during all field activities. Generators and cord and plug equipment should employ an overcurrent protection device such as an integrated ground fault circuit interrupter cord. If thunder or lighting is present, discontinue sampling and take cover until 30 minutes have passed after the last occurrence of thunder or lighting. Use caution when removing well caps as the well may be under pressure and the cap can dislodge forcefully and cause injury.

6 PROCEDURE

If a round of water level measurements for all site monitoring wells are planned as part of the project scope, the site-wide water level measurements should be collected in such a manner to avoid potential cross-contamination between the wells. Follow appropriate decontamination procedures for collection of water level measurements.

Peristaltic pumps are preferred when sampling for PFASs to minimize potential cross-contamination. If the depth to water is below the sampling range of a peristaltic pump (approximately 25 feet), a PFAS-free bladder pump is acceptable. Purge water should be collected and containerized according to the direction of the project team.

1. Calibrate field instruments according to manufacturer procedures for calibration and document.
2. Place plastic sheeting (preferably HDPE) adjacent to the sample port for use as a clean work area, if conditions allow. Otherwise, prevent sampling equipment from contacting the ground or other surface that could compromise sample integrity.
3. If required in the HASP, use a photoionization detector (PID) to measure the headspace before sampling. Open the well cover while standing upwind of the well. Remove the well cap and place it on the plastic sheeting. Insert the PID probe approximately 4 to 6 inches into the casing or the well headspace and cover it with a gloved hand. Record the PID reading in the field log. Perform air monitoring in the breathing zone according to the HASP and/or JSA.
4. Measure the initial depth to groundwater prior to placing the HDPE tubing.
5. Prepare and install the pump in the well: when using a peristaltic pump, slowly lower the HDPE sampling tubing into the well to a depth corresponding to the approximate center of the saturated screen section of the well. Any dedicated tubing in the well should be replaced with new HDPE tubing. The sampling tube must be kept at least 2 feet above the bottom of the well to prevent mobilization of any sediment present in the bottom of the well. If using a weight on the tubing ensure the material is PFAS free and has been deconned according to the procedures described in this document.
6. Measure the water level again with the pump in the well before starting the pump to ensure that it has stabilized. Start pumping the well at 200 to 500 milliliters (mL) per minute (or at a lower site-specific rate if specified). Adjust the pump rate to cause little or no water level drawdown in the well (less than 0.3 foot below the initial static depth to water measurement), and the water level should stabilize; however, this is not always possible. If the recovery rate is less than 50 mL per minute, or the well is being essentially dewatered during purging, the well should be sampled as soon as the water level has recovered sufficiently to collect the volume needed for all anticipated samples. Contact the project manager or other appropriate personnel to discuss.

   The water level should be monitored every 3 to 5 minutes (or as appropriate, lower flow rates may require longer time between readings) during pumping if the well diameter is of sufficient size to allow such monitoring. Do not break pump suction or cause entrainment of air in the sample. Record pumping rate adjustments and depths to water. If necessary, reduce pumping rates to the minimum capabilities of the pump to avoid pumping the well dry and/or to stabilize indicator parameters. Maintain a steady flow rate to the extent practicable. Review groundwater sampling records from previous sampling events (if available) prior to mobilization to estimate the optimum pumping rate and anticipated drawdown for the well in order to more efficiently reach a stabilized pumping condition.

   If the recharge rate of the well is very low, use approved alternative purging techniques, which will vary based on the well construction and screen position. For wells screened across the water table, the well may be pumped dry and sampling can commence as soon as the volume in the well has recovered sufficiently to permit collection of samples. For wells screened entirely below the water table, the well can be pumped until a stabilized level (which may be greater than the maximum displacement goal of 0.3 foot) is maintained and monitoring for stabilization of field indicator parameters can commence. If a lower stabilization level cannot be maintained, the well may be pumped until the drawdown is at a level slightly higher than top of the well screen. Sampling may

commence after one well volume has been removed and the well has recovered sufficiently to permit collection of samples.

During purging, monitor the field indicator parameters (e.g., turbidity, temperature, specific conductance, pH, ORP, and DO) every 3 to 5 minutes (or after each volume of the flow-through cell has been purged). Measure field indicator parameters using a flow-through analytical cell or a clean container such as a glass beaker. Record field indicator parameters on the groundwater sampling log. The well is considered stabilized and ready for sample collection when turbidity values remain within 10% (or within 1 nephelometric turbidity unit [NTU] if the turbidity reading is less than 5 NTU), the specific conductance and temperature values remain within 3%, ORP readings remain within ± 10 mV, DO values remain within 10%, and pH remains within 0.1 unit for three consecutive readings collected at 3- to 5-minute intervals (or other appropriate interval, alternate stabilization goals may exist in different geographic regions, consult the site-specific Work Plan for stabilization criteria). If the field indicator parameters do not stabilize within 1 hour of the start of purging, but the groundwater turbidity is below the goal of 10 NTU and the values for all other parameters are within 10%, the well can be sampled. If the parameters have stabilized but the turbidity is not in the range of the 5 NTU goal, the pump flow rate may be decreased to a minimum rate of 100 mL/min to reduce turbidity levels as low as possible.

DO is extremely susceptible to various external influences (including temperature or the presence of bubbles on the DO meter); care should be taken to minimize the agitation or other disturbance of water within the flow-through cell while collecting these measurements. If air bubbles are present on the DO probe or in the discharge tubing, remove them before taking a measurement. If DO values are not within acceptable range for the temperature of groundwater then again check for and remove air bubbles on the probe before re-measuring. If the DO value is 0.00 or less, then the meter should be serviced and re-calibrated. If the DO values are above possible results, then the meter should be serviced and re-calibrated.

During extreme weather conditions, stabilization of field indicator parameters may be difficult to attain. Modifications to the sampling procedures to alleviate these conditions (e.g., measuring the water temperature in the well adjacent to the pump intake) should be documented in the field notes. If other field conditions preclude stabilization of certain parameters, an explanation of why the parameters did not stabilize should also be documented on the groundwater sampling log.

7. After the indicator parameters have stabilized, collect groundwater samples by diverting flow out of the unfiltered discharge tubing into the appropriate labeled sample container. If a flow-through analytical cell is being used to measure field parameters, the flow-through cell should be disconnected after stabilization of the field indicator parameters and prior to groundwater sample collection. Under no circumstances should analytical samples be collected from the discharge of the flow-through cell.
8. Make sure the sample bottle caps have remained on the bottle until immediately prior to sample collection.
9. Don a new set of nitrile gloves prior to sample collection. While collecting the sample, make sure the bottle cap remains in the other hand of the sampler until replaced on the bottle. When the container is full (fill to the neck of the bottle, some headspace is acceptable), firmly screw on the cap (snug but

not too tight so that the screw cap is stripped). Do not use gloved hands to subsequently handle papers, pens, clothes, etc. before collecting the sample.

10. Collect any necessary duplicates and matrix spikes. As the laboratory should be analyzing the entire aqueous sample rather than sub-sampling, separate bottles will be required for these samples.
11. Do not rinse PFAS sample bottles during sampling. Do not filter samples.
12. Complete and attach the sample label(s) after sample collection and after the caps have been placed back on each container. Pre-printed labels are preferred, but pens and Sharpies® may be used.
13. Place sample bottles in a sealed Ziploc® bag. Place samples in coolers that are durable in transportation and keep the temperature between 0 and 4ºC until transported to the laboratory.
14. Record the sample name and time of sampling on the sample bottle label, in the field notes and note observations (e.g., physical appearance and the presence or lack of odors or sheens), and record on the COC form.
15. NOTE: If high concentrations of PFAS related to class B firefighting foams are expected in a groundwater sample, collect and shake a small portion of the sample (~10 to 25 mL) on site. If foaming is noted within the sample, document the foaming when samples are submitted for analysis; the 'shaker test' vial can then be disposed. This shaker test provides information about how each of the samples should be handled analytically. Therefore, note ‘shake test’ results on the COC form if appropriate.
16. Turn off the pump. Slowly remove the tubing from the well. If the tubing will be dedicated, store the tubing in an appropriate storage container. Do not allow the tubing or lines to touch the ground or any other surfaces which could contaminate them.
17. Complete the procedures for packaging, shipping, and handling with the associated COC.
18. Between uses, complete decontamination procedures for flow-through analytical cell and water level meter, and any equipment that comes into contact with well water (see decontamination procedures described in Section 9 below).
19. At the end of the day, perform a calibration check of field instruments.
20. The general procedures listed in this document can be used for collection of samples from groundwater treatment systems or other similar sampling of water. In order to collect samples from a sampling port on a groundwater treatment system or for a similar situation follow the safety and quality procedures listed in this document. As a general note on sampling ports, ensure that there is no indication of Teflon™ tape or other Teflon™ containing material.

7 WASTE MANAGEMENT

Materials generated during groundwater sampling activities, including disposable equipment, should be placed in appropriate containers. PFAS containing waste requires special considerations and containerized waste will be stored onsite for future management by the responsible party.

8 DATA RECORDING AND MANAGEMENT

Initial field logs and COC records should be transmitted to the Arcadis Project Manager at the end of each day unless otherwise directed. The groundwater team leader retains copies of the groundwater sampling logs until they are relinquished to the project file.

9 QUALITY ASSURANCE

In addition to the quality control samples to be collected in accordance with these methods and procedures, the following quality control procedures should be observed in the field:

- Collect samples from monitoring wells, in order of increasing concentration, to the extent known based on review of historical site information if available. If no analytical data are available, collect samples in order of upgradient, then furthest downgradient to source area locations.
- Bottle caps must remain in the hand of the sampler until replaced on the bottle.
- Labels must be completed after the caps have been placed back on each bottle.
- Equipment blanks should be collected from various sampling equipment including the pump, water level meter (following decontamination procedures), disposable tubing, and nitrile gloves.
- Collect equipment blanks using laboratory supplied “PFAS-free” water after wells with higher concentrations (if known) have been sampled.
- Field duplicates, matrix spike, and matrix spike duplicates will be collected at a frequency in accordance with the QAPP and applicable QAPP Addenda.
- Samples must be stored in appropriate transport containers (coolers) with ice (Ziploc© bags for use as ice containers) with appropriate labeling. Do not use blue ice. Store PFAS samples in a separate cooler from other types of samples. Samples should be maintained at temperatures between 0 and 4^{o}C until transported to the laboratory.
- Operate all monitoring instrumentation in accordance with manufacturer’s instructions and calibration procedures. Calibrate instruments at the beginning of each day and verify the calibration at the end of each day. Record all calibration activities on calibration log sheets.
- Clean all groundwater sampling equipment prior to use in the first well and after each subsequent well following the procedure for PFAS equipment decontamination noted below. Clean all field equipment used at locations that are suspected of containing class B firefighting foam (i.e., those that foam during shaking or are known to be near a class B firefighting foam source zone) using each of the below steps repeated twice.
- The steps for PFAS equipment decontamination are as follows:
    - Donning a new pair of nitrile gloves;
    - Rinse sampling equipment with Alconox or Liquinox® cleaning solution; Scrub equipment with a plastic brush if needed;
    - Rinse two times with distilled water or deionized water;

- Rinse one time with “PFAS-free” water; and
- Collect all rinsate in a sealed pail for disposal. Do not reuse decontamination solutions between sampling locations

10 REFERENCES

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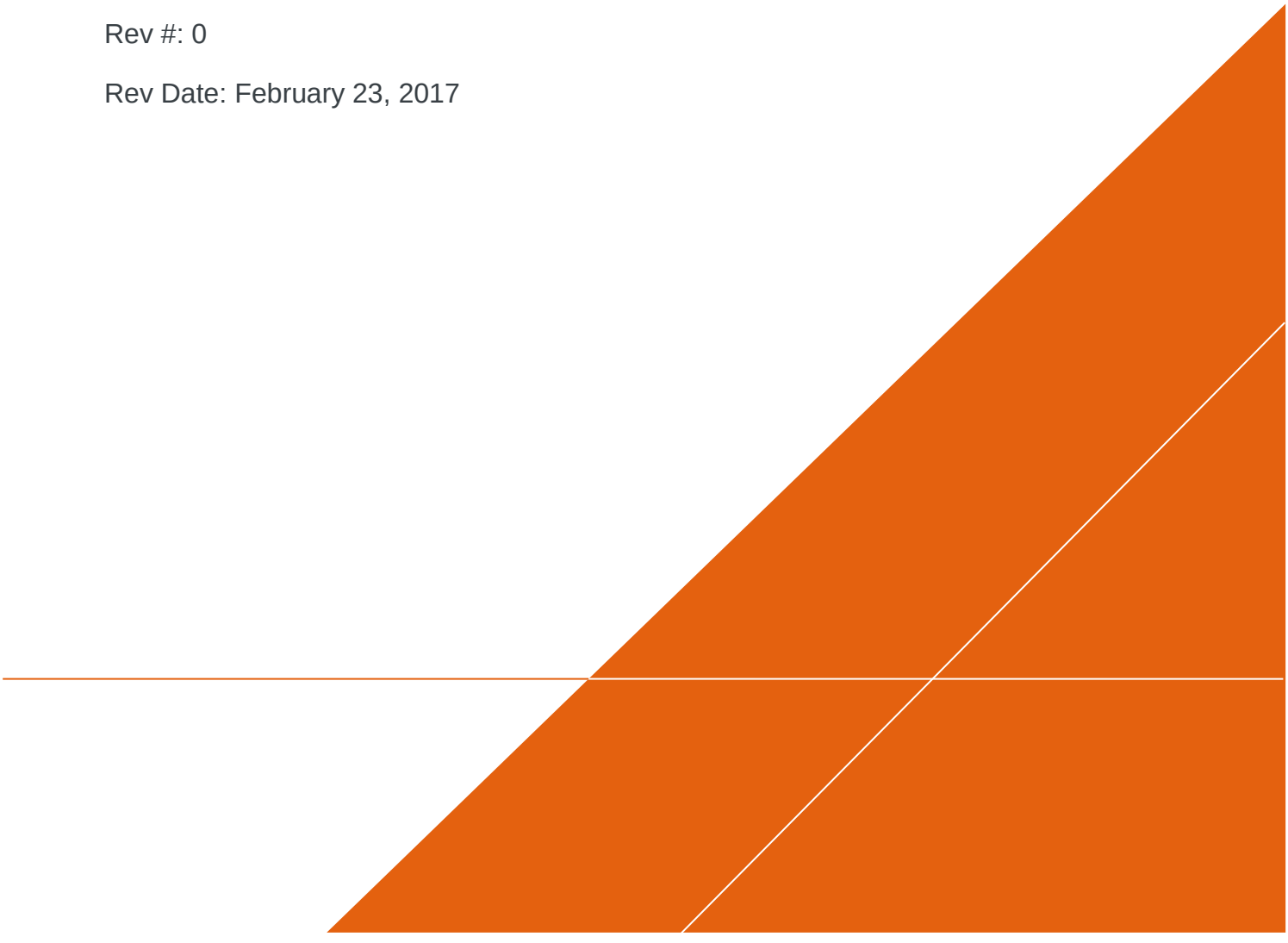
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TGI - INVESTIGATION-DERIVED WASTE HANDLING AND STORAGE

Rev #: 0

Rev Date: February 23, 2017

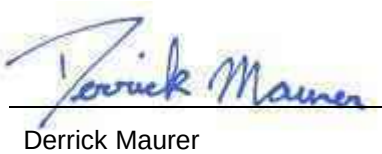


VERSION CONTROL

Revision No	Revision Date	Page No(s)	Description	Reviewed by
0	February 23, 2017	ALL	Conversion from SOP to TGI	Ryan Mattson / Peter Frederick

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APPROVAL SIGNATURES

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1 INTRODUCTION

This document describes general and/or specific procedures, methods, actions, steps, and considerations to be used and observed by Arcadis staff when performing work, tasks, or actions under the scope and relevancy of this document. This document may describe expectations, requirements, guidance, recommendations, and/or instructions pertinent to the service, work task, or activity it covers.

It is the responsibility of the Arcadis Certified Project Manager (CPM) to provide this document to the persons conducting services that fall under the scope and purpose of this procedure, instruction, and/or guidance. The Arcadis CPM will also ensure that the persons conducting the work falling under this document are appropriately trained and familiar with its content. The persons conducting the work under this document are required to meet the minimum competency requirements outlined herein, and inquire to the CPM regarding any questions, misunderstanding, or discrepancy related to the work under this document.

This document is not considered to be all inclusive nor does it apply to any and all projects. It is the CPM's responsibility to determine the proper scope and personnel required for each project. There may be project- and/or client- and/or state-specific requirements that may be more or less stringent than what is described herein. The CPM is responsible for informing Arcadis and/or Subcontractor personnel of omissions and/or deviations from this document that may be required for the project. In turn, project staff are required to inform the CPM if or when there is a deviation or omission from work performed as compared to what is described herein.

In following this document to execute the scope of work for a project, it may be necessary for staff to make professional judgment decisions to meet the project's scope of work based upon site conditions, staffing expertise, state-specific requirements, health and safety concerns, etc. Staff are required to consult with the CPM when or if a deviation or omission from this document is required that has not already been previously approved by the CPM. Upon approval by the CPM, the staff can perform the deviation or omission as confirmed by the CPM.

2 SCOPE AND APPLICATION

The objective of this Technical Guidance Instruction (TGI) is to describe the procedures to manage investigation-derived wastes (IDW), both hazardous and nonhazardous, generated during site activities, which may include, but are not limited to: drilling, trenching/excavation, construction, demolition, monitoring well sampling, soil sampling, decontamination and remediation. For the purposes of this TGI, IDW is considered to be discarded materials which are defined as solid waste by United States Environmental Protection Agency (EPA) standard 40 CFR § 261.2 (which may include liquids, solids, or sludges). IDW may include soil, groundwater, drilling fluids, decontamination liquids, as well as contaminated personal protective equipment (PPE), sorbent materials, construction and demolition debris, and disposable sampling materials. Hazardous or uncharacterized IDW will be collected and staged at the point of generation. Quantities small enough to be containerized in 55-gallon drums will be taken to a designated temporary onsite storage area (discussed in further detail under Drum Storage) pending characterization and disposal. IDW materials will be characterized using process knowledge and appropriate laboratory analyses to determine the waste classification and evaluate proper safe handling and disposal methods.

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This TGI describes the necessary equipment, field procedures, materials, regulatory references, and documentation procedures necessary for proper handling and storage of IDW up to the time it is properly transported from the project site and disposed. The procedures included in this TGI for handling and temporary storage of IDW are based on the EPA's guidance document *Guide to Management of Investigation Derived Wastes* (USEPA, 1992). IDW is assumed to be contaminated with the site constituents of concern (COCs) until analytical evidence indicates otherwise. IDW will be managed to ensure the protection of human health and the environment and will comply with all applicable or relevant and appropriate requirements (ARAR). Although not comprehensive, the following laws and regulations on Hazardous Waste Management should be considered as potential ARAR. It is the Arcadis Certified Project Manager (CPM) and/or designated Technical Expert to determine which laws and regulations, at all levels of government, are applicable to each project site and activity falling under this TGI.

Federal Laws and Regulations

- Resource Conservation and Recovery Act (RCRA) 42 USC § 6901-6987.
- Federal Hazardous Waste Regulations 40 CFR § 260-265

Department of Transportation (DOT) Hazardous Materials Transportation 49 CFR

Occupational Safety and Health Administration (OSHA) Regulations 29 CFR

State Laws and Regulations

- To be determined based on location of site and location of treatment, storage, and/or disposal facility (TSDF) to be utilized.

Regional, County, Municipal, and Local Regulations

- To be determined based on location of site and location of treatment, storage, and/or disposal facility (TSDF) to be utilized.

Initial Storage

Pending characterization, IDW will be temporarily stored appropriately within each area of contamination (AOC). Under RCRA, "storage" is defined as the "holding of hazardous waste for a temporary period, at the end of which the hazardous waste is treated, disposed of, or stored elsewhere" (40 CFR § 260.10). The onsite waste staging area will be in a secure and controlled area. Uncharacterized wastes are considered potentially hazardous wastes and must be stored in DOT approved packaging. Liquid wastes must be stored in DOT approved closed head drums or other approved containers (e.g., portable tank containers) that are compatible with the type of material stored therein. Solid materials must be stored in DOT approved open head drums where practicable. Larger quantities of solid IDW can be containerized in bulk containers (such as in a roll-off box). Soil from large excavation projects may be managed in stockpiles with within the AOC and does not need to be containerized until exiting the AOC.

Characterization

Waste characterization can either be based on generator knowledge, such as using historical process knowledge and safety data sheets (SDS), or can be based upon characterization sampling analytical results. IDW typically is not characterized using SDS as it is a mixture of aged chemicals and environmental media. Historical process knowledge should be used to determine if the IDW is a listed hazardous waste (40 CFR § 261.31-33). If the IDW is not a listed hazardous waste, waste

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characterization can be completed by laboratory analysis of representative samples of the IDW. The laboratory used for waste characterization analysis must have the appropriate state and federal accreditations and may be required to be pre-approved by the Client. IDW will be classified as RCRA hazardous or non-regulated under RCRA based on the waste characterization determination.

If IDW is characterized as RCRA hazardous waste, RCRA and DOT requirements must be followed for packaging, labeling, transporting, storing, and record keeping as described in 40 CFR § 262 and 49 CFR § 171-178. Waste material classified as RCRA nonhazardous may be handled and disposed of as nonhazardous waste in accordance with applicable federal, state, and local regulations.

Storage Time Limitations

Containerized hazardous wastes can be temporarily stored for a maximum of 90 calendar days from the accumulation start date for a large quantity generator or a maximum of 180 calendar days from the accumulation start date for a small quantity generator. Wastes classified as nonhazardous may be handled and disposed of as nonhazardous waste and are not subject to storage time limitations.

This is TGI may be modified by the CPM and/or Technical Expert for a specific project or client program, as required, dependent upon client requirements, site conditions, equipment limitations, or limitations imposed by the procedure. The resulting procedure employed to execute the work will be documented in the project work plans or reports. If changes to the sampling procedures are required due to unanticipated field conditions, the changes will be discussed with the CPM and/or Technical Expert as soon as practicable, and if approved to be performed, be documented.

3 PERSONNEL QUALIFICATIONS

Arcadis field sampling personnel will have current regulatory- and Arcadis-required health and safety training including 40-hour HAZWOPER training, site supervisor training, site-specific training, first aid, and cardiopulmonary resuscitation (CPR), as needed. Personnel handling and packaging hazardous waste and performing hazardous waste characterizations must have RCRA hazardous waste management training per 40 CFR § 264.16.

Although not common practice, in certain situations Arcadis personnel may sign waste profiles and/or waste manifests on a case by case basis for clients, provided the appropriate agreement is in place between Arcadis and the client documenting that Arcadis is not the generator, but is acting as an authorized representative of the generator. Arcadis personnel who sign waste profiles and/or waste manifests will have both current RCRA hazardous waste management training per 40 CFR § 264.16 and current DOT hazardous materials transportation training per 49 CFR § 172.704. Arcadis field personnel will also comply with client-specific training. In addition, Arcadis field sampling personnel will be knowledgeable in the relevant processes, procedures, and Technical Guidance Instructions (TGIs) and possess the demonstrated required skills and experience necessary to successfully complete the desired field work. The project health and safety plan (HASP) and other documents will identify other training requirements or access control requirements.

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4 EQUIPMENT LIST

The Following Materials, as required, will be available for IDW handling and Storage:

- Appropriate personal protective equipment as specified in the Site Health and Safety Plan (HASP)
- DOT approved containers
- Hammer
- Leather gloves
- Drum dolly
- Appropriate drum labels (outdoor waterproof self-adhesive)
- Portable tank container
- Appropriate labeling, packing, chain-of-custody forms, and shipping materials as determined by the CPM and/or Technical Expert.
- Indelible ink and/or permanent marking pens
- Plastic sheeting
- Appropriate sample containers, labels, and forms
- Stainless-steel bucket auger
- Stainless steel spatula or knife
- Stainless steel hand spade
- Stainless steel scoop
- Digital camera
- Field logbook

5 CAUTIONS

Filled drums can be very heavy, become unbalanced, or spill its contents. Therefore, use appropriate moving techniques and equipment for safe handling. Similar media (e.g. soils with other soils; or liquids with other liquids) will be stored in the same drums to aid in sample analysis and disposal. Drum lids must be secured to prevent rainwater from entering the drums and leakage during movement. Drums containing solid material may not contain any free liquids. Waste containers stored for extended periods of time may be subject to deterioration. Drum Over Packs may be used as secondary containment. All drums must be visually inspected for condition to ensure that they are in good condition without visible evidence of rusting, holes, breakage, etc., to prevent potential leakage and facilitate subsequent disposal. All drum lids must be verified as having a properly functioning secured lid prior to use.

6 HEALTH AND SAFETY CONSIDERATIONS

Click here and enter text] As determined by the site's known and suspected hazards, appropriate PPE must be worn by all field personnel within the designated work area. Exposure air monitoring may be required during certain field activities as required in the Site Health and Safety Plan. If soil excavation in areas with potentially hazardous contaminants is possible, contingency plans will be developed to address the potential for encountering gross contamination or non-aqueous phase liquids. All excavation

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activities shall be in compliance with OSHA standard 29 CFR 1926.651 Excavations, and any other applicable regulations.

Arcadis field personnel and subcontractors will be trained in and perform their work in compliance with all applicable federal, state, and local health and safety regulations as well as Arcadis' HASP and applicable Client health and safety requirements.

7 PROCEDURE

Specific waste temporary storage and handling procedures to be used are dependent upon the type of generated waste, including type of media (e.g. soils or free liquids) and constituents of concern. For this reason, IDW can be stored in a secure location onsite in separate 55-gallon storage drums, where solids can be stockpiled onsite (if nonhazardous) and purge water may be stored in portable tank containers. Waste materials such as broken sample bottles or equipment containers and wrappings will be stored in 55-gallon drums unless they were not in contact with sample media.

Management of IDW

Minimization of IDW should be considered by the project team during all phases of the project. Site managers may want to consider techniques such as replacing solvent based cleaners with aqueous-based cleaners for decontamination of equipment, reuse of equipment (where it can be properly decontaminated), limitation of traffic between exclusion and support zones, and drilling methods and sampling techniques that minimize the generation of waste. Alternative drilling and subsurface sampling methods may include the use of small diameter boreholes, as well as borehole testing methods such as a core penetrometer or direct push technique instead of coring.

Drum Storage

Drums containing hazardous waste will be stored in accordance with the requirements of 40 CFR 265 Subpart I (for containers) and 265 Subpart DD (for containment buildings). All 55-gallon drums will be stored at a secure, centralized onsite location that is readily accessible for vehicular pick-up. Drums confirmed as, or assumed to contain hazardous waste will be stored over an impervious surface provided with secondary spill containment. The storage location will, for drums containing liquid, have a containment system that can contain at least the larger of 10% of the aggregate volume of staged materials or 100% of the volume of the largest container. Drums will be closed during storage and be in good condition in accordance with the Guide to Management of Investigation-Derived Wastes (USEPA, 1992).

Hazardous Waste Determination

Waste material must be characterized to determine if it meets any of the federal definitions of hazardous waste as required by 40 CFR § 262.11. If the waste does not meet any of the federal definitions, it must then be established if any state-specific or local-specific hazardous waste criteria exist/apply.

Generator Status

Once hazardous waste determination has been made, the generator status will be determined. Large quantity generators (LQG) are generators who generate more than 1,000 kilograms of hazardous waste in a calendar month. Small quantity generators (SQG) of hazardous waste are generators who generate

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greater than 100 kilograms but less than 1,000 kilograms of hazardous waste in a calendar month. Conditionally exempt small quantity generators (CESQG) are generators who generate less than 100 kilograms of hazardous waste per month. Please note that a generator status may change from month to month and that a notice of this change is usually required by the generator's state agency.

Accumulation Time for Hazardous Waste

A LQG may accumulate hazardous waste on site for 90 calendar days or less without a permit and without having interim status, provided that such accumulation is in compliance with requirements in 40 CFR § 262.34. A SQG may accumulate hazardous waste on site for 180 calendar days or less without a permit or without having interim status, subject to the requirements of 40 CFR § 262.34(d). CESQG requirements are found in 40 CFR § 261.5. NOTE: The CESQG and SQG provisions of 40 CFR § 261.5, 262.20(e), 262.42(b) and 262.44 may not be recognized by some states (e.g., California and Rhode Island). State-specific and local-specific regulations must be reviewed and understood prior to the generation of hazardous waste.

Satellite Accumulation of Hazardous Waste Satellite accumulation (SAA) will mean the accumulation of as much as fifty-five (55) gallons of hazardous waste, or the accumulation of as much as one quart of acutely hazardous waste, in containers at or near any point of generation where the waste initially accumulates, which is under the control of the operator of the process generating the waste, without a permit or interim status and without complying with the requirements of 40 CFR § 262.34(a) and without any storage time limit, provided that the generator complies with 40 CFR § 262.34(c)(1)(i).

Once more than 55 gallons of hazardous waste accumulates in SAA, the generator has three days to move this waste into storage.

Storage recommendations for hazardous waste include:

- Ignitable Hazardous wastes must be >50 feet from the property line per 40 CFR § 265.176 (LQG generators only).
- Hazardous waste must be stored on a concrete slab (asphalt is acceptable if there are no free liquids in the waste) per 40 CFR § 265.176.
- Drainage must be directed away from the accumulation area.
- Area must be properly vented.
- Area must be secure.

Drum/Container Labeling

Drums will be labeled on both the side and lid of the drum using a permanent marking pen. Old drum labels must be removed to the extent possible, descriptions crossed out should any information remain, and new labels affixed on top of the old labels. Other containers used to store various types of waste (e.g., polyethylene tanks, roll-off boxes, end-dump trailers, etc.) will be labeled with an appropriate "Waste Container" or "Testing in Progress" label pending characterization. Drums and containers will be labeled as follows:

- Appropriate waste characterization label (Pending Analysis, Hazardous, or Nonhazardous)
- Waste generator's name (e.g., client name)
- Project Name
- Name and telephone number of Arcadis project manager

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- Composition of contents (e.g., used oil, acetone 40%, toluene 60%)
- Media (e.g., solid, liquid)
- Accumulation start date
- Drum number of total drums as reconciled with the Drum Inventory maintained in the field log book.

IDW containers will remain closed except when adding or removing waste. Immediately upon beginning to place waste into the drum/container, a “Waste Container” or “Pending Analysis” label will be filled out to include the information specified above, and affixed to the container. Once the contents of the container are identified as either non-hazardous or hazardous, the following additional labels will be applied.

- Containers with waste determined to be non-hazardous will be labeled with a green and white "Nonhazardous Waste" label over the "Waste Container" label.
- Containers with waste determined to be hazardous will be stored in an onsite storage area and will be labeled with the "Hazardous Waste" label and affixed over the "Waste Container" label.

The ACCUMULATION DATE for the hazardous waste is the date the waste is first placed in the container and is the same date as the date on the "Waste Container" label. DOT hazardous class labels must be applied to all hazardous waste containers for shipment offsite to an approved disposal or recycling facility. In addition, a DOT proper shipping name will be included on the hazardous waste label. The transporter should be equipped with the appropriate DOT placards. However, placarding or offering placards to the initial transporter is the responsibility of the generator per 40 CFR § 262.33.

Inspections and Documentation

All IDW will be documented as generated on a Drum Inventory Log maintained in the field log book. The Drum Inventory will record the generation date, type, quantity, matrix and origin (e.g., Boring-1, Test Pit 3, etc.) of materials in every drum, as well as a unique identification number for each drum. The drum inventory will be used during drum pickup to assist with labeling of drums. The drum storage area and any other areas of temporarily staged waste, such as soil/debris piles, will be inspected weekly. The weekly inspections will be recorded in the field notebook or on a Weekly Inspection Log. Digital photographs will be taken upon the initial generation and drumming/staging of waste, and final labeling after characterization to document compliance with labeling and storage protocols, and condition of the container. Evidence of damage, tampering or other discrepancy should be documented photographically.

Emergency Response and Notifications

Specific procedures for responding to site emergencies will be detailed in the HASP. If the generator is designated as a LQG, a Contingency Plan will need to be prepared to include emergency response and notification procedures per 40 CFR § 265 Subpart D. In the event of a fire, explosion, or other release which could threaten human health outside of the site or when Client or ARCADIS has knowledge of a spill that has reached surface water, Client or ARCADIS must immediately notify the National Response Center (800-424-8802) in accordance with 40 CFR § 262.34. Other notifications to state and/or other local regulatory agencies may also be necessary.

Drilling Soil Cuttings and Muds

Soil cuttings are solid to semi-solid soils generated during trenching activities, subsurface soil sampling, or installation of monitoring wells. Depending on the drilling method, drilling fluids known as "muds" may

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be used to remove soil cuttings. Drilling fluids flushed from the borehole must be directed into a settling section of a mud pit. This allows reuse of the decanted fluids after removal of the settled sediments. Soil cuttings will be labeled and stored in 55-gallon drums with bolt-sealed lids.

Excavated Solids

Excavated solids may include, but are not limited to: soil, fill, and construction and demolition debris. Prior to permitted treatment or offsite disposal, potentially hazardous excavated solids may be temporarily stockpiled onsite as long as the stockpile remains in the same AOC from where it was excavated. Potentially hazardous excavated solids removed from the AOC must be immediately containerized in labeled drums or closable top roll-offs lined with 9-mil polyvinyl chloride (PVC) sheeting and are subject to LQG storage time limits. Nonhazardous excavated solids can be stockpiled either inside or outside of the AOC, do not have to be containerized and are not subject to hazardous waste regulations. Potentially hazardous excavated solids must not be mixed with nonhazardous excavated solids. All classes of excavated solid stockpiles should be maintained in a secure area onsite. At a minimum, the floor of the stockpile area will be covered with a 20-mil high density polyethylene liner that is supported by a foundation or at least a 60-mil high density polyethylene liner that is not supported by a foundation. The excavated material will not contain free liquids. The owner/operator will provide controls for windblown dispersion, run-on control, and precipitation runoff. The run-on control system will prevent flow onto the active portion of the pile during peak discharge from at least a 25-year storm and the run-off management system will collect and control at least the water volume resulting from a 24-hour, 25-year storm (USEPA, 1992). Additionally, the stockpile area will be inspected on a weekly basis and after storm events. Individual states may require that the stockpile be inspected/certified by a licensed professional engineer. Stockpiled material will be covered with a 6-mil polyvinyl chloride (PVC) liner or sprayed dust control product. The stockpile cover will be secured in place with appropriate material (concrete blocks, weights, etc.) to prevent the movement of the cover.

Decontamination Solutions

Decontamination solutions are generated during the decontamination of personal protective equipment and sampling equipment. Decontamination solutions may range from detergents, organic solvents and acids used to decontaminate small field sampling equipment to steam cleaning rinsate used to wash heavy field equipment. These solutions are to be labeled and stored in closed head drums compatible with the decontamination solution. Decontamination procedures, including personnel and field sampling equipment, must comply with applicable Arcadis procedural documents.

Disposable Equipment

Disposable equipment includes personal protective equipment (e.g., tyvek coveralls, gloves, booties and APR cartridges) and disposable sampling equipment such as trowels or disposable bailers. If the media sampled exhibits hazardous characteristics per results of waste characterization sampling, contaminated disposable equipment will also be disposed of as a hazardous waste. If compatible with the original IDW waste stream (i.e., the IDW is a solid and the disposal equipment is a solid), the disposable equipment can be combined with the IDW. If these materials are not compatible (i.e., the IDW is a liquid and the disposal equipment is a solid), the disposable equipment will be stored onsite in separate labeled 55-gallon drums. Uncontaminated or decontaminated disposable equipment can be considered nonhazardous waste.

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Purge Water

Purge water includes groundwater generated during well development, groundwater sampling, or aquifer testing. The volume of groundwater generated will dictate the appropriate storage procedure. Monitoring well development and groundwater sampling may generate three well volumes of groundwater or more. This volume will be stored in labeled 55-gallon drums. Aquifer tests may generate significantly greater volumes of groundwater depending on the well yield and the duration of the test. Therefore, large-volume portable polyethylene tanks will be considered for temporary storage pending groundwater-waste characterization.

Purged Water Storage Tank Decontamination and Removal

The following procedures will be used for inspection, cleaning, and offsite removal of storage tanks used for temporary storage of purge water. These procedures are intended to be used for rented portable tanks such as Baker Tanks or Rain for Rent containers. Storage tanks will be made of inert plastic materials. The major steps for preparing a rented tank for return to a vendor include characterizing the purge water, disposing of the purge water, decontaminating the tank, final tank inspection, and mobilization. Decontamination and inspection procedures are described in further detail below.

- Tank Cleaning: Most vendors require that tanks be free of any visible sediment and water before returning, a professional cleaning service may be required. Each specific vendor should be consulted concerning specific requirements for returning tanks.
- Tank Inspection: After emptying the tank, purged water storage tanks should be inspected for debris, chemical staining, and physical damage. The vendors require that tanks be returned in the original condition (i.e., free of sediment, staining and no physical damage).

8 WASTE MANAGEMENT

Soil/Solids Characterization

Waste characterization will be conducted in accordance with waste hauler, waste handling facility, and local/state/federal requirements. In general, RCRA hazardous wastes are those solid wastes determined by a Toxicity Characteristic Leaching Procedure (TCLP) test or to contain levels of certain toxic metals, pesticides, or other organic chemicals above specific applicable regulatory agency thresholds. If the one or more of 40 toxic compounds listed in Table I of 40 CFR § 261.24 are detected in the sample at levels above the maximum unregulated concentrations, the waste must be characterized as a toxic hazardous waste. Wastes can also be considered “listed” hazardous waste depending on site-specific processes.

Composite soil samples will be collected at a frequency of one sample per 10 cubic yard basis for stockpiled soil or one per 55-gallon drum for containerized. A four-point composite sample will be collected per 10 cubic yards of stockpiled material and for each drum. Sample and composite frequencies may be adjusted in accordance with the waste handling facility’s requirements. Waste characterization samples may be analyzed for the TCLP volatile organic compounds (VOCs), TCLP semi-volatile organic compounds (SVOCs), TCLP RCRA metals, and polychlorinated biphenyls (PCBs), as well as reactivity and flammability (flashpoint). Additional samples may be collected and analyzed by the laboratory on a contingency basis. Site-specific constituents of concern including pesticides may require additional

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sampling. Please note that state- or local-specific regulations may require a different or additional sampling approaches.

Wastewater Characterization

Waste characterization will be conducted in accordance with the requirements of the waste hauler, waste handling facility, and local/state/federal governments. In general, purge water should be analyzed by methods appropriate for the known contaminants, if any, that have been historically detected in the monitoring wells. Samples will be collected and analyzed in accordance with the requirements of the waste disposal facility. Wastewater characterization samples may be analyzed for TCLP volatile organic compounds (VOCs), TCLP semi-volatile organic compounds (SVOCs), TCLP RCRA metals, and polychlorinated biphenyls, as well as corrosivity (pH), reactivity and flammability (flashpoint). Additional samples may be collected and analyzed by the laboratory on a contingency basis. Site-specific constituents of concern including pesticides may require additional sampling. Please note that state- and/or local-specific regulations may require different or additional sampling approaches.

Sample Handling and Shipping

All samples will be appropriately labeled, packed, and shipped, and the chain-of-custody will be filled out in accordance with current Arcadis sample chain of custody, handling, packing, and shipping procedures and guidance instructions.

It should be noted that additional training is required for packaging and shipping of hazardous and/or dangerous materials. Please refer to the current Arcadis training requirements related to handling and shipping of samples, shipping determinations, and hazardous materials.

Preparing Waste Shipment Documentation (Hazardous and Nonhazardous)

Waste profiles will be prepared by the Arcadis CPM and forwarded, along with laboratory analytical data to the Client for approval/signature. The Client will then return the profile to Arcadis who will then forward to the waste removal contractor for preparation of a manifest. The manifest will be reviewed by Arcadis prior to forwarding to the Client for approval. Upon approval of the manifest, the Client will return the original signed manifest directly to the waste contractor or to the Arcadis CPM for forwarding to the waste contractor. Arcadis personnel may sign waste profiles and/or waste manifests on a case by case basis for clients, provided the appropriate agreement is in place between Arcadis and the client documenting that Arcadis is not the generator, but is acting as an authorized representative of the generator.

Final drum labeling and pickup will be supervised by an Arcadis representative who is trained and experienced with applicable waste labeling procedures. The Arcadis representative will have a copy of the drum inventory maintained in the field book and will reconcile the drum inventory with the profile numbers on the labels and on the manifest. Different profile numbers will be generated for different matrices or materials in the drums. For example, the profile number for drill cuttings will be different than the profile number for purge water. When there are multiple profiles it is critical that the proper label, with the profile number appropriate to a specific material be affixed to the proper drums. A copy of the Arcadis drum inventory will be provided to the waste transporter during drum pickup and to the facility receiving the waste.

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9 DATA RECORDING AND MANAGEMENT

Waste characterization sample handling, packing, and shipping procedures will be documented in accordance with relevant Arcadis procedures and guidance instructions as well as applicable client and/or project requirements, such as a Quality Assurance Project Plan or Sampling and Analysis Plan. Copies of the chain-of-custody forms will be maintained in the project file. Arcadis should photograph or maintain a copy of any hazardous waste manifest signed on behalf of Client in the corresponding office DOT record file.

10 QUALITY ASSURANCE

The CPM or APM will review all field documentation once per week for errors or omissions as compared to applicable project requirements including but not limited to: the proposal/scope of work, QAPP, SAP, HASP, etc. Deficiencies will be noted, tracked, and resolved. Upon correction, they will be noted for project documentation.

11 REFERENCES

United States Environmental Protection Agency (USEPA). 1992. Guide to Management of Investigation-Derived Wastes. Office of Remedial and Emergency Response. Hazardous Site Control Division. January 1992.

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Appendix C

Groundwater Sampling Logs

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MW-01-17			**Date**	09/18/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	59.0 degrees F and Cloudy. The wind is blowing NW at 11.4 mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	7.45	**Total Depth (ft-bmp)**	10.73	**Water Column (ft)**	3.28	**Gallons in Well**	0.53
Purge Start	13:36	**Pump Intake (ft-bmp)**	9.5	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	14:35	**Volumes Purged**	43.40	**Sample ID**	MW-01-17_GW-091823	**Sampled by**	Sommer Guy
Sample Time	14:25	**Gallons Purged**	23.00	**Replicate/ Code No.**	DUP-03_GW-091823	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
13:37	0	0	130	7.54	--	8.24	2.4	19.2	0.58	18.3	-82.4	--	--
13:42	5	5	130	7.54	--	7.9	2.4	14.1	0.2	18.1	-178.3	--	--
13:47	5	10	130	7.54	--	7.84	2.4	7.57	0.13	18.2	-195.1	--	--
13:52	5	15	130	7.54	--	7.83	2.39	10.2	0.08	17.9	-202.9	--	--
13:57	5	20	130	7.54	--	7.79	2.39	6.63	0.09	18	-202.5	--	--
14:02	5	25	130	7.54	--	7.78	2.39	9.01	0.09	18.1	-202.3	--	--
14:07	5	30	130	7.54	--	7.79	2.39	5.58	0.09	18.1	-203.8	--	--
14:12	5	35	130	7.54	--	7.81	2.39	5.23	0.09	18.2	-205.8	--	--
14:17	5	40	130	7.54	--	7.81	2.4	5.78	0.09	17.9	-207.2	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	4	None

Comments:

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot — 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location: USPS
Condition of Well: Good condition
Well Completion: Stick-up
Well Locked at Arrival: yes
Well Locked at Departure: yes
Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MW-02-17			**Date**	09/12/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	60.1 degrees F and Fog/Mist. The wind is blowing W/NW at 10.3 mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	25.67	**Total Depth (ft-bmp)**	29.58	**Water Column (ft)**	3.91	**Gallons in Well**	0.64
Purge Start	10:17	**Pump Intake (ft-bmp)**	27	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	11:16	**Volumes Purged**	3.13	**Sample ID**	MW-02-17_GW-091223	**Sampled by**	Garrett Link
Sample Time	11:10	**Gallons Purged**	2.00	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
10:22	0	0	145	25.69	--	7.03	1.27	2.56	3.67	15.7	88.2	--	--
10:27	5	5	145	25.69	--	7.04	1.24	2.1	3.53	15.5	80.1	--	--
10:32	5	10	145	25.69	--	7.06	1.21	1.75	2.48	15.4	70.8	--	--
10:37	5	15	145	25.69	--	7.07	1.2	1.67	2.33	15.4	66.6	--	--
10:42	5	20	145	25.69	--	7.08	1.19	1.15	2.16	15.3	63.2	--	--
10:47	5	25	145	25.69	--	7.09	1.18	0.76	2.07	15.3	60.9	--	--
10:52	5	30	145	25.69	--	7.1	1.17	1.23	0.31	15.3	58.8	--	--
10:57	5	35	145	25.69	--	7.1	1.17	0.8	0.37	15.4	57.2	--	--
11:02	5	40	145	25.69	--	7.11	1.16	0.8	0.37	15.3	56	--	--
11:07	5	45	145	25.69	--	7.11	1.16	0.02	0.39	15.4	54.4	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments: Well vault flooded w/ water.

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot — 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location: Powerhouse
Condition of Well: Good condition
Well Completion: Flush mount
Well Locked at Arrival: yes
Well Locked at Departure: yes
Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MW-03-17			**Date**	09/21/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	74 °F, Sunny, winds at mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	8.89	**Total Depth (ft-bmp)**	21.9	**Water Column (ft)**	13.01	**Gallons in Well**	2.11
Purge Start	12:05	**Pump Intake (ft-bmp)**	19.4	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	13:40	**Volumes Purged**	1.42	**Sample ID**	MW-03-17_GW-092123	**Sampled by**	Lottie Jay
Sample Time	13:10	**Gallons Purged**	3.00	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
12:10	0	0	130	9.12	--	7.32	0.91	63.8	0.32	15.9	-82.4	--	--
12:15	5	5	130	9.13	--	7.38	0.91	22.2	0.14	15.7	-111.2	--	--
12:20	5	10	130	9.13	--	7.42	0.91	64.6	0.08	15.5	-126	--	--
12:25	5	15	130	9.13	--	7.42	0.91	25.3	0.09	15.4	-130.1	--	--
12:30	5	20	130	9.13	--	7.42	0.9	25.9	0.07	15.3	-134.1	--	--
12:35	5	25	110	9.13	--	7.43	0.91	19	0.09	15.7	-135.9	--	--
12:40	5	30	110	9.13	--	7.42	0.91	16.3	0.07	15.7	-136.5	--	--
12:45	5	35	110	9.13	--	7.42	0.91	9.23	0.06	15.6	-137.6	--	--
12:50	5	40	110	9.13	--	7.42	0.91	17.1	0.06	15.6	-138.2	--	--
12:55	5	45	110	9.13	--	7.42	0.91	8.24	0.06	15.8	-139.1	--	--
13:00	5	50	110	9.13	--	7.42	0.91	5.84	0.06	15.7	-139.6	--	--
13:05	5	55	110	9.13	--	7.42	0.91	7.86	0.06	15.9	-139.4	--	--
13:10	5	60	110	9.13	--	7.42	0.91	6.12	0.05	16	-140	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments:

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot — 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location:

Condition of Well:

Well Completion: NA

Well Locked at Arrival: yes

Well Locked at Departure: yes

Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter

mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MW-05-18			**Date**	09/12/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	68.0 degrees F and Mostly Cloudy. The wind is blowing W at 10.3 mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	27.02	**Total Depth (ft-bmp)**	33.56	**Water Column (ft)**	6.54	**Gallons in Well**	1.06
Purge Start	16:03	**Pump Intake (ft-bmp)**	31	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	16:46	**Volumes Purged**	1.89	**Sample ID**	MW-05-28_GW-091223	**Sampled by**	Sommer Guy
Sample Time	16:42	**Gallons Purged**	2.00	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
16:05	0	0	130	27.02	--	7.62	0.75	17.5	5.27	16.1	99.1	--	--
16:10	5	5	130	27.02	--	7.1	0.72	6.98	4.39	14.8	104.4	--	--
16:15	5	10	130	27.02	--	7.04	0.72	3.93	3.45	16	97.5	--	--
16:20	5	15	130	27.02	--	7.09	0.72	4.49	3.5	16.2	86.5	--	--
16:25	5	20	130	27.02	--	7.11	0.72	4.63	2.9	16.3	78.6	--	--
16:30	5	25	130	27.02	--	7.13	0.72	4.69	2.79	16.3	72.9	--	--
16:35	5	30	130	27.02	--	7.1	0.73	4.22	2.81	16.1	70.5	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments:

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot — 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location: Fiero Powerhouse
Condition of Well: Good condition
Well Completion: Flush mount
Well Locked at Arrival: yes
Well Locked at Departure: yes
Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MW-43-14R			**Date**	09/25/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	64.0 degrees F and Cloudy. The wind is blowing E/NE at 9.2 mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	26.87	**Total Depth (ft-bmp)**	33.5	**Water Column (ft)**	6.63	**Gallons in Well**	1.08
Purge Start	11:44	**Pump Intake (ft-bmp)**	30.5	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	12:23	**Volumes Purged**	1.85	**Sample ID**	MW-43-14R_GW-092523	**Sampled by**	Sommer Guy
Sample Time	12:20	**Gallons Purged**	2.00	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
11:45	0	0	130	27.02	--	7.49	2.79	1.17	0.73	17.9	33.1	--	--
11:50	5	5	130	26.98	--	7.62	2.83	2.31	0.5	17.6	-72.1	--	--
11:55	5	10	130	26.98	--	7.67	2.83	0.97	0.33	17.6	-127.9	--	--
12:00	5	15	130	26.98	--	7.7	2.83	0.62	0.24	17.6	-153.6	--	--
12:05	5	20	130	26.98	--	7.71	2.83	0.55	0.21	17.7	-164.9	--	--
12:10	5	25	130	26.98	--	7.72	2.83	0.63	0.2	17.8	-168.2	--	--
12:15	5	30	130	26.98	--	7.73	2.83	0.36	0.22	18.1	-174.6	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments:

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot — 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location: USPS
Well Locked at Arrival:
Condition of Well: Good condition
Well Locked at Departure:
Well Completion: Stick-up
Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWDP-2R			**Date**	09/21/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	55.9 degrees F and Patchy Fog and Fog/Mist. The wind is blowing undefined at 0.0 mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	4.55	**Total Depth (ft-bmp)**	14.41	**Water Column (ft)**	9.86	**Gallons in Well**	1.6
Purge Start	08:41	**Pump Intake (ft-bmp)**	11.9	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	09:26	**Volumes Purged**	1.25	**Sample ID**	MWDP-2R_GW-092123	**Sampled by**	Sommer Guy
Sample Time	09:23	**Gallons Purged**	2.00	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
08:42	0	0	130	4.68	--	6.86	1.26	25.9	2.85	15.8	114.5	--	--
08:47	5	5	130	4.74	--	6.77	1.25	17.4	3.28	15.9	71.7	--	--
08:52	5	10	130	4.83	--	6.79	1.25	11.8	2.83	15.9	20.4	--	--
08:57	5	15	130	4.92	--	6.84	1.25	5.91	2.93	16	-14.3	--	--
09:02	5	20	130	4.97	--	6.87	1.26	5.34	2.67	16	-30	--	--
09:07	5	25	130	5.02	--	6.9	1.26	4.92	2.48	16	-40.2	--	--
09:12	5	30	130	5.06	--	6.92	1.27	5.66	2.67	16	-43.7	--	--
09:17	5	35	130	5.11	--	6.93	1.27	5.7	2.52	15.9	-48.3	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments: Equipment blank 07 collected here

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot

1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location: South of Montcalm

Condition of Well: Good condition

Well Completion: Flush mount

Well Locked at Arrival: yes

Well Locked at Departure: yes

Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter

mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWF12-02R			**Date**	09/12/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	64.0 degrees F and Cloudy. The wind is blowing W at 10.3 mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	13.05	**Total Depth (ft-bmp)**	27.75	**Water Column (ft)**	14.7	**Gallons in Well**	2.39
Purge Start	13:32	**Pump Intake (ft-bmp)**	25.25	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	14:40	**Volumes Purged**	1.05	**Sample ID**	MWF12-02R_GW-091223	**Sampled by**	Garrett Link
Sample Time	14:35	**Gallons Purged**	2.50	**Replicate/ Code No.**	MWF12-02R_GW-091223	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
13:32	0	0	150	13.06	--	7.2	0.99	39.9	0.24	14.6	71	--	--
13:37	5	5	125	13.06	--	7.21	0.97	40.3	0.15	15	67.7	--	--
13:42	5	10	125	13.06	--	7.22	0.95	32	0.27	15.2	66	--	--
13:47	5	15	125	13.06	--	7.22	0.94	25.5	0.16	15.1	64.9	--	--
13:52	5	20	125	13.06	--	7.22	0.92	18.2	0.16	15.2	63.2	--	--
13:57	5	25	125	13.06	--	7.22	0.9	15.5	0.16	15.2	62	--	--
14:02	5	30	125	13.06	--	7.22	0.88	12.6	0.17	14.9	61.4	--	--
14:07	5	35	125	13.06	--	7.21	0.88	9.09	0.19	15	61	--	--
14:12	5	40	125	13.06	--	7.22	0.88	9.83	0.17	14.8	61.2	--	--
14:17	5	45	125	13.06	--	7.22	0.87	8.72	0.17	14.8	60.3	--	--
14:22	5	50	125	13.06	--	7.22	0.86	6.37	0.18	14.8	60.2	--	--
14:27	5	55	125	13.06	--	7.22	0.87	5.99	0.21	15	59.8	--	--
14:32	5	60	125	13.06	--	7.22	0.87	5.05	0.22	15.2	59.7	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	6	None

Comments:

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot — 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location: Powerhouse
Condition of Well: Good condition
Well Completion: Flush mount
Well Locked at Arrival: yes
Well Locked at Departure: yes
Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWF15-01			**Date**	09/12/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	63 °F, Cloudy, winds at mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	18.13	**Total Depth (ft-bmp)**	28.66	**Water Column (ft)**	10.53	**Gallons in Well**	1.71
Purge Start	12:25	**Pump Intake (ft-bmp)**	25.4	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	13:35	**Volumes Purged**	1.75	**Sample ID**	MWF15-01_GW-091223	**Sampled by**	Lottie Jay
Sample Time	13:30	**Gallons Purged**	3.00	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
12:30	0	0	130	18.16	--	7.15	1.65	23.7	1.01	15.1	121.3	--	--
12:35	5	5	130	18.16	--	7.16	1.64	15.5	0.68	14.8	115.3	--	--
12:40	5	10	130	18.16	--	7.17	1.63	9.51	0.43	14.6	108.8	--	--
12:45	5	15	130	18.16	--	7.16	1.6	9.06	0.35	14.7	103.5	--	--
12:50	5	20	130	18.16	--	7.19	1.54	8.64	0.28	14.7	96.7	--	--
12:55	5	25	130	18.16	--	7.2	1.47	6.39	0.24	14.5	91	--	--
13:00	5	30	130	18.16	--	7.22	1.39	6.47	0.22	14.8	85.8	--	--
13:05	5	35	130	18.16	--	7.22	1.34	6.64	0.2	14.6	80.4	--	--
13:10	5	40	130	18.16	--	7.23	1.29	5.69	0.23	14.5	77.1	--	--
13:15	5	45	130	18.16	--	7.23	1.26	4.94	0.19	14.5	75	--	--
13:20	5	50	130	18.16	--	7.24	1.21	3.49	0.19	14.7	70.7	--	--
13:25	5	55	130	18.16	--	7.24	1.18	3.93	0.19	14.7	67.2	--	--
13:30	5	60	130	18.16	--	7.24	1.16	1.27	0.17	14.9	64.3	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments:

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot — 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location:

Condition of Well:

Well Completion: NA

Well Locked at Arrival: yes

Well Locked at Departure: yes

Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter

mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWF16-06			**Date**	09/15/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	66.0 degrees F and Mostly Cloudy. The wind is blowing at 6.9 mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	12.02	**Total Depth (ft-bmp)**	28.65	**Water Column (ft)**	16.63	**Gallons in Well**	2.7
Purge Start	12:25	**Pump Intake (ft-bmp)**	26	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	13:11	**Volumes Purged**	0.46	**Sample ID**	MWF16-06_GW-091523	**Sampled by**	Garrett Link
Sample Time	13:00	**Gallons Purged**	1.25	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
12:30	0	0	110	12.04	--	7.87	0.391	7.49	3.74	17.6	72.6	--	--
12:35	5	5	100	12.05	--	7.87	0.39	5.41	4.38	17.3	71.4	--	--
12:40	5	10	100	12.06	--	7.88	0.394	1.85	4.12	17.3	69.3	--	--
12:45	5	15	100	12.07	--	7.88	0.397	1.26	4.42	17.6	67	--	--
12:50	5	20	100	12.07	--	7.86	0.397	0.49	4.38	17.2	66	--	--
12:55	5	25	100	12.1	--	7.87	0.394	0.02	4.32	17.1	63.6	--	--
13:00	5	30	100	12.06	--	7.88	0.395	0.26	4.52	17.5	61.8	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments: Initial log was lost due to app crashing, SWL is estimated

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot

1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location: GFL SE

Well Locked at Arrival: yes

Condition of Well: Good condition

Well Locked at Departure: yes

Well Completion: Flush mount

Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter

mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWF16-12			**Date**	09/18/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	55.9 degrees F and Mostly Cloudy. The wind is blowing W/NW at 8.1 mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	13.27	**Total Depth (ft-bmp)**	18.89	**Water Column (ft)**	5.62	**Gallons in Well**	0.91
Purge Start	10:29	**Pump Intake (ft-bmp)**	16.89	**Purge Method**	Low-Flow	**Purge Equipment**	Submersible
Purge End	11:07	**Volumes Purged**	2.20	**Sample ID**	MWF16-12	**Sampled by**	Samantha Szpaichler
Sample Time	11:00	**Gallons Purged**	2.00	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
10:32	0	0	120	13.72	--	8.22	0.281	12.9	7.9	15.9	176.6	--	--
10:37	5	5	120	14.5	--	8.21	0.266	9.4	1.61	16.1	177.3	--	--
10:42	5	10	120	15.06	--	8.19	0.266	7.31	1.08	16	178.1	--	--
10:47	5	15	120	15.48	--	8.16	0.265	15.1	1.6	16	179.3	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments: At 10:50 stopped purging as DTW lowered below tubing. Reached out to Ian Drost. Okay to sample and lower tubing as needed. Will note that parameters DO, Turb did not stabilize. Sampled at 11 am. Lowered 3" at 11:02

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot — 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location: GFL
Well Locked at Arrival: yes
Condition of Well: Good condition,Other
Well Locked at Departure: yes
Well Completion: Flush mount
Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWF16-18			**Date**	09/15/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	68.0 degrees F and Mostly Cloudy. The wind is blowing S/SE at 8.1 mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	20.52	**Total Depth (ft-bmp)**	31.48	**Water Column (ft)**	10.96	**Gallons in Well**	1.78
Purge Start	13:30	**Pump Intake (ft-bmp)**	29	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	14:27	**Volumes Purged**	0.98	**Sample ID**	MWF16-18_GW-091523	**Sampled by**	Garrett Link
Sample Time	14:20	**Gallons Purged**	1.75	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
13:35	0	0	105	20.52	--	7.02	0.86	2.16	0.38	18.2	64	--	--
13:40	5	5	105	20.52	--	7.04	0.86	1.91	0.34	17.5	61.1	--	--
13:45	5	10	105	20.52	--	7.05	0.86	2.33	0.29	16.8	59	--	--
13:50	5	15	105	20.52	--	7.06	0.85	1.95	0.29	16.5	57.4	--	--
13:55	5	20	105	20.52	--	7.07	0.86	1.93	0.31	16.7	56.1	--	--
14:00	5	25	105	20.51	--	7.07	0.86	1.72	0.32	16.8	55.7	--	--
14:05	5	30	105	20.51	--	7.07	0.86	1.27	0.32	16.3	55.6	--	--
14:10	5	35	105	20.51	--	7.07	0.86	0.62	0.29	15.8	55.2	--	--
14:15	5	40	105	20.51	--	7.08	0.86	0.13	0.31	16.1	54.2	--	--
14:20	5	45	105	20.51	--	7.08	0.86	0.02	0.29	16.1	53.5	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments:

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot — 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location: GFL East
Condition of Well: Good condition
Well Completion: Flush mount
Well Locked at Arrival: yes
Well Locked at Departure: yes
Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWF16-23			**Date**	09/12/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	67 °F, Partly cloudy , winds at mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	23.71	**Total Depth (ft-bmp)**	30.5	**Water Column (ft)**	6.79	**Gallons in Well**	1.1
Purge Start	14:00	**Pump Intake (ft-bmp)**	28	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	15:10	**Volumes Purged**	2.73	**Sample ID**	MWF16-23_GW-091223	**Sampled by**	Lottie Jay
Sample Time	15:05	**Gallons Purged**	3.00	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
14:05	0	0	120	23.72	--	7.06	0.426	22	3.38	22.2	55.9	--	--
14:10	5	5	120	23.72	--	7.04	0.96	11.3	3.76	18.9	50.4	--	--
14:15	5	10	130	23.72	--	7.15	0.98	1.45	1.54	18.6	52.3	--	--
14:20	5	15	130	23.72	--	7.09	0.96	136	1.35	18.1	50.5	--	--
14:25	5	20	130	23.72	--	6.99	0.91	244	0.22	16.9	48.1	--	--
14:30	5	25	130	23.72	--	7.02	0.9	129	0.21	16.7	45.2	--	--
14:35	5	30	130	23.72	--	7.05	0.89	59.3	0.24	17.4	41	--	--
14:40	5	35	130	23.72	--	7.05	0.88	41.6	0.25	17.7	38.3	--	--
14:45	5	40	130	23.72	--	7.05	0.87	26.9	0.29	18	36	--	--
14:50	5	45	130	23.72	--	7.05	0.86	24.7	0.29	17.7	35.1	--	--
14:55	5	50	130	23.72	--	7.04	0.84	20.3	0.35	17.5	34.4	--	--
15:00	5	55	130	23.72	--	7.05	0.82	14.4	0.53	17.5	33	--	--
15:05	5	60	130	23.72	--	7.05	0.8	8.6	0.6	17.8	31.8	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments:

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location:

Condition of Well:

Well Completion: NA

Well Locked at Arrival: yes

Well Locked at Departure: yes

Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter

mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWF16-25			**Date**	09/12/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	64.0 degrees F and Cloudy. The wind is blowing W at 10.3 mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	25.86	**Total Depth (ft-bmp)**	37.18	**Water Column (ft)**	11.32	**Gallons in Well**	1.84
Purge Start	13:41	**Pump Intake (ft-bmp)**	35.8	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	14:23	**Volumes Purged**	1.36	**Sample ID**	MWF16-25_GW-091223	**Sampled by**	Sommer Guy
Sample Time	14:17	**Gallons Purged**	2.50	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
13:43	0	0	130	25.86	--	7.35	0.76	12.4	2.16	15.2	112	--	--
13:48	5	5	130	25.86	--	7.11	0.75	10.1	2.59	15.3	119.6	--	--
13:53	5	10	130	25.86	--	7.04	0.73	7.36	2.9	15.4	122.7	--	--
13:58	5	15	130	25.86	--	7.06	0.69	5.36	3.13	15.2	122.1	--	--
14:03	5	20	130	25.86	--	7.08	0.69	5.13	3.06	15.1	122.5	--	--
14:08	5	25	130	25.86	--	7.09	0.69	5.75	3.24	15	123.5	--	--
14:13	5	30	130	25.86	--	7.11	0.69	5.45	3.35	15.1	123.3	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments:

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot — 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location: Kennett ST North ROW
Condition of Well: Good condition,Missing bolts
Well Completion: Flush mount
Well Locked at Arrival: yes
Well Locked at Departure: yes
Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWF16-26			**Date**	09/12/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	66.0 degrees F and Mostly Cloudy. The wind is blowing W/NW at 9.2 mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	24.4	**Total Depth (ft-bmp)**	36.7	**Water Column (ft)**	12.3	**Gallons in Well**	2
Purge Start	14:48	**Pump Intake (ft-bmp)**	34.2	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	15:27	**Volumes Purged**	1.00	**Sample ID**	MWF16-26_GW-091223	**Sampled by**	Sommer Guy
Sample Time	15:25	**Gallons Purged**	2.00	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
14:49	0	0	130	24.4	--	7.33	1.45	4.26	5.22	14.9	144.4	--	--
14:54	5	5	130	24.4	--	7	1.44	4.15	3.57	14.5	141.2	--	--
14:59	5	10	130	24.4	--	6.97	1.4	4.73	3.93	14.5	137.6	--	--
15:04	5	15	130	24.4	--	7.01	1.34	6.93	3.74	14.5	135	--	--
15:09	5	20	130	24.4	--	7.02	1.32	2.98	3.79	14.5	133.7	--	--
15:14	5	25	130	24.4	--	7.02	1.31	2.64	3.97	14.7	132.5	--	--
15:19	5	30	130	24.4	--	7.06	1.3	2.34	3.76	14.9	127.6	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments:

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot — 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location: Baldwin ROW east
Condition of Well:
Well Completion: Flush mount
Well Locked at Arrival: yes
Well Locked at Departure: yes
Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWF7-02			**Date**	09/12/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	60 °F, Cloudy, winds at mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	18.68	**Total Depth (ft-bmp)**	22.87	**Water Column (ft)**	4.19	**Gallons in Well**	0.68
Purge Start	10:20	**Pump Intake (ft-bmp)**	20	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	11:37	**Volumes Purged**	2.94	**Sample ID**	MWF7-02_GW-091223	**Sampled by**	Lottie Jay
Sample Time	11:25	**Gallons Purged**	2.00	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
10:25	0	0	130	18.73	--	7.05	1.09	156	3.74	15.6	81.9	--	--
10:30	5	5	130	18.72	--	7.07	1.08	95.2	2.41	15.6	74.5	--	--
10:35	5	10	130	18.72	--	7.17	1.09	30.1	3.14	15.7	66.1	--	--
10:40	5	15	130	18.72	--	7.17	1.08	19	4.1	15.6	63.2	--	--
10:45	5	20	130	18.72	--	7.16	1.08	19.4	4.06	15.4	62.4	--	--
10:50	5	25	130	18.72	--	7.15	1.08	15.2	4.03	15.4	61.3	--	--
10:55	5	30	130	18.72	--	7.18	1.08	8.74	4.03	15.3	59.1	--	--
11:00	5	35	130	18.72	--	7.18	1.08	5.15	4.02	15.3	58.2	--	--
11:05	5	40	130	18.72	--	7.19	1.08	3.94	3.98	15.3	56.9	--	--
11:10	5	45	130	18.72	--	7.19	1.09	1.68	3.95	15.3	56.2	--	--
11:15	5	50	130	18.72	--	7.19	1.09	0.46	3.92	15.3	55.7	--	--
11:20	5	55	130	18.72	--	7.19	1.08	2.46	3.91	15.3	54.8	--	--
11:25	5	60	130	18.72	--	7.19	1.09	4.59	3.89	15.3	54.7	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments: Equipment Blank 03 taken here

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location:

Condition of Well:

Well Completion: NA

Well Locked at Arrival: yes

Well Locked at Departure: yes

Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWM16-52			**Date**	09/19/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	59.0 degrees F and Mostly Clear. The wind is blowing W at 4.7 mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	26.84	**Total Depth (ft-bmp)**	37.2	**Water Column (ft)**	10.36	**Gallons in Well**	1.68
Purge Start	10:29	**Pump Intake (ft-bmp)**	34.7	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	11:30	**Volumes Purged**	1.19	**Sample ID**	MWM16-52_GW-091923	**Sampled by**	Sommer Guy
Sample Time	11:15	**Gallons Purged**	2.00	**Replicate/ Code No.**	MWM16-52_GW-091923	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
10:30	0	0	130	27.16	--	7.64	2.31	24.3	1.64	15.6	-110.8	--	--
10:35	5	5	130	27.16	--	7.15	2.32	22.4	0.72	15.9	-98.2	--	--
10:40	5	10	130	27.16	--	7.03	2.45	13.4	0.32	15.7	-95.2	--	--
10:45	5	15	130	27.16	--	7.06	2.38	10.3	0.24	15.5	-102.8	--	--
10:50	5	20	130	27.16	--	7.07	2.38	10.4	0.22	15.3	-108.4	--	--
10:55	5	25	130	27.16	--	7.08	2.35	9.56	0.14	15.5	-115	--	--
11:00	5	30	130	27.16	--	7.09	2.35	8.64	0.14	15.3	-120.6	--	--
11:05	5	35	130	27.16	--	7.09	2.33	7.88	0.14	15.2	-124.8	--	--
11:10	5	40	130	27.16	--	7.1	2.33	8.52	0.14	15.4	-129.1	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	6	None

Comments:

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot

1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location: Upull lot

Condition of Well: Good condition

Well Completion: Flush mount

Well Locked at Arrival: yes

Well Locked at Departure: yes

Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter

mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWM2-22			**Date**	09/25/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	63.0 degrees F and Cloudy. The wind is blowing E at 9.2 mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	17.02	**Total Depth (ft-bmp)**	24.22	**Water Column (ft)**	7.2	**Gallons in Well**	1.17
Purge Start	10:39	**Pump Intake (ft-bmp)**	21.7	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	11:20	**Volumes Purged**	1.71	**Sample ID**	MWM2-22_GW-092523	**Sampled by**	Sommer Guy
Sample Time	11:15	**Gallons Purged**	2.00	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
10:40	0	0	130	17.03	--	6.98	0.74	0.02	0.89	16.8	19.4	--	--
10:45	5	5	130	17.03	--	6.92	0.75	0.02	0.6	17	-14.7	--	--
10:50	5	10	130	17.03	--	6.92	0.76	0.02	0.59	17	-29.4	--	--
10:55	5	15	130	17.03	--	6.91	0.77	0.02	0.5	16.8	-37.4	--	--
11:00	5	20	130	17.03	--	6.9	0.78	0.02	0.28	16.8	-41.7	--	--
11:05	5	25	130	17.03	--	6.9	0.78	0.02	0.3	16.7	-44.7	--	--
11:10	5	30	130	17.03	--	6.89	0.79	0.02	0.28	16.7	-46.8	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments:

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot — 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location: Tatro/Recycling
Well Locked at Arrival:
Condition of Well: Good condition
Well Locked at Departure:
Well Completion: Stick-up
Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWM2-28			**Date**	09/25/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	60.1 degrees F and Cloudy. The wind is blowing E/NE at 8.1 mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	16.7	**Total Depth (ft-bmp)**	25.79	**Water Column (ft)**	9.09	**Gallons in Well**	1.48
Purge Start	09:39	**Pump Intake (ft-bmp)**	23.3	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	10:24	**Volumes Purged**	1.35	**Sample ID**	MWM2-28_GW-092523	**Sampled by**	Sommer Guy
Sample Time	10:20	**Gallons Purged**	2.00	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
09:40	0	0	130	16.81	--	7.72	0.7	1.46	0.71	17.1	88.5	--	--
09:45	5	5	130	16.81	--	6.96	0.63	1.9	0.37	17.1	77.9	--	--
09:50	5	10	130	16.81	--	6.92	0.62	0.89	0.21	17.1	24	--	--
09:55	5	15	130	16.81	--	6.97	0.62	1.72	0.19	17.2	-13	--	--
10:00	5	20	130	16.81	--	7.01	0.62	0.3	0.16	17.2	-29.2	--	--
10:05	5	25	130	16.81	--	7.06	0.62	0.09	0.16	17.3	-38.8	--	--
10:10	5	30	130	16.81	--	7.09	0.62	0.02	0.16	17.3	-42.5	--	--
10:15	5	35	130	16.81	--	7.11	0.62	0.02	0.16	17.3	-48.3	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments:

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot

1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location: Tatro/ Recycling

Condition of Well: Good condition

Well Completion: Stick-up

Well Locked at Arrival: yes

Well Locked at Departure: yes

Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter

mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWM30-01			**Date**	09/14/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	64.0 degrees F and Mostly Cloudy. The wind is blowing W/SW at 3.4 mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	23.58	**Total Depth (ft-bmp)**	34.63	**Water Column (ft)**	11.05	**Gallons in Well**	1.8
Purge Start	13:39	**Pump Intake (ft-bmp)**	32.1	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	14:31	**Volumes Purged**	1.11	**Sample ID**	MWM30-01_GW-091423	**Sampled by**	Sommer Guy
Sample Time	14:25	**Gallons Purged**	2.00	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
13:40	0	0	130	23.6	--	7.46	1.04	43.7	3.69	17.2	10.3	--	--
13:45	5	5	130	23.6	--	6.87	1.01	40	2.99	16.3	-47.4	--	--
13:50	5	10	130	23.6	--	6.83	1	28.4	2.49	16.6	-54	--	--
13:55	5	15	130	23.6	--	6.83	0.99	22.4	2.46	16.3	-55.5	--	--
14:00	5	20	130	23.6	--	6.85	0.99	15.7	2.53	16.1	-56.9	--	--
14:05	5	25	130	23.6	--	6.87	0.99	13.7	2.14	16.3	-57.4	--	--
14:10	5	30	130	23.6	--	6.91	0.99	11.2	2.26	16.3	-59.7	--	--
14:15	5	35	130	23.6	--	6.93	0.99	10.8	2.25	16.4	-59.9	--	--
14:20	5	40	130	23.6	--	6.94	0.98	8.91	2.14	16.6	-61.5	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments: Equipment blank 04 collected here

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot — 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location: Upull lot south

Condition of Well: Good condition,Missing well cover and bolts

Well Completion: Flush mount

Well Locked at Arrival:

Well Locked at Departure:

Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter

mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWM30-02			**Date**	09/19/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	59 °F, Sunny, winds at mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	19.15	**Total Depth (ft-bmp)**	32.35	**Water Column (ft)**	13.2	**Gallons in Well**	2.14
Purge Start	10:30	**Pump Intake (ft-bmp)**	29.8	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	11:30	**Volumes Purged**	1.40	**Sample ID**	MWM30-02_GW-091923	**Sampled by**	Lottie Jay
Sample Time	11:20	**Gallons Purged**	3.00	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
10:35	0	0	100	19.24	--	7.22	1.04	169	2.55	17	152.8	--	--
10:40	10	10	110	19.28	--	7.3	1.03	117	1.1	16.8	137.4	--	--
10:45	5	15	110	19.32	--	7.31	1.04	96.5	0.86	16.4	119.6	--	--
10:50	5	20	110	19.35	--	7.33	1.04	58.9	0.73	16.4	121.4	--	--
10:55	5	20	110	19.36	--	7.38	1.02	23.9	0.57	16.6	105.1	--	--
11:00	5	25	110	19.4	--	7.38	1.03	9.8	0.57	16.3	98.4	--	--
11:05	5	30	110	19.46	--	7.39	1.03	5.74	0.57	16.3	92.2	--	--
11:10	5	35	110	19.37	--	7.38	1.03	1.85	0.61	16.4	88	--	--
11:15	5	40	110	19.42	--	7.39	1.03	1.61	0.62	16.4	85.2	--	--
11:20	5	45	110	19.46	--	7.39	1.03	2.01	0.61	16.4	80.9	Small white particles	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments:

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location:
Condition of Well:
Well Completion: NA
Well Locked at Arrival: yes
Well Locked at Departure: yes
Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWM5-03			**Date**	09/14/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	64 °F, Sunny, winds at mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	21.13	**Total Depth (ft-bmp)**	33.29	**Water Column (ft)**	12.16	**Gallons in Well**	1.98
Purge Start	12:30	**Pump Intake (ft-bmp)**	30.8	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	14:53	**Volumes Purged**	2.53	**Sample ID**	MWM5-03_GW-091423	**Sampled by**	Lottie Jay
Sample Time	14:35	**Gallons Purged**	5.00	**Replicate/ Code No.**	DUP-02_GW-091423	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
12:35	0	0	130	21.13	--	6.6	8.83	60	1.58	16.7	72.3	--	--
12:40	5	5	130	21.15	--	6.64	8.73	56.7	0.41	17.1	35	--	--
12:45	5	10	130	21.15	--	6.71	8.74	49.4	0.24	16.4	5.7	--	--
12:50	5	15	130	21.15	--	6.72	8.72	46.4	0.2	16.3	-13	--	--
12:55	5	20	110	21.15	--	6.73	8.57	41.4	0.17	16	-27.8	--	--
13:00	5	25	130	21.15	--	6.74	8.52	36.4	0.17	16.6	-36	--	--
13:05	5	30	130	21.15	--	6.74	8.44	32.2	0.16	16.5	-41.1	--	--
13:10	5	35	100	21.15	--	6.74	8.34	30.6	0.14	16.6	-46.5	--	--
13:15	5	40	100	21.15	--	6.74	8.33	25.1	0.14	16.7	-47.8	--	--
13:20	5	45	100	21.15	--	6.74	8.28	25.4	0.13	17	-50.6	--	--
13:25	5	50	100	21.15	--	6.74	8.21	24.6	0.12	16.4	-53.6	--	--
13:30	5	55	100	21.15	--	6.74	8.19	18.3	0.12	16.8	-55.9	--	--
13:35	5	60	100	21.15	--	6.74	8.16	18.2	0.13	17.2	-57.2	--	--
13:40	5	65	100	21.15	--	6.74	8.2	15.4	0.14	17.3	-58.1	--	--
13:45	5	70	100	21.15	--	6.74	8.27	32.4	0.14	16.7	-59	--	--
13:50	5	75	100	21.15	--	6.75	8.18	39.5	0.13	16.7	-60.1	--	--
13:55	5	80	100	21.15	--	6.75	8.09	37.4	0.13	16.6	-61.3	--	--
14:00	5	85	100	21.15	--	6.75	8.08	29.1	0.12	16.6	-61.4	--	--
14:05	5	90	100	21.15	--	6.75	8.04	28.1	0.11	16.8	-62.2	--	--
14:10	5	95	100	21.15	--	6.75	8.04	24.8	0.11	16.6	-62.4	--	--
14:15	5	100	100	21.15	--	6.75	8.04	17.1	0.11	16.6	-62.7	--	--
14:20	5	105	100	21.15	--	6.75	8.03	23	0.11	16.9	-63	--	--
14:25	5	110	100	21.15	--	6.75	8.06	18.3	0.11	16.8	-63.6	--	--
14:30	5	115	100	21.15	--	6.75	-63.7	18.8	0.1	16.3	-63.8	Clear	Mild

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	4	None

Comments: Higher turbidity at this well, not going below 18.8 NTU

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot

1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location:

Well Locked at Arrival: yes

Condition of Well:

Well Locked at Departure: yes

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter

mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWOS-01			**Date**	09/13/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	53.1 degrees F and Partly Cloudy. The wind is blowing N/NW at 8.1 mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	7.19	**Total Depth (ft-bmp)**	12.95	**Water Column (ft)**	5.76	**Gallons in Well**	0.94
Purge Start	09:42	**Pump Intake (ft-bmp)**	10.45	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	10:55	**Volumes Purged**	3.19	**Sample ID**	MWOS-01_GW-091323	**Sampled by**	Garrett Link
Sample Time	10:45	**Gallons Purged**	3.00	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
09:45	0	0	125	7.19	--	6.86	1.76	70	0.23	16.8	122.3	--	--
09:50	5	5	150	7.21	--	6.89	1.74	39	0.11	16.8	115.4	--	--
09:55	5	10	150	7.21	--	6.93	1.73	38.5	0.15	16.9	112	--	--
10:00	5	15	150	7.21	--	6.94	1.72	25.8	0.12	16.6	108.2	--	--
10:05	5	20	150	7.22	--	6.94	1.7	26.2	0.1	16.7	105.9	--	--
10:10	5	25	150	7.22	--	6.96	1.69	21.4	0.08	16.9	103.7	--	--
10:15	5	30	150	7.22	--	6.97	1.68	13.9	0.09	17	102.3	--	--
10:20	5	35	150	7.22	--	6.98	1.67	14.1	0.1	16.9	101	--	--
10:25	5	40	150	7.22	--	7	1.66	13.9	0.1	16.8	100.5	--	--
10:30	5	45	150	7.22	--	7.01	1.65	9.46	0.09	16.9	99.8	--	--
10:35	5	50	150	7.22	--	7.02	1.65	8.51	0.09	16.8	99.5	--	--
10:40	5	55	150	7.22	--	7.02	1.64	8.95	0.09	16.8	98.9	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments:

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot — 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location: Off-site; Montcalm st

Well Locked at Arrival: yes

Condition of Well: Good condition

Well Locked at Departure: yes

Well Completion: Flush mount

Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter

mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWOS-01			**Date**	09/13/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	53.1 degrees F and Partly Cloudy. The wind is blowing N/NW at 8.1 mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	7.19	**Total Depth (ft-bmp)**	12.95	**Water Column (ft)**	5.76	**Gallons in Well**	0.94
Purge Start	09:42	**Pump Intake (ft-bmp)**	10.45	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	10:55	**Volumes Purged**	3.19	**Sample ID**	MWOS-01_GW-091323	**Sampled by**	Garrett Link
Sample Time	10:45	**Gallons Purged**	3.00	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
09:45	0	0	125	7.19	--	6.86	1.76	70	0.23	16.8	122.3	--	--
09:50	5	5	150	7.21	--	6.89	1.74	39	0.11	16.8	115.4	--	--
09:55	5	10	150	7.21	--	6.93	1.73	38.5	0.15	16.9	112	--	--
10:00	5	15	150	7.21	--	6.94	1.72	25.8	0.12	16.6	108.2	--	--
10:05	5	20	150	7.22	--	6.94	1.7	26.2	0.1	16.7	105.9	--	--
10:10	5	25	150	7.22	--	6.96	1.69	21.4	0.08	16.9	103.7	--	--
10:15	5	30	150	7.22	--	6.97	1.68	13.9	0.09	17	102.3	--	--
10:20	5	35	150	7.22	--	6.98	1.67	14.1	0.1	16.9	101	--	--
10:25	5	40	150	7.22	--	7	1.66	13.9	0.1	16.8	100.5	--	--
10:30	5	45	150	7.22	--	7.01	1.65	9.46	0.09	16.9	99.8	--	--
10:35	5	50	150	7.22	--	7.02	1.65	8.51	0.09	16.8	99.5	--	--
10:40	5	55	150	7.22	--	7.02	1.64	8.95	0.09	16.8	98.9	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250 mL Plastic	2	None

Comments:

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot — 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location: Off-site; Montcalm st

Well Locked at Arrival: yes

Condition of Well: Good condition

Well Locked at Departure: yes

Well Completion: Flush mount

Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter

mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWOS-02			**Date**	09/13/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	55 °F, Partly cloudy, winds at mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	6.89	**Total Depth (ft-bmp)**	15.9	**Water Column (ft)**	9.01	**Gallons in Well**	1.46
Purge Start	10:05	**Pump Intake (ft-bmp)**	13.5	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	12:05	**Volumes Purged**	1.37	**Sample ID**	MWOS-02_GW-091323	**Sampled by**	Lottie Jay
Sample Time	11:35	**Gallons Purged**	2.00	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
10:10	0	0	120	6.89	--	6.93	2.84	369	0.19	16.9	145.2	--	--
10:15	5	5	120	6.89	--	7.08	2.86	199	0.11	16.8	72.7	--	--
10:20	5	10	120	6.89	--	7.11	2.86	223	0.1	16.8	51.4	--	--
10:25	5	15	120	6.89	--	7.14	2.86	118	0.14	16.9	26	--	--
10:30	5	20	120	6.89	--	7.15	2.86	41.4	0.13	16.9	19.5	--	--
10:35	5	25	120	6.89	--	7.16	2.84	39.4	0.16	16.5	13.6	--	--
10:40	5	30	120	6.89	--	7.16	2.81	53.2	0.08	16.9	3.5	--	--
10:45	5	35	120	6.89	--	7.17	2.78	50.6	0.12	16.9	-11.2	--	--
10:50	5	40	120	6.89	--	7.17	2.78	105	0.2	16.9	-16	--	--
10:55	5	45	120	6.89	--	7.17	2.76	29.3	0.16	17.1	-28.3	--	--
11:00	5	50	100	6.89	--	7.17	2.76	25.7	0.1	17.1	-34.4	--	--
11:05	5	55	100	6.89	--	7.17	2.75	31	0.07	17	-43	--	--
11:10	5	60	100	6.89	--	7.17	2.74	28.6	0.08	17	-45.7	--	--
11:15	5	65	100	6.89	--	7.17	2.74	64.9	0.06	17	-47.6	--	--
11:20	5	70	100	6.89	--	7.17	2.73	24.5	0.06	17	-51.2	--	--
11:25	5	75	100	6.89	--	7.17	2.72	20.7	0.17	17	-52.3	--	--
11:30	5	80	100	6.89	--	7.18	2.76	12.4	0.17	17	-54.5	--	--
11:35	5	85	100	6.89	--	7.18	2.72	9.43	0.17	17.1	-56.1	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments:

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot

1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location:

Condition of Well:

Well Completion: NA

Well Locked at Arrival: yes

Well Locked at Departure: yes

Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter

mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWOS-03			**Date**	09/13/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	53.1 degrees F and Partly Cloudy. The wind is blowing N/NW at 8.1 mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	7.13	**Total Depth (ft-bmp)**	18.72	**Water Column (ft)**	11.59	**Gallons in Well**	1.88
Purge Start	10:04	**Pump Intake (ft-bmp)**	16.2	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	10:54	**Volumes Purged**	1.06	**Sample ID**	MWOS-10_GW-091323	**Sampled by**	Sommer Guy
Sample Time	10:43	**Gallons Purged**	2.00	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
10:05	0	0	130	7.4	--	6.65	1.79	6.19	8.63	13.9	34.6	--	--
10:10	5	5	130	7.66	--	6.57	1.75	8.21	8.2	14.2	-13	--	--
10:15	5	10	130	7.77	--	6.59	1.74	6.53	7.44	14	-26.6	--	--
10:20	5	15	130	7.8	--	6.59	1.75	5.21	7.56	13.9	-31.1	--	--
10:25	5	20	130	7.81	--	6.6	1.75	5.36	7.34	13.8	-34	--	--
10:30	5	25	130	7.81	--	6.61	1.75	5.58	7.21	13.8	-36.8	--	--
10:35	5	30	130	7.81	--	6.62	1.75	5.54	7.06	13.8	-38.6	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments: Equipment blank 01 taken here

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location: Sidewalk. South ROW Montcalm

Well Locked at Arrival: yes

Condition of Well: Good condition

Well Locked at Departure: yes

Well Completion: Flush mount

Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter

mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWOS-04			**Date**	09/13/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	57.9 degrees F and Cloudy. The wind is blowing NW at 5.8 mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	3.67	**Total Depth (ft-bmp)**	12.85	**Water Column (ft)**	9.18	**Gallons in Well**	1.49
Purge Start	11:56	**Pump Intake (ft-bmp)**	10	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	13:50	**Volumes Purged**	1.34	**Sample ID**	MWOS-04_GW-091323	**Sampled by**	Sommer Guy
Sample Time	13:10	**Gallons Purged**	2.00	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
11:58	0	0	130	3.86	--	6.9	2.66	23.1	6.67	16.9	-90.4	--	--
12:03	5	5	130	4.03	--	6.78	2.6	24.3	5.8	17.1	-87.7	--	--
12:08	5	10	130	4.25	--	6.78	2.53	25.6	5.35	17.4	-86.4	--	--
12:13	5	15	130	4.42	--	6.8	2.5	20.1	5.27	17.7	-86.7	--	--
12:18	5	20	130	4.57	--	6.8	2.47	15	5.14	17.9	-87	--	--
12:23	5	25	130	4.73	--	6.8	2.47	17.6	4.9	17.9	-87.1	--	--
12:28	5	30	130	4.9	--	6.79	2.48	15.6	4.73	17.8	-87	--	--
12:33	5	35	130	5.01	--	6.79	2.49	9.26	4.73	17.9	-87.3	--	--
12:38	5	40	130	5.1	--	6.79	2.49	11.1	4.58	17.9	-87.9	--	--
12:43	5	45	130	5.2	--	6.79	2.49	9.57	4.34	17.9	-88.1	--	--
12:48	5	50	130	5.22	--	6.79	2.51	4.69	4.27	18	-88.5	--	--
12:53	5	55	130	5.22	--	6.8	2.51	6.6	4.19	17.8	-88.9	--	--
12:58	5	60	130	5.34	--	6.78	2.51	5.52	4.15	17.8	-88.7	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments:

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot — 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location: In sidewalk. Southern ROW of Montcalm

Condition of Well: Good condition

Well Completion: Flush mount

Well Locked at Arrival: yes

Well Locked at Departure: yes

Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter

mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWOS-09R			**Date**	09/12/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	66.0 degrees F and Mostly Cloudy. The wind is blowing W/NW at 9.2 mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	27.06	**Total Depth (ft-bmp)**	32.21	**Water Column (ft)**	5.15	**Gallons in Well**	0.84
Purge Start	15:17	**Pump Intake (ft-bmp)**	30	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	16:38	**Volumes Purged**	2.98	**Sample ID**	MWOS-09R_GW-091223	**Sampled by**	Garrett Link
Sample Time	16:35	**Gallons Purged**	2.50	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
15:30	0	0	125	27.08	--	7.18	0.85	47.5	1.94	15.9	66.1	--	--
15:35	5	5	125	27.08	--	7.21	0.83	38.4	0.22	15.9	63.5	--	--
15:40	2	10	155	27.08	--	7.18	0.85	32.6	0.31	15.8	64.7	--	--
15:45	5	15	125	27.08	--	7.19	0.87	27.1	0.6	15.6	65	--	--
15:50	5	20	125	27.08	--	7.19	0.87	19.9	0.62	15.6	64.6	--	--
15:55	5	25	125	27.08	--	7.19	0.87	14	0.4	15.5	64.7	--	--
16:00	5	30	125	27.08	--	7.2	0.87	9.69	0.35	15.7	64.3	--	--
16:05	5	35	125	27.08	--	7.2	0.87	9.43	0.3	15.5	64.1	--	--
16:10	5	40	125	27.08	--	7.2	0.87	7.99	0.31	15.4	64.2	--	--
16:15	5	45	125	27.08	--	7.2	0.87	7.94	0.3	15.4	64	--	--
16:20	5	50	125	27.08	--	7.19	0.87	6.3	0.33	15.4	64.1	--	--
16:25	5	55	125	27.08	--	7.21	0.87	5.04	0.33	15.4	64	--	--
16:30	5	60	125	27.08	--	7.2	0.87	4.92	0.35	15.3	63.8	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments: Well vault flooded with water apron arrival.

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot — 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location: Offsite near powerhouse
Condition of Well: Good condition
Well Completion: Flush mount
Well Locked at Arrival: yes
Well Locked at Departure: yes
Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWOS-10			**Date**	09/12/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	67 °F, Light Rain, winds at mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	28.32	**Total Depth (ft-bmp)**	32.72	**Water Column (ft)**	4.4	**Gallons in Well**	0.71
Purge Start	15:55	**Pump Intake (ft-bmp)**	30	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	17:05	**Volumes Purged**	4.23	**Sample ID**	MWOS-10_GW-091233	**Sampled by**	Lottie Jay
Sample Time	17:00	**Gallons Purged**	3.00	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
16:00	0	0	130	28.32	--	7.22	0.97	84	1.5	16.2	89.7	--	--
16:05	5	5	130	28.33	--	7.22	0.95	51.9	1.02	15.9	85.8	--	--
16:10	5	10	130	28.33	--	7.28	0.95	31.6	0.95	15.8	78.3	--	--
16:15	5	15	130	28.33	--	7.31	0.96	28	1.07	15.8	73.8	--	--
16:20	5	20	130	28.33	--	7.31	0.96	24.7	1.52	15.7	70.2	--	--
16:25	5	25	130	28.33	--	7.31	0.97	18.7	1.47	15.8	63.8	--	--
16:30	5	30	130	28.33	--	7.32	0.97	18.2	1.3	16.4	61	--	--
16:35	5	35	130	28.33	--	7.31	0.96	14.9	1.14	16.2	60.3	--	--
16:40	5	40	130	28.33	--	7.31	0.962	12.8	1.23	16.1	56.6	--	--
16:45	5	45	130	28.33	--	7.3	0.96	8.59	1.24	15.8	55.2	--	--
16:50	5	50	130	28.33	--	7.31	0.95	7.28	1.21	15.9	53.1	--	--
16:55	5	55	130	28.33	--	7.31	0.95	5.05	1.25	15.6	50.2	--	--
17:00	5	60	130	28.33	--	7.31	0.95	6.39	1.12	15.6	48.8	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments:

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot — 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location:

Condition of Well:

Well Completion: NA

Well Locked at Arrival: yes

Well Locked at Departure: yes

Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter

mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWW10-03			**Date**	09/15/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	65 °F, Sunny, winds at mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	7.21	**Total Depth (ft-bmp)**	13.09	**Water Column (ft)**	5.88	**Gallons in Well**	0.96
Purge Start	12:15	**Pump Intake (ft-bmp)**	11.5	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	13:38	**Volumes Purged**	2.08	**Sample ID**	MWW10-03_GW-091523	**Sampled by**	Lottie Jay
Sample Time	12:50	**Gallons Purged**	2.00	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
12:20	0	0	120	7.21	--	6.87	0.93	157	0.33	21.5	122.3	--	--
12:25	12	12	120	7.14	--	6.92	0.92	6.7	0.29	21.4	109.8	--	--
12:30	5	10	120	7.16	--	6.95	0.91	2.23	0.33	21.3	105.4	--	--
12:35	5	15	120	7.17	--	6.96	0.92	0.98	0.3	21.4	99.9	--	--
12:40	5	20	120	7.19	--	6.96	0.92	0.83	0.13	21.7	95	--	--
12:45	5	25	120	7.19	--	6.96	0.92	0.58	0.12	21.6	91.8	--	--
12:50	5	30	120	7.19	--	6.96	0.92	0.02	0.12	21.6	90.4	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments: Wasps

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot — 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location:

Condition of Well:

Well Completion: NA

Well Locked at Arrival: yes

Well Locked at Departure: yes

Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter

mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWW10-04			**Date**	09/15/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	60 °F, Sunny, winds at mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	8.27	**Total Depth (ft-bmp)**	14	**Water Column (ft)**	5.73	**Gallons in Well**	0.93
Purge Start	10:25	**Pump Intake (ft-bmp)**	11.5	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	11:47	**Volumes Purged**	2.69	**Sample ID**	MWW10-04_GW-091523	**Sampled by**	Lottie Jay
Sample Time	11:30	**Gallons Purged**	2.50	**Replicate/ Code No.**	DUP-01_GW-091223	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
10:30	0	0	110	8.33	--	6.74	0.66	82.1	0.35	20.3	137.5	--	--
10:35	5	5	120	8.33	--	7.07	0.63	70	0.13	20.7	125.1	--	--
10:40	5	10	120	8.35	--	7.12	0.62	46.7	0.14	20.7	116	--	--
10:45	5	15	120	8.35	--	7.13	0.63	21.1	0.1	20.8	113.8	--	--
10:50	5	20	120	8.37	--	7.13	0.63	12	0.08	20.7	112.8	--	--
10:55	5	25	120	8.37	--	7.13	0.64	7.66	0.09	20.6	112	--	--
11:00	5	30	120	8.37	--	7.13	0.64	7.43	0.09	20.7	111	--	--
11:05	5	35	120	8.37	--	7.13	0.64	6.48	0.09	20.8	110.3	--	--
11:10	5	40	120	8.38	--	7.13	0.64	6.38	0.06	20.6	110	--	--
11:15	5	45	120	8.38	--	7.13	0.64	5.2	0.09	20.4	109.2	--	--
11:20	5	50	120	8.38	--	7.13	0.65	4.11	0.07	20.4	107.9	--	--
11:25	5	55	120	8.38	--	7.13	0.66	3.81	0.07	20.1	107.8	--	--
11:30	5	60	120	8.38	--	7.13	0.65	1.91	0.06	20.1	107.5	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	4	None

Comments: Wasps

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot — 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location:

Condition of Well:

Well Completion: NA

Well Locked at Arrival: yes

Well Locked at Departure: yes

Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWW1-02			**Date**	09/19/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	64.9 degrees F and Mostly Cloudy. The wind is blowing W at 9.2 mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	5.17	**Total Depth (ft-bmp)**	15.07	**Water Column (ft)**	9.9	**Gallons in Well**	1.61
Purge Start	12:36	**Pump Intake (ft-bmp)**	12.6	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	13:26	**Volumes Purged**	1.24	**Sample ID**	MWW1-02_GW-091923	**Sampled by**	Sommer Guy
Sample Time	13:22	**Gallons Purged**	2.00	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
12:37	0	0	130	5.25	--	6.79	2.54	7.56	5.22	16.4	-94.9	--	--
12:42	5	5	130	5.25	--	6.68	2.54	11.4	0.44	16.3	-96.3	--	--
12:47	5	10	130	5.25	--	6.68	2.53	11.4	0.31	16.5	-98.4	--	--
12:52	5	15	130	5.25	--	6.69	2.53	25.5	0.26	16.3	-99.9	--	--
12:57	5	20	130	5.25	--	6.71	2.52	6.53	0.36	17.1	-101.6	--	--
13:02	5	25	130	5.25	--	6.72	2.52	14.1	0.36	16.9	-102.7	--	--
13:07	5	30	130	5.25	--	6.72	2.51	6.53	0.4	17.3	-102.9	--	--
13:12	5	35	130	5.25	--	6.73	2.51	6.41	0.39	17.4	-103.5	--	--
13:17	5	40	130	5.25	--	6.74	2.51	6.74	0.4	17.6	-103.8	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments: Equipment blank 06 taken here

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot — 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location: USPS
Condition of Well: Good condition
Well Completion: Stick-up
Well Locked at Arrival: yes
Well Locked at Departure: yes
Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWW1-04			**Date**	09/15/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	69 °F, Sunny, winds at mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	5.75	**Total Depth (ft-bmp)**	16.4	**Water Column (ft)**	10.65	**Gallons in Well**	1.73
Purge Start	14:35	**Pump Intake (ft-bmp)**	14	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	16:12	**Volumes Purged**	1.73	**Sample ID**	MWW1-04_GW-091523	**Sampled by**	Lottie Jay
Sample Time	15:40	**Gallons Purged**	3.00	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
14:40	0	0	120	5.76	--	10.81	0.55	80.4	0.76	22	-131.8	--	--
14:45	5	5	100	5.76	--	10.61	0.002	47.1	0.49	22.1	-131.1	--	--
14:50	5	10	100	5.76	--	10.85	0.54	34.4	0.27	21.8	-141.5	--	--
14:56	6	16	100	5.76	--	10.87	0.54	26.9	0.19	21.6	-144	--	--
15:00	4	20	100	5.77	--	10.83	0.531	24.7	0.04	21.2	-157.6	--	--
15:05	5	25	100	5.77	--	10.77	0.509	19.2	0.04	21.2	-156.9	--	--
15:10	5	30	100	5.77	--	10.71	0.503	13.5	0.05	21.4	-149.4	--	--
15:15	5	35	100	5.76	--	10.66	0.493	8.6	0.05	21.3	-142.7	--	--
15:20	5	40	100	5.76	--	10.57	0.478	9.07	0.07	21.3	-130.9	--	--
15:25	5	45	100	5.76	--	10.52	0.47	9.32	0.07	20.8	-121.1	--	--
15:30	5	50	100	5.76	--	10.49	0.465	7.86	0.08	21	-117.2	--	--
15:35	5	55	100	5.76	--	10.43	0.463	7	0.07	20.9	-111	--	--
15:40	5	60	100	5.76	--	10.38	0.46	6.99	0.06	20.7	-109.6	Clear	Mild

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments:

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot — 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location:

Condition of Well:

Well Completion: NA

Well Locked at Arrival: yes

Well Locked at Departure: yes

Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter

mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWW1-06			**Date**	09/13/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	65 °F, Partly cloudy, winds at mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	5.54	**Total Depth (ft-bmp)**	14	**Water Column (ft)**	8.46	**Gallons in Well**	1.37
Purge Start	12:40	**Pump Intake (ft-bmp)**	11.5	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	13:57	**Volumes Purged**	2.19	**Sample ID**	MWW1-06_GW-091323	**Sampled by**	Lottie Jay
Sample Time	13:50	**Gallons Purged**	3.00	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
12:45	0	0	130	5.54	--	7.06	0.565	324	0.16	14.9	-51.2	--	--
12:50	5	5	130	5.54	--	7.09	0.564	72.9	0.09	14.9	-59.5	--	--
12:55	5	10	130	5.54	--	7.14	0.571	19.1	0.07	14.8	-67.9	--	--
13:00	5	15	130	5.54	--	7.15	0.578	42.5	0.06	14.7	-76.2	--	--
13:05	5	20	110	5.54	--	7.13	0.589	81.1	0.09	15.4	-82.4	--	--
13:10	5	25	110	5.54	--	7.13	0.589	125	0.04	15.3	-86.1	--	--
13:15	5	30	110	5.54	--	7.12	0.591	52.5	0.03	14.9	-91.7	--	--
13:20	5	35	110	5.54	--	7.12	0.591	32.5	0.01	14.8	-97.2	--	--
13:25	5	40	110	5.54	--	7.12	0.593	20.9	0.02	14.7	-100.8	--	--
13:30	5	45	110	5.54	--	7.12	0.593	19.3	0.02	14.7	-102	--	--
13:35	5	50	110	5.54	--	7.12	0.596	14.6	0.05	14.7	-105.5	--	--
13:40	5	55	110	5.54	--	7.12	0.596	13.3	0.04	14.7	-107.8	--	--
13:45	5	60	110	5.54	--	7.11	0.602	12.3	0.03	14.6	-110.1	--	--
13:50	5	65	110	5.54	--	7.11	0.605	9.89	0.03	14.6	-111.2	Clear	Medium

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments:

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot — 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location:

Condition of Well:

Well Completion: NA

Well Locked at Arrival: yes

Well Locked at Departure: yes

Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter

mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	MWW10-SEN01			**Date**	09/18/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	55.9 degrees F and Cloudy. The wind is blowing W/NW at 8.1 mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	16.64	**Total Depth (ft-bmp)**	22.48	**Water Column (ft)**	5.84	**Gallons in Well**	0.95
Purge Start	12:20	**Pump Intake (ft-bmp)**	17.8	**Purge Method**	Low-Flow	**Purge Equipment**	Submersible
Purge End	13:47	**Volumes Purged**		**Sample ID**	NA	**Sampled by**	Samantha Szpaichler
Sample Time		**Gallons Purged**		**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
12:23	0	0	120	16.98	--	7.14	0.96	83.5	2.99	15.6	6.1	--	--
12:28	5	5	120	17.85	--	7.15	0.95	78	1.95	15.7	-7.6	--	--
12:33	5	10	120	17.96	--	7.2	0.94	78	1.97	15.8	-18.6	--	--
12:38	5	15	120	18.04	--	7.14	0.96	30.5	1.51	15.5	-35.2	--	--
12:43	5	20	120	18.06	--	7.14	0.96	28.5	1.41	16.1	-38.2	--	--
12:48	5	25	120	18.06	--	7.12	0.97	42.7	1.54	16	-43.5	--	--
12:53	5	30	120	18.42	--	7.13	1.01	42.7	0.4	16.1	-82.3	--	--
12:58	5	35	120	18.42	--	7.11	1.02	45.2	0.65	16.3	-83.2	--	--
13:03	5	40	120	18.42	--	7.13	1.02	35.9	0.96	16.8	-89.6	--	--
13:08	5	45	120	18.56	--	7.15	1.04	11.2	0.99	16.9	-90.4	--	--
13:13	5	50	120	18.68	--	7.1	1.23	10.9	0.4	16.9	-108.8	--	--
13:18	5	55	120	18.68	--	7.12	1.2	0.64	0.28	16.4	-113.1	--	--
13:23	5	60	120	19.02	--	7.11	1.11	0.02	0.3	16.3	-103.5	--	--
13:28	5	65	120	19.13	--	7.12	1.12	0.02	0.32	15.9	-101.1	--	--
13:33	5	70	120	19.13	--	7.11	1.14	0.02	0.3	15.9	-102.7	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250 mL Plastic	2	None

Comments: Lowered tubing at 12:46 5". At 1:08 lowered 6". Lowered 5" at 1:32

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot — 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location: USPS
Condition of Well: Good condition
Well Completion: Stick-up
Well Locked at Arrival: yes
Well Locked at Departure: yes
Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	PZF17-05			**Date**	09/15/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	64.0 degrees F and Mostly Clear. The wind is blowing S/SE at 5.8 mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	26.03	**Total Depth (ft-bmp)**	34.1	**Water Column (ft)**	8.07	**Gallons in Well**	1.31
Purge Start	12:26	**Pump Intake (ft-bmp)**	32.1	**Purge Method**	Low-Flow	**Purge Equipment**	Submersible
Purge End	13:15	**Volumes Purged**	1.53	**Sample ID**	PZF17-05_GW-091523	**Sampled by**	Samantha Szpaichler
Sample Time	13:05	**Gallons Purged**	2.00	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
12:28	0	0	130	26.04	--	7.2	0.65	1.33	3.81	17	220.7	--	--
12:33	5	5	130	26.04	--	7.24	0.63	1.14	3.3	17.3	219	--	--
12:38	5	10	130	26.04	--	7.3	0.65	0.62	3.59	16.7	221.6	--	--
12:43	5	15	130	26.04	--	7.19	0.65	0.69	3.77	16.5	222.8	--	--
12:48	5	20	130	26.04	--	7.19	0.66	0.07	3.38	17	224.4	--	--
12:53	5	25	130	26.04	--	7.21	0.66	0.1	3.2	17	225.5	--	--
12:58	5	30	130	26.04	--	7.23	0.66	0.02	3.19	17	225.8	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments: Equipment blank 05 collected here

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location: Former Fiero Parking lot
Well Locked at Arrival: yes
Condition of Well: Good condition
Well Locked at Departure: yes
Well Completion: Flush mount
Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	SUMP			**Date**	09/21/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	63.0 degrees F and Fog/Mist. The wind is blowing SE at 3 mph			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**		**Well Casing Material**	NA
Static Water Level (ft-bmp)	1.18	**Total Depth (ft-bmp)**	7	**Water Column (ft)**	5.82	**Gallons in Well**	
Purge Start	10:04	**Pump Intake (ft-bmp)**		**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End		**Volumes Purged**		**Sample ID**	SUMP_GW-092123	**Sampled by**	Sommer Guy
Sample Time	10:10	**Gallons Purged**	0.10	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
10:06	0	0	130	1.18	--	7.69	3.07	21.5	1.44	15.2	-80.9	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments:

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot

1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location:

Condition of Well:

Well Completion: NA

Well Locked at Arrival:

Well Locked at Departure:

Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter

mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	TW-01-03			**Date**	09/18/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	55.9 degrees F and Mostly Cloudy. The wind is blowing W/NW at 8.1 mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	14.24	**Total Depth (ft-bmp)**	23.06	**Water Column (ft)**	8.82	**Gallons in Well**	1.43
Purge Start	10:48	**Pump Intake (ft-bmp)**	20.5	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	11:27	**Volumes Purged**	1.40	**Sample ID**	TW-01-03_GW-091823	**Sampled by**	Sommer Guy
Sample Time	11:25	**Gallons Purged**	2.00	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
10:49	0	0	130	14.35	--	7.22	10.52	9.03	0.57	15.1	-91.2	--	--
10:54	5	5	130	14.35	--	6.96	10.56	5.47	0.29	15.2	-103.5	--	--
10:59	5	10	130	14.35	--	6.93	10.57	7.7	0.22	15	-107.2	--	--
11:04	5	15	130	14.35	--	6.93	10.52	6.15	0.18	14.9	-109.8	--	--
11:09	5	20	130	14.35	--	6.96	10.42	6.16	0.15	15	-113.9	--	--
11:14	5	25	130	14.35	--	6.97	10.23	6.18	0.15	15.1	-116.1	--	--
11:19	5	30	130	14.35	--	6.99	10.12	6.7	0.14	14.9	-119.6	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	3	None

Comments: Equipment blank 02 collected here

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot

1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location: USPS

Well Locked at Arrival: yes

Condition of Well: Good condition

Well Locked at Departure: yes

Well Completion: Stick-up

Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter

mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	TW-10-01			**Date**	09/18/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	61.0 degrees F and Partly Cloudy. The wind is blowing NW at 10.3 mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	19.24	**Total Depth (ft-bmp)**	32.79	**Water Column (ft)**	13.55	**Gallons in Well**	2.2
Purge Start	14:21	**Pump Intake (ft-bmp)**	30.79	**Purge Method**	Low-Flow	**Purge Equipment**	Submersible
Purge End	15:20	**Volumes Purged**	0.91	**Sample ID**	TW-10-01_GW-091823	**Sampled by**	Samantha Szpaichler
Sample Time	15:20	**Gallons Purged**	2.00	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
14:24	0	0	120	19.43	--	6.98	1.38	2.91	5.11	17.5	-84.5	--	--
14:29	5	5	120	19.35	--	6.91	1.41	1.74	0.9	17.6	-84.4	--	--
14:34	5	10	120	19.32	--	6.94	1.42	1.36	0.52	17.9	-82.6	--	--
14:39	5	15	120	19.32	--	6.94	1.42	0.11	0.43	18	-81.1	--	--
14:44	5	20	120	19.32	--	6.9	1.42	0.36	0.3	17.4	-80	--	--
14:49	5	25	120	19.32	--	6.93	1.42	0.02	0.2	17.3	-78.5	--	--
14:54	5	30	120	19.32	--	6.95	1.42	0.02	0.16	17	-78	--	--
14:59	5	35	120	19.32	--	6.92	1.43	0.02	0.18	16.5	-77.3	--	--
15:04	5	40	120	19.32	--	6.95	1.44	0.02	0.18	16.3	-77	--	--
15:09	5	45	120	19.32	--	6.92	1.46	0.02	0.17	16.3	-76.9	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments:

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot — 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location: USPS
Condition of Well: Good condition
Well Completion: Stick-up
Well Locked at Arrival: yes
Well Locked at Departure: yes
Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	TW-ROW-01			**Date**	09/13/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	57.9 degrees F and Cloudy. The wind is blowing NW at 5.8 mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	1.72	**Total Depth (ft-bmp)**	7.96	**Water Column (ft)**	6.24	**Gallons in Well**	1.01
Purge Start	12:44	**Pump Intake (ft-bmp)**	5.4	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	13:35	**Volumes Purged**	0.99	**Sample ID**	TW-ROW-01_GW-091323	**Sampled by**	Garrett Link
Sample Time	13:30	**Gallons Purged**	1.00	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
12:45	0	0	110	1.85	--	6.86	2.61	11.1	0.74	18.7	97.1	--	--
12:50	5	5	110	1.85	--	6.88	2.68	10.8	0.7	18.9	92.9	--	--
12:55	5	10	110	1.87	--	6.9	2.54	4.7	0.61	18.6	88.1	--	--
13:00	5	15	110	1.87	--	6.92	2.33	5.17	0.48	18.6	84.8	--	--
13:05	5	20	110	1.87	--	6.91	2.26	2	0.5	18.9	83.2	--	--
13:10	5	25	110	1.88	--	6.91	2.24	1.46	0.39	19.1	81.7	--	--
13:15	5	30	110	1.88	--	6.9	2.26	2.49	0.34	18.5	80.6	--	--
13:20	5	35	110	1.88	--	6.9	2.25	2.05	0.33	18.6	79.2	--	--
13:25	5	40	110	1.88	--	6.9	2.27	1.99	0.34	18.8	77.3	Clear	None

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments:

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot — 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location: Off-site, Montcalm ROW
Condition of Well: Good condition
Well Completion: Flush mount
Well Locked at Arrival: yes
Well Locked at Departure: yes
Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter
mV = milliv

Groundwater Sampling Form

ARCADIS

Project Number	30167840	**Well ID**	TW-ROW-03			**Date**	09/13/2023
Project Name/Location	RACER Pontiac North Campus 2023		**Weather(°F)**	57.0 degrees F and Cloudy. The wind is blowing NW at 8.1 mph.			
Measuring Pt. Description	Top of Inner Casing	**MP Elevation**		**Casing Diameter (in)**	2	**Well Casing Material**	PVC
Static Water Level (ft-bmp)	1.42	**Total Depth (ft-bmp)**	7.98	**Water Column (ft)**	6.56	**Gallons in Well**	1.07
Purge Start	11:36	**Pump Intake (ft-bmp)**	5.4	**Purge Method**	Low-Flow	**Purge Equipment**	Peristaltic
Purge End	12:20	**Volumes Purged**	1.40	**Sample ID**	TW-ROW-03_GW-091323	**Sampled by**	Garrett Link
Sample Time	12:15	**Gallons Purged**	1.50	**Replicate/ Code No.**	NA	**Sample Type**	Grab

Time	Minutes Elapsed	Total Elapsed Minutes	Rate mL/min	Depth to Water (ft)	Gallons Purged	pH (standard units)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature °C	Redox (mV)	Appearance	
												Color	Odor
11:38	0	0	175	2.19	--	6.89	2.33	12.9	0.3	19.2	113.6	--	--
11:43	5	5	175	2.49	--	6.93	2.37	8.18	0.16	19.2	105.2	--	--
11:48	5	10	110	2.29	--	6.95	2.31	4.93	0.12	19.3	98.7	--	--
11:53	5	15	110	2.37	--	6.95	2.34	4.85	0.11	19.4	96.2	--	--
11:58	5	20	110	2.43	--	6.95	2.35	3.56	0.09	19.3	92.7	--	--
12:03	5	25	110	2.43	--	6.96	2.41	3.1	0.1	19.1	90.3	--	--
12:08	5	30	110	2.43	--	6.96	2.42	2.85	0.1	19.4	87.4	--	--
12:13	5	35	110	2.43	--	6.95	2.44	3.22	0.11	19.5	85.4	Clear	Mild

Constituent Sampled	Container	Number	Preservative
PFAS	250mL HDPE Plastic	2	None

Comments:

Well Casing Volume Conversion

Well diameter (inches) = gallons per foot 1 = 0.04; 1.5 = 0.09; 2.5 = 0.26; 3.5 = 0.50; 6 = 1.47
1.25 = 0.06; 2 = 0.16; 3 = 0.37; 4 = 0.65

Well Information

Well Location: Off-site, Montcalm st ROW

Well Locked at Arrival: no

Condition of Well: Missing bolts,Missing lock,Needs repairs

Well Locked at Departure: no

Well Completion: Flush mount

Key Number To Well: NA

ft-bmp = feet below measuring point
in = inches
ft = feet
mL/min = milliliters per minute
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Unit
mg/L = milligrams per liter

mV = milliv

Appendix D

Laboratory Data Validation Summary

Racer

DATA REVIEW

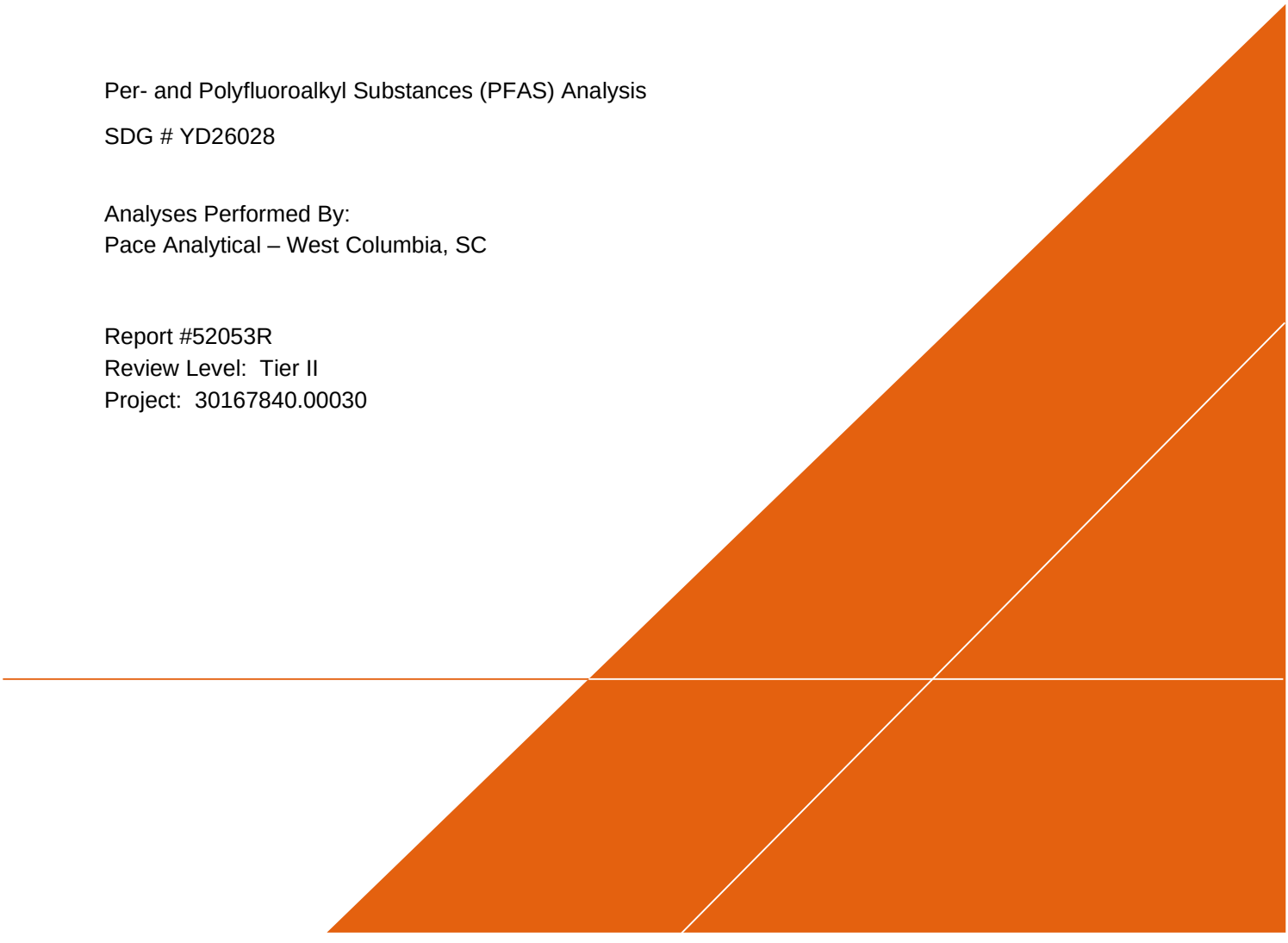
Pontiac North Campus, MI

Per- and Polyfluoroalkyl Substances (PFAS) Analysis

SDG # YD26028

Analyses Performed By:
Pace Analytical – West Columbia, SC

Report #52053R
Review Level: Tier II
Project: 30167840.00030



SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) #YD26028 for samples collected in association with the Racer PNC, MI Site. The review was conducted as a Tier II evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis				
					PFAS	SVOC	PCB	MET	MISC
MWM16-37-GW	YD26028-1	Water	04/25/23		X				
MWM30-01-GW	YD26028-2	Water	04/25/23		X				
MWM5-02-GW	YD26028-3	Water	04/25/23		X				
MWF16-23-GW	YD26028-4	Water	04/25/23		X				
MWF12-02R-GW	YD26028-5	Water	04/25/23		X				
MW-02-17-GW	YD26028-6	Water	04/25/23		X				
Trip Blank	YD26028-7	Water	04/25/23		X				

ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

Note:
QA - Quality Assurance

ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) Modified Method 537. Data were reviewed in accordance with the USEPA National Functional Guidelines for Organic Superfund Methods Data Review, EPA 540-R-20-005, November 2020 (with reference to the historical USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, OSWER 9240.1-05A-P, October 1999 as appropriate) and USEPA Data Review and Validation Guidelines for Perfluoroalkyl Substances (PFASs) Analyzed Using EPA Method 537, EPA 910-R-18-001, November 2018; and Department of Defense (DoD) Quality Systems Manual (QSM) 5.3, DoD Final General Data Validation Guidelines, November 2019.

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers
  - U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
  - B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- Quantitation (Q) Qualifiers
  - E The compound was quantitated above the calibration range.
  - D Concentration is based on a diluted sample analysis.
- Validation Qualifiers
  - J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
  - UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
  - JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
  - UB Compound considered non-detect at the listed value due to associated blank contamination.
  - N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
  - R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and

provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) ANALYSIS

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
USEPA modified Method 537	Water	28 days to extraction; 28 days from extraction to analysis	Cool to <6 °C

All samples were initially analyzed within the specified holding time criteria.

2. Blank Contamination

Quality assurance (QA) blanks (i.e., method, field, and equipment blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Equipment blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (DL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were not detected above the DL in the associated blanks; therefore, detected sample results were not associated with blank contamination.

3. Extracted Internal Standard (EIS)/Surrogate Compounds

Labeled standards must be added to all field samples and QC samples prior to extraction. EIS recoveries must be within DoD QSM 5.3 specified limits of 50% to150%.

Sample locations associated with EIS exhibiting recoveries outside of the control limits are presented in the following table.

Sample Locations	EIS	Associated Compound	%R
MWM16-37-GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
MWM30-01-GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
	13C2_8:2FTS	1H,1H, 2H,2H-perfluorodecane sulfonic acid (8:2 FTS)	>150
	13C4-PFBA	Perfluoro-n-butanoic acid (PFBA)	< 50% but > 20%
MWM5-02-GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150

Sample Locations	EIS	Associated Compound	%R
MWM5-02-GW	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
MWF12-02R-GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150

The criteria used to evaluate the EIS recoveries are presented in the following table. In the case of an EIS deviation, the sample results associated with the EIS are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
< 50% but > 20%	Non-detect	UJ
	Detect	J
> 150%	Non-detect	No Action
	Detect	J
< 20%	Non-detect	R
	Detect	R

4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within 50-150%. The relative percent difference (RPD) between the MS/MSD recoveries must exhibit an RPD within 30%.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

The MS/MSD performed on samples MWM16-37-GW and MWF12-02R-GW exhibited recoveries and RPDs within the control limits.

5. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

All compounds associated with the LCS analysis exhibited recoveries within the control limits.

6. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 30% for water matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of two times the RL is applied for soil matrices.

A field duplicate was not included in the data package.

7. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR PFAs

PFAs: USEPA modified Method 537	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
LIQUID CHROMATOGRAPHY/MASS SPECTROMETRY (LC/MS/MS)					
Tier II Validation					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks	X				X
C. Trip blanks		X		X	
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate(LCSD) %R	X				X
LCS/LCSD Precision (RPD)	X				X
Matrix Spike (MS) %R		X		X	
Matrix Spike Duplicate (MSD) %R		X		X	
MS/MSD Precision (RPD)		X		X	
Field Duplicate (RPD)	X				X
Extracted Internal Standards (EIS) Recoveries		X	X		
Dilution Factor		X		X	
Moisture Content	X				X

Notes:

%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Rachelle Borne

SIGNATURE: 

DATE: December 5, 2023

PEER REVIEW: Joseph C. Houser

DATE: December 19, 2023

CHAIN OF CUSTODY

CORRECTED SAMPLE ANALYSIS DATA SHEETS

Pace Analytical

PACE ANALYTICAL SERVICES, LLC
108 Vantage Point Drive • West Columbia, SC 29172
Telephone No. 803-791-9700 Fax No. 803-791-9111
www.pacelabs.com

Number 146507

Client: Arcadis	Report to Contact: Tiffany Linder, Alexis Crisp	Telephone No. / E-mail: Tiffany.Linder@arcadis.com, Alexis.Crisp@arcadis.com	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: x Sommer Guy	Analysis (Attach list if more space is needed): Report EGLE 24 Compounds	Page 1 of 1
City: Novi / State: MI / Zip Code: 48377	Printed Name: Sommer Guy Lotte Jay		YD26028
Project Name: RacerPNC			KES2
Project No.: 30167840.00030	P.O. No.		

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Grab (G) / Composite (C)	Matrix: Aqueous	Soil	Non-Aqueous	No of Containers by Preservative Type: Unpres.	H2SO4	HNO3	HCl	NaOH	NaS2O3	Methanol	Filtered (Y/N)	Remarks / Cooler I.D.
MWM16-37_GW-042523	4/25/23	1028	G	6			6							X	Run MS/MSD
MWM30-01_GW-042523	4/25/23	1040	G	2			2							X	
MWM5-02_GW-042523	4/25/23	1210	G	2			2							X	
MWF16-23_GW-042523	4/25/23	1307	G	2			2							X	
MWF12-02R_GW-042523	4/25/23	1425	G	6			6							X	Run MS/MSD
MW-02-17_GW-042523	4/25/23	1420	G	2			2							X	
trip blank	4/25/23	1730	G	1			1							X	

Turn Around Time Required (Prior lab approval required for expedited TAT.): X Standard ☐ Rush (Specify)

Sample Disposal: ☐ Return to Client X Dispose by Lab

Possible Hazard Identification: X Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: Sommer Guy	4/25/23	1750	1. Received by: FedEx	4/25/23	1750
2. Relinquished by	Date	Time	2. Received by	Date	Time
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by: FedEx	4/26/23	1025	4. Laboratory received by	4/26/23	1025

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY: Received on ice (Circle) (Yes) No Ice Pack; Receipt Temp. 1.7 °C; Temp Blank ☐ Y ☐ N

DISTRIBUTION: WHITE & YELLOW-Return to laboratory with Sample(s); PINK-Field/Client Copy

Document Number: (illegible)

PACE ANALYTICAL SERVICES, LLC

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD26028-001**

Description: **MWM16-37_GW-042523** Matrix: **Aqueous**

Date Sampled: **04/25/2023 1028** Project Name: **RACER PNC**

Date Received: **04/26/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/12/2023 0448	OMNS	05/10/2023 1430	74943

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	6.9	1.7	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**1.4**	**JM-03**	**3.5**	**0.86**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**0.93**	**JM-03**	**3.5**	**0.86**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**5.8**	**M-03**	**3.5**	**0.86**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**6.4**	**M-03**	**3.5**	**0.86**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**1.5**	**J**	**3.5**	**0.86**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**1.9**	**JM-03**	**3.5**	**0.86**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**2.5**	**JM-03**	**3.5**	**0.86**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**2.0**	**J**	**3.5**	**0.86**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**4.4**	**M-03**	**3.5**	**0.86**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	174	50-150
13C2_6:2FTS		128	50-150
13C2_8:2FTS		108	50-150
13C2_PFDoA		81	50-150
13C2_PFTeDA		93	50-150
13C3_PFBS		111	50-150
13C3_PFHxS		116	50-150
13C3-HFPO-DA		101	50-150
13C4_PFBA		84	50-150
13C4_PFHpA		116	50-150
13C5_PFHxA		106	50-150
13C5_PFPeA		99	50-150
13C6_PFDA		101	50-150
13C7_PFUdA		92	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD26028-001**

Description: **MWM16-37_GW-042523** Matrix: **Aqueous**

Date Sampled: **04/25/2023 1028** Project Name: **RACER PNC**

Date Received: **04/26/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		111	50-150
13C8_PFOS		106	50-150
13C8_PFOSA		90	50-150
13C9_PFNA		115	50-150
d5-EtFOSAA		96	50-150
d3-MeFOSAA		100	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
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S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD26028-002**

Description: **MWM30-01_GW-042523** Matrix: **Aqueous**

Date Sampled: **04/25/2023 1040** Project Name: **RACER PNC**

Date Received: **04/26/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/12/2023 0319	ARC2	05/10/2023 1430	74943

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		8.1	2.0	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		8.1	2.0	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	8.1	2.0	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**34**	**Q J**	**8.1**	**2.0**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	8.1	2.0	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		8.1	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		8.1	2.0	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		8.1	2.0	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		8.1	2.0	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**4.6**	**M-03**	**4.0**	**1.0**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**2.4**	**JM-03**	**4.0**	**1.0**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**8.3**	**M-03**	**4.0**	**1.0**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**24**	**QM-03 J**	**4.0**	**1.0**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**15**		**4.0**	**1.0**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**20**	**M-03**	**4.0**	**1.0**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**45**		**4.0**	**1.0**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**18**	**M-03**	**4.0**	**1.0**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		4.0	1.0	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	223	50-150
13C2_6:2FTS	N	243	50-150
13C2_8:2FTS	N	193	50-150
13C2_PFDoA		90	50-150
13C2_PFTeDA		95	50-150
13C3_PFBS		77	50-150
13C3_PFHxS		99	50-150
13C3-HFPO-DA		74	50-150
13C4_PFBA	N	26	50-150
13C4_PFHpA		90	50-150
13C5_PFHxA		74	50-150
13C5_PFPeA		55	50-150
13C6_PFDA		108	50-150
13C7_PFUdA		101	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
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S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD26028-002**

Description: **MWM30-01_GW-042523** Matrix: **Aqueous**

Date Sampled: **04/25/2023 1040** Project Name: **RACER PNC**

Date Received: **04/26/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		98	50-150
13C8_PFOS		106	50-150
13C8_PFOSA		103	50-150
13C9_PFNA		113	50-150
d5-EtFOSAA		118	50-150
d3-MeFOSAA		114	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD26028-003**

Description: **MWM5-02_GW-042523** Matrix: **Aqueous**

Date Sampled: **04/25/2023 1210** Project Name: **RACER PNC**

Date Received: **04/26/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/12/2023 0332	ARC2	05/10/2023 1430	74943

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	6.9	1.7	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	6.9	1.7	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**0.95**	**JM-03**	**3.5**	**0.86**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND	M-03	3.5	0.86	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**2.5**	**J**	**3.5**	**0.86**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**1.0**	**JM-03**	**3.5**	**0.86**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.86	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**1.3**	**JM-03**	**3.5**	**0.86**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	196	50-150
13C2_6:2FTS	N	158	50-150
13C2_8:2FTS		125	50-150
13C2_PFDoA		105	50-150
13C2_PFTeDA		104	50-150
13C3_PFBS		117	50-150
13C3_PFHxS		116	50-150
13C3-HFPO-DA		111	50-150
13C4_PFBA		83	50-150
13C4_PFHpA		117	50-150
13C5_PFHxA		118	50-150
13C5_PFPeA		110	50-150
13C6_PFDA		109	50-150
13C7_PFUdA		99	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD26028-003**

Description: **MWM5-02_GW-042523** Matrix: **Aqueous**

Date Sampled: **04/25/2023 1210** Project Name: **RACER PNC**

Date Received: **04/26/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		119	50-150
13C8_PFOS		114	50-150
13C8_PFOSA		102	50-150
13C9_PFNA		119	50-150
d5-EtFOSAA		112	50-150
d3-MeFOSAA		112	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD26028-004**

Description: **MWF16-23_GW-042523** Matrix: **Aqueous**

Date Sampled: **04/25/2023 1307** Project Name: **RACER PNC**

Date Received: **04/26/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/12/2023 0526	OMNS	05/10/2023 1430	74943

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**6.7**	**M-03**	**3.5**	**0.87**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.87	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**1.3**	**JM-03**	**3.5**	**0.87**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.87	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.87	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**6.1**	**M-03**	**3.5**	**0.87**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**26**		**3.5**	**0.87**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**9.8**	**M-03**	**3.5**	**0.87**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.87	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.87	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**23**		**3.5**	**0.87**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**12**		**3.5**	**0.87**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	0.87	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**63**	**M-03**	**3.5**	**0.87**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**14**		**3.5**	**0.87**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.87	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.87	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.87	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.5	0.87	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		145	50-150
13C2_6:2FTS		97	50-150
13C2_8:2FTS		87	50-150
13C2_PFDoA		65	50-150
13C2_PFTeDA		71	50-150
13C3_PFBS		97	50-150
13C3_PFHxS		98	50-150
13C3-HFPO-DA		90	50-150
13C4_PFBA		65	50-150
13C4_PFHpA		96	50-150
13C5_PFHxA		95	50-150
13C5_PFPeA		93	50-150
13C6_PFDA		92	50-150
13C7_PFUdA		80	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD26028-004**

Description: **MWF16-23_GW-042523** Matrix: **Aqueous**

Date Sampled: **04/25/2023 1307** Project Name: **RACER PNC**

Date Received: **04/26/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		101	50-150
13C8_PFOS		89	50-150
13C8_PFOSA		85	50-150
13C9_PFNA		97	50-150
d5-EtFOSAA		73	50-150
d3-MeFOSAA		80	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD26028-005**

Description: **MWF12-02R_GW-042523** Matrix: **Aqueous**

Date Sampled: **04/25/2023 1425** Project Name: **RACER PNC**

Date Received: **04/26/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/12/2023 0539	OMNS	05/10/2023 1430	74943

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.6	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.6	1.9	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**3.7**	**JM-03**	**3.8**	**0.95**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.8	0.95	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.8	0.95	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.8	0.95	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.8	0.95	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**1.6**	**JM-03**	**3.8**	**0.95**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**5.9**	**M-03**	**3.8**	**0.95**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**22**	**M-03**	**3.8**	**0.95**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.8	0.95	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.8	0.95	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**4.4**	**M-03**	**3.8**	**0.95**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**12**		**3.8**	**0.95**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.8	0.95	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**11**	**M-03**	**3.8**	**0.95**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**14**	**M-03**	**3.8**	**0.95**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.8	0.95	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.8	0.95	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.8	0.95	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**4.0**	**M-03**	**3.8**	**0.95**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	239	50-150
13C2_6:2FTS	N	155	50-150
13C2_8:2FTS		112	50-150
13C2_PFDoA		83	50-150
13C2_PFTeDA		94	50-150
13C3_PFBS		103	50-150
13C3_PFHxS		108	50-150
13C3-HFPO-DA		97	50-150
13C4_PFBA		56	50-150
13C4_PFHpA		102	50-150
13C5_PFHxA		100	50-150
13C5_PFPeA		88	50-150
13C6_PFDA		101	50-150
13C7_PFUdA		97	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD26028-005**

Description: **MWF12-02R_GW-042523** Matrix: **Aqueous**

Date Sampled: **04/25/2023 1425** Project Name: **RACER PNC**

Date Received: **04/26/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		114	50-150
13C8_PFOS		105	50-150
13C8_PFOSA		94	50-150
13C9_PFNA		115	50-150
d5-EtFOSAA		94	50-150
d3-MeFOSAA		103	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD26028-006**

Description: **MW-02-17_GW-042523** Matrix: **Aqueous**

Date Sampled: **04/25/2023 1420** Project Name: **RACER PNC**

Date Received: **04/26/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/12/2023 0617	OMNS	05/10/2023 1430	74943

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		8.0	2.0	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		8.0	2.0	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		8.0	2.0	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		8.0	2.0	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		8.0	2.0	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		8.0	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		8.0	2.0	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		8.0	2.0	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		8.0	2.0	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**9.3**	**M-03**	**4.0**	**1.0**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**5.8**	**M-03**	**4.0**	**1.0**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**10**		**4.0**	**1.0**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**12**		**4.0**	**1.0**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**6.4**	**M-03**	**4.0**	**1.0**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**11**	**M-03**	**4.0**	**1.0**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**7.7**	**M-03**	**4.0**	**1.0**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**7.2**		**4.0**	**1.0**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		4.0	1.0	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		4.0	1.0	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		111	50-150
13C2_6:2FTS		87	50-150
13C2_8:2FTS		89	50-150
13C2_PFDoA		75	50-150
13C2_PFTeDA		83	50-150
13C3_PFBS		94	50-150
13C3_PFHxS		94	50-150
13C3-HFPO-DA		88	50-150
13C4_PFBA		70	50-150
13C4_PFHpA		90	50-150
13C5_PFHxA		90	50-150
13C5_PFPeA		90	50-150
13C6_PFDA		84	50-150
13C7_PFUdA		84	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD26028-006**

Description: **MW-02-17_GW-042523** Matrix: **Aqueous**

Date Sampled: **04/25/2023 1420** Project Name: **RACER PNC**

Date Received: **04/26/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		92	50-150
13C8_PFOS		89	50-150
13C8_PFOSA		78	50-150
13C9_PFNA		94	50-150
d5-EtFOSAA		77	50-150
d3-MeFOSAA		84	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD26028-007**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **04/25/2023 1730** Project Name: **RACER PNC**

Date Received: **04/26/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/12/2023 0630	OMNS	05/10/2023 1430	74943

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.7	0.92	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		100	50-150
13C2_6:2FTS		92	50-150
13C2_8:2FTS		99	50-150
13C2_PFDoA		86	50-150
13C2_PFTeDA		98	50-150
13C3_PFBS		97	50-150
13C3_PFHxS		105	50-150
13C3-HFPO-DA		98	50-150
13C4_PFBA		101	50-150
13C4_PFHpA		102	50-150
13C5_PFHxA		101	50-150
13C5_PFPeA		103	50-150
13C6_PFDA		99	50-150
13C7_PFUdA		96	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
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H = Out of holding time
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S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD26028-007**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **04/25/2023 1730** Project Name: **RACER PNC**

Date Received: **04/26/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		99	50-150
13C8_PFOS		97	50-150
13C8_PFOSA		88	50-150
13C9_PFNA		106	50-150
d5-EtFOSAA		92	50-150
d3-MeFOSAA		98	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
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Racer

DATA REVIEW

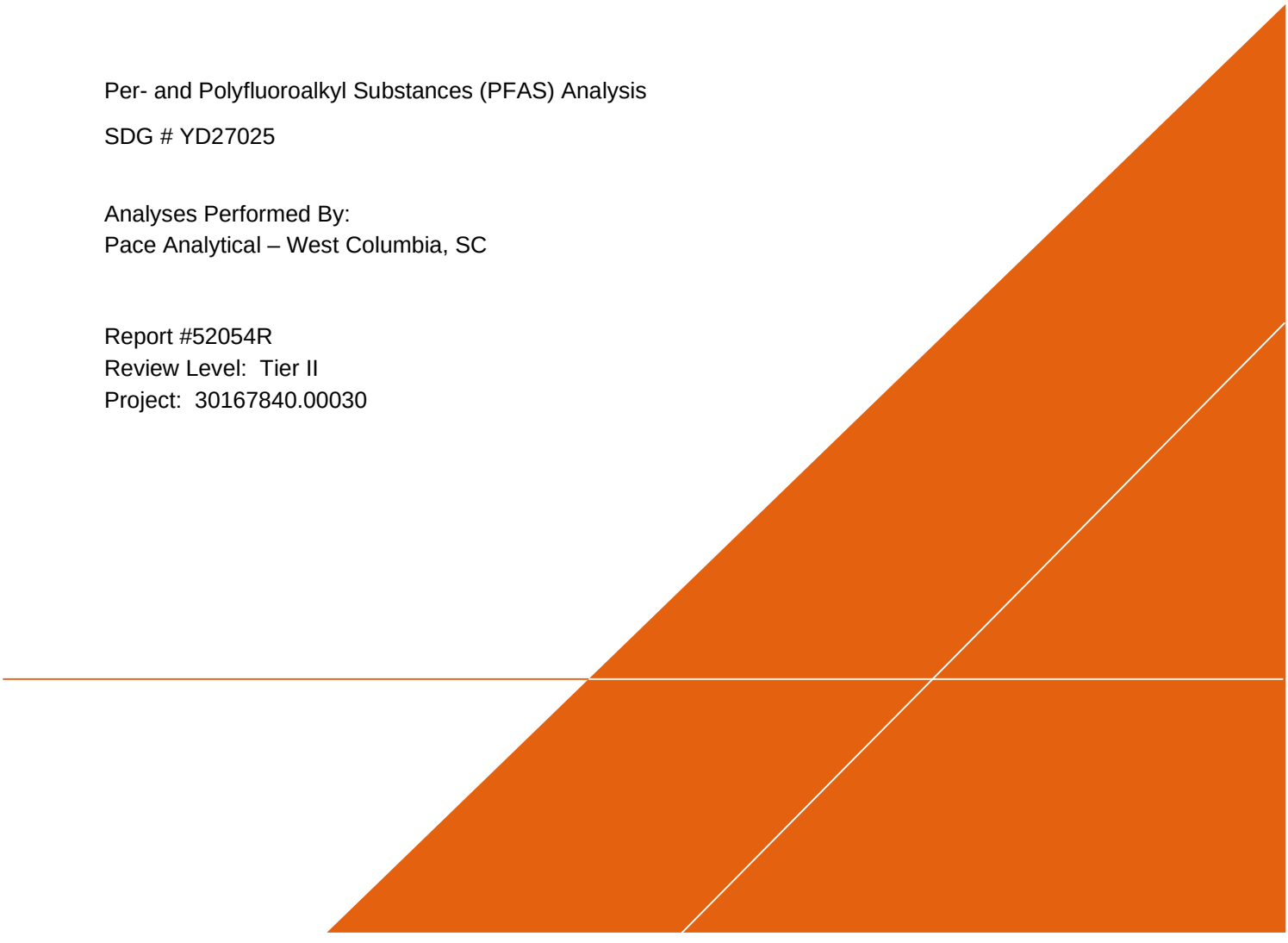
Pontiac North Campus, MI

Per- and Polyfluoroalkyl Substances (PFAS) Analysis

SDG # YD27025

Analyses Performed By:
Pace Analytical – West Columbia, SC

Report #52054R
Review Level: Tier II
Project: 30167840.00030



SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) #YD27025 for samples collected in association with the Racer PNC, MI Site. The review was conducted as a Tier II evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis				
					PFAS	SVOC	PCB	MET	MISC
TW-MD-01-GW	YD27025-1	Water	04/26/23		X				
EB-02	YD27025-2	Water	04/26/23		X				
SLEEPVAULT-GW	YD27025-3	Water	04/26/23		X				
MWW10-SEN01-GW	YD27025-4	Water	04/26/23		X				
TW-01-03-GW	YD27025-5	Water	04/26/23		X				
MWW10-04-GW	YD27025-6	Water	04/26/23		X				
Trip Blank	YD27025-7	Water	04/26/23		X				

ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

Note:
QA - Quality Assurance

ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) Modified Method 537. Data were reviewed in accordance with the USEPA National Functional Guidelines for Organic Superfund Methods Data Review, EPA 540-R-20-005, November 2020 (with reference to the historical USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, OSWER 9240.1-05A-P, October 1999 as appropriate) and USEPA Data Review and Validation Guidelines for Perfluoroalkyl Substances (PFASs) Analyzed Using EPA Method 537, EPA 910-R-18-001, November 2018; and Department of Defense (DoD) Quality Systems Manual (QSM) 5.3, DoD Final General Data Validation Guidelines, November 2019.

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers
  - U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
  - B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- Quantitation (Q) Qualifiers
  - E The compound was quantitated above the calibration range.
  - D Concentration is based on a diluted sample analysis.
- Validation Qualifiers
  - J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
  - UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
  - JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
  - UB Compound considered non-detect at the listed value due to associated blank contamination.
  - N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
  - R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and

provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) ANALYSIS

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
USEPA modified Method 537	Water	28 days to extraction; 28 days from extraction to analysis	Cool to <6 °C

All samples were initially analyzed within the specified holding time criteria.

2. Blank Contamination

Quality assurance (QA) blanks (i.e., method, field, and equipment blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Equipment blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (DL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were not detected above the DL in the associated blanks; therefore, detected sample results were not associated with blank contamination.

3. Extracted Internal Standard (EIS)/Surrogate Compounds

Labeled standards must be added to all field samples and QC samples prior to extraction. EIS recoveries must be within DoD QSM 5.3 specified limits of 50% to150%.

Sample locations associated with EIS exhibiting recoveries outside of the control limits are presented in the following table.

Sample Locations	EIS	Associated Compound	%R
TW-MD-01-GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
	13C4-PFBA	Perfluoro-n-butanoic acid (PFBA)	< 50% but > 20%
SLEEPVAULT-GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
MWW10-SEN01-GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150

Sample Locations	EIS	Associated Compound	%R
MWW10-SEN01-GW	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
TW-01-03-GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
	13C2_8:2FTS	1H,1H, 2H,2H-perfluorodecane sulfonic acid (8:2 FTS)	>150
	d5-EtFPSAA	N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	>150
	d3-MeFOSAA	N-methylperfluoro-1-octanesulfonamidoacetic acid	>150
MWW10-04-GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
	13C2_8:2FTS	1H,1H, 2H,2H-perfluorodecane sulfonic acid (8:2 FTS)	>150
	13C4-PFBA	Perfluoro-n-butanoic acid (PFBA)	< 50% but > 20%

The criteria used to evaluate the EIS recoveries are presented in the following table. In the case of an EIS deviation, the sample results associated with the EIS are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
< 50% but > 20%	Non-detect	UJ
	Detect	J
> 150%	Non-detect	No Action
	Detect	J
< 20%	Non-detect	R
	Detect	R

4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within 50-150%. The relative percent difference (RPD) between the MS/MSD recoveries must exhibit an RPD within 30%.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

A site-specific MS/MSD was not included in the data package.

The laboratory duplicate performed on sample TW-MD-01-GW exhibited RPDs within the control limits.

5. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

All compounds associated with the LCS analysis exhibited recoveries within the control limits.

6. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 30% for water matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of two times the RL is applied for soil matrices.

A field duplicate was not included in the data package.

7. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR PFAs

PFAs: USEPA modified Method 537	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
LIQUID CHROMATOGRAPHY/MASS SPECTROMETRY (LC/MS/MS)					
Tier II Validation					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks		X		X	
C. Trip blanks		X		X	
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate(LCSD) %R	X				X
LCS/LCSD Precision (RPD)	X				X
Matrix Spike (MS) %R	X				X
Matrix Spike Duplicate (MSD) %R	X				X
MS/MSD Precision (RPD)	X				X
Field/Lab Duplicate (RPD)		X		X	
Extracted Internal Standards (EIS) Recoveries		X	X		
Dilution Factor		X		X	
Moisture Content	X				X

Notes:

%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Rachelle Borne

SIGNATURE: 

DATE: December 5, 2023

PEER REVIEW: Joseph C. Houser

DATE: December 19, 2023

CHAIN OF CUSTODY

CORRECTED SAMPLE ANALYSIS DATA SHEETS

PACE ANALYTICAL SERVICES, LLC
106 Vantage Point Drive • West Columbia, SC 29172
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www.pacelabs.com

Number 146504

Client: Arcadis	Report to Contact: Tiffany. Linder Alexis Crisp	Telephone No / E-mail: Alexis.Crisp@arcadis.com tiffany.linder@arcadis.com	Quote No.
Address: 28555 Cabot Dr #500	Sampler's Signature: x Sommer Guy	Analysis (Attach list if more space is needed): Report EGLE 28 Compounds	Page 1 of
City: Novi / State: MI / Zip Code: 48377	Printed Name: Sommer Guy		YD27025
Project Name: Racer PNC			RES2
Project No.: 30167840.00030	P.O. No.:		

Sample ID / Description (Containers for each sample may be combined on one line)	Collection Date(s)	Collection Time (Military)	Grab G / Composite C	Matrix: Aqueous	Soil	Non-Aqueous	No of Containers by Preservative Type: Unpres.	HCl	HNO3	H2SO4	NaOH	Na2S2O3	Field Filtered	PFAS Method 537 mod. with isotope dilution (533 Table 4)	Remarks / Cooler I.D.
TW-MD-01_GW-042623	4/26/23	1000	G	2			2							X	
EB-02_042623	4/26/23	1010	G	2			2							X	Equipment Blank
SEEPVAULT_GW-042623	4/26/23	1030	G	2			2							X	
MWM10-SEN01_GW-042623	4/26/23	1255	G	2			2							X	
TW-01-03_GW-042623	4/26/23	1515	G	2			2							X	
MWM10-04_GW-042623	4/26/23	1650	G	2			2							X	
tripblank	4/26/23	1710	G	1			1							X	tripblank

Turn Around Time Required (Prior lab approval required for expedited TAT): ☒ Standard ☐ Rush (Specify)

Sample Disposal: ☐ Return to Client ☒ Disposal by Lab

Possible Hazard Identification: ☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: Sommer Guy	4/26/23	1750	1. Received by: FedEx	4/26/23	1750
2. Relinquished by	Date	Time	2. Received by	Date	Time
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by: FedEx	4.27.23	1010	4. Laboratory received by: Kayem Reams	4.27.23	1010

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY: Received on Ice (Circle) (Yes) No Ice Pack — Receipt Temp 2.8 °C — Temp Blank ☒ Y ☐ N

DISTRIBUTION: WHITE & YELLOW-Return to laboratory with Sample(s); PINK-Field/Client Copy

Document Number: ME003N2-01

PACE ANALYTICAL SERVICES, LLC

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-001**

Description: **TW-MD-01_GW-042623** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1000** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/30/2023 2008	ARC2	05/15/2023 1720	75308

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.2	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.2	1.8	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**1.3**	**JM-03**	**3.6**	**0.90**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.90	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.6	0.90	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.90	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	0.90	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**0.97**	**JM-03**	**3.6**	**0.90**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**5.6**	**M-03**	**3.6**	**0.90**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**2.7**	**JQM-03**	**3.6**	**0.90**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	0.90	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.90	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.6	0.90	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**1.2**	**JM-03**	**3.6**	**0.90**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.6	0.90	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**4.6**	**M-03**	**3.6**	**0.90**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.6	0.90	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.90	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.90	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.90	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**1.3**	**JM-03**	**3.6**	**0.90**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	259	50-150
13C2_6:2FTS	N	187	50-150
13C2_8:2FTS		130	50-150
13C2_PFDoA		102	50-150
13C2_PFTeDA		101	50-150
13C3_PFBS		85	50-150
13C3_PFHxS		99	50-150
13C3-HFPO-DA		90	50-150
13C4_PFBA	N	40	50-150
13C4_PFHpA		108	50-150
13C5_PFHxA		98	50-150
13C5_PFPeA		73	50-150
13C6_PFDA		112	50-150
13C7_PFUdA		106	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-001**

Description: **TW-MD-01_GW-042623** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1000** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		112	50-150
13C8_PFOS		109	50-150
13C8_PFOSA		117	50-150
13C9_PFNA		112	50-150
d5-EtFOSAA		111	50-150
d3-MeFOSAA		110	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-002**

Description: **EB-02_042623** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1010** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/30/2023 2033	ARC2	05/15/2023 1720	75308

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		8.2	2.1	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		8.2	2.1	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		8.2	2.1	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		8.2	2.1	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		8.2	2.1	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		8.2	2.1	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		8.2	2.1	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		8.2	2.1	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		8.2	2.1	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		4.1	1.0	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		4.1	1.0	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		89	50-150
13C2_6:2FTS		90	50-150
13C2_8:2FTS		96	50-150
13C2_PFDoA		92	50-150
13C2_PFTeDA		93	50-150
13C3_PFBS		84	50-150
13C3_PFHxS		91	50-150
13C3-HFPO-DA		87	50-150
13C4_PFBA		89	50-150
13C4_PFHpA		91	50-150
13C5_PFHxA		93	50-150
13C5_PFPeA		88	50-150
13C6_PFDA		89	50-150
13C7_PFUdA		93	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-002**

Description: **EB-02_042623** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1010** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		92	50-150
13C8_PFOS		91	50-150
13C8_PFOSA		100	50-150
13C9_PFNA		91	50-150
d5-EtFOSAA		95	50-150
d3-MeFOSAA		95	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-003**

Description: **SEEPVAULT_GW-042623** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1030** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/30/2023 2046	ARC2	05/15/2023 1720	75308

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		80	20	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		80	20	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		80	20	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	80	20	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	80	20	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		80	20	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		80	20	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		80	20	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		80	20	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**12**	**JM-03**	**40**	**10**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**14**	**JM-03**	**40**	**10**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**11**	**JM-03**	**40**	**10**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**100**	**M-03**	**40**	**10**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	215	50-150
13C2_6:2FTS	N	173	50-150
13C2_8:2FTS		150	50-150
13C2_PFDoA		105	50-150
13C2_PFTeDA		109	50-150
13C3_PFBS		106	50-150
13C3_PFHxS		105	50-150
13C3-HFPO-DA		104	50-150
13C4_PFBA		79	50-150
13C4_PFHpA		118	50-150
13C5_PFHxA		117	50-150
13C5_PFPeA		96	50-150
13C6_PFDA		120	50-150
13C7_PFUdA		120	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-003**

Description: **SEEPVAULT_GW-042623** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1030** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		119	50-150
13C8_PFOS		116	50-150
13C8_PFOSA		126	50-150
13C9_PFNA		119	50-150
d5-EtFOSAA		124	50-150
d3-MeFOSAA		127	50-150

LOQ = Limit of Quantitation	B = Detected in the method blank	E = Quantitation of compound exceeded the calibration range	DL = Detection Limit	Q = Surrogate failure
ND = Not detected at or above the DL	N = Recovery is out of criteria	P = The RPD between two GC columns exceeds 40%	J = Estimated result < LOQ and ≥ DL	L = LCS/LCSD failure
H = Out of holding time	W = Reported on wet weight basis			S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-004**

Description: **MWW10-SEN01_GW-042623** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1255** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/30/2023 2059	ARC2	05/15/2023 1720	75308

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		80	20	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		80	20	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		80	20	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	80	20	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	80	20	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		80	20	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		80	20	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		80	20	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		80	20	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**10**	**JM-03**	**40**	**10**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND	M-03	40	10	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**15**	**JM-03**	**40**	**10**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	202	50-150
13C2_6:2FTS	N	170	50-150
13C2_8:2FTS		134	50-150
13C2_PFDoA		101	50-150
13C2_PFTeDA		113	50-150
13C3_PFBS		109	50-150
13C3_PFHxS		111	50-150
13C3-HFPO-DA		105	50-150
13C4_PFBA		87	50-150
13C4_PFHpA		115	50-150
13C5_PFHxA		119	50-150
13C5_PFPeA		101	50-150
13C6_PFDA		117	50-150
13C7_PFUdA		117	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-004**

Description: **MWW10-SEN01_GW-042623** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1255** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		124	50-150
13C8_PFOS		115	50-150
13C8_PFOSA		127	50-150
13C9_PFNA		114	50-150
d5-EtFOSAA		120	50-150
d3-MeFOSAA		124	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-005**

Description: **TW-01-03_GW-042623** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1515** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/31/2023 1617	ARC2	05/15/2023 1720	75308

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		80	20	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		80	20	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	80	20	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	80	20	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	80	20	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		80	20	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		80	20	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND	Q	80	20	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND	Q	80	20	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**19**	**JM-03**	**40**	**10**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**29**	**JM-03**	**40**	**10**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**97**	**M-03**	**40**	**10**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	385	50-150
13C2_6:2FTS	N	327	50-150
13C2_8:2FTS	N	344	50-150
13C2_PFDoA		134	50-150
13C2_PFTeDA		118	50-150
13C3_PFBS		113	50-150
13C3_PFHxS		125	50-150
13C3-HFPO-DA		107	50-150
13C4_PFBA		84	50-150
13C4_PFHpA		115	50-150
13C5_PFHxA		115	50-150
13C5_PFPeA		102	50-150
13C6_PFDA		131	50-150
13C7_PFUdA		144	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
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S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-005**

Description: **TW-01-03_GW-042623** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1515** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		117	50-150
13C8_PFOS		125	50-150
13C8_PFOSA		128	50-150
13C9_PFNA		126	50-150
d5-EtFOSAA	N	183	50-150
d3-MeFOSAA	N	162	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-006**

Description: **MWW10-04_GW-042623** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1650** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/31/2023 1630	ARC2	05/15/2023 1720	75308
2	SOP SPE	PFAS by ID SOP QSM B-15	1	06/06/2023 2308	ARC2	06/05/2023 1453	76891

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.3	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.3	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.3	1.8	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**1.2**	**JM-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**6.9**	**M-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**11**	**QM-03 J**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**17**		**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**19**		**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**12**		**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**78**	**M-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**18**	**M-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**18**	**M-03**	**3.7**	**0.92**	**ng/L**	**1**

Surrogate	Run 1 Q	Run 1 % Recovery	Run 1 Acceptance Limits	Run 2 Q	Run 2 % Recovery	Run 2 Acceptance Limits
13C2_4:2FTS	N	292	50-150	HN	280	50-150
13C2_6:2FTS	N	299	50-150	HN	304	50-150
13C2_8:2FTS	N	277	50-150	HN	321	50-150
13C2_PFDoA		119	50-150	H	91	50-150
13C2_PFTeDA		104	50-150	H	73	50-150
13C3_PFBS		90	50-150	H	61	50-150
13C3_PFHxS		107	50-150	H	68	50-150
13C3-HFPO-DA		80	50-150	HN	41	50-150
13C4_PFBA	N	33	50-150	HN	18	50-150
13C4_PFHpA		91	50-150	HN	44	50-150
13C5_PFHxA		82	50-150	HN	44	50-150
13C5_PFPeA		61	50-150	HN	28	50-150
13C6_PFDA		108	50-150	H	82	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-006**

Description: **MWW10-04_GW-042623** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1650** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits	Q	Run 2 % Recovery	Acceptance Limits
13C7_PFUdA		124	50-150	H	93	50-150
13C8_PFOA		91	50-150	H	60	50-150
13C8_PFOS		115	50-150	HM-03	82	50-150
13C8_PFOSA		111	50-150	H	69	50-150
13C9_PFNA		108	50-150	H	77	50-150
d5-EtFOSAA		145	50-150	H	105	50-150
d3-MeFOSAA		126	50-150	H	98	50-150

LOQ = Limit of Quantitation
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E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-006**

Description: **MWW10-04_GW-042623** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1650** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/31/2023 1630	ARC2	05/15/2023 1720	75308
2	SOP SPE	PFAS by ID SOP QSM B-15	1	06/06/2023 2308	ARC2	06/05/2023 1453	76891

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND	H	7.1	1.8	ng/L	2
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND	H	7.1	1.8	ng/L	2
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	HQ	7.1	1.8	ng/L	2
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	HQ	7.1	1.8	ng/L	2
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	HQ	7.1	1.8	ng/L	2
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND	HQ	7.1	1.8	ng/L	2
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND	H	7.1	1.8	ng/L	2
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND	H	7.1	1.8	ng/L	2
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND	H	7.1	1.8	ng/L	2
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND	H	3.6	0.89	ng/L	2
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND	H	3.6	0.89	ng/L	2
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND	H	3.6	0.89	ng/L	2
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND	H	3.6	0.89	ng/L	2
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND	H	3.6	0.89	ng/L	2
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND	H	3.6	0.89	ng/L	2
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**6.8**	**HM-03**	**3.6**	**0.89**	**ng/L**	**2**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**9.1**	**HQM-03**	**3.6**	**0.89**	**ng/L**	**2**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND	H	3.6	0.89	ng/L	2
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND	H	3.6	0.89	ng/L	2
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**19**	**HQM-03**	**3.6**	**0.89**	**ng/L**	**2**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**25**	**HQM-03**	**3.6**	**0.89**	**ng/L**	**2**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**11**	**H**	**3.6**	**0.89**	**ng/L**	**2**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**79**	**HM-03**	**3.6**	**0.89**	**ng/L**	**2**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**21**	**HQM-03**	**3.6**	**0.89**	**ng/L**	**2**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND	H	3.6	0.89	ng/L	2
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND	H	3.6	0.89	ng/L	2
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND	H	3.6	0.89	ng/L	2
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**21**	**HM-03**	**3.6**	**0.89**	**ng/L**	**2**

Surrogate	Run 1 Q	Run 1 % Recovery	Run 1 Acceptance Limits	Run 2 Q	Run 2 % Recovery	Run 2 Acceptance Limits
13C2_4:2FTS	N	292	50-150	HN	280	50-150
13C2_6:2FTS	N	299	50-150	HN	304	50-150
13C2_8:2FTS	N	277	50-150	HN	321	50-150
13C2_PFDoA		119	50-150	H	91	50-150
13C2_PFTeDA		104	50-150	H	73	50-150
13C3_PFBS		90	50-150	H	61	50-150
13C3_PFHxS		107	50-150	H	68	50-150
13C3-HFPO-DA		80	50-150	HN	41	50-150
13C4_PFBA	N	33	50-150	HN	18	50-150
13C4_PFHpA		91	50-150	HN	44	50-150
13C5_PFHxA		82	50-150	HN	44	50-150
13C5_PFPeA		61	50-150	HN	28	50-150
13C6_PFDA		108	50-150	H	82	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-006**

Description: **MWW10-04_GW-042623** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1650** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits	Q	Run 2 % Recovery	Acceptance Limits
13C7_PFUdA		124	50-150	H	93	50-150
13C8_PFOA		91	50-150	H	60	50-150
13C8_PFOS		115	50-150	HM-03	82	50-150
13C8_PFOSA		111	50-150	H	69	50-150
13C9_PFNA		108	50-150	H	77	50-150
d5-EtFOSAA		145	50-150	H	105	50-150
d3-MeFOSAA		126	50-150	H	98	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-007**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1710** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/31/2023 1643	ARC2	05/15/2023 1720	75308

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		8.4	2.1	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		8.4	2.1	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		8.4	2.1	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		8.4	2.1	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		8.4	2.1	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		8.4	2.1	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		8.4	2.1	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		8.4	2.1	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		8.4	2.1	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		4.2	1.1	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		4.2	1.1	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		129	50-150
13C2_6:2FTS		108	50-150
13C2_8:2FTS		110	50-150
13C2_PFDoA		114	50-150
13C2_PFTeDA		115	50-150
13C3_PFBS		113	50-150
13C3_PFHxS		114	50-150
13C3-HFPO-DA		117	50-150
13C4_PFBA		114	50-150
13C4_PFHpA		118	50-150
13C5_PFHxA		122	50-150
13C5_PFPeA		109	50-150
13C6_PFDA		110	50-150
13C7_PFUdA		112	50-150

LOQ = Limit of Quantitation
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P = The RPD between two GC columns exceeds 40%
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD27025-007**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **04/26/2023 1710** Project Name: **RACER PNC**

Date Received: **04/27/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		116	50-150
13C8_PFOS		117	50-150
13C8_PFOSA		119	50-150
13C9_PFNA		114	50-150
d5-EtFOSAA		120	50-150
d3-MeFOSAA		113	50-150

LOQ = Limit of Quantitation
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Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
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Racer

DATA REVIEW

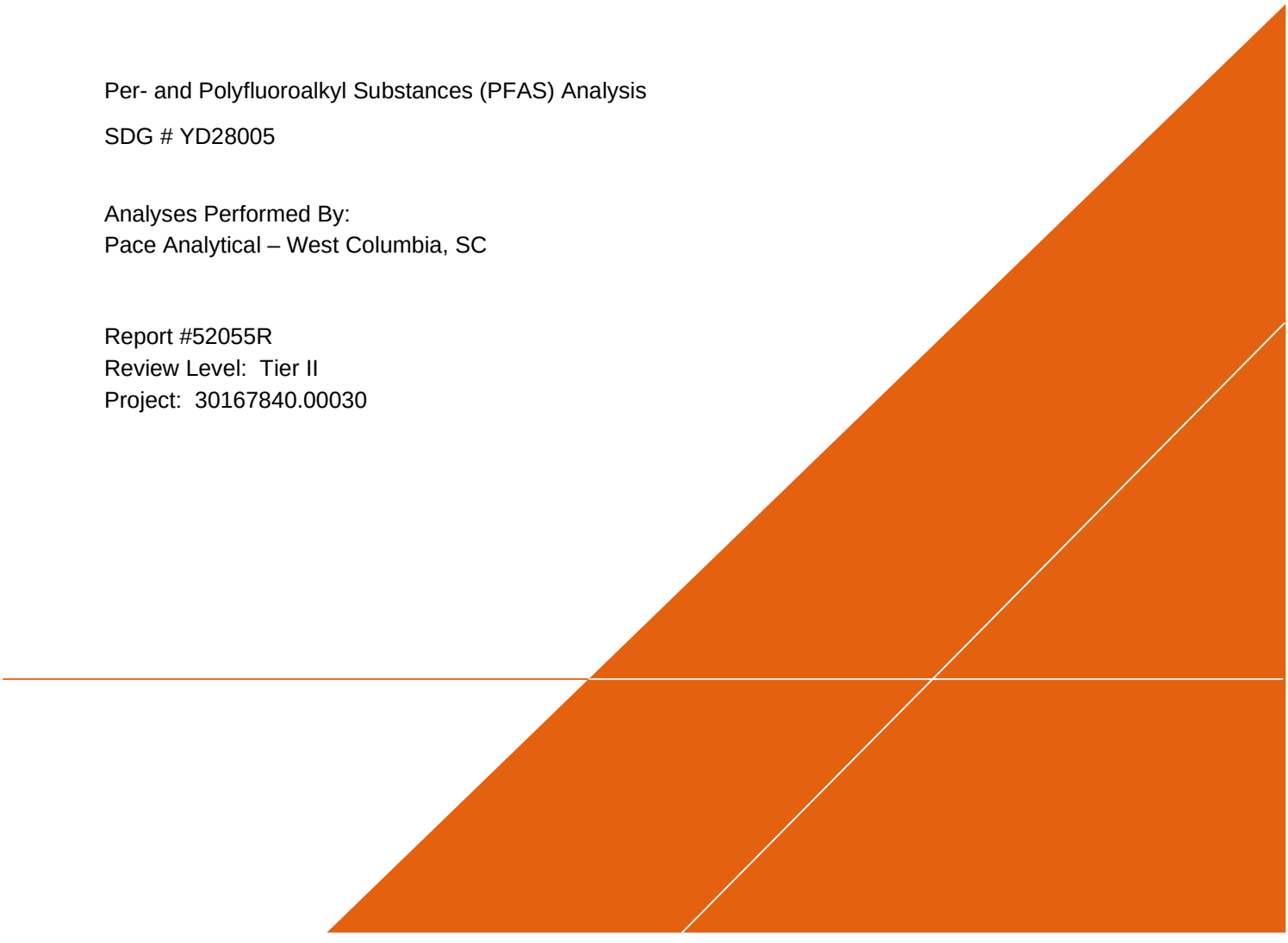
Pontiac North Campus, MI

Per- and Polyfluoroalkyl Substances (PFAS) Analysis

SDG # YD28005

Analyses Performed By:
Pace Analytical – West Columbia, SC

Report #52055R
Review Level: Tier II
Project: 30167840.00030



SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) #YD28005 for samples collected in association with the Racer PNC, MI Site. The review was conducted as a Tier II evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis				
					PFAS	SVOC	PCB	MET	MISC
MWF16-05_GW	YD28005-1	Water	04/27/23		X				
MWF8-01_GW	YD28005-2	Water	04/27/23		X				
MWF16-18_GW	YD28005-3	Water	04/27/23		X				
MWF16-06_GW	YD28005-4	Water	04/27/23		X				
MWF12-01R_GW	YD28005-5	Water	04/27/23		X				
MW0S-05_GW	YD28005-6	Water	04/27/23		X				
DUP-01_GW	YD28005-7	Water	04/27/23	MWF12-01R_GW	X				
TRIP BLANK	YD28005-8	Water	04/27/23		X				

ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

Note:
QA - Quality Assurance

ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) Modified Method 537. Data were reviewed in accordance with the USEPA National Functional Guidelines for Organic Superfund Methods Data Review, EPA 540-R-20-005, November 2020 (with reference to the historical USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, OSWER 9240.1-05A-P, October 1999 as appropriate) and USEPA Data Review and Validation Guidelines for Perfluoroalkyl Substances (PFASs) Analyzed Using EPA Method 537, EPA 910-R-18-001, November 2018; and Department of Defense (DoD) Quality Systems Manual (QSM) 5.3, DoD Final General Data Validation Guidelines, November 2019.

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers
  - U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
  - B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- Quantitation (Q) Qualifiers
  - E The compound was quantitated above the calibration range.
  - D Concentration is based on a diluted sample analysis.
- Validation Qualifiers
  - J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
  - UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
  - JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
  - UB Compound considered non-detect at the listed value due to associated blank contamination.
  - N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
  - R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and

provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

DATA REVIEW REPORT

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) ANALYSIS

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
USEPA modified Method 537	Water	28 days to extraction; 28 days from extraction to analysis	Cool to <6 °C

All samples were initially analyzed within the specified holding time criteria.

2. Blank Contamination

Quality assurance (QA) blanks (i.e., method, field, and equipment blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Equipment blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (DL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were not detected above the DL in the associated blanks; therefore, detected sample results were not associated with blank contamination.

3. Extracted Internal Standard (EIS)/Surrogate Compounds

Labeled standards must be added to all field samples and QC samples prior to extraction. EIS recoveries must be within DoD QSM 5.3 specified limits of 50% to150%.

Sample locations associated with EIS exhibiting recoveries outside of the control limits are presented in the following table.

Sample Locations	EIS	Associated Compound	%R
MWF16-05_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
MWF16-18_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
	13C4-PFBA	Perfluoro-n-butanoic acid (PFBA)	< 50% but > 20%
MWF12-O1R_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C8_PFOS	11Cl-PF3OUdS (F-53B Minor)	>150

Sample Locations	EIS	Associated Compound	%R
MWF12-O1R_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
	13C2_8:2FTS	1H,1H, 2H,2H-perfluorodecane sulfonic acid (8:2 FTS)	>150
	13C8_PFOS	9Cl-PF3ONS (F-53B Major)	>150
	13C3_PFHxS	ADONA	>150
	13C3-HFPO-DA	HFPO-DA (GenX)	>150
	d5-EtFOSAA	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	>150
	d3-MeFOSAA	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	>150
	13C3_PFBS	Perfluorobutanesulfonic acid (PFBS)	>150
	13C8_PFOS	Perfluorodecanesulfonic acid (PFDS)	>150
	13C6_PFDA	Perfluorodecanoic acid (PFDA)	>150
	13C2-PFDoA	Perfluorododecanoic acid (PFDoA)	>150
	13C3_PFHxS	Perfluoroheptanesulfonic Acid (PFHpS)	>150
	13C4_PFHpA	Perfluoroheptanoic acid (PFHpA)	>150
	13C3_PFHxS	Perfluorohexanesulfonic acid (PFHxS)	>150
	13C5_PFHxA	Perfluorohexanoic acid (PFHxA)	>150
	13C8_PFOS	Perfluorononanesulfonic acid (PFNS)	>150
	13C9_PFNA	Perfluorononanoic acid (PFNA)	>150
	13C8_PFOSA	Perfluorooctane Sulfonamide (PFOSA)	>150
	13C8_PFOS	Perfluorooctane sulfonic acid	>150
	13C8_PFOA	Perfluorooctanoic acid	>150
	13C3_PFBS	Perfluoropentanesulfonic acid (PFPeS)	>150
	13C5_PFPeA	Perfluoropentanoic acid (PFPeA)	>150
	13C2_PFTeDA	Perfluorotetradecanoic acid (PFTeA)	>150
	13C2-PFDoA	Perfluorotridecanoic Acid (PFTriA)	>150
	13C7_PFUdA	Perfluoroundecanoic acid (PFUnA)	>150
MWOS-05_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
DUP-01	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150

The criteria used to evaluate the EIS recoveries are presented in the following table. In the case of an EIS deviation, the sample results associated with the EIS are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
< 50% but > 20%	Non-detect	UJ
	Detect	J
> 150%	Non-detect	No Action
	Detect	J
< 20%	Non-detect	R
	Detect	R

4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within 50-150%. The relative percent difference (RPD) between the MS/MSD recoveries must exhibit an RPD within 30%.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

The MS and laboratory duplicate performed on sample MWF12-01R_GW exhibited recoveries and RPDs within the control limits.

5. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

All compounds associated with the LCS analysis exhibited recoveries within the control limits.

6. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 30% for water matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of two times the RL is applied for soil matrices.

Results for duplicate samples are summarized in the following table.

Sample ID/Duplicate ID	Compound	Sample Result	Duplicate Result	RPD
MWF12-01R_GW / DUP-01_GW	Perfluorobutanesulfonic acid (PFBS)	1.8 J	3.5 J	AC
	Perfluorohexanesulfonic acid (PFHxS)	1.8 J	4.0	AC
	Perfluorobutanoic acid (PFBA)	4.3	9.0	AC
	Perfluoroheptanoic acid (PFHpA)	0.90 J	1.6 J	AC

Sample ID/Duplicate ID	Compound	Sample Result	Duplicate Result	RPD
	Perfluorohexanoic acid (PFHxA)	1.8 J	2.6 J	AC
	Perfluorooctanoic acid (PFOA)	3.2 J	6.7	AC
	Perfluoropentanoic acid (PFPeA)	1.9 J	2.7 J	AC
	Perfluorooctane sulfonic acid (PFOS)	3.5 U	0.90 J	AC

Notes:

AC Acceptable

The calculated RPDs between the parent sample and field duplicate were acceptable.

7. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR PFAs

PFAs: USEPA modified Method 537	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
LIQUID CHROMATOGRAPHY/MASS SPECTROMETRY (LC/MS/MS)					
Tier II Validation					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks	X				X
C. Trip blanks		X		X	
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate(LCSD) %R	X				X
LCS/LCSD Precision (RPD)	X				X
Matrix Spike (MS) %R		X		X	
Matrix Spike Duplicate (MSD) %R	X				X
MS/MSD Precision (RPD)	X				X
Field Duplicate (RPD)		X		X	
Extracted Internal Standards (EIS) Recoveries		X	X		
Dilution Factor		X		X	
Moisture Content	X				X

Notes:

%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Rachelle Borne

SIGNATURE: 

DATE: December 17, 2023

PEER REVIEW: Joseph C. Houser

DATE: December 19, 2023

CHAIN OF CUSTODY

CORRECTED SAMPLE ANALYSIS DATA SHEETS

Pace Analytical®

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Number 146506

Client: Arcadis	Report to Contact: Tiffany Linder, Alexis Crisp	Telephone No. / E-mail: tiffany.linder@arcadis.com, Alexis.Crisp@arcadis.com	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: Jommel Guy	Analysis (Attach list if more space is needed): Repost EGLE 28 Compounds	Page 1 of 1
City: NOVI	State: MI	Zip Code: 48377	Printed Name: Jommel Guy
Project Name: Racer PNC			YD28005
Project No.: 30167840.00030	P.O. No.:		KESZ

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	G=Grab C=Composite	Matrix: Aqueous	Soil	Air/Gas	No. of Containers by Preservative Type: Unpres.	H2SO4	HNO3	HCl	NaOH	Na2S2O3	NaHSO4	PFAS Method 537.1mod. with isotope dilution PZ (Y/N)	Remarks / Cooler I.D.
MWF16-05_GW-042723	4/27/23	0940	G	2			2							X	
MWF18-01_GW-042723	4/27/23	1035	G	2			2							X	
MWF16-18_GW-042723	4/27/23	1125	G	2			2							X	
MWF16-06_GW-042723	4/27/23	1220	G	2			2							X	
MWF12-01R_GW-042723	4/27/23	1342	G	2			2							X	
MWOS-05_GW-042723	4/27/23	1453	G	2			2							X	
DUP-01_GW-042723	4/27/23	—	G	2			2							X	
tripblank	4/27/23	1410	G	1			1							X	tripblank

Turn Around Time Required (Prior lab approval required for expedited TAT.): ☒ Standard ☐ Rush (Specify)

Sample Disposal: ☐ Return to Client ☒ Disposal by Lab

Possible Hazard Identification: ☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: Jommel Guy	4/27/23	1550	1. Received by: FedEx	4/27/23	1550
2. Relinquished by	Date	Time	2. Received by	Date	Time
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by: Fedex	4-28-23	930	4. Laboratory received by: [signature]	4-28-23	930

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY — Received on Ice (Circle): (Yes) No Ice Pack — Receipt Temp. 1.5 °C — Temp Blank: ☒ Y ☐ N

DISTRIBUTION: WHITE & YELLOW-Return to laboratory with Sample(s); PINK-Field/Client Copy

Document Number: ME003N2-01

PACE ANALYTICAL SERVICES, LLC

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-001**

Description: **MWF16-05_GW-042723** Matrix: **Aqueous**

Date Sampled: **04/27/2023 0940** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/18/2023 1856	ALM	05/17/2023 1903	75586

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.4	1.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.4	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.4	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.4	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.4	1.8	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.4	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.4	1.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.4	1.8	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.4	1.8	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**3.3**	**JM-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**2.8**	**JM-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**6.8**	**M-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**8.8**		**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**2.8**	**JM-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**8.6**	**M-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**4.8**	**M-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**7.4**	**M-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.7	0.92	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	243	50-150
13C2_6:2FTS	N	151	50-150
13C2_8:2FTS		104	50-150
13C2_PFDoA		89	50-150
13C2_PFTeDA		84	50-150
13C3_PFBS		100	50-150
13C3_PFHxS		103	50-150
13C3-HFPO-DA		82	50-150
13C4_PFBA		63	50-150
13C4_PFHpA		90	50-150
13C5_PFHxA		98	50-150
13C5_PFPeA		82	50-150
13C6_PFDA		96	50-150
13C7_PFUdA		86	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-001**

Description: **MWF16-05_GW-042723** Matrix: **Aqueous**

Date Sampled: **04/27/2023 0940** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		110	50-150
13C8_PFOS		95	50-150
13C8_PFOSA		97	50-150
13C9_PFNA		97	50-150
d5-EtFOSAA		94	50-150
d3-MeFOSAA		85	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-002**

Description: **MWF8-01_GW-042723** Matrix: **Aqueous**

Date Sampled: **04/27/2023 1035** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/18/2023 1917	ALM	05/17/2023 1903	75586

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**3.6**		**3.6**	**0.89**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**1.6**	**JM-03**	**3.6**	**0.89**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.6	0.89	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		111	50-150
13C2_6:2FTS		98	50-150
13C2_8:2FTS		89	50-150
13C2_PFDoA		81	50-150
13C2_PFTeDA		81	50-150
13C3_PFBS		105	50-150
13C3_PFHxS		91	50-150
13C3-HFPO-DA		86	50-150
13C4_PFBA		86	50-150
13C4_PFHpA		95	50-150
13C5_PFHxA		87	50-150
13C5_PFPeA		94	50-150
13C6_PFDA		86	50-150
13C7_PFUdA		86	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-002**

Description: **MWF8-01_GW-042723** Matrix: **Aqueous**

Date Sampled: **04/27/2023 1035** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		104	50-150
13C8_PFOS		88	50-150
13C8_PFOSA		95	50-150
13C9_PFNA		94	50-150
d5-EtFOSAA		92	50-150
d3-MeFOSAA	M-03	84	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-003**

Description: **MWF16-18_GW-042723** Matrix: **Aqueous**

Date Sampled: **04/27/2023 1125** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/18/2023 1928	ALM	05/17/2023 1903	75586

Parameter	CAS Number	Analytical Method	Result	Q		LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND			7.1	1.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND			7.1	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND			7.1	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q		7.1	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q		7.1	1.8	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND			7.1	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND			7.1	1.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND			7.1	1.8	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND			7.1	1.8	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**10**	**M-03**		**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND			3.5	0.88	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**1.3**	**J**		**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND			3.5	0.88	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND			3.5	0.88	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**13**			**3.5**	**0.88**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**33**	**M-03**		**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**14**	**QM-03**	J	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND			3.5	0.88	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND			3.5	0.88	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**20**	**M-03**		**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**21**	**M-03**		**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND			3.5	0.88	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**41**			**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**16**	**M-03**		**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND			3.5	0.88	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND			3.5	0.88	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND			3.5	0.88	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND			3.5	0.88	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	249	50-150
13C2_6:2FTS	N	294	50-150
13C2_8:2FTS		128	50-150
13C2_PFDoA		85	50-150
13C2_PFTeDA		86	50-150
13C3_PFBS		88	50-150
13C3_PFHxS		88	50-150
13C3-HFPO-DA		65	50-150
13C4_PFBA	N	40	50-150
13C4_PFHpA		64	50-150
13C5_PFHxA		72	50-150
13C5_PFPeA		58	50-150
13C6_PFDA		99	50-150
13C7_PFUdA		87	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-003**

Description: **MWF16-18_GW-042723** Matrix: **Aqueous**

Date Sampled: **04/27/2023 1125** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		109	50-150
13C8_PFOS		97	50-150
13C8_PFOSA		93	50-150
13C9_PFNA		105	50-150
d5-EtFOSAA		90	50-150
d3-MeFOSAA		95	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-004**

Description: **MWF16-06_GW-042723** Matrix: **Aqueous**

Date Sampled: **04/27/2023 1220** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
2	SOP SPE	PFAS by ID SOP QSM B-15	1	05/24/2023 1510	ALM	05/23/2023 1402	75963

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.0	1.7	ng/L	2
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.0	1.7	ng/L	2
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.0	1.7	ng/L	2
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.0	1.7	ng/L	2
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.0	1.7	ng/L	2
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.0	1.7	ng/L	2
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.0	1.7	ng/L	2
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.0	1.7	ng/L	2
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.0	1.7	ng/L	2
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**3.4**	**J**	**3.5**	**0.87**	**ng/L**	**2**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.87	ng/L	2
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**5.7**		**3.5**	**0.87**	**ng/L**	**2**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.87	ng/L	2
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.87	ng/L	2
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**5.1**		**3.5**	**0.87**	**ng/L**	**2**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**18**	**M-03**	**3.5**	**0.87**	**ng/L**	**2**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**9.1**		**3.5**	**0.87**	**ng/L**	**2**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.87	ng/L	2
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.87	ng/L	2
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**7.5**		**3.5**	**0.87**	**ng/L**	**2**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**8.8**	**M-03**	**3.5**	**0.87**	**ng/L**	**2**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	0.87	ng/L	2
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**42**	**M-03**	**3.5**	**0.87**	**ng/L**	**2**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**10**	**M-03**	**3.5**	**0.87**	**ng/L**	**2**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.87	ng/L	2
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.87	ng/L	2
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.87	ng/L	2
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**38**	**M-03**	**3.5**	**0.87**	**ng/L**	**2**

Surrogate	Q	Run 2 % Recovery	Acceptance Limits
13C2_4:2FTS	N	207	50-150
13C2_6:2FTS		132	50-150
13C2_8:2FTS		89	50-150
13C2_PFDoA		93	50-150
13C2_PFTeDA		90	50-150
13C3_PFBS		97	50-150
13C3_PFHxS		93	50-150
13C3-HFPO-DA		93	50-150
13C4_PFBA		70	50-150
13C4_PFHpA		93	50-150
13C5_PFHxA		108	50-150
13C5_PFPeA		96	50-150
13C6_PFDA		98	50-150
13C7_PFUdA		91	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-004**

Description: **MWF16-06_GW-042723** Matrix: **Aqueous**

Date Sampled: **04/27/2023 1220** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Surrogate	Q	Run 2 % Recovery	Acceptance Limits
13C8_PFOA		119	50-150
13C8_PFOS		97	50-150
13C8_PFOSA		92	50-150
13C9_PFNA		104	50-150
d5-EtFOSAA		93	50-150
d3-MeFOSAA		89	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-005**

Description: **MWF12-01R_GW-042723** Matrix: **Aqueous**

Date Sampled: **04/27/2023 1342** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/18/2023 1949	ALM	05/17/2023 1903	75586

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND	Q	7.0	1.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND	Q	7.0	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.0	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.0	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.0	1.8	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND	Q	7.0	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND	Q	7.0	1.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND	Q	7.0	1.8	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND	Q	7.0	1.8	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**1.8**	**JQM-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND	Q	3.5	0.88	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND	Q	3.5	0.88	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND	Q	3.5	0.88	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND	Q	3.5	0.88	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND	Q	3.5	0.88	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**1.8**	**JQM-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**4.3**		**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND	Q	3.5	0.88	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND	Q	3.5	0.88	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**0.90**	**JQM-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**1.8**	**JQM-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND	Q	3.5	0.88	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**3.2**	**JQ**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**1.9**	**JQM-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND	Q	3.5	0.88	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND	Q	3.5	0.88	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND	Q	3.5	0.88	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND	Q	3.5	0.88	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	397	50-150
13C2_6:2FTS	N	222	50-150
13C2_8:2FTS	N	182	50-150
13C2_PFDoA	N	157	50-150
13C2_PFTeDA	N	161	50-150
13C3_PFBS	N	192	50-150
13C3_PFHxS	N	178	50-150
13C3-HFPO-DA	N	162	50-150
13C4_PFBA		120	50-150
13C4_PFHpA	N	179	50-150
13C5_PFHxA	N	181	50-150
13C5_PFPeA	N	159	50-150
13C6_PFDA	N	180	50-150
13C7_PFUdA	N	159	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-005**

Description: **MWF12-01R_GW-042723** Matrix: **Aqueous**

Date Sampled: **04/27/2023 1342** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA	N	212	50-150
13C8_PFOS	N	173	50-150
13C8_PFOSA	N	174	50-150
13C9_PFNA	N	186	50-150
d5-EtFOSAA	M-03N	165	50-150
d3-MeFOSAA	N	171	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-006**

Description: **MW0S-05_GW-042723** Matrix: **Aqueous**

Date Sampled: **04/27/2023 1453** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
2	SOP SPE	PFAS by ID SOP QSM B-15	1	05/24/2023 1521	ALM	05/23/2023 1402	75963

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		6.9	1.7	ng/L	2
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		6.9	1.7	ng/L	2
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		6.9	1.7	ng/L	2
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		6.9	1.7	ng/L	2
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	6.9	1.7	ng/L	2
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		6.9	1.7	ng/L	2
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		6.9	1.7	ng/L	2
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		6.9	1.7	ng/L	2
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		6.9	1.7	ng/L	2
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**2.9**	**JM-03**	**3.5**	**0.86**	**ng/L**	**2**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.86	ng/L	2
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.5	0.86	ng/L	2
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.86	ng/L	2
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.86	ng/L	2
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.5	0.86	ng/L	2
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**2.3**	**JM-03**	**3.5**	**0.86**	**ng/L**	**2**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**12**		**3.5**	**0.86**	**ng/L**	**2**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.86	ng/L	2
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.86	ng/L	2
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.5	0.86	ng/L	2
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.5	0.86	ng/L	2
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	0.86	ng/L	2
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**2.1**	**JM-03**	**3.5**	**0.86**	**ng/L**	**2**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**2.5**	**J**	**3.5**	**0.86**	**ng/L**	**2**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.86	ng/L	2
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.86	ng/L	2
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.86	ng/L	2
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**2.7**	**JM-03**	**3.5**	**0.86**	**ng/L**	**2**

Surrogate	Q	Run 2 % Recovery	Acceptance Limits
13C2_4:2FTS	N	207	50-150
13C2_6:2FTS		150	50-150
13C2_8:2FTS		84	50-150
13C2_PFDoA		89	50-150
13C2_PFTeDA		85	50-150
13C3_PFBS		91	50-150
13C3_PFHxS		93	50-150
13C3-HFPO-DA		85	50-150
13C4_PFBA		54	50-150
13C4_PFHpA		93	50-150
13C5_PFHxA		99	50-150
13C5_PFPeA		91	50-150
13C6_PFDA		98	50-150
13C7_PFUdA		93	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-006**

Description: **MW0S-05_GW-042723** Matrix: **Aqueous**

Date Sampled: **04/27/2023 1453** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Surrogate	Q	Run 2 % Recovery	Acceptance Limits
13C8_PFOA		115	50-150
13C8_PFOS		95	50-150
13C8_PFOSA		85	50-150
13C9_PFNA		105	50-150
d5-EtFOSAA		101	50-150
d3-MeFOSAA		89	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-007**

Description: **DUP-01_GW-042723** Matrix: **Aqueous**

Date Sampled: **04/27/2023** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
2	SOP SPE	PFAS by ID SOP QSM B-15	1	05/24/2023 1531	ALM	05/23/2023 1402	75963

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.2	1.8	ng/L	2
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.2	1.8	ng/L	2
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.2	1.8	ng/L	2
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.2	1.8	ng/L	2
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.2	1.8	ng/L	2
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.2	1.8	ng/L	2
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.2	1.8	ng/L	2
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.2	1.8	ng/L	2
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.2	1.8	ng/L	2
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**3.5**	**J**	**3.6**	**0.90**	**ng/L**	**2**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.90	ng/L	2
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.6	0.90	ng/L	2
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.90	ng/L	2
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	0.90	ng/L	2
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.6	0.90	ng/L	2
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**4.0**	**M-03**	**3.6**	**0.90**	**ng/L**	**2**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**9.0**		**3.6**	**0.90**	**ng/L**	**2**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	0.90	ng/L	2
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.90	ng/L	2
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**1.6**	**JM-03**	**3.6**	**0.90**	**ng/L**	**2**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**2.6**	**J**	**3.6**	**0.90**	**ng/L**	**2**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.6	0.90	ng/L	2
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**6.7**		**3.6**	**0.90**	**ng/L**	**2**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**2.7**	**J**	**3.6**	**0.90**	**ng/L**	**2**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.90	ng/L	2
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.90	ng/L	2
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.90	ng/L	2
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**0.90**	**J**	**3.6**	**0.90**	**ng/L**	**2**

Surrogate	Q	Run 2 % Recovery	Acceptance Limits
13C2_4:2FTS	N	191	50-150
13C2_6:2FTS		111	50-150
13C2_8:2FTS		85	50-150
13C2_PFDoA		90	50-150
13C2_PFTeDA		93	50-150
13C3_PFBS		95	50-150
13C3_PFHxS		93	50-150
13C3-HFPO-DA		82	50-150
13C4_PFBA		57	50-150
13C4_PFHpA		99	50-150
13C5_PFHxA		93	50-150
13C5_PFPeA		89	50-150
13C6_PFDA		91	50-150
13C7_PFUdA		86	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-007**

Description: **DUP-01_GW-042723** Matrix: **Aqueous**

Date Sampled: **04/27/2023** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Surrogate	Q	Run 2 % Recovery	Acceptance Limits
13C8_PFOA		103	50-150
13C8_PFOS		90	50-150
13C8_PFOSA		88	50-150
13C9_PFNA		94	50-150
d5-EtFOSAA		93	50-150
d3-MeFOSAA		85	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-008**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **04/27/2023 1410** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/18/2023 2032	ALM	05/17/2023 1903	75586

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		6.8	1.7	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		6.8	1.7	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		6.8	1.7	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		6.8	1.7	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		6.8	1.7	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		6.8	1.7	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		6.8	1.7	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		6.8	1.7	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		6.8	1.7	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.4	0.85	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.4	0.85	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		80	50-150
13C2_6:2FTS		75	50-150
13C2_8:2FTS		78	50-150
13C2_PFDoA		76	50-150
13C2_PFTeDA		60	50-150
13C3_PFBS		94	50-150
13C3_PFHxS		87	50-150
13C3-HFPO-DA		86	50-150
13C4_PFBA		86	50-150
13C4_PFHpA		84	50-150
13C5_PFHxA		86	50-150
13C5_PFPeA		80	50-150
13C6_PFDA		78	50-150
13C7_PFUdA		74	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YD28005-008**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **04/27/2023 1410** Project Name: **Racer PNC**

Date Received: **04/28/2023** Project Number: **30171056.0370B**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA	M-03	93	50-150
13C8_PFOS		79	50-150
13C8_PFOSA		83	50-150
13C9_PFNA		87	50-150
d5-EtFOSAA		83	50-150
d3-MeFOSAA	M-03	82	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
Q = Surrogate failure
L = LCS/LCSD failure
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Racer

DATA REVIEW

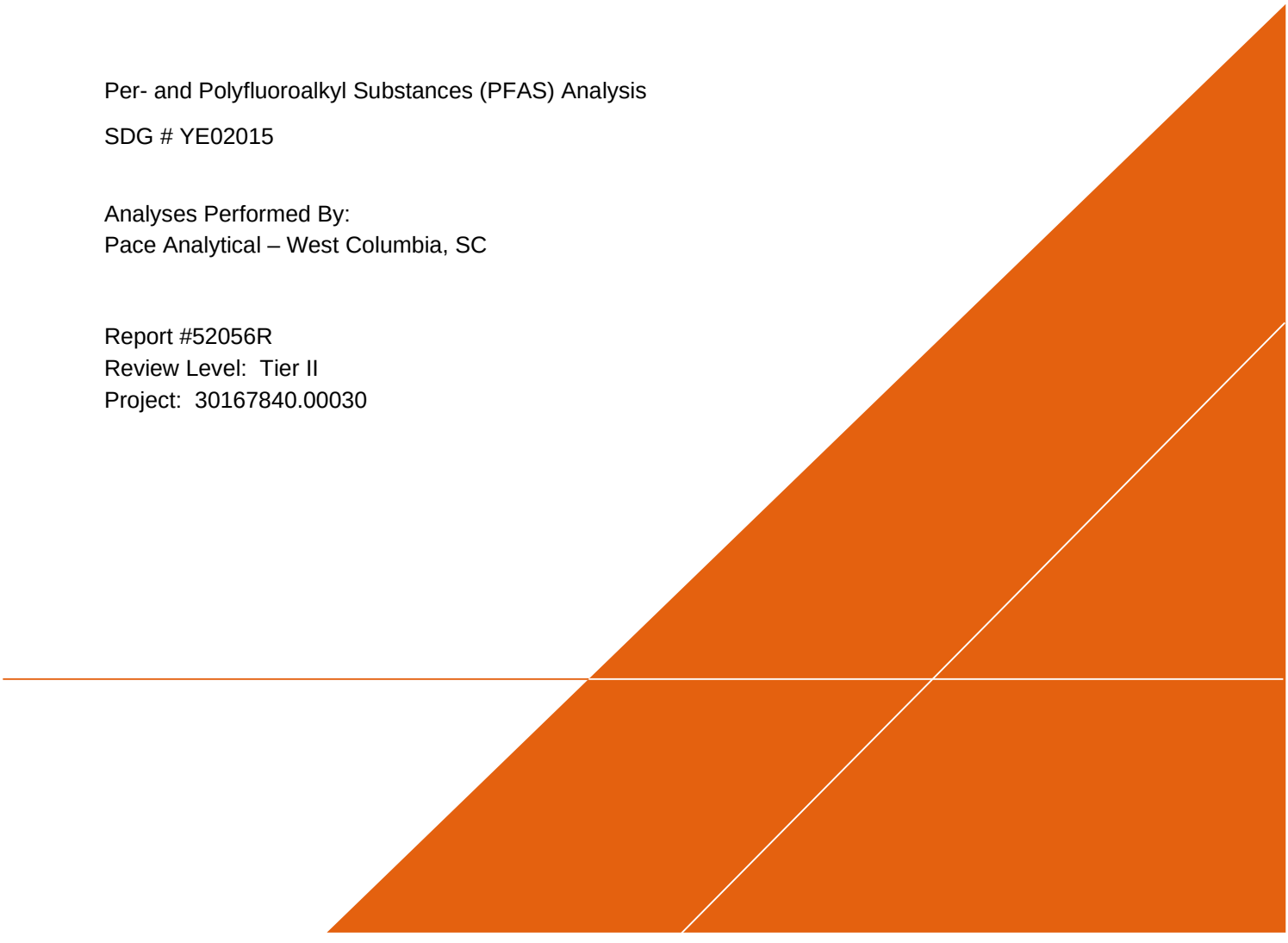
Pontiac North Campus, MI

Per- and Polyfluoroalkyl Substances (PFAS) Analysis

SDG # YE02015

Analyses Performed By:
Pace Analytical – West Columbia, SC

Report #52056R
Review Level: Tier II
Project: 30167840.00030



SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) #YE02015 for samples collected in association with the Racer PNC, MI Site. The review was conducted as a Tier II evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis				
					PFAS	SVOC	PCB	MET	MISC
MWM16-30_GW	YE02015-1	Water	05/01/23		X				
MWM4-05_GW	YE02015-2	Water	05/01/23		X				
MWM32-01_GW	YE02015-3	Water	05/01/23		X				
MWM2-28_GW	YE02015-4	Water	05/01/23		X				
MWM2-22_GW	YE02015-5	Water	05/01/23		X				
DUP-02_GW	YE02015-6	Water	05/01/23	MWM16-30_GW	X				
Trip Blank	YE02015-7	Water	05/01/23		X				

ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

Note:
QA - Quality Assurance

ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) Modified Method 537. Data were reviewed in accordance with the USEPA National Functional Guidelines for Organic Superfund Methods Data Review, EPA 540-R-20-005, November 2020 (with reference to the historical USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, OSWER 9240.1-05A-P, October 1999 as appropriate) and USEPA Data Review and Validation Guidelines for Perfluoroalkyl Substances (PFASs) Analyzed Using EPA Method 537, EPA 910-R-18-001, November 2018; and Department of Defense (DoD) Quality Systems Manual (QSM) 5.3, DoD Final General Data Validation Guidelines, November 2019.

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers
  - U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
  - B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- Quantitation (Q) Qualifiers
  - E The compound was quantitated above the calibration range.
  - D Concentration is based on a diluted sample analysis.
- Validation Qualifiers
  - J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
  - UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
  - JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
  - UB Compound considered non-detect at the listed value due to associated blank contamination.
  - N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
  - R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and

provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) ANALYSIS

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
USEPA modified Method 537	Water	28 days to extraction; 28 days from extraction to analysis	Cool to <6 °C

All samples were initially analyzed within the specified holding time criteria.

2. Blank Contamination

Quality assurance (QA) blanks (i.e., method, field, and equipment blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Equipment blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (DL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were not detected above the DL in the associated blanks; therefore, detected sample results were not associated with blank contamination.

3. Extracted Internal Standard (EIS)/Surrogate Compounds

Labeled standards must be added to all field samples and QC samples prior to extraction. EIS recoveries must be within DoD QSM 5.3 specified limits of 50% to150%.

Sample locations associated with EIS exhibiting recoveries outside of the control limits are presented in the following table.

Sample Locations	EIS	Associated Compound	%R
MWM16-30_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
	13C4-PFBA	Perfluoro-n-butanoic acid (PFBA)	< 50% but > 20%
MWM4-05_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
MWM32-01_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150

Sample Locations	EIS	Associated Compound	%R
MWM32-01_GW	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
	13C2_8:2FTS	1H,1H, 2H,2H-perfluorodecane sulfonic acid (8:2 FTS)	>150
MWM2-28_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
	13C2_8:2FTS	1H,1H, 2H,2H-perfluorodecane sulfonic acid (8:2 FTS)	>150
	13C4-PFBA	Perfluoro-n-butanoic acid (PFBA)	< 50% but > 20%
MWM2-22_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
	13C2_8:2FTS	1H,1H, 2H,2H-perfluorodecane sulfonic acid (8:2 FTS)	>150
DUP-02_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
	13C4-PFBA	Perfluoro-n-butanoic acid (PFBA)	< 50% but > 20%

The criteria used to evaluate the EIS recoveries are presented in the following table. In the case of an EIS deviation, the sample results associated with the EIS are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
< 50% but > 20%	Non-detect	UJ
	Detect	J
> 150%	Non-detect	No Action
	Detect	J
< 20%	Non-detect	R
	Detect	R

4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within 50-150%. The relative percent difference (RPD) between the MS/MSD recoveries must exhibit an RPD within 30%.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

A site-specific MS/MSD was not included in the data package.

5. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

All compounds associated with the LCS analysis exhibited recoveries within the control limits.

6. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 30% for water matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of two times the RL is applied for soil matrices.

Results for duplicate samples are summarized in the following table.

Sample ID/Duplicate ID	Compound	Sample Result	Duplicate Result	RPD
MMW16-30_GW / DUP-02	Perfluorobutanesulfonic acid (PFBS)	3.0 J	3.0 J	AC
	Perfluoropentanesulfonic acid (PFPeS)	1.0 J	3.7 U	AC
	Perfluorohexanesulfonic acid (PFHxS)	4.7	4.6	AC
	Perfluorobutanoic acid (PFBA)	12	11	AC
	Perfluoroheptanoic acid (PFHpA)	6.7	6.5	AC
	Perfluorohexanoic acid (PFHxA)	7.7	7.0	AC
	Perfluorooctanoic acid (PFOA)	3.8 J	4.1	AC
	Perfluoropentanoic acid (PFPeA)	11	13	AC
	Perfluorooctane sulfonic acid (PFOS)	1.3 J	1.2 J	AC

Notes:

AC Acceptable

The calculated RPDs between the parent sample and field duplicate were acceptable.

7. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR PFAs

PFAs: USEPA modified Method 537	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
LIQUID CHROMATOGRAPHY/MASS SPECTROMETRY (LC/MS/MS)					
Tier II Validation					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks	X				X
C. Trip blanks		X		X	
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate(LCSD) %R	X				X
LCS/LCSD Precision (RPD)	X				X
Matrix Spike (MS) %R	X				X
Matrix Spike Duplicate (MSD) %R	X				X
MS/MSD Precision (RPD)	X				X
Field Duplicate (RPD)		X		X	
Extracted Internal Standards (EIS) Recoveries		X	X		
Dilution Factor		X		X	
Moisture Content	X				X

Notes:

%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Rachelle Borne

SIGNATURE: 

DATE: December 17, 2023

PEER REVIEW: Joseph C. Houser

DATE: December 19, 2023

CHAIN OF CUSTODY

CORRECTED SAMPLE ANALYSIS DATA SHEETS

Pace Analytical®

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Number 146505

Client: ArCadis	Report to Contact: Tiffany Linder, Alexis Crisp	Telephone No. / E-mail: Alexis.Crisp@arcadis.com, tiffany.linder@arcadis.com	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: x Sommer Guy	Analysis (Attach list if more space is needed): Report EGLE 28 compounds	Page: of
City: Novi / State: MI / Zip Code: 48377	Printed Name: Sommer Guy		YE02015
Project Name: River PNC			
Project No.: 30167840.00030	P.O. No.		

Sample ID / Description (Containers for each sample may be combined on one line)	Collection Date(s)	Collection Time (Military)	Grab / C-Composite	Matrix: Aqueous	Matrix: Soil	Matrix: Non-Aqueous	No. of Containers by Preservative Type: Unpres.	H2SO4	HNO3	HCl	NaOH	Other	Other Analysis	PFAS - Per/Poly Fluoroalkyl Substances by ASTM D7979-17 Modified	Remarks / Cooler I.D.
MWM16-30_GW-050123	5/1/23	0838	G	2			2							X	
MWM4-05_GW-050123	5/1/23	1132	G	2			2							X	
MWM32-01_GW-050123	5/1/23	1250	G	2			2							X	
MWM2-28_GW-050123	5/1/23	1413	G	2			2							X	
MWM2-22_GW-050123	5/1/23	1505	G	2			2							X	
DUP-02_GW-050123	5/1/23	—	G	2			2							X	
tripblank	5/1/23	1540	G	1			1							X	tripblank

Turn Around Time Required (Prior lab approval required for expedited TAT.): X Standard ☐ Rush (Specify)

Sample Disposal: ☐ Return to Client X Disposal by Lab

Possible Hazard Identification: X Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: Sommer Guy	5/1/23	1625	1. Received by: FedEx	5/1/23	1625
2. Relinquished by	Date	Time	2. Received by	Date	Time
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by: fedex	5-2-23	950	4. Laboratory received by: Keyanna Williams	5/2/23	950

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY — Received on Ice (Circle): Yes No Ice Pack — Receipt Temp: 3.6 °C — Temp Blank: ☐ Y ☐ N

DISTRIBUTION: WHITE & YELLOW-Return to Laboratory with Sample(s); PINK-Field/Client Copy

Document Number: ME009N2-01

PACE ANALYTICAL SERVICES, LLC

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE02015-001**

Description: **MWM16-30_GW-050123** Matrix: **Aqueous**

Date Sampled: **05/01/2023 0838** Project Name: **Racer PNC**

Date Received: **05/02/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/24/2023 0211	ARC2	05/19/2023 1219	75726

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.7	1.9	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.7	1.9	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.7	1.9	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.7	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.7	1.9	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.7	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.7	1.9	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.7	1.9	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.7	1.9	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**3.0**	**JM-03**	**3.9**	**0.96**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.9	0.96	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.9	0.96	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.9	0.96	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.9	0.96	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**1.0**	**JM-03**	**3.9**	**0.96**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**4.7**	**M-03**	**3.9**	**0.96**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**12**	**QM-03** J	**3.9**	**0.96**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.9	0.96	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.9	0.96	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**6.7**		**3.9**	**0.96**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**7.7**	**M-03**	**3.9**	**0.96**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.9	0.96	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**3.8**	**JM-03**	**3.9**	**0.96**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**11**		**3.9**	**0.96**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.9	0.96	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.9	0.96	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.9	0.96	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**1.3**	**JM-03**	**3.9**	**0.96**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	295	50-150
13C2_6:2FTS	N	166	50-150
13C2_8:2FTS		110	50-150
13C2_PFDoA		88	50-150
13C2_PFTeDA		92	50-150
13C3_PFBS		95	50-150
13C3_PFHxS		101	50-150
13C3-HFPO-DA		88	50-150
13C4_PFBA	N	31	50-150
13C4_PFHpA		105	50-150
13C5_PFHxA		93	50-150
13C5_PFPeA		67	50-150
13C6_PFDA		99	50-150
13C7_PFUdA		93	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE02015-001**

Description: **MWM16-30_GW-050123** Matrix: **Aqueous**

Date Sampled: **05/01/2023 0838** Project Name: **Racer PNC**

Date Received: **05/02/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		105	50-150
13C8_PFOS		97	50-150
13C8_PFOSA		98	50-150
13C9_PFNA		109	50-150
d5-EtFOSAA		95	50-150
d3-MeFOSAA		103	50-150

LOQ = Limit of Quantitation	B = Detected in the method blank	E = Quantitation of compound exceeded the calibration range	DL = Detection Limit	Q = Surrogate failure
ND = Not detected at or above the DL	N = Recovery is out of criteria	P = The RPD between two GC columns exceeds 40%	J = Estimated result < LOQ and ≥ DL	L = LCS/LCSD failure
H = Out of holding time	W = Reported on wet weight basis			S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE02015-002**

Description: **MWM4-05_GW-050123** Matrix: **Aqueous**

Date Sampled: **05/01/2023 1132** Project Name: **Racer PNC**

Date Received: **05/02/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/24/2023 0223	ARC2	05/19/2023 1219	75726

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.4	1.9	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.4	1.9	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.4	1.9	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	QM-03	7.4	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.4	1.9	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.4	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.4	1.9	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.4	1.9	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.4	1.9	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**2.5**	**JM-03**	**3.7**	**0.93**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	0.93	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.7	0.93	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	0.93	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	0.93	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.7	0.93	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**2.2**	**JM-03**	**3.7**	**0.93**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**8.5**	**M-03**	**3.7**	**0.93**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	0.93	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	0.93	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**2.6**	**JM-03**	**3.7**	**0.93**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**3.5**	**JM-03**	**3.7**	**0.93**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.7	0.93	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**4.2**	**M-03**	**3.7**	**0.93**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**3.8**		**3.7**	**0.93**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	0.93	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	0.93	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	0.93	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**2.2**	**JM-03**	**3.7**	**0.93**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	251	50-150
13C2_6:2FTS	N	169	50-150
13C2_8:2FTS		119	50-150
13C2_PFDoA		88	50-150
13C2_PFTeDA		93	50-150
13C3_PFBS		99	50-150
13C3_PFHxS		102	50-150
13C3-HFPO-DA		92	50-150
13C4_PFBA		55	50-150
13C4_PFHpA		105	50-150
13C5_PFHxA		102	50-150
13C5_PFPeA		85	50-150
13C6_PFDA		105	50-150
13C7_PFUdA		95	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE02015-002**

Description: **MWM4-05_GW-050123** Matrix: **Aqueous**

Date Sampled: **05/01/2023 1132** Project Name: **Racer PNC**

Date Received: **05/02/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		105	50-150
13C8_PFOS		95	50-150
13C8_PFOSA		99	50-150
13C9_PFNA		107	50-150
d5-EtFOSAA		96	50-150
d3-MeFOSAA		107	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE02015-003**

Description: **MWM32-01_GW-050123** Matrix: **Aqueous**

Date Sampled: **05/01/2023 1250** Project Name: **Racer PNC**

Date Received: **05/02/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/24/2023 0236	ARC2	05/19/2023 1219	75726

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		80	20	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		80	20	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	80	20	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	80	20	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	80	20	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		80	20	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		80	20	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		80	20	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		80	20	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		40	10	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	234	50-150
13C2_6:2FTS	N	214	50-150
13C2_8:2FTS	N	186	50-150
13C2_PFDoA		106	50-150
13C2_PFTeDA		103	50-150
13C3_PFBS		104	50-150
13C3_PFHxS		106	50-150
13C3-HFPO-DA		98	50-150
13C4_PFBA		86	50-150
13C4_PFHpA		110	50-150
13C5_PFHxA		110	50-150
13C5_PFPeA		97	50-150
13C6_PFDA		112	50-150
13C7_PFUdA		113	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE02015-003**

Description: **MWM32-01_GW-050123** Matrix: **Aqueous**

Date Sampled: **05/01/2023 1250** Project Name: **Racer PNC**

Date Received: **05/02/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		108	50-150
13C8_PFOS		99	50-150
13C8_PFOSA		105	50-150
13C9_PFNA		111	50-150
d5-EtFOSAA		124	50-150
d3-MeFOSAA		134	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE02015-004**

Description: **MWM2-28_GW-050123** Matrix: **Aqueous**

Date Sampled: **05/01/2023 1413** Project Name: **Racer PNC**

Date Received: **05/02/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/24/2023 0249	ARC2	05/19/2023 1219	75726

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	**39108-34-4**	**PFAS by ID SOP**	**2.3**	**JQM-03**	**7.0**	**1.8**	**ng/L**	**1**
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**3.9**	**JQM-03**	**7.0**	**1.8**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.0	1.8	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**3.7**	**M-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**1.1**	**JM-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**4.2**	**M-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**14**	**QM-03** J	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	**335-76-2**	**PFAS by ID SOP**	**2.2**	**JM-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**8.1**	**M-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**16**	**M-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**5.0**		**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**18**		**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**14**	**M-03**	**3.5**	**0.88**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**56**	**M-03**	**3.5**	**0.88**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	331	50-150
13C2_6:2FTS	N	312	50-150
13C2_8:2FTS	N	359	50-150
13C2_PFDoA		103	50-150
13C2_PFTeDA		104	50-150
13C3_PFBS		89	50-150
13C3_PFHxS		92	50-150
13C3-HFPO-DA		74	50-150
13C4_PFBA	N	29	50-150
13C4_PFHpA		82	50-150
13C5_PFHxA		77	50-150
13C5_PFPeA		57	50-150
13C6_PFDA		93	50-150
13C7_PFUdA		105	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
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P = The RPD between two GC columns exceeds 40%
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE02015-004**

Description: **MWM2-28_GW-050123** Matrix: **Aqueous**

Date Sampled: **05/01/2023 1413** Project Name: **Racer PNC**

Date Received: **05/02/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		82	50-150
13C8_PFOS		93	50-150
13C8_PFOSA		80	50-150
13C9_PFNA		93	50-150
d5-EtFOSAA		131	50-150
d3-MeFOSAA		119	50-150

LOQ = Limit of Quantitation	B = Detected in the method blank	E = Quantitation of compound exceeded the calibration range	DL = Detection Limit	Q = Surrogate failure
ND = Not detected at or above the DL	N = Recovery is out of criteria	P = The RPD between two GC columns exceeds 40%	J = Estimated result < LOQ and ≥ DL	L = LCS/LCSD failure
H = Out of holding time	W = Reported on wet weight basis			S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE02015-005**

Description: **MWM2-22_GW-050123** Matrix: **Aqueous**

Date Sampled: **05/01/2023 1505** Project Name: **Racer PNC**

Date Received: **05/02/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/24/2023 0302	ARC2	05/19/2023 1219	75726

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		80	20	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		80	20	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	80	20	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	80	20	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	80	20	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		80	20	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		80	20	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		80	20	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		80	20	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**27**	**JM-03**	**40**	**10**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**15**	**JM-03**	**40**	**10**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**28**	**JM-03**	**40**	**10**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**28**	**JM-03**	**40**	**10**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**26**	**JM-03**	**40**	**10**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		40	10	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**77**	**M-03**	**40**	**10**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	221	50-150
13C2_6:2FTS	N	183	50-150
13C2_8:2FTS	N	171	50-150
13C2_PFDoA		108	50-150
13C2_PFTeDA		105	50-150
13C3_PFBS		105	50-150
13C3_PFHxS		110	50-150
13C3-HFPO-DA		99	50-150
13C4_PFBA		81	50-150
13C4_PFHpA		111	50-150
13C5_PFHxA		109	50-150
13C5_PFPeA		95	50-150
13C6_PFDA		113	50-150
13C7_PFUdA		113	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE02015-005**

Description: **MWM2-22_GW-050123** Matrix: **Aqueous**

Date Sampled: **05/01/2023 1505** Project Name: **Racer PNC**

Date Received: **05/02/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		107	50-150
13C8_PFOS		102	50-150
13C8_PFOSA		108	50-150
13C9_PFNA		113	50-150
d5-EtFOSAA		128	50-150
d3-MeFOSAA		136	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE02015-006**

Description: **DUP-02_GW-050123** Matrix: **Aqueous**

Date Sampled: **05/01/2023** Project Name: **Racer PNC**

Date Received: **05/02/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	05/24/2023 0314	ARC2	05/19/2023 1219	75726

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.4	1.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.4	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.4	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.4	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.4	1.8	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.4	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.4	1.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.4	1.8	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.4	1.8	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**3.0**	**JM-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND	M-03	3.7	0.92	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**4.6**	**M-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**11**	**Q** J	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**6.5**		**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**7.0**		**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**4.1**	**M-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**13**	**M-03**	**3.7**	**0.92**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	0.92	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**1.2**	**JM-03**	**3.7**	**0.92**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	292	50-150
13C2_6:2FTS	N	167	50-150
13C2_8:2FTS		110	50-150
13C2_PFDoA		88	50-150
13C2_PFTeDA		91	50-150
13C3_PFBS		97	50-150
13C3_PFHxS		102	50-150
13C3-HFPO-DA		86	50-150
13C4_PFBA	N	31	50-150
13C4_PFHpA		105	50-150
13C5_PFHxA		92	50-150
13C5_PFPeA		66	50-150
13C6_PFDA		103	50-150
13C7_PFUdA		92	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE02015-006**

Description: **DUP-02_GW-050123** Matrix: **Aqueous**

Date Sampled: **05/01/2023** Project Name: **Racer PNC**

Date Received: **05/02/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		105	50-150
13C8_PFOS		98	50-150
13C8_PFOSA		99	50-150
13C9_PFNA		109	50-150
d5-EtFOSAA		93	50-150
d3-MeFOSAA		106	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE02015-007**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **05/01/2023 1540** Project Name: **Racer PNC**

Date Received: **05/02/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	06/01/2023 2338	ARC2	05/19/2023 1238	75750

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND	M-03	6.9	1.7	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.4	0.86	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.4	0.86	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		92	50-150
13C2_6:2FTS		86	50-150
13C2_8:2FTS		96	50-150
13C2_PFDoA		93	50-150
13C2_PFTeDA		79	50-150
13C3_PFBS		95	50-150
13C3_PFHxS		91	50-150
13C3-HFPO-DA		95	50-150
13C4_PFBA		94	50-150
13C4_PFHpA		95	50-150
13C5_PFHxA		89	50-150
13C5_PFPeA		96	50-150
13C6_PFDA		94	50-150
13C7_PFUdA		95	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE02015-007**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **05/01/2023 1540** Project Name: **Racer PNC**

Date Received: **05/02/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		95	50-150
13C8_PFOS		89	50-150
13C8_PFOSA		91	50-150
13C9_PFNA		87	50-150
d5-EtFOSAA		83	50-150
d3-MeFOSAA		89	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
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L = LCS/LCSD failure
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Racer

DATA REVIEW

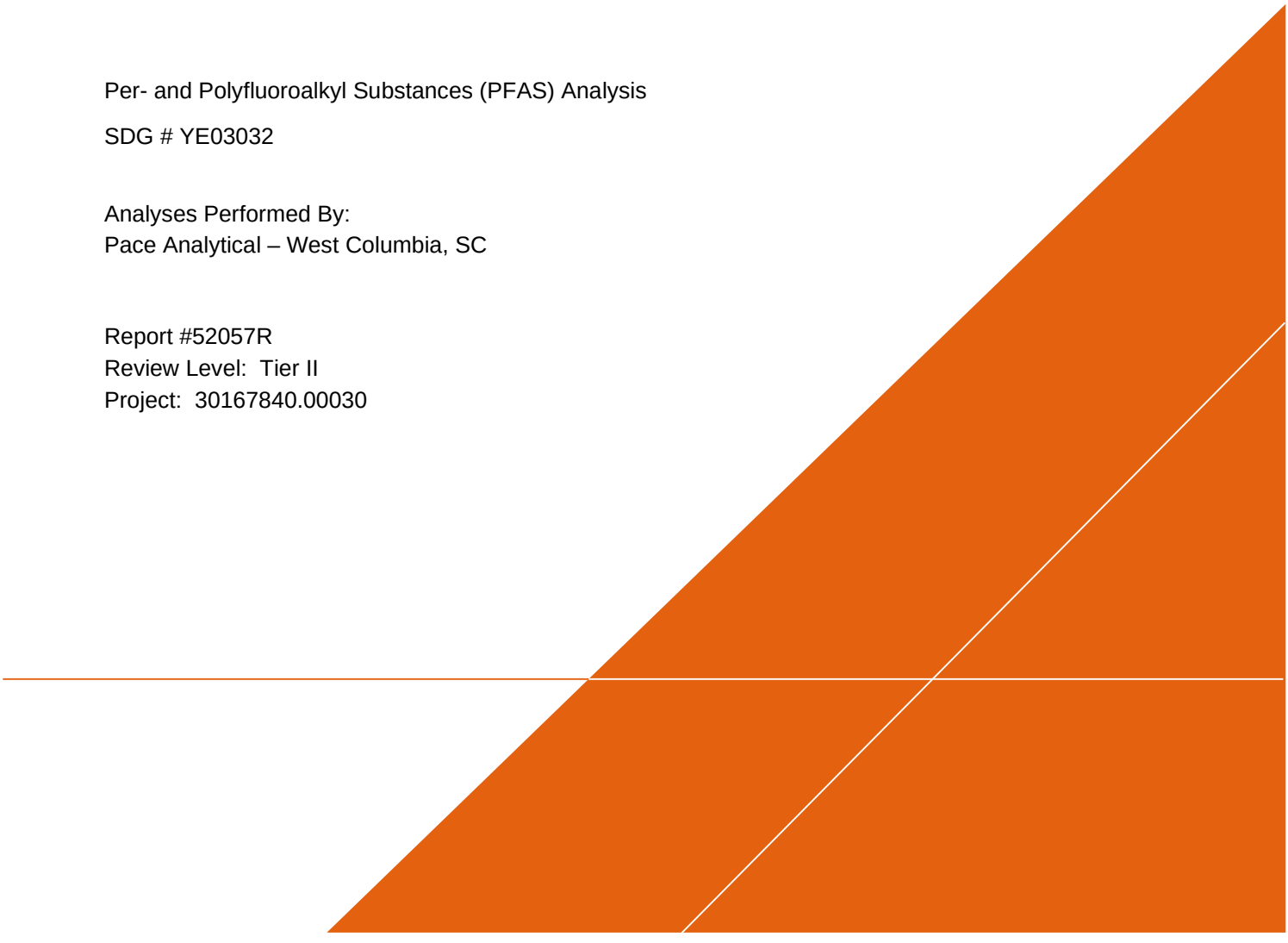
Pontiac North Campus, MI

Per- and Polyfluoroalkyl Substances (PFAS) Analysis

SDG # YE03032

Analyses Performed By:
Pace Analytical – West Columbia, SC

Report #52057R
Review Level: Tier II
Project: 30167840.00030



SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) #YE03032 for samples collected in association with the Racer PNC, MI Site. The review was conducted as a Tier II evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis				
					PFAS	SVOC	PCB	MET	MISC
MW-03-17-GW	YE03032-1	Water	05/02/23		X				
MWM32-09-GW	YE03032-2	Water	05/02/23		X				
EB-01	YE03032-3	Water	05/02/23		X				
MWF16-26-GW	YE03032-4	Water	05/02/23		X				
MWW1-04-GW	YE03032-5	Water	05/02/23		X				
DUP-03-GW	YE03032-6	Water	05/02/23	MW-03-17-GW	X				
TRIP BLANK	YE03032-7	Water	05/02/23		X				

ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

Note:
QA - Quality Assurance

ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) Modified Method 537. Data were reviewed in accordance with the USEPA National Functional Guidelines for Organic Superfund Methods Data Review, EPA 540-R-20-005, November 2020 (with reference to the historical USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, OSWER 9240.1-05A-P, October 1999 as appropriate) and USEPA Data Review and Validation Guidelines for Perfluoroalkyl Substances (PFASs) Analyzed Using EPA Method 537, EPA 910-R-18-001, November 2018; and Department of Defense (DoD) Quality Systems Manual (QSM) 5.3, DoD Final General Data Validation Guidelines, November 2019.

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers
  - U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
  - B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- Quantitation (Q) Qualifiers
  - E The compound was quantitated above the calibration range.
  - D Concentration is based on a diluted sample analysis.
- Validation Qualifiers
  - J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
  - UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
  - JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
  - UB Compound considered non-detect at the listed value due to associated blank contamination.
  - N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
  - R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and

provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) ANALYSIS

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
USEPA modified Method 537	Water	28 days to extraction; 28 days from extraction to analysis	Cool to <6 °C

All samples were initially analyzed within the specified holding time criteria.

2. Blank Contamination

Quality assurance (QA) blanks (i.e., method, field, and equipment blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Equipment blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (DL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were not detected above the DL in the associated blanks; therefore, detected sample results were not associated with blank contamination.

3. Extracted Internal Standard (EIS)/Surrogate Compounds

Labeled standards must be added to all field samples and QC samples prior to extraction. EIS recoveries must be within DoD QSM 5.3 specified limits of 50% to150%.

Sample locations associated with EIS exhibiting recoveries outside of the control limits are presented in the following table.

Sample Locations	EIS	Associated Compound	%R
MW-03-17-GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
	13C2_8:2FTS	1H,1H, 2H,2H-perfluorodecane sulfonic acid (8:2 FTS)	>150
	13C4-PFBA	Perfluoro-n-butanoic acid (PFBA)	< 50% but > 20%
MWW1-04-GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150

Sample Locations	EIS	Associated Compound	%R
MWW1-04-GW	13C2_8:2FTS	1H,1H, 2H,2H-perfluorodecane sulfonic acid (8:2 FTS)	>150
	13C4-PFBA	Perfluoro-n-butanoic acid (PFBA)	<20%
DUP-03-GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
	13C2_8:2FTS	1H,1H, 2H,2H-perfluorodecane sulfonic acid (8:2 FTS)	>150
	13C4-PFBA	Perfluoro-n-butanoic acid (PFBA)	< 50% but > 20%

The criteria used to evaluate the EIS recoveries are presented in the following table. In the case of an EIS deviation, the sample results associated with the EIS are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
< 50% but > 20%	Non-detect	UJ
	Detect	J
> 150%	Non-detect	No Action
	Detect	J
< 20%	Non-detect	R
	Detect	R

4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within 50-150%. The relative percent difference (RPD) between the MS/MSD recoveries must exhibit an RPD within 30%.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

A site-specific MS/MSD was not included in the data package.

5. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

All compounds associated with the LCS analysis exhibited recoveries within the control limits.

6. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 30% for water matrices is applied to the RPD between the parent

sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of two times the RL is applied for soil matrices.

Results for duplicate samples are summarized in the following table.

Sample ID/Duplicate ID	Compound	Sample Result	Duplicate Result	RPD
MW-03-17-GW15 / DUP-03-GW	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	8.8	9.6	AC
	Perfluorobutanesulfonic acid (PFBS)	5.2	4.0	AC
	Perfluoroheptanesulfonic Acid (PFHpS)	4.7	5.1	AC
	Perfluoropentanesulfonic acid (PFPeS)	4.0	3.8	AC
	Perfluorohexanesulfonic acid (PFHxS)	58	57	1.7%
	Perfluorobutanoic acid (PFBA)	18	17	5.7%
	Perfluoroheptanoic acid (PFHpA)	9.1	8.8	AC
	Perfluorohexanoic acid (PFHxA)	14	15	AC
	Perfluorononanoic acid (PFNA)	2.4 J	2.2 J	AC
	Perfluorooctanoic acid (PFOA)	27	27	0.0%
	Perfluoropentanoic acid (PFPeA)	16	16	0.0%
	Perfluorooctane sulfonic acid (PFOS)	140	140	0.0%

Notes:

AC Acceptable

The calculated RPDs between the parent sample and field duplicate were acceptable.

7. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR PFAs

PFAs: USEPA modified Method 537	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
LIQUID CHROMATOGRAPHY/MASS SPECTROMETRY (LC/MS/MS)					
Tier II Validation					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks		X		X	
C. Trip blanks		X		X	
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate(LCSD) %R	X				X
LCS/LCSD Precision (RPD)	X				X
Matrix Spike (MS) %R	X				X
Matrix Spike Duplicate (MSD) %R	X				X
MS/MSD Precision (RPD)	X				X
Field Duplicate (RPD)		X		X	
Extracted Internal Standards (EIS) Recoveries		X	X		
Dilution Factor		X		X	
Moisture Content	X				X

Notes:

%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Rachelle Borne

SIGNATURE: 

DATE: December 17, 2023

PEER REVIEW: Joseph C. Houser

DATE: December 19, 2023

CHAIN OF CUSTODY

CORRECTED SAMPLE ANALYSIS DATA SHEETS

Pace Analytical®

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Number 146506

Client: Arcadis	Report to Contact: Tiffany Linder, Alexis Cusp	Telephone No. / E-mail: Alexis.cusp@arcadis.com, tiffany.linder@arcadis.com	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: Sommer Guy	Analysis (Attach list if more space is needed): Report EGLE 28 compounds	Page 1 of 1
City: Novi; State: MI; Zip Code: 48377	Printed Name: Sommer Guy		Lot # Bar Code (lab use only): YE03032
Project Name: Racer PNC			
Project No.: 30167840.00030	P.O. No.		

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Sample Type: G=Grab C=Composite	Matrix: Aqueous	Soil/Solid	Oil	Biota/Animal	No. of Containers by Preservative Type: Unpres.	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other: Filtered (Y/N)	Analysis: Report EGLE 28 compounds per QSM 5.1	Lab ID
MW-03-17_GW-050223	5/2/23	0918	G	2				2								X	
MWM32-09_GW-050223	5/2/23	1053	G	2				2								X	
EB-01-050223	5/2/23	1105	G	2				2								X	
MWF16-26_GW-050223	5/2/23	1155	G	2				2								X	
MWW1-04_GW-050223	5/2/23	1308	G	2				2								X	
Dup-03_GW-050223	5/2/23	—	G	2				2								X	
tripblank	5/2/23	1320	G	1				1								X	tripblank

Turn Around Time Required (Prior lab approval required for expedited TAT.): [X] Standard [ ] Rush (Specify)

Sample Disposal: [ ] Return to Client [X] Disposal by Lab

Possible Hazard Identification: [X] Non-Hazard [ ] Flammable [ ] Skin Irritant [ ] Poison [ ] Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: Sommer Guy	5/2/23	1420	1. Received by: FedEx	5/2/23	1420
2. Relinquished by	Date	Time	2. Received by	Date	Time
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by: FedEx	5/3/23	0945	4. Laboratory received by: Jennifer N Parker	5/3/23	0945

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY — Received on ice (Circle): (Yes) No; Ice Pack:; Receipt Temp. 3.2 °C; Temp Blank: [ ] Y [X] N

DISTRIBUTION: WHITE & YELLOW-Return to laboratory with Sample(s); PINK-Field/Client Copy

Document Number: ME003N2-01

PACE ANALYTICAL SERVICES, LLC

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE03032-001**

Description: **MW-03-17-GW-050223** Matrix: **Aqueous**

Date Sampled: **05/02/2023 0918** Project Name: **Racer PNC**

Date Received: **05/03/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	06/01/2023 1303	ARC2	05/23/2023 1402	75967

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.8	2.0	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.8	2.0	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.8	2.0	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**8.8**	**Q** J	**7.8**	**2.0**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.8	2.0	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.8	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.8	2.0	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.8	2.0	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.8	2.0	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**5.2**	**M-03**	**3.9**	**0.98**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.9	0.98	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**4.7**		**3.9**	**0.98**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.9	0.98	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.9	0.98	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**4.0**	**M-03**	**3.9**	**0.98**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**58**		**3.9**	**0.98**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**18**	**QM-03** J	**3.9**	**0.98**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.9	0.98	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.9	0.98	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**9.1**		**3.9**	**0.98**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**14**	**M-03**	**3.9**	**0.98**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**2.4**	**JM-03**	**3.9**	**0.98**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**27**		**3.9**	**0.98**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**16**	**M-03**	**3.9**	**0.98**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.9	0.98	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.9	0.98	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.9	0.98	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**140**	**M-03**	**3.9**	**0.98**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	272	50-150
13C2_6:2FTS	N	261	50-150
13C2_8:2FTS	N	272	50-150
13C2_PFDoA		109	50-150
13C2_PFTeDA		90	50-150
13C3_PFBS		91	50-150
13C3_PFHxS		97	50-150
13C3-HFPO-DA		82	50-150
13C4_PFBA	N	34	50-150
13C4_PFHpA		92	50-150
13C5_PFHxA		80	50-150
13C5_PFPeA		63	50-150
13C6_PFDA		112	50-150
13C7_PFUdA		120	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE03032-001**

Description: **MW-03-17-GW-050223** Matrix: **Aqueous**

Date Sampled: **05/02/2023 0918** Project Name: **Racer PNC**

Date Received: **05/03/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		102	50-150
13C8_PFOS		95	50-150
13C8_PFOSA		99	50-150
13C9_PFNA		108	50-150
d5-EtFOSAA		127	50-150
d3-MeFOSAA		123	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE03032-002**

Description: **MWM32-09-GW-050223** Matrix: **Aqueous**

Date Sampled: **05/02/2023 1053** Project Name: **Racer PNC**

Date Received: **05/03/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	06/01/2023 1316	ARC2	05/23/2023 1402	75967

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		130	50-150
13C2_6:2FTS		103	50-150
13C2_8:2FTS		111	50-150
13C2_PFDoA		90	50-150
13C2_PFTeDA		92	50-150
13C3_PFBS		106	50-150
13C3_PFHxS		96	50-150
13C3-HFPO-DA		100	50-150
13C4_PFBA		69	50-150
13C4_PFHpA		99	50-150
13C5_PFHxA		94	50-150
13C5_PFPeA		89	50-150
13C6_PFDA		97	50-150
13C7_PFUdA		94	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE03032-002**

Description: **MWM32-09-GW-050223** Matrix: **Aqueous**

Date Sampled: **05/02/2023 1053** Project Name: **Racer PNC**

Date Received: **05/03/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		99	50-150
13C8_PFOS		90	50-150
13C8_PFOSA		91	50-150
13C9_PFNA		92	50-150
d5-EtFOSAA		84	50-150
d3-MeFOSAA		92	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE03032-003**

Description: **EB-01-050223** Matrix: **Aqueous**

Date Sampled: **05/02/2023 1105** Project Name: **Racer PNC**

Date Received: **05/03/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	06/01/2023 1329	ARC2	05/23/2023 1402	75967

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.8	0.94	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.8	0.94	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		106	50-150
13C2_6:2FTS		101	50-150
13C2_8:2FTS		104	50-150
13C2_PFDoA		96	50-150
13C2_PFTeDA		92	50-150
13C3_PFBS		106	50-150
13C3_PFHxS		99	50-150
13C3-HFPO-DA		102	50-150
13C4_PFBA		96	50-150
13C4_PFHpA		101	50-150
13C5_PFHxA		98	50-150
13C5_PFPeA		96	50-150
13C6_PFDA		101	50-150
13C7_PFUdA		102	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.**		Laboratory ID: **YE03032-003**
Description: **EB-01-050223**		Matrix: **Aqueous**
Date Sampled: **05/02/2023 1105**	Project Name: **Racer PNC**	
Date Received: **05/03/2023**	Project Number: **30167840.00030**	

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		106	50-150
13C8_PFOS		99	50-150
13C8_PFOSA		92	50-150
13C9_PFNA		96	50-150
d5-EtFOSAA		94	50-150
d3-MeFOSAA		96	50-150

LOQ = Limit of Quantitation	B = Detected in the method blank	E = Quantitation of compound exceeded the calibration range	DL = Detection Limit	Q = Surrogate failure
ND = Not detected at or above the DL	N = Recovery is out of criteria	P = The RPD between two GC columns exceeds 40%	J = Estimated result < LOQ and ≥ DL	L = LCS/LCSD failure
H = Out of holding time	W = Reported on wet weight basis			S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE03032-004**

Description: **MWF16-26-GW-050223** Matrix: **Aqueous**

Date Sampled: **05/02/2023 1155** Project Name: **Racer PNC**

Date Received: **05/03/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	06/01/2023 1341	ARC2	05/23/2023 1402	75967

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.1	1.8	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**15**	**M-03**	**3.6**	**0.89**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**14**		**3.6**	**0.89**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**24**		**3.6**	**0.89**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**8.6**		**3.6**	**0.89**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**7.3**		**3.6**	**0.89**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**17**	**M-03**	**3.6**	**0.89**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**34**		**3.6**	**0.89**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**12**		**3.6**	**0.89**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.89	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.6	0.89	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		113	50-150
13C2_6:2FTS		96	50-150
13C2_8:2FTS		105	50-150
13C2_PFDoA		91	50-150
13C2_PFTeDA		96	50-150
13C3_PFBS		118	50-150
13C3_PFHxS		101	50-150
13C3-HFPO-DA		101	50-150
13C4_PFBA		79	50-150
13C4_PFHpA		101	50-150
13C5_PFHxA		97	50-150
13C5_PFPeA		95	50-150
13C6_PFDA		101	50-150
13C7_PFUdA		95	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE03032-004**

Description: **MWF16-26-GW-050223** Matrix: **Aqueous**

Date Sampled: **05/02/2023 1155** Project Name: **Racer PNC**

Date Received: **05/03/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		98	50-150
13C8_PFOS		98	50-150
13C8_PFOSA		99	50-150
13C9_PFNA		95	50-150
d5-EtFOSAA		92	50-150
d3-MeFOSAA		95	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE03032-005**

Description: **MWW1-04-GW-050223** Matrix: **Aqueous**

Date Sampled: **05/02/2023 1308** Project Name: **Racer PNC**

Date Received: **05/03/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	06/01/2023 1354	ARC2	05/23/2023 1402	75967

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run	
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.1	1.8	ng/L	1	
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.1	1.8	ng/L	1	
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.1	1.8	ng/L	1	
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.1	1.8	ng/L	1	
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.1	1.8	ng/L	1	
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.1	1.8	ng/L	1	
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.1	1.8	ng/L	1	
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	**2991-50-6**	**PFAS by ID SOP**	**8.9**	**M-03**	**7.1**	**1.8**	**ng/L**	**1**	
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND	M-03	7.1	1.8	ng/L	1	
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND	M-03	3.5	0.88	ng/L	1	
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.88	ng/L	1	
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.5	0.88	ng/L	1	
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1	
Perfluoro-1-octanesulfonamide (PFOSA)	**754-91-6**	**PFAS by ID SOP**	**1.2**	**JM-03**	**3.5**	**0.88**	**ng/L**	**1**	
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.5	0.88	ng/L	1	
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**4.1**	**M-03**	**3.5**	**0.88**	**ng/L**	**1**	
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND	Q	3.5	0.88	ng/L	1	R
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.88	ng/L	1	
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1	
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.5	0.88	ng/L	1	
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.5	0.88	ng/L	1	
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND	M-03	3.5	0.88	ng/L	1	
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**2.8**	**JM-03**	**3.5**	**0.88**	**ng/L**	**1**	
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.5	0.88	ng/L	1	
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.88	ng/L	1	
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.88	ng/L	1	
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.88	ng/L	1	
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**98**		**3.5**	**0.88**	**ng/L**	**1**	

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	267	50-150
13C2_6:2FTS	N	277	50-150
13C2_8:2FTS	N	281	50-150
13C2_PFDoA		104	50-150
13C2_PFTeDA		83	50-150
13C3_PFBS		91	50-150
13C3_PFHxS		93	50-150
13C3-HFPO-DA		80	50-150
13C4_PFBA	N	13	50-150
13C4_PFHpA		91	50-150
13C5_PFHxA		78	50-150
13C5_PFPeA		65	50-150
13C6_PFDA		105	50-150
13C7_PFUdA		110	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE03032-005**

Description: **MWW1-04-GW-050223** Matrix: **Aqueous**

Date Sampled: **05/02/2023 1308** Project Name: **Racer PNC**

Date Received: **05/03/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		95	50-150
13C8_PFOS		93	50-150
13C8_PFOSA		93	50-150
13C9_PFNA		102	50-150
d5-EtFOSAA		116	50-150
d3-MeFOSAA		115	50-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE03032-006**

Description: **DUP-03-GW-050223** Matrix: **Aqueous**

Date Sampled: **05/02/2023** Project Name: **Racer PNC**

Date Received: **05/03/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	06/01/2023 1407	ARC2	05/23/2023 1402	75967

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.2	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**9.6**	**Q J**	**7.2**	**1.8**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.2	1.8	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**4.0**	**M-03**	**3.6**	**0.91**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.91	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**5.1**		**3.6**	**0.91**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.91	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	0.91	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**3.8**	**M-03**	**3.6**	**0.91**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**57**		**3.6**	**0.91**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**17**	**QM-03 J**	**3.6**	**0.91**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	0.91	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.91	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**8.8**		**3.6**	**0.91**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**15**		**3.6**	**0.91**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**2.2**	**J**	**3.6**	**0.91**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**27**		**3.6**	**0.91**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**16**	**M-03**	**3.6**	**0.91**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.91	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.91	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.91	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**140**	**M-03**	**3.6**	**0.91**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	269	50-150
13C2_6:2FTS	N	263	50-150
13C2_8:2FTS	N	268	50-150
13C2_PFDoA		108	50-150
13C2_PFTeDA		87	50-150
13C3_PFBS		91	50-150
13C3_PFHxS		95	50-150
13C3-HFPO-DA		80	50-150
13C4_PFBA	N	33	50-150
13C4_PFHpA		95	50-150
13C5_PFHxA		78	50-150
13C5_PFPeA		61	50-150
13C6_PFDA		115	50-150
13C7_PFUdA		118	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE03032-006**

Description: **DUP-03-GW-050223** Matrix: **Aqueous**

Date Sampled: **05/02/2023** Project Name: **Racer PNC**

Date Received: **05/03/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		102	50-150
13C8_PFOS		97	50-150
13C8_PFOSA		97	50-150
13C9_PFNA		108	50-150
d5-EtFOSAA		123	50-150
d3-MeFOSAA		116	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
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S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE03032-007**

Description: **TRIP BLANK** Matrix: **Aqueous**

Date Sampled: **05/02/2023 1320** Project Name: **Racer PNC**

Date Received: **05/03/2023** Project Number: **30167840.00030**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP QSM B-15	1	06/01/2023 1419	ARC2	05/23/2023 1402	75967

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.88	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.5	0.88	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		94	50-150
13C2_6:2FTS		93	50-150
13C2_8:2FTS		99	50-150
13C2_PFDoA		90	50-150
13C2_PFTeDA		89	50-150
13C3_PFBS		102	50-150
13C3_PFHxS		96	50-150
13C3-HFPO-DA		97	50-150
13C4_PFBA		92	50-150
13C4_PFHpA		100	50-150
13C5_PFHxA		92	50-150
13C5_PFPeA		92	50-150
13C6_PFDA		100	50-150
13C7_PFUdA		102	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YE03032-007**

Description: **TRIP BLANK** Matrix: **Aqueous**

Date Sampled: **05/02/2023 1320** Project Name: **Racer PNC**

Date Received: **05/03/2023** Project Number: **30167840.00030**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		99	50-150
13C8_PFOS		91	50-150
13C8_PFOSA		93	50-150
13C9_PFNA		94	50-150
d5-EtFOSAA		92	50-150
d3-MeFOSAA		94	50-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
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Racer

DATA REVIEW

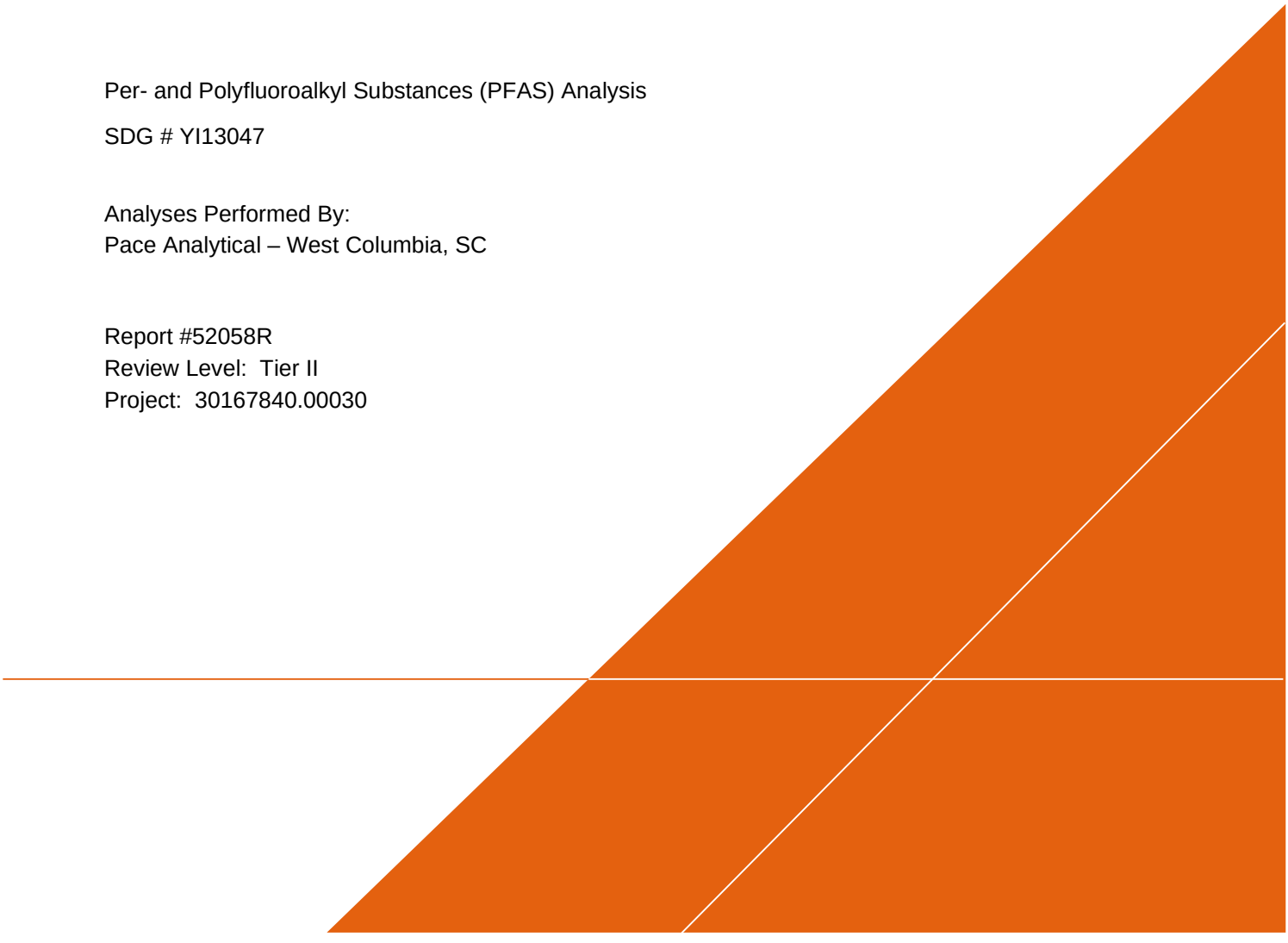
Pontiac North Campus, MI

Per- and Polyfluoroalkyl Substances (PFAS) Analysis

SDG # YI13047

Analyses Performed By:
Pace Analytical – West Columbia, SC

Report #52058R
Review Level: Tier II
Project: 30167840.00030



SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) #YI13047 for samples collected in association with the Racer PNC, MI Site. The review was conducted as a Tier II evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis				
					PFAS	SVOC	PCB	MET	MISC
MWF16-25_GW	YI13047-1	Water	09/12/23		X				
Trip Blank	YI13047-2	Water	09/12/23		X				
MWF16-26_GW	YI13047-3	Water	09/12/23		X				
MW-05-18_GW	YI13047-4	Water	09/12/23		X				
MW-02-17_GW	YI13047-5	Water	09/12/23		X				
MWF12-02R_GW	YI13047-6	Water	09/12/23		X				
MWOS-09R_GW	YI13047-7	Water	09/12/23		X				
MWF7-02_GW	YI13047-8	Water	09/12/23		X				
MWF15-01_GW	YI13047-9	Water	09/12/23		X				
MWF16-23_GW	YI13047-10	Water	09/12/23		X				
MWOS-10_GW	YI13047-11	Water	09/12/23		X				
EB-03	YI13047-12	Water	09/12/23		X				

ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

Note:
QA - Quality Assurance

ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency Method 537 Modified. Data were reviewed in accordance with the method specified criteria, USEPA National Functional Guidelines NFG for Organic Superfund Methods Data Review, EPA-540-R-20-005 (November 2020), with reference to the historical (USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, OSWER 9240.1-05A-P, October 1999, as appropriate).

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers

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

  B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.

- Quantitation (Q) Qualifiers

  E The compound was quantitated above the calibration range.

  D Concentration is based on a diluted sample analysis.

- Validation Qualifiers

  J The compound was positively identified; however, the associated numerical value is an estimated concentration only.

  UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.

  JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.

  UB Compound considered non-detect at the listed value due to associated blank contamination.

  N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.

  R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is

that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) ANALYSIS

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
USEPA modified Method 537	Water	28 days to extraction; 28 days from extraction to analysis	Cool to <6 °C

All samples were initially analyzed within the specified holding time criteria.

2. Blank Contamination

Quality assurance (QA) blanks (i.e., method, field, and equipment blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Equipment blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (DL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were not detected above the DL in the associated blanks; therefore, detected sample results were not associated with blank contamination.

3. Extracted Internal Standard (EIS)/Surrogate Compounds

Labeled standards must be added to all field samples and QC samples prior to extraction. EIS recoveries must be within the laboratory-established acceptance limits of ICAL midpoint standard area or area measured in the initial CCV on days when ICAL not performed.

Samples associated with EIS exhibited acceptable recoveries with the exceptions noted in the table.

Sample Locations	EIS	Associated Compound	%R
MWF16-25_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
MW-05-18_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
MW-02-17_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
MWF12-02R_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150

Sample Locations	EIS	Associated Compound	%R
MWF12-02R_GW	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
MWOS-09R_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
MWF7-02_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
MWF15-01_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
MWF16-23_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
MWOS-10_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150

The criteria used to evaluate the EIS recoveries are presented in the following table. In the case of an EIS deviation, the sample results associated with the EIS are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
< the lower control limit (LL) but > 20%	Non-detect	UJ
	Detect	J
> the upper control limit (UL)	Non-detect	No Action
	Detect	J
< 20%	Non-detect	R
	Detect	J

4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within 50-150%. The relative percent difference (RPD) between the MS/MSD recoveries must exhibit an RPD within 30%.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

The MS/MSD performed on sample MWF12-02R_GW exhibited recoveries and RPDs within the control limits.

5. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

All compounds associated with the LCS analysis exhibited recoveries within the control limits.

6. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 30% for water matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of two times the RL is applied for soil matrices.

A field duplicate was not included in the data package.

7. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR PFAs

PFAs: USEPA modified Method 537	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
LIQUID CHROMATOGRAPHY/MASS SPECTROMETRY (LC/MS/MS)					
Tier II Validation					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks		X		X	
C. Trip blanks		X		X	
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate(LCSD) %R	X				X
LCS/LCSD Precision (RPD)	X				X
Matrix Spike (MS) %R		X		X	
Matrix Spike Duplicate (MSD) %R		X		X	
MS/MSD Precision (RPD)		X		X	
Field Duplicate (RPD)	X				X
Extracted Internal Standards (EIS) Recoveries		X	X		
Dilution Factor		X		X	
Moisture Content	X				X

Notes:

%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Rachelle Borne

SIGNATURE: 

DATE: December 18, 2023

PEER REVIEW: Joseph C. Houser

DATE: December 19, 2023

CHAIN OF CUSTODY

CORRECTED SAMPLE ANALYSIS DATA SHEETS

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Number 149979

Client: Arcadis	Report to Contact: Alexis.crisp@arcadis.com, tiffany.linder@arcadis.com	Telephone No. / E-mail: tiffany linder, Alexis Crisp	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: x Sommer Guy	Analysis (Attach list if more space is needed): Report EGLE 26 compounds	Page 1 of 3
City: Novi; State: MI; Zip Code: 48377	Printed Name: Sommer Guy		Lot # Bar Code: YI13047
Project Name: Racer PNC			

Project No. 30167840.00031	P.O. No.		Grab/Composite	Matrix: Aqueous, Solid, Non-Aqueous	No of Containers by Preservative Type: Unpres, H2SO4, HNO3, HCl, NaOH, ZnAc/NaOH, Na2S2O3, Other	Analysis: Method 537.1 mod. with isotope dilution per QSM 5.1	HES2
Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)					Remarks / Cooler I.D.
MWF16-25_GW-091223	9/12/23	1417	G	X — —	2	X	
tripblank	9/12/23	1400	G	X — —	1	X	tripblank
MWF16-26_GW-091223	9/12/23	1525	G	X — —	2	X	
MW-05-18_GW-091223	9/12/23	1642	G	X — —	2	X	

Turn Around Time Required (Prior lab approval required for expedited TAT.)	Sample Disposal	Possible Hazard Identification	QC Requirements (Specify)
☒ Standard ☐ Rush (Specify)	☐ Return to Client ☒ Disposal by Lab	☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown	

	Date	Time		Date	Time
1. Relinquished by: Sommer Guy	9/12/23	1800	1. Received by: FedEx	9/12/23	1806
2. Relinquished by	Date	Time	2. Received by	Date	Time
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by: FedEx	Date 9/13/23	Time 0650	4. Laboratory received by: CJH	Date 9/12/23	Time 0650

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY — Received on Ice (Circle): (Yes) No Ice Pack — Receipt Temp: 1.3 °C — Temp Blank: ☐ Y ☐N

DISTRIBUTION: WHITE & YELLOW-Return to laboratory with Sample(s); PINK-Field/Client Copy

FedEx CJH

Document Number: MEG03N2-01

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Number 149978

Client: Arcadis	Report to Contact: Tiffany Linder Mundt CHSP	Telephone No. / E-mail: tiffany.linder@arcadis.us Alexis.Crisp@arcadis.com	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: x Garrett Link	Analysis (Attach list if more space is needed): Report EGLE 28 Compounds	Page 2 of 3
City: Novi / State: MI / Zip Code: 48377	Printed Name:		
Project Name: Racer PNC			

Project No.	P.O. No.		Grab/Composite	Matrix				No of Containers by Preservative Type									
Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)		Aqueous	Solid	Wipe / Assay	Other	Unpres.	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Field Filtered	537 Mod. w/ Isotope dilution for PFOA & PFOS		Remarks / Cooler I.D.
30167840.00031																	YI13047
MW-02-17_GW-091223	9/12/23	11:40	G	X				X							X		
MWP12-02R_GW-091223	9/12/23	14:35	G	X				X							X		EGLE MS/MSD
MW05-09R_GW-091223	9/12/23	16:35	G	X				X							X		

Turn Around Time Required (Prior lab approval required for expedited TAT.): ☒ Standard ☐ Rush (Specify)

Sample Disposal: ☐ Return to Client ☒ Disposal by Lab

Possible Hazard Identification: ☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify):

	Date	Time		Date	Time
1. Relinquished by: Jennifer Hay	9/12/23	1800	1. Received by: FedEx	9/12/23	1800
2. Relinquished by	Date	Time	2. Received by	Date	Time
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by: FEDEX	Date: 9/13/23	Time: 0850	4. Laboratory received by: Ch Hy	Date: 9/14/23	Time: 0850

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY
Received on Ice (Circle): (Yes) No Ice Pack
Receipt Temp: 1.3 °C
Temp Blank: ☐ Y ☐ N

DISTRIBUTION: WHITE & YELLOW-Return to laboratory with Sample(s); PINK-Field/Client Copy

Document Number: MECC3N2-01

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Number 149976

ARCADIS

Client: 28550 Cabot Dr #500	Report to Contact: Tiffany Linder, Alexis Crisp	Telephone No. / E-mail: Alexis.crisp@arcadis.com, tiffany.linder@arcadis.com	Quote No.
Address: Arcadis	Sampler's Signature: x Lottie Jay	Analysis (Attach list if more space is needed): Report EGLE 28 Compounds	Page 3 of 3
City: Novi; State: MI; Zip Code: 48377	Printed Name:		
Project Name: Racer PNC			YI13047
Project No.: 30167840.00031	P.O. No.		KES2

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Matrix: Grab/Composite	Aqueous	Solid	Non-Aqueous	No of Containers by Preservative Type: Unpres.	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Method 537 mod. with isotope dilution per DSHS	Remarks / Cooler I.D.
MWF7-02_GW-091223	9/12/23	1125	G	2			2							X	
MWF15-01_GW-091223		1330	G	2			2							X	
MWF16-23_GW-091223		1505	G	2			2							X	
MW05-10-GW-091223		1700	G	2			2							X	
EB-03-GW-091223		1129	G	1			1							X	

Turn Around Time Required (Prior lab approval required for expedited TAT): ☒ Standard ☐ Rush (Specify)

Sample Disposal: ☐ Return to Client ☒ Disposal by Lab

Possible Hazard Identification: ☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: Lottie Jay	9/12/23	1800	1. Received by: FedEx	9/12/23	1800
2. Relinquished by	Date	Time	2. Received by	Date	Time
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by: FedEx	Date 9/13/23	Time 0850	4. Laboratory received by	Date 9/13/23	Time 0850

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY — Received on Ice (Circle) (Yes) No — Ice Pack — Receipt Temp. 1.3 °C — Temp Blank ☐ Yes ☐ No

DISTRIBUTION: WHITE & YELLOW-Return to laboratory with Sample(s); PINK-Field/Client Copy

Document Number: MF002N2-01

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-001**

Description: **MWF16-25_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1417** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/28/2023 1643	ARC2	09/19/2023 1753	85183

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		8.0	0.48	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		8.0	0.66	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		8.0	1.6	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	8.0	2.0	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	8.0	0.87	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		8.0	2.1	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		8.0	0.48	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		8.0	0.75	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		8.0	0.93	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**12**		**4.0**	**0.41**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		4.0	0.78	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		4.0	0.50	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		4.0	0.71	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		4.0	0.61	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**10**		**4.0**	**0.59**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**22**		**4.0**	**0.55**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**13**		**4.0**	**0.60**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		4.0	0.52	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		4.0	0.47	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**8.0**		**4.0**	**0.45**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**13**		**4.0**	**0.69**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		4.0	0.46	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**20**		**4.0**	**0.83**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**9.2**		**4.0**	**0.54**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		4.0	0.60	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		4.0	0.53	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		4.0	0.63	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		4.0	2.0	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	203	25-150
13C2_6:2FTS	N	151	25-150
13C2_8:2FTS		98	25-150
13C2_PFDoA		88	25-150
13C2_PFTeDA		81	25-150
13C3_PFBS		115	25-150
13C3_PFHxS		112	25-150
13C3-HFPO-DA		105	25-150
13C4_PFBA		95	25-150
13C4_PFHpA		112	25-150
13C5_PFHxA		118	25-150
13C5_PFPeA		117	25-150
13C6_PFDA		111	25-150
13C7_PFUdA		100	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-001**

Description: **MWF16-25_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1417** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		136	25-150
13C8_PFOS		114	25-150
13C8_PFOSA		100	10-150
13C9_PFNA		106	25-150
d5-EtFOSAA		105	25-150
d3-MeFOSAA		109	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-002**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1400** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/28/2023 1654	ARC2	09/19/2023 1753	85183

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.4	0.45	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.4	0.61	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.4	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.4	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.4	0.81	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.4	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.4	0.45	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.4	0.70	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.4	0.86	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.7	0.38	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	0.72	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.7	0.46	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	0.66	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	0.57	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.7	0.55	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.7	0.51	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.7	0.56	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	0.49	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	0.44	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.7	0.41	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.7	0.64	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.7	0.43	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.7	0.77	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.7	0.50	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	0.56	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	0.49	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	0.58	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.7	1.9	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		98	25-150
13C2_6:2FTS		99	25-150
13C2_8:2FTS		85	25-150
13C2_PFDoA		85	25-150
13C2_PFTeDA		81	25-150
13C3_PFBS		92	25-150
13C3_PFHxS		95	25-150
13C3-HFPO-DA		91	25-150
13C4_PFBA		100	25-150
13C4_PFHpA		96	25-150
13C5_PFHxA		97	25-150
13C5_PFPeA		97	25-150
13C6_PFDA		84	25-150
13C7_PFUdA		81	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-002**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1400** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		105	25-150
13C8_PFOS		90	25-150
13C8_PFOSA		87	10-150
13C9_PFNA		88	25-150
d5-EtFOSAA		88	25-150
d3-MeFOSAA		96	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-003**

Description: **MWF16-26_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1525** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1700	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		8.0	0.48	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		8.0	0.67	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		8.0	1.6	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**8.4**		**8.0**	**2.0**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		8.0	0.88	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		8.0	2.1	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		8.0	0.49	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		8.0	0.75	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		8.0	0.94	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**17**		**4.0**	**0.42**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		4.0	0.78	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**0.98**	**J**	**4.0**	**0.50**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		4.0	0.71	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		4.0	0.62	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**11**		**4.0**	**0.60**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**21**		**4.0**	**0.55**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**11**		**4.0**	**0.60**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		4.0	0.53	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		4.0	0.47	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**5.8**		**4.0**	**0.45**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**22**		**4.0**	**0.69**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		4.0	0.46	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**34**		**4.0**	**0.83**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**24**		**4.0**	**0.55**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		4.0	0.60	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		4.0	0.53	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		4.0	0.63	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**2.0**	**J**	**4.0**	**2.0**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		149	25-150
13C2_6:2FTS		110	25-150
13C2_8:2FTS		92	25-150
13C2_PFDoA		76	25-150
13C2_PFTeDA		87	25-150
13C3_PFBS		97	25-150
13C3_PFHxS		88	25-150
13C3-HFPO-DA		87	25-150
13C4_PFBA		76	25-150
13C4_PFHpA		89	25-150
13C5_PFHxA		98	25-150
13C5_PFPeA		100	25-150
13C6_PFDA		93	25-150
13C7_PFUdA		85	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
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S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-003**

Description: **MWF16-26_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1525** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		91	25-150
13C8_PFOS		83	25-150
13C8_PFOSA		87	10-150
13C9_PFNA		94	25-150
d5-EtFOSAA		85	25-150
d3-MeFOSAA		83	25-150

LOQ = Limit of Quantitation
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-004**

Description: **MW-05-18_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1642** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/28/2023 1715	ARC2	09/19/2023 1753	85183

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.5	0.45	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.5	0.62	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.5	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.5	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.5	0.82	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.5	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.5	0.46	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.5	0.71	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.5	0.88	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**7.4**		**3.8**	**0.39**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.8	0.73	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.8	0.47	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.8	0.67	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.8	0.58	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**5.2**		**3.8**	**0.56**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**7.0**		**3.8**	**0.52**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**15**		**3.8**	**0.57**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.8	0.49	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.8	0.44	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**5.7**		**3.8**	**0.42**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**11**		**3.8**	**0.65**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.8	0.44	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**5.3**		**3.8**	**0.78**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**9.3**		**3.8**	**0.51**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.8	0.56	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.8	0.59	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.8	1.9	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	219	25-150
13C2_6:2FTS		124	25-150
13C2_8:2FTS		83	25-150
13C2_PFDoA		87	25-150
13C2_PFTeDA		74	25-150
13C3_PFBS		87	25-150
13C3_PFHxS		94	25-150
13C3-HFPO-DA		75	25-150
13C4_PFBA		74	25-150
13C4_PFHpA		91	25-150
13C5_PFHxA		93	25-150
13C5_PFPeA		84	25-150
13C6_PFDA		79	25-150
13C7_PFUdA		82	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
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S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-004**

Description: **MW-05-18_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1642** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		95	25-150
13C8_PFOS		94	25-150
13C8_PFOSA		94	10-150
13C9_PFNA		98	25-150
d5-EtFOSAA		87	25-150
d3-MeFOSAA		87	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-005**

Description: **MW-02-17_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1110** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/28/2023 1726	ARC2	09/19/2023 1753	85183

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		6.7	0.40	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		6.7	0.56	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		6.7	1.3	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	6.7	1.7	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	6.7	0.73	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		6.7	1.7	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		6.7	0.41	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		6.7	0.63	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		6.7	0.78	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**7.4**		**3.4**	**0.35**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.4	0.65	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.4	0.42	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.4	0.60	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.4	0.51	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**5.5**		**3.4**	**0.50**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**9.3**		**3.4**	**0.46**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**16**		**3.4**	**0.50**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.4	0.44	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.4	0.40	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**4.9**		**3.4**	**0.37**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**8.3**		**3.4**	**0.58**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.4	0.39	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**5.9**		**3.4**	**0.69**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**7.7**		**3.4**	**0.46**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.4	0.50	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.4	0.44	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.4	0.52	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.4	1.7	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	262	25-150
13C2_6:2FTS	N	176	25-150
13C2_8:2FTS		99	25-150
13C2_PFDoA		82	25-150
13C2_PFTeDA		73	25-150
13C3_PFBS		96	25-150
13C3_PFHxS		98	25-150
13C3-HFPO-DA		82	25-150
13C4_PFBA		69	25-150
13C4_PFHpA		99	25-150
13C5_PFHxA		100	25-150
13C5_PFPeA		88	25-150
13C6_PFDA		97	25-150
13C7_PFUdA		81	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-005**

Description: **MW-02-17_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1110** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		113	25-150
13C8_PFOS		99	25-150
13C8_PFOSA		96	10-150
13C9_PFNA		108	25-150
d5-EtFOSAA		92	25-150
d3-MeFOSAA		91	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-006**

Description: **MWF12-02R_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1435** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/28/2023 1736	ARC2	09/19/2023 1753	85183

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		6.9	0.42	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		6.9	0.57	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		6.9	1.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	6.9	1.7	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	6.9	0.75	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		6.9	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		6.9	0.42	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		6.9	0.65	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		6.9	0.80	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**3.9**		**3.4**	**0.36**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.4	0.67	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.4	0.43	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.4	0.61	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.4	0.53	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.4	0.51	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**4.6**		**3.4**	**0.48**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**20**		**3.4**	**0.52**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.4	0.45	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.4	0.41	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**3.5**		**3.4**	**0.39**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**8.9**		**3.4**	**0.59**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.4	0.40	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**9.6**		**3.4**	**0.71**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**11**		**3.4**	**0.47**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.4	0.52	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.4	0.46	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.4	0.54	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**9.0**		**3.4**	**1.7**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	241	25-150
13C2_6:2FTS	N	194	25-150
13C2_8:2FTS		86	25-150
13C2_PFDoA		71	25-150
13C2_PFTeDA		61	25-150
13C3_PFBS		63	25-150
13C3_PFHxS		69	25-150
13C3-HFPO-DA		49	25-150
13C4_PFBA		35	25-150
13C4_PFHpA		57	25-150
13C5_PFHxA		62	25-150
13C5_PFPeA		51	25-150
13C6_PFDA		70	25-150
13C7_PFUdA		65	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-006**

Description: **MWF12-02R_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1435** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		73	25-150
13C8_PFOS		66	25-150
13C8_PFOSA		62	10-150
13C9_PFNA		79	25-150
d5-EtFOSAA		73	25-150
d3-MeFOSAA		75	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-007**

Description: **MWOS-09R_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1635** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1711	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.0	0.42	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.0	0.58	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.0	1.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**3.5**	**J**	**7.0**	**1.7**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.0	0.76	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.0	0.42	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.0	0.65	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.0	0.81	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**6.3**		**3.5**	**0.36**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.68	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.5	0.43	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.62	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.53	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**5.0**		**3.5**	**0.52**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**10**		**3.5**	**0.48**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**9.8**		**3.5**	**0.52**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.46	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.41	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**10**		**3.5**	**0.39**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**11**		**3.5**	**0.60**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	0.40	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**19**		**3.5**	**0.72**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**11**		**3.5**	**0.47**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.52	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.46	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.54	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.5	1.7	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	214	25-150
13C2_6:2FTS		130	25-150
13C2_8:2FTS		97	25-150
13C2_PFDoA		76	25-150
13C2_PFTeDA		83	25-150
13C3_PFBS		97	25-150
13C3_PFHxS		89	25-150
13C3-HFPO-DA		88	25-150
13C4_PFBA		63	25-150
13C4_PFHpA		82	25-150
13C5_PFHxA		97	25-150
13C5_PFPeA		91	25-150
13C6_PFDA		87	25-150
13C7_PFUdA		79	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-007**

Description: **MWOS-09R_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1635** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		98	25-150
13C8_PFOS		88	25-150
13C8_PFOSA		87	10-150
13C9_PFNA		93	25-150
d5-EtFOSAA		85	25-150
d3-MeFOSAA		86	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-008**

Description: **MWF7-02_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1125** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1721	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		8.4	0.51	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		8.4	0.70	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		8.4	1.7	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**4.9**	**JQ**	**8.4**	**2.1**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	8.4	0.92	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		8.4	2.2	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		8.4	0.51	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		8.4	0.79	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		8.4	0.98	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**7.0**		**4.2**	**0.44**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		4.2	0.82	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**1.6**	**J**	**4.2**	**0.53**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		4.2	0.75	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		4.2	0.65	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**6.0**		**4.2**	**0.63**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**16**		**4.2**	**0.58**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**15**		**4.2**	**0.63**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		4.2	0.55	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		4.2	0.50	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**8.9**		**4.2**	**0.47**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**16**		**4.2**	**0.73**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		4.2	0.49	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**50**		**4.2**	**0.87**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**9.6**		**4.2**	**0.57**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		4.2	0.63	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		4.2	0.56	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		4.2	0.66	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**12**		**4.2**	**2.1**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	261	25-150
13C2_6:2FTS	N	159	25-150
13C2_8:2FTS		101	25-150
13C2_PFDoA		77	25-150
13C2_PFTeDA		87	25-150
13C3_PFBS		89	25-150
13C3_PFHxS		87	25-150
13C3-HFPO-DA		71	25-150
13C4_PFBA		51	25-150
13C4_PFHpA		78	25-150
13C5_PFHxA		97	25-150
13C5_PFPeA		75	25-150
13C6_PFDA		91	25-150
13C7_PFUdA		86	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
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S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-008**

Description: **MWF7-02_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1125** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		99	25-150
13C8_PFOS		88	25-150
13C8_PFOSA		90	10-150
13C9_PFNA		95	25-150
d5-EtFOSAA		88	25-150
d3-MeFOSAA		86	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-009**

Description: **MWF15-01_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1330** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1732	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.9	0.48	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.9	0.66	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.9	1.6	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**4.7**	**JQ**	**7.9**	**2.0**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.9	0.86	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.9	2.1	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.9	0.48	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.9	0.74	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.9	0.92	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**5.9**		**4.0**	**0.41**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		4.0	0.77	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**0.96**	**J**	**4.0**	**0.49**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		4.0	0.70	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		4.0	0.61	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**5.8**		**4.0**	**0.59**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**13**		**4.0**	**0.55**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**10**		**4.0**	**0.59**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		4.0	0.52	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		4.0	0.47	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**5.2**		**4.0**	**0.44**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**7.8**		**4.0**	**0.68**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		4.0	0.46	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**11**		**4.0**	**0.82**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**7.3**		**4.0**	**0.54**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		4.0	0.59	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		4.0	0.52	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		4.0	0.62	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**17**		**4.0**	**2.0**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	269	25-150
13C2_6:2FTS	N	177	25-150
13C2_8:2FTS		93	25-150
13C2_PFDoA		73	25-150
13C2_PFTeDA		75	25-150
13C3_PFBS		94	25-150
13C3_PFHxS		93	25-150
13C3-HFPO-DA		77	25-150
13C4_PFBA		65	25-150
13C4_PFHpA		82	25-150
13C5_PFHxA		100	25-150
13C5_PFPeA		87	25-150
13C6_PFDA		91	25-150
13C7_PFUdA		86	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-009**

Description: **MWF15-01_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1330** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		103	25-150
13C8_PFOS		90	25-150
13C8_PFOSA		87	10-150
13C9_PFNA		100	25-150
d5-EtFOSAA		86	25-150
d3-MeFOSAA		86	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-010**

Description: **MWF16-23_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1505** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/28/2023 1705	ARC2	09/19/2023 1753	85183

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		9.1	0.55	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		9.1	0.76	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		9.1	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**7.8**	**J**	**9.1**	**2.3**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	9.1	1.0	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		9.1	2.4	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		9.1	0.55	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		9.1	0.86	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		9.1	1.1	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**4.8**		**4.6**	**0.47**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		4.6	0.89	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		4.6	0.57	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		4.6	0.81	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		4.6	0.70	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**2.5**	**J**	**4.6**	**0.68**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**8.0**		**4.6**	**0.63**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**13**		**4.6**	**0.68**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		4.6	0.60	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		4.6	0.54	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**5.5**		**4.6**	**0.51**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**9.3**		**4.6**	**0.79**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		4.6	0.53	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**19**		**4.6**	**0.95**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**7.1**		**4.6**	**0.62**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		4.6	0.68	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		4.6	0.60	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		4.6	0.71	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		4.6	2.3	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	247	25-150
13C2_6:2FTS		129	25-150
13C2_8:2FTS		89	25-150
13C2_PFDoA		84	25-150
13C2_PFTeDA		72	25-150
13C3_PFBS		85	25-150
13C3_PFHxS		93	25-150
13C3-HFPO-DA		77	25-150
13C4_PFBA		54	25-150
13C4_PFHpA		94	25-150
13C5_PFHxA		89	25-150
13C5_PFPeA		79	25-150
13C6_PFDA		86	25-150
13C7_PFUdA		86	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
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H = Out of holding time
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-010**

Description: **MWF16-23_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1505** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		100	25-150
13C8_PFOS		93	25-150
13C8_PFOSA		85	10-150
13C9_PFNA		92	25-150
d5-EtFOSAA		94	25-150
d3-MeFOSAA		93	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-011**

Description: **MWOS-10_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1700** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1742	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		8.8	0.53	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		8.8	0.73	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		8.8	1.8	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**3.0**	**J**	**8.8**	**2.2**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	8.8	0.97	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		8.8	2.3	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		8.8	0.53	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		8.8	0.83	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		8.8	1.0	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**7.5**		**4.4**	**0.46**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		4.4	0.86	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		4.4	0.55	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		4.4	0.79	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		4.4	0.68	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**5.0**		**4.4**	**0.66**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**13**		**4.4**	**0.61**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**14**		**4.4**	**0.66**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		4.4	0.58	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		4.4	0.52	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**11**		**4.4**	**0.49**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**15**		**4.4**	**0.76**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		4.4	0.51	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**10**		**4.4**	**0.92**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**14**		**4.4**	**0.60**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		4.4	0.66	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		4.4	0.58	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		4.4	0.69	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		4.4	2.2	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	162	25-150
13C2_6:2FTS		113	25-150
13C2_8:2FTS		90	25-150
13C2_PFDoA		74	25-150
13C2_PFTeDA		86	25-150
13C3_PFBS		101	25-150
13C3_PFHxS		90	25-150
13C3-HFPO-DA		89	25-150
13C4_PFBA		68	25-150
13C4_PFHpA		83	25-150
13C5_PFHxA		96	25-150
13C5_PFPeA		97	25-150
13C6_PFDA		84	25-150
13C7_PFUdA		82	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-011**

Description: **MWOS-10_GW-091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1700** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		92	25-150
13C8_PFOS		88	25-150
13C8_PFOSA		86	10-150
13C9_PFNA		90	25-150
d5-EtFOSAA		81	25-150
d3-MeFOSAA		86	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI13047-012**

Description: **EB-03_091223** Matrix: **Aqueous**

Date Sampled: **09/12/2023 1129** Project Name: **RACER PNC**

Date Received: **09/13/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1753	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		8.1	0.49	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		8.1	0.67	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		8.1	1.6	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		8.1	2.0	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		8.1	0.89	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		8.1	2.1	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		8.1	0.49	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		8.1	0.76	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		8.1	0.95	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		4.1	0.42	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		4.1	0.79	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		4.1	0.51	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		4.1	0.72	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		4.1	0.62	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		4.1	0.60	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		4.1	0.56	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		4.1	0.61	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		4.1	0.53	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		4.1	0.48	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		4.1	0.45	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		4.1	0.70	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		4.1	0.47	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		4.1	0.84	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		4.1	0.55	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		4.1	0.61	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		4.1	0.54	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		4.1	0.64	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		4.1	2.0	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		93	25-150
13C2_6:2FTS		92	25-150
13C2_8:2FTS		81	25-150
13C2_PFDoA		72	25-150
13C2_PFTeDA		83	25-150
13C3_PFBS		88	25-150
13C3_PFHxS		84	25-150
13C3-HFPO-DA		79	25-150
13C4_PFBA		92	25-150
13C4_PFHpA		85	25-150
13C5_PFHxA		89	25-150
13C5_PFPeA		86	25-150
13C6_PFDA		87	25-150
13C7_PFUdA		86	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.**		Laboratory ID: **YI13047-012**
Description: **EB-03_091223**		Matrix: **Aqueous**
Date Sampled: **09/12/2023 1129**	Project Name: **RACER PNC**	
Date Received: **09/13/2023**	Project Number: **30167840.00031**	

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		88	25-150
13C8_PFOS		83	25-150
13C8_PFOSA		79	10-150
13C9_PFNA		82	25-150
d5-EtFOSAA		84	25-150
d3-MeFOSAA		80	25-150

LOQ = Limit of Quantitation	B = Detected in the method blank	E = Quantitation of compound exceeded the calibration range	DL = Detection Limit	Q = Surrogate failure
ND = Not detected at or above the DL	N = Recovery is out of criteria	P = The RPD between two GC columns exceeds 40%	J = Estimated result < LOQ and ≥ DL	L = LCS/LCSD failure
H = Out of holding time	W = Reported on wet weight basis			S = MS/MSD failure

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Racer

DATA REVIEW

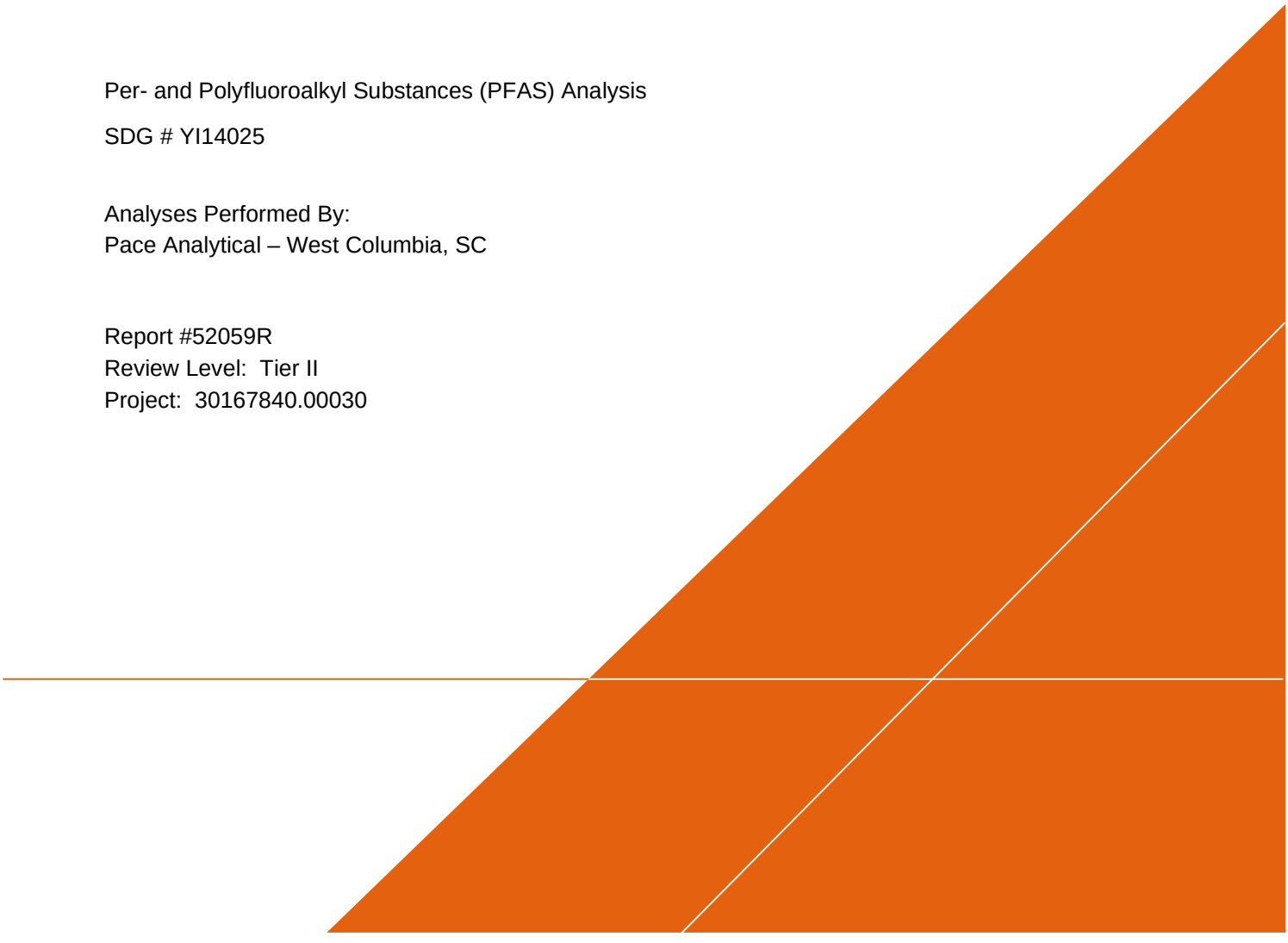
Pontiac North Campus, MI

Per- and Polyfluoroalkyl Substances (PFAS) Analysis

SDG # YI14025

Analyses Performed By:
Pace Analytical – West Columbia, SC

Report #52059R
Review Level: Tier II
Project: 30167840.00030



SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) #YI14025 for samples collected in association with the Racer PNC, MI Site. The review was conducted as a Tier II evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis				
					PFAS	SVOC	PCB	MET	MISC
MWOS-03_GW	YI14025-1	Water	09/13/23		X				
EB-01	YI14025-2	Water	09/13/23		X				
Trip Blank	YI14025-3	Water	09/13/23		X				
MWOS-04_GW	YI14025-4	Water	09/13/23		X				
MWOS-01_GW	YI14025-5	Water	09/13/23		X				
MWOS-02_GW	YI14025-6	Water	09/13/23		X				
TW-ROW-03_GW	YI14025-7	Water	09/13/23		X				
TW-ROW-01_GW	YI14025-8	Water	09/13/23		X				
MWW1-06_GW	YI14025-9	Water	09/13/23		X				

ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

Note:
QA - Quality Assurance

ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency Method 537 Modified. Data were reviewed in accordance with the method specified criteria, USEPA National Functional Guidelines NFG for Organic Superfund Methods Data Review, EPA-540-R-20-005 (November 2020), with reference to the historical (USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, OSWER 9240.1-05A-P, October 1999, as appropriate).

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers

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

  B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.

- Quantitation (Q) Qualifiers

  E The compound was quantitated above the calibration range.

  D Concentration is based on a diluted sample analysis.

- Validation Qualifiers

  J The compound was positively identified; however, the associated numerical value is an estimated concentration only.

  UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.

  JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.

  UB Compound considered non-detect at the listed value due to associated blank contamination.

  N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.

  R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is

that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) ANALYSIS

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
USEPA modified Method 537	Water	28 days to extraction; 28 days from extraction to analysis	Cool to <6 °C

All samples were initially analyzed within the specified holding time criteria.

2. Blank Contamination

Quality assurance (QA) blanks (i.e., method, field, and equipment blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Equipment blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (DL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were not detected above the DL in the associated blanks; therefore, detected sample results were not associated with blank contamination.

3. Extracted Internal Standard (EIS)/Surrogate Compounds

Labeled standards must be added to all field samples and QC samples prior to extraction. EIS recoveries must be within the laboratory-established acceptance limits of ICAL midpoint standard area or area measured in the initial CCV on days when ICAL not performed.

Samples associated with EIS exhibited acceptable recoveries with the exceptions noted in the table.

Sample Locations	EIS	Associated Compound	%R
MWOS-03_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
MWOS-04_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
	13C4_PFBA	Perfluoro-n-butanoic acid (PFBA)	< the lower control limit (LL) but > 20%
MWOS-01_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150

Sample Locations	EIS	Associated Compound	%R
MWOS-02_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
TW-ROW-03_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
TW-ROW-01_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
MWW1-06_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150

The criteria used to evaluate the EIS recoveries are presented in the following table. In the case of an EIS deviation, the sample results associated with the EIS are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
< the lower control limit (LL) but > 20%	Non-detect	UJ
	Detect	J
> the upper control limit (UL)	Non-detect	No Action
	Detect	J
< 20%	Non-detect	R
	Detect	J

4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within 50-150%. The relative percent difference (RPD) between the MS/MSD recoveries must exhibit an RPD within 30%.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

A site-specific MS/MSD was not included in the data package.

5. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

All compounds associated with the LCS analysis exhibited recoveries within the control limits.

6. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 30% for water matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of two times the RL is applied for soil matrices.

A field duplicate was not included in the data package.

7. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR PFAs

PFAs: USEPA modified Method 537	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
LIQUID CHROMATOGRAPHY/MASS SPECTROMETRY (LC/MS/MS)					
Tier II Validation					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks		X		X	
C. Trip blanks		X		X	
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate(LCSD) %R	X				X
LCS/LCSD Precision (RPD)	X				X
Matrix Spike (MS) %R	X				X
Matrix Spike Duplicate (MSD) %R	X				X
MS/MSD Precision (RPD)	X				X
Field Duplicate (RPD)	X				X
Extracted Internal Standards (EIS) Recoveries		X	X		
Dilution Factor		X		X	
Moisture Content	X				X

Notes:

%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Rachelle Borne

SIGNATURE: 

DATE: December 18, 2023

PEER REVIEW: Joseph C. Houser

DATE: December 19, 2023

CHAIN OF CUSTODY

CORRECTED SAMPLE ANALYSIS DATA SHEETS

Pace Analytical®

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Number 149977

Client: Arcadis	Report to Contact: Tiffany Linder, Alexis Crisp	Telephone No. / E-mail: Alexis.crisp@arcadis.com, Tiffany.linder@arcadis.com	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: x Sommer Gray	Analysis (Attach list if more space is needed): Report EGLE 28 Compounds	Page 1 of 1
City: Novi	State: MI	Zip Code: 48377	Printed Name: Sommer Gray, Lothe Jay Garrett Link	Lot # Bar Code: YI14025
Project Name: Racer PNC				
Project No.: 30167840.00031	P.O. No.			

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Grab/Composite	Matrix: Aqueous	Solid	Non-Aqueous	No of Containers by Preservative Type: Unpres.	HNO3	H2SO4	HCl	NaOH	Na2S2O3	Field Filtered	Methanol MS with Tentative Compounds OSM 9.1	Remarks / Locker I.D.
MWOS-03_GW-091323	9/13/23	1043	G	X			2							X	
EB-01_091323	9/13/23	1100	G	X			1							X	equipment blank
tripblank	9/13/23	1105	G	X			1							X	tripblank
MWOS-04_GW-091323	9/13/23	1310	G	X			2							X	
MWOS-01_GW-091323	9/13/23	1045	G	X			2							X	
MWOS-02_GW-091323	9/13/23	1135	G	X			2							X	
TW-ROW-03_GW-091323	9/13/23	1215	G	X			2							X	
TW-ROW-01_GW-091323	9/13/23	1330	G	X			2							X	
MWW1-06_GW-091323	9/13/23	1350	G	X			2							X	

Turn Around Time Required (Prior lab approval required for expedited TAT.): ☒ Standard ☐ Rush (Specify)

Sample Disposal: ☐ Return to Client ☒ Dispose by Lab

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: Sommer Gray	9/13/23	1715	1. Received by: FedEx	9/13/23	1715
2. Relinquished by	Date	Time	2. Received by	Date	Time
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by: FedEx	9/14/23	1250	4. Laboratory Received by	9/14/23	1250

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY — Received on ice (Circle): (Yes) No Ice Pack — Receipt Temp: 1.0 °C — Temp Blank ☐ Y ☐ N

DISTRIBUTION: WHITE & YELLOW-Return to laboratory with Sample(s); PINK-Field/Client Copy

Document Number: ME00SIN2-01

PACE ANALYTICAL SERVICES, LLC

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-001**

Description: **MWOS-03_GW-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1043** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1804	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.7	0.47	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.7	0.64	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.7	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.7	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.7	0.84	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.7	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.7	0.47	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.7	0.72	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.7	0.90	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.9	0.40	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.9	0.75	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.9	0.48	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.9	0.69	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.9	0.59	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.9	0.57	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.9	0.53	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.9	0.58	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.9	0.51	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.9	0.46	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.9	0.43	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.9	0.66	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.9	0.45	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.9	0.80	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.9	0.53	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.9	0.58	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.9	0.51	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.9	0.61	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.9	1.9	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	283	25-150
13C2_6:2FTS	N	217	25-150
13C2_8:2FTS		98	25-150
13C2_PFDoA		74	25-150
13C2_PFTeDA		73	25-150
13C3_PFBS		76	25-150
13C3_PFHxS		85	25-150
13C3-HFPO-DA		64	25-150
13C4_PFBA		26	25-150
13C4_PFHpA		80	25-150
13C5_PFHxA		74	25-150
13C5_PFPeA		54	25-150
13C6_PFDA		91	25-150
13C7_PFUdA		90	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-001**

Description: **MWOS-03_GW-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1043** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		104	25-150
13C8_PFOS		90	25-150
13C8_PFOSA		92	10-150
13C9_PFNA		101	25-150
d5-EtFOSAA		86	25-150
d3-MeFOSAA		85	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-002**

Description: **EB-01-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1100** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1814	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.2	0.43	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.2	0.60	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.2	1.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.2	0.79	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.2	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.2	0.44	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.2	0.68	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.2	0.84	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.6	0.37	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.70	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.6	0.45	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.64	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	0.55	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.6	0.53	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.6	0.50	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.6	0.54	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	0.47	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.42	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.6	0.40	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.6	0.62	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.6	0.42	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.6	0.75	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.6	0.49	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.54	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.48	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.56	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.6	1.8	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		105	25-150
13C2_6:2FTS		98	25-150
13C2_8:2FTS		88	25-150
13C2_PFDoA		72	25-150
13C2_PFTeDA		85	25-150
13C3_PFBS		94	25-150
13C3_PFHxS		87	25-150
13C3-HFPO-DA		82	25-150
13C4_PFBA		94	25-150
13C4_PFHpA		84	25-150
13C5_PFHxA		95	25-150
13C5_PFPeA		95	25-150
13C6_PFDA		86	25-150
13C7_PFUdA		85	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-002**

Description: **EB-01-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1100** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		97	25-150
13C8_PFOS		81	25-150
13C8_PFOSA		81	10-150
13C9_PFNA		85	25-150
d5-EtFOSAA		87	25-150
d3-MeFOSAA		80	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-003**

Description: **trip blank** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1105** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1825	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.8	0.47	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.8	0.65	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.8	1.6	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.8	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.8	0.85	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.8	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.8	0.47	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.8	0.73	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.8	0.91	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.9	0.40	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.9	0.76	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.9	0.49	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.9	0.69	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.9	0.60	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.9	0.58	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.9	0.54	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.9	0.58	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.9	0.51	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.9	0.46	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.9	0.44	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.9	0.67	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.9	0.45	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.9	0.81	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.9	0.53	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.9	0.58	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.9	0.52	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.9	0.61	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.9	2.0	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		94	25-150
13C2_6:2FTS		102	25-150
13C2_8:2FTS		82	25-150
13C2_PFDoA		75	25-150
13C2_PFTeDA		85	25-150
13C3_PFBS		93	25-150
13C3_PFHxS		90	25-150
13C3-HFPO-DA		90	25-150
13C4_PFBA		92	25-150
13C4_PFHpA		84	25-150
13C5_PFHxA		92	25-150
13C5_PFPeA		97	25-150
13C6_PFDA		90	25-150
13C7_PFUdA		87	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-003**

Description: **trip blank** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1105** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		95	25-150
13C8_PFOS		86	25-150
13C8_PFOSA		91	10-150
13C9_PFNA		93	25-150
d5-EtFOSAA		94	25-150
d3-MeFOSAA		82	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-004**

Description: **MWOS-04_GW-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1310** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1857	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q		LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND			7.4	0.45	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND			7.4	0.61	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND			7.4	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q		7.4	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q		7.4	0.81	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND			7.4	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND			7.4	0.45	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND			7.4	0.70	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND			7.4	0.86	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND			3.7	0.38	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND			3.7	0.72	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND			3.7	0.46	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND			3.7	0.66	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND			3.7	0.57	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND			3.7	0.55	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND			3.7	0.51	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND	Q	UJ	3.7	0.56	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND			3.7	0.49	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND			3.7	0.44	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND			3.7	0.41	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND			3.7	0.64	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND			3.7	0.43	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND			3.7	0.77	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND			3.7	0.50	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND			3.7	0.56	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND			3.7	0.49	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND			3.7	0.58	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND			3.7	1.9	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	231	25-150
13C2_6:2FTS	N	224	25-150
13C2_8:2FTS		108	25-150
13C2_PFDoA		67	25-150
13C2_PFTeDA		73	25-150
13C3_PFBS		80	25-150
13C3_PFHxS		83	25-150
13C3-HFPO-DA		56	25-150
13C4_PFBA	N	21	25-150
13C4_PFHpA		60	25-150
13C5_PFHxA		55	25-150
13C5_PFPeA		40	25-150
13C6_PFDA		93	25-150
13C7_PFUdA		81	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-004**

Description: **MWOS-04_GW-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1310** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		95	25-150
13C8_PFOS		80	25-150
13C8_PFOSA		84	10-150
13C9_PFNA		98	25-150
d5-EtFOSAA		80	25-150
d3-MeFOSAA		87	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-005**

Description: **MWOS-01_GW-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1045** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1907	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.0	0.42	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.0	0.58	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.0	1.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.0	1.7	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.0	0.76	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.0	0.42	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.0	0.66	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.0	0.81	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**18**		**3.5**	**0.36**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.68	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.5	0.44	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.62	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.54	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.5	0.52	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**2.2**	**J**	**3.5**	**0.48**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**14**		**3.5**	**0.52**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.46	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.41	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**1.8**	**J**	**3.5**	**0.39**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**3.3**	**J**	**3.5**	**0.60**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	0.40	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**3.8**		**3.5**	**0.72**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**5.7**		**3.5**	**0.48**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.52	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.46	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.55	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**7.8**		**3.5**	**1.7**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	224	25-150
13C2_6:2FTS		135	25-150
13C2_8:2FTS		91	25-150
13C2_PFDoA		75	25-150
13C2_PFTeDA		84	25-150
13C3_PFBS		87	25-150
13C3_PFHxS		81	25-150
13C3-HFPO-DA		75	25-150
13C4_PFBA		52	25-150
13C4_PFHpA		88	25-150
13C5_PFHxA		66	25-150
13C5_PFPeA		83	25-150
13C6_PFDA		88	25-150
13C7_PFUdA		88	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-005**

Description: **MWOS-01_GW-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1045** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		91	25-150
13C8_PFOS		74	25-150
13C8_PFOSA		87	10-150
13C9_PFNA		94	25-150
d5-EtFOSAA		85	25-150
d3-MeFOSAA		86	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-006**

Description: **MWOS-02_GW-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1135** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1918	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		8.0	0.48	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		8.0	0.66	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		8.0	1.6	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	8.0	2.0	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	8.0	0.88	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		8.0	2.1	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		8.0	0.48	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		8.0	0.75	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		8.0	0.93	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**4.3**		**4.0**	**0.42**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		4.0	0.78	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		4.0	0.50	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		4.0	0.71	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		4.0	0.61	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**1.6**	**J**	**4.0**	**0.60**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**6.8**		**4.0**	**0.55**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**7.9**		**4.0**	**0.60**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		4.0	0.53	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		4.0	0.47	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**1.5**	**J**	**4.0**	**0.45**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**2.9**	**J**	**4.0**	**0.69**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		4.0	0.46	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**7.0**		**4.0**	**0.83**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**2.5**	**J**	**4.0**	**0.55**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		4.0	0.60	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		4.0	0.53	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		4.0	0.63	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**9.5**		**4.0**	**2.0**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	276	25-150
13C2_6:2FTS	N	157	25-150
13C2_8:2FTS		92	25-150
13C2_PFDoA		69	25-150
13C2_PFTeDA		73	25-150
13C3_PFBS		94	25-150
13C3_PFHxS		85	25-150
13C3-HFPO-DA		69	25-150
13C4_PFBA		56	25-150
13C4_PFHpA		79	25-150
13C5_PFHxA		88	25-150
13C5_PFPeA		78	25-150
13C6_PFDA		89	25-150
13C7_PFUdA		83	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-006**

Description: **MWOS-02_GW-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1135** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		96	25-150
13C8_PFOS		83	25-150
13C8_PFOSA		88	10-150
13C9_PFNA		97	25-150
d5-EtFOSAA		83	25-150
d3-MeFOSAA		80	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-007**

Description: **TW-ROW-03_GW-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1215** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1928	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		6.9	0.42	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		6.9	0.57	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		6.9	1.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**2.1**	**JQ**	**6.9**	**1.7**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	6.9	0.76	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		6.9	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		6.9	0.42	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		6.9	0.65	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		6.9	0.81	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**4.8**		**3.5**	**0.36**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.67	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**0.95**	**J**	**3.5**	**0.43**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.62	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.53	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**1.3**	**J**	**3.5**	**0.51**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**6.3**		**3.5**	**0.48**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**12**		**3.5**	**0.52**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.46	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.41	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**1.7**	**J**	**3.5**	**0.39**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**4.1**		**3.5**	**0.60**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**0.74**	**J**	**3.5**	**0.40**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**5.8**		**3.5**	**0.72**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**4.5**		**3.5**	**0.47**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.52	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.46	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.54	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**36**		**3.5**	**1.7**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	266	25-150
13C2_6:2FTS	N	219	25-150
13C2_8:2FTS		130	25-150
13C2_PFDoA		72	25-150
13C2_PFTeDA		66	25-150
13C3_PFBS		84	25-150
13C3_PFHxS		82	25-150
13C3-HFPO-DA		58	25-150
13C4_PFBA		32	25-150
13C4_PFHpA		72	25-150
13C5_PFHxA		84	25-150
13C5_PFPeA		61	25-150
13C6_PFDA		93	25-150
13C7_PFUdA		85	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-007**

Description: **TW-ROW-03_GW-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1215** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		94	25-150
13C8_PFOS		80	25-150
13C8_PFOSA		82	10-150
13C9_PFNA		94	25-150
d5-EtFOSAA		91	25-150
d3-MeFOSAA		88	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-008**

Description: **TW-ROW-01_GW-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1330** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1939	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		6.9	0.41	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		6.9	0.57	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		6.9	1.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	6.9	1.7	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	6.9	0.75	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		6.9	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		6.9	0.41	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		6.9	0.64	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		6.9	0.80	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.4	0.36	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.4	0.67	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**0.88**	**J**	**3.4**	**0.43**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.4	0.61	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.4	0.53	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.4	0.51	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**3.5**		**3.4**	**0.47**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**8.6**		**3.4**	**0.51**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.4	0.45	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.4	0.40	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**2.1**	**J**	**3.4**	**0.38**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**4.2**		**3.4**	**0.59**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.4	0.40	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**5.5**		**3.4**	**0.71**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.4	0.47	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.4	0.51	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.4	0.45	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.4	0.54	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**12**		**3.4**	**1.7**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	328	25-150
13C2_6:2FTS	N	215	25-150
13C2_8:2FTS		105	25-150
13C2_PFDoA		65	25-150
13C2_PFTeDA		63	25-150
13C3_PFBS		81	25-150
13C3_PFHxS		80	25-150
13C3-HFPO-DA		57	25-150
13C4_PFBA		31	25-150
13C4_PFHpA		66	25-150
13C5_PFHxA		72	25-150
13C5_PFPeA		60	25-150
13C6_PFDA		83	25-150
13C7_PFUdA		77	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-008**

Description: **TW-ROW-01_GW-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1330** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		93	25-150
13C8_PFOS		72	25-150
13C8_PFOSA		80	10-150
13C9_PFNA		84	25-150
d5-EtFOSAA		74	25-150
d3-MeFOSAA		77	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
Q = Surrogate failure
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-009**

Description: **MWW1-06_GW-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1350** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 1950	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		8.2	0.50	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		8.2	0.68	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		8.2	1.7	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**16**		**8.2**	**2.1**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	8.2	0.90	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		8.2	2.1	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		8.2	0.50	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		8.2	0.77	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		8.2	0.96	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**2.7**	**J**	**4.1**	**0.43**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		4.1	0.80	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		4.1	0.51	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		4.1	0.73	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		4.1	0.63	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		4.1	0.61	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**0.96**	**J**	**4.1**	**0.57**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**6.1**		**4.1**	**0.62**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		4.1	0.54	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		4.1	0.49	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**1.3**	**J**	**4.1**	**0.46**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**1.3**	**J**	**4.1**	**0.71**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		4.1	0.48	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**6.8**		**4.1**	**0.85**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**0.92**	**J**	**4.1**	**0.56**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		4.1	0.62	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		4.1	0.54	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		4.1	0.64	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**22**		**4.1**	**2.1**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	205	25-150
13C2_6:2FTS		140	25-150
13C2_8:2FTS		104	25-150
13C2_PFDoA		70	25-150
13C2_PFTeDA		71	25-150
13C3_PFBS		101	25-150
13C3_PFHxS		89	25-150
13C3-HFPO-DA		79	25-150
13C4_PFBA		68	25-150
13C4_PFHpA		87	25-150
13C5_PFHxA		100	25-150
13C5_PFPeA		89	25-150
13C6_PFDA		89	25-150
13C7_PFUdA		85	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI14025-009**

Description: **MWW1-06_GW-091323** Matrix: **Aqueous**

Date Sampled: **09/13/2023 1350** Project Name: **RACER PNC**

Date Received: **09/14/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		98	25-150
13C8_PFOS		84	25-150
13C8_PFOSA		87	10-150
13C9_PFNA		97	25-150
d5-EtFOSAA		82	25-150
d3-MeFOSAA		87	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
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Racer

DATA REVIEW

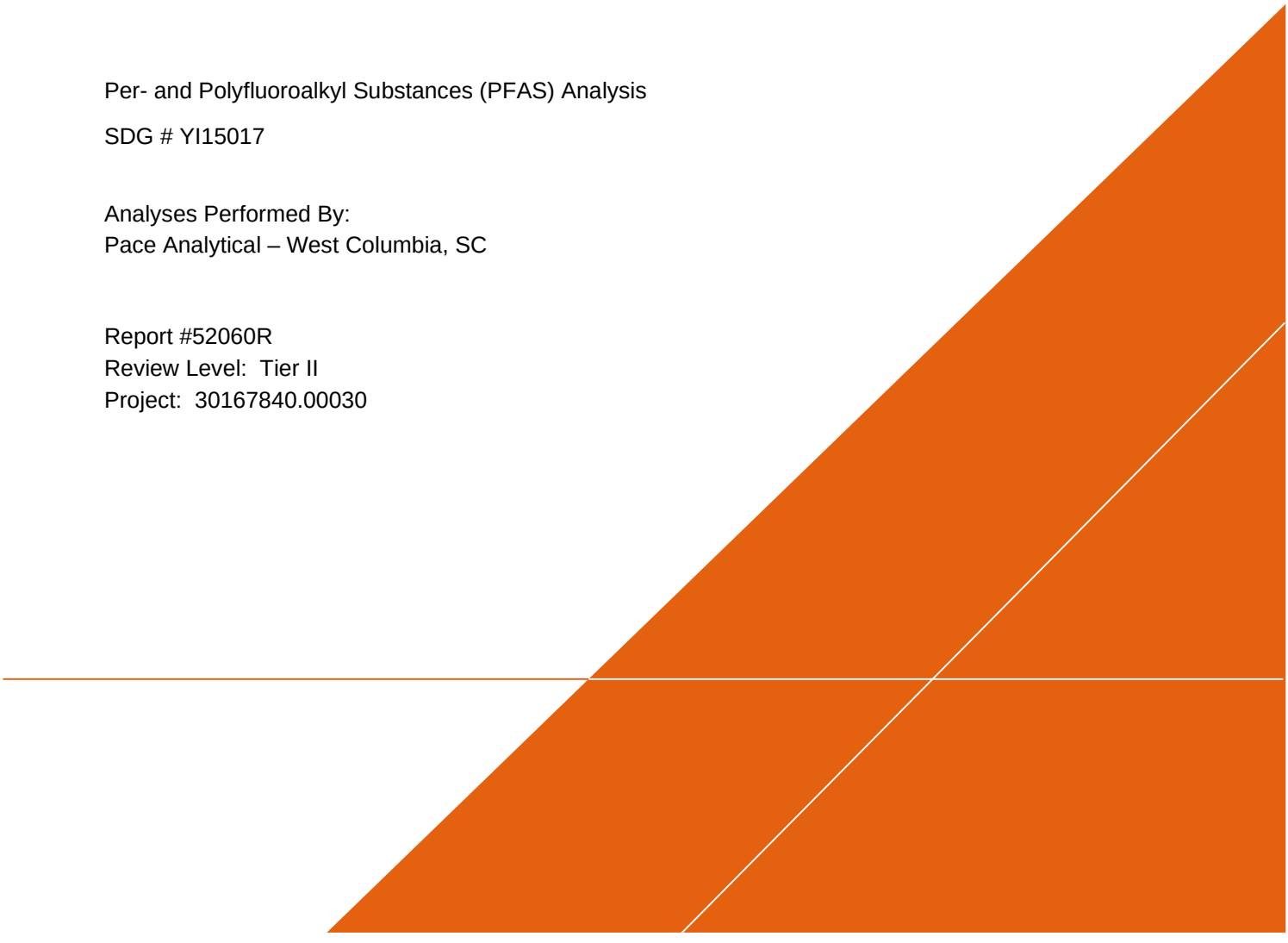
Pontiac North Campus, MI

Per- and Polyfluoroalkyl Substances (PFAS) Analysis

SDG # YI15017

Analyses Performed By:
Pace Analytical – West Columbia, SC

Report #52060R
Review Level: Tier II
Project: 30167840.00030



SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) #YI15017 for samples collected in association with the Racer PNC, MI Site. The review was conducted as a Tier II evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis				
					PFAS	SVOC	PCB	MET	MISC
MWM30-01_GW	YI15017-1	Water	09/14/23		X				
EB-04	YI15017-2	Water	09/14/23		X				
Trip Blank	YI15017-3	Water	09/14/23		X				
MWM5-03_GW	YI15017-4	Water	09/14/23		X				
DUP-02_GW	YI15017-5	Water	09/14/23	MWM5-03_GW	X				

ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

Note:
QA - Quality Assurance

ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency Method 537 Modified. Data were reviewed in accordance with the method specified criteria, USEPA National Functional Guidelines NFG for Organic Superfund Methods Data Review, EPA-540-R-20-005 (November 2020), with reference to the historical (USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, OSWER 9240.1-05A-P, October 1999, as appropriate).

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers

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

  B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.

- Quantitation (Q) Qualifiers

  E The compound was quantitated above the calibration range.

  D Concentration is based on a diluted sample analysis.

- Validation Qualifiers

  J The compound was positively identified; however, the associated numerical value is an estimated concentration only.

  UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.

  JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.

  UB Compound considered non-detect at the listed value due to associated blank contamination.

  N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.

  R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is

that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) ANALYSIS

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
USEPA modified Method 537	Water	28 days to extraction; 28 days from extraction to analysis	Cool to <6 °C

All samples were initially analyzed within the specified holding time criteria.

2. Blank Contamination

Quality assurance (QA) blanks (i.e., method, field, and equipment blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Equipment blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (DL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were not detected above the DL in the associated blanks; therefore, detected sample results were not associated with blank contamination.

3. Extracted Internal Standard (EIS)/Surrogate Compounds

Labeled standards must be added to all field samples and QC samples prior to extraction. EIS recoveries must be within the laboratory-established acceptance limits of ICAL midpoint standard area or area measured in the initial CCV on days when ICAL not performed.

Samples associated with EIS exhibited acceptable recoveries with the exceptions noted in the table.

Sample Locations	EIS	Associated Compound	%R
MWM30-01_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
	13C2_8:2FTS	1H,1H, 2H,2H-perfluorodecane sulfonic acid (8:2 FTS)	>150
	13C4_PFBA	Perfluoro-n-butanoic acid (PFBA)	<20%
MWM5-03_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150

Sample Locations	EIS	Associated Compound	%R
DUP-02_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150

The criteria used to evaluate the EIS recoveries are presented in the following table. In the case of an EIS deviation, the sample results associated with the EIS are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
< the lower control limit (LL) but > 20%	Non-detect	UJ
	Detect	J
> the upper control limit (UL)	Non-detect	No Action
	Detect	J
< 20%	Non-detect	R
	Detect	J

4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within 50-150%. The relative percent difference (RPD) between the MS/MSD recoveries must exhibit an RPD within 30%.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

A site-specific MS/MSD was not included in the data package.

5. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

All compounds associated with the LCS analysis exhibited recoveries within the control limits.

6. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 30% for water matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of two times the RL is applied for soil matrices.

Results for duplicate samples are summarized in the following table.

Sample ID/Duplicate ID	Compound	Sample Result	Duplicate Result	RPD
MWM5-03_GW / DUP-02_GW	Perfluorobutanesulfonic acid (PFBS)	3.7 U	2.8 J	AC
	Perfluorohexanesulfonic acid (PFHxS)	1.8 J	1.5 J	AC
	Perfluorobutanoic acid (PFBA)	2.5 J	3.4 J	AC
	Perfluoroheptanoic acid (PFHpA)	0.57 J	0.70 J	AC
	Perfluorooctanoic acid (PFOA)	3.7 U	1.3 J	AC

Notes:

AC Acceptable

The calculated RPDs between the parent sample and field duplicate were acceptable.

7. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR PFAs

PFAs: USEPA modified Method 537	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
LIQUID CHROMATOGRAPHY/MASS SPECTROMETRY (LC/MS/MS)					
Tier II Validation					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks		X		X	
C. Trip blanks		X		X	
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate(LCSD) %R	X				X
LCS/LCSD Precision (RPD)	X				X
Matrix Spike (MS) %R	X				X
Matrix Spike Duplicate (MSD) %R	X				X
MS/MSD Precision (RPD)	X				X
Field Duplicate (RPD)		X		X	
Extracted Internal Standards (EIS) Recoveries		X	X		
Dilution Factor		X		X	
Moisture Content	X				X

Notes:

%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Rachelle Borne

SIGNATURE: 

DATE: December 18, 2023

PEER REVIEW: Joseph C. Houser

DATE: December 19, 2023

CHAIN OF CUSTODY

CORRECTED SAMPLE ANALYSIS DATA SHEETS

Pace Analytical®

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Number 150049

Client: Arcadis	Report to Contact: Tiffany Linder, Alexis Crisp	Telephone No. / E-mail: Alexis.crisp@arcadis.com, tiffany.linder@arcadis.com	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: x Sommer Guy	Analysis (Attach list if more space is needed): Report CoLE 28 Compounds	Page 1 of 2
City: Novi	State: MI Zip Code: 48377	Printed Name: Sommer Guy	
Project Name: Racer PNC			YI15017
Project No.: 30167840.00031	P.O. No.		KES2

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Grab (G) C-Composite	Matrix: Aqueous	Matrix: Solid	Matrix: Non-Aqueous	No. of Containers by Preservative Type: Unpres	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Methyl 537 mod. with Isotope dilution PFAS 533 PFAS	Remarks / Cooler I.D.
MWM30-01_GW-091423	9/14/23	1425	G	X			2							X	
EB-04_091423	9/14/23	1450	G	X			1							X	equipment blank
tripblank	9/14/23	1455	G	X			1							X	tripblank

Turn Around Time Required (Prior lab approval required for expedited TAT.): ☑ Standard ☐ Rush (Specify)	Sample Disposal: ☐ Return to Client ☒ Disposal by Lab	Possible Hazard Identification: ☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown		QC Requirements (Specify)	
1. Relinquished by: Sommer Guy	Date: 9/14/23	Time: 1700	1. Received by: FedEx	Date: 9/14/23	Time: 1700
2. Relinquished by	Date	Time	2. Received by	Date	Time
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by: FedEx	Date: 9.15.23	Time: 1030	4. Laboratory received by: Karen Weems	Date: 9.15.23	Time: 1030

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY
Received on Ice (Circle) (Yes) No Ice Pack
Receipt Temp: 4.0 °C
Temp Blank: Y ☐ N

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Number 150049

Client: US ARCADIS	Report to Contact: Alexis Crisp	Telephone No. / E-mail: Alexis.crisp@arcadis.com	Quote No.
Address: US 28550 Cabot Dr #500 Novi	Sampler's Signature: x	Analysis (Attach list if more space is needed): Report Chlate 28 Compounds	Page 2 of 2
City: Novi / State: MI / Zip Code: 48377	Printed Name: Lottie Jay		
Project Name: Racer PNC			
Project No.: 30167840.00031.SG	P.O. No.		

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Grab / Composite	Matrix: Aqueous	Matrix: Soil	Matrix: Non-Aqueous	No. of Containers by Preservative Type: Unpres.	HCl	HNO3	H2SO4	NaOH	Na2S2O3	Field Filtered	Method 537 mod. with isotope dilution per QSM 5.1	Remarks / Cooler I.D.
MWMS-03_GW-091423	9/14/23	1435	G	X			2							X	
DUP-02-GW-091423	"	—	G	X			2							X	

Y115017

KBS2

Turn Around Time Required (Prior lab approval required for expedited TAT.)	Sample Disposal	Possible Hazard Identification	QC Requirements (Specify)
☐ Standard ☐ Rush (Specify)	☐ Return to Client ☑ Disposal by Lab	☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown	

	Date	Time		Date	Time
1. Relinquished by: Lottie Jay/Lottie	9/14/23	1525	1. Received by: Jonnmen	9/14/23	1525
2. Relinquished by: Jonnmen	9/14/23	1700	2. Received by: FedEx	9/14/23	1700
3. Relinquished by:	Date	Time	3. Received by:	Date	Time
4. Relinquished by: Fedex	9.15.23	1030	4. Laboratory received by: Keyon Mercer	9.15.23	1030

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY
Received on Ice (Circle) (Yes) No Ice Pack Receipt Temp. 4.0 °C Temp Blank ☑ Y ☐ N

PACE ANALYTICAL SERVICES, LLC

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI15017-001**

Description: **MWM30-01_GW-091423** Matrix: **Aqueous**

Date Sampled: **09/14/2023 1425** Project Name: **RACER PNC**

Date Received: **09/15/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/21/2023 1842	ARC2	09/20/2023 2104	85336

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run	
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.1	0.43	ng/L	1	
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.1	0.59	ng/L	1	
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.1	1.4	ng/L	1	
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**37**	**Q** J	**7.1**	**1.8**	**ng/L**	**1**	
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.1	0.77	ng/L	1	
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.1	1.8	ng/L	1	
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.1	0.43	ng/L	1	
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.1	0.66	ng/L	1	
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.1	0.82	ng/L	1	
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.5	0.37	ng/L	1	
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.69	ng/L	1	
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.5	0.44	ng/L	1	
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.63	ng/L	1	
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.54	ng/L	1	
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**2.6**	**J**	**3.5**	**0.53**	**ng/L**	**1**	
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**12**		**3.5**	**0.49**	**ng/L**	**1**	
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND	Q	3.5	0.53	ng/L	1	R
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.46	ng/L	1	
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.42	ng/L	1	
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**16**		**3.5**	**0.40**	**ng/L**	**1**	
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**23**		**3.5**	**0.61**	**ng/L**	**1**	
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	0.41	ng/L	1	
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**54**		**3.5**	**0.73**	**ng/L**	**1**	
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**21**		**3.5**	**0.48**	**ng/L**	**1**	
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.53	ng/L	1	
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.47	ng/L	1	
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.55	ng/L	1	
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.5	1.8	ng/L	1	

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	177	25-150
13C2_6:2FTS	N	300	25-150
13C2_8:2FTS	N	213	25-150
13C2_PFDoA		95	25-150
13C2_PFTeDA		92	25-150
13C3_PFBS		71	25-150
13C3_PFHxS		87	25-150
13C3-HFPO-DA		44	25-150
13C4_PFBA	N	19	25-150
13C4_PFHpA		55	25-150
13C5_PFHxA		43	25-150
13C5_PFPeA		32	25-150
13C6_PFDA		105	25-150
13C7_PFUdA		94	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI15017-001**

Description: **MWM30-01_GW-091423** Matrix: **Aqueous**

Date Sampled: **09/14/2023 1425** Project Name: **RACER PNC**

Date Received: **09/15/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		82	25-150
13C8_PFOS		88	25-150
13C8_PFOSA		83	10-150
13C9_PFNA		89	25-150
d5-EtFOSAA		111	25-150
d3-MeFOSAA		107	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
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S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI15017-002**

Description: **EB-04_091423** Matrix: **Aqueous**

Date Sampled: **09/14/2023 1450** Project Name: **RACER PNC**

Date Received: **09/15/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/21/2023 1853	ARC2	09/20/2023 2104	85336

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.8	0.47	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.8	0.65	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.8	1.6	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.8	2.0	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.8	0.85	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.8	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.8	0.47	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.8	0.73	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.8	0.91	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.9	0.41	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.9	0.76	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.9	0.49	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.9	0.70	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.9	0.60	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.9	0.58	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.9	0.54	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.9	0.59	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.9	0.51	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.9	0.46	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.9	0.44	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.9	0.67	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.9	0.45	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.9	0.81	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.9	0.53	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.9	0.59	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.9	0.52	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.9	0.61	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.9	2.0	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		99	25-150
13C2_6:2FTS		139	25-150
13C2_8:2FTS		94	25-150
13C2_PFDoA		99	25-150
13C2_PFTeDA		91	25-150
13C3_PFBS		111	25-150
13C3_PFHxS		100	25-150
13C3-HFPO-DA		101	25-150
13C4_PFBA		103	25-150
13C4_PFHpA		101	25-150
13C5_PFHxA		98	25-150
13C5_PFPeA		96	25-150
13C6_PFDA		99	25-150
13C7_PFUdA		91	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.**		Laboratory ID: **YI15017-002**
Description: **EB-04_091423**		Matrix: **Aqueous**
Date Sampled: **09/14/2023 1450**	Project Name: **RACER PNC**	
Date Received: **09/15/2023**	Project Number: **30167840.00031**	

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		106	25-150
13C8_PFOS		96	25-150
13C8_PFOSA		90	10-150
13C9_PFNA		98	25-150
d5-EtFOSAA		90	25-150
d3-MeFOSAA		88	25-150

LOQ = Limit of Quantitation	B = Detected in the method blank	E = Quantitation of compound exceeded the calibration range	DL = Detection Limit	Q = Surrogate failure
ND = Not detected at or above the DL	N = Recovery is out of criteria	P = The RPD between two GC columns exceeds 40%	J = Estimated result < LOQ and ≥ DL	L = LCS/LCSD failure
H = Out of holding time	W = Reported on wet weight basis			S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI15017-003**

Description: **trip blank** Matrix: **Aqueous**

Date Sampled: **09/14/2023 1455** Project Name: **RACER PNC**

Date Received: **09/15/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/21/2023 1903	ARC2	09/20/2023 2104	85336

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.6	0.46	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.6	0.63	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.6	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.6	0.83	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.6	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.6	0.46	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.6	0.71	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.6	0.88	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.8	0.39	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.8	0.74	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.8	0.47	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.8	0.67	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.8	0.58	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.8	0.56	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.8	0.52	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.8	0.57	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.8	0.45	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.8	0.42	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.8	0.65	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.8	0.44	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.8	0.79	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.8	0.52	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.8	0.57	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.8	0.59	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.8	1.9	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		96	25-150
13C2_6:2FTS		121	25-150
13C2_8:2FTS		93	25-150
13C2_PFDoA		97	25-150
13C2_PFTeDA		95	25-150
13C3_PFBS		104	25-150
13C3_PFHxS		102	25-150
13C3-HFPO-DA		94	25-150
13C4_PFBA		105	25-150
13C4_PFHpA		105	25-150
13C5_PFHxA		96	25-150
13C5_PFPeA		99	25-150
13C6_PFDA		99	25-150
13C7_PFUdA		102	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI15017-003**

Description: **trip blank** Matrix: **Aqueous**

Date Sampled: **09/14/2023 1455** Project Name: **RACER PNC**

Date Received: **09/15/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		109	25-150
13C8_PFOS		101	25-150
13C8_PFOSA		90	10-150
13C9_PFNA		104	25-150
d5-EtFOSAA		100	25-150
d3-MeFOSAA		95	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI15017-004**

Description: **MWM5-03_GW-091423** Matrix: **Aqueous**

Date Sampled: **09/14/2023 1435** Project Name: **RACER PNC**

Date Received: **09/15/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/21/2023 1935	ARC2	09/20/2023 2104	85336

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.4	0.45	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.4	0.62	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.4	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.4	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.4	0.81	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.4	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.4	0.45	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.4	0.70	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.4	0.87	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.7	0.39	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	0.72	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.7	0.46	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	0.66	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	0.57	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.7	0.55	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**1.8**	**J**	**3.7**	**0.51**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**2.5**	**J**	**3.7**	**0.56**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	0.49	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	0.44	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**0.57**	**J**	**3.7**	**0.42**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.7	0.64	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.7	0.43	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.7	0.77	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.7	0.51	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	0.56	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	0.49	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	0.58	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.7	1.9	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	291	25-150
13C2_6:2FTS	N	193	25-150
13C2_8:2FTS		91	25-150
13C2_PFDoA		81	25-150
13C2_PFTeDA		73	25-150
13C3_PFBS		93	25-150
13C3_PFHxS		94	25-150
13C3-HFPO-DA		63	25-150
13C4_PFBA		39	25-150
13C4_PFHpA		90	25-150
13C5_PFHxA		87	25-150
13C5_PFPeA		66	25-150
13C6_PFDA		97	25-150
13C7_PFUdA		90	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI15017-004**

Description: **MWM5-03_GW-091423** Matrix: **Aqueous**

Date Sampled: **09/14/2023 1435** Project Name: **RACER PNC**

Date Received: **09/15/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		114	25-150
13C8_PFOS		93	25-150
13C8_PFOSA		90	10-150
13C9_PFNA		100	25-150
d5-EtFOSAA		85	25-150
d3-MeFOSAA		85	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI15017-005**

Description: **DUP-02_GW-091423** Matrix: **Aqueous**

Date Sampled: **09/14/2023** Project Name: **RACER PNC**

Date Received: **09/15/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/21/2023 1946	ARC2	09/20/2023 2104	85336

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.6	0.46	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.6	0.63	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.6	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.6	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.6	0.83	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.6	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.6	0.46	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.6	0.71	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.6	0.89	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**2.8**	**J**	**3.8**	**0.39**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.8	0.74	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.8	0.47	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.8	0.68	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.8	0.58	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.8	0.56	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**1.5**	**J**	**3.8**	**0.52**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**3.4**	**J**	**3.8**	**0.57**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.8	0.45	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**0.70**	**J**	**3.8**	**0.43**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.8	0.65	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.8	0.44	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**1.3**	**J**	**3.8**	**0.79**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.8	0.52	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.8	0.57	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.8	0.60	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.8	1.9	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	280	25-150
13C2_6:2FTS	N	191	25-150
13C2_8:2FTS		96	25-150
13C2_PFDoA		79	25-150
13C2_PFTeDA		71	25-150
13C3_PFBS		96	25-150
13C3_PFHxS		101	25-150
13C3-HFPO-DA		68	25-150
13C4_PFBA		41	25-150
13C4_PFHpA		88	25-150
13C5_PFHxA		85	25-150
13C5_PFPeA		64	25-150
13C6_PFDA		92	25-150
13C7_PFUdA		86	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
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P = The RPD between two GC columns exceeds 40%
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI15017-005**

Description: **DUP-02_GW-091423** Matrix: **Aqueous**

Date Sampled: **09/14/2023** Project Name: **RACER PNC**

Date Received: **09/15/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		114	25-150
13C8_PFOS		93	25-150
13C8_PFOSA		85	10-150
13C9_PFNA		100	25-150
d5-EtFOSAA		81	25-150
d3-MeFOSAA		86	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
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Racer

DATA REVIEW

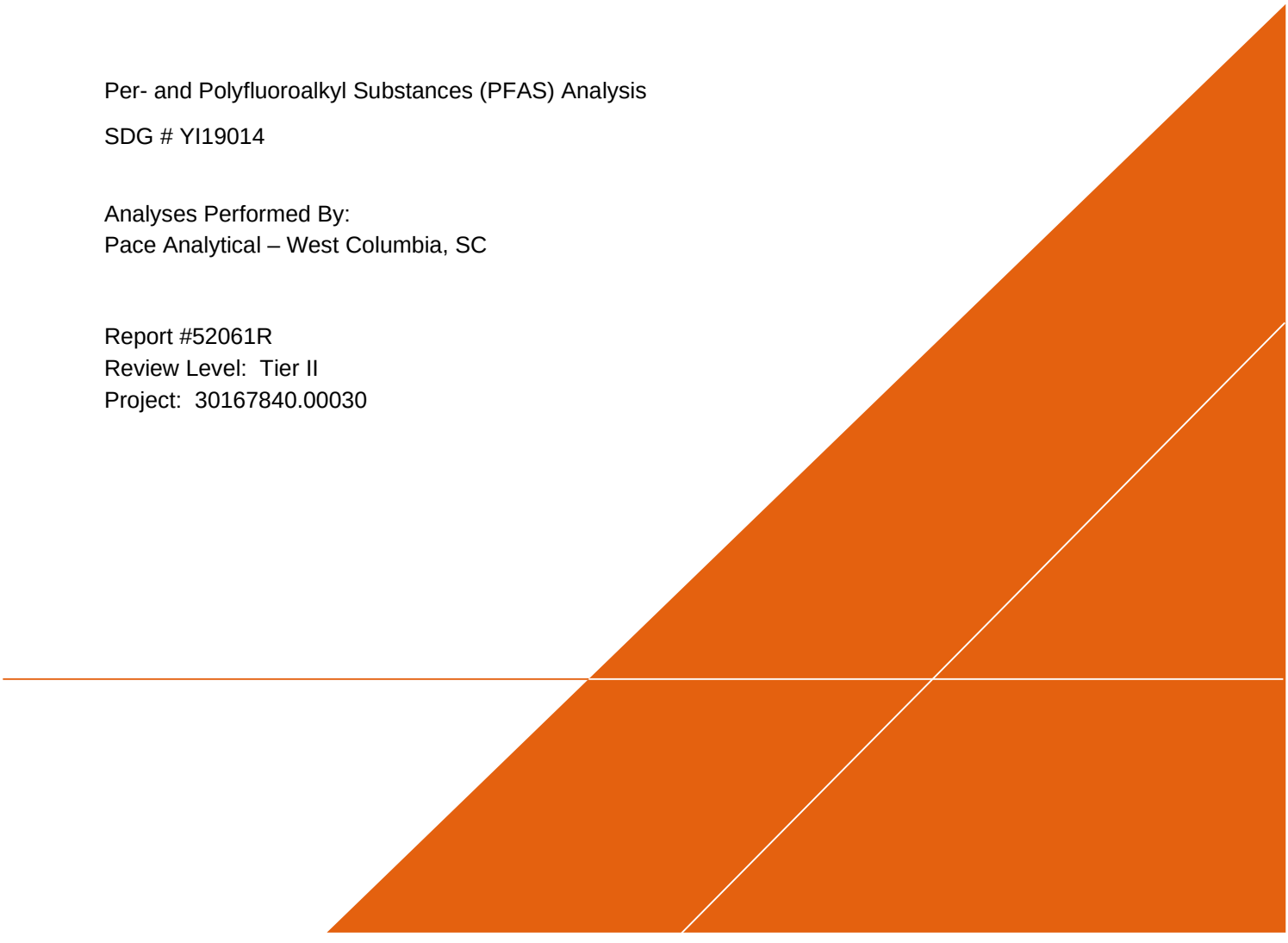
Pontiac North Campus, MI

Per- and Polyfluoroalkyl Substances (PFAS) Analysis

SDG # YI19014

Analyses Performed By:
Pace Analytical – West Columbia, SC

Report #52061R
Review Level: Tier II
Project: 30167840.00030



SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) #YI19014 for samples collected in association with the Racer PNC, MI Site. The review was conducted as a Tier II evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis				
					PFAS	SVOC	PCB	MET	MISC
PZF17-05_GW	YI19014-1	Water	09/15/23		X				
EB-05	YI19014-2	Water	09/15/23		X				
TRIP BLANK	YI19014-3	Water	09/15/23		X				
MWF16-12_GW	YI19014-4	Water	09/15/23		X				
MWW10-SEN01	YI19014-5	Water	09/15/23		X				
TW-01-03_GW	YI19014-6	Water	09/15/23		X				
EB-02	YI19014-7	Water	09/15/23		X				
MW-01-17_GW	YI19014-8	Water	09/15/23		X				
DUP-03_GW	YI19014-9	Water	09/15/23	MW-01-17_GW	X				
MWF16-06_GW	YI19014-10	Water	09/15/23		X				
MWF16-18_GW	YI19014-11	Water	09/15/23		X				
MWW10-03_GW	YI19014-12	Water	09/15/23		X				
MWW1-04_GW	YI19014-13	Water	09/15/23		X				
MWW10-04_GW	YI19014-14	Water	09/15/23		X				
DUP-01_GW	YI19014-15	Water	09/15/23	MWW10-04_GW	X				

ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

Note:
QA - Quality Assurance

ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency Method 537 Modified. Data were reviewed in accordance with the method specified criteria, USEPA National Functional Guidelines NFG for Organic Superfund Methods Data Review, EPA-540-R-20-005 (November 2020), with reference to the historical (USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, OSWER 9240.1-05A-P, October 1999, as appropriate).

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers

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

  B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.

- Quantitation (Q) Qualifiers

  E The compound was quantitated above the calibration range.

  D Concentration is based on a diluted sample analysis.

- Validation Qualifiers

  J The compound was positively identified; however, the associated numerical value is an estimated concentration only.

  UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.

  JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.

  UB Compound considered non-detect at the listed value due to associated blank contamination.

  N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.

  R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is

that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) ANALYSIS

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
USEPA modified Method 537	Water	28 days to extraction; 28 days from extraction to analysis	Cool to <6 °C

All samples were initially analyzed within the specified holding time criteria.

2. Blank Contamination

Quality assurance (QA) blanks (i.e., method, field, and equipment blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Equipment blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (DL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were not detected above the DL in the associated blanks; therefore, detected sample results were not associated with blank contamination.

3. Extracted Internal Standard (EIS)/Surrogate Compounds

Labeled standards must be added to all field samples and QC samples prior to extraction. EIS recoveries must be within the laboratory-established acceptance limits of ICAL midpoint standard area or area measured in the initial CCV on days when ICAL not performed.

Samples associated with EIS exhibited acceptable recoveries with the exceptions noted in the table.

Sample Locations	EIS	Associated Compound	%R
MWF16-12_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
MMW10-SEN01	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
	13C2_8:2FTS	1H,1H, 2H,2H-perfluorodecane sulfonic acid (8:2 FTS)	>150
	13C4_PFBA	Perfluoro-n-butanoic acid (PFBA)	< the lower control limit (LL) but > 20%

Sample Locations	EIS	Associated Compound	%R
TW-01-03_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
	13C2_8:2FTS	1H,1H, 2H,2H-perfluorodecane sulfonic acid (8:2 FTS)	>150
	13C4_PFBA	Perfluoro-n-butanoic acid (PFBA)	<20%
MW-01-17_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
	13C2_8:2FTS	1H,1H, 2H,2H-perfluorodecane sulfonic acid (8:2 FTS)	>150
	13C4_PFBA	Perfluoro-n-butanoic acid (PFBA)	< the lower control limit (LL) but > 20%
DUP-03_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
	13C2_8:2FTS	1H,1H, 2H,2H-perfluorodecane sulfonic acid (8:2 FTS)	>150
	13C4_PFBA	Perfluoro-n-butanoic acid (PFBA)	< the lower control limit (LL) but > 20%
MWF16-06_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
MWF16-18_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
MMW10-03_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
	13C2_8:2FTS	1H,1H, 2H,2H-perfluorodecane sulfonic acid (8:2 FTS)	>150
MMW1-04_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150

Sample Locations	EIS	Associated Compound	%R
MMW1-04_GW	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
	13C2_8:2FTS	1H,1H, 2H,2H-perfluorodecane sulfonic acid (8:2 FTS)	>150
MMW10-04_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
	13C2_8:2FTS	1H,1H, 2H,2H-perfluorodecane sulfonic acid (8:2 FTS)	>150
DUP-01_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
	13C2_8:2FTS	1H,1H, 2H,2H-perfluorodecane sulfonic acid (8:2 FTS)	>150

The criteria used to evaluate the EIS recoveries are presented in the following table. In the case of an EIS deviation, the sample results associated with the EIS are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
< the lower control limit (LL) but > 20%	Non-detect	UJ
	Detect	J
> the upper control limit (UL)	Non-detect	No Action
	Detect	J
< 20%	Non-detect	R
	Detect	J

4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within 50-150%. The relative percent difference (RPD) between the MS/MSD recoveries must exhibit an RPD within 30%.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

A site-specific MS/MSD was not included in the data package.

5. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

All compounds associated with the LCS analysis exhibited recoveries within the control limits.

6. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 30% for water matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of two times the RL is applied for soil matrices.

Sample ID/Duplicate ID	Compound	Sample Result	Duplicate Result	RPD
MW-01-17_GW / DUP-03_GW	Perfluorobutanesulfonic acid (PFBS)	7.0	4.9	AC
	Perfluoropentanesulfonic acid (PFPeS)	3.4 J	3.7 U	AC
	Perfluorohexanesulfonic acid (PFHxS)	13	13	0.0%
	Perfluorobutanoic acid (PFBA)	18	3.7 U	NC
	Perfluoroheptanoic acid (PFHpA)	5.7	6	AC
	Perfluorohexanoic acid (PFHxA)	9.2	9.6	AC
	Perfluorononanoic acid (PFNA)	0.67 J	0.72 J	AC
	Perfluorooctanoic acid (PFOA)	14	13	AC
	Perfluorooctane sulfonic acid (PFOS)	13	14	AC
MWW10-04_GW / DUP-01_GW	Perfluorohexanesulfonic acid (PFHxS)	5.7	5.0	AC
	Perfluorobutanoic acid (PFBA)	8.3 J	40 U	AC
	Perfluorodecanoic acid (PFDA)	0.94 J	1.1 J	AC
	Perfluoroheptanoic acid (PFHpA)	11	14	AC
	Perfluorohexanoic acid (PFHxA)	18	15	AC
	Perfluorononanoic acid (PFNA)	16	15	AC
	Perfluorooctanoic acid (PFOA)	45	45	0.0%
	Perfluoropentanoic acid (PFPeA)	15	15	0.0%
	Perfluorooctane sulfonic acid (PFOS)	48	47	2.1%

Notes:

AC Acceptable

NC Non-compliant

The compound PFBA associated with sample locations MW-01-17_GW and DUP-03_GW exhibited a field duplicate RPD greater than the control limit. The associated sample results from sample locations for the listed analyte were qualified as estimated.

7. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR PFAs

PFAs: USEPA modified Method 537	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
LIQUID CHROMATOGRAPHY/MASS SPECTROMETRY (LC/MS/MS)					
Tier II Validation					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks		X		X	
C. Trip blanks		X		X	
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate(LCSD) %R	X				X
LCS/LCSD Precision (RPD)	X				X
Matrix Spike (MS) %R	X				X
Matrix Spike Duplicate (MSD) %R	X				X
MS/MSD Precision (RPD)	X				X
Field Duplicate (RPD)		X	X		
Extracted Internal Standards (EIS) Recoveries		X	X		
Dilution Factor		X		X	
Moisture Content	X				X

Notes:

%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Rachelle Borne

SIGNATURE: 

DATE: December 18, 2023

PEER REVIEW: Joseph C. Houser

DATE: December 19, 2023

CHAIN OF CUSTODY

CORRECTED SAMPLE ANALYSIS DATA SHEETS

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www.pacelabs.com

Number 150049

Client: Aradis	Report to Contact: Alexis Crisp	Telephone No. / E-mail: alexis.crisp@aradas.com Diana.linder@aradas.com	Quote No.
Address: 29550 Cabot Dr Suite #500	Sampler's Signature: Samantha Szpaichler	Analysis (Attach list if more space is needed): Full Report EGLE 28 compounds	Page 1 of 4
City: Novi	State: MI Zip Code: 48377		
Project Name: Ralph Pine	Printed Name: Samantha Szpaichler		
Project No.: 30167840.00031	P.O. No.: 30167840.00031		

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Sample Type (G=Grab C=Comp)	Matrix: Aqueous	Matrix: Solid	Matrix: Non-Aqueous	No of Containers by Preservative Type: Unpres.	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Field Filtered	PFAS Analysis Required by DOD Lab?	Remarks / Cooler I.D.
PZE17-05_GW-091523	9/15/23	1304	G	2			2						N	X	
EB-05_091523	9/15/23	1610	G	1			1						N	X	equipment blank
Trip Blank	9/16/23	1000	G	1			1						N	X	trip blank
MWF16-12_GW-091823	9/18/23	1100	G	2			2						N	X	
MWW10-SEN01_GW-091823	9/18/23	1340	G	2			2						N	X	
~~FB-10-01_GW-091823~~ SS	~~9/18/23~~		G	2			2						N	X	

Turn Around Time Required (Prior lab approval required for expedited TAT): ☑ Standard ☐ Rush (Specify)

Sample Disposal: ☐ Return to Client ☑ Disposal by Lab

Possible Hazard Identification: ☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: Samantha Szpaichler / Aradis	9/15/23	1510	1. Received by: Tammera Ely	9/15/23	1510
2. Relinquished by: Tammera Ely	9/18/23	1645	2. Received by: FedEx	9/18/23	1645
3. Relinquished by:	Date	Time	3. Received by:	Date	Time
4. Relinquished by: FedEx	9/18/23	1805	4. Laboratory received by:	9/19/23	0805

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY
Received on ice (Circle) (Yes) No Ice Pack: Receipt Temp: 1.7 °C
Temp Blank: ☑ Y ☐ N

YI19014

KES2

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Number 150049

Client: Arcadis	Report to Contact: Alexis Crisp, Tiffany Linder	Telephone No. / E-mail: Alexis.crisp@arcadis.com, Tiffany.Linder@arcadis.com	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: Jammer Guy	Analysis (Attach list if more space is needed): Report EGLE 28 Compounds	Page 2 of 4
City: Novi / State: MI / Zip Code: 48377	Printed Name: Jammer Guy		YI19014
Project Name: Racer PNC			
Project No.: 30167840.00031	P.O. No.		

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Grab / Composite	Matrix: Aqueous	Matrix: Solid	Matrix: Non-Aqueous	No. of Containers by Preservative Type: Unpres.	HCl	HNO3	H2SO4	NaOH	Na2S2O3	Field Filtered	Method 537.1 mod. with isotope dilution per WSP	Remarks / Cooler I.D.
TW-01-03_GW-091823	9/18/23	1125	G	X			2							X	
EB-02_091823	9/18/23	1135	G	X			1							X	equipment blank
MW-01-17_GW-091823	9/18/23	1425	G	X			2							X	
DUP-03_GW-091823	9/18/23	—	G	X			2							X	

Turn Around Time Required (Prior lab approval required for expedited TAT.): ☒ Standard ☐ Rush (Specify)

Sample Disposal: ☐ Return to Client ☒ Disposal by Lab

Possible Hazard Identification: ☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: Jammer Guy	9/18/23	1645	1. Received by: FedEx	9/18/23	1645
2. Relinquished by	Date	Time	2. Received by	Date	Time
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by: FedEx	9/19/23	1005	4. Laboratory received by	9/16/23	1005

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY — Received on Ice (Circle): Yes / No — Ice Pack — Receipt Temp. 1.7 °C — Temp Blank: ☒ Y ☐ N

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Number 150049

Client: ARCADIS	Report to Contact: Alexis Crisp	Telephone No. / E-mail: tiffany.linder@arcadis.com; alexis.crisp@arcadis.com	Quote No.
Address: 28550 Cabot Dr. #500	Sampler's Signature: Garrett Link	Analysis (Attach list if more space is needed): Report EGLE 28 Compounds	Page 3 of 4
City: Nov. State: MI Zip Code: 48377	Printed Name: Garrett Link		YI19014
Project Name: Pontiac North Campus (RACER)			IKES2
Project No.: 30167840.00031	P.O. No.		

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Grab/Composite	Matrix: Aqueous	Matrix: Solid	Matrix: Non-aqueous	No. of Containers by Preservative Type: Unpres	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Field Filtered	(MS/MSD, 537 w/ isotope dilution per ASMS.1)	Remarks / Cooler I.D.
~~MWF16-12_GW-091523~~	~~9/15/23~~		G	X			X								
MWF16-06_GW-091523	9/15/23	13:00	G	2			2							X	
MWF16-18_GW-091523	9/15/23	14:20	G	2			2							X	

Turn Around Time Required (Prior lab approval required for expedited TAT.)	Sample Disposal	Possible Hazard Identification	QC Requirements (Specify)
☑ Standard ☐ Rush (Specify)	☐ Return to Client ☑ Disposal by Lab	☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown	

	Date	Time		Date	Time
1. Relinquished by: Garrett Link	9/15/23	15:00	1. Received by: Arcadis	9/15/23	1500
2. Relinquished by: Arcadis	9/18/23	1510	2. Received by: Jennifer Eby	9/18/23	1510
3. Relinquished by: Jennifer Eby	9/18/23	1645	3. Received by: FedEx	9/18/23	1645
4. Relinquished by: FedEx	9/19/23	1005	4. Laboratory received by:	9/19/23	1005

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY
Received on Ice (Circle) (Yes) No Ice Pack
Receipt Temp 1.7 °C
Temp Blank ☑ Y ☐ N

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Number 150049

Client: ARCADIS	Report to Contact: Lexi Crisp	Telephone No. / E-mail: tiffany.linder@arcadis.com; alexis.crisp@arcadis.com	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: x Lotte Jay	Analysis (Attach list if more space is needed): Report EGLE 28 (compound)	Page 4 of 4
City: NOVI	State: MI	Zip Code: 48377	
Project Name: Racer PNC	Printed Name: Lottie Jay		YI19014
Project No.: 30167840.00031	P.O. No.		KF52

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Grab / Composite	Matrix: Aqueous	Matrix: Solid	Matrix: Other	No. of Containers by Preservative Type: Unpres.	HNO3	H2SO4	HCl	NaOH	Na2S2O3	Field Filtered	Method 537 mod with isotope dilution per QSM 5.1	Remarks / Cooler I.D.
MWW10-03_GW-091523	9/15/23	1250	G	X			2							X	
MWW1-04_GW-091523		1540	G	X			2							X	
MWW10-04_GW-091523		1130	G	X			2							X	
DUP-01_GW-091523		—	G	X			2							X	

Turn Around Time Required (Prior lab approval required for expedited TAT.): ☒ Standard ☐ Rush (Specify)

Sample Disposal: ☐ Return to Client ☒ Disposal by Lab

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: Lottie Jay	9/15/23	1628	1. Received by: Arcadis	9/15/23	1628
2. Relinquished by: Arcadis	9/18/23	1510	2. Received by: Jammel Day	9/18/23	1510
3. Relinquished by: Jammel Day	9/19/23	1645	3. Received by: FedEx	9/19/23	1645
4. Relinquished by: FedEx	9/19/23	1685	4. Laboratory received by: [signature]	9/19/23	1685

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY — Received on Ice (Circle): (Yes) No Ice Pack — Receipt Temp. 1.7 °C — Temp Blank ☒ ☐ N

PACE ANALYTICAL SERVICES, LLC

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-001**

Description: **PZF17-05_GW-091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023 1304** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/29/2023 2329	ARC2	09/27/2023 1602	85922

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.4	0.45	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.4	0.62	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.4	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.4	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.4	0.81	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.4	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.4	0.45	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.4	0.70	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.4	0.87	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**0.67**	**J**	**3.7**	**0.39**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	0.72	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.7	0.46	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	0.66	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	0.57	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.7	0.55	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.7	0.51	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**1.1**	**J**	**3.7**	**0.56**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	0.49	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	0.44	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.7	0.42	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.7	0.64	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.7	0.43	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.7	0.77	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.7	0.51	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	0.56	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	0.49	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	0.58	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.7	1.9	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		116	25-150
13C2_6:2FTS		95	25-150
13C2_8:2FTS		81	25-150
13C2_PFDoA		73	25-150
13C2_PFTeDA		83	25-150
13C3_PFBS		93	25-150
13C3_PFHxS		84	25-150
13C3-HFPO-DA		92	25-150
13C4_PFBA		80	25-150
13C4_PFHpA		87	25-150
13C5_PFHxA		93	25-150
13C5_PFPeA		92	25-150
13C6_PFDA		80	25-150
13C7_PFUdA		82	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.pacelabs.com

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-001**

Description: **PZF17-05_GW-091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023 1304** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		89	25-150
13C8_PFOS		84	25-150
13C8_PFOSA		79	10-150
13C9_PFNA		90	25-150
d5-EtFOSAA		85	25-150
d3-MeFOSAA		83	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-002**

Description: **EB-05_091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023 1610** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/29/2023 2339	ARC2	09/27/2023 1602	85922

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.6	0.46	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.6	0.63	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.6	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.6	0.83	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.6	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.6	0.46	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.6	0.71	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.6	0.88	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.8	0.39	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.8	0.74	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.8	0.47	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.8	0.67	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.8	0.58	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.8	0.56	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.8	0.52	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.8	0.57	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.8	0.45	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.8	0.42	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.8	0.65	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.8	0.44	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.8	0.78	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.8	0.51	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.8	0.57	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.8	0.59	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.8	1.9	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		117	25-150
13C2_6:2FTS		139	25-150
13C2_8:2FTS		105	25-150
13C2_PFDoA		102	25-150
13C2_PFTeDA		105	25-150
13C3_PFBS		111	25-150
13C3_PFHxS		100	25-150
13C3-HFPO-DA		106	25-150
13C4_PFBA		108	25-150
13C4_PFHpA		110	25-150
13C5_PFHxA		112	25-150
13C5_PFPeA		112	25-150
13C6_PFDA		108	25-150
13C7_PFUdA		103	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-002**

Description: **EB-05_091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023 1610** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		116	25-150
13C8_PFOS		112	25-150
13C8_PFOSA		98	10-150
13C9_PFNA		114	25-150
d5-EtFOSAA		106	25-150
d3-MeFOSAA		107	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-003**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **09/16/2023 1000** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/29/2023 2350	ARC2	09/27/2023 1602	85922

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.2	0.43	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.2	0.59	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.2	1.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.2	0.78	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.2	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.2	0.43	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.2	0.67	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.2	0.83	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.6	0.37	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.70	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.6	0.45	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.64	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	0.55	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.6	0.53	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.6	0.49	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.6	0.54	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	0.47	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.42	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.6	0.40	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.6	0.61	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.6	0.41	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.6	0.74	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.6	0.49	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.54	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.47	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.56	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.6	1.8	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		88	25-150
13C2_6:2FTS		94	25-150
13C2_8:2FTS		83	25-150
13C2_PFDoA		78	25-150
13C2_PFTeDA		88	25-150
13C3_PFBS		91	25-150
13C3_PFHxS		85	25-150
13C3-HFPO-DA		93	25-150
13C4_PFBA		91	25-150
13C4_PFHpA		90	25-150
13C5_PFHxA		94	25-150
13C5_PFPeA		87	25-150
13C6_PFDA		90	25-150
13C7_PFUdA		91	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-003**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **09/16/2023 1000** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		92	25-150
13C8_PFOS		85	25-150
13C8_PFOSA		81	10-150
13C9_PFNA		93	25-150
d5-EtFOSAA		90	25-150
d3-MeFOSAA		82	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-004**

Description: **MWF16-12_GW-091823** Matrix: **Aqueous**

Date Sampled: **09/18/2023 1100** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/30/2023 0032	ARC2	09/28/2023 2045	86111

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.8	0.47	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.8	0.64	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.8	1.6	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.8	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.8	0.85	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.8	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.8	0.47	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	**2991-50-6**	**PFAS by ID SOP**	**1.4**	**J**	**7.8**	**0.73**	**ng/L**	**1**
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.8	0.91	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.9	0.40	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.9	0.76	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**1.8**	**J**	**3.9**	**0.48**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.9	0.69	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	**754-91-6**	**PFAS by ID SOP**	**3.5**	**J**	**3.9**	**0.60**	**ng/L**	**1**
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.9	0.58	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**3.4**	**J**	**3.9**	**0.54**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**3.7**	**J**	**3.9**	**0.58**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	**335-76-2**	**PFAS by ID SOP**	**0.91**	**J**	**3.9**	**0.51**	**ng/L**	**1**
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.9	0.46	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**6.0**		**3.9**	**0.43**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**12**		**3.9**	**0.67**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**2.2**	**J**	**3.9**	**0.45**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**24**		**3.9**	**0.81**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**11**		**3.9**	**0.53**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.9	0.58	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.9	0.51	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.9	0.61	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**110**		**3.9**	**1.9**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	256	25-150
13C2_6:2FTS	N	168	25-150
13C2_8:2FTS		119	25-150
13C2_PFDoA		91	25-150
13C2_PFTeDA		92	25-150
13C3_PFBS		94	25-150
13C3_PFHxS		94	25-150
13C3-HFPO-DA		87	25-150
13C4_PFBA		55	25-150
13C4_PFHpA		88	25-150
13C5_PFHxA		99	25-150
13C5_PFPeA		92	25-150
13C6_PFDA		102	25-150
13C7_PFUdA		101	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-004**

Description: **MWF16-12_GW-091823** Matrix: **Aqueous**

Date Sampled: **09/18/2023 1100** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		105	25-150
13C8_PFOS		93	25-150
13C8_PFOSA		92	10-150
13C9_PFNA		107	25-150
d5-EtFOSAA		95	25-150
d3-MeFOSAA		106	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-005**

Description: **MWW10-SEN01-091823** Matrix: **Aqueous**

Date Sampled: **09/18/2023 1340** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/30/2023 0043	ARC2	09/28/2023 2045	86111

Parameter	CAS Number	Analytical Method	Result	Q		LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND			7.9	0.48	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND			7.9	0.65	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q		7.9	1.6	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q		7.9	2.0	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q		7.9	0.86	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND			7.9	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND			7.9	0.48	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND			7.9	0.74	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND			7.9	0.92	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND			3.9	0.41	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND			3.9	0.77	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND			3.9	0.49	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND			3.9	0.70	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND			3.9	0.60	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND			3.9	0.59	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**2.9**	**J**		**3.9**	**0.54**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND	Q	UJ	3.9	0.59	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND			3.9	0.52	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND			3.9	0.47	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**3.4**	**J**		**3.9**	**0.44**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**6.0**			**3.9**	**0.68**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND			3.9	0.46	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**8.7**			**3.9**	**0.82**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND			3.9	0.54	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND			3.9	0.59	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND			3.9	0.52	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND			3.9	0.62	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**18**			**3.9**	**2.0**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	234	25-150
13C2_6:2FTS	N	298	25-150
13C2_8:2FTS	N	236	25-150
13C2_PFDoA		90	25-150
13C2_PFTeDA		86	25-150
13C3_PFBS		76	25-150
13C3_PFHxS		83	25-150
13C3-HFPO-DA		61	25-150
13C4_PFBA	N	24	25-150
13C4_PFHpA		56	25-150
13C5_PFHxA		56	25-150
13C5_PFPeA		43	25-150
13C6_PFDA		99	25-150
13C7_PFUdA		103	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-005**

Description: **MWW10-SEN01-091823** Matrix: **Aqueous**

Date Sampled: **09/18/2023 1340** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		83	25-150
13C8_PFOS		87	25-150
13C8_PFOSA		84	10-150
13C9_PFNA		94	25-150
d5-EtFOSAA		108	25-150
d3-MeFOSAA		112	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-006**

Description: **TW-01-03_GW-091823** Matrix: **Aqueous**

Date Sampled: **09/18/2023 1125** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/30/2023 0054	ARC2	09/28/2023 2045	86111

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run	
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.1	0.43	ng/L	1	
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.1	0.59	ng/L	1	
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.1	1.4	ng/L	1	
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.1	1.8	ng/L	1	
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.1	0.78	ng/L	1	
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.1	1.8	ng/L	1	
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.1	0.43	ng/L	1	
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.1	0.67	ng/L	1	
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.1	0.83	ng/L	1	
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.6	0.37	ng/L	1	
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.69	ng/L	1	
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**3.1**	**J**	**3.6**	**0.44**	**ng/L**	**1**	
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.63	ng/L	1	
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	0.55	ng/L	1	
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.6	0.53	ng/L	1	
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**19**		**3.6**	**0.49**	**ng/L**	**1**	
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND	Q	3.6	0.53	ng/L	1	R
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	0.47	ng/L	1	
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.42	ng/L	1	
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.6	0.40	ng/L	1	
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.6	0.61	ng/L	1	
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**1.1**	**J**	**3.6**	**0.41**	**ng/L**	**1**	
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**21**		**3.6**	**0.74**	**ng/L**	**1**	
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.6	0.48	ng/L	1	
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.53	ng/L	1	
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.47	ng/L	1	
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.56	ng/L	1	
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**150**		**3.6**	**1.8**	**ng/L**	**1**	

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	260	25-150
13C2_6:2FTS	N	246	25-150
13C2_8:2FTS	N	249	25-150
13C2_PFDoA		63	25-150
13C2_PFTeDA		44	25-150
13C3_PFBS		70	25-150
13C3_PFHxS		62	25-150
13C3-HFPO-DA		45	25-150
13C4_PFBA	N	17	25-150
13C4_PFHpA		28	25-150
13C5_PFHxA		33	25-150
13C5_PFPeA		29	25-150
13C6_PFDA		66	25-150
13C7_PFUdA		74	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-006**

Description: **TW-01-03_GW-091823** Matrix: **Aqueous**

Date Sampled: **09/18/2023 1125** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		55	25-150
13C8_PFOS		71	25-150
13C8_PFOSA		35	10-150
13C9_PFNA		66	25-150
d5-EtFOSAA		72	25-150
d3-MeFOSAA		69	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-007**

Description: **EB-02_091823** Matrix: **Aqueous**

Date Sampled: **09/18/2023 1135** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/30/2023 0104	ARC2	09/28/2023 2045	86111

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.2	0.44	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.2	0.60	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.2	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.2	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.2	0.79	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.2	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.2	0.44	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.2	0.68	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.2	0.84	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.6	0.38	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.70	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.6	0.45	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.64	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	0.56	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.6	0.54	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.6	0.50	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.6	0.54	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	0.48	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.43	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.6	0.41	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.6	0.62	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.6	0.42	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.6	0.75	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.6	0.49	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.54	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.48	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.57	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.6	1.8	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		93	25-150
13C2_6:2FTS		80	25-150
13C2_8:2FTS		74	25-150
13C2_PFDoA		81	25-150
13C2_PFTeDA		91	25-150
13C3_PFBS		87	25-150
13C3_PFHxS		86	25-150
13C3-HFPO-DA		86	25-150
13C4_PFBA		90	25-150
13C4_PFHpA		83	25-150
13C5_PFHxA		87	25-150
13C5_PFPeA		83	25-150
13C6_PFDA		87	25-150
13C7_PFUdA		87	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-007**

Description: **EB-02_091823** Matrix: **Aqueous**

Date Sampled: **09/18/2023 1135** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		92	25-150
13C8_PFOS		86	25-150
13C8_PFOSA		83	10-150
13C9_PFNA		86	25-150
d5-EtFOSAA		86	25-150
d3-MeFOSAA		82	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-008**

Description: **MW-01-17_GW-091823** Matrix: **Aqueous**

Date Sampled: **09/18/2023 1425** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/30/2023 0251	ARC2	09/28/2023 2045	86111

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.3	0.44	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.3	0.61	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.3	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.3	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.3	0.80	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.3	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.3	0.44	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.3	0.69	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.3	0.85	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**7.0**		**3.7**	**0.38**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	0.71	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.7	0.46	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	0.65	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	0.56	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**3.4**	**J**	**3.7**	**0.54**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**13**		**3.7**	**0.51**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**18**	**Q J**	**3.7**	**0.55**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	0.48	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	0.43	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**5.7**		**3.7**	**0.41**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**9.2**		**3.7**	**0.63**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**0.67**	**J**	**3.7**	**0.42**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**14**		**3.7**	**0.76**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.7	0.50	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	0.55	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	0.48	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	0.57	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**13**		**3.7**	**1.8**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	220	25-150
13C2_6:2FTS	N	285	25-150
13C2_8:2FTS	N	249	25-150
13C2_PFDoA		104	25-150
13C2_PFTeDA		91	25-150
13C3_PFBS		76	25-150
13C3_PFHxS		95	25-150
13C3-HFPO-DA		59	25-150
13C4_PFBA	N	21	25-150
13C4_PFHpA		64	25-150
13C5_PFHxA		61	25-150
13C5_PFPeA		40	25-150
13C6_PFDA		112	25-150
13C7_PFUdA		119	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-008**

Description: **MW-01-17_GW-091823** Matrix: **Aqueous**

Date Sampled: **09/18/2023 1425** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		101	25-150
13C8_PFOS		107	25-150
13C8_PFOSA		90	10-150
13C9_PFNA		110	25-150
d5-EtFOSAA		125	25-150
d3-MeFOSAA		118	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-009**

Description: **DUP-03_GW-091823** Matrix: **Aqueous**

Date Sampled: **09/18/2023** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/30/2023 0301	ARC2	09/28/2023 2045	86111

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.4	0.45	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.4	0.62	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.4	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.4	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.4	0.81	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.4	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.4	0.45	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.4	0.70	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.4	0.87	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**4.9**		**3.7**	**0.39**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	0.72	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.7	0.46	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	0.66	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	0.57	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.7	0.55	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**13**		**3.7**	**0.51**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND	Q UJ	3.7	0.56	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	0.49	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	0.44	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**6.0**		**3.7**	**0.42**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**9.6**		**3.7**	**0.64**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**0.72**	**J**	**3.7**	**0.43**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**13**		**3.7**	**0.77**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.7	0.51	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	0.56	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	0.49	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	0.58	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**14**		**3.7**	**1.9**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	247	25-150
13C2_6:2FTS	N	317	25-150
13C2_8:2FTS	N	214	25-150
13C2_PFDoA		101	25-150
13C2_PFTeDA		85	25-150
13C3_PFBS		82	25-150
13C3_PFHxS		90	25-150
13C3-HFPO-DA		59	25-150
13C4_PFBA	N	21	25-150
13C4_PFHpA		61	25-150
13C5_PFHxA		62	25-150
13C5_PFPeA		40	25-150
13C6_PFDA		111	25-150
13C7_PFUdA		113	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
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H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-009**

Description: **DUP-03_GW-091823** Matrix: **Aqueous**

Date Sampled: **09/18/2023** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		99	25-150
13C8_PFOS		89	25-150
13C8_PFOSA		96	10-150
13C9_PFNA		107	25-150
d5-EtFOSAA		125	25-150
d3-MeFOSAA		116	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-010**

Description: **MWF16-06_GW-091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023 1300** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/30/2023 0312	ARC2	09/28/2023 2045	86111

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		6.9	0.42	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		6.9	0.57	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		6.9	1.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	6.9	1.7	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	6.9	0.76	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		6.9	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		6.9	0.42	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		6.9	0.65	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		6.9	0.81	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**4.2**		**3.5**	**0.36**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.67	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**5.1**		**3.5**	**0.43**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.62	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.53	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**4.8**		**3.5**	**0.51**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**17**		**3.5**	**0.48**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**9.6**		**3.5**	**0.52**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.45	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.41	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**7.7**		**3.5**	**0.39**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**14**		**3.5**	**0.60**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	0.40	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**40**		**3.5**	**0.72**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**13**		**3.5**	**0.47**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.52	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.46	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.54	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**49**		**3.5**	**1.7**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	201	25-150
13C2_6:2FTS	N	171	25-150
13C2_8:2FTS		102	25-150
13C2_PFDoA		95	25-150
13C2_PFTeDA		89	25-150
13C3_PFBS		94	25-150
13C3_PFHxS		99	25-150
13C3-HFPO-DA		85	25-150
13C4_PFBA		73	25-150
13C4_PFHpA		90	25-150
13C5_PFHxA		104	25-150
13C5_PFPeA		90	25-150
13C6_PFDA		103	25-150
13C7_PFUdA		89	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
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H = Out of holding time
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S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-010**

Description: **MWF16-06_GW-091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023 1300** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		110	25-150
13C8_PFOS		100	25-150
13C8_PFOSA		91	10-150
13C9_PFNA		102	25-150
d5-EtFOSAA		89	25-150
d3-MeFOSAA		81	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
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S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-011**

Description: **MWF16-18_GW-091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023 1420** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/30/2023 0323	ARC2	09/28/2023 2045	86111

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		6.9	0.42	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		6.9	0.57	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		6.9	1.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	6.9	1.7	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	6.9	0.76	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		6.9	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		6.9	0.42	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		6.9	0.65	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		6.9	0.81	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.5	0.36	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.67	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.5	0.43	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.62	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.53	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.5	0.51	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**2.2**	**J**	**3.5**	**0.48**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**10**		**3.5**	**0.52**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.45	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.41	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**3.5**		**3.5**	**0.39**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**4.2**		**3.5**	**0.60**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**0.91**	**J**	**3.5**	**0.40**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**12**		**3.5**	**0.72**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**4.8**		**3.5**	**0.47**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.52	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.46	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.54	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**13**		**3.5**	**1.7**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	299	25-150
13C2_6:2FTS	N	231	25-150
13C2_8:2FTS		128	25-150
13C2_PFDoA		94	25-150
13C2_PFTeDA		87	25-150
13C3_PFBS		91	25-150
13C3_PFHxS		100	25-150
13C3-HFPO-DA		65	25-150
13C4_PFBA		46	25-150
13C4_PFHpA		84	25-150
13C5_PFHxA		95	25-150
13C5_PFPeA		73	25-150
13C6_PFDA		105	25-150
13C7_PFUdA		98	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-011**

Description: **MWF16-18_GW-091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023 1420** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		107	25-150
13C8_PFOS		99	25-150
13C8_PFOSA		94	10-150
13C9_PFNA		114	25-150
d5-EtFOSAA		100	25-150
d3-MeFOSAA		92	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-012**

Description: **MWW10-03_GW-091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023 1250** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/30/2023 0602	ARC2	09/28/2023 2045	86111

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.5	0.45	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.5	0.62	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.5	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.5	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.5	0.82	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.5	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.5	0.45	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.5	0.71	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.5	0.88	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**12**		**3.8**	**0.39**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.8	0.73	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**1.6**	**J**	**3.8**	**0.47**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.8	0.67	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.8	0.58	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**15**		**3.8**	**0.56**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**44**		**3.8**	**0.52**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**21**		**3.8**	**0.56**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.8	0.49	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.8	0.44	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**30**		**3.8**	**0.42**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**29**		**3.8**	**0.65**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.8	0.43	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**50**		**3.8**	**0.78**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**27**		**3.8**	**0.51**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.8	0.56	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.8	0.59	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.8	1.9	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	234	25-150
13C2_6:2FTS	N	304	25-150
13C2_8:2FTS	N	167	25-150
13C2_PFDoA		100	25-150
13C2_PFTeDA		94	25-150
13C3_PFBS		84	25-150
13C3_PFHxS		89	25-150
13C3-HFPO-DA		57	25-150
13C4_PFBA		27	25-150
13C4_PFHpA		59	25-150
13C5_PFHxA		64	25-150
13C5_PFPeA		45	25-150
13C6_PFDA		109	25-150
13C7_PFUdA		98	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
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H = Out of holding time
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-012**

Description: **MWW10-03_GW-091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023 1250** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		88	25-150
13C8_PFOS		97	25-150
13C8_PFOSA		95	10-150
13C9_PFNA		103	25-150
d5-EtFOSAA		105	25-150
d3-MeFOSAA		101	25-150

LOQ = Limit of Quantitation
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-013**

Description: **MWW1-04_GW-091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023 1540** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/30/2023 0333	ARC2	09/28/2023 2045	86111
2	SOP SPE	PFAS by ID SOP	1	10/11/2023 0146	OMNS	10/03/2023 1731	86454

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.8	0.47	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.8	0.64	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.8	1.6	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.8	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.8	0.85	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.8	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.8	0.47	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	**2991-50-6**	**PFAS by ID SOP**	**15**		**7.8**	**0.73**	**ng/L**	**1**
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	**2355-31-9**	**PFAS by ID SOP**	**1.0**	**J**	**7.8**	**0.90**	**ng/L**	**1**
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.9	0.40	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	**335-77-3**	**PFAS by ID SOP**	**0.88**	**J**	**3.9**	**0.76**	**ng/L**	**1**
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.9	0.48	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.9	0.69	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	**754-91-6**	**PFAS by ID SOP**	**1.7**	**J**	**3.9**	**0.59**	**ng/L**	**1**
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.9	0.58	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**4.5**		**3.9**	**0.54**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		40	6.0	ng/L	2
Perfluoro-n-decanoic acid (PFDA)	**335-76-2**	**PFAS by ID SOP**	**0.87**	**J**	**3.9**	**0.51**	**ng/L**	**1**
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.9	0.46	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**3.1**	**J**	**3.9**	**0.43**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.9	0.67	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**1.3**	**J**	**3.9**	**0.45**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**6.8**		**3.9**	**0.80**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**5.2**		**3.9**	**0.53**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.9	0.58	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.9	0.51	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.9	0.61	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**130**		**3.9**	**1.9**	**ng/L**	**1**

Surrogate	Run 1 Q	Run 1 % Recovery	Run 1 Acceptance Limits	Run 2 Q	Run 2 % Recovery	Run 2 Acceptance Limits
13C2_4:2FTS	N	275	25-150	N	268	25-150
13C2_6:2FTS	N	335	25-150	N	174	25-150
13C2_8:2FTS	N	293	25-150		108	25-150
13C2_PFDoA		106	25-150		93	25-150
13C2_PFTeDA		88	25-150		88	25-150
13C3_PFBS		89	25-150		97	25-150
13C3_PFHxS		88	25-150		96	25-150
13C3-HFPO-DA		58	25-150		75	25-150
13C4_PFBA	N	4.0	25-150		84	25-150
13C4_PFHpA		59	25-150		88	25-150
13C5_PFHxA		76	25-150		93	25-150
13C5_PFPeA		29	25-150		99	25-150
13C6_PFDA		102	25-150		88	25-150

LOQ = Limit of Quantitation
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DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-013**

Description: **MWW1-04_GW-091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023 1540** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits	Q	Run 2 % Recovery	Acceptance Limits
13C7_PFUdA		108	25-150		101	25-150
13C8_PFOA		87	25-150		97	25-150
13C8_PFOS		95	25-150		98	25-150
13C8_PFOSA		87	10-150		95	10-150
13C9_PFNA		94	25-150		106	25-150
d5-EtFOSAA		127	25-150		94	25-150
d3-MeFOSAA		115	25-150		97	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-014**

Description: **MWW10-04_GW-091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023 1130** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/30/2023 0344	ARC2	09/28/2023 2045	86111
2	SOP SPE	PFAS by ID SOP	1	10/11/2023 0156	OMNS	10/03/2023 1731	86454

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.7	0.47	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.7	0.64	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.7	1.6	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.7	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.7	0.85	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.7	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.7	0.47	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.7	0.73	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.7	0.90	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.9	0.40	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.9	0.75	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.9	0.48	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.9	0.69	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.9	0.59	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.9	0.57	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**5.7**		**3.9**	**0.53**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**8.3**	**J**	**40**	**6.0**	**ng/L**	**2**
Perfluoro-n-decanoic acid (PFDA)	**335-76-2**	**PFAS by ID SOP**	**0.94**	**J**	**3.9**	**0.51**	**ng/L**	**1**
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.9	0.46	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**11**		**3.9**	**0.43**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**18**		**3.9**	**0.67**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**16**		**3.9**	**0.45**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**45**		**3.9**	**0.80**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**15**		**3.9**	**0.53**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.9	0.58	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.9	0.51	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.9	0.61	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**48**		**3.9**	**1.9**	**ng/L**	**1**

Surrogate	Run 1 Q	Run 1 % Recovery	Run 1 Acceptance Limits	Run 2 Q	Run 2 % Recovery	Run 2 Acceptance Limits
13C2_4:2FTS	N	236	25-150	N	251	25-150
13C2_6:2FTS	N	298	25-150	N	161	25-150
13C2_8:2FTS	N	241	25-150		106	25-150
13C2_PFDoA		100	25-150		84	25-150
13C2_PFTeDA		91	25-150		84	25-150
13C3_PFBS		73	25-150		93	25-150
13C3_PFHxS		83	25-150		90	25-150
13C3-HFPO-DA		47	25-150		70	25-150
13C4_PFBA	N	22	25-150		75	25-150
13C4_PFHpA		54	25-150		85	25-150
13C5_PFHxA		53	25-150		88	25-150
13C5_PFPeA		35	25-150		92	25-150
13C6_PFDA		97	25-150		90	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-014**

Description: **MWW10-04_GW-091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023 1130** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits	Q	Run 2 % Recovery	Acceptance Limits
13C7_PFUdA		107	25-150		96	25-150
13C8_PFOA		79	25-150		95	25-150
13C8_PFOS		88	25-150		99	25-150
13C8_PFOSA		73	10-150		90	10-150
13C9_PFNA		94	25-150		99	25-150
d5-EtFOSAA		110	25-150		87	25-150
d3-MeFOSAA		105	25-150		90	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-015**

Description: **DUP-01_GW-091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/30/2023 0354	ARC2	09/28/2023 2045	86111
2	SOP SPE	PFAS by ID SOP	1	10/11/2023 0207	OMNS	10/03/2023 1731	86454

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.5	0.45	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.5	0.62	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.5	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.5	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.5	0.82	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.5	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.5	0.46	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.5	0.71	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.5	0.88	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.8	0.39	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.8	0.73	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.8	0.47	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.8	0.67	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.8	0.58	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.8	0.56	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**5.0**		**3.8**	**0.52**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		40	6.0	ng/L	2
Perfluoro-n-decanoic acid (PFDA)	**335-76-2**	**PFAS by ID SOP**	**1.1**	**J**	**3.8**	**0.49**	**ng/L**	**1**
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.8	0.44	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**14**		**3.8**	**0.42**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**15**		**3.8**	**0.65**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**15**		**3.8**	**0.43**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**45**		**3.8**	**0.78**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**15**		**3.8**	**0.51**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.8	0.56	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.8	0.59	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**47**		**3.8**	**1.9**	**ng/L**	**1**

Surrogate	Run 1 Q	Run 1 % Recovery	Run 1 Acceptance Limits	Run 2 Q	Run 2 % Recovery	Run 2 Acceptance Limits
13C2_4:2FTS	N	232	25-150	N	278	25-150
13C2_6:2FTS	N	300	25-150	N	181	25-150
13C2_8:2FTS	N	236	25-150		103	25-150
13C2_PFDoA		98	25-150		84	25-150
13C2_PFTeDA		86	25-150		84	25-150
13C3_PFBS		74	25-150		89	25-150
13C3_PFHxS		86	25-150		94	25-150
13C3-HFPO-DA		54	25-150		82	25-150
13C4_PFBA	N	23	25-150		77	25-150
13C4_PFHpA		50	25-150		89	25-150
13C5_PFHxA		56	25-150		95	25-150
13C5_PFPeA		38	25-150		93	25-150
13C6_PFDA		101	25-150		96	25-150

LOQ = Limit of Quantitation
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI19014-015**

Description: **DUP-01_GW-091523** Matrix: **Aqueous**

Date Sampled: **09/15/2023** Project Name: **RACER PNC**

Date Received: **09/19/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits	Q	Run 2 % Recovery	Acceptance Limits
13C7_PFUdA		97	25-150		96	25-150
13C8_PFOA		76	25-150		95	25-150
13C8_PFOS		88	25-150		96	25-150
13C8_PFOSA		74	10-150		86	10-150
13C9_PFNA		94	25-150		104	25-150
d5-EtFOSAA		110	25-150		84	25-150
d3-MeFOSAA		98	25-150		87	25-150

LOQ = Limit of Quantitation
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Racer

DATA REVIEW

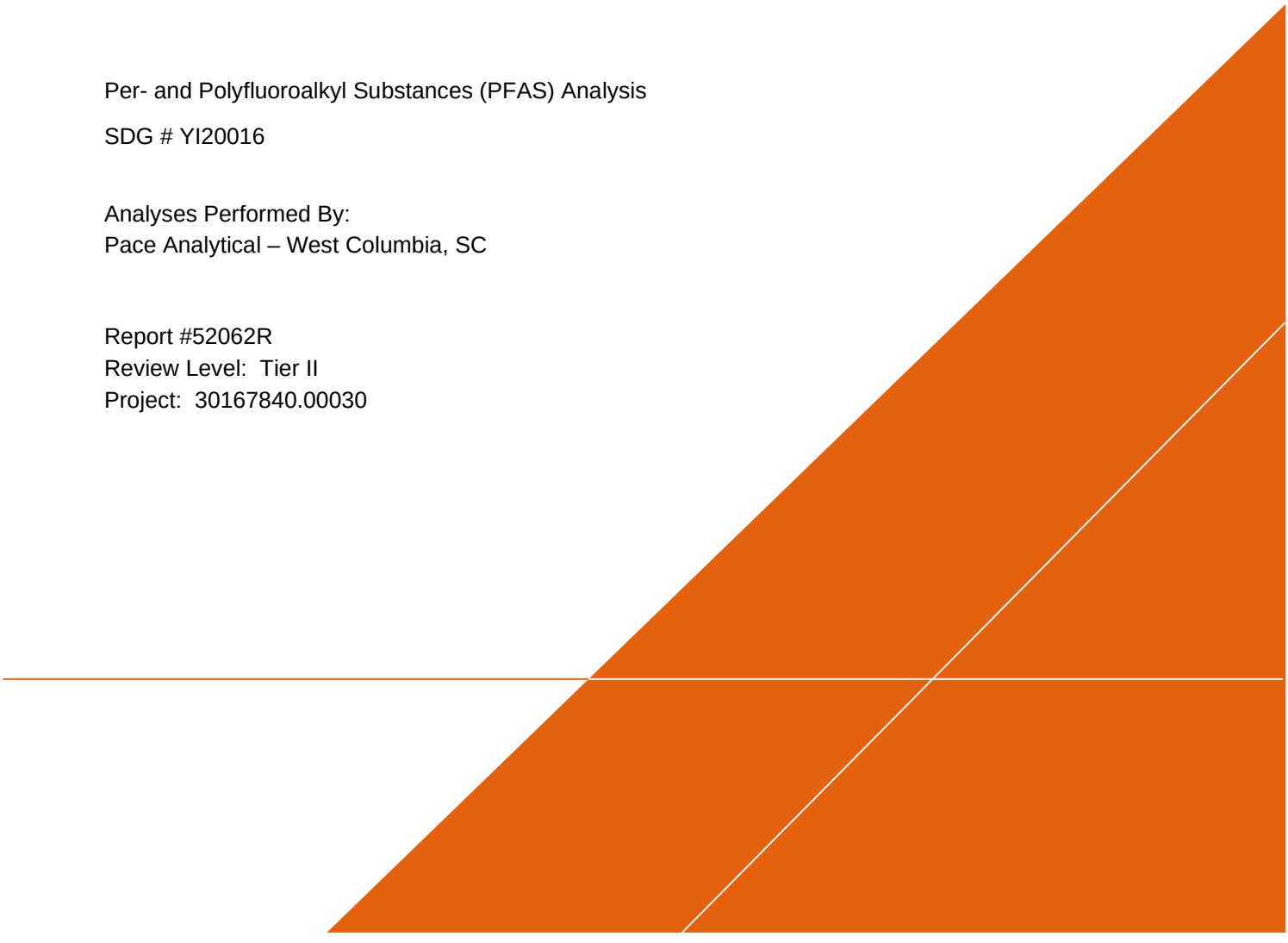
Pontiac North Campus, MI

Per- and Polyfluoroalkyl Substances (PFAS) Analysis

SDG # YI20016

Analyses Performed By:
Pace Analytical – West Columbia, SC

Report #52062R
Review Level: Tier II
Project: 30167840.00030



SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) #YI20016 for samples collected in association with the Racer PNC, MI Site. The review was conducted as a Tier II evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis				
					PFAS	SVOC	PCB	MET	MISC
Trip Blank	YI20016-1	Water	09/18/23		X				
MWM16-52_GW	YI20016-2	Water	09/19/23		X				
MWW1-02_GW	YI20016-3	Water	09/19/23		X				
EB-06	YI20016-4	Water	09/19/23		X				
MWM30-02_GW	YI20016-5	Water	09/19/23		X				
TW-10-01_GW	YI20016-6	Water	09/18/23		X				

ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

Note:
QA - Quality Assurance

ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency Method 537 Modified. Data were reviewed in accordance with the method specified criteria, USEPA National Functional Guidelines NFG for Organic Superfund Methods Data Review, EPA-540-R-20-005 (November 2020), with reference to the historical (USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, OSWER 9240.1-05A-P, October 1999, as appropriate).

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers

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

  B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.

- Quantitation (Q) Qualifiers

  E The compound was quantitated above the calibration range.

  D Concentration is based on a diluted sample analysis.

- Validation Qualifiers

  J The compound was positively identified; however, the associated numerical value is an estimated concentration only.

  UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.

  JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.

  UB Compound considered non-detect at the listed value due to associated blank contamination.

  N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.

  R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is

that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) ANALYSIS

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
USEPA modified Method 537	Water	28 days to extraction; 28 days from extraction to analysis	Cool to <6 °C

All samples were initially analyzed within the specified holding time criteria.

2. Blank Contamination

Quality assurance (QA) blanks (i.e., method, field, and equipment blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Equipment blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (DL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were not detected above the DL in the associated blanks; therefore, detected sample results were not associated with blank contamination.

3. Extracted Internal Standard (EIS)/Surrogate Compounds

Labeled standards must be added to all field samples and QC samples prior to extraction. EIS recoveries must be within the laboratory-established acceptance limits of ICAL midpoint standard area or area measured in the initial CCV on days when ICAL not performed.

Samples associated with EIS exhibited acceptable recoveries with the exceptions noted in the table.

Sample Locations	EIS	Associated Compound	%R
MWM16-52_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
	13C2_8:2FTS	1H,1H, 2H,2H-perfluorodecane sulfonic acid (8:2 FTS)	>150
MWW1-02_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
MWM30-02_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150

Sample Locations	EIS	Associated Compound	%R
TW-10-01_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
	13C4_PFBA	Perfluoro-n-butanoic acid (PFBA)	<20%

The criteria used to evaluate the EIS recoveries are presented in the following table. In the case of an EIS deviation, the sample results associated with the EIS are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
< the lower control limit (LL) but > 20%	Non-detect	UJ
	Detect	J
> the upper control limit (UL)	Non-detect	No Action
	Detect	J
< 20%	Non-detect	R
	Detect	J

4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within 50-150%. The relative percent difference (RPD) between the MS/MSD recoveries must exhibit an RPD within 30%.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

The MS/MSD performed on samples MWM16-52_GW and MWM30-02_GW exhibited recoveries and RPDs within the control limits.

A laboratory duplicate was performed on sample TW-10-01_GW. The RPDs for 6:2 FTS, PFPeS, PFHxS, PFHxA, PFOA and PFOS were above the 20% control limit. The parent sample was qualified as estimated for these compounds.

5. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

All compounds associated with the LCS analysis exhibited recoveries within the control limits.

6. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 30% for water matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of two times the RL is applied for soil matrices.

A field duplicate was not included in the data package.

7. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR PFAs

PFAs: USEPA modified Method 537	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
LIQUID CHROMATOGRAPHY/MASS SPECTROMETRY (LC/MS/MS)					
Tier II Validation					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks		X		X	
C. Trip blanks		X		X	
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate(LCSD) %R	X				X
LCS/LCSD Precision (RPD)	X				X
Matrix Spike (MS) %R		X		X	
Matrix Spike Duplicate (MSD) %R		X		X	
MS/MSD Precision (RPD)		X		X	
Field/Lab Duplicate (RPD)		X	X		
Extracted Internal Standards (EIS) Recoveries		X	X		
Dilution Factor		X		X	
Moisture Content	X				X

Notes:

%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Rachelle Borne

SIGNATURE: 

DATE: December 18, 2023

PEER REVIEW: Joseph C. Houser

DATE: December 19, 2023

CHAIN OF CUSTODY

CORRECTED SAMPLE ANALYSIS DATA SHEETS

Pace Analytical®

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Number 150049

Client: Arcadis	Report to Contact: Alexis Crisp, Tiffany Linder	Telephone No. / E-mail: Alexis.Crisp@arcadis.com, Tiffany.linder@arcadis.com	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: x Jammer Guy	Analysis (Attach list if more space is needed): Report EGLE 28 compounds	Page 1 of 3
City: Novi; State: MI; Zip Code: 48377	Printed Name: Jammer Guy		YI20016 KB52
Project Name: Racer PNC			
Project No.: 30167840.00031	P.O. No.		

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Grab / Composite	Matrix: Aqueous	Matrix: Solid	Matrix: Non-aqueous	No of Containers by Preservative Type: Unpres.	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Method 537 mod, with 150 ppb dilution per QSM 5.1	Remarks / Cooler I.D.
tripblank	9/18/23	1500	G	X			1						X		tripblank
MWM16-52_GW-091923	9/19/23	1115	G	X			6						X		Run MS/MSD
MWWI-02_GW-091923	9/19/23	1322	G	X			2						X		
EB-06_091923	9/19/23	1330	G	X			1						X		equipment blank

Turn Around Time Required (Prior lab approval required for expedited TAT.): ☒ Standard ☐ Rush (Specify)	Sample Disposal: ☐ Return to Client ☒ Disposal by Lab	Possible Hazard Identification: ☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown	QC Requirements (Specify)			
1. Relinquished by: Jammer Guy	Date: 9/19/23	Time: 1630	1. Received by: FedEx	Date: 9/19/23	Time: 1630	
2. Relinquished by	Date	Time	2. Received by	Date	Time	
3. Relinquished by	Date	Time	3. Received by	Date	Time	
4. Relinquished by: fedex	Date: 9.20.23	Time: 1010	4. Laboratory received by: Keegan Williams	Date: 9.20.23	Time: 1010	

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY — Received on ice (Circle): (Yes) No Ice Pack: Receipt Temp: 3.6 °C Temp Blank: ☐ Y ☒ N

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Number 150049

Client: ARCADIS	Report to Contact: Lexi Crisp	Telephone No. / E-mail: tiffany.linder@arcadis.com alexis.crisp@arcadis.com	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: X Lottie Jay	Analysis (Attach list if more space is needed): Report EGLE 28 Compounds	Page 2 of 3
City: NOVI	State: MI	Zip Code: 48377	Printed Name: Lottie Jay
Project Name: Racer PNC			
Project No.: ~~Racer PNC-LT~~ 30167840.00031	P.O. No.		

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Grab/Composite	Matrix: Aqueous	Matrix: Solid	Matrix: Non-Aqueous	No of Containers by Preservative Type: Unpres.	HCSO4	HNO3	HCl	NaOH	Soda Ash	Other Preserved	Method 624 + MS/MSD with Isotope dilution per USEPA SOW	Remarks / Cooler I.D.
MWM30-02-GW-091923	9/19/23	1120	G	X			2							X	

YI20016

KR32

Turn Around Time Required (Prior lab approval required for expedited TAT.)	Sample Disposal	Possible Hazard Identification	QC Requirements (Specify)
☒ Standard ☐ Rush (Specify)	☐ Return to Client ☒ Disposal by Lab	☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown	

	Date	Time		Date	Time
1. Relinquished by: Lottie Jay / ARCADIS	9/19/23	1500	1. Received by: Jennifer Kay	9/19/23	1500
2. Relinquished by: Jennifer Kay	9/19/23	1630	2. Received by: Fed Ex	9/19/23	1630
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by	9.20.2023	1010	4. Laboratory received by: Kelizeth Guerrero	9.20.23	10:10

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY
Received on Ice (Circle) (Yes) No Ice Pack | Receipt Temp. 3.1 °C | Temp Blank ☐ Y ☒N

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Number 150049

Client: Aradis	Report to Contact: Alexis Crisp	Telephone No. / E-mail: alexis.crisp@aradis.com; tiffany.binder@aradis.com	Quote No.
Address: 28550 Cabot Dr Suite #500	Sampler's Signature: X	Analysis (Attach list if more space is needed)	Page 3 of 3
City: Novi	State: MI Zip Code: 48377	Printed Name: Samantha Szpanier	YI20016
Project Name: Ruler PJC			
Project No.: 30167840.00031	P.O. No.: 30167840.00031		

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Sample Temperature	Matrix: Aqueous	Matrix: Solid	Matrix: Non-aqueous	No. of Containers by Preservation Type: Unpres.	HNO3	H2SO4	HCl	NaOH	Na2S2O3	Field Filtered	PFAS Method 537.1 / Isotope Dilution Analysis	Remarks / Cooler I.D.
TW-10-01, GW-091823	9/18/23	1515	6	X			2						N	X	

Turn Around Time Required (Prior lab approval required for expedited TAT.)
☑ Standard ☐ Rush (Specify)

Sample Disposal
☐ Return to Client ☑ Disposal by Lab

Possible Hazard Identification
☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: Samantha Szpanier / Aradis	9/19/23	1520	1. Received by:	9/19/23	1520
2. Relinquished by:	9/19/23	1630	2. Received by: FedEx	9/19/23	1630
3. Relinquished by:	Date	Time	3. Received by:	Date	Time
4. Relinquished by: Fedex	9.20.23	1010	4. Laboratory received by:	9.20.23	1010

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY
Received on Ice (Circle) (Yes) No Ice Pack — Receipt Temp: 3.6 °C — Temp Blank ☐ Y (N)

PACE ANALYTICAL SERVICES, LLC

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI20016-001**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **09/18/2023 1500** Project Name: **RACER PNC**

Date Received: **09/20/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 2000	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.6	0.46	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.6	0.63	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.6	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.6	0.83	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.6	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.6	0.46	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.6	0.71	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.6	0.89	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.8	0.39	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.8	0.74	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.8	0.47	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.8	0.68	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.8	0.58	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.8	0.56	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.8	0.52	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.8	0.57	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.8	0.45	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.8	0.42	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.8	0.65	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.8	0.44	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.8	0.79	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.8	0.52	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.8	0.57	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.8	0.59	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.8	1.9	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		91	25-150
13C2_6:2FTS		123	25-150
13C2_8:2FTS		90	25-150
13C2_PFDoA		74	25-150
13C2_PFTeDA		84	25-150
13C3_PFBS		93	25-150
13C3_PFHxS		84	25-150
13C3-HFPO-DA		89	25-150
13C4_PFBA		94	25-150
13C4_PFHpA		85	25-150
13C5_PFHxA		99	25-150
13C5_PFPeA		92	25-150
13C6_PFDA		80	25-150
13C7_PFUdA		79	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI20016-001**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **09/18/2023 1500** Project Name: **RACER PNC**

Date Received: **09/20/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		91	25-150
13C8_PFOS		77	25-150
13C8_PFOSA		78	10-150
13C9_PFNA		85	25-150
d5-EtFOSAA		86	25-150
d3-MeFOSAA		77	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI20016-002**

Description: **MWM16-52_GW-091923** Matrix: **Aqueous**

Date Sampled: **09/19/2023 1115** Project Name: **RACER PNC**

Date Received: **09/20/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/22/2023 2011	ARC2	09/21/2023 1602	85388

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		80	4.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		80	6.6	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	80	16	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**28**	**JQ**	**80**	**20**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	80	8.7	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		80	21	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		80	4.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		80	7.5	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		80	9.3	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		40	4.1	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		40	7.8	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		40	5.0	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		40	7.1	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		40	6.1	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		40	5.9	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**25**	**J**	**40**	**5.5**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		40	6.0	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		40	5.2	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		40	4.7	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**8.6**	**J**	**40**	**4.5**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**12**	**J**	**40**	**6.9**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		40	4.6	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**21**	**J**	**40**	**8.3**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		40	5.4	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		40	6.0	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		40	5.3	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		40	6.3	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**65**		**40**	**20**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	327	25-150
13C2_6:2FTS	N	246	25-150
13C2_8:2FTS	N	151	25-150
13C2_PFDoA		82	25-150
13C2_PFTeDA		82	25-150
13C3_PFBS		91	25-150
13C3_PFHxS		83	25-150
13C3-HFPO-DA		61	25-150
13C4_PFBA		72	25-150
13C4_PFHpA		72	25-150
13C5_PFHxA		90	25-150
13C5_PFPeA		80	25-150
13C6_PFDA		89	25-150
13C7_PFUdA		90	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI20016-002**

Description: **MWM16-52_GW-091923** Matrix: **Aqueous**

Date Sampled: **09/19/2023 1115** Project Name: **RACER PNC**

Date Received: **09/20/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		92	25-150
13C8_PFOS		78	25-150
13C8_PFOSA		87	10-150
13C9_PFNA		90	25-150
d5-EtFOSAA		97	25-150
d3-MeFOSAA		90	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI20016-003**

Description: **MWW1-02_GW-091923** Matrix: **Aqueous**

Date Sampled: **09/19/2023 1322** Project Name: **RACER PNC**

Date Received: **09/20/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/29/2023 1800	ARC2	09/21/2023 1924	85448

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		80	4.8	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		80	6.6	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		80	16	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		80	20	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	80	8.7	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		80	21	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		80	4.8	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		80	7.5	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		80	9.3	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		40	4.1	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		40	7.8	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		40	5.0	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		40	7.1	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		40	6.1	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		40	5.9	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**15**	**J**	**40**	**5.5**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**43**		**40**	**6.0**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		40	5.2	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		40	4.7	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		40	4.5	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		40	6.9	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		40	4.6	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**15**	**J**	**40**	**8.3**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		40	5.4	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		40	6.0	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		40	5.3	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		40	6.3	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**66**		**40**	**20**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	242	25-150
13C2_6:2FTS		137	25-150
13C2_8:2FTS		105	25-150
13C2_PFDoA		97	25-150
13C2_PFTeDA		97	25-150
13C3_PFBS		96	25-150
13C3_PFHxS		93	25-150
13C3-HFPO-DA		91	25-150
13C4_PFBA		78	25-150
13C4_PFHpA		94	25-150
13C5_PFHxA		114	25-150
13C5_PFPeA		93	25-150
13C6_PFDA		123	25-150
13C7_PFUdA		94	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI20016-003**

Description: **MWW1-02_GW-091923** Matrix: **Aqueous**

Date Sampled: **09/19/2023 1322** Project Name: **RACER PNC**

Date Received: **09/20/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		106	25-150
13C8_PFOS		93	25-150
13C8_PFOSA		98	10-150
13C9_PFNA		111	25-150
d5-EtFOSAA		96	25-150
d3-MeFOSAA		97	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI20016-004**

Description: **EB-06_091923** Matrix: **Aqueous**

Date Sampled: **09/19/2023 1330** Project Name: **RACER PNC**

Date Received: **09/20/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/29/2023 1811	ARC2	09/21/2023 1924	85448

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.6	0.46	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.6	0.63	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.6	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.6	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.6	0.83	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.6	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.6	0.46	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.6	0.71	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.6	0.88	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.8	0.39	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.8	0.74	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.8	0.47	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.8	0.67	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.8	0.58	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.8	0.56	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.8	0.52	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.8	0.57	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.8	0.45	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.8	0.42	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.8	0.65	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.8	0.44	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.8	0.79	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.8	0.52	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.8	0.57	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.8	0.59	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.8	1.9	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		104	25-150
13C2_6:2FTS		113	25-150
13C2_8:2FTS		105	25-150
13C2_PFDoA		98	25-150
13C2_PFTeDA		102	25-150
13C3_PFBS		103	25-150
13C3_PFHxS		102	25-150
13C3-HFPO-DA		104	25-150
13C4_PFBA		102	25-150
13C4_PFHpA		99	25-150
13C5_PFHxA		107	25-150
13C5_PFPeA		101	25-150
13C6_PFDA		105	25-150
13C7_PFUdA		98	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
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H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.**		Laboratory ID: **YI20016-004**
Description: **EB-06_091923**		Matrix: **Aqueous**
Date Sampled: **09/19/2023 1330**	Project Name: **RACER PNC**	
Date Received: **09/20/2023**	Project Number: **30167840.00031**	

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		107	25-150
13C8_PFOS		98	25-150
13C8_PFOSA		96	10-150
13C9_PFNA		112	25-150
d5-EtFOSAA		99	25-150
d3-MeFOSAA		103	25-150

LOQ = Limit of Quantitation	B = Detected in the method blank	E = Quantitation of compound exceeded the calibration range	DL = Detection Limit	Q = Surrogate failure
ND = Not detected at or above the DL	N = Recovery is out of criteria	P = The RPD between two GC columns exceeds 40%	J = Estimated result < LOQ and ≥ DL	L = LCS/LCSD failure
H = Out of holding time	W = Reported on wet weight basis			S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI20016-005**

Description: **MWM30-02_GW-091923** Matrix: **Aqueous**

Date Sampled: **09/19/2023 1120** Project Name: **RACER PNC**

Date Received: **09/20/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/29/2023 1821	ARC2	09/21/2023 1924	85448

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.7	0.46	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.7	0.64	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.7	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.7	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.7	0.84	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.7	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.7	0.47	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.7	0.72	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.7	0.90	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**2.9**	**J**	**3.9**	**0.40**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.9	0.75	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.9	0.48	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.9	0.69	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.9	0.59	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.9	0.57	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**3.3**	**J**	**3.9**	**0.53**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**6.5**		**3.9**	**0.58**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.9	0.51	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.9	0.45	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**3.3**	**J**	**3.9**	**0.43**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**3.4**	**J**	**3.9**	**0.66**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.9	0.44	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**6.7**		**3.9**	**0.80**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**3.0**	**J**	**3.9**	**0.52**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.9	0.58	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.9	0.51	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.9	0.60	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**3.1**	**J**	**3.9**	**1.9**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	206	25-150
13C2_6:2FTS	N	154	25-150
13C2_8:2FTS		103	25-150
13C2_PFDoA		96	25-150
13C2_PFTeDA		108	25-150
13C3_PFBS		105	25-150
13C3_PFHxS		94	25-150
13C3-HFPO-DA		102	25-150
13C4_PFBA		82	25-150
13C4_PFHpA		97	25-150
13C5_PFHxA		111	25-150
13C5_PFPeA		105	25-150
13C6_PFDA		103	25-150
13C7_PFUdA		104	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
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H = Out of holding time
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI20016-005**

Description: **MWM30-02_GW-091923** Matrix: **Aqueous**

Date Sampled: **09/19/2023 1120** Project Name: **RACER PNC**

Date Received: **09/20/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		109	25-150
13C8_PFOS		106	25-150
13C8_PFOSA		97	10-150
13C9_PFNA		112	25-150
d5-EtFOSAA		102	25-150
d3-MeFOSAA		101	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI20016-006**

Description: **TW-10-01_GW-091823** Matrix: **Aqueous**

Date Sampled: **09/18/2023 1515** Project Name: **RACER PNC**

Date Received: **09/20/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	09/29/2023 1842	ARC2	09/21/2023 1924	85448

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run	
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.7	0.46	ng/L	1	
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.7	0.64	ng/L	1	
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.7	1.5	ng/L	1	
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**24**	**Q J**	**7.7**	**1.9**	**ng/L**	**1**	
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.7	0.84	ng/L	1	
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.7	2.0	ng/L	1	
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.7	0.46	ng/L	1	
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.7	0.72	ng/L	1	
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.7	0.89	ng/L	1	
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**43**		**3.8**	**0.40**	**ng/L**	**1**	
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.8	0.75	ng/L	1	
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**3.1**	**J**	**3.8**	**0.48**	**ng/L**	**1**	
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.8	0.68	ng/L	1	
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.8	0.59	ng/L	1	
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**13**	**J**	**3.8**	**0.57**	**ng/L**	**1**	
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**47**	**J**	**3.8**	**0.53**	**ng/L**	**1**	
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND	Q	3.8	0.58	ng/L	1	R
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.8	0.50	ng/L	1	
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.8	0.45	ng/L	1	
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**7.0**		**3.8**	**0.43**	**ng/L**	**1**	
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**45**	**J**	**3.8**	**0.66**	**ng/L**	**1**	
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.8	0.44	ng/L	1	
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**15**	**J**	**3.8**	**0.80**	**ng/L**	**1**	
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.8	0.52	ng/L	1	
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.8	0.58	ng/L	1	
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.8	0.51	ng/L	1	
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.8	0.60	ng/L	1	
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**81**	**J**	**3.8**	**1.9**	**ng/L**	**1**	

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	219	25-150
13C2_6:2FTS	N	223	25-150
13C2_8:2FTS		107	25-150
13C2_PFDoA		70	25-150
13C2_PFTeDA		60	25-150
13C3_PFBS		74	25-150
13C3_PFHxS		79	25-150
13C3-HFPO-DA		54	25-150
13C4_PFBA	N	16	25-150
13C4_PFHpA		56	25-150
13C5_PFHxA		44	25-150
13C5_PFPeA		32	25-150
13C6_PFDA		92	25-150
13C7_PFUdA		79	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
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S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI20016-006**

Description: **TW-10-01_GW-091823** Matrix: **Aqueous**

Date Sampled: **09/18/2023 1515** Project Name: **RACER PNC**

Date Received: **09/20/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		83	25-150
13C8_PFOS		84	25-150
13C8_PFOSA		88	10-150
13C9_PFNA		93	25-150
d5-EtFOSAA		80	25-150
d3-MeFOSAA		86	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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Racer

DATA REVIEW

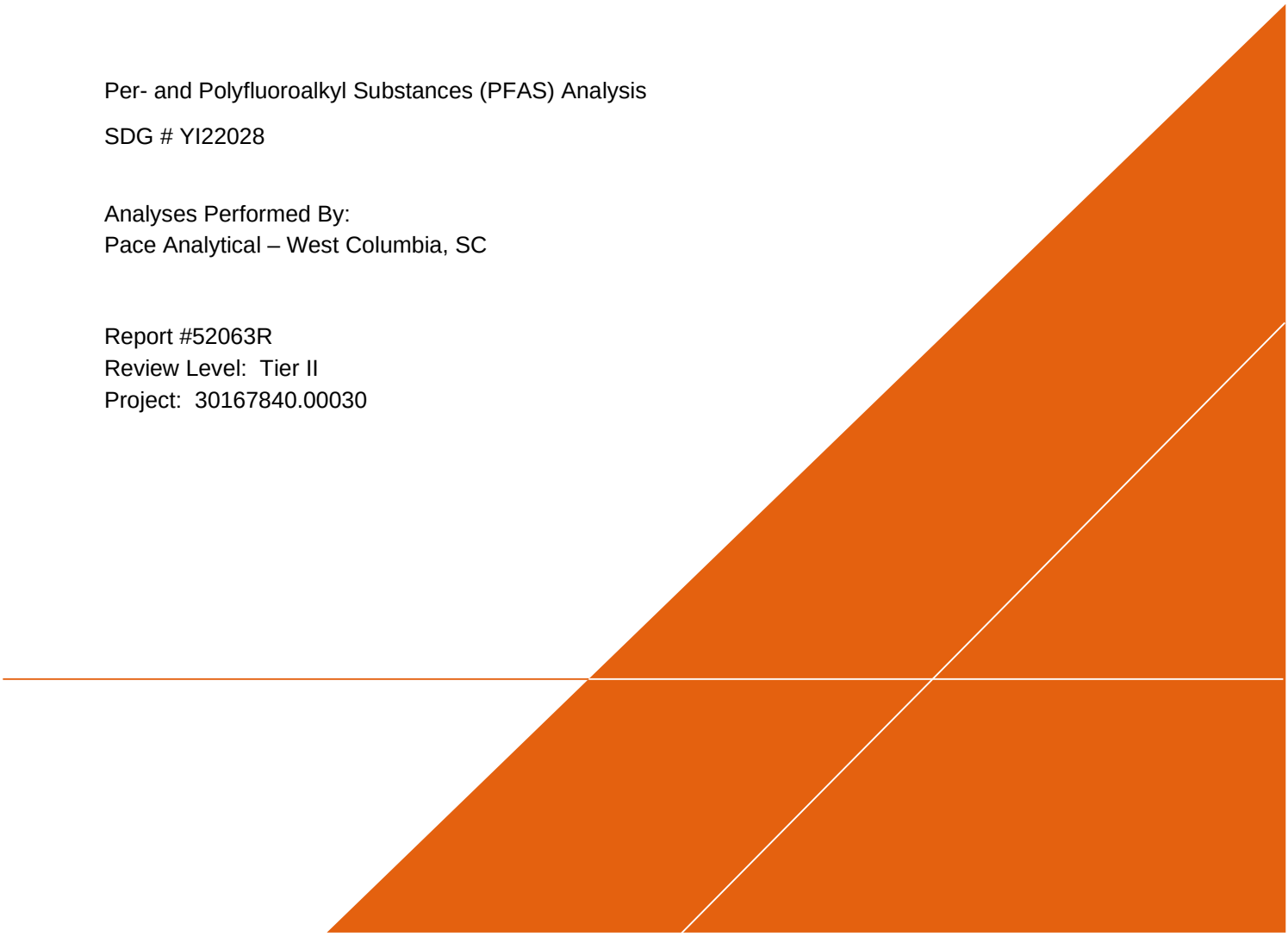
Pontiac North Campus, MI

Per- and Polyfluoroalkyl Substances (PFAS) Analysis

SDG # YI22028

Analyses Performed By:
Pace Analytical – West Columbia, SC

Report #52063R
Review Level: Tier II
Project: 30167840.00030



SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) #YI22028 for samples collected in association with the Racer PNC, MI Site. The review was conducted as a Tier II evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis				
					PFAS	SVOC	PCB	MET	MISC
Trip Blank	YI22028-1	Water	09/21/23		X				
MWDP-2R_GW	YI22028-2	Water	09/21/23		X				
EB-07	YI22028-3	Water	09/21/23		X				
SUMP_GW	YI22028-4	Water	09/21/23		X				
MW-03-17_GW	YI22028-5	Water	09/21/23		X				

ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

Note:
QA - Quality Assurance

ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency Method 537 Modified. Data were reviewed in accordance with the method specified criteria, USEPA National Functional Guidelines NFG for Organic Superfund Methods Data Review, EPA-540-R-20-005 (November 2020), with reference to the historical (USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, OSWER 9240.1-05A-P, October 1999, as appropriate).

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers

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

  B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.

- Quantitation (Q) Qualifiers

  E The compound was quantitated above the calibration range.

  D Concentration is based on a diluted sample analysis.

- Validation Qualifiers

  J The compound was positively identified; however, the associated numerical value is an estimated concentration only.

  UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.

  JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.

  UB Compound considered non-detect at the listed value due to associated blank contamination.

  N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.

  R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is

that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) ANALYSIS

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
USEPA modified Method 537	Water	28 days to extraction; 28 days from extraction to analysis	Cool to <6 °C

All samples were initially analyzed within the specified holding time criteria.

2. Blank Contamination

Quality assurance (QA) blanks (i.e., method, field, and equipment blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Equipment blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (DL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were not detected above the DL in the associated blanks; therefore, detected sample results were not associated with blank contamination.

3. Extracted Internal Standard (EIS)/Surrogate Compounds

Labeled standards must be added to all field samples and QC samples prior to extraction. EIS recoveries must be within the laboratory-established acceptance limits of ICAL midpoint standard area or area measured in the initial CCV on days when ICAL not performed.

Samples associated with EIS exhibited acceptable recoveries with the exceptions noted in the table.

Sample Locations	EIS	Associated Compound	%R
MWDP-2R_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
SUMP_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
	13C2_8:2FTS	1H,1H, 2H,2H-perfluorodecane sulfonic acid (8:2 FTS)	>150
	13C4_PFBA	Perfluoro-n-butanoic acid (PFBA)	< the lower control limit (LL) but > 20%

Sample Locations	EIS	Associated Compound	%R
MW-03-17_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
	13C2_8:2FTS	1H,1H, 2H,2H-perfluorodecane sulfonic acid (8:2 FTS)	>150

The criteria used to evaluate the EIS recoveries are presented in the following table. In the case of an EIS deviation, the sample results associated with the EIS are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
< the lower control limit (LL) but > 20%	Non-detect	UJ
	Detect	J
> the upper control limit (UL)	Non-detect	No Action
	Detect	J
< 20%	Non-detect	R
	Detect	J

4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within 50-150%. The relative percent difference (RPD) between the MS/MSD recoveries must exhibit an RPD within 30%.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

A site-specific MS/MSD was not included in the data package.

5. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

All compounds associated with the LCS analysis exhibited recoveries within the control limits.

6. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 30% for water matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of two times the RL is applied for soil matrices.

A field duplicate was not included in the data package.

7. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR PFAs

PFAs: USEPA modified Method 537	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
LIQUID CHROMATOGRAPHY/MASS SPECTROMETRY (LC/MS/MS)					
Tier II Validation					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks		X		X	
C. Trip blanks		X		X	
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate(LCSD) %R	X				X
LCS/LCSD Precision (RPD)	X				X
Matrix Spike (MS) %R	X				X
Matrix Spike Duplicate (MSD) %R	X				X
MS/MSD Precision (RPD)	X				X
Field/Lab Duplicate (RPD)	X				X
Extracted Internal Standards (EIS) Recoveries		X	X		
Dilution Factor		X		X	
Moisture Content	X				X

Notes:

%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Rachelle Borne

SIGNATURE: 

DATE: December 18, 2023

PEER REVIEW: Joseph C. Houser

DATE: December 19, 2023

CHAIN OF CUSTODY

CORRECTED SAMPLE ANALYSIS DATA SHEETS

Pace Analytical®

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www.pacelabs.com

Number 150049

Client: Arcadis	Report to Contact: Alexis Crisp, Tiffany Linder	Telephone No. / E-mail: Alexis.crisp@arcadis.com, tiffany.linder@arcadis.com	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: x Sommer Guy	Analysis (Attach list if more space is needed): Report EGLE 28 Compounds*	Page 1 of 2
City: Novi	State: MI	Zip Code: 48377	Printed Name: Sommer Guy
Project Name: Racer PNC			
Project No.: 3116784D.00031	P.O. No.		

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Grab G / Composite C	Matrix: Aqueous	Soil	Non-aqueous	No of Containers by Preservative Type: Unpres.	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Field Filtered	Method 537.1 and 533 PFAS Analysis	Remarks / Cooler I.D.
tripblank	9/21/23	0845	G	X			1							X	tripblank
MWDP-2R_GW-092123	9/21/23	0923	G	X			2							X	
EB-07_092123	9/21/23	0930	G	X			1							X	Equipment blank
SUMP_GW-092123	9/21/23	1010	G	X			2							X	

YI22028

HSSI

Turn Around Time Required (Prior lab approval required for expedited TAT.): ☒ Standard ☐ Rush (Specify)

Sample Disposal: ☐ Return to Client ☒ Disposal by Lab

Possible Hazard Identification: ☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: Sommer Guy	9/21/23	1700	1. Received by: FedEx	9/21/23	1700
2. Relinquished by	Date	Time	2. Received by	Date	Time
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by: FedEx	9/22/23	1000	4. Laboratory received by: Brooke Sapelka	9/22/23	1000

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY
Received on Ice (Circle) (Yes) No Ice Pack
Receipt Temp 1.9 °C
Temp Blank ☐ Y ☒ N

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Number 150049

Client: ARCADIS	Report to Contact: Lexi Crisp	Telephone No. / E-mail: tiffany.linder@arcadis.com; Alexis.crisp@arcadis.com	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: x Lottie Jay	Analysis (Attach list if more space is needed): Report Edit 28 Compounds	Page 2 of 2
City: Novi; State: MI; Zip Code: 48377	Printed Name: Lottie Jay		Lot # Bar Code: YI22028 KES2
Project Name: Racer PNC			
Project No.: 30112891.00031	P.O. No.		

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	Grab/Composite	Matrix: Aqueous	Solid	Non-Aqueous	No of Containers by Preservative Type: Unpres.	HCl/504	NaOO	HCl	NaOH	ZnAc NB	Field Filtered	PFAS Analysis List of Analytes per QSM 5.1
MW-03-17_GW-092123	9/21/23	1310	G	X			2							X

Turn Around Time Required (Prior lab approval required for expedited TAT.)
X Standard ☐ Rush (Specify)

Sample Disposal
☐ Return to Client ☐ Disposal by Lab

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: Lottie Jay	9/21/23	1530	1. Received by: Lorraine Guy	9/21/23	1530
2. Relinquished by: Lorraine Guy	9/21/23	1700	2. Received by: Fed Ex	9/21/23	1700
3. Relinquished by:	Date	Time	3. Received by:	Date	Time
4. Relinquished by: FedEX	9/22/23	1000	4. Laboratory received by: Vincent Esperon	9/22/23	1000

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY
Received on Ice (Circle) (Yes) No Ice Pack — Receipt Temp. 0.9 °C — Temp Blank ☐ Y ☑ N

PACE ANALYTICAL SERVICES, LLC

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI22028-001**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **09/21/2023 0845** Project Name: **RACER PNC**

Date Received: **09/22/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	10/03/2023 1815	ARC2	10/01/2023 2059	86250

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.3	0.44	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.3	0.61	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.3	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.3	0.80	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.3	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.3	0.44	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.3	0.69	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.3	0.85	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.7	0.38	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.7	0.71	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.7	0.46	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.7	0.65	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.7	0.56	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.7	0.54	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.7	0.50	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.7	0.55	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.7	0.48	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.7	0.43	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.7	0.41	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.7	0.63	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.7	0.42	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.7	0.76	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.7	0.50	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.7	0.55	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.7	0.48	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.7	0.57	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.7	1.8	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		91	25-150
13C2_6:2FTS		106	25-150
13C2_8:2FTS		76	25-150
13C2_PFDoA		91	25-150
13C2_PFTeDA		85	25-150
13C3_PFBS		90	25-150
13C3_PFHxS		95	25-150
13C3-HFPO-DA		92	25-150
13C4_PFBA		99	25-150
13C4_PFHpA		104	25-150
13C5_PFHxA		94	25-150
13C5_PFPeA		90	25-150
13C6_PFDA		92	25-150
13C7_PFUdA		85	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI22028-001**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **09/21/2023 0845** Project Name: **RACER PNC**

Date Received: **09/22/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		97	25-150
13C8_PFOS		85	25-150
13C8_PFOSA		80	10-150
13C9_PFNA		91	25-150
d5-EtFOSAA		92	25-150
d3-MeFOSAA		80	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI22028-002**

Description: **MWDP-2R_GW-092123** Matrix: **Aqueous**

Date Sampled: **09/21/2023 0923** Project Name: **RACER PNC**

Date Received: **09/22/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	10/03/2023 1826	ARC2	10/01/2023 2059	86250

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.0	0.42	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.0	0.58	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.0	1.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.0	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.0	0.77	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.0	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.0	0.42	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.0	0.66	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.0	0.82	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**5.3**		**3.5**	**0.36**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.68	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.5	0.44	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.62	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.54	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**0.84**	**J**	**3.5**	**0.52**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**2.3**	**J**	**3.5**	**0.48**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**18**		**3.5**	**0.53**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.46	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.41	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**1.1**	**J**	**3.5**	**0.39**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**3.5**		**3.5**	**0.60**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	0.41	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**2.2**	**J**	**3.5**	**0.73**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**3.5**		**3.5**	**0.48**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.53	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.46	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.55	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**4.2**		**3.5**	**1.8**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	292	25-150
13C2_6:2FTS	N	180	25-150
13C2_8:2FTS		103	25-150
13C2_PFDoA		86	25-150
13C2_PFTeDA		81	25-150
13C3_PFBS		88	25-150
13C3_PFHxS		94	25-150
13C3-HFPO-DA		69	25-150
13C4_PFBA		50	25-150
13C4_PFHpA		97	25-150
13C5_PFHxA		88	25-150
13C5_PFPeA		74	25-150
13C6_PFDA		98	25-150
13C7_PFUdA		87	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI22028-002**

Description: **MWDP-2R_GW-092123** Matrix: **Aqueous**

Date Sampled: **09/21/2023 0923** Project Name: **RACER PNC**

Date Received: **09/22/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		108	25-150
13C8_PFOS		96	25-150
13C8_PFOSA		90	10-150
13C9_PFNA		100	25-150
d5-EtFOSAA		88	25-150
d3-MeFOSAA		89	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI22028-003**

Description: **EB-07_092123** Matrix: **Aqueous**

Date Sampled: **09/21/2023 0930** Project Name: **RACER PNC**

Date Received: **09/22/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	10/03/2023 1836	ARC2	10/01/2023 2059	86250

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.3	0.44	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.3	0.60	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.3	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.3	0.80	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.3	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.3	0.44	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.3	0.68	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.3	0.85	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.6	0.38	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.71	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.6	0.45	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.65	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	0.56	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.6	0.54	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.6	0.50	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.6	0.55	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	0.48	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.43	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.6	0.41	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.6	0.63	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.6	0.42	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.6	0.76	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.6	0.50	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.55	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.48	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.57	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.6	1.8	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		94	25-150
13C2_6:2FTS		90	25-150
13C2_8:2FTS		84	25-150
13C2_PFDoA		95	25-150
13C2_PFTeDA		93	25-150
13C3_PFBS		96	25-150
13C3_PFHxS		99	25-150
13C3-HFPO-DA		100	25-150
13C4_PFBA		104	25-150
13C4_PFHpA		110	25-150
13C5_PFHxA		100	25-150
13C5_PFPeA		93	25-150
13C6_PFDA		97	25-150
13C7_PFUdA		88	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI22028-003**

Description: **EB-07_092123** Matrix: **Aqueous**

Date Sampled: **09/21/2023 0930** Project Name: **RACER PNC**

Date Received: **09/22/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		99	25-150
13C8_PFOS		99	25-150
13C8_PFOSA		88	10-150
13C9_PFNA		88	25-150
d5-EtFOSAA		94	25-150
d3-MeFOSAA		89	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI22028-004**

Description: **SUMP_GW-092123** Matrix: **Aqueous**

Date Sampled: **09/21/2023 1010** Project Name: **RACER PNC**

Date Received: **09/22/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	10/03/2023 1847	ARC2	10/01/2023 2059	86250

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.5	0.45	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.5	0.62	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.5	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q	7.5	1.9	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.5	0.82	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.5	2.0	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.5	0.45	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.5	0.71	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.5	0.88	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.8	0.39	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.8	0.73	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**2.1**	**J**	**3.8**	**0.47**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.8	0.67	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.8	0.58	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.8	0.56	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**11**		**3.8**	**0.52**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND	Q UJ	3.8	0.56	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.8	0.49	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.8	0.44	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**4.4**		**3.8**	**0.42**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**7.4**		**3.8**	**0.65**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**0.71**	**J**	**3.8**	**0.43**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**12**		**3.8**	**0.78**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.8	0.51	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.8	0.56	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.8	0.50	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.8	0.59	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**120**		**3.8**	**1.9**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	268	25-150
13C2_6:2FTS	N	286	25-150
13C2_8:2FTS	N	288	25-150
13C2_PFDoA		110	25-150
13C2_PFTeDA		85	25-150
13C3_PFBS		79	25-150
13C3_PFHxS		84	25-150
13C3-HFPO-DA		57	25-150
13C4_PFBA	N	20	25-150
13C4_PFHpA		62	25-150
13C5_PFHxA		57	25-150
13C5_PFPeA		39	25-150
13C6_PFDA		101	25-150
13C7_PFUdA		112	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
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Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI22028-004**

Description: **SUMP_GW-092123** Matrix: **Aqueous**

Date Sampled: **09/21/2023 1010** Project Name: **RACER PNC**

Date Received: **09/22/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		86	25-150
13C8_PFOS		82	25-150
13C8_PFOSA		78	10-150
13C9_PFNA		94	25-150
d5-EtFOSAA		142	25-150
d3-MeFOSAA		117	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI22028-005**

Description: **MW-03-17_GW-092123** Matrix: **Aqueous**

Date Sampled: **09/21/2023 1310** Project Name: **RACER PNC**

Date Received: **09/22/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	10/03/2023 1858	ARC2	10/01/2023 2059	86250

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.3	0.44	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.3	0.60	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q	7.3	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**8.0**	**Q J**	**7.3**	**1.8**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.3	0.79	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.3	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.3	0.44	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.3	0.68	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.3	0.85	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**3.3**	**J**	**3.6**	**0.38**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.71	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	**375-92-8**	**PFAS by ID SOP**	**4.5**		**3.6**	**0.45**	**ng/L**	**1**
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.65	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	**754-91-6**	**PFAS by ID SOP**	**1.4**	**J**	**3.6**	**0.56**	**ng/L**	**1**
Perfluoro-1-pentanesulfonic acid (PFPeS)	**2706-91-4**	**PFAS by ID SOP**	**2.7**	**J**	**3.6**	**0.54**	**ng/L**	**1**
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**32**		**3.6**	**0.50**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**15**		**3.6**	**0.54**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	0.48	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.43	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**8.6**		**3.6**	**0.41**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**14**		**3.6**	**0.62**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**2.5**	**J**	**3.6**	**0.42**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**20**		**3.6**	**0.75**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**15**		**3.6**	**0.49**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.54	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.48	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.57	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**140**		**3.6**	**1.8**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	267	25-150
13C2_6:2FTS	N	249	25-150
13C2_8:2FTS	N	184	25-150
13C2_PFDoA		95	25-150
13C2_PFTeDA		77	25-150
13C3_PFBS		79	25-150
13C3_PFHxS		96	25-150
13C3-HFPO-DA		60	25-150
13C4_PFBA		33	25-150
13C4_PFHpA		79	25-150
13C5_PFHxA		73	25-150
13C5_PFPeA		54	25-150
13C6_PFDA		103	25-150
13C7_PFUdA		109	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI22028-005**

Description: **MW-03-17_GW-092123** Matrix: **Aqueous**

Date Sampled: **09/21/2023 1310** Project Name: **RACER PNC**

Date Received: **09/22/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		98	25-150
13C8_PFOS		87	25-150
13C8_PFOSA		85	10-150
13C9_PFNA		108	25-150
d5-EtFOSAA		112	25-150
d3-MeFOSAA		119	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
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Racer

DATA REVIEW

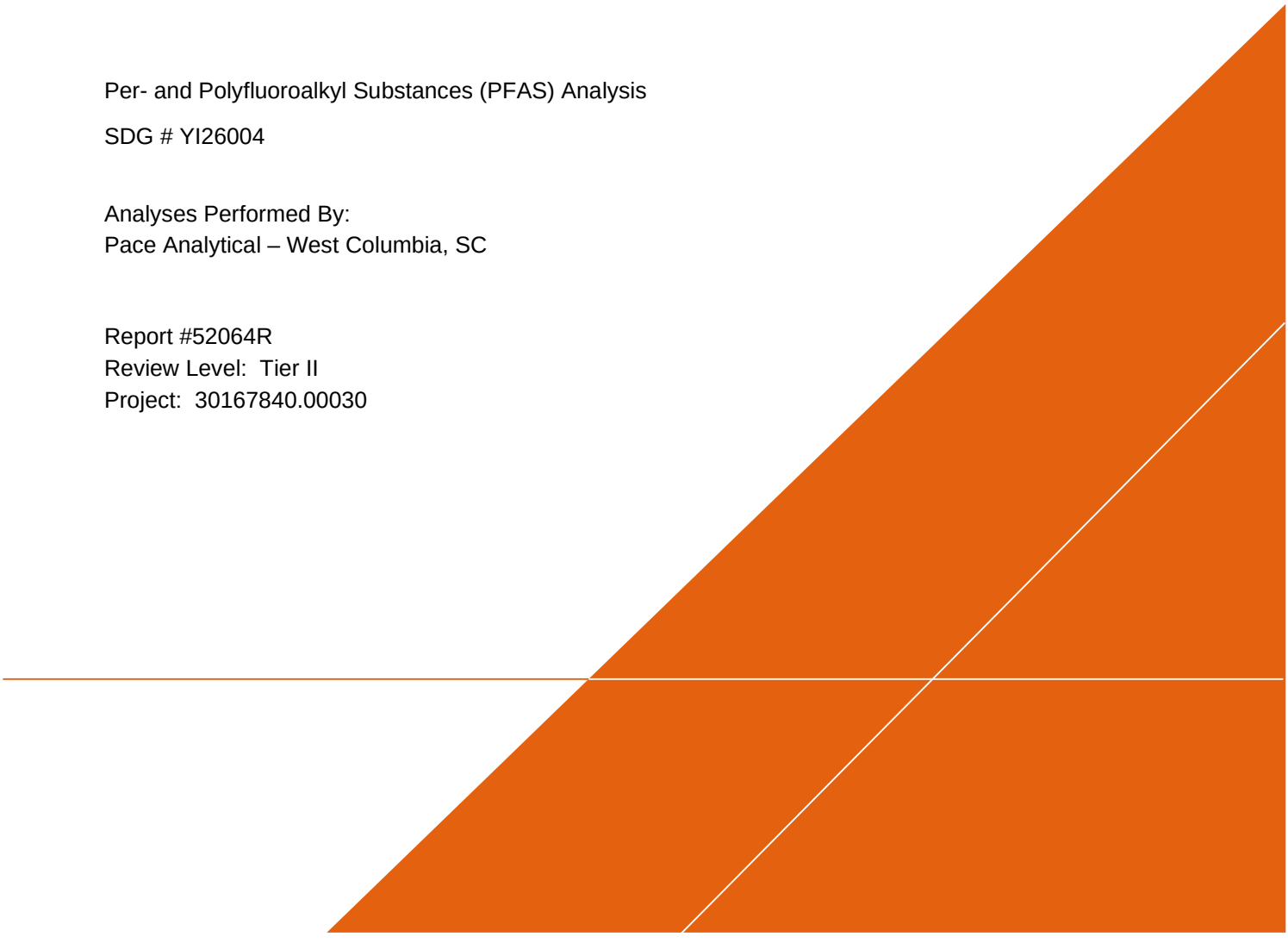
Pontiac North Campus, MI

Per- and Polyfluoroalkyl Substances (PFAS) Analysis

SDG # YI26004

Analyses Performed By:
Pace Analytical – West Columbia, SC

Report #52064R
Review Level: Tier II
Project: 30167840.00030



SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) #YI26004 for samples collected in association with the Racer PNC, MI Site. The review was conducted as a Tier II evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis				
					PFAS	SVOC	PCB	MET	MISC
MWM2-28_GW	YI26004-1	Water	09/25/23		X				
EB-08	YI26004-2	Water	09/25/23		X				
Trip Blank	YI26004-3	Water	09/25/23		X				
MWM2-22_GW	YI26004-4	Water	09/25/23		X				
MW-43-14R_GW	YI26004-5	Water	09/25/23		X				

ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

Note:
QA - Quality Assurance

ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency Method 537 Modified. Data were reviewed in accordance with the method specified criteria, USEPA National Functional Guidelines NFG for Organic Superfund Methods Data Review, EPA-540-R-20-005 (November 2020), with reference to the historical (USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, OSWER 9240.1-05A-P, October 1999, as appropriate).

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers

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

  B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.

- Quantitation (Q) Qualifiers

  E The compound was quantitated above the calibration range.

  D Concentration is based on a diluted sample analysis.

- Validation Qualifiers

  J The compound was positively identified; however, the associated numerical value is an estimated concentration only.

  UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.

  JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.

  UB Compound considered non-detect at the listed value due to associated blank contamination.

  N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.

  R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is

that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) ANALYSIS

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
USEPA modified Method 537	Water	28 days to extraction; 28 days from extraction to analysis	Cool to <6 °C

All samples were initially analyzed within the specified holding time criteria.

2. Blank Contamination

Quality assurance (QA) blanks (i.e., method, field, and equipment blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Equipment blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (DL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were not detected above the DL in the associated blanks; therefore, detected sample results were not associated with blank contamination.

3. Extracted Internal Standard (EIS)/Surrogate Compounds

Labeled standards must be added to all field samples and QC samples prior to extraction. EIS recoveries must be within the laboratory-established acceptance limits of ICAL midpoint standard area or area measured in the initial CCV on days when ICAL not performed.

Samples associated with EIS exhibited acceptable recoveries with the exceptions noted in the table.

Sample Locations	EIS	Associated Compound	%R
MWM2-28_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150
	13C2_8:2FTS	1H,1H, 2H,2H-perfluorodecane sulfonic acid (8:2 FTS)	>150
MWM2-22_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
MW-43-14R_GW	13C2_4:2FTS	1H,1H, 2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	>150
	13C2_6:2FTS	1H,1H, 2H,2H-perfluorooctane sulfonic acid (6:2 FTS)	>150

Sample Locations	EIS	Associated Compound	%R
MW-43-14R_GW	13C2_8:2FTS	1H,1H, 2H,2H-perfluorodecane sulfonic acid (8:2 FTS)	>150
	13C4_PFBA	Perfluoro-n-butanoic acid (PFBA)	< the lower control limit (LL) but > 20%

The criteria used to evaluate the EIS recoveries are presented in the following table. In the case of an EIS deviation, the sample results associated with the EIS are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
< the lower control limit (LL) but > 20%	Non-detect	UJ
	Detect	J
> the upper control limit (UL)	Non-detect	No Action
	Detect	J
< 20%	Non-detect	R
	Detect	J

4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within 50-150%. The relative percent difference (RPD) between the MS/MSD recoveries must exhibit an RPD within 30%.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

A site-specific MS/MSD was not included in the data package.

5. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

All compounds associated with the LCS analysis exhibited recoveries within the control limits.

6. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 30% for water matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of two times the RL is applied for soil matrices.

A field duplicate was not included in the data package.

7. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR PFAs

PFAs: USEPA modified Method 537	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
LIQUID CHROMATOGRAPHY/MASS SPECTROMETRY (LC/MS/MS)					
Tier II Validation					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks		X		X	
C. Trip blanks		X		X	
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate(LCSD) %R	X				X
LCS/LCSD Precision (RPD)	X				X
Matrix Spike (MS) %R	X				X
Matrix Spike Duplicate (MSD) %R	X				X
MS/MSD Precision (RPD)	X				X
Field/Lab Duplicate (RPD)	X				X
Extracted Internal Standards (EIS) Recoveries		X	X		
Dilution Factor		X		X	
Moisture Content	X				X

Notes:

%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Rachelle Borne

SIGNATURE: 

DATE: December 18, 2023

PEER REVIEW: Joseph C. Houser

DATE: December 19, 2023

CHAIN OF CUSTODY

CORRECTED SAMPLE ANALYSIS DATA SHEETS

Pace Analytical

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Number 150049

Client: Arcadis	Report to Contact: Alexis Crisp, Tiffany Linder	Telephone No. / E-mail: Alexis.Crisp@arcadis.com; Tiffany.linder@arcadis.com	Quote No.
Address: 28550 Cabot Dr #500	Sampler's Signature: x Sommer Guy	Analysis (Attach list if more space is needed): Report 8610 28 compounds	Page 1 of 1
City: Novi	State: MI	Zip Code: 48377	Lot # Bar Code: YI26004
Project Name: Racer PNC	Printed Name: Sommer Guy		
Project No.: 30167840.00031	P.O. No.		

Sample ID / Description (Containers for each sample may be combined on one line.)	Collection Date(s)	Collection Time (Military)	# Grab Composite	Matrix: Aqueous	Soil	Wipe	Air	No. of Containers by Preservative Type: Unpres.	HCl	H2SO4	HNO3	NaOH	Na2S2O3	Ascorbic Acid	Methanol	Volatile Organics 8260D Full List	Lot # Bar Code	KIESZ	
MWM2-28_GW-092523	9/25/23	1020	G	X				2								X			
EB-08_092523	9/25/23	1025	G	X				1								X			equipment blank
triplank	9/25/23	0925	G	X				1								X			triplank
MWM2-22_GW-092523	9/25/23	1115	G	X				2								X			
MW-43-14R_GW-092523	9/25/23	1220	G	X				2								X			

Turn Around Time Required (Prior lab approval required for expedited TAT.): ☒ Standard ☐ Rush (Specify)

Sample Disposal: ☐ Return to Client ☒ Disposal by Lab

Possible Hazard Identification: ☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by: Sommer Guy	9/25/23	1630	1. Received by: FedEx	9/25/23	1630
2. Relinquished by	Date	Time	2. Received by	Date	Time
3. Relinquished by	Date	Time	3. Received by	Date	Time
4. Relinquished by: FedEx	9/26/23	1030	4. Laboratory received by	9/26/23	1036

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY — Received on ice (Circle): (Yes) No Ice Pack — Receipt Temp: 4.5 °C — Temp Blank: PRESENT

DISTRIBUTION: WHITE & YELLOW-Return to laboratory with Sample(s); PINK-Field/Client Copy

Document Number: ME003NA-01

PACE ANALYTICAL SERVICES, LLC

PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI26004-001**

Description: **MWM2-28_GW-092523** Matrix: **Aqueous**

Date Sampled: **09/25/2023 1020** Project Name: **RACER PNC**

Date Received: **09/26/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	10/12/2023 0137	ELC2	10/10/2023 2002	87060

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.3	0.44	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.3	0.60	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	**39108-34-4**	**PFAS by ID SOP**	**2.0**	**JQ**	**7.3**	**1.5**	**ng/L**	**1**
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	**27619-97-2**	**PFAS by ID SOP**	**3.4**	**JQ**	**7.3**	**1.8**	**ng/L**	**1**
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.3	0.80	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.3	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.3	0.44	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.3	0.68	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.3	0.85	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.6	0.38	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.71	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.6	0.45	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.65	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	0.56	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.6	0.54	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**7.0**		**3.6**	**0.50**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**16**		**3.6**	**0.55**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	**335-76-2**	**PFAS by ID SOP**	**2.2**	**J**	**3.6**	**0.48**	**ng/L**	**1**
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.43	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**8.3**		**3.6**	**0.41**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**18**		**3.6**	**0.63**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**4.0**		**3.6**	**0.42**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**16**		**3.6**	**0.76**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**17**		**3.6**	**0.50**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.55	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.48	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.57	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**65**		**3.6**	**1.8**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	308	25-150
13C2_6:2FTS	N	341	25-150
13C2_8:2FTS	N	361	25-150
13C2_PFDoA		110	25-150
13C2_PFTeDA		111	25-150
13C3_PFBS		89	25-150
13C3_PFHxS		96	25-150
13C3-HFPO-DA		69	25-150
13C4_PFBA		37	25-150
13C4_PFHpA		77	25-150
13C5_PFHxA		72	25-150
13C5_PFPeA		56	25-150
13C6_PFDA		107	25-150
13C7_PFUdA		110	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI26004-001**

Description: **MWM2-28_GW-092523** Matrix: **Aqueous**

Date Sampled: **09/25/2023 1020** Project Name: **RACER PNC**

Date Received: **09/26/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		99	25-150
13C8_PFOS		108	25-150
13C8_PFOSA		93	10-150
13C9_PFNA		104	25-150
d5-EtFOSAA		118	25-150
d3-MeFOSAA		128	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI26004-002**

Description: **EB-08_092523** Matrix: **Aqueous**

Date Sampled: **09/25/2023 1025** Project Name: **RACER PNC**

Date Received: **09/26/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	10/12/2023 1517	ELC2	10/10/2023 2002	87060

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.3	0.44	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.3	0.60	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		7.3	1.5	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		7.3	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		7.3	0.79	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.3	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.3	0.44	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		7.3	0.68	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.3	0.85	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.6	0.38	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.71	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.6	0.45	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.65	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	0.56	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.6	0.54	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.6	0.50	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.6	0.55	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.6	0.48	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.43	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.6	0.41	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.6	0.63	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.6	0.42	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.6	0.75	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.6	0.49	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.55	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.48	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.57	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.6	1.8	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		115	25-150
13C2_6:2FTS		122	25-150
13C2_8:2FTS		100	25-150
13C2_PFDoA		101	25-150
13C2_PFTeDA		103	25-150
13C3_PFBS		107	25-150
13C3_PFHxS		110	25-150
13C3-HFPO-DA		96	25-150
13C4_PFBA		107	25-150
13C4_PFHpA		100	25-150
13C5_PFHxA		102	25-150
13C5_PFPeA		105	25-150
13C6_PFDA		108	25-150
13C7_PFUdA		105	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI26004-002**

Description: **EB-08_092523** Matrix: **Aqueous**

Date Sampled: **09/25/2023 1025** Project Name: **RACER PNC**

Date Received: **09/26/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		113	25-150
13C8_PFOS		105	25-150
13C8_PFOSA		101	10-150
13C9_PFNA		102	25-150
d5-EtFOSAA		100	25-150
d3-MeFOSAA		97	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI26004-003**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **09/25/2023 0925** Project Name: **RACER PNC**

Date Received: **09/26/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	10/12/2023 1528	ELC2	10/10/2023 2002	87060

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		6.9	0.42	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		6.9	0.57	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		6.9	1.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		6.9	1.7	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND		6.9	0.76	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		6.9	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		6.9	0.42	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND		6.9	0.65	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		6.9	0.81	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND		3.5	0.36	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.5	0.67	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.5	0.43	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.5	0.62	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.5	0.53	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.5	0.52	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	PFAS by ID SOP	ND		3.5	0.48	ng/L	1
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND		3.5	0.52	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND		3.5	0.46	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.5	0.41	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9	PFAS by ID SOP	ND		3.5	0.39	ng/L	1
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND		3.5	0.60	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1	PFAS by ID SOP	ND		3.5	0.40	ng/L	1
Perfluoro-n-octanoic acid (PFOA)	335-67-1	PFAS by ID SOP	ND		3.5	0.72	ng/L	1
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND		3.5	0.47	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.5	0.52	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.5	0.46	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.5	0.54	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	PFAS by ID SOP	ND		3.5	1.7	ng/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS		114	25-150
13C2_6:2FTS		118	25-150
13C2_8:2FTS		88	25-150
13C2_PFDoA		92	25-150
13C2_PFTeDA		88	25-150
13C3_PFBS		101	25-150
13C3_PFHxS		104	25-150
13C3-HFPO-DA		94	25-150
13C4_PFBA		105	25-150
13C4_PFHpA		96	25-150
13C5_PFHxA		102	25-150
13C5_PFPeA		104	25-150
13C6_PFDA		98	25-150
13C7_PFUdA		95	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI26004-003**

Description: **Trip Blank** Matrix: **Aqueous**

Date Sampled: **09/25/2023 0925** Project Name: **RACER PNC**

Date Received: **09/26/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		99	25-150
13C8_PFOS		99	25-150
13C8_PFOSA		94	10-150
13C9_PFNA		93	25-150
d5-EtFOSAA		93	25-150
d3-MeFOSAA		98	25-150

LOQ = Limit of Quantitation
ND = Not detected at or above the DL
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
DL = Detection Limit
J = Estimated result < LOQ and ≥ DL
Q = Surrogate failure
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI26004-004**

Description: **MWM2-22_GW-092523** Matrix: **Aqueous**

Date Sampled: **09/25/2023 1115** Project Name: **RACER PNC**

Date Received: **09/26/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	10/12/2023 1539	ELC2	10/10/2023 2002	87060
2	SOP SPE	PFAS by ID SOP	1	10/18/2023 1905	BWS	10/17/2023 1806	87673

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND		7.2	0.43	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND		7.2	0.59	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND		80	16	ng/L	2
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND		80	20	ng/L	2
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q	7.2	0.78	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND		7.2	1.9	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND		7.2	0.43	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	**2991-50-6**	**PFAS by ID SOP**	**2.0**	**J**	**7.2**	**0.67**	**ng/L**	**1**
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND		7.2	0.83	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	**375-73-5**	**PFAS by ID SOP**	**7.4**		**3.6**	**0.37**	**ng/L**	**1**
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND		3.6	0.70	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND		3.6	0.45	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND		3.6	0.64	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND		3.6	0.55	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND		3.6	0.53	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**8.7**		**3.6**	**0.49**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	**375-22-4**	**PFAS by ID SOP**	**28**		**3.6**	**0.54**	**ng/L**	**1**
Perfluoro-n-decanoic acid (PFDA)	**335-76-2**	**PFAS by ID SOP**	**1.9**	**J**	**3.6**	**0.47**	**ng/L**	**1**
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND		3.6	0.42	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**14**		**3.6**	**0.40**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	**307-24-4**	**PFAS by ID SOP**	**28**		**3.6**	**0.62**	**ng/L**	**1**
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**5.4**		**3.6**	**0.41**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**26**		**3.6**	**0.74**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	**2706-90-3**	**PFAS by ID SOP**	**27**		**3.6**	**0.49**	**ng/L**	**1**
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND		3.6	0.54	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND		3.6	0.47	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND		3.6	0.56	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**95**		**3.6**	**1.8**	**ng/L**	**1**

Surrogate	Run 1 Q	Run 1 % Recovery	Run 1 Acceptance Limits	Run 2 Q	Run 2 % Recovery	Run 2 Acceptance Limits
13C2_4:2FTS	N	273	25-150	N	194	25-150
13C2_6:2FTS	N	253	25-150		145	25-150
13C2_8:2FTS	N	274	25-150		95	25-150
13C2_PFDoA		104	25-150		108	25-150
13C2_PFTeDA		96	25-150		106	25-150
13C3_PFBS		78	25-150		100	25-150
13C3_PFHxS		93	25-150		103	25-150
13C3-HFPO-DA		56	25-150		92	25-150
13C4_PFBA		29	25-150		79	25-150
13C4_PFHpA		60	25-150		106	25-150
13C5_PFHxA		59	25-150		111	25-150
13C5_PFPeA		42	25-150		93	25-150
13C6_PFDA		97	25-150		98	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI26004-004**

Description: **MWM2-22_GW-092523** Matrix: **Aqueous**

Date Sampled: **09/25/2023 1115** Project Name: **RACER PNC**

Date Received: **09/26/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits	Q	Run 2 % Recovery	Acceptance Limits
13C7_PFUdA		109	25-150		110	25-150
13C8_PFOA		74	25-150		101	25-150
13C8_PFOS		99	25-150		104	25-150
13C8_PFOSA		77	10-150		97	10-150
13C9_PFNA		85	25-150		104	25-150
d5-EtFOSAA		117	25-150		116	25-150
d3-MeFOSAA		113	25-150		111	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI26004-005**

Description: **MW-43-14R_GW-092523** Matrix: **Aqueous**

Date Sampled: **09/25/2023 1220** Project Name: **RACER PNC**

Date Received: **09/26/2023** Project Number: **30167840.00031**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SOP SPE	PFAS by ID SOP	1	10/12/2023 1550	ELC2	10/10/2023 2002	87060

Parameter	CAS Number	Analytical Method	Result	Q		LOQ	DL	Units	Run
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	PFAS by ID SOP	ND			7.1	0.43	ng/L	1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3...)	763051-92-9	PFAS by ID SOP	ND			7.1	0.59	ng/L	1
1H, 1H, 2H, 2H-perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	PFAS by ID SOP	ND	Q		7.1	1.4	ng/L	1
1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	PFAS by ID SOP	ND	Q		7.1	1.8	ng/L	1
1H,1H,2H,2H-perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	PFAS by ID SOP	ND	Q		7.1	0.78	ng/L	1
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	PFAS by ID SOP	ND			7.1	1.8	ng/L	1
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	PFAS by ID SOP	ND			7.1	0.43	ng/L	1
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	PFAS by ID SOP	ND			7.1	0.67	ng/L	1
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	PFAS by ID SOP	ND			7.1	0.83	ng/L	1
Perfluoro-1-butanesulfonic acid (PFBS)	375-73-5	PFAS by ID SOP	ND			3.6	0.37	ng/L	1
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	PFAS by ID SOP	ND			3.6	0.69	ng/L	1
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	PFAS by ID SOP	ND			3.6	0.44	ng/L	1
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	PFAS by ID SOP	ND			3.6	0.63	ng/L	1
Perfluoro-1-octanesulfonamide (PFOSA)	754-91-6	PFAS by ID SOP	ND			3.6	0.55	ng/L	1
Perfluoro-1-pentanesulfonic acid (PFPeS)	2706-91-4	PFAS by ID SOP	ND			3.6	0.53	ng/L	1
Perfluorohexanesulfonic acid (PFHxS)	**355-46-4**	**PFAS by ID SOP**	**16**			**3.6**	**0.49**	**ng/L**	**1**
Perfluoro-n-butanoic acid (PFBA)	375-22-4	PFAS by ID SOP	ND	Q	UJ	3.6	0.53	ng/L	1
Perfluoro-n-decanoic acid (PFDA)	335-76-2	PFAS by ID SOP	ND			3.6	0.47	ng/L	1
Perfluoro-n-dodecanoic acid (PFDoA)	307-55-1	PFAS by ID SOP	ND			3.6	0.42	ng/L	1
Perfluoro-n-heptanoic acid (PFHpA)	**375-85-9**	**PFAS by ID SOP**	**4.9**			**3.6**	**0.40**	**ng/L**	**1**
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4	PFAS by ID SOP	ND			3.6	0.61	ng/L	1
Perfluoro-n-nonanoic acid (PFNA)	**375-95-1**	**PFAS by ID SOP**	**1.0**	**J**		**3.6**	**0.41**	**ng/L**	**1**
Perfluoro-n-octanoic acid (PFOA)	**335-67-1**	**PFAS by ID SOP**	**12**			**3.6**	**0.74**	**ng/L**	**1**
Perfluoro-n-pentanoic acid (PFPeA)	2706-90-3	PFAS by ID SOP	ND			3.6	0.48	ng/L	1
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7	PFAS by ID SOP	ND			3.6	0.53	ng/L	1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8	PFAS by ID SOP	ND			3.6	0.47	ng/L	1
Perfluoro-n-undecanoic acid (PFUdA)	2058-94-8	PFAS by ID SOP	ND			3.6	0.56	ng/L	1
Perfluorooctanesulfonic acid (PFOS)	**1763-23-1**	**PFAS by ID SOP**	**99**			**3.6**	**1.8**	**ng/L**	**1**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C2_4:2FTS	N	308	25-150
13C2_6:2FTS	N	229	25-150
13C2_8:2FTS	N	287	25-150
13C2_PFDoA		96	25-150
13C2_PFTeDA		72	25-150
13C3_PFBS		77	25-150
13C3_PFHxS		85	25-150
13C3-HFPO-DA		49	25-150
13C4_PFBA	N	20	25-150
13C4_PFHpA		54	25-150
13C5_PFHxA		54	25-150
13C5_PFPeA		35	25-150
13C6_PFDA		99	25-150
13C7_PFUdA		100	25-150

LOQ = Limit of Quantitation
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
DL = Detection Limit
Q = Surrogate failure
ND = Not detected at or above the DL
N = Recovery is out of criteria
P = The RPD between two GC columns exceeds 40%
J = Estimated result < LOQ and ≥ DL
L = LCS/LCSD failure
H = Out of holding time
W = Reported on wet weight basis
S = MS/MSD failure

Pace Analytical Services, LLC *(formerly Shealy Environmental Services, Inc.)*
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PFAS by LC/MS/MS

Client: **Arcadis U.S., Inc.** Laboratory ID: **YI26004-005**

Description: **MW-43-14R_GW-092523** Matrix: **Aqueous**

Date Sampled: **09/25/2023 1220** Project Name: **RACER PNC**

Date Received: **09/26/2023** Project Number: **30167840.00031**

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
13C8_PFOA		69	25-150
13C8_PFOS		98	25-150
13C8_PFOSA		80	10-150
13C9_PFNA		88	25-150
d5-EtFOSAA		115	25-150
d3-MeFOSAA		110	25-150

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