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Alex Villhauer, Arcadis

Date:

January 29, 2019

Arcadis Project No.:

B0064479.2019

Subject:

PFAS Storm Sewer Sampling Results- Plant 2 RACER Trust Site, Lansing, Michigan

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The following provides a summary of the per- and polyfluoroalkyl substances (PFAS) storm sewer sampling completed at RACER Trust, Plant 2 located in the Lansing Township, Michigan (Site).

As described in the Monitoring Well PFAS Summary (Arcadis 2018), initial sampling completed at Plant 2 identified Perfluorooctanesulfonic acid (PFOS) at concentrations exceeding the MDEQ Part 201 Groundwater Surface Water Interface (GSI) criterion of 12 nanograms per liter (ng/L). This memorandum describes the follow-up storm sewer outfall sampling conducted at Plant 2 to evaluate the GSI pathway for PFAS impacted groundwater.

INVESTIGATION ACTIVITIES

The work completed included sampling two storm sewer structures, P2-MH-NW and P2-MH-W, representing the two locations where stormwater leaves the Site. The location of the storm sewer structures is included on **Figure 1**. Sample location P2-MH-NW was sampled on December 7, 2018. Location P2-MH-W was sampled on January 14, 2019. Samples were collected by accessing the manhole covers and collecting the sample using a peristaltic pump and PFAS free disposable tubing.

Storm sewer samples were sent to SGS Accutest Laboratory located in Orlando, Florida and analyzed for the 24 PFAS outlined in the Michigan Department of Environmental Quality (MDEQ) PFAS Minimum

Laboratory Analyte List (MDEQ, 2018) using modified USEPA Method 537 with isotope dilution (DoD QSM 5.1). In addition, samples were analyzed for 1,4-dioxane at Merit Laboratories in Lansing using USEPA Method 8260 SIM. To avoid cross contamination, all sampling was conducted in accordance with the Arcadis PFAS Sampling Technical Guidance Instruction.

RESULTS AND DISCUSSION

The analytical results for storm sewer samples were compared to the GSI criteria for PFOS, Perfluorooctanoic acid (PFOA), and 1,4-dioxane. Sampling locations and analytical results for PFOS, PFOA, and 1,4-dioxane are shown **Figure 1**. Analytical results for PFAS and 1,4-dioxane are summarized on **Table 1**. Laboratory analytical reports are included as **Attachment 1**.

PFOS was detected at P2-MH-NW above the GSI Criterion at a concentration 176 nanograms per liter (ng/L). PFOS detected in P2-MH-W was below the GSI Criteria. PFOA was detected below GSI criteria at both locations. 1,4-Dioxane was not detected in the storm sewer samples. Additional PFAS compounds detected are included on **Table 1**.

Additional sampling of the Plant 2 storm sewer system was completed on January 26, 2019 to obtain additional data to better isolate potential contributions of PFAS in storm water. This data will be used to help identify and evaluate possible options to mitigate discharge of PFAS to the Genesee County and City of Lansing sewers located north of Plant 2.

References:

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

Enclosures:

Table 1 – Plant 2 Storm Sewer Analytical Results

Figure 1 – Plant 2 Storm Sewer Analytical Results

Attachment 1 – Laboratory Analytical Reports

TABLES

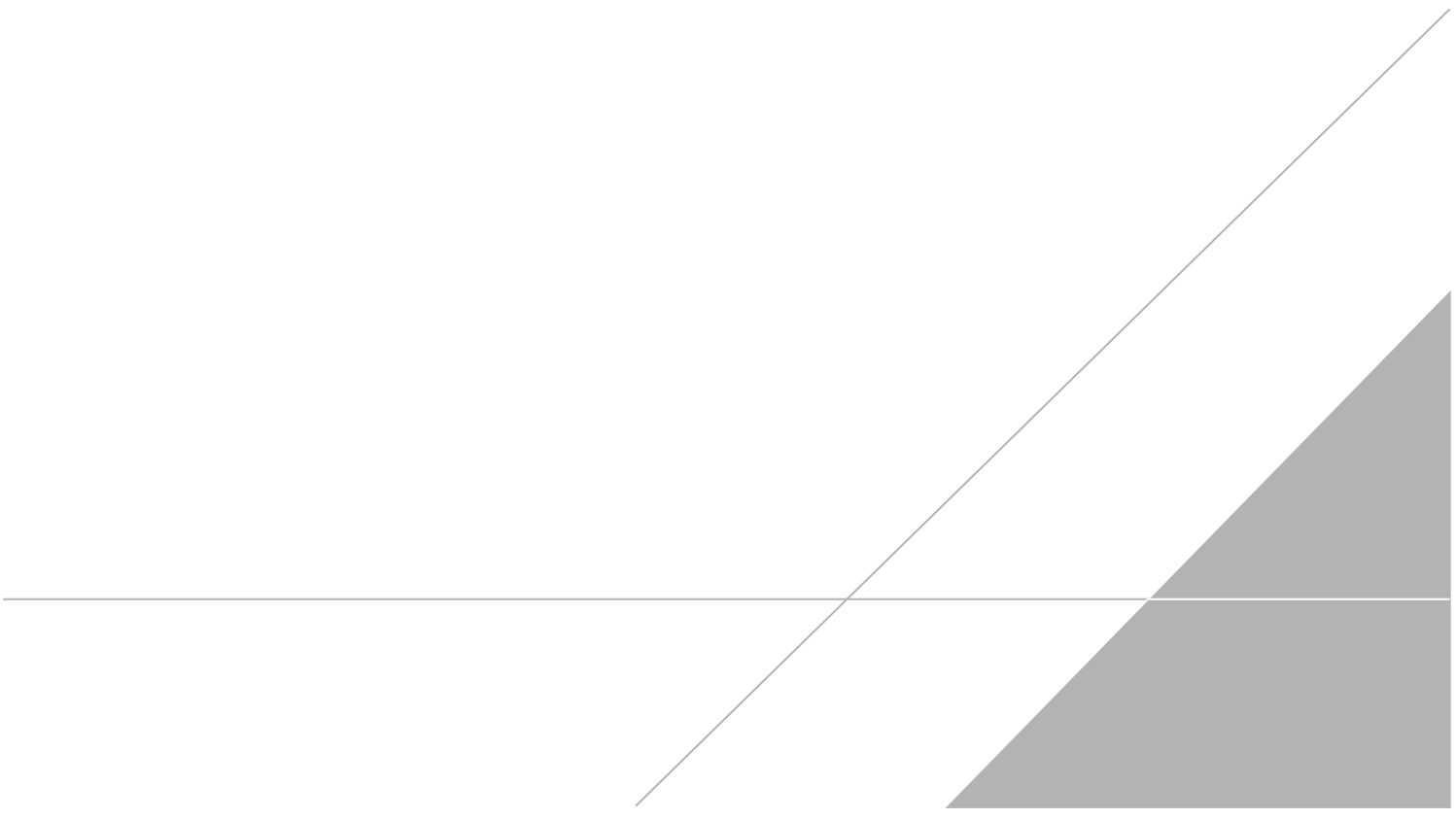


Table 1
Plant 2 Storm Sewer Analytical Summary
RACER Trust Plant 2
Lansing, Michigan

ARCADIS Design & Consultancy for natural and built assets

Location ID: Date Collected: Sample Name:	MDEQ Part 201 GSI	Units	P2-MH-NW 12/7/2018 P2-MH-NW_120718	P2-MH-W 1/14/2019 P2-MH-W_011419
Poly- and Perfluorinated Compounds (by USEPA Method 537 modified)				
4:2 FTS	- -	ng/L	<7.7	<8.3
6:2FTS	- -	ng/L	**2.21 J**	<8.3
8:2FTS	- -	ng/L	<7.7	<8.3
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	- -	ng/L	<19	<21
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA	- -	ng/L	<19	<21
Perfluorobutanesulfonic acid (PFBS)	- -	ng/L	**8.07**	**3.28 J**
Perfluorobutanoic acid (PFBA)	- -	ng/L	**13.6**	**8.26 J**
Perfluorodecanesulfonic acid (PFDS)	- -	ng/L	<3.8	<4.2
Perfluorodecanoic acid (PFDA)	- -	ng/L	**4.53**	**3.7 J**
Perfluorododecanoic acid (PFDoA)	- -	ng/L	<3.8	<4.2
Perfluoroheptanesulfonic Acid (PFHpS)	- -	ng/L	**1.96 J**	<4.2
Perfluoroheptanoic acid (PFHpA)	- -	ng/L	**16.1**	**9.76**
Perfluorohexanesulfonic acid (PFHxS)	- -	ng/L	**22**	**2.28 J**
Perfluorohexanoic acid (PFHxA)	- -	ng/L	**17.7**	**11.9**
Perfluorononanesulfonic acid (PFNS)	- -	ng/L	<3.8	<4.2
Perfluorononanoic acid (PFNA)	- -	ng/L	**3.6 J**	**3.14 J**
Perfluorooctane Sulfonamide (FOSA)	- -	ng/L	<3.8	<4.2
Perfluorooctane sulfonic acid (PFOS)	12	ng/L	**176**	**8.95**
Perfluorooctanoic acid (PFOA)	12,000	ng/L	**31.2**	**24.5**
Perfluoropentanesulfonic acid (PFPeS)	- -	ng/L	**3.31 J**	<4.2
Perfluoropentanoic acid (PFPeA)	- -	ng/L	**18.2**	**9.05**
Perfluorotetradecanoic acid (PFTeA)	- -	ng/L	<3.8	<4.2
Perfluorotridecanoic Acid (PFTriA)	- -	ng/L	<3.8	<4.2
Perfluoroundecanoic acid (PFUnA)	- -	ng/L	<3.8	<4.2
Combined PFOS + PFOA	- -	ng/L	**207**	**33.5**
1,4-Dioxane (by USEPA Method 8260 SIM)				
1,4-Dioxane	2,800	µg/L	<1	<1

See notes on last page.

Table 1
Plant 2 Storm Sewer Analytical Summary
RACER Trust Plant 2
Lansing, Michigan

ARCADIS Design & Consultancy for natural and built assets

Notes:

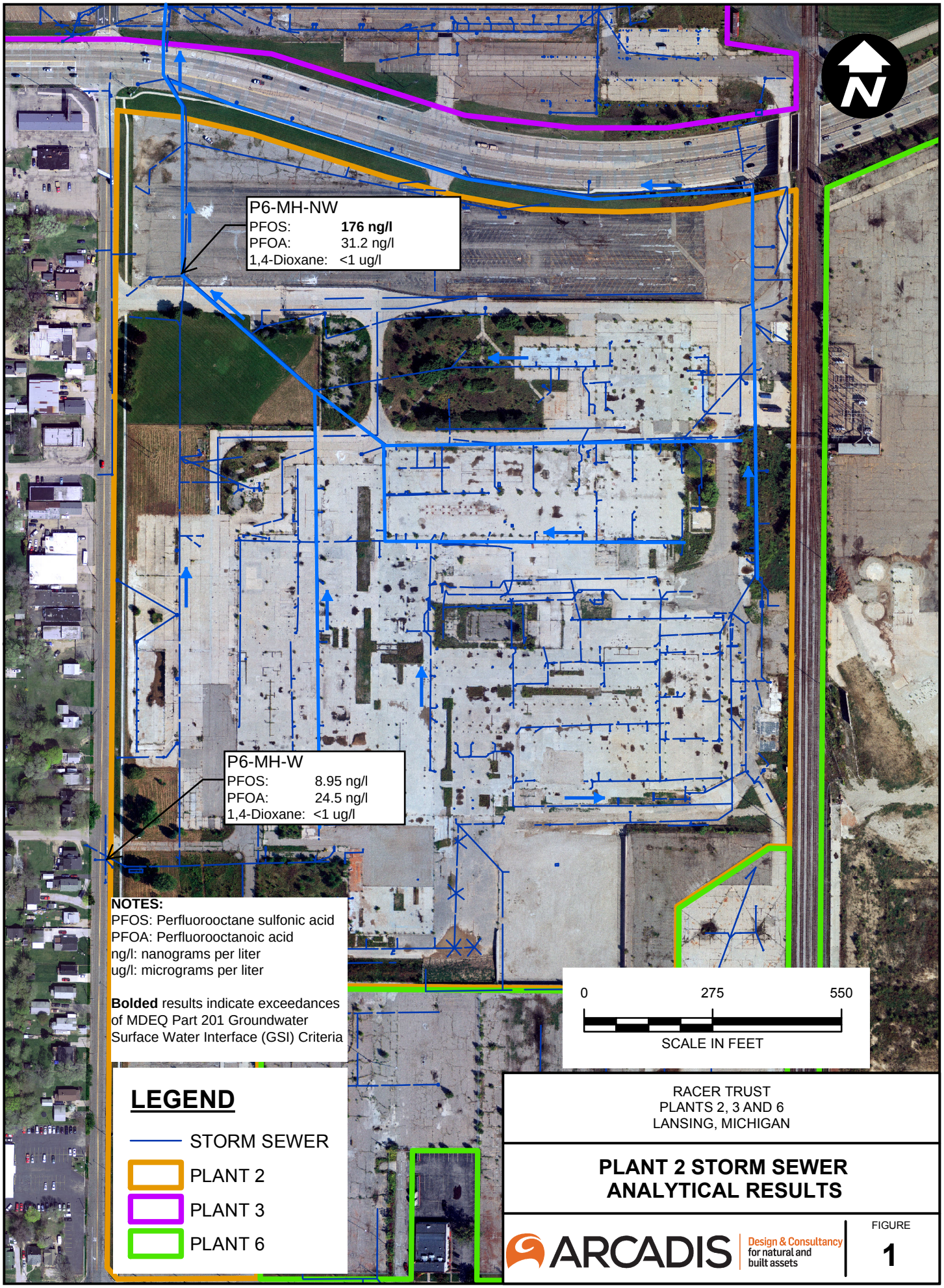
Bold result denotes detection is above the laboratory reporting limit but below MDEQ Part 201 Generic Cleanup Criteria.
Gray shading denotes exceedances of one or more MDEQ Part 201 Generic Cleanup Criteria.
Data shown in brackets [ ] represent duplicate sample analytical results.
- - = Not listed in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

Acronyms and Abbreviations:
GSI - Groundwater Surface Water Interface Criteria
MH - manhole
ng/L - nanograms per liter
µg/L - micrograms per liter
NA - not analyzed
SB - soil boring
MDEQ - Michigan Department of Environmental Quality
USEPA - United States Environmental Protection Agency

Analytical Laboratory:
SGS Accutest - Orlando, FL

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

FIGURES



NOTES:
PFOS: Perfluorooctane sulfonic acid
PFOA: Perfluorooctanoic acid
ng/l: nanograms per liter
ug/l: micrograms per liter

Bolded results indicate exceedances of MDEQ Part 201 Groundwater Surface Water Interface (GSI) Criteria

RACER TRUST
PLANTS 2, 3 AND 6
LANSING, MICHIGAN

PLANT 2 STORM SEWER ANALYTICAL RESULTS

ARCADIS Design & Consultancy for natural and built assets

FIGURE 1

CITY: KNOXVILLE DIV: ENV DB: A.SMITH PIC: PM: TM: TR: PROJECT NUMBER: COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
G:\GIS\Project Files\MotorsLiquidationCompany\Lansing\Docs\Quarterly Report Figures\A1-1_Plant 2 SW.mxd PLOTTED: 2/12/2016 11:33:57 AM BY: dolexa

ATTACHMENT 1

Laboratory Analytical Reports

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

e-Hardcopy 2.0
Automated Report

Technical Report for

Arcadis

Racer Lansing PFAS Delineation; Lansing, MI

B0064479.2018.03700

SGS Job Number: FA60008

Sampling Dates: 12/04/18 - 12/07/18

Report to:

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Lansing, MI 48933
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ATTN: Alex Villhauer

Total number of pages in report: **68**

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

Caitlin Brice, M.S.
General Manager

Client Service contact: Andrea Colby 407-425-6700

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

Sections: 1 2 3 4 5

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SGS North America Inc.

Sample Summary

Arcadis

Job No: FA60008

Racer Lansing PFAS Delineation; Lansing, MI
Project No: B0064479.2018.03700

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
FA60008-1	12/04/18	14:35	AWDA	12/08/18	AQ	Ground Water	MW-91-2_120418
FA60008-2	12/05/18	10:45	AWDA	12/08/18	AQ	Ground Water	MW-02-04(3)_120518
FA60008-3	12/05/18	12:20	AWDA	12/08/18	AQ	Ground Water	MW-18-92_120518
FA60008-4	12/05/18	13:40	AWDA	12/08/18	AQ	Ground Water	MW-18-88_120518
FA60008-5	12/05/18	15:15	AWDA	12/08/18	AQ	Ground Water	MW-18-89_120518
FA60008-6	12/06/18	10:45	AWDA	12/08/18	AQ	Ground Water	MW-18-90_120618
FA60008-7	12/06/18	12:15	AWDA	12/08/18	AQ	Ground Water	MW-18-91_120618
FA60008-8	12/06/18	14:40	AWDA	12/08/18	AQ	Ground Water	CH-14-RO_120618
FA60008-9	12/06/18	00:00	AWDA	12/08/18	AQ	Ground Water	DUP-04
FA60008-10	12/07/18	11:40	AWDA	12/08/18	AQ	Ground Water	AS-17-05_120718
FA60008-11	12/07/18	12:50	AWDA	12/08/18	AQ	Ground Water	AS-17-04_120718
FA60008-12	12/07/18	14:20	AWDA	12/08/18	AQ	Ground Water	P6-MH2-SW_120718
FA60008-13	12/07/18	15:10	AWDA	12/08/18	AQ	Ground Water	P3-MH-NE_120718

Sample Summary
(continued)

Arcadis

Job No: FA60008

Racer Lansing PFAS Delineation; Lansing, MI
Project No: B0064479.2018.03700

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
FA60008-14	12/07/18	15:40	AWDA	12/08/18	AQ	Ground Water	P2-MH-NW_120718
FA60008-15	12/07/18	00:00	AWDA	12/08/18	AQ	Ground Water	DUP-08_120718

Summary of Hits

Job Number: FA60008
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 12/04/18 thru 12/07/18

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
FA60008-1	**MW-91-2_120418**					
Perfluoropentanoic acid		0.00157 J	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid		0.00156 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00145 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.00582	0.0040	0.0015	ug/l	EPA 537M BY ID
FA60008-2	**MW-02-04(3)_120518**					
Perfluorobutanoic acid		0.00266 J	0.0077	0.0019	ug/l	EPA 537M BY ID
FA60008-3	**MW-18-92_120518**					
Perfluorobutanoic acid		0.00267 J	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.00156 J	0.0038	0.0014	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.00105 J	0.0038	0.00096	ug/l	EPA 537M BY ID
FA60008-4	**MW-18-88_120518**					
Perfluorobutanoic acid		0.00596 J	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.00322 J	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00179 J	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00135 J	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.106	0.0038	0.0014	ug/l	EPA 537M BY ID
FA60008-5	**MW-18-89_120518**					
Perfluorobutanoic acid		0.0126	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0145	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0102	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.00778	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0214	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00229 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00297 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00223 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid		0.00128 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00848	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.00705	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.289	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorodecanesulfonic acid [a]		0.00248 J	0.0040	0.0010	ug/l	EPA 537M BY ID
FA60008-6	**MW-18-90_120618**					
Perfluoropentanoic acid [b]		0.00618	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid [c]		0.00614	0.0040	0.0010	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA60008
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 12/04/18 thru 12/07/18

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
Perfluoroheptanoic acid [c]		0.00516	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid [c]		0.0191	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid [d]		0.00155 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid [c]		0.00111 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid [c]		0.00273 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid [c]		0.00512	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid [c]		0.0360	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid [c]		0.0549	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid [c]		0.940	0.040	0.015	ug/l	EPA 537M BY ID
FA60008-7	**MW-18-91_120618**					
Perfluorobutanoic acid		0.0105	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.00649	0.0038	0.0014	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.00435	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.00401	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.00899	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00133 J	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00176 J	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00182 J	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00177 J	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.0760	0.0038	0.0014	ug/l	EPA 537M BY ID
Perfluorodecanesulfonic acid [a]		0.00529	0.0038	0.00096	ug/l	EPA 537M BY ID
PFOSA		0.00212 J	0.0038	0.00096	ug/l	EPA 537M BY ID
FA60008-8	**CH-14-RO_120618**					
Perfluorooctanoic acid		0.126 J	0.38	0.096	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.102 J	0.38	0.096	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid		0.290 J	0.38	0.096	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		1.54	0.38	0.096	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.651	0.38	0.096	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		10.1	0.38	0.14	ug/l	EPA 537M BY ID
FA60008-9	**DUP-04**					
Perfluorooctanoic acid		0.108 J	0.38	0.096	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.120 J	0.38	0.096	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid		0.336 J	0.38	0.096	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		1.78	0.38	0.096	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.758	0.38	0.096	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		11.0	0.38	0.14	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA60008
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 12/04/18 thru 12/07/18

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
FA60008-10	**AS-17-05_120718**					
Perfluorobutanoic acid		0.00549 J	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.00256 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00473	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.00114 J	0.0040	0.0010	ug/l	EPA 537M BY ID
FA60008-11	**AS-17-04_120718**					
Perfluorobutanoic acid		0.00655 J	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.00640	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.00113 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00103 J	0.0040	0.0010	ug/l	EPA 537M BY ID
FA60008-12	**P6-MH2-SW_120718**					
Perfluorobutanoic acid		0.0167	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0253	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0232	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0207	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0394	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00303 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00217 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00186 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00126 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.0730	0.0040	0.0015	ug/l	EPA 537M BY ID
PFOSA		0.0141	0.0040	0.0010	ug/l	EPA 537M BY ID
FA60008-13	**P3-MH-NE_120718**					
Perfluorobutanoic acid [c]		0.00289 J	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluorooctanoic acid [c]		0.00163 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid [c]		0.00148 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid [c]		0.00161 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid [c]		0.0219 B	0.0040	0.0015	ug/l	EPA 537M BY ID
FA60008-14	**P2-MH-NW_120718**					
Perfluorobutanoic acid		0.0136	0.0077	0.0019	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0182	0.0038	0.0014	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0177	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0161	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0312	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00360 J	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00453	0.0038	0.00096	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA60008
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 12/04/18 thru 12/07/18

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
Perfluorobutanesulfonic acid		0.00807	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid		0.00331 J	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.0220	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.00196 J	0.0038	0.00096	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.176	0.0038	0.0014	ug/l	EPA 537M BY ID
6:2 Fluorotelomer sulfonate		0.00221 J	0.0077	0.0019	ug/l	EPA 537M BY ID
FA60008-15	**DUP-08_120718**					
Perfluorobutanoic acid		0.0162	0.0080	0.0020	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.0243	0.0040	0.0015	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0216	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.0193	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0374	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00304 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00205 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00200 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00103 J	0.0040	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.0620	0.0040	0.0015	ug/l	EPA 537M BY ID
PFOSA		0.0133	0.0040	0.0010	ug/l	EPA 537M BY ID

(a) Associated BS recovery outside control limits.
(b) Insufficient sample for re-extraction. Associated ID Standard outside control limits.
(c) Insufficient sample for re-extraction.
(d) Insufficient sample for re-extraction. Associated BS recovery outside control limits.

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID:	MW-91-2_120418		
Lab Sample ID:	FA60008-1	**Date Sampled:**	12/04/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q25389.D	1	12/21/18 14:01	NAF	12/19/18 09:00	OP73096	S2Q394
Run #2							

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.00157	0.0040	0.0015	ug/l	J
307-24-4	Perfluorohexanoic acid	ND	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid [a]	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	0.00156	0.0040	0.0010	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	0.00145	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.00582	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

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

Report of Analysis

Client Sample ID:	MW-91-2_120418		
Lab Sample ID:	FA60008-1	**Date Sampled:**	12/04/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

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

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	94%		30-140%
	13C5-PFPeA	99%		40-140%
	13C5-PFHxA	103%		50-150%
	13C4-PFHpA	107%		50-150%
	13C8-PFOA	126%		50-150%
	13C9-PFNA	111%		50-150%
	13C6-PFDA	103%		50-150%
	13C7-PFUnDA	102%		50-150%
	13C2-PFDoDA	77%		50-150%
	13C2-PFTeDA	84%		40-150%
	13C3-PFBS	95%		50-150%
	13C3-PFHxS	100%		50-150%
	13C8-PFOS	83%		50-150%
	13C8-FOSA	95%		30-140%
	d3-MeFOSAA	84%		50-150%
	13C2-4:2FTS	110%		50-150%
	13C2-6:2FTS	119%		50-150%
	13C2-8:2FTS	94%		50-150%

(a) Associated BS recovery outside control limits.

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

Report of Analysis

Client Sample ID:	MW-02-04(3)_120518		
Lab Sample ID:	FA60008-2	**Date Sampled:**	12/05/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q25514.D	1	12/24/18 18:41	NAF	12/19/18 09:00	OP73096	S2Q395
Run #2							

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.00266	0.0077	0.0019	ug/l	J
2706-90-3	Perfluoropentanoic acid	ND	0.0038	0.0014	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0038	0.00096	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0038	0.00096	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0038	0.00096	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0038	0.00096	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0038	0.00096	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0038	0.00096	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0038	0.0014	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0038	0.00096	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0038	0.00096	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	0.0038	0.00096	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0038	0.00096	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0038	0.00096	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0038	0.00096	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0038	0.0014	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0038	0.00096	ug/l	
335-77-3	Perfluorodecanesulfonic acid [a]	ND	0.0038	0.00096	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0038	0.00096	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.019	0.0038	ug/l	
2991-50-6	EtFOSAA	ND	0.019	0.0038	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	

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

Report of Analysis

Client Sample ID:	MW-02-04(3)_120518		
Lab Sample ID:	FA60008-2	**Date Sampled:**	12/05/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

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

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	100%		30-140%
	13C5-PFPeA	107%		40-140%
	13C5-PFHxA	115%		50-150%
	13C4-PFHpA	115%		50-150%
	13C8-PFOA	121%		50-150%
	13C9-PFNA	107%		50-150%
	13C6-PFDA	106%		50-150%
	13C7-PFUnDA	103%		50-150%
	13C2-PFDoDA	94%		50-150%
	13C2-PFTeDA	91%		40-150%
	13C3-PFBS	105%		50-150%
	13C3-PFHxS	105%		50-150%
	13C8-PFOS	90%		50-150%
	13C8-FOSA	100%		30-140%
	d3-MeFOSAA	92%		50-150%
	13C2-4:2FTS	109%		50-150%
	13C2-6:2FTS	112%		50-150%
	13C2-8:2FTS	90%		50-150%

(a) Associated BS recovery outside control limits.

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

Report of Analysis

Client Sample ID:	MW-18-92_120518		
Lab Sample ID:	FA60008-3	**Date Sampled:**	12/05/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q25391.D	1	12/21/18 14:33	NAF	12/19/18 09:00	OP73096	S2Q394
Run #2							

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.00267	0.0077	0.0019	ug/l	J
2706-90-3	Perfluoropentanoic acid	0.00156	0.0038	0.0014	ug/l	J
307-24-4	Perfluorohexanoic acid	ND	0.0038	0.00096	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0038	0.00096	ug/l	
335-67-1	Perfluorooctanoic acid	0.00105	0.0038	0.00096	ug/l	J
375-95-1	Perfluorononanoic acid [a]	ND	0.0038	0.00096	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0038	0.00096	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0038	0.00096	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0038	0.0014	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0038	0.00096	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0038	0.00096	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	ND	0.0038	0.00096	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0038	0.00096	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0038	0.00096	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0038	0.00096	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0038	0.0014	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0038	0.00096	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0038	0.00096	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0038	0.00096	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.019	0.0038	ug/l	
2991-50-6	EtFOSAA	ND	0.019	0.0038	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	

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

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

Report of Analysis

Client Sample ID:	MW-18-92_120518		
Lab Sample ID:	FA60008-3	**Date Sampled:**	12/05/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

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

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	76%		30-140%
	13C5-PFPeA	83%		40-140%
	13C5-PFHxA	91%		50-150%
	13C4-PFHpA	92%		50-150%
	13C8-PFOA	105%		50-150%
	13C9-PFNA	98%		50-150%
	13C6-PFDA	88%		50-150%
	13C7-PFUnDA	95%		50-150%
	13C2-PFDoDA	68%		50-150%
	13C2-PFTeDA	74%		40-150%
	13C3-PFBS	79%		50-150%
	13C3-PFHxS	84%		50-150%
	13C8-PFOS	78%		50-150%
	13C8-FOSA	94%		30-140%
	d3-MeFOSAA	79%		50-150%
	13C2-4:2FTS	90%		50-150%
	13C2-6:2FTS	102%		50-150%
	13C2-8:2FTS	84%		50-150%

(a) Associated BS recovery outside control limits.

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

Report of Analysis

Client Sample ID:	MW-18-88_120518		
Lab Sample ID:	FA60008-4	**Date Sampled:**	12/05/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q25392.D	1	12/21/18 14:50	NAF	12/19/18 09:00	OP73096	S2Q394
Run #2							

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.00596	0.0077	0.0019	ug/l	J
2706-90-3	Perfluoropentanoic acid	ND	0.0038	0.0014	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0038	0.00096	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0038	0.00096	ug/l	
335-67-1	Perfluorooctanoic acid	0.00322	0.0038	0.00096	ug/l	J
375-95-1	Perfluorononanoic acid [a]	ND	0.0038	0.00096	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0038	0.00096	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0038	0.00096	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0038	0.0014	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0038	0.00096	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0038	0.00096	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00179	0.0038	0.00096	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0038	0.00096	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00135	0.0038	0.00096	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0038	0.00096	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.106	0.0038	0.0014	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0038	0.00096	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0038	0.00096	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0038	0.00096	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.019	0.0038	ug/l	
2991-50-6	EtFOSAA	ND	0.019	0.0038	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	

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

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

Report of Analysis

Client Sample ID:	MW-18-88_120518		
Lab Sample ID:	FA60008-4	**Date Sampled:**	12/05/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

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

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	98%		30-140%
	13C5-PFPeA	101%		40-140%
	13C5-PFHxA	104%		50-150%
	13C4-PFHpA	109%		50-150%
	13C8-PFOA	125%		50-150%
	13C9-PFNA	109%		50-150%
	13C6-PFDA	97%		50-150%
	13C7-PFUnDA	97%		50-150%
	13C2-PFDoDA	71%		50-150%
	13C2-PFTeDA	74%		40-150%
	13C3-PFBS	98%		50-150%
	13C3-PFHxS	101%		50-150%
	13C8-PFOS	86%		50-150%
	13C8-FOSA	94%		30-140%
	d3-MeFOSAA	77%		50-150%
	13C2-4:2FTS	103%		50-150%
	13C2-6:2FTS	119%		50-150%
	13C2-8:2FTS	94%		50-150%

(a) Associated BS recovery outside control limits.

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

Report of Analysis

Client Sample ID:	MW-18-89_120518		
Lab Sample ID:	FA60008-5	**Date Sampled:**	12/05/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q25515.D	1	12/24/18 18:57	NAF	12/19/18 09:00	OP73096	S2Q395
Run #2							

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0126	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0145	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0102	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.00778	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0214	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00229	0.0040	0.0010	ug/l	J
335-76-2	Perfluorodecanoic acid	0.00297	0.0040	0.0010	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00223	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	0.00128	0.0040	0.0010	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	0.00848	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.00705	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.289	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid [a]	0.00248	0.0040	0.0010	ug/l	J
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

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

Report of Analysis

Client Sample ID:	MW-18-89_120518		
Lab Sample ID:	FA60008-5	**Date Sampled:**	12/05/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

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

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	86%		30-140%
	13C5-PFPeA	94%		40-140%
	13C5-PFHxA	98%		50-150%
	13C4-PFHpA	103%		50-150%
	13C8-PFOA	114%		50-150%
	13C9-PFNA	114%		50-150%
	13C6-PFDA	109%		50-150%
	13C7-PFUnDA	113%		50-150%
	13C2-PFDoDA	102%		50-150%
	13C2-PFTeDA	93%		40-150%
	13C3-PFBS	94%		50-150%
	13C3-PFHxS	95%		50-150%
	13C8-PFOS	98%		50-150%
	13C8-FOSA	64%		30-140%
	d3-MeFOSAA	105%		50-150%
	13C2-4:2FTS	102%		50-150%
	13C2-6:2FTS	115%		50-150%
	13C2-8:2FTS	112%		50-150%

(a) Associated BS recovery outside control limits.

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

Report of Analysis

Client Sample ID:	MW-18-90_120618		
Lab Sample ID:	FA60008-6	**Date Sampled:**	12/06/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	2Q25394.D	1	12/21/18 15:21	NAF	12/19/18 09:00	OP73096	S2Q394
Run #2 [a]	2Q25517.D	10	12/24/18 19:28	NAF	12/19/18 09:00	OP73096	S2Q395
Run #3 [b]	2Q25516.D	1	12/24/18 19:12	NAF	12/19/18 09:00	OP73096	S2Q395

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid [c]	ND	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid [c]	0.00618	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.00614	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.00516	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0191	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid [d]	0.00155	0.0040	0.0010	ug/l	J
335-76-2	Perfluorodecanoic acid	0.00111	0.0040	0.0010	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00273	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	0.00512	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.0360	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.0549	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.940 [e]	0.040	0.015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						

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

Report of Analysis

Client Sample ID:	MW-18-90_120618		
Lab Sample ID:	FA60008-6	**Date Sampled:**	12/06/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Run# 3	Limits
	13C4-PFBA	3% f	3% f	3% f	30-140%
	13C5-PFPeA	35% f	37% f	36% f	40-140%
	13C5-PFHxA	91%	104%	97%	50-150%
	13C4-PFHpA	93%	109%	102%	50-150%
	13C8-PFOA	94%	107%	102%	50-150%
	13C9-PFNA	86%	107%	92%	50-150%
	13C6-PFDA	73%	94%	77%	50-150%
	13C7-PFUnDA	63%	91%	63%	50-150%
	13C2-PFDoDA	70%	85%	77%	50-150%
	13C2-PFTeDA	81%	78%	80%	40-150%
	13C3-PFBS	91%	102%	98%	50-150%
	13C3-PFHxS	85%	102%	92%	50-150%
	13C8-PFOS	72%	89%	78%	50-150%
	13C8-FOSA	62%	113%	52%	30-140%
	d3-MeFOSAA	68%	82%	74%	50-150%
	13C2-4:2FTS	91%	97%	96%	50-150%
	13C2-6:2FTS	98%	103%	100%	50-150%
	13C2-8:2FTS	72%	93%	76%	50-150%

(a) Insufficient sample for re-extraction.
(b) Confirmation run for internal standard areas.
(c) Associated ID Standard outside control limits.
(d) Associated BS recovery outside control limits.
(e) Result is from Run# 2
(f) Outside control limits.

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

Report of Analysis

Client Sample ID:	MW-18-91_120618		
Lab Sample ID:	FA60008-7	**Date Sampled:**	12/06/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q25518.D	1	12/24/18 19:44	NAF	12/19/18 09:00	OP73096	S2Q395
Run #2							

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0105	0.0077	0.0019	ug/l	
2706-90-3	Perfluoropentanoic acid	0.00649	0.0038	0.0014	ug/l	
307-24-4	Perfluorohexanoic acid	0.00435	0.0038	0.00096	ug/l	
375-85-9	Perfluoroheptanoic acid	0.00401	0.0038	0.00096	ug/l	
335-67-1	Perfluorooctanoic acid	0.00899	0.0038	0.00096	ug/l	
375-95-1	Perfluorononanoic acid	0.00133	0.0038	0.00096	ug/l	J
335-76-2	Perfluorodecanoic acid	0.00176	0.0038	0.00096	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.0038	0.00096	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0038	0.0014	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0038	0.00096	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0038	0.00096	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00182	0.0038	0.00096	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0038	0.00096	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00177	0.0038	0.00096	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0038	0.00096	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0760	0.0038	0.0014	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0038	0.00096	ug/l	
335-77-3	Perfluorodecanesulfonic acid [a]	0.00529	0.0038	0.00096	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	0.00212	0.0038	0.00096	ug/l	J
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.019	0.0038	ug/l	
2991-50-6	EtFOSAA	ND	0.019	0.0038	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	

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

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

Report of Analysis

Client Sample ID:	MW-18-91_120618		
Lab Sample ID:	FA60008-7	**Date Sampled:**	12/06/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

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

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	81%		30-140%
	13C5-PFPeA	86%		40-140%
	13C5-PFHxA	90%		50-150%
	13C4-PFHpA	93%		50-150%
	13C8-PFOA	106%		50-150%
	13C9-PFNA	107%		50-150%
	13C6-PFDA	101%		50-150%
	13C7-PFUnDA	83%		50-150%
	13C2-PFDoDA	73%		50-150%
	13C2-PFTeDA	78%		40-150%
	13C3-PFBS	85%		50-150%
	13C3-PFHxS	87%		50-150%
	13C8-PFOS	90%		50-150%
	13C8-FOSA	56%		30-140%
	d3-MeFOSAA	101%		50-150%
	13C2-4:2FTS	93%		50-150%
	13C2-6:2FTS	108%		50-150%
	13C2-8:2FTS	103%		50-150%

(a) Associated BS recovery outside control limits.

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

Report of Analysis

Client Sample ID:	CH-14-RO_120618		
Lab Sample ID:	FA60008-8	**Date Sampled:**	12/06/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q25519.D	100	12/24/18 20:00	NAF	12/19/18 09:00	OP73096	S2Q395
Run #2							

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND	0.77	0.19	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.38	0.14	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.38	0.096	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.38	0.096	ug/l	
335-67-1	Perfluorooctanoic acid	0.126	0.38	0.096	ug/l	J
375-95-1	Perfluorononanoic acid	ND	0.38	0.096	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.38	0.096	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.38	0.096	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.38	0.14	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.38	0.096	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.38	0.096	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.102	0.38	0.096	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	0.290	0.38	0.096	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	1.54	0.38	0.096	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.651	0.38	0.096	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	10.1	0.38	0.14	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.38	0.096	ug/l	
335-77-3	Perfluorodecanesulfonic acid [a]	ND	0.38	0.096	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.38	0.096	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	1.9	0.38	ug/l	
2991-50-6	EtFOSAA	ND	1.9	0.38	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.77	0.19	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.77	0.19	ug/l	

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

Report of Analysis

Client Sample ID:	CH-14-RO_120618		
Lab Sample ID:	FA60008-8	**Date Sampled:**	12/06/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.77	0.19	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	98%		30-140%
	13C5-PFPeA	104%		40-140%
	13C5-PFHxA	108%		50-150%
	13C4-PFHpA	105%		50-150%
	13C8-PFOA	107%		50-150%
	13C9-PFNA	110%		50-150%
	13C6-PFDA	117%		50-150%
	13C7-PFUnDA	110%		50-150%
	13C2-PFDoDA	110%		50-150%
	13C2-PFTeDA	107%		40-150%
	13C3-PFBS	102%		50-150%
	13C3-PFHxS	103%		50-150%
	13C8-PFOS	106%		50-150%
	13C8-FOSA	117%		30-140%
	d3-MeFOSAA	104%		50-150%
	13C2-4:2FTS	99%		50-150%
	13C2-6:2FTS	100%		50-150%
	13C2-8:2FTS	102%		50-150%

(a) Associated BS recovery outside control limits.

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

Report of Analysis

Client Sample ID:	DUP-04		
Lab Sample ID:	FA60008-9	**Date Sampled:**	12/06/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q25520.D	100	12/24/18 20:15	NAF	12/19/18 09:00	OP73096	S2Q395
Run #2							

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	ND	0.77	0.19	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.38	0.14	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.38	0.096	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.38	0.096	ug/l	
335-67-1	Perfluorooctanoic acid	0.108	0.38	0.096	ug/l	J
375-95-1	Perfluorononanoic acid	ND	0.38	0.096	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.38	0.096	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.38	0.096	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.38	0.14	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.38	0.096	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.38	0.096	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.120	0.38	0.096	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	0.336	0.38	0.096	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	1.78	0.38	0.096	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.758	0.38	0.096	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	11.0	0.38	0.14	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.38	0.096	ug/l	
335-77-3	Perfluorodecanesulfonic acid [a]	ND	0.38	0.096	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.38	0.096	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	1.9	0.38	ug/l	
2991-50-6	EtFOSAA	ND	1.9	0.38	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.77	0.19	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.77	0.19	ug/l	

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

Report of Analysis

Client Sample ID:	DUP-04		
Lab Sample ID:	FA60008-9	**Date Sampled:**	12/06/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.77	0.19	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	95%		30-140%
	13C5-PFPeA	99%		40-140%
	13C5-PFHxA	103%		50-150%
	13C4-PFHpA	102%		50-150%
	13C8-PFOA	103%		50-150%
	13C9-PFNA	105%		50-150%
	13C6-PFDA	112%		50-150%
	13C7-PFUnDA	109%		50-150%
	13C2-PFDoDA	107%		50-150%
	13C2-PFTeDA	100%		40-150%
	13C3-PFBS	98%		50-150%
	13C3-PFHxS	98%		50-150%
	13C8-PFOS	101%		50-150%
	13C8-FOSA	112%		30-140%
	d3-MeFOSAA	97%		50-150%
	13C2-4:2FTS	95%		50-150%
	13C2-6:2FTS	95%		50-150%
	13C2-8:2FTS	99%		50-150%

(a) Associated BS recovery outside control limits.

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

Report of Analysis

Client Sample ID:	AS-17-05_120718		
Lab Sample ID:	FA60008-10	**Date Sampled:**	12/07/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q25523.D	1	12/24/18 21:02	NAF	12/19/18 09:00	OP73096	S2Q395
Run #2							

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.00549	0.0080	0.0020	ug/l	J
2706-90-3	Perfluoropentanoic acid	ND	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.00256	0.0040	0.0010	ug/l	J
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00473	0.0040	0.0010	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.00114	0.0040	0.0010	ug/l	J
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid [a]	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

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

Report of Analysis

Client Sample ID:	AS-17-05_120718		
Lab Sample ID:	FA60008-10	**Date Sampled:**	12/07/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

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

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	71%		30-140%
	13C5-PFPeA	80%		40-140%
	13C5-PFHxA	91%		50-150%
	13C4-PFHpA	89%		50-150%
	13C8-PFOA	98%		50-150%
	13C9-PFNA	97%		50-150%
	13C6-PFDA	91%		50-150%
	13C7-PFUnDA	86%		50-150%
	13C2-PFDoDA	59%		50-150%
	13C2-PFTeDA	56%		40-150%
	13C3-PFBS	86%		50-150%
	13C3-PFHxS	94%		50-150%
	13C8-PFOS	90%		50-150%
	13C8-FOSA	41%		30-140%
	d3-MeFOSAA	74%		50-150%
	13C2-4:2FTS	93%		50-150%
	13C2-6:2FTS	99%		50-150%
	13C2-8:2FTS	97%		50-150%

(a) Associated BS recovery outside control limits.

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

Report of Analysis

Client Sample ID: AS-17-04_120718
Lab Sample ID: FA60008-11
Matrix: AQ - Ground Water
Method: EPA 537M BY ID EPA 537 MOD
Project: Racer Lansing PFAS Delineation; Lansing, MI

Date Sampled: 12/07/18
Date Received: 12/08/18
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q25525.D	1	12/24/18 21:34	NAF	12/19/18 09:00	OP73096	S2Q395
Run #2							

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.00655	0.0080	0.0020	ug/l	J
2706-90-3	Perfluoropentanoic acid	0.00640	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.00113	0.0040	0.0010	ug/l	J
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00103	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0040	0.0010	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid [a]	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

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

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

Report of Analysis

Client Sample ID:	AS-17-04_120718		
Lab Sample ID:	FA60008-11	**Date Sampled:**	12/07/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

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

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	77%		30-140%
	13C5-PFPeA	83%		40-140%
	13C5-PFHxA	94%		50-150%
	13C4-PFHpA	98%		50-150%
	13C8-PFOA	104%		50-150%
	13C9-PFNA	108%		50-150%
	13C6-PFDA	101%		50-150%
	13C7-PFUnDA	88%		50-150%
	13C2-PFDoDA	67%		50-150%
	13C2-PFTeDA	57%		40-150%
	13C3-PFBS	85%		50-150%
	13C3-PFHxS	93%		50-150%
	13C8-PFOS	89%		50-150%
	13C8-FOSA	49%		30-140%
	d3-MeFOSAA	75%		50-150%
	13C2-4:2FTS	91%		50-150%
	13C2-6:2FTS	105%		50-150%
	13C2-8:2FTS	120%		50-150%

(a) Associated BS recovery outside control limits.

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

Report of Analysis

Client Sample ID:	P6-MH2-SW_120718		
Lab Sample ID:	FA60008-12	**Date Sampled:**	12/07/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q25403.D	1	12/21/18 17:43	NAF	12/19/18 09:00	OP73096	S2Q394
Run #2	2Q25526.D	1	12/24/18 21:50	NAF	12/19/18 09:00	OP73096	S2Q395

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0167	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0253	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0232	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0207	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0394	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00303 [a]	0.0040	0.0010	ug/l	J
335-76-2	Perfluorodecanoic acid	0.00217	0.0040	0.0010	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00186	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00126	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0730	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	0.0141	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

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

Report of Analysis

Client Sample ID:	P6-MH2-SW_120718		
Lab Sample ID:	FA60008-12	**Date Sampled:**	12/07/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

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

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	86%	92%	30-140%
	13C5-PFPeA	89%	96%	40-140%
	13C5-PFHxA	93%	102%	50-150%
	13C4-PFHpA	96%	107%	50-150%
	13C8-PFOA	110%	116%	50-150%
	13C9-PFNA	105%	115%	50-150%
	13C6-PFDA	91%	94%	50-150%
	13C7-PFUnDA	90%	92%	50-150%
	13C2-PFDoDA	65%	78%	50-150%
	13C2-PFTeDA	73%	74%	40-150%
	13C3-PFBS	86%	94%	50-150%
	13C3-PFHxS	91%	97%	50-150%
	13C8-PFOS	82%	88%	50-150%
	13C8-FOSA	96%	100%	30-140%
	d3-MeFOSAA	73%	79%	50-150%
	13C2-4:2FTS	95%	97%	50-150%
	13C2-6:2FTS	113%	114%	50-150%
	13C2-8:2FTS	91%	94%	50-150%

(a) Result is from Run# 2

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

Report of Analysis

Client Sample ID:	P3-MH-NE_120718		
Lab Sample ID:	FA60008-13	**Date Sampled:**	12/07/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	2Q25693.D	1	12/27/18 18:03	NAF	12/26/18 12:00	OP73191	S2Q397
Run #2							

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.00289	0.0080	0.0020	ug/l	J
2706-90-3	Perfluoropentanoic acid	ND	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.00163	0.0040	0.0010	ug/l	J
375-95-1	Perfluorononanoic acid	ND	0.0040	0.0010	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0040	0.0010	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00148	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00161	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0219	0.0040	0.0015	ug/l	B
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid [b]	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

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

Report of Analysis

Client Sample ID:	P3-MH-NE_120718		
Lab Sample ID:	FA60008-13	**Date Sampled:**	12/07/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

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

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	90%		30-140%
	13C5-PFPeA	91%		40-140%
	13C5-PFHxA	98%		50-150%
	13C4-PFHpA	101%		50-150%
	13C8-PFOA	112%		50-150%
	13C9-PFNA	105%		50-150%
	13C6-PFDA	90%		50-150%
	13C7-PFUnDA	80%		50-150%
	13C2-PFDoDA	75%		50-150%
	13C2-PFTeDA	81%		40-150%
	13C3-PFBS	90%		50-150%
	13C3-PFHxS	90%		50-150%
	13C8-PFOS	72%		50-150%
	13C8-FOSA	91%		30-140%
	d3-MeFOSAA	68%		50-150%
	13C2-4:2FTS	90%		50-150%
	13C2-6:2FTS	99%		50-150%
	13C2-8:2FTS	83%		50-150%

(a) Insufficient sample for re-extraction.
(b) Associated BS recovery outside control limits.

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

Report of Analysis

Client Sample ID:	P2-MH-NW_120718		
Lab Sample ID:	FA60008-14	**Date Sampled:**	12/07/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q25405.D	1	12/21/18 18:14	NAF	12/19/18 09:00	OP73096	S2Q394
Run #2	2Q25527.D	1	12/24/18 22:05	NAF	12/19/18 09:00	OP73096	S2Q395

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0136	0.0077	0.0019	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0182	0.0038	0.0014	ug/l	
307-24-4	Perfluorohexanoic acid	0.0177	0.0038	0.00096	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0161	0.0038	0.00096	ug/l	
335-67-1	Perfluorooctanoic acid	0.0312	0.0038	0.00096	ug/l	
375-95-1	Perfluorononanoic acid	0.00360 [a]	0.0038	0.00096	ug/l	J
335-76-2	Perfluorodecanoic acid	0.00453	0.0038	0.00096	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0038	0.00096	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0038	0.0014	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0038	0.00096	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0038	0.00096	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00807	0.0038	0.00096	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	0.00331	0.0038	0.00096	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	0.0220	0.0038	0.00096	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.00196	0.0038	0.00096	ug/l	J
1763-23-1	Perfluorooctanesulfonic acid	0.176	0.0038	0.0014	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0038	0.00096	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0038	0.00096	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0038	0.00096	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.019	0.0038	ug/l	
2991-50-6	EtFOSAA	ND	0.019	0.0038	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0077	0.0019	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	0.00221	0.0077	0.0019	ug/l	J

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

Report of Analysis

Client Sample ID:	P2-MH-NW_120718		
Lab Sample ID:	FA60008-14	**Date Sampled:**	12/07/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

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

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	74%	80%	30-140%
	13C5-PFPeA	77%	84%	40-140%
	13C5-PFHxA	78%	87%	50-150%
	13C4-PFHpA	80%	91%	50-150%
	13C8-PFOA	89%	100%	50-150%
	13C9-PFNA	85%	99%	50-150%
	13C6-PFDA	80%	84%	50-150%
	13C7-PFUnDA	71%	75%	50-150%
	13C2-PFDoDA	59%	69%	50-150%
	13C2-PFTeDA	66%	71%	40-150%
	13C3-PFBS	73%	81%	50-150%
	13C3-PFHxS	73%	82%	50-150%
	13C8-PFOS	73%	79%	50-150%
	13C8-FOSA	69%	61%	30-140%
	d3-MeFOSAA	67%	74%	50-150%
	13C2-4:2FTS	81%	87%	50-150%
	13C2-6:2FTS	95%	101%	50-150%
	13C2-8:2FTS	79%	83%	50-150%

(a) Result is from Run# 2

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

Report of Analysis

Client Sample ID:	DUP-08_120718		
Lab Sample ID:	FA60008-15	**Date Sampled:**	12/07/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q25407.D	1	12/21/18 18:46	NAF	12/19/18 09:00	OP73096	S2Q394
Run #2	2Q25528.D	1	12/24/18 22:21	NAF	12/19/18 09:00	OP73096	S2Q395

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.0162	0.0080	0.0020	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0243	0.0040	0.0015	ug/l	
307-24-4	Perfluorohexanoic acid	0.0216	0.0040	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.0193	0.0040	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0374	0.0040	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00304 [a]	0.0040	0.0010	ug/l	J
335-76-2	Perfluorodecanoic acid	0.00205	0.0040	0.0010	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.0040	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0040	0.0015	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0040	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00200	0.0040	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0040	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00103	0.0040	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0040	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0620	0.0040	0.0015	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0040	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	0.0133	0.0040	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.020	0.0040	ug/l	
2991-50-6	EtFOSAA	ND	0.020	0.0040	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0080	0.0020	ug/l	

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

Report of Analysis

Client Sample ID:	DUP-08_120718		
Lab Sample ID:	FA60008-15	**Date Sampled:**	12/07/18
Matrix:	AQ - Ground Water	**Date Received:**	12/08/18
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

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

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	84%	89%	30-140%
	13C5-PFPeA	87%	93%	40-140%
	13C5-PFHxA	88%	98%	50-150%
	13C4-PFHpA	94%	103%	50-150%
	13C8-PFOA	99%	113%	50-150%
	13C9-PFNA	102%	111%	50-150%
	13C6-PFDA	96%	101%	50-150%
	13C7-PFUnDA	108%	107%	50-150%
	13C2-PFDoDA	81%	91%	50-150%
	13C2-PFTeDA	84%	89%	40-150%
	13C3-PFBS	83%	91%	50-150%
	13C3-PFHxS	88%	94%	50-150%
	13C8-PFOS	95%	100%	50-150%
	13C8-FOSA	82%	89%	30-140%
	d3-MeFOSAA	88%	96%	50-150%
	13C2-4:2FTS	92%	94%	50-150%
	13C2-6:2FTS	105%	111%	50-150%
	13C2-8:2FTS	98%	104%	50-150%

(a) Result is from Run# 2

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

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

FA60008

SGS North America Inc - Orlando

Chain of Custody

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

SGS - ORLANDO JOB # : PAGE 1 OF 2

SGS - ORLANDO Quote # | SKIFF #

Client / Reporting Information

Company Name: Arcadis of Michigan, LLC
Address: 28550 Cabot Drive, Suite 500
City: Novi State: MI Zip: 48377
Project Contact: Christine Gregg Email: Christine.Gregg@arcadis.com
Phone #: 248-483-6634
Sampler(s) Name(s) (Printed) Sampler 1: Austin Westhuis Sampler 2: Dale Arnett

Project Information

Project Name: RACER Lansing
Street
City Lansing State MI
Project # B0064479.2018.03700
Fax # 248-994-2241
Client Purchase Order # B0064479.2018.03700

Analytical Information

Matrix Codes

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

SGS Orlando Sample #	Field ID / Point of Collection	COLLECTION DATE	TIME	SAMPLED BY:	MATRIX	TOTAL # OF BOTTLES	OTHER	CONTAINER INFORMATION: NONE	HCl	NaOH	HNO3	H2SO4	NAOH+ZNAA	DI WATER	MEOH	PFAS *	LAB USE ONLY
1	MW-91-2_120418	12/4/18	1435	AW	GW	2		2								X	
2	MW-02-04(3)_120518	12/5/18	1045	AW	GW	2		2								X	
3	MW-18-92_120518	12/5/18	1220	AW	GW	2		2								X	
4	MW-18-88_120518	12/5/18	1340	AW	GW	2		2								X	
5	MW-18-89_120518	12/5/18	1515	AW	GW	2		2								X	
6	MW-18-90_120618	12/6/18	1045	AW	GW	2		2								X	
7	MW-18-91_120618	12/6/18	1215	AW	GW	2		2								X	
8	CH-14-RO-120618	12/6/18	1440	AW	GW	2		2								X	
9	Dup-04	12/6/18	—	AW	GW	2		2								X	
10	AS-17-05_120718	12/7/18	1140	DA	GW	2		2								X	
11	AS-17-07_120718	12/7/18	1350	DA	GW	2		2								X	
12	PB-MW2-SW_120718	12/7/18	1420	DA	GW	2		2								X	

Turnaround Time (Business days)

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

Data Deliverable Information

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

Comments / Remarks

* PFAS method 537 mod. with isotope dilution per QSM 5.1. MDEQ 24-Compound list.

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

Relinquished by Sampler/Affiliation	Date Time:	Received By/Affiliation	Relinquished By/Affiliation	Date Time:	Received By/Affiliation
1 Dale Arn / ARCADIS	12/7/18 1700	2 Fedex / Fedex	3 FF		4 [illegible] 12/8/18 1040
Relinquished by/Affiliation	Date Time:	Received By/Affiliation	Relinquished By/Affiliation	Date Time:	Received By/Affiliation
5		6	7		8

Lab Use Only : Cooler Temperature (s) Celsius (corrected): 1.2

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

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

FA60008: Chain of Custody
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FA60008

SGS North America Inc - Orlando

Chain of Custody

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

SGS - ORLANDO JOB # : PAGE 2 OF 2

SGS - ORLANDO Quote # | SKIFF #

Client / Reporting Information	Project Information	Analytical Information	Matrix Codes
Company Name: ARCADIS of Michigan LLC	Project Name: Racer Landfill		DW - Drinking Water; GW - Ground Water; WW - Water; SW - Surface Water; SO - Soil; SL- Sludge; OI - Oil; LIQ - Other Liquid; AIR - Air; SOL - Other Solid
Address: 28550 Cabot Dr. Ste 500	Street		
City: Novi State: MI Zip: 48377	City Lansing State MI		
Project Contact: Christine Boggs Email: Christine.Boggs@arcadis.com	Project # B006474.79.0018.03700		
Phone #: 248-483-6634	Fax # 248-994-2241		
Sampler(s) Name(s) (Printed) Sampler 1: Avash Westhuis Sampler 2: Dale Alsop	Client Purchase Order # B006474.79.0018.03700		

SGS Orlando Sample #	Field ID / Point of Collection	COLLECTION DATE	TIME	SAMPLED BY:	MATRIX	TOTAL # OF BOTTLES	CONTAINER INFORMATION: OTHER	NONE	HCl	NaOH	HNO3	H2SO4	NaOH+ZnAc	DI WATER	MEOH	PFAS *	LAB USE ONLY
13	FB-MH-NE_120718	12/7/18	1510	DA	GW	2		2								X	
14	FD-MH-NW_120718	12/7/18	1540	DA	GW	2		2								X	
15	Dup-08_120718	12/7/18	—	DA	GW	2		2								X	

Turnaround Time (Business days)	Data Deliverable Information	Comments / Remarks
10 Day (Business) Approved By: / Date:	COMMERCIAL "A" (RESULTS ONLY)	* PFAS Method 537 mod. w/ isotope dilution per QSM 5.1 MDEQ
7 Day	COMMERCIAL "B" (RESULTS PLUS QC)	
5 Day	REDT1 (EPA LEVEL 3)	24-Comp and list
3 Day *RUSH*	FULLT1 (EPA LEVEL 4)	
2 Day *RUSH*	EDD'S	
1 Day *RUSH*		
Other		
Rush T/A Data Available VIA Email or Lablink		

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

Relinquished by Sampler/Affiliation	Date Time:	Received By/Affiliation	Relinquished By/Affiliation	Date Time:	Received By/Affiliation
1 D Alsop / ARCADIS	12/7/18 1700	2 FedEx	3		4 12/8/18 1000
Relinquished by/Affiliation	Date Time:	Received By/Affiliation	Relinquished By/Affiliation	Date Time:	Received By/Affiliation
5		6	7		8

Lab Use Only : Cooler Temperature (s) Celsius (corrected): 1c2

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

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

FA60008: Chain of Custody
Page 2 of 3

SGS Sample Receipt Summary

Job Number: FA60008 **Client:** ARCADIS OF MICHIGAN **Project:** RACER LANSING

Date / Time Received: 12/8/2018 10:00:00 AM **Delivery Method:** FX **Airbill #'s:** 1002241571060003281100813921966404

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

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

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

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

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

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

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

Misc. Information

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

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

Residual Chlorine Test Strip Lot #: _____

Comments

SM001
Rev. Date 05/24/17

Technician: PETERH Date: 12/8/2018 10:00:00 A Reviewer: _____ Date: _____

MS Semi-volatiles

QC Data Summaries

Includes the following where applicable:

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

Method Blank Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73096-MB	2Q25388.D	1	12/21/18	NAF	12/19/18	OP73096	S2Q394

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

FA60008-1, FA60008-2, FA60008-3, FA60008-4, FA60008-5, FA60008-6, FA60008-7, FA60008-8, FA60008-9, FA60008-10, FA60008-11, FA60008-12, FA60008-14, FA60008-15

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

CAS No.	ID Standard Recoveries		Limits
	13C4-PFBA	98%	30-140%
	13C5-PFPeA	97%	40-140%
	13C5-PFHxA	99%	50-150%
	13C4-PFHpA	101%	50-150%
	13C8-PFOA	117%	50-150%
	13C9-PFNA	106%	50-150%
	13C6-PFDA	90%	50-150%
	13C7-PFUnDA	88%	50-150%

Method Blank Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73096-MB	2Q25388.D	1	12/21/18	NAF	12/19/18	OP73096	S2Q394

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

FA60008-1, FA60008-2, FA60008-3, FA60008-4, FA60008-5, FA60008-6, FA60008-7, FA60008-8, FA60008-9, FA60008-10, FA60008-11, FA60008-12, FA60008-14, FA60008-15

CAS No.	ID Standard Recoveries		Limits
	13C2-PFDoDA	62%	50-150%
	13C2-PFTeDA	66%	40-150%
	13C3-PFBS	95%	50-150%
	13C3-PFHxS	96%	50-150%
	13C8-PFOS	79%	50-150%
	13C8-FOSA	99%	30-140%
	d3-MeFOSAA	72%	50-150%
	13C2-4:2FTS	94%	50-150%
	13C2-6:2FTS	112%	50-150%
	13C2-8:2FTS	81%	50-150%

Method Blank Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73191-MB	2Q25692.D	1	12/27/18	NAF	12/26/18	OP73191	S2Q397

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

FA60008-13

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.015	0.0038	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0077	0.0029	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0077	0.0019	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0077	0.0019	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0077	0.0019	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0077	0.0019	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0077	0.0019	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0077	0.0019	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0077	0.0029	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0077	0.0019	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0077	0.0019	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0077	0.0019	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0077	0.0019	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0077	0.0019	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0077	0.0019	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.00546	0.0077	0.0029	ug/l	J
68259-12-1	Perfluorononanesulfonic acid	ND	0.0077	0.0019	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0077	0.0019	ug/l	
754-91-6	PFOSA	ND	0.0077	0.0019	ug/l	
2355-31-9	MeFOSAA	ND	0.038	0.0077	ug/l	
2991-50-6	EtFOSAA	ND	0.038	0.0077	ug/l	
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	

CAS No.	ID Standard Recoveries		Limits
	13C4-PFBA	102%	30-140%
	13C5-PFPeA	107%	40-140%
	13C5-PFHxA	111%	50-150%
	13C4-PFHpA	110%	50-150%
	13C8-PFOA	116%	50-150%
	13C9-PFNA	114%	50-150%
	13C6-PFDA	109%	50-150%
	13C7-PFUnDA	101%	50-150%

Method Blank Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73191-MB	2Q25692.D	1	12/27/18	NAF	12/26/18	OP73191	S2Q397

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

FA60008-13

CAS No.	ID Standard Recoveries		Limits
	13C2-PFDoDA	84%	50-150%
	13C2-PFTeDA	80%	40-150%
	13C3-PFBS	102%	50-150%
	13C3-PFHxS	104%	50-150%
	13C8-PFOS	102%	50-150%
	13C8-FOSA	108%	30-140%
	d3-MeFOSAA	86%	50-150%
	13C2-4:2FTS	103%	50-150%
	13C2-6:2FTS	107%	50-150%
	13C2-8:2FTS	96%	50-150%

Method Blank Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73191-MB	2Q25757.D	1	12/28/18	NAF	12/26/18	OP73191	S2Q397

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

FA60008-13

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.015	0.0038	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0077	0.0029	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0077	0.0019	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0077	0.0019	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0077	0.0019	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0077	0.0019	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0077	0.0019	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0077	0.0019	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0077	0.0029	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0077	0.0019	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0077	0.0019	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0077	0.0019	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0077	0.0019	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0077	0.0019	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0077	0.0019	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.00578	0.0077	0.0029	ug/l	J
68259-12-1	Perfluorononanesulfonic acid	ND	0.0077	0.0019	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0077	0.0019	ug/l	
754-91-6	PFOSA	ND	0.0077	0.0019	ug/l	
2355-31-9	MeFOSAA	ND	0.038	0.0077	ug/l	
2991-50-6	EtFOSAA	ND	0.038	0.0077	ug/l	
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	

CAS No.	ID Standard Recoveries		Limits
	13C4-PFBA	104%	30-140%
	13C5-PFPeA	110%	40-140%
	13C5-PFHxA	114%	50-150%
	13C4-PFHpA	111%	50-150%
	13C8-PFOA	120%	50-150%
	13C9-PFNA	120%	50-150%
	13C6-PFDA	118%	50-150%
	13C7-PFUnDA	101%	50-150%

Method Blank Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73191-MB	2Q25757.D	1	12/28/18	NAF	12/26/18	OP73191	S2Q397

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

FA60008-13

CAS No.	ID Standard Recoveries		Limits
	13C2-PFDoDA	86%	50-150%
	13C2-PFTeDA	87%	40-150%
	13C3-PFBS	106%	50-150%
	13C3-PFHxS	107%	50-150%
	13C8-PFOS	104%	50-150%
	13C8-FOSA	113%	30-140%
	d3-MeFOSAA	99%	50-150%
	13C2-4:2FTS	108%	50-150%
	13C2-6:2FTS	115%	50-150%
	13C2-8:2FTS	103%	50-150%

Instrument Blank

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q394-IBLK	2Q25384.D	1	12/21/18	NAF	n/a	n/a	S2Q394

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

FA60008-1, FA60008-3, FA60008-4, FA60008-6, FA60008-12, FA60008-14, FA60008-15

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

CAS No.	ID Standard Recoveries		Limits
	13C4-PFBA	97%	50-150%
	13C5-PFPeA	98%	50-150%
	13C5-PFHxA	100%	50-150%
	13C4-PFHpA	100%	50-150%
	13C8-PFOA	101%	50-150%
	13C9-PFNA	105%	50-150%
	13C6-PFDA	110%	50-150%
	13C7-PFUnDA	107%	50-150%

Instrument Blank

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q394-IBLK	2Q25384.D	1	12/21/18	NAF	n/a	n/a	S2Q394

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

FA60008-1, FA60008-3, FA60008-4, FA60008-6, FA60008-12, FA60008-14, FA60008-15

CAS No.	ID Standard Recoveries		Limits
	13C2-PFDoDA	105%	50-150%
	13C2-PFTeDA	105%	50-150%
	13C3-PFBS	97%	50-150%
	13C3-PFHxS	97%	50-150%
	13C8-PFOS	101%	50-150%
	13C8-FOSA	109%	50-150%
	d3-MeFOSAA	105%	50-150%
	13C2-4:2FTS	93%	50-150%
	13C2-6:2FTS	95%	50-150%
	13C2-8:2FTS	99%	50-150%

Instrument Blank

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q395-IBLK	2Q25509.D	1	12/24/18	NAF	n/a	n/a	S2Q395

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

FA60008-2, FA60008-5, FA60008-6, FA60008-7, FA60008-8, FA60008-9, FA60008-10, FA60008-11, FA60008-12, FA60008-14, FA60008-15

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

CAS No.	ID Standard Recoveries		Limits
	13C4-PFBA	98%	50-150%
	13C5-PFPeA	99%	50-150%
	13C5-PFHxA	102%	50-150%
	13C4-PFHpA	102%	50-150%
	13C8-PFOA	102%	50-150%
	13C9-PFNA	100%	50-150%
	13C6-PFDA	109%	50-150%
	13C7-PFUnDA	105%	50-150%

Instrument Blank

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q395-IBLK	2Q25509.D	1	12/24/18	NAF	n/a	n/a	S2Q395

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

FA60008-2, FA60008-5, FA60008-6, FA60008-7, FA60008-8, FA60008-9, FA60008-10, FA60008-11, FA60008-12, FA60008-14, FA60008-15

CAS No.	ID Standard Recoveries		Limits
	13C2-PFDoDA	102%	50-150%
	13C2-PFTeDA	100%	50-150%
	13C3-PFBS	99%	50-150%
	13C3-PFHxS	100%	50-150%
	13C8-PFOS	99%	50-150%
	13C8-FOSA	108%	50-150%
	d3-MeFOSAA	99%	50-150%
	13C2-4:2FTS	93%	50-150%
	13C2-6:2FTS	95%	50-150%
	13C2-8:2FTS	97%	50-150%

Instrument Blank

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q397-IBLK	2Q25674.D	1	12/27/18	NAF	n/a	n/a	S2Q397

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

FA60008-13

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

CAS No.	ID Standard Recoveries		Limits
	13C4-PFBA	105%	50-150%
	13C5-PFPeA	104%	50-150%
	13C5-PFHxA	107%	50-150%
	13C4-PFHpA	105%	50-150%
	13C8-PFOA	108%	50-150%
	13C9-PFNA	107%	50-150%
	13C6-PFDA	113%	50-150%
	13C7-PFUnDA	114%	50-150%

Instrument Blank

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q397-IBLK	2Q25674.D	1	12/27/18	NAF	n/a	n/a	S2Q397

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

FA60008-13

CAS No.	ID Standard Recoveries		Limits
	13C2-PFDoDA	111%	50-150%
	13C2-PFTeDA	103%	50-150%
	13C3-PFBS	104%	50-150%
	13C3-PFHxS	104%	50-150%
	13C8-PFOS	106%	50-150%
	13C8-FOSA	112%	50-150%
	d3-MeFOSAA	109%	50-150%
	13C2-4:2FTS	99%	50-150%
	13C2-6:2FTS	102%	50-150%
	13C2-8:2FTS	101%	50-150%

Blank Spike Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73096-BS	2Q25387.D	1	12/21/18	NAF	12/19/18	OP73096	S2Q394

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

FA60008-1, FA60008-2, FA60008-3, FA60008-4, FA60008-5, FA60008-6, FA60008-7, FA60008-8, FA60008-9, FA60008-10, FA60008-11, FA60008-12, FA60008-14, FA60008-15

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
375-22-4	Perfluorobutanoic acid	0.08	0.0692	87	70-130
2706-90-3	Perfluoropentanoic acid	0.08	0.0689	86	70-130
307-24-4	Perfluorohexanoic acid	0.08	0.0609	76	70-130
375-85-9	Perfluoroheptanoic acid	0.08	0.0682	85	71-130
335-67-1	Perfluorooctanoic acid	0.08	0.0661	83	74-130
375-95-1	Perfluorononanoic acid	0.08	0.0571	71* [a]	76-130
335-76-2	Perfluorodecanoic acid	0.08	0.0601	75	70-130
2058-94-8	Perfluoroundecanoic acid	0.08	0.0653	82	70-130
307-55-1	Perfluorododecanoic acid	0.08	0.0722	90	70-130
72629-94-8	Perfluorotridecanoic acid	0.08	0.0787	98	70-139
376-06-7	Perfluorotetradecanoic acid	0.08	0.0654	82	70-130
375-73-5	Perfluorobutanesulfonic acid	0.0708	0.0593	84	73-130
2706-91-4	Perfluoropentanesulfonic acid	0.0752	0.0630	84	70-130
355-46-4	Perfluorohexanesulfonic acid	0.0728	0.0587	81	74-130
375-92-8	Perfluoroheptanesulfonic acid	0.076	0.0657	86	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.074	0.0669	90	70-130
68259-12-1	Perfluorononanesulfonic acid	0.0768	0.0594	77	70-130
335-77-3	Perfluorodecanesulfonic acid	0.0772	0.0568	74	70-130
754-91-6	PFOSA	0.08	0.0699	87	70-131
2355-31-9	MeFOSAA	0.08	0.0681	85	70-130
2991-50-6	EtFOSAA	0.08	0.0686	86	70-130
757124-72-4	4:2 Fluorotelomer sulfonate	0.0748	0.0659	88	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	0.076	0.0682	90	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	0.0768	0.0658	86	70-130

CAS No.	ID Standard Recoveries	BSP	Limits
	13C4-PFBA	114%	30-140%
	13C5-PFPeA	113%	40-140%
	13C5-PFHxA	115%	50-150%
	13C4-PFHpA	113%	50-150%
	13C8-PFOA	126%	50-150%
	13C9-PFNA	114%	50-150%
	13C6-PFDA	106%	50-150%
	13C7-PFUnDA	117%	50-150%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73096-BS	2Q25387.D	1	12/21/18	NAF	12/19/18	OP73096	S2Q394

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

FA60008-1, FA60008-2, FA60008-3, FA60008-4, FA60008-5, FA60008-6, FA60008-7, FA60008-8, FA60008-9, FA60008-10, FA60008-11, FA60008-12, FA60008-14, FA60008-15

CAS No.	ID Standard Recoveries	BSP	Limits
	13C2-PFDoDA	85%	50-150%
	13C2-PFTeDA	90%	40-150%
	13C3-PFBS	110%	50-150%
	13C3-PFHxS	106%	50-150%
	13C8-PFOS	94%	50-150%
	13C8-FOSA	107%	30-140%
	d3-MeFOSAA	94%	50-150%
	13C2-4:2FTS	114%	50-150%
	13C2-6:2FTS	126%	50-150%
	13C2-8:2FTS	102%	50-150%

(a) Sporadic marginal failure.

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73096-BS	2Q25512.D	1	12/24/18	NAF	12/19/18	OP73096	S2Q395

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

FA60008-1, FA60008-2, FA60008-3, FA60008-4, FA60008-5, FA60008-6, FA60008-7, FA60008-8, FA60008-9, FA60008-10, FA60008-11, FA60008-12, FA60008-14, FA60008-15

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
375-22-4	Perfluorobutanoic acid	0.08	0.0666	83	70-130
2706-90-3	Perfluoropentanoic acid	0.08	0.0665	83	70-130
307-24-4	Perfluorohexanoic acid	0.08	0.0605	76	70-130
375-85-9	Perfluoroheptanoic acid	0.08	0.0659	82	71-130
335-67-1	Perfluorooctanoic acid	0.08	0.0694	87	74-130
375-95-1	Perfluorononanoic acid	0.08	0.0618	77	76-130
335-76-2	Perfluorodecanoic acid	0.08	0.0612	77	70-130
2058-94-8	Perfluoroundecanoic acid	0.08	0.0697	87	70-130
307-55-1	Perfluorododecanoic acid	0.08	0.0650	81	70-130
72629-94-8	Perfluorotridecanoic acid	0.08	0.0724	91	70-139
376-06-7	Perfluorotetradecanoic acid	0.08	0.0662	83	70-130
375-73-5	Perfluorobutanesulfonic acid	0.0708	0.0580	82	73-130
2706-91-4	Perfluoropentanesulfonic acid	0.0752	0.0628	84	70-130
355-46-4	Perfluorohexanesulfonic acid	0.0728	0.0567	78	74-130
375-92-8	Perfluoroheptanesulfonic acid	0.076	0.0642	84	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.074	0.0660	89	70-130
68259-12-1	Perfluorononanesulfonic acid	0.0768	0.0577	75	70-130
335-77-3	Perfluorodecanesulfonic acid	0.0772	0.0520	67* [a]	70-130
754-91-6	PFOSA	0.08	0.0681	85	70-131
2355-31-9	MeFOSAA	0.08	0.0661	83	70-130
2991-50-6	EtFOSAA	0.08	0.0673	84	70-130
757124-72-4	4:2 Fluorotelomer sulfonate	0.0748	0.0638	85	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	0.076	0.0651	86	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	0.0768	0.0617	80	70-130

CAS No.	ID Standard Recoveries	BSP	Limits
	13C4-PFBA	113%	30-140%
	13C5-PFPeA	116%	40-140%
	13C5-PFHxA	118%	50-150%
	13C4-PFHpA	118%	50-150%
	13C8-PFOA	123%	50-150%
	13C9-PFNA	116%	50-150%
	13C6-PFDA	101%	50-150%
	13C7-PFUnDA	99%	50-150%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73096-BS	2Q25512.D	1	12/24/18	NAF	12/19/18	OP73096	S2Q395

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

FA60008-1, FA60008-2, FA60008-3, FA60008-4, FA60008-5, FA60008-6, FA60008-7, FA60008-8, FA60008-9, FA60008-10, FA60008-11, FA60008-12, FA60008-14, FA60008-15

CAS No.	ID Standard Recoveries	BSP	Limits
	13C2-PFDoDA	91%	50-150%
	13C2-PFTeDA	89%	40-150%
	13C3-PFBS	115%	50-150%
	13C3-PFHxS	111%	50-150%
	13C8-PFOS	96%	50-150%
	13C8-FOSA	108%	30-140%
	d3-MeFOSAA	92%	50-150%
	13C2-4:2FTS	118%	50-150%
	13C2-6:2FTS	121%	50-150%
	13C2-8:2FTS	99%	50-150%

(a) Sporadic marginal failure.

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73191-BS	2Q25691.D	1	12/27/18	NAF	12/26/18	OP73191	S2Q397

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

FA60008-13

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
375-22-4	Perfluorobutanoic acid	0.154	0.134	87	70-130
2706-90-3	Perfluoropentanoic acid	0.154	0.126	82	70-130
307-24-4	Perfluorohexanoic acid	0.154	0.117	76	70-130
375-85-9	Perfluoroheptanoic acid	0.154	0.127	83	71-130
335-67-1	Perfluorooctanoic acid	0.154	0.137	89	74-130
375-95-1	Perfluorononanoic acid	0.154	0.118	77	76-130
335-76-2	Perfluorodecanoic acid	0.154	0.122	79	70-130
2058-94-8	Perfluoroundecanoic acid	0.154	0.131	85	70-130
307-55-1	Perfluorododecanoic acid	0.154	0.140	91	70-130
72629-94-8	Perfluorotridecanoic acid	0.154	0.142	92	70-139
376-06-7	Perfluorotetradecanoic acid	0.154	0.123	80	70-130
375-73-5	Perfluorobutanesulfonic acid	0.136	0.113	83	73-130
2706-91-4	Perfluoropentanesulfonic acid	0.145	0.122	84	70-130
355-46-4	Perfluorohexanesulfonic acid	0.14	0.114	81	74-130
375-92-8	Perfluoroheptanesulfonic acid	0.146	0.126	86	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.142	0.141	99	70-130
68259-12-1	Perfluorononanesulfonic acid	0.148	0.116	79	70-130
335-77-3	Perfluorodecanesulfonic acid	0.148	0.103	69* [a]	70-130
754-91-6	PFOSA	0.154	0.135	88	70-131
2355-31-9	MeFOSAA	0.154	0.133	86	70-130
2991-50-6	EtFOSAA	0.154	0.136	88	70-130
757124-72-4	4:2 Fluorotelomer sulfonate	0.144	0.125	87	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	0.146	0.128	88	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	0.148	0.122	83	70-130

CAS No.	ID Standard Recoveries	BSP	Limits
	13C4-PFBA	94%	30-140%
	13C5-PFPeA	98%	40-140%
	13C5-PFHxA	102%	50-150%
	13C4-PFHpA	102%	50-150%
	13C8-PFOA	100%	50-150%
	13C9-PFNA	104%	50-150%
	13C6-PFDA	102%	50-150%
	13C7-PFUnDA	99%	50-150%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73191-BS	2Q25691.D	1	12/27/18	NAF	12/26/18	OP73191	S2Q397

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

FA60008-13

CAS No.	ID Standard Recoveries	BSP	Limits
	13C2-PFDoDA	88%	50-150%
	13C2-PFTeDA	91%	40-150%
	13C3-PFBS	96%	50-150%
	13C3-PFHxS	98%	50-150%
	13C8-PFOS	95%	50-150%
	13C8-FOSA	80%	30-140%
	d3-MeFOSAA	88%	50-150%
	13C2-4:2FTS	101%	50-150%
	13C2-6:2FTS	101%	50-150%
	13C2-8:2FTS	95%	50-150%

(a) Sporadic marginal failure.

* = Outside of Control Limits.

Matrix Spike Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73096-MS	2Q25524.D	1	12/24/18	NAF	12/19/18	OP73096	S2Q395
FA60008-10	2Q25523.D	1	12/24/18	NAF	12/19/18	OP73096	S2Q395

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

FA60008-1, FA60008-2, FA60008-3, FA60008-4, FA60008-5, FA60008-6, FA60008-7, FA60008-8, FA60008-9, FA60008-10, FA60008-11, FA60008-12, FA60008-14, FA60008-15

CAS No.	Compound	FA60008-10 ug/l	Q	Spike ug/l	MS ug/l	MS %	Limits
375-22-4	Perfluorobutanoic acid	0.00549	J	0.08	0.0791	92	70-130
2706-90-3	Perfluoropentanoic acid	ND		0.08	0.0773	97	70-130
307-24-4	Perfluorohexanoic acid	ND		0.08	0.0672	84	70-130
375-85-9	Perfluoroheptanoic acid	ND		0.08	0.0742	93	71-130
335-67-1	Perfluorooctanoic acid	0.00256	J	0.08	0.0767	93	74-130
375-95-1	Perfluorononanoic acid	ND		0.08	0.0662	83	76-130
335-76-2	Perfluorodecanoic acid	ND		0.08	0.0728	91	70-130
2058-94-8	Perfluoroundecanoic acid	ND		0.08	0.0810	101	70-130
307-55-1	Perfluorododecanoic acid	ND		0.08	0.0830	104	70-130
72629-94-8	Perfluorotridecanoic acid	ND		0.08	0.0736	92	70-139
376-06-7	Perfluorotetradecanoic acid	ND		0.08	0.0757	95	70-130
375-73-5	Perfluorobutanesulfonic acid	0.00473		0.0708	0.0677	89	73-130
2706-91-4	Perfluoropentanesulfonic acid	ND		0.0752	0.0739	98	70-130
355-46-4	Perfluorohexanesulfonic acid	ND		0.0728	0.0635	87	74-130
375-92-8	Perfluoroheptanesulfonic acid	0.00114	J	0.076	0.0766	99	74-130
1763-23-1	Perfluorooctanesulfonic acid	ND		0.074	0.0728	98	70-130
68259-12-1	Perfluorononanesulfonic acid	ND		0.0768	0.0564	73	70-130
335-77-3	Perfluorodecanesulfonic acid	ND		0.0772	0.0420	54*	70-130
754-91-6	PFOSA	ND		0.08	0.0797	100	70-131
2355-31-9	MeFOSAA	ND		0.08	0.0772	97	70-130
2991-50-6	EtFOSAA	ND		0.08	0.0796	100	70-130
757124-72-4	4:2 Fluorotelomer sulfonate	ND		0.0748	0.0700	94	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	ND		0.076	0.0709	93	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	ND		0.0768	0.0692	90	70-130

CAS No.	ID Standard Recoveries	MS	FA60008-10	Limits
	13C4-PFBA	75%	71%	30-140%
	13C5-PFPeA	83%	80%	40-140%
	13C5-PFHxA	94%	91%	50-150%
	13C4-PFHpA	93%	89%	50-150%
	13C8-PFOA	98%	98%	50-150%
	13C9-PFNA	103%	97%	50-150%
	13C6-PFDA	93%	91%	50-150%
	13C7-PFUnDA	82%	86%	50-150%

* = Outside of Control Limits.

Matrix Spike Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73096-MS	2Q25524.D	1	12/24/18	NAF	12/19/18	OP73096	S2Q395
FA60008-10	2Q25523.D	1	12/24/18	NAF	12/19/18	OP73096	S2Q395

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

FA60008-1, FA60008-2, FA60008-3, FA60008-4, FA60008-5, FA60008-6, FA60008-7, FA60008-8, FA60008-9, FA60008-10, FA60008-11, FA60008-12, FA60008-14, FA60008-15

CAS No.	ID Standard Recoveries	MS	FA60008-10	Limits
	13C2-PFDoDA	52%	59%	50-150%
	13C2-PFTeDA	38%* [a]	56%	40-150%
	13C3-PFBS	89%	86%	50-150%
	13C3-PFHxS	97%	94%	50-150%
	13C8-PFOS	92%	90%	50-150%
	13C8-FOSA	51%	41%	30-140%
	d3-MeFOSAA	74%	74%	50-150%
	13C2-4:2FTS	99%	93%	50-150%
	13C2-6:2FTS	105%	99%	50-150%
	13C2-8:2FTS	120%	97%	50-150%

(a) Outside control limits.

* = Outside of Control Limits.

Matrix Spike Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73191-MS	2Q25695.D	1	12/27/18	NAF	12/26/18	OP73191	S2Q397
JC80150-21 [a]	2Q25694.D	1	12/27/18	NAF	12/26/18	OP73191	S2Q397

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

FA60008-13

CAS No.	Compound	JC80150-21 ug/l	Q	Spike ug/l	MS ug/l	MS %	Limits
375-22-4	Perfluorobutanoic acid	ND		0.16	0.132	83	70-130
2706-90-3	Perfluoropentanoic acid	0.00339	J	0.16	0.129	79	70-130
307-24-4	Perfluorohexanoic acid	0.00585	J	0.16	0.119	71	70-130
375-85-9	Perfluoroheptanoic acid	0.0450		0.16	0.173	80	71-130
335-67-1	Perfluorooctanoic acid	0.0630		0.16	0.194	82	74-130
375-95-1	Perfluorononanoic acid	0.614		0.16	0.723	68* [b]	76-130
335-76-2	Perfluorodecanoic acid	ND		0.16	0.125	78	70-130
2058-94-8	Perfluoroundecanoic acid	ND		0.16	0.130	81	70-130
307-55-1	Perfluorododecanoic acid	ND		0.16	0.134	84	70-130
72629-94-8	Perfluorotridecanoic acid	ND		0.16	0.152	95	70-139
376-06-7	Perfluorotetradecanoic acid	ND		0.16	0.128	80	70-130
375-73-5	Perfluorobutanesulfonic acid	ND		0.142	0.112	79	73-130
2706-91-4	Perfluoropentanesulfonic acid	ND		0.15	0.119	79	70-130
355-46-4	Perfluorohexanesulfonic acid	0.00210	J	0.146	0.112	75	74-130
375-92-8	Perfluoroheptanesulfonic acid	ND		0.152	0.128	84	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.00966	B	0.148	0.134	84	70-130
68259-12-1	Perfluorononanesulfonic acid	ND		0.154	0.116	76	70-130
335-77-3	Perfluorodecanesulfonic acid	ND		0.154	0.0989	64*	70-130
754-91-6	PFOSA	ND		0.16	0.131	82	70-131
2355-31-9	MeFOSAA	ND		0.16	0.133	83	70-130
2991-50-6	EtFOSAA	ND		0.16	0.129	81	70-130
757124-72-4	4:2 Fluorotelomer sulfonate	ND		0.15	0.123	82	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	ND		0.152	0.127	84	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	ND		0.154	0.121	79	70-130

CAS No.	ID Standard Recoveries	MS	JC80150-21	Limits
	13C4-PFBA	38%		30-140%
	13C5-PFPeA	112%		40-140%
	13C5-PFHxA	120%	107%	50-150%
	13C4-PFHpA	116%	106%	50-150%
	13C8-PFOA	121%	113%	50-150%
	13C9-PFNA	114%	105%	50-150%
	13C6-PFDA	111%	112%	50-150%
	13C7-PFUnDA	113%	103%	50-150%

* = Outside of Control Limits.

Matrix Spike Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73191-MS	2Q25695.D	1	12/27/18	NAF	12/26/18	OP73191	S2Q397
JC80150-21 [a]	2Q25694.D	1	12/27/18	NAF	12/26/18	OP73191	S2Q397

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

FA60008-13

CAS No.	ID Standard Recoveries	MS	JC80150-21	Limits
	13C2-PFDoDA	100%	95%	50-150%
	13C2-PFTeDA	97%	90%	40-150%
	13C3-PFBS	112%	100%	50-150%
	13C3-PFHxS	109%	101%	50-150%
	13C8-PFOS	107%	99%	50-150%
	13C8-FOSA	120%		30-140%
	d3-MeFOSAA	102%		50-150%
	13C2-4:2FTS	115%		50-150%
	13C2-6:2FTS	118%		50-150%
	13C2-8:2FTS	109%		50-150%

(a) Insufficient sample for re-extraction.
(b) Outside control limits due to high level in sample relative to spike amount.

* = Outside of Control Limits.

Duplicate Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73096-DUP	2Q25406.D	1	12/21/18	NAF	12/19/18	OP73096	S2Q394
FA60008-14	2Q25405.D	1	12/21/18	NAF	12/19/18	OP73096	S2Q394
FA60008-14	2Q25527.D	1	12/24/18	NAF	12/19/18	OP73096	S2Q395

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

FA60008-1, FA60008-2, FA60008-3, FA60008-4, FA60008-5, FA60008-6, FA60008-7, FA60008-8, FA60008-9, FA60008-10, FA60008-11, FA60008-12, FA60008-14, FA60008-15

CAS No.	Compound	FA60008-14 ug/l	Q	DUP ug/l	Q	RPD	Limits
375-22-4	Perfluorobutanoic acid	0.0136		0.0143		5	30
2706-90-3	Perfluoropentanoic acid	0.0182		0.0207		13	30
307-24-4	Perfluorohexanoic acid	0.0177		0.0185		4	30
375-85-9	Perfluoroheptanoic acid	0.0161		0.0176		9	30
335-67-1	Perfluorooctanoic acid	0.0312		0.0341		9	30
375-95-1	Perfluorononanoic acid	0.00360	aJ	0.00437		19	30
335-76-2	Perfluorodecanoic acid	0.00453		0.00444		2	30
2058-94-8	Perfluoroundecanoic acid	ND		ND		nc	30
307-55-1	Perfluorododecanoic acid	ND		ND		nc	30
72629-94-8	Perfluorotridecanoic acid	ND		ND		nc	30
376-06-7	Perfluorotetradecanoic acid	ND		ND		nc	30
375-73-5	Perfluorobutanesulfonic acid	0.00807		0.0128		45*	30
2706-91-4	Perfluoropentanesulfonic acid	0.00331	J	0.00337	J	2	30
355-46-4	Perfluorohexanesulfonic acid	0.0220		0.0233		6	30
375-92-8	Perfluoroheptanesulfonic acid	0.00196	J	0.00199	J	2	30
1763-23-1	Perfluorooctanesulfonic acid	0.176		0.192		9	30
68259-12-1	Perfluorononanesulfonic acid	ND		ND		nc	30
335-77-3	Perfluorodecanesulfonic acid	ND		ND		nc	30
754-91-6	PFOSA	ND		ND		nc	30
2355-31-9	MeFOSAA	ND		ND		nc	30
2991-50-6	EtFOSAA	ND		ND		nc	30
757124-72-4	4:2 Fluorotelomer sulfonate	ND		ND		nc	30
27619-97-2	6:2 Fluorotelomer sulfonate	0.00221	J	0.00233	J	5	30
39108-34-4	8:2 Fluorotelomer sulfonate	ND		ND		nc	30

CAS No.	ID Standard Recoveries	DUP	FA60008-14	FA60008-14	Limits
	13C4-PFBA	83%	74%	80%	30-140%
	13C5-PFPeA	86%	77%	84%	40-140%
	13C5-PFHxA	88%	78%	87%	50-150%
	13C4-PFHpA	89%	80%	91%	50-150%
	13C8-PFOA	99%	89%	100%	50-150%
	13C9-PFNA	99%	85%	99%	50-150%
	13C6-PFDA	87%	80%	84%	50-150%
	13C7-PFUnDA	82%	71%	75%	50-150%

* = Outside of Control Limits.

Duplicate Summary

Job Number: FA60008
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73096-DUP	2Q25406.D	1	12/21/18	NAF	12/19/18	OP73096	S2Q394
FA60008-14	2Q25405.D	1	12/21/18	NAF	12/19/18	OP73096	S2Q394
FA60008-14	2Q25527.D	1	12/24/18	NAF	12/19/18	OP73096	S2Q395

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

FA60008-1, FA60008-2, FA60008-3, FA60008-4, FA60008-5, FA60008-6, FA60008-7, FA60008-8, FA60008-9, FA60008-10, FA60008-11, FA60008-12, FA60008-14, FA60008-15

CAS No.	ID Standard Recoveries	DUP	FA60008-14	FA60008-14	Limits
	13C2-PFDoDA	72%	59%	69%	50-150%
	13C2-PFTeDA	79%	66%	71%	40-150%
	13C3-PFBS	83%	73%	81%	50-150%
	13C3-PFHxS	83%	73%	82%	50-150%
	13C8-PFOS	81%	73%	79%	50-150%
	13C8-FOSA	77%	69%	61%	30-140%
	d3-MeFOSAA	79%	67%	74%	50-150%
	13C2-4:2FTS	93%	81%	87%	50-150%
	13C2-6:2FTS	109%	95%	101%	50-150%
	13C2-8:2FTS	90%	79%	83%	50-150%

(a) Result is from Run #2.

* = Outside of Control Limits.

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

e-Hardcopy 2.0
Automated Report

Technical Report for

Arcadis

Racer Lansing PFAS Delineation; Lansing, MI

B0064479.2019

SGS Job Number: FA60790

Sampling Date: 01/14/19

Report to:

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Lansing, MI 48933
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ATTN: Alex Villhauer

Total number of pages in report: **19**

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

Caitlin Brice, M.S.
General Manager

Client Service contact: Andrea Colby 407-425-6700

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

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SGS North America Inc.

Sample Summary

Arcadis

Job No: FA60790

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

Sample Number	Collected Date	Time	By	Received	Matrix Code	Matrix Type	Client Sample ID
FA60790-1	01/14/19	15:15	DA	01/15/19	AQ	Ground Water	P2-MH-W-011419

Summary of Hits

Job Number: FA60790
Account: Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI
Collected: 01/14/19

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
FA60790-1	**P2-MH-W-011419**					
Perfluorobutanoic acid		0.00826 J	0.0083	0.0021	ug/l	EPA 537M BY ID
Perfluoropentanoic acid		0.00905	0.0042	0.0016	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.0119	0.0042	0.0010	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.00976	0.0042	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.0245	0.0042	0.0010	ug/l	EPA 537M BY ID
Perfluorononanoic acid		0.00314 J	0.0042	0.0010	ug/l	EPA 537M BY ID
Perfluorodecanoic acid		0.00370 J	0.0042	0.0010	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00328 J	0.0042	0.0010	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00228 J	0.0042	0.0010	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.00895	0.0042	0.0016	ug/l	EPA 537M BY ID

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID:	P2-MH-W-011419		
Lab Sample ID:	FA60790-1	**Date Sampled:**	01/14/19
Matrix:	AQ - Ground Water	**Date Received:**	01/15/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q26396.D	1	01/17/19 18:20	NAF	01/16/19 10:00	OP73402	S2Q411
Run #2							

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

PFAS List

CAS No.	Compound	Result	RL	MDL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS						
375-22-4	Perfluorobutanoic acid	0.00826	0.0083	0.0021	ug/l	J
2706-90-3	Perfluoropentanoic acid	0.00905	0.0042	0.0016	ug/l	
307-24-4	Perfluorohexanoic acid	0.0119	0.0042	0.0010	ug/l	
375-85-9	Perfluoroheptanoic acid	0.00976	0.0042	0.0010	ug/l	
335-67-1	Perfluorooctanoic acid	0.0245	0.0042	0.0010	ug/l	
375-95-1	Perfluorononanoic acid	0.00314	0.0042	0.0010	ug/l	J
335-76-2	Perfluorodecanoic acid	0.00370	0.0042	0.0010	ug/l	J
2058-94-8	Perfluoroundecanoic acid	ND	0.0042	0.0010	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0042	0.0016	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0042	0.0010	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0042	0.0010	ug/l	
PERFLUOROALKYLSULFONATES						
375-73-5	Perfluorobutanesulfonic acid	0.00328	0.0042	0.0010	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0042	0.0010	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00228	0.0042	0.0010	ug/l	J
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0042	0.0010	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.00895	0.0042	0.0016	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0042	0.0010	ug/l	
335-77-3	Perfluorodecanesulfonic acid [a]	ND	0.0042	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDES						
754-91-6	PFOSA	ND	0.0042	0.0010	ug/l	
PERFLUOROOCTANESULFONAMIDOACETIC ACIDS						
2355-31-9	MeFOSAA	ND	0.021	0.0042	ug/l	
2991-50-6	EtFOSAA	ND	0.021	0.0042	ug/l	
FLUOROTELOMER SULFONATES						
757124-72-4	4:2 Fluorotelomer sulfonate	ND	0.0083	0.0021	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.0083	0.0021	ug/l	

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

Report of Analysis

Client Sample ID:	P2-MH-W-011419		
Lab Sample ID:	FA60790-1	**Date Sampled:**	01/14/19
Matrix:	AQ - Ground Water	**Date Received:**	01/15/19
Method:	EPA 537M BY ID EPA 537 MOD	**Percent Solids:**	n/a
Project:	Racer Lansing PFAS Delineation; Lansing, MI		

PFAS List

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

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	90%		30-140%
	13C5-PFPeA	92%		40-140%
	13C5-PFHxA	96%		50-150%
	13C4-PFHpA	99%		50-150%
	13C8-PFOA	106%		50-150%
	13C9-PFNA	111%		50-150%
	13C6-PFDA	103%		50-150%
	13C7-PFUnDA	87%		50-150%
	13C2-PFDoDA	100%		50-150%
	13C2-PFTeDA	76%		40-150%
	13C3-PFBS	88%		50-150%
	13C3-PFHxS	92%		50-150%
	13C8-PFOS	95%		50-150%
	13C8-FOSA	110%		30-140%
	d3-MeFOSAA	81%		50-150%
	13C2-4:2FTS	103%		50-150%
	13C2-6:2FTS	116%		50-150%
	13C2-8:2FTS	103%		50-150%

(a) Associated BS recovery outside control limits.

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

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

SGS North America Inc - Orlando

Chain of Custody

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

FA60790

SGS - ORLANDO JOB # :

PAGE 1 OF 1

SGS - ORLANDO Quote #	SKIFF #

Client / Reporting Information

Company Name: ARCADIS
Address: 28550 Cabot Dr
City: Novi State: MI Zip: 48377
Project Contact: Dan Stockard Email: Daniel.Stockard@arcadis.com
Phone #: 248-994-2240
Sampler(s) Name(s) (Printed) Sampler 1: Dale Arndt Sampler 2:

Project Information

Project Name: Racer Lansing
Street
City Lansing State MI
Project # B00 64479.2019
Fax # 248-994-2241
Client Purchase Order #

Analytical Information

SKIFF

Matrix Codes

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

SGS Orlando Sample #	Field ID / Point of Collection	COLLECTION DATE	TIME	SAMPLED BY:	MATRIX	TOTAL # OF BOTTLES	CONTAINER INFORMATION: OTHER	NONE	HCl	NaOH	HNO3	H2SO4	NAOH+ZNA	DI WATER	MEOH	LAB USE ONLY
(1)	P2-MH-W-01 1419	1/14/19	1515	DMA	GW	2	X								X	

Turnaround Time (Business days)

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

Data Deliverable Information

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

Comments / Remarks

Samples kept on wet Ice

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

Relinquished by Sampler/Affiliation	Date Time:	Received By/Affiliation	Relinquished By/Affiliation	Date Time:	Received By/Affiliation
1 ARCADIS	1/14/19 1730	2 FedEx	3 Fed Ex		4 01/15/19
Relinquished by/Affiliation	Date Time:	Received By/Affiliation	Relinquished By/Affiliation	Date Time:	Received By/Affiliation
5		6	7		8

Lab Use Only : Cooler Temperature (s) Celsius (corrected): 3.6

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

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

FA60790: Chain of Custody
Page 1 of 2

SGS Sample Receipt Summary

Job Number: FA60790 **Client:** ARCADIS **Project:** RACER LANSING

Date / Time Received: 1/15/2019 9:00:00 AM **Delivery Method:** FED EX **Airbill #'s:** 1002239982110003281100813939290662

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

Cooler Temps (Raw Measured) °C: Cooler 1: (3.8);

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

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

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

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

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

Misc. Information

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

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

Residual Chlorine Test Strip Lot #: _____

Comments

SM001
Rev. Date 05/24/17

Technician: SHAYLAP Date: 1/15/2019 9:00:00 AM Reviewer: _____ Date: _____

FA60790: Chain of Custody
Page 2 of 2

MS Semi-volatiles

QC Data Summaries

Includes the following where applicable:

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

Method Blank Summary

Job Number: FA60790
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73402-MB	2Q26369.D	1	01/17/19	NAF	01/16/19	OP73402	S2Q410

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

FA60790-1

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

CAS No.	ID Standard Recoveries		Limits
	13C4-PFBA	107%	30-140%
	13C5-PFPeA	97%	40-140%
	13C5-PFHxA	97%	50-150%
	13C4-PFHpA	96%	50-150%
	13C8-PFOA	98%	50-150%
	13C9-PFNA	104%	50-150%
	13C6-PFDA	93%	50-150%
	13C7-PFUnDA	97%	50-150%

Method Blank Summary

Job Number: FA60790
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73402-MB	2Q26369.D	1	01/17/19	NAF	01/16/19	OP73402	S2Q410

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

FA60790-1

CAS No.	ID Standard Recoveries		Limits
	13C2-PFDoDA	89%	50-150%
	13C2-PFTeDA	72%	40-150%
	13C3-PFBS	96%	50-150%
	13C3-PFHxS	94%	50-150%
	13C8-PFOS	100%	50-150%
	13C8-FOSA	102%	30-140%
	d3-MeFOSAA	88%	50-150%
	13C2-4:2FTS	90%	50-150%
	13C2-6:2FTS	94%	50-150%
	13C2-8:2FTS	89%	50-150%

Instrument Blank

Job Number: FA60790
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q410-IBLK	2Q26365.D	1	01/17/19	NAF	n/a	n/a	S2Q410

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

OP73402-BS, OP73402-MS, OP73402-MSD

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

CAS No.	ID Standard Recoveries		Limits
	13C4-PFBA	109%	50-150%
	13C5-PFPeA	102%	50-150%
	13C5-PFHxA	104%	50-150%
	13C4-PFHpA	108%	50-150%
	13C8-PFOA	101%	50-150%
	13C9-PFNA	105%	50-150%
	13C6-PFDA	109%	50-150%
	13C7-PFUnDA	100%	50-150%

Instrument Blank

Job Number: FA60790
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q410-IBLK	2Q26365.D	1	01/17/19	NAF	n/a	n/a	S2Q410

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

OP73402-BS, OP73402-MS, OP73402-MSD

CAS No.	ID Standard Recoveries		Limits
	13C2-PFDoDA	96%	50-150%
	13C2-PFTeDA	92%	50-150%
	13C3-PFBS	101%	50-150%
	13C3-PFHxS	102%	50-150%
	13C8-PFOS	101%	50-150%
	13C8-FOSA	106%	50-150%
	d3-MeFOSAA	95%	50-150%
	13C2-4:2FTS	91%	50-150%
	13C2-6:2FTS	92%	50-150%
	13C2-8:2FTS	89%	50-150%

Blank Spike Summary

Job Number: FA60790
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73402-BS	2Q26368.D	1	01/17/19	NAF	01/16/19	OP73402	S2Q410

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

FA60790-1

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
375-22-4	Perfluorobutanoic acid	0.08	0.0700	88	70-130
2706-90-3	Perfluoropentanoic acid	0.08	0.0781	98	70-130
307-24-4	Perfluorohexanoic acid	0.08	0.0681	85	70-130
375-85-9	Perfluoroheptanoic acid	0.08	0.0779	97	71-130
335-67-1	Perfluorooctanoic acid	0.08	0.0737	92	74-130
375-95-1	Perfluorononanoic acid	0.08	0.0698	87	76-130
335-76-2	Perfluorodecanoic acid	0.08	0.0704	88	70-130
2058-94-8	Perfluoroundecanoic acid	0.08	0.0775	97	70-130
307-55-1	Perfluorododecanoic acid	0.08	0.0740	93	70-130
72629-94-8	Perfluorotridecanoic acid	0.08	0.0772	97	70-139
376-06-7	Perfluorotetradecanoic acid	0.08	0.0734	92	70-130
375-73-5	Perfluorobutanesulfonic acid	0.0708	0.0655	93	73-130
2706-91-4	Perfluoropentanesulfonic acid	0.0752	0.0755	100	70-130
355-46-4	Perfluorohexanesulfonic acid	0.0728	0.0635	87	74-130
375-92-8	Perfluoroheptanesulfonic acid	0.076	0.0753	99	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.074	0.0729	99	70-130
68259-12-1	Perfluorononanesulfonic acid	0.0768	0.0700	91	70-130
335-77-3	Perfluorodecanesulfonic acid	0.0772	0.0492	64* [a]	70-130
754-91-6	PFOSA	0.08	0.0765	96	70-131
2355-31-9	MeFOSAA	0.08	0.0733	92	70-130
2991-50-6	EtFOSAA	0.08	0.0720	90	70-130
757124-72-4	4:2 Fluorotelomer sulfonate	0.0748	0.0741	99	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	0.076	0.0771	101	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	0.0768	0.0717	93	70-130

CAS No.	ID Standard Recoveries	BSP	Limits
	13C4-PFBA	96%	30-140%
	13C5-PFPeA	88%	40-140%
	13C5-PFHxA	88%	50-150%
	13C4-PFHpA	88%	50-150%
	13C8-PFOA	85%	50-150%
	13C9-PFNA	89%	50-150%
	13C6-PFDA	85%	50-150%
	13C7-PFUnDA	76%	50-150%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA60790
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73402-BS	2Q26368.D	1	01/17/19	NAF	01/16/19	OP73402	S2Q410

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

FA60790-1

CAS No.	ID Standard Recoveries	BSP	Limits
	13C2-PFDoDA	83%	50-150%
	13C2-PFTeDA	68%	40-150%
	13C3-PFBS	90%	50-150%
	13C3-PFHxS	87%	50-150%
	13C8-PFOS	91%	50-150%
	13C8-FOSA	90%	30-140%
	d3-MeFOSAA	80%	50-150%
	13C2-4:2FTS	87%	50-150%
	13C2-6:2FTS	87%	50-150%
	13C2-8:2FTS	84%	50-150%

(a) Sporadic marginal failure.

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA60790
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73402-MS	2Q26372.D	1	01/17/19	NAF	01/16/19	OP73402	S2Q410
OP73402-MSD	2Q26373.D	1	01/17/19	NAF	01/16/19	OP73402	S2Q410
FA60804-1	2Q26371.D	1	01/17/19	NAF	01/16/19	OP73402	S2Q410

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

FA60790-1

CAS No.	Compound	FA60804-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
375-22-4	Perfluorobutanoic acid	0.0080	U	0.08	0.0728	91	0.08	0.0691	86	5	70-130/30
2706-90-3	Perfluoropentanoic acid	0.0040	U	0.08	0.0795	99	0.08	0.0779	97	2	70-130/30
307-24-4	Perfluorohexanoic acid	0.0040	U	0.08	0.0675	84	0.08	0.0652	82	3	70-130/30
375-85-9	Perfluoroheptanoic acid	0.0040	U	0.08	0.0736	92	0.08	0.0735	92	0	71-130/30
335-67-1	Perfluorooctanoic acid	0.0040	U	0.08	0.0670	84	0.08	0.0702	88	5	74-130/30
375-95-1	Perfluorononanoic acid	0.0040	U	0.08	0.0685	86	0.08	0.0708	89	3	76-130/30
335-76-2	Perfluorodecanoic acid	0.0040	U	0.08	0.0764	96	0.08	0.0761	95	0	70-130/30
2058-94-8	Perfluoroundecanoic acid	0.0040	U	0.08	0.0759	95	0.08	0.0748	94	1	70-130/30
307-55-1	Perfluorododecanoic acid	0.0040	U	0.08	0.0757	95	0.08	0.0768	96	1	70-130/30
72629-94-8	Perfluorotridecanoic acid	0.0040	U	0.08	0.0785	98	0.08	0.0781	98	1	70-139/30
376-06-7	Perfluorotetradecanoic acid	0.0040	U	0.08	0.0695	87	0.08	0.0689	86	1	70-130/30
375-73-5	Perfluorobutanesulfonic acid	0.0040	U	0.0708	0.0639	90	0.0708	0.0631	89	1	73-130/30
2706-91-4	Perfluoropentanesulfonic acid	0.0040	U	0.0752	0.0856	114	0.0752	0.0829	110	3	70-130/30
355-46-4	Perfluorohexanesulfonic acid	0.0040	U	0.0728	0.0618	85	0.0728	0.0619	85	0	74-130/30
375-92-8	Perfluoroheptanesulfonic acid	0.0040	U	0.076	0.0758	100	0.076	0.0761	100	0	74-130/30
1763-23-1	Perfluorooctanesulfonic acid	0.0040	U	0.074	0.0708	96	0.074	0.0714	96	1	70-130/30
68259-12-1	Perfluorononanesulfonic acid	0.0040	U	0.0768	0.0703	92	0.0768	0.0709	92	1	70-130/30
335-77-3	Perfluorodecanesulfonic acid	0.0040	U	0.0772	0.0537	70	0.0772	0.0529	69*	2	70-130/30
754-91-6	PFOSA	0.0040	U	0.08	0.0751	94	0.08	0.0735	92	2	70-131/30
2355-31-9	MeFOSAA	0.020	U	0.08	0.0738	92	0.08	0.0738	92	0	70-130/30
2991-50-6	EtFOSAA	0.020	U	0.08	0.0741	93	0.08	0.0719	90	3	70-130/30
757124-72-4	4:2 Fluorotelomer sulfonate	0.0080	U	0.0748	0.0720	96	0.0748	0.0705	94	2	70-130/30
27619-97-2	6:2 Fluorotelomer sulfonate	0.0080	U	0.076	0.0749	99	0.076	0.0740	97	1	70-133/30
39108-34-4	8:2 Fluorotelomer sulfonate	0.0080	U	0.0768	0.0682	89	0.0768	0.0707	92	4	70-130/30

CAS No.	ID Standard Recoveries	MS	MSD	FA60804-1	Limits
	13C4-PFBA	77%	74%	76%	30-140%
	13C5-PFPeA	90%	87%	88%	40-140%
	13C5-PFHxA	101%	98%	103%	50-150%
	13C4-PFHpA	109%	105%	111%	50-150%
	13C8-PFOA	113%	115%	119%	50-150%
	13C9-PFNA	121%	113%	120%	50-150%
	13C6-PFDA	109%	103%	109%	50-150%
	13C7-PFUnDA	111%	109%	117%	50-150%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA60790
Account: ARCMIL Arcadis
Project: Racer Lansing PFAS Delineation; Lansing, MI

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73402-MS	2Q26372.D	1	01/17/19	NAF	01/16/19	OP73402	S2Q410
OP73402-MSD	2Q26373.D	1	01/17/19	NAF	01/16/19	OP73402	S2Q410
FA60804-1	2Q26371.D	1	01/17/19	NAF	01/16/19	OP73402	S2Q410

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

FA60790-1

CAS No.	ID Standard Recoveries	MS	MSD	FA60804-1	Limits
	13C2-PFDoDA	108%	97%	107%	50-150%
	13C2-PFTeDA	85%	77%	74%	40-150%
	13C3-PFBS	85%	82%	83%	50-150%
	13C3-PFHxS	104%	98%	101%	50-150%
	13C8-PFOS	109%	101%	105%	50-150%
	13C8-FOSA	120%	112%	117%	30-140%
	d3-MeFOSAA	106%	98%	98%	50-150%
	13C2-4:2FTS	110%	107%	105%	50-150%
	13C2-6:2FTS	124%	121%	123%	50-150%
	13C2-8:2FTS	122%	112%	107%	50-150%

* = Outside of Control Limits.

Analytical Laboratory Report

Report ID: S97828.01(01)
Generated on 12/21/2018

Report to

Attention: Christine Gregg
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 734-585-7817 FAX: 248-994-2241
Email: christine.gregg@arcadis.com

Addtional Contacts: Alex Villhauer, Kristen Padron, Randy Christensen

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

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Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S97828.01-S97828.05
Project: RACER Lansing / B0064479.2018.03100
Collected Date: 12/07/2018
Submitted Date/Time: 12/14/2018 11:50
Sampled by: Dale Arnett
P.O. #: B0064479.2018.03100

Table of Contents

Maya Murshak
Technical Director

General Report Notes

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

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

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

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

Qualifier Descriptions

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

Glossary of Abbreviations

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

Method Summary

Method	Version
N/A	Not Applicable
SW3015A	SW 846 Method 3015A Revision 1 February 2007
SW5030C/8260C	SW 846 Method 8260C Revision 3 August 2006 / 5030C Revision 3 May 2003
SW6020A	SW 846 Method 6020A Revision 1 February 2007
SW7471B	SW 846 Method 7471B Revision 2 February 2007
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Sample Summary (5 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S97828.01	P6-MH2-SW_120718	Groundwater	12/07/18 14:00
S97828.02	P3-MH-NE_120718	Groundwater	12/07/18 15:10
S97828.03	P2-MH-NW_120718	Groundwater	12/07/18 15:40
S97828.04	Dup-08_120718	Groundwater	12/07/18 00:01
S97828.05	Trip Blank	Water	12/07/18 00:01

Lab Sample ID: S97828.01
Sample Tag: P6-MH2-SW_120718
Collected Date/Time: 12/07/2018 14:00
Matrix: Groundwater
COC Reference: 120336

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	4.4	IR
1	125ml Plastic	HNO3	Yes	4.4	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	12/18/18 14:00	JML	
Metal Digestion	Completed	SW3015A	12/18/18 09:00	JRH	
Mercury Digestion*	Completed	SW7471B	12/21/18 10:00	JRH	

Metals

Method: SW6020A, Run Date: 12/19/18 12:57, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Boron	0.11	0.04		mg/L	5	7440-42-8	

Method: SW6020A, Run Date: 12/18/18 13:55, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005		mg/L	5	7440-36-0	
Arsenic	0.002	0.002		mg/L	5	7440-38-2	
Barium	0.058	0.005		mg/L	5	7440-39-3	
Cadmium	Not detected	0.0005		mg/L	5	7440-43-9	
Chromium	Not detected	0.005		mg/L	5	7440-47-3	
Cobalt	Not detected	0.005		mg/L	5	7440-48-4	
Copper	Not detected	0.005		mg/L	5	7440-50-8	
Lead	Not detected	0.003		mg/L	5	7439-92-1	
Manganese	0.054	0.005		mg/L	5	7439-96-5	
Nickel	Not detected	0.005		mg/L	5	7440-02-0	
Selenium	Not detected	0.004		mg/L	5	7782-49-2	
Silver	Not detected	0.0005		mg/L	5	7440-22-4	
Vanadium	Not detected	0.005		mg/L	5	7440-62-2	
Zinc	0.005	0.005		mg/L	5	7440-66-6	

Method: SW7471B, Run Date: 12/21/18 14:08, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury*	Not detected	0.0002		mg/L	1	7439-97-6	

Organics - Volatiles

Method: SW5030C/8260C, Run Date: 12/17/18 20:19, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,2-Dibromo-3-chloropropane	Not detected	1		ug/L	1	96-12-8	
1,2-Dibromoethane	Not detected	1		ug/L	1	106-93-4	

Method: SW8260B - SIM, Run Date: 12/21/18 14:58, Analyst: JML

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

Lab Sample ID: S97828.01 (continued)
Sample Tag: P6-MH2-SW_120718

TCL Volatile Organics 8260, Method: SW5030C/8260C, Run Date: 12/17/18 20:19, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,1,2-Trichloro-1,2,2-trifluoroethane	Not detected	1		ug/L	1	76-13-1	
Acetone	Not detected	10		ug/L	1	67-64-1	
Carbon disulfide	Not detected	1		ug/L	1	75-15-0	
Methyl Acetate	Not detected	10		ug/L	1	79-20-9	
tert-Methyl butyl ether (MTBE)	Not detected	1		ug/L	1	1634-04-4	
2-Butanone (MEK)	Not detected	10		ug/L	1	78-93-3	
Dichlorodifluoromethane	Not detected	1		ug/L	1	75-71-8	
Chloromethane	Not detected	1		ug/L	1	74-87-3	
Vinyl chloride	Not detected	1		ug/L	1	75-01-4	
Bromomethane	Not detected	1		ug/L	1	74-83-9	
Chloroethane	Not detected	1		ug/L	1	75-00-3	
Trichlorofluoromethane	Not detected	1		ug/L	1	75-69-4	
1,1-Dichloroethene	Not detected	1		ug/L	1	75-35-4	
Methylene chloride	Not detected	1		ug/L	1	75-09-2	
trans-1,2-Dichloroethene	Not detected	1		ug/L	1	156-60-5	
1,1-Dichloroethane	Not detected	1		ug/L	1	75-34-3	
cis-1,2-Dichloroethene	Not detected	1		ug/L	1	156-59-2	
Chloroform	Not detected	1		ug/L	1	67-66-3	
1,1,1-Trichloroethane	Not detected	1		ug/L	1	71-55-6	
Cyclohexane	Not detected	1		ug/L	1	110-82-7	
4-Methyl-2-pentanone (MIBK)	Not detected	10		ug/L	1	108-10-1	
2-Hexanone	Not detected	10		ug/L	1	591-78-6	
Carbon tetrachloride	Not detected	1		ug/L	1	56-23-5	
Benzene	Not detected	1		ug/L	1	71-43-2	
1,2-Dichloroethane	Not detected	1		ug/L	1	107-06-2	
Trichloroethene	Not detected	1		ug/L	1	79-01-6	
1,2-Dichloropropane	Not detected	1		ug/L	1	78-87-5	
Bromodichloromethane	Not detected	1		ug/L	1	75-27-4	
Methyl cyclohexane	Not detected	1		ug/L	1	108-87-2	
cis-1,3-Dichloropropene	Not detected	1		ug/L	1	10061-01-5	
Toluene	Not detected	1		ug/L	1	108-88-3	
trans-1,3-Dichloropropene	Not detected	1		ug/L	1	10061-02-6	
1,1,2-Trichloroethane	Not detected	1		ug/L	1	79-00-5	
Tetrachloroethene	Not detected	1		ug/L	1	127-18-4	
Dibromochloromethane	Not detected	1		ug/L	1	124-48-1	
Chlorobenzene	Not detected	1		ug/L	1	108-90-7	
1,1,2,2-Tetrachloroethane	Not detected	1		ug/L	1	79-34-5	
Ethylbenzene	Not detected	1		ug/L	1	100-41-4	
p,m-Xylene*	Not detected	2		ug/L	1		
o-Xylene	Not detected	1		ug/L	1	95-47-6	
Styrene	Not detected	1		ug/L	1	100-42-5	
Isopropylbenzene	Not detected	1		ug/L	1	98-82-8	
Bromoform	Not detected	1		ug/L	1	75-25-2	
1,3-Dichlorobenzene	Not detected	1		ug/L	1	541-73-1	
1,4-Dichlorobenzene	Not detected	1		ug/L	1	106-46-7	
1,2-Dichlorobenzene	Not detected	1		ug/L	1	95-50-1	
1,2,4-Trichlorobenzene	Not detected	1		ug/L	1	120-82-1	

Lab Sample ID: S97828.02
Sample Tag: P3-MH-NE_120718
Collected Date/Time: 12/07/2018 15:10
Matrix: Groundwater
COC Reference: 120336

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	4.4	IR
1	125ml Plastic	HNO3	Yes	4.4	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	12/18/18 14:00	JML	
Metal Digestion	Completed	SW3015A	12/18/18 09:00	JRH	
Mercury Digestion*	Completed	SW7471B	12/21/18 10:00	JRH	

Metals

Method: SW6020A, Run Date: 12/19/18 12:58, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Boron	Not detected	0.04		mg/L	5	7440-42-8	

Method: SW6020A, Run Date: 12/18/18 13:59, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005		mg/L	5	7440-36-0	
Arsenic	Not detected	0.002		mg/L	5	7440-38-2	
Barium	0.045	0.005		mg/L	5	7440-39-3	
Cadmium	Not detected	0.0005		mg/L	5	7440-43-9	
Chromium	Not detected	0.005		mg/L	5	7440-47-3	
Cobalt	Not detected	0.005		mg/L	5	7440-48-4	
Copper	Not detected	0.005		mg/L	5	7440-50-8	
Lead	Not detected	0.003		mg/L	5	7439-92-1	
Manganese	0.018	0.005		mg/L	5	7439-96-5	
Nickel	Not detected	0.005		mg/L	5	7440-02-0	
Selenium	Not detected	0.004		mg/L	5	7782-49-2	
Silver	Not detected	0.0005		mg/L	5	7440-22-4	
Vanadium	Not detected	0.005		mg/L	5	7440-62-2	
Zinc	Not detected	0.005		mg/L	5	7440-66-6	

Method: SW7471B, Run Date: 12/21/18 14:10, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury*	Not detected	0.0002		mg/L	1	7439-97-6	

Organics - Volatiles

Method: SW5030C/8260C, Run Date: 12/17/18 20:39, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,2-Dibromo-3-chloropropane	Not detected	1		ug/L	1	96-12-8	
1,2-Dibromoethane	Not detected	1		ug/L	1	106-93-4	

Method: SW8260B - SIM, Run Date: 12/21/18 03:59, Analyst: JML

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

Lab Sample ID: S97828.02 (continued)
Sample Tag: P3-MH-NE_120718

TCL Volatile Organics 8260, Method: SW5030C/8260C, Run Date: 12/17/18 20:39, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,1,2-Trichloro-1,2,2-trifluoroethane	Not detected	1		ug/L	1	76-13-1	
Acetone	11	10		ug/L	1	67-64-1	
Carbon disulfide	Not detected	1		ug/L	1	75-15-0	
Methyl Acetate	Not detected	10		ug/L	1	79-20-9	
tert-Methyl butyl ether (MTBE)	Not detected	1		ug/L	1	1634-04-4	
2-Butanone (MEK)	Not detected	10		ug/L	1	78-93-3	
Dichlorodifluoromethane	Not detected	1		ug/L	1	75-71-8	
Chloromethane	Not detected	1		ug/L	1	74-87-3	
Vinyl chloride	Not detected	1		ug/L	1	75-01-4	
Bromomethane	Not detected	1		ug/L	1	74-83-9	
Chloroethane	Not detected	1		ug/L	1	75-00-3	
Trichlorofluoromethane	Not detected	1		ug/L	1	75-69-4	
1,1-Dichloroethene	Not detected	1		ug/L	1	75-35-4	
Methylene chloride	Not detected	1		ug/L	1	75-09-2	
trans-1,2-Dichloroethene	Not detected	1		ug/L	1	156-60-5	
1,1-Dichloroethane	Not detected	1		ug/L	1	75-34-3	
cis-1,2-Dichloroethene	Not detected	1		ug/L	1	156-59-2	
Chloroform	Not detected	1		ug/L	1	67-66-3	
1,1,1-Trichloroethane	Not detected	1		ug/L	1	71-55-6	
Cyclohexane	Not detected	1		ug/L	1	110-82-7	
4-Methyl-2-pentanone (MIBK)	Not detected	10		ug/L	1	108-10-1	
2-Hexanone	Not detected	10		ug/L	1	591-78-6	
Carbon tetrachloride	Not detected	1		ug/L	1	56-23-5	
Benzene	Not detected	1		ug/L	1	71-43-2	
1,2-Dichloroethane	Not detected	1		ug/L	1	107-06-2	
Trichloroethene	Not detected	1		ug/L	1	79-01-6	
1,2-Dichloropropane	Not detected	1		ug/L	1	78-87-5	
Bromodichloromethane	Not detected	1		ug/L	1	75-27-4	
Methyl cyclohexane	Not detected	1		ug/L	1	108-87-2	
cis-1,3-Dichloropropene	Not detected	1		ug/L	1	10061-01-5	
Toluene	Not detected	1		ug/L	1	108-88-3	
trans-1,3-Dichloropropene	Not detected	1		ug/L	1	10061-02-6	
1,1,2-Trichloroethane	Not detected	1		ug/L	1	79-00-5	
Tetrachloroethene	Not detected	1		ug/L	1	127-18-4	
Dibromochloromethane	Not detected	1		ug/L	1	124-48-1	
Chlorobenzene	Not detected	1		ug/L	1	108-90-7	
1,1,2,2-Tetrachloroethane	Not detected	1		ug/L	1	79-34-5	
Ethylbenzene	Not detected	1		ug/L	1	100-41-4	
p,m-Xylene*	Not detected	2		ug/L	1		
o-Xylene	Not detected	1		ug/L	1	95-47-6	
Styrene	Not detected	1		ug/L	1	100-42-5	
Isopropylbenzene	Not detected	1		ug/L	1	98-82-8	
Bromoform	Not detected	1		ug/L	1	75-25-2	
1,3-Dichlorobenzene	Not detected	1		ug/L	1	541-73-1	
1,4-Dichlorobenzene	Not detected	1		ug/L	1	106-46-7	
1,2-Dichlorobenzene	Not detected	1		ug/L	1	95-50-1	
1,2,4-Trichlorobenzene	Not detected	1		ug/L	1	120-82-1	

Lab Sample ID: S97828.03
Sample Tag: P2-MH-NW_120718
Collected Date/Time: 12/07/2018 15:40
Matrix: Groundwater
COC Reference: 120336

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	4.4	IR
1	125ml Plastic	HNO3	Yes	4.4	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	12/19/18 12:30	JML	
Metal Digestion	Completed	SW3015A	12/18/18 09:00	JRH	
Mercury Digestion*	Completed	SW7471B	12/21/18 10:00	JRH	

Metals

Method: SW6020A, Run Date: 12/19/18 12:59, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Boron	0.13	0.04		mg/L	5	7440-42-8	

Method: SW6020A, Run Date: 12/18/18 14:03, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005		mg/L	5	7440-36-0	
Arsenic	0.003	0.002		mg/L	5	7440-38-2	
Barium	0.055	0.005		mg/L	5	7440-39-3	
Cadmium	Not detected	0.0005		mg/L	5	7440-43-9	
Chromium	Not detected	0.005		mg/L	5	7440-47-3	
Cobalt	Not detected	0.005		mg/L	5	7440-48-4	
Copper	Not detected	0.005		mg/L	5	7440-50-8	
Lead	Not detected	0.003		mg/L	5	7439-92-1	
Manganese	0.082	0.005		mg/L	5	7439-96-5	
Nickel	Not detected	0.005		mg/L	5	7440-02-0	
Selenium	Not detected	0.004		mg/L	5	7782-49-2	
Silver	Not detected	0.0005		mg/L	5	7440-22-4	
Vanadium	Not detected	0.005		mg/L	5	7440-62-2	
Zinc	0.013	0.005		mg/L	5	7440-66-6	

Method: SW7471B, Run Date: 12/21/18 14:12, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury*	Not detected	0.0002		mg/L	1	7439-97-6	

Organics - Volatiles

Method: SW5030C/8260C, Run Date: 12/19/18 06:16, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,2-Dibromo-3-chloropropane	Not detected	1		ug/L	1	96-12-8	
1,2-Dibromoethane	Not detected	1		ug/L	1	106-93-4	

Method: SW8260B - SIM, Run Date: 12/21/18 04:20, Analyst: JML

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

Lab Sample ID: S97828.03 (continued)
Sample Tag: P2-MH-NW_120718

TCL Volatile Organics 8260, Method: SW5030C/8260C, Run Date: 12/19/18 06:16, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,1,2-Trichloro-1,2,2-trifluoroethane	Not detected	1		ug/L	1	76-13-1	
Acetone	Not detected	10		ug/L	1	67-64-1	
Carbon disulfide	Not detected	1		ug/L	1	75-15-0	
Methyl Acetate	Not detected	10		ug/L	1	79-20-9	
tert-Methyl butyl ether (MTBE)	Not detected	1		ug/L	1	1634-04-4	
2-Butanone (MEK)	Not detected	10		ug/L	1	78-93-3	
Dichlorodifluoromethane	Not detected	1		ug/L	1	75-71-8	
Chloromethane	Not detected	1		ug/L	1	74-87-3	
Vinyl chloride	Not detected	1		ug/L	1	75-01-4	
Bromomethane	Not detected	1		ug/L	1	74-83-9	
Chloroethane	Not detected	1		ug/L	1	75-00-3	
Trichlorofluoromethane	Not detected	1		ug/L	1	75-69-4	
1,1-Dichloroethene	Not detected	1		ug/L	1	75-35-4	
Methylene chloride	Not detected	1		ug/L	1	75-09-2	
trans-1,2-Dichloroethene	Not detected	1		ug/L	1	156-60-5	
1,1-Dichloroethane	Not detected	1		ug/L	1	75-34-3	
cis-1,2-Dichloroethene	Not detected	1		ug/L	1	156-59-2	
Chloroform	Not detected	1		ug/L	1	67-66-3	
1,1,1-Trichloroethane	Not detected	1		ug/L	1	71-55-6	
Cyclohexane	Not detected	1		ug/L	1	110-82-7	
4-Methyl-2-pentanone (MIBK)	Not detected	10		ug/L	1	108-10-1	
2-Hexanone	Not detected	10		ug/L	1	591-78-6	
Carbon tetrachloride	Not detected	1		ug/L	1	56-23-5	
Benzene	Not detected	1		ug/L	1	71-43-2	
1,2-Dichloroethane	Not detected	1		ug/L	1	107-06-2	
Trichloroethene	Not detected	1		ug/L	1	79-01-6	
1,2-Dichloropropane	Not detected	1		ug/L	1	78-87-5	
Bromodichloromethane	Not detected	1		ug/L	1	75-27-4	
Methyl cyclohexane	Not detected	1		ug/L	1	108-87-2	
cis-1,3-Dichloropropene	Not detected	1		ug/L	1	10061-01-5	
Toluene	Not detected	1		ug/L	1	108-88-3	
trans-1,3-Dichloropropene	Not detected	1		ug/L	1	10061-02-6	
1,1,2-Trichloroethane	Not detected	1		ug/L	1	79-00-5	
Tetrachloroethene	Not detected	1		ug/L	1	127-18-4	
Dibromochloromethane	Not detected	1		ug/L	1	124-48-1	
Chlorobenzene	Not detected	1		ug/L	1	108-90-7	
1,1,2,2-Tetrachloroethane	Not detected	1		ug/L	1	79-34-5	
Ethylbenzene	Not detected	1		ug/L	1	100-41-4	
p,m-Xylene*	Not detected	2		ug/L	1		
o-Xylene	Not detected	1		ug/L	1	95-47-6	
Styrene	Not detected	1		ug/L	1	100-42-5	
Isopropylbenzene	Not detected	1		ug/L	1	98-82-8	
Bromoform	Not detected	1		ug/L	1	75-25-2	
1,3-Dichlorobenzene	Not detected	1		ug/L	1	541-73-1	
1,4-Dichlorobenzene	Not detected	1		ug/L	1	106-46-7	
1,2-Dichlorobenzene	Not detected	1		ug/L	1	95-50-1	
1,2,4-Trichlorobenzene	Not detected	1		ug/L	1	120-82-1	

Lab Sample ID: S97828.04
Sample Tag: Dup-08_120718
Collected Date/Time: 12/07/2018 00:01
Matrix: Groundwater
COC Reference: 120336

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	4.4	IR
1	125ml Plastic	HNO3	Yes	4.4	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	12/19/18 12:30	JML	
Metal Digestion	Completed	SW3015A	12/18/18 09:00	JRH	
Mercury Digestion*	Completed	SW7471B	12/21/18 10:00	JRH	

Metals

Method: SW6020A, Run Date: 12/19/18 13:00, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Boron	0.11	0.04		mg/L	5	7440-42-8	

Method: SW6020A, Run Date: 12/18/18 14:07, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.005		mg/L	5	7440-36-0	
Arsenic	0.002	0.002		mg/L	5	7440-38-2	
Barium	0.060	0.005		mg/L	5	7440-39-3	
Cadmium	Not detected	0.0005		mg/L	5	7440-43-9	
Chromium	Not detected	0.005		mg/L	5	7440-47-3	
Cobalt	Not detected	0.005		mg/L	5	7440-48-4	
Copper	Not detected	0.005		mg/L	5	7440-50-8	
Lead	0.003	0.003		mg/L	5	7439-92-1	
Manganese	0.092	0.005		mg/L	5	7439-96-5	
Nickel	Not detected	0.005		mg/L	5	7440-02-0	
Selenium	Not detected	0.004		mg/L	5	7782-49-2	
Silver	Not detected	0.0005		mg/L	5	7440-22-4	
Vanadium	Not detected	0.005		mg/L	5	7440-62-2	
Zinc	0.011	0.005		mg/L	5	7440-66-6	

Method: SW7471B, Run Date: 12/21/18 14:14, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury*	Not detected	0.0002		mg/L	1	7439-97-6	

Organics - Volatiles

Method: SW5030C/8260C, Run Date: 12/19/18 06:35, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,2-Dibromo-3-chloropropane	Not detected	1		ug/L	1	96-12-8	
1,2-Dibromoethane	Not detected	1		ug/L	1	106-93-4	

Method: SW8260B - SIM, Run Date: 12/21/18 04:42, Analyst: JML

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

Lab Sample ID: S97828.04 (continued)
Sample Tag: Dup-08_120718

TCL Volatile Organics 8260, Method: SW5030C/8260C, Run Date: 12/19/18 06:35, Analyst: KAG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,1,2-Trichloro-1,2,2-trifluoroethane	Not detected	1		ug/L	1	76-13-1	
Acetone	Not detected	10		ug/L	1	67-64-1	
Carbon disulfide	Not detected	1		ug/L	1	75-15-0	
Methyl Acetate	Not detected	10		ug/L	1	79-20-9	
tert-Methyl butyl ether (MTBE)	Not detected	1		ug/L	1	1634-04-4	
2-Butanone (MEK)	Not detected	10		ug/L	1	78-93-3	
Dichlorodifluoromethane	Not detected	1		ug/L	1	75-71-8	
Chloromethane	Not detected	1		ug/L	1	74-87-3	
Vinyl chloride	Not detected	1		ug/L	1	75-01-4	
Bromomethane	Not detected	1		ug/L	1	74-83-9	
Chloroethane	Not detected	1		ug/L	1	75-00-3	
Trichlorofluoromethane	Not detected	1		ug/L	1	75-69-4	
1,1-Dichloroethene	Not detected	1		ug/L	1	75-35-4	
Methylene chloride	Not detected	1		ug/L	1	75-09-2	
trans-1,2-Dichloroethene	Not detected	1		ug/L	1	156-60-5	
1,1-Dichloroethane	Not detected	1		ug/L	1	75-34-3	
cis-1,2-Dichloroethene	Not detected	1		ug/L	1	156-59-2	
Chloroform	Not detected	1		ug/L	1	67-66-3	
1,1,1-Trichloroethane	Not detected	1		ug/L	1	71-55-6	
Cyclohexane	Not detected	1		ug/L	1	110-82-7	
4-Methyl-2-pentanone (MIBK)	Not detected	10		ug/L	1	108-10-1	
2-Hexanone	Not detected	10		ug/L	1	591-78-6	
Carbon tetrachloride	Not detected	1		ug/L	1	56-23-5	
Benzene	Not detected	1		ug/L	1	71-43-2	
1,2-Dichloroethane	Not detected	1		ug/L	1	107-06-2	
Trichloroethene	Not detected	1		ug/L	1	79-01-6	
1,2-Dichloropropane	Not detected	1		ug/L	1	78-87-5	
Bromodichloromethane	Not detected	1		ug/L	1	75-27-4	
Methyl cyclohexane	Not detected	1		ug/L	1	108-87-2	
cis-1,3-Dichloropropene	Not detected	1		ug/L	1	10061-01-5	
Toluene	Not detected	1		ug/L	1	108-88-3	
trans-1,3-Dichloropropene	Not detected	1		ug/L	1	10061-02-6	
1,1,2-Trichloroethane	Not detected	1		ug/L	1	79-00-5	
Tetrachloroethene	Not detected	1		ug/L	1	127-18-4	
Dibromochloromethane	Not detected	1		ug/L	1	124-48-1	
Chlorobenzene	Not detected	1		ug/L	1	108-90-7	
1,1,2,2-Tetrachloroethane	Not detected	1		ug/L	1	79-34-5	
Ethylbenzene	Not detected	1		ug/L	1	100-41-4	
p,m-Xylene*	Not detected	2		ug/L	1		
o-Xylene	Not detected	1		ug/L	1	95-47-6	
Styrene	Not detected	1		ug/L	1	100-42-5	
Isopropylbenzene	Not detected	1		ug/L	1	98-82-8	
Bromoform	Not detected	1		ug/L	1	75-25-2	
1,3-Dichlorobenzene	Not detected	1		ug/L	1	541-73-1	
1,4-Dichlorobenzene	Not detected	1		ug/L	1	106-46-7	
1,2-Dichlorobenzene	Not detected	1		ug/L	1	95-50-1	
1,2,4-Trichlorobenzene	Not detected	1		ug/L	1	120-82-1	

Analytical Laboratory Report

Lab Sample ID: S97828.05
Sample Tag: Trip Blank
Collected Date/Time: 12/07/2018 00:01
Matrix: Water
COC Reference: 120336

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	125ml Plastic	HNO3	Yes	4.4	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	12/18/18 14:00	JML	

Organics - Volatiles

Method: SW5030C/8260C, Run Date: 12/17/18 15:33, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,2-Dibromo-3-chloropropane	Not detected	1		ug/L	1	96-12-8	
1,2-Dibromoethane	Not detected	1		ug/L	1	106-93-4	

Method: SW8260B - SIM, Run Date: 12/21/18 01:30, Analyst: JML

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

TCL Volatile Organics 8260, Method: SW5030C/8260C, Run Date: 12/17/18 15:33, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
1,1,2-Trichloro-1,2,2-trifluoroethane	Not detected	1		ug/L	1	76-13-1	
Acetone	Not detected	10		ug/L	1	67-64-1	
Carbon disulfide	Not detected	1		ug/L	1	75-15-0	
Methyl Acetate	Not detected	10		ug/L	1	79-20-9	
tert-Methyl butyl ether (MTBE)	Not detected	1		ug/L	1	1634-04-4	
2-Butanone (MEK)	Not detected	10		ug/L	1	78-93-3	
Dichlorodifluoromethane	Not detected	1		ug/L	1	75-71-8	
Chloromethane	Not detected	1		ug/L	1	74-87-3	
Vinyl chloride	Not detected	1		ug/L	1	75-01-4	
Bromomethane	Not detected	1		ug/L	1	74-83-9	
Chloroethane	Not detected	1		ug/L	1	75-00-3	
Trichlorofluoromethane	Not detected	1		ug/L	1	75-69-4	
1,1-Dichloroethene	Not detected	1		ug/L	1	75-35-4	
Methylene chloride	Not detected	1		ug/L	1	75-09-2	
trans-1,2-Dichloroethene	Not detected	1		ug/L	1	156-60-5	
1,1-Dichloroethane	Not detected	1		ug/L	1	75-34-3	
cis-1,2-Dichloroethene	Not detected	1		ug/L	1	156-59-2	
Chloroform	Not detected	1		ug/L	1	67-66-3	
1,1,1-Trichloroethane	Not detected	1		ug/L	1	71-55-6	
Cyclohexane	Not detected	1		ug/L	1	110-82-7	
4-Methyl-2-pentanone (MIBK)	Not detected	10		ug/L	1	108-10-1	
2-Hexanone	Not detected	10		ug/L	1	591-78-6	
Carbon tetrachloride	Not detected	1		ug/L	1	56-23-5	
Benzene	Not detected	1		ug/L	1	71-43-2	
1,2-Dichloroethane	Not detected	1		ug/L	1	107-06-2	
Trichloroethene	Not detected	1		ug/L	1	79-01-6	
1,2-Dichloropropane	Not detected	1		ug/L	1	78-87-5	
Bromodichloromethane	Not detected	1		ug/L	1	75-27-4	

Lab Sample ID: S97828.05 (continued)
Sample Tag: Trip Blank

TCL Volatile Organics 8260, Method: SW5030C/8260C, Run Date: 12/17/18 15:33, Analyst: JML (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Methyl cyclohexane	Not detected	1		ug/L	1	108-87-2	
cis-1,3-Dichloropropene	Not detected	1		ug/L	1	10061-01-5	
Toluene	Not detected	1		ug/L	1	108-88-3	
trans-1,3-Dichloropropene	Not detected	1		ug/L	1	10061-02-6	
1,1,2-Trichloroethane	Not detected	1		ug/L	1	79-00-5	
Tetrachloroethene	Not detected	1		ug/L	1	127-18-4	
Dibromochloromethane	Not detected	1		ug/L	1	124-48-1	
Chlorobenzene	Not detected	1		ug/L	1	108-90-7	
1,1,2,2-Tetrachloroethane	Not detected	1		ug/L	1	79-34-5	
Ethylbenzene	Not detected	1		ug/L	1	100-41-4	
p,m-Xylene*	Not detected	2		ug/L	1		
o-Xylene	Not detected	1		ug/L	1	95-47-6	
Styrene	Not detected	1		ug/L	1	100-42-5	
Isopropylbenzene	Not detected	1		ug/L	1	98-82-8	
Bromoform	Not detected	1		ug/L	1	75-25-2	
1,3-Dichlorobenzene	Not detected	1		ug/L	1	541-73-1	
1,4-Dichlorobenzene	Not detected	1		ug/L	1	106-46-7	
1,2-Dichlorobenzene	Not detected	1		ug/L	1	95-50-1	
1,2,4-Trichlorobenzene	Not detected	1		ug/L	1	120-82-1	

Merit Laboratories Login Checklist

Lab Set ID: S97828
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: RACER Lansing / B0064479.2018.03100
Submitted: 12/14/2018 11:50 Login User: MMC

Attention: Christine Gregg
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 734-585-7817 FAX: 248-994-2241
Email: christine.gregg@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 4.4
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[X] Yes	[ ] No	[ ] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[ ] No	[X] N/A	Do water VOC or TOX bottles contain headspace	

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

Client Review By: _____ Date: _____

Merit Laboratories Bottle Preservation Check

Lab Set ID: S97828 Initials: MMC

Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)

Project: RACER Lansing / B0064479.2018.03100

Submitted: 12/14/2018 11:50 Login User:

Attention: Christine Gregg
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 734-585-7817 FAX: 248-994-2241
Email: christine.gregg@arcadis.com

Lab ID	125 ml Plastic HNO_3	250 ml Plastic HNO_3	1 L Plastic HNO_3	250 ml Plastic H_2SO_4	125 ml Amber H_2SO_4	32 oz Glass HCl	125 ml Plastic NaOH	125 ml Amber $PbCO_3$ NaOH	pH					Notes
									<2	>12	other	ml add	new pH	
S97828.01	X								X					
S97828.02	X								X					
S97828.03	X								X					
S97828.04	X								X					
S97828.05	X								X					

Prepared by Merit Laboratories

Merit Laboratories, Inc.
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C.O.C. PAGE # 1 OF 1

120336

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Christine Gress
COMPANY: ARCADIS
ADDRESS: 28550 Cabot Dr
CITY: Novi STATE: MI ZIP CODE: 48377
PHONE NO.: 248-994-2240 FAX NO.: 248-994-2241 P.O. NO.:
E-MAIL ADDRESS: Christine.Gress@arcadis.com QUOTE NO.:

INVOICE TO

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

PROJECT NO./NAME: Race Lansing / B0064479.2018.03100
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Dan Kinn

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

DELIVERABLES REQUIRED X STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

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

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications: ☐ OHIO VAP ☐ Drinking Water ☐ DoD ☐ NPDES

Project Locations: ☐ Detroit ☐ New York ☐ Other

Special Instructions

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	1,4-Dioxane 8260 VOCs	Select Metals (Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Vanadium, Zinc (Total))
97828.01	12/7/18	1400	P6-MH2-SW_120718	GW	3		3	1					X	X
.02	"	1510	P3-MH-NE_120718	GW	3		3	1					X	X
.03	"	1540	P2-MH-NW_120718	GW	3		3	1					X	X
.04	"	—	Dup-08_120718	GW	3		3	1					X	X
.05	"	—	Trip Blnk	DI WATER	1		1						X	

RELINQUISHED BY: SIGNATURE/ORGANIZATION	X Sampler ARCADIS	DATE 12/13/18	TIME 1150
RECEIVED BY: SIGNATURE/ORGANIZATION	M Chilcote	DATE 12/14/18	TIME 1150
RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME

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

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

NOTES: TEMP. ON ARRIVAL 4.4

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

Rev. 5.18.12

Analytical Laboratory Report

Report ID: S98508.01(01)
Generated on 01/23/2019

Report to

Attention: Daniel Stockard
ARCADIS U.S., Inc.
28550 Cabot Drive
Suite 500
Novi, MI 48377

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

Addtional Contacts: Alex Villhauer, Kristen Padron, Randy Christensen, Christine Gregg

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S98508.01-S98508.02
Project: RACER Lansing / B0064479.2019
Collected Date: 01/14/2019
Submitted Date/Time: 01/14/2019 16:58
Sampled by: Dale Arnett
P.O. #: B0064479.2019

Table of Contents

Maya Murshak
Technical Director

General Report Notes

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

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

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

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

Qualifier Descriptions

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

Glossary of Abbreviations

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

Method Summary

Method	Version
N/A	Not Applicable
SW5030C/8260C	SW 846 Method 8260C Revision 3 August 2006 / 5030C Revision 3 May 2003
SW8260B - SIM	SW 846 Method 8260B Revision 2 December 1996 SIMs

Analytical Laboratory Report

Sample Summary (2 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S98508.01	P2-MH-W-011419	Groundwater	01/14/19 15:15
S98508.02	Trip Blank	Water	01/14/19 00:01

Lab Sample ID: S98508.01
Sample Tag: P2-MH-W-011419
Collected Date/Time: 01/14/2019 15:15
Matrix: Groundwater
COC Reference: 098201

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
3	40ml Glass	HCL	Yes	3.7	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	01/16/19 09:20	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 01/17/19 15:56, Analyst: JML

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

Volatile Organics - DEQ List, Method: SW5030C/8260C, Run Date: 01/15/19 14:19, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Diethyl ether	Not detected	10		ug/L	1	60-29-7	
Acetone	Not detected	50		ug/L	1	67-64-1	
Methyl iodide	Not detected	1		ug/L	1	74-88-4	
Carbon disulfide	Not detected	5		ug/L	1	75-15-0	
tert-Methyl butyl ether (MTBE)	Not detected	5		ug/L	1	1634-04-4	
Acrylonitrile	Not detected	2		ug/L	1	107-13-1	
2-Butanone (MEK)	Not detected	25		ug/L	1	78-93-3	
Dichlorodifluoromethane	Not detected	5		ug/L	1	75-71-8	
Chloromethane	Not detected	5		ug/L	1	74-87-3	
Vinyl chloride	Not detected	1		ug/L	1	75-01-4	
Bromomethane	Not detected	5		ug/L	1	74-83-9	
Chloroethane	Not detected	5		ug/L	1	75-00-3	
Trichlorofluoromethane	Not detected	1		ug/L	1	75-69-4	
1,1-Dichloroethene	Not detected	1		ug/L	1	75-35-4	
Methylene chloride	Not detected	5		ug/L	1	75-09-2	
trans-1,2-Dichloroethene	Not detected	1		ug/L	1	156-60-5	
1,1-Dichloroethane	Not detected	1		ug/L	1	75-34-3	
cis-1,2-Dichloroethene	Not detected	1		ug/L	1	156-59-2	
Tetrahydrofuran*	Not detected	90		ug/L	1	109-99-9	
Chloroform	Not detected	1		ug/L	1	67-66-3	
Bromochloromethane	Not detected	1		ug/L	1	74-97-5	
1,1,1-Trichloroethane	Not detected	1		ug/L	1	71-55-6	
4-Methyl-2-pentanone (MIBK)	Not detected	50		ug/L	1	108-10-1	
2-Hexanone	Not detected	50		ug/L	1	591-78-6	
Carbon tetrachloride	Not detected	1		ug/L	1	56-23-5	
Benzene	Not detected	1		ug/L	1	71-43-2	
1,2-Dichloroethane	Not detected	1		ug/L	1	107-06-2	
Trichloroethene	Not detected	1		ug/L	1	79-01-6	
1,2-Dichloropropane	Not detected	1		ug/L	1	78-87-5	
Bromodichloromethane	Not detected	1		ug/L	1	75-27-4	
Dibromomethane	Not detected	5		ug/L	1	74-95-3	
cis-1,3-Dichloropropene	Not detected	1		ug/L	1	10061-01-5	
Toluene	Not detected	1		ug/L	1	108-88-3	

Lab Sample ID: S98508.01 (continued)
Sample Tag: P2-MH-W-011419

Volatile Organics - DEQ List, Method: SW5030C/8260C, Run Date: 01/15/19 14:19, Analyst: JML (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
trans-1,3-Dichloropropene	Not detected	1		ug/L	1	10061-02-6	
1,1,2-Trichloroethane	Not detected	1		ug/L	1	79-00-5	
Tetrachloroethene	Not detected	1		ug/L	1	127-18-4	
trans-1,4-Dichloro-2-butene	Not detected	1		ug/L	1	110-57-6	
Dibromochloromethane	Not detected	5		ug/L	1	124-48-1	
1,2-Dibromoethane	Not detected	1		ug/L	1	106-93-4	
Chlorobenzene	Not detected	1		ug/L	1	108-90-7	
1,1,1,2-Tetrachloroethane	Not detected	1		ug/L	1	630-20-6	
Ethylbenzene	Not detected	1		ug/L	1	100-41-4	
p,m-Xylene*	Not detected	2		ug/L	1		
o-Xylene	Not detected	1		ug/L	1	95-47-6	
Styrene	Not detected	1		ug/L	1	100-42-5	
Isopropylbenzene	Not detected	5		ug/L	1	98-82-8	
Bromoform	Not detected	1		ug/L	1	75-25-2	
1,1,2,2-Tetrachloroethane	Not detected	1		ug/L	1	79-34-5	
1,2,3-Trichloropropane	Not detected	1		ug/L	1	96-18-4	
n-Propylbenzene	Not detected	1		ug/L	1	103-65-1	
Bromobenzene	Not detected	1		ug/L	1	108-86-1	
1,3,5-Trimethylbenzene	Not detected	1		ug/L	1	108-67-8	
tert-Butylbenzene	Not detected	1		ug/L	1	98-06-6	
1,2,4-Trimethylbenzene	Not detected	1		ug/L	1	95-63-6	
sec-Butylbenzene	Not detected	1		ug/L	1	135-98-8	
p-Isopropyltoluene	Not detected	5		ug/L	1	99-87-6	
1,3-Dichlorobenzene	Not detected	1		ug/L	1	541-73-1	
1,4-Dichlorobenzene	Not detected	1		ug/L	1	106-46-7	
1,2-Dichlorobenzene	Not detected	1		ug/L	1	95-50-1	
1,2,3-Trimethylbenzene	Not detected	1		ug/L	1	526-73-8	
n-Butylbenzene	Not detected	1		ug/L	1	104-51-8	
Hexachloroethane	Not detected	5		ug/L	1	67-72-1	
1,2-Dibromo-3-chloropropane	Not detected	5		ug/L	1	96-12-8	
1,2,4-Trichlorobenzene	Not detected	5		ug/L	1	120-82-1	
1,2,3-Trichlorobenzene	Not detected	5		ug/L	1	87-61-6	
Naphthalene	Not detected	5		ug/L	1	91-20-3	
2-Methylnaphthalene	Not detected	5		ug/L	1	91-57-6	

Lab Sample ID: S98508.02
Sample Tag: Trip Blank
Collected Date/Time: 01/14/2019 00:01
Matrix: Water
COC Reference: 098201

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40ml Glass	HCL	Yes	3.7	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	01/16/19 09:20	JML	

Organics - Volatiles

Method: SW8260B - SIM, Run Date: 01/17/19 15:14, Analyst: JML

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

Volatile Organics - DEQ List, Method: SW5030C/8260C, Run Date: 01/15/19 13:22, Analyst: JML

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Diethyl ether	Not detected	10		ug/L	1	60-29-7	
Acetone	Not detected	50		ug/L	1	67-64-1	
Methyl iodide	Not detected	1		ug/L	1	74-88-4	
Carbon disulfide	Not detected	5		ug/L	1	75-15-0	
tert-Methyl butyl ether (MTBE)	Not detected	5		ug/L	1	1634-04-4	
Acrylonitrile	Not detected	2		ug/L	1	107-13-1	
2-Butanone (MEK)	Not detected	25		ug/L	1	78-93-3	
Dichlorodifluoromethane	Not detected	5		ug/L	1	75-71-8	
Chloromethane	Not detected	5		ug/L	1	74-87-3	
Vinyl chloride	Not detected	1		ug/L	1	75-01-4	
Bromomethane	Not detected	5		ug/L	1	74-83-9	
Chloroethane	Not detected	5		ug/L	1	75-00-3	
Trichlorofluoromethane	Not detected	1		ug/L	1	75-69-4	
1,1-Dichloroethene	Not detected	1		ug/L	1	75-35-4	
Methylene chloride	Not detected	5		ug/L	1	75-09-2	
trans-1,2-Dichloroethene	Not detected	1		ug/L	1	156-60-5	
1,1-Dichloroethane	Not detected	1		ug/L	1	75-34-3	
cis-1,2-Dichloroethene	Not detected	1		ug/L	1	156-59-2	
Tetrahydrofuran*	Not detected	90		ug/L	1	109-99-9	
Chloroform	Not detected	1		ug/L	1	67-66-3	
Bromochloromethane	Not detected	1		ug/L	1	74-97-5	
1,1,1-Trichloroethane	Not detected	1		ug/L	1	71-55-6	
4-Methyl-2-pentanone (MIBK)	Not detected	50		ug/L	1	108-10-1	
2-Hexanone	Not detected	50		ug/L	1	591-78-6	
Carbon tetrachloride	Not detected	1		ug/L	1	56-23-5	
Benzene	Not detected	1		ug/L	1	71-43-2	
1,2-Dichloroethane	Not detected	1		ug/L	1	107-06-2	
Trichloroethene	Not detected	1		ug/L	1	79-01-6	
1,2-Dichloropropane	Not detected	1		ug/L	1	78-87-5	
Bromodichloromethane	Not detected	1		ug/L	1	75-27-4	
Dibromomethane	Not detected	5		ug/L	1	74-95-3	
cis-1,3-Dichloropropene	Not detected	1		ug/L	1	10061-01-5	
Toluene	Not detected	1		ug/L	1	108-88-3	

Lab Sample ID: S98508.02 (continued)
Sample Tag: Trip Blank

Volatile Organics - DEQ List, Method: SW5030C/8260C, Run Date: 01/15/19 13:22, Analyst: JML (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
trans-1,3-Dichloropropene	Not detected	1		ug/L	1	10061-02-6	
1,1,2-Trichloroethane	Not detected	1		ug/L	1	79-00-5	
Tetrachloroethene	Not detected	1		ug/L	1	127-18-4	
trans-1,4-Dichloro-2-butene	Not detected	1		ug/L	1	110-57-6	
Dibromochloromethane	Not detected	5		ug/L	1	124-48-1	
1,2-Dibromoethane	Not detected	1		ug/L	1	106-93-4	
Chlorobenzene	Not detected	1		ug/L	1	108-90-7	
1,1,1,2-Tetrachloroethane	Not detected	1		ug/L	1	630-20-6	
Ethylbenzene	Not detected	1		ug/L	1	100-41-4	
p,m-Xylene*	Not detected	2		ug/L	1		
o-Xylene	Not detected	1		ug/L	1	95-47-6	
Styrene	Not detected	1		ug/L	1	100-42-5	
Isopropylbenzene	Not detected	5		ug/L	1	98-82-8	
Bromoform	Not detected	1		ug/L	1	75-25-2	
1,1,2,2-Tetrachloroethane	Not detected	1		ug/L	1	79-34-5	
1,2,3-Trichloropropane	Not detected	1		ug/L	1	96-18-4	
n-Propylbenzene	Not detected	1		ug/L	1	103-65-1	
Bromobenzene	Not detected	1		ug/L	1	108-86-1	
1,3,5-Trimethylbenzene	Not detected	1		ug/L	1	108-67-8	
tert-Butylbenzene	Not detected	1		ug/L	1	98-06-6	
1,2,4-Trimethylbenzene	Not detected	1		ug/L	1	95-63-6	
sec-Butylbenzene	Not detected	1		ug/L	1	135-98-8	
p-Isopropyltoluene	Not detected	5		ug/L	1	99-87-6	
1,3-Dichlorobenzene	Not detected	1		ug/L	1	541-73-1	
1,4-Dichlorobenzene	Not detected	1		ug/L	1	106-46-7	
1,2-Dichlorobenzene	Not detected	1		ug/L	1	95-50-1	
1,2,3-Trimethylbenzene	Not detected	1		ug/L	1	526-73-8	
n-Butylbenzene	Not detected	1		ug/L	1	104-51-8	
Hexachloroethane	Not detected	5		ug/L	1	67-72-1	
1,2-Dibromo-3-chloropropane	Not detected	5		ug/L	1	96-12-8	
1,2,4-Trichlorobenzene	Not detected	5		ug/L	1	120-82-1	
1,2,3-Trichlorobenzene	Not detected	5		ug/L	1	87-61-6	
Naphthalene	Not detected	5		ug/L	1	91-20-3	
2-Methylnaphthalene	Not detected	5		ug/L	1	91-57-6	

Merit Laboratories Login Checklist

Lab Set ID: S98508
Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)
Project: RACER Lansing / B0064479.2019
Submitted: 01/14/2019 16:58 Login User: SRS

Attention: Daniel Stockard
Address: ARCADIS U.S., Inc.
28550 Cabot Drive
Suite 500
Novi, MI 48377

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

Selection				Description	Note
Sample Receiving					
01.	[X] Yes	[ ] No	[ ] N/A	Samples are received at 4C +/- 2C Thermometer #	IR 3.7
02.	[X] Yes	[ ] No	[ ] N/A	Received on ice/ cooling process begun	
03.	[ ] Yes	[X] No	[ ] N/A	Samples shipped	
04.	[ ] Yes	[X] No	[ ] N/A	Samples left in 24 hr. drop box	
05.	[ ] Yes	[ ] No	[X] N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	[X] Yes	[ ] No	[ ] N/A	COC adequately filled out	
07.	[X] Yes	[ ] No	[ ] N/A	COC signed and relinquished to the lab	
08.	[X] Yes	[ ] No	[ ] N/A	Sample tag on bottles match COC	
09.	[ ] Yes	[X] No	[ ] N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	[X] Yes	[ ] No	[ ] N/A	Do sample have correct chemical preservation	
11.	[ ] Yes	[ ] No	[X] N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	[ ] Yes	[X] No	[ ] N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	[X] Yes	[ ] No	[ ] N/A	All bottles intact	
14.	[X] Yes	[ ] No	[ ] N/A	Appropriate analytical bottles are used	
15.	[X] Yes	[ ] No	[ ] N/A	Merit bottles used	
16.	[X] Yes	[ ] No	[ ] N/A	Sufficient sample volume received	
17.	[ ] Yes	[X] No	[ ] N/A	Samples require laboratory filtration	
18.	[X] Yes	[ ] No	[ ] N/A	Samples submitted within holding time	
19.	[ ] Yes	[X] No	[ ] N/A	Do water VOC or TOX bottles contain headspace	

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

Client Review By: _____ Date: _____

Merit Laboratories, Inc.

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

C.O.C. PAGE # 1 OF 1

098201

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Dan Stockard
COMPANY: ARCADIS
ADDRESS: 28550 Cabot Dr
CITY: Novi STATE: MI ZIP CODE: 48377
PHONE NO.: 248-994-2240 FAX NO.: 248-994-2241 P.O. NO.:
E-MAIL ADDRESS: Daniel.Stockard@arcadis.com QUOTE NO.:

INVOICE TO

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

PROJECT NO./NAME: Race Lansing / B00 64479.2019.
SAMPLER(S) - PLEASE PRINT/SIGN NAME: Dale Aiken / [signature]

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

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

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

MERIT LAB NO. (FOR LAB USE ONLY)	YEAR DATE	YEAR TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	ANALYSIS: VOCs
98508.01	1/14/19	1515	P2-MH-W_011419	GW	3		X						X
.02	—	—	trip Blank	↓	1		X						X

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☐ Other

Special Instructions

RELINQUISHED BY: SIGNATURE/ORGANIZATION	[signature] / ARCADIS (Sampler)	DATE 1/14/19	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION	[signature]	DATE 1/14/19	TIME 1658
RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME

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

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

NOTES: Samples left on ice TEMP. ON ARRIVAL 5.7

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

Rev. 5.18.12